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PETROLEUM INDUSTRY IN THE EAST AFRICAN SUB-REGION

CONTENTS

ANNEXES

CHAPTER I

INTRODUCTION

Scope of the Report

1. This report constitutes a preliminary study of the situation of the petroleum industry in the East African sub-region.

The report examines the situation of petroleum industry in the world economy in general and in the sub-region's economy in particular.

It estimates future demand of petroleum products of the sub-region till 1975. On the basis of the anticipated demand it proposes an expansion of refining capacities and the construction of a lubricating oil plant, which, as an integrated industry, would have to serve the whole sub-region.

2. The countries covered by the report are divided into two groups:

(a)
1. Ethiopia
2. Somalia
3. Kenya
4. Tanzania
5. Uganda
6. Rwanda
7. Burundi
8. Zambia
9. Malawi
10. S. Rhodesia
11. Madagascar
12. Mauritius

(b)
1. French Somaliland[1/]
2. Reunion
3. Mozambique

1/ These three countries have been included in the study because of their geographical proximity to the sub-region, and possible future economic relationship.

3. Since individual country statistics did not give consumption of petroleum products according to kinds and years it was decided to use: "Overseas Geological Surveys Statistical Summary of the Mineral Industry (Export and Import) as a main source for this information.

The estimates of future consumption between 1960 and 1975 have been made for two separately observed periods, i.e.

a. period between 1960 and 1965 and

b. period between 1965 and 1957; for the following reasons:

Firstly, data are partly available for the actual consumption in 1961, 1962 and 1963. Secondly, the greater number of East African countries achieved independence between 1960 and 1964 and there are indications that this transition period had adverse repercussions on the rate of growth.

On the other hand, the period between 1965 and 1975 may be regarded as likely to be one of stabilized political and economic conditions in the newly independent countries.

4. The quantities consumed for bunkering of ships and aircraft in a country have been recorded as consumption in that country, and the forecast of consumption of petroleum products also includes bunkering.

CHAPTER II

SIGNIFICANCE OF PETROLEUM ECONOMY

5. The rapid growth of the petroleum economy is to be attributed, in the first place, to the unique characteristics of petroleum and petroleum products.

6. Its high calorific power (about 10,000 kcal/kg) and easy handling while being transported (simple loading, unloading and transportation through pipelines) have inabled petroleum to replace to a considerable extent the earlier conventional sources of power, i.e., wood and coal.

7. Petroleum has also opened a new era in the chemical industry in providing a series of valuable chemical products, in particular, the olefins obtained as gaseous by-products in refining.

8. A third field covered by petroleum is the production of lubricating oils and greases. The rapid progress of mechanization and motorization has only been possible through the utilization of petroleum products.

9. Though at present a new form of power i.e., nuclear - is in sight petroleum will still remain an important source of power, while its importance as a raw material for chemicals and lubricants will grow still further.

10. Today petroleum products are used in all economic sectors (industry, agriculture, transport etc.) so that petroleum has become one of the most important raw materials of the world economy and its per capita consumption serves today as one of the indicators of the economic potential as well as of the standard of living of a country. Moreover, as a modern army cannot be operative without utilizing petroleum products, petroleum has become not only an economic, but also a first class strategic raw material.

11. The modern history of petroleum began only some hundred years ago (1859 in Pensylvania-USA). Industrial processing (refining) started around 1900 while chemical processing started only some 30 years ago.

Consequently one may justifiably expect further achievements in processing as well as in the application of petroleum and petroleum products.

12. The growth of the petroleum industry, for the world as a whole, has been among the fastest, as may be seen from the following indicators:

TABLE 1

World economic growth 1938-1956[1/]

	1938 = 100	
Industrial production	225	
Crude Steel production	245	
Motor Vehicles production	285	
Shipbuilding	305	
Crude oil production	315	
Rubber production	340	(Natural and Synthetic)
Aluminium production	540	

The demand for rubber has increased mainly through the application of petroleum products in transport, while aluminium is a newer material which came into general use only during and after World War II and therefore shows a relatively higher increase.

13. The share of petroleum (including natural gas) in the world energy supplies, has been as follows:

1/ Petroleum Handbook, Shell International Petrol Co. 1959 - page 19.

TABLE 2

a. Petroleum Handbook Shell International 1959

	1920	1956
Coal	84%	44%
Petroleum and gas	14%	50%
Hydro	2%	6%
Total	100%	100%

b. "Energy International" March 1964

(in million of tons coal equivalent)	1960	
Coal	2,204 =	48%
Crude oil and gas	2,064 =	45%
Hydro, geoth. nuclear	321 =	7%
Total	4,589 =	100%

c. United Nations World Energy Supply

(in million of tons coal equivalent)	1962	
Coal	2,209 =	48%
Crude oil and gas	2,341 =	50%
Hydro	96 =	2%
Total	4,646 =	100%

The differences in these figures are most probably due to the application of various conversion factors, as is being obvious in the case of hydro-power.

14. In the long run it seems, nuclear energy will take a considerable share in total energy supplies. However, till 1975 it is expected to be modest, while that of petroleum will increase still further i.e., above 50 per cent of total energy supplies.

15. The above data and indicators show the significance of the petroleum industry in the world economy. They also show that a further steady growth of this industry may be expected.

CHAPTER III

WORLD CONSUMPTION OF PETROLEUM

16. World production and consumption of crude oil and natural gas has been as follows:[1/]

TABLE 3

	1938	1946	1956	1963
Quantity in million tons	290	391	869	1,304
Index	100	135	300	450

According to the above data, world production and consumption of petroleum has increased during the last 25 years by 4½ times, or at a rate of about 6 per cent per year.

17. The per capita consumption for the world as a whole was as follows:

TABLE 4

1938	290 million tons / 2200 million population	= ca 130 kg
1946	391 million tons / 2380 million population	= ca 164 kg
1956	869 million tons / 2750 million population	= ca 316 kg
1963	1304 million tons / 3200 million population	= ca 408 kg

The per capita consumption of petroleum products differs considerably among the countries; economically advanced countries consuming much more petroleum products per capita than developing countries.

1/ Years 1938, 1946, 1956 source Petroleum Handbook Shell: for 1963 Petroleum Times, June 26, 1964.

For instance the USA consumed in 1963 about 3,000 kg of petroleum products per capita, while other industrially advanced countries consumed from 500 to 2,000 kg. per capita.

18. The per capita consumption in some European countries was as follows:

TABLE 5

(In kg.)

Country	1953	1956	1963
Austria	150	250	550
Belgium	340	540	1,100
France	290	410	820
Italy	145	230	730
Norway	530	740	1,200
Sweden	750	1,250	2,000
West Germany	135	255	1,000

The per capita consumption of some developing countries was as follows:

TABLE 6

(1963)

a.	South America	
	Bolivia	110 kg.
	Brazil	230 "
	Chile	365 "
	Columbia	270 "
	Paraguay	70 "
	Peru	260 "

TABLE 6 (Cont'd)

(1963)

b. Asia

Burma	40 kg.
Ceylon	108 "
India	23 "
Indonesia	56 "
Jordan	165 "
Pakistan	31 "

c. Africa (Excluding the East African sub-region)

Algeria	130 kg.
Congo Leo.	33 "
Ghana	73 "
Nigeria	26 "
South Africa	275 "
Sudan	45 "
UAR	200 "

19. The per capita consumption of petroleum products is in close correlation with income per capita, as may be observed from the following comparative data:

TABLE 7

Country	Petroleum consumption 1963 in kg. per capita	Income US$ per capita	Year
Austria	550	831	1961
Belgium	1,100	1,198	1961
Italy	730	618	1961
Sweden	2,000	1,592	1961
Bolivia	110	96	1958
Brazil	230	252	1958
Chile	365	352	1958
Paraguay	70	126	1958
Burma	40	55	1961
Ceylon	108	128	1961
India	23	73	1961
Congo	33	87	1958
Sudan	45	94	1961

However, the rate of growth of petroleum consumption per capita as shown in the following countries is faster than that of income per capita. The following data supports this assumption:

TABLE 8

Country	Petroleum consumption kg. 1953	1963	Index 1953 = 100	Income US$ 1953	1963	Index
Austria	150	550	367	407	831	204
Belgium	340	1100	324	903	1198	133
Italy	145	730	503	353	618	175
Sweden	750	2000	267	981	1592	162
West Germany	135	1000	741	611	1000	164

20. For the world as a whole the comparative rates of growth of petroleum consumption and of income (GDP) for the period 1950-1960 were as follows:

TABLE 9

World total	Petroleum consumption	Income[1/]
Annual rate of growth	ca 6.0%	3.6%

21. A further analysis shows that the consumption of petroleum products is in still closer correlation with the rate of growth of industrialization of a country. The rate of growth of industry between 1950 and 1960 in the above mentioned European countries was as follows:[1/]

1/ Source: ECA Tables East Africa Survey.

TABLE 10

Austria	7.1%
Belgium	4.1%
Italy	9.0%
Sweden	3.3%
W. Germany	10.1%

As will be noted, the above table shows that the countries which had the highest rate of growth of industry had also the highest increase in petroleum consumption (Austria, Italy, West Germany).

22. The assumptions and results obtained from the analysis of petroleum consumption for the world as a whole and of some individual countries are used in preparing the projections for future petroleum consumption for the East African sub-region.

CHAPTER IV

PRODUCTION AND CONSUMPTION OF PETROLEUM IN THE EAST AFRICAN SUB-REGION

23. The petroleum industry in the East African sub-region is just at its beginning. The first refineries were constructed a little more than a year ago (Mombasa and Mozambique) and there are four other refineries under construction. At present there is no production of crude oil in the countries of the East African sub-region. (Methane gas is exploited from the Lake Kivu in Rwanda). Exploration for petroleum was and still is carried on in almost all East African countries, but up to now without success.

The situation in the individual countries is as follows:

Ethiopia

a. Exploration

24. At present there are three concessionaires to carry on exploration for petroleum and natural gas in Ethiopia.

A German concern, Elwerath, has a concession in Ogaden while Mobil Petroleum (affiliate of Socony Mobil) and Gulf Oil Corporation hold the exploration permits for Eritrea including onshore and offshore area around Massawa harbour. Elwerath started exploration in 1962, Mobil in 1963 and Gulf in 1964. Some test drilling was done in Ogaden but no discovery was reported.

b. Petroleum processing

A petroleum refinery of 500,000 tons/year capacity is under construction at Assab harbour. It is a Government refinery projected and constructed by a USSR firm. Operations are expected to start mid-1966.

c. Consumption of petroleum products

The total consumption of the country is covered via import, and imported quantities of petroleum products have been as follows: (all kinds of products - see Annex I, Table 1):

TABLE 11

Year	Tons
1950	40,930
1951	38,727
1952	46,940
1953	65,640
1954	82,076
1955	66,323
1956	77,925
1957	101,985
1958	112,198
1959	127,116
1960	124,038
1961	132,657

According to the records of petroleum companies, sales of petroleum products were as follows:

TABLE 12

Year	Tons
1962	164,329
1963	183,847

It is expected that consumption including refinery fuel will reach about 300,000 tons in 1966 when the refinery will start operations.

The forecast for the years 1967/1970 is as follows:

TABLE 13

Year	Tons
1967	344,000
1968	371,000
1969	409,000
1970	452,000

According to the above data the per capita consumption was as follows:

TABLE 14

Year	Kg.
1950	about 2.5
1960	" 6.0
1963	" 9.0

and is expected to rise in 1970 to about 18.0 kg.

Total annual consumption in the period between 1950 and 1960 increased by 3 times (from 40,930 in 1950 to 124,038 in 1960) and for the next 10 years is expected to increase again by about 3½ times (to 452,000 tons in 1970).

Somalia

a. Exploration

25. The principal explorer in Somalia is Sinclair-Somal in association with a number of other companies. Three wells were drilled during 1962 and 1963 but abandoned.

Guld-oil received a concession in 1962 and began to explore in 1963.

Mobil Petroleum has been active on its concession in 1963. In mid-year 1963, total footage drilled from the beginning of work was 30,239 ft.

b. Processing of petroleum

At present there is no processing plant in the country and no plans are known for the construction of such a plant.

c. Consumption of petroleum products

All quantities consumed in the country are imported. Unfortunately, there are no complete data for the whole territory comprising today's Republic of Somalia. Imported quantities for the period 1950 to 1960

are only available for the former British territory and for the whole territory from 1960 to 1962 (See Annex I, Table 2).

The consumption (import) of petroleum products for the whole territory was as follows:

TABLE 15

Year	Tons
1960	19,712
1961	19,838
1962	24,687

According to import data, former British Somaliland accounted for about 45 per cent of total consumption (for 1960). Taking this as the basis and using available data for consumption in the former British territory, it is estimated that total consumption of petroleum products in the year 1950 may have been about 12,000 tons.

This would mean that the total consumption of the Republic of Somalia from 1950 to 1960 increased by about 70 per cent; and the per capita consumption from about 7.5 kg. to about 10 kg.

Estimates for the future consumption are not available.

Kenya

a. Exploration

26. Only one company is known to be exploring in Kenya, i.e. BP-Shell Petroleum Development Co. of Kenya Ltd. Test drillings have been made but no reports on the results are available.

b. Petroleum processing

The new East African Oil Refinery at Mombasa of about two million tons/year capacity started operating on February 21, 1964. It is jointly owned by Shell and BP.

c. Consumption of petroleum products

Up to the year 1963 all the petroleum products consumed in the country were imported (see Annex I, Table 3), and the figures are as follows:

TABLE 16

Year	Tons
1950	416,247
1951	598,452
1952	672,302
1953	595,107
1954	659,120
1955	737,252
1956	804,367
1957	806,534
1958	748,002
1959	778,062
1960	821,212
1961	801,089

The above quantities include export-bunkering for ships and aircraft supplied in the harbour and airports of Kenya, which ranged from about 100 thousand to about 200 thousand tons per year.

The internal consumption of Kenya (excluding bunkering) is shown in Annex I, Table 3. It amounted 275,301 tons in 1950 and increased to 703,241 tons in 1960. According to the above data total consumption between 1950 and 1960 increased as follows.

TABLE 17

a. consumption including bunkering = by about 200%

b. internal consumption = by about 256%

Consumption per capita was as follows:

	1950	1960
a. consumption including bunkering	60 kg.	100 kg.
b. internal consumption	40 kg.	88 kg.

According to the Statistical Abstract of Kenya net import for 1962 amounted to 880,495 tons and for 1963 to 838,100 tons.

Estimates for future consumption of petroleum products are not available.

Tanzania

a. Exploration

27. British Petroleum Company has been doing exploration work in Tanzania. No drilling was reported for 1963 but seismic reflection survey was carried out in the Pugu-Msanga area. BP-Shell is the concession holder in Zanzibar. A deep well was drilled and abandoned in 1962. No drilling was reported during 1963.

b. Petroleum processing

An ENI affiliate, Tanganyikan Italian Petroleum Co. (TIPER) was formed in 1963 with the aim of building a refinery at Dar-es-Salaam with an initial capacity of about 500,000 tons/year. The Tanzania Government has option to participate to the extent of 50 per cent in the venture. The refinery is under construction and is exported to start operation in 1967.

c. Consumption of petroleum products

All the petroleum products consumed are imported. Imports are as follows: (See Annex I, Table 4).

TABLE 18

Year	Tons
1950	120,063
1951	107,599
1952	130,580
1953	134,135
1954	151,680
1955	204,478
1956	239,548
1957	275,704
1958	294,441
1959	260,231
1960	302,905
1961	282,383

In Annex I, Table 4, separate figures are shown for Tanzania (Zanzibar and Tanganyika territory). Zanzibar consumption was small i.e. amounted in 1950 to 7,538 tons and in 1960 to 10,758 tons. The above quantities include export-bunkering which was relatively small, amounting to from one thousand to two thousand tons per year only.

According to the above data the total consumption of Tanzania between 1950 and 1960 increased by about 250 per cent, and the per capita consumption from about 15 kg. to about 32 kg.

No forecast for the consumption of petroleum products is available.

Uganda

a. Exploration

28. Surface indications of the presence of oil and gas are found at several localities within the Lake Albert Rift Valley in Western Uganda.

Drilling programmes were carried out some time ago in these areas but without promising results and at present no exploration is underway.

b. Petroleum processing

There is no processing plant in Uganda and no plans are known for the future.

c. Consumption of petroleum products

All the petroleum products consumed in the country are imported. Imports were as follows: (See Annex I, Table 5)

TABLE 19

Year	Tons
1950	71,050
1951	66,106
1952	76,843
1953	102,914
1954	96,862
1955	115,856
1956	117,904
1957	126,141
1958	136,446
1959	127,392
1960	128,214
1961	131,754

The above figures include export-bunkering (aviation spirit) from 0.5 to 3.5 thousand tons per year. According to the above data the total consumption of petroleum products increased from 71,050 tons in 1950 to 128,214 tons in 1960, i.e. by about 65 per cent, and consumption per capita from about 12 kg. to about 19.5 kg.

No forecasts for future consumption are available.

Zambia, Malawi and Rhodesia

29. As the data for the past (1954 to 1962) are available only for the territory of the former Federation of Rhodesia and Nyasaland it was not possible to obtain separate data for the three countries.

a. Exploration

No exploration has been reported in any of the three territories.

b. Petroleum processing

A seven company syndicate is building a refinery at Umtali (S. Rhodesia), with ownership 42 per cent Shell-BP, 16 per cent Caltex, 15 per cent American Independent Oil (Aminoil), 5 per cent Kuwait National Petroleum Company, 4 per cent Compagnie Française de Pétroles (CFP) and 18 per cent Mobil Oil. Shell will operate the plant which is scheduled to start in 1965. It will have an annual capacity of one million tons.

Crude oil will be supplied from Beira (Mozambique) via a 10-inch 190 miles long pipeline.

No other refinery is at present under construction and no plans are known for construction in the near future.

c. Consumption of petroleum products

All the petroleum products consumed in the three countries are imported. Imports were as follows: (See Annex I, Table 6).

TABLE 20

Year	Zambia	Malawi	S. Rhodesia	Total
1950	42,383	15,558	141,387	199,328
1951	52,928	15,226	177,558	245,712
1952	63,482	18,558	196,056	278,096
1953	68,642	18,745	186,423	273,810
1954	Not available			334,438
1955	"			378,518
1956	"			459,700
1957	"			482,705
1958	"			520,247
1959	"			511,739
1960	130,000 est.	34,458 est.	370,000 est.	534,458
1961	Not available			542,247
1962	"			581,452

Consumption for the three countries was separately estimated for the year 1960 in order to make possible projections of future demand.

According to the above data the total consumption of all three countries increased from 199,328 tons in 1950 to 534,458 tons in 1960, i.e. by 270 per cent. Taking the estimated consumption in 1960, the corresponding increase of consumption for the individual countries was as follows:

TABLE 21

a. Zambia from 42,383 t to 130,000 t or by 310 per cent

b. Malawi from 15,558 t to 34,458 t or by 220 per cent

c. Rhodesia 141,387 t to 370,000 t or by 260 per cent

The corresponding consumption per capita is as follows:

TABLE 22

	1950	1960
a. Zambia	15 kg.	40 kg.
b. Malawi	7 "	12.5 kg.
c. Rhodesia	45 "	105 kg.

It was planned that the Umtali refinery would supply all three countries, and in order to facilitate distribution of petroleum products a pipeline was to be constructed from Umtali to Salisbury and extended to Lusaka.

No official forecasts on consumption of petroleum products by these three countries is available.

Rwanda and Burundi

30. Almost no data are available for these two countries as all statistical data were recorded together with the Congo (Leo.).

It is not known whether exploration for petroleum is being undertaken, and no processing plants are in operation or planned for the

near future. However, great reserves of methane gas, about 57 billions m^3 are known to exist in Lake Kivu, and are at present being exploited at a small extent for the local brewery (about one million m^3/year).

There are plans for utilizing the methane gas for the production of fertilizers, and as fuel for various industrial plants, and there is also a possibility of using it in transport. Consequently, in Rwanda and the boardering countries, i.e., Burundi and Uganda, the methane gas could, to a greater or smaller extent, depending on the suitability of exploitation and application, replace the conventional petroleum products.

Consumption of petroleum products for Rwanda and Burundi together has been estimated at about 12,000 tons in 1950 and about 25,000 tons in 1960.[1/] Per capita consumption for both countries together was about 3 kg. in 1950 and about 5.5 kg. in 1960.

Madagascar

a. Exploration

31. Exploration is carried on by SPM, a company which, together with French Government's BRP has done extensive seismic and other exploration works, including drilling, but so far without results.

b. Petroleum processing

At present there is no processing of crude oil, but a company has been formed to build a refinery at Tamatave. According to agreement the Malagasy Government will have a 15 per cent interest, the French Government 35 per cent through BRP, and the remaining 50 per cent will be held by Shell, BP, Esso, Caltex and local affiliatesof C.F.P.

The capacity planned is 600,000 tons per year and the start of operation scheduled for 1965.

1/ According to Banque d'émission du Rwanda et du Burundi No.5, import for 1962 amounted to 30,850 tons of all petroleum products for these two countries.

c. Consumption of petroleum products

For the past period all petroleum products consumed in the country were imported. The import was as follows: (See Annex I, Table 7)

TABLE 23

Year	Tons
1950	50,000
1951	60,000
1952	73,000
1953	88,665
1954	93,720
1955	105,438
1956	115,615
1957	120,361
1958	122,916
1959	121,719
1960	125,953
1961	123,483

The consumption for the years 1950, 1951 and 1952 was estimated on the basis of imported quantities in 1948 of 35,216 tons and 88,665 in 1953.

According to the above data total consumption between 1950 and 1960 increased by about 245 per cent, and consumption per capita from about 11 kg. to about 25 kg. According to the country's plan, the anticipated consumption will be 232,000 tons in 1967 and 339,000 tons in 1972. The surplus quantities of the refinery are expected to be exported to Reunion and Comoro Islands (gasoline and keresone) and to Aden and Djibouti (fuel oils). There is no plan to use asphaltic liquid in the Bemolanga region in the immediate future since the possibilities of extraction are still uncertain.

TABLE 25

Year	Tons
1950	56,236
1951	64,566
1952	70,000
1953	75,540
1954	82,416
1955	90,112
1956	103,789
1957	115,265
1958	131,940
1959	133,499
1960	152,429
1961	145,058

According to the above data total consumption increased from 56,236 tons in 1950 to 152,429 tons in 1960, i.e. by about 270 per cent, and per capita consumption increased from about 10 kg in 1950 to about 23 kg in 1960. No official forecast for the consumption of petroleum products is available.

The refinery capacity equals three times present consumption. It is not known where the surplus quantities will be disposed of, or whether the refinery will work at reduced capacity.

Summary of the situation in the sub-region

Exploration and exploitation

36. Exploration is carried on in Ethiopia, Somalia, Kenya, Tanzania, Madagascar and Mozambique, but up to now there has been no discovery of crude oil. Gas has been discovered in Mozambique and methane gas (reserve 57 billion m^3) is to a small extent exploited from Lake Kivu in Rwanda. Nevertheless, it is believed that some of the prospective

oil bearing areas (See attached map Annex IV) will in the near future start production of crude oil.

Petroleum processing

37. At present there are only two refineries under operation in the sub-region, i.e., one in Kenya and the other in Mozambique, although four others are under construction, in Ethiopia, Madagascar, S. Rhodesia and Tanzania. When these four refineries are completed in 1967, the sub-region will have the following capacities:

TABLE 26

1.	Mombasa, Kenya	2,000,000 tons,	started	1964
2.	Umtali, S. Rhodesia	1,000,000 "	"	1965
3.	Tamatave, Madagascar	600,000 "	"	1965
4.	Assab, Ethiopia	500,000 "	"	1966
5.	Dar-es-Salaam, Tanzania	500,000 "	"	1967
	Total I.	4,600,000 tons		
6.	Mozambique	600,000 "	"	1963
	Total II.	5,200,000 tons.		

All the refineries will produce: gasoline (regular and premium), kerosone and jet fuel, gas and diesel oil, fuel oil and bitumen as well as liquefied gases. The refinery at Umtali will in addition produce paraffin and in the future petrochemicals. None of the refineries is producing lubricating oils and greases and other specialized petroleum products which have to be imported. As the total consumption of the sub-region in 1967 will amount to about 3.5 million tons it would mean that there will be considerable surplus in refinery capacity. In order to utilize the installed capacity the refineries will have to look for export outside of the sub-region.

Consumption of petroleum products

38. As was stated for individual countries, all petroleum products consumed in the sub-region between 1950 and 1960 were imported. The total consumption of the sub-region (including bunkering) amounted to 1,015,521 tons in 1950 and was increased to 2,330,603 tons in 1960, i.e. it rose by 2.3 times (see Annex I, Table 10). This means that the annual compound rate of growth between 1950 and 1960 for the sub-region amounted to 8.7 per cent. As the annual rate of growth for the world as a whole was about 6 per cent, it would appear that the annual rate of growth of petroleum consumption of the sub-region was higher by 2.7 per cent than the world average. The higher rate of growth of the sub-region is due partly to the initial very low level of consumption. However, this is a good sign showing that the countries of sub-region have commenced to mechanize their economies. When analysing the world consumption of petroleum products it was found out that its rate of growth is correlated with the rate of growth of GDP in total and per capita. It was further established that the rate of growth of petroleum consumption was faster than that of GDP. The comparative figures for the world and sub-region are as follows (for 10 years period 1950-1960):

TABLE 27

	Rate of growth of GDP (at current prices	Rate of Growth of petroleum consumption
World	3.6 per cent	6.0 per cent
Sub-region	5.4 per cent	8.7 per cent

This shows that the ratio between these rates of growth was the same for the sub-region as for the world as a whole.

The correlation between GDP per capita and consumption of petroleum products per capita for the countries of the sub-region for the year 1960 was as follows (petroleum consumption excluding bunkering):

TABLE 28

	Country	GDP per capita US$	Petroleum consumption per capita kg.
1.	Ethiopia	40	6.5
2.	Somalia	51	10
3.	Kenya	78	88
4.	Tanzania	58	32
5.	Uganda	64	19.5
6.	Rwanda	53	5.5
7.	Burundi	53	5.5
8.	Zambia	181	40
9.	Malawi	42	12.5
10.	S. Rhodesia	211	105
11.	Madagascar	100	25
12.	Mauritius	180	80
13.	French Somaliland		80
14.	Reunion		83
15.	Mozambique	45	23
	average	71	40

The comparison between GDP per capita and petroleum consumption per capita shows some discrepancies, i.e. some countries with lower income have higher petroleum consumption per capita (for instance Kenya with GDP per capita US$78 had petroleum consumption 88 kg. per capita, while Zambia with GDP of US$181 had only 40 kg.). Such discrepancies in the case of countries with relatively low consumption may be due to the different economic structure or level of mechanization and to the availability of other fuels, e.g., while Zambia

consumes large quantities of coal, Kenya consumes very little. The average consumption of about 40 kg. per capita for the sub-region (1960) is about one-tenth that of the world average consumption of 408 kg. (1963). The individual countries' consumption show that Ethiopia, Somalia, Rwanda, Burundi and Malawi are among the countries with the lowers per capita consumption of petroleum products in the world.

CHAPTER V

ESTIMATION OF FUTURE PETROLEUM CONSUMPTION (till 1975)

39. In the absence of forecasts on petroleum consumption by individual countries and without knowing the requirements of the "end-consumers" of petroleum products, the established correlation between the rate of growth of GDP and petroleum consumption for the past period is used as the basis for estimating future consumption of petroleum products. This, however, implies the availability of GDP rate of growth for individual countries and for the Sub-region as a whole. The development plans of individual countries usually cover a period of five year. The countries of the sub-region have prepared such plans for the years between 1960 and 1970, but none covers the whole period of 15 years (from 1960 to 1975). Since we are now in 1965 and for the period between 1960 and 1965 partial data on realized consumption are already available it would be, perhaps, advisable to make an estimate for the remaining 10 years from 1965 to 1975. A further point if favour of the division of the 15-year period into two shorter periods, one 1960 to 1965 and the other 1965 to 1975 is the fact that most East African countries got their independence between 1960 and 1964. The transition in political and economic leadership seems to have caused a slower rate of economic growth during this short period. On the other hand, the newly independent countries are vigorously attempting to accelerate their economic development.

40. It would therefore, be logical to expect, for the period 1960 to 1965, a lower rate of growth of GDP than was achieved during the decade 1950 to 1960, while for the period 1965 to 1975 the rate of growth should be higher or at least the same as was realized during the period 1950 to 1960.

41. It might be assumed that the GDP rate of growth for the sub-region on the average would be as follows:

TABLE 29 (a)

a.	realized for period	1954/60	= 4.7	per cent
b.	planned "	" 1960/65	= 4.0	per cent
c.	planned "	" 1965/75	= 6.0	per cent

In relation to these planned annual compound rates of growth of GDP the following rates of growth of petroleum consumption for the sub-region as a whole have been estimated as follows:

TABLE 29 (b)

a.	realized for period	1950/60	= 8.7	per cent
b.	projected "	" 1960/65	= 5.0	per cent
c.	projected "	" 1965/75	= 7.6	per cent

Although for the period 1965/75 a higher rate of growth of GDP is expected than was realized during 1950/60, the projected rate of growth of petroleum consumption for this period is lower than was realized during 1950/60. The reasons for such a decline in petroleum consumption in relation to GDP are:

- first, the level of consumption at the end of 1965 will be about 3 times higher than it was in 1950, and the most urgent needs may have been met;
- secondly, it is reasonable to expect some structural changes in the national economies of newly independent countries, which might result in a reduction in the rates of growth of petroleum consumption.

The projection is been presented in Annex I, Table 11 by individual countries and for the sub-region as a whole. The quantities of petroleum consumption for the sub-region at the beginning and end of the chosen periods are as follows:

TABLE 30

a.	Actual consumption	1950	=	1,015 th.	long tons
b.	" "	1960	=	2,330	" "
c.	estimated "	1965	=	2,985	" "
d.	" "	1975	=	6,100	" "

The average per capita consumption is expected to rise from about 32 kg in 1960 to about 60 kg in 1975.

CHAPTER VI

REFINERIES CAPACITIES

42. The total capacity of the refineries already constructed and of those which are at present under construction, when completed in 1967 will be about 5.2 million tons, while the total consumption of the sub-region is expected to reach about 6.1 million tons in 1975.

43. As was said earlier the consumption of the sub-region in 1967 might be about 3.5 million tons and consequently from then up to 1971 the refineries will have a capacity in excess of the consumption of petroleum products. From 1971, however, new refinery capacities should be established in order to meet requirements in 1975. The required new refinery capacity may be assessed through a comparison of the quantity of petroleum consumption expected in each country and the refinery capacity already installed.

TABLE 31

Country	Expected Consumption 1975 th. tons	Installed Capacities 1967
1. Ethiopia	520	500
2. Somalia	80	-
3. Kenya	1,450	2,000
4. Tanzania	900	500
5. Uganda	350	-
6. Rwanda, Burundi	80	-
7. Zambia	550	-
8. Malawi	100	-
9. S. Rhodesia	950	1,000
10. Madagascar	420	600
11. Mauritius	200	-
12. French Somaliland	20	-
13. Reunion	70	-
14. Mozambique	410	600
Total	6,100	5,200

According to the above table, the requirements for the extensions and/or construction of new refineries, might be as follows:

The Dar-es-Salaam refinery might be extended in the year 1972/73 by an additional 0.6 million tons; Zambia might build a new refinery in the year 1972/73 with a capacity of 0.6 million tons; additional new total 1.2 million tons; installed earlier = 5.2 million tons; by 1975, total available would be 6.4 million tons.

44. With these capacities the whole demand of the sub-region (expected to amount to 6.1 million tons in 1975) would be supplied. Of course by 1970 the prevailing conditions might require other solutions, since actual consumption up to then and the expected trend of consumption as well as advances in technology might influence the position. In particular, the establishment and capacity of a new refinery in Zambia will depend on the relation prevailing at the time with Rhodesia and Katanga. There might be a possibility of extending the Umtali refinery capacity (especially if the pipeline is constructed to Salisbury and on to Lusaka). There might be also an advantage in constructing a refinery which would cover the demand of Zambia and Katanga, in which case a bigger capacity (and cheaper per ton of production) could be constructed.

45. A separate problem is the supply to other inland countries, i.e., Uganda, Rwanda and Burundi which together will have in 1975 consumption of about 430,000 tons. These countries could be best supplied from the Mombasa or Dar-es-Salaam refineries, since it does not seem to be economical to construct a new refinery for them. Perhaps the most economical solution for those three countries would be to find a way of increasing consumption of methane gas from Lake Kivu, instead of importing petroleum products. Finally, the construction of the new refineries could be influenced through discoveries of crude oil on one or more of the respective oil fields.

46. It was mentioned earlier, that the refineries which are constructed or are under construction, will produce common petroleum products, while highly valuable products like lubricants and aviation gasoline as well as other specialized petroleum products will not be produced.

The reasons for this are the low quantities consumed and the relatively high investment costs of the installations for producing these products. For this reason, collaboration among the refineries of the sub-region should be sought in order to achieve a specialization in production and exchange in the kinds of petroleum products manufactured. With the same object it is proposed that a lubricating oil plant should be established as an integrated industry to meet the whole demand for lubricants in the sub-region.

CHAPTER VII

INTEGRATED LUBRICATING OIL PLANT

47. Lubricants are highly valuable and highly priced petroleum products. No running of engines is possible without lubricants and/or greases, and the prices of lubricants are on the average about five times higher than those of petroleum fuels (gasoline, kerosene, gas oil). It is today established that due to costly machinery and production processes, a minimum economic size for a lubricating oil plant is from 75,000 to 80,000 tons capacity per year. The investment costs for such a plant are estimated to amount to about US$ 15 million. (This investment is equal to the construction cost for a refinery of about 500 to 600 thousand tons per year capacity).

48. In 1960 all the countries of the sub-region consumed about 66 thousand tons of lubricating oils and greases; the consumption by individual country ranging from one to maximum 14 thousand tons per year. Logically, no country will find it economical to construct its own lubricating oil plant. However, consumption is growing and in the near future there will be a possibility of establishing a lubricating oil plant for the sub-region as a whole, provided that all countries of the sub-region agree to buy lubricants from this plant.

Consumption of lubricants

49. Annex I, Table 12 shows the realized consumption of lubricants according to years and countries for the period 1950 to 1960. The total consumption of the sub-region amounted in 1950 to 36,775 tons, reaching 66,126 tons in 1960. According to this, consumption in ten years increased by about 180 per cent or at an annual compound rate of growth of about 6.5 per cent. For petroleum products over the same period the rate of growth was 8.7 per cent.

50. The projection of the future consumption of lubricants may be made on the same basis as for all petroleum products. However, such a projection should be controlled by the proportion which the consumption

of lubricants bears to that of other petroleum products. It is known that lubricants are consumed in proportion to the consumption of so-called "engine fuels" i.e. gasoline, power kerosene and gas oils, or in proportion to that of all petroleum products. For the world as a whole less than two per cent of all petroleum products made from crude oil are lubricants. This percentage varies, however, from country to country depending on economic structure and the kind of other petroleum products consumed. For instance, a country not having coal and consuming proportionally more fuel oil (furnace oil) will consume as a percentage less lubricating oils than one which uses coal as fuel.

51. Projection on the basis of realized rate of growth in the same way as for all petroleum products, would be as follows: (for the sub-region as a whole).

TABLE 32

Period	All petroleum products	Lubricants
a. realized for period 1950/60	8.7%	6.5%
b. estimated for period 1960/75	5.0%	2.5%
c. estimated for period 1965/75	7.6%	4.0%

Annex I, Table 13 shows the comparative figures included in the projection for all petroleum products and for lubricants in total for the sub-region and for individual countries. According to Annex I, Table 13 the total consumption of lubricants for the sub-region at the beginning and end of the various periods will be as follows:

TABLE 33

a.	realized at 1950	=	36.7 thousand long tons
b.	realized at 1960	=	66.1 thousand long tons
c.	estimated at 1965	=	74.0 thousand long tons
d.	estimated at 1970	=	91.0 thousand long tons
e.	estimated at 1975	=	110.0 thousand long tons

52. Annex I, Table 13 shows that the consumption of lubricants in 1950 amounted to 36.7 thousand tons, compared with 1,015 thousand tons for all petroleum products or about 3.6 per cent of the total. In 1960 the consumption of lubricants was 66.1 thousand tons or about 2.8 per cent of that of all petroleum products. The share of lubricants in the total consumption of petroleum products has fallen and the reason for this is the relatively faster consumption of so-called "black petroleum products" (diesel oils, fuel oils) than of so-called "white products" (gasoline, kerosene). For the world as a whole the demand for white petroleum products has grown between 1938 and 1956 by two and three-fourths times, while that of black products has grown by three and three-fourths times,[1/] and since black products require less lubricants, it follows that the share of lubricants in total petroleum products consumption has diminished.

53. Such a development has been forecast for the sub-region as well. In order to be as realistic as possible the lowest possible rate of growth for lubricants has been anticipated, namely 2.5 and 4.0 per cent for the periods after 1960, compared with the actual rate of 6.5 per cent between 1950 and 1960. On this basis, the share of lubricants in total petroleum consumption is as follows:

TABLE 34

Period	All petroleum prod. th. cons. in tons	Lubricants cons. in th.t.	%
a. estimated for 1965	2,985	74	2.5
b. estimated for 1975	6,100	110	1.8
(actual for 1950 - 3.6% and 1960-2.8%)			

In spite of these estimated low rates of growth, consumption in 1970 will reach about 91 thousand tons, which would allow the construction of an economic-size lubricating plant.

1/ Petroleum Handbook Shell Inter. 1959.

Lubricating Oil Plant

54. At present all requirements for lubricants for the sub-region are supplied from Europe, mostly from England. For the time being there is no lubricating oil plant on the whole continent of Africa (this year one plant will come into operation in the UAR) and all lubricants are imported from outside. There is a plan to construct a lubricating oil plant at the Durban Refinery which is expected to start operation in 1968. It is not known what the capacity of that plant will be, but South Africa is consuming between 120 and 150 thousand tons of lubricants per year and it may be presumed that it will be somewhere between 150 and 200 thousand tons, in order to meet the growing demand. It is, however, assumed that for political reasons no supply of lubricants for the sub-region from this source may be anticipated, though this situation may change with time. It is reasonable, therefore, to plan the construction of a lubricating oil plant which will supply all the countries of the sub-region, and it would also be reasonable to construct such lubricating oil plants in either sub-regions of Africa where consumption may justify it.

Capacity

55. It has already been stated that in the year 1970 a consumption of about 91 thousand tons for the sub-region is expected. This would mean that in 1968 the construction of a lubricating oil plant could be started with a capacity of about 100 thousand tons per year to meet the growing requirements in coming years. 1/

Location

56. Lubricating oils are produced from the residue of vacuum distillation in a refinery, and a refinery having a distillation plant and producing a sufficiently great quantity of residue would be a suitable place, from the technical point of view, for the production of lubricants.

1/ In case co-operation with Rhodesia and Mozambique should not be possible for political reasons, supplies to the Sudan (which will consume about 17 thousand tons in 1970) could be considered.

For economic reasons it is also advisable to construct a lubricating oil plant near its raw material supply in order to avoid transport costs. A third element that has to be taken into consideration are the transport costs of the finished product to the consumers. The sub-region consists of countries of which only a few are land-locked; the majority being located along the sea. Therefore, the location of a lubricating oil plant on the coast is to be preferred not only from the point of view of accessibility to the various markets but also because of lower costs of sea transport. It may be observed that out of six refineries in the sub-region, five are located on the coast.

57. Practically all the refineries situated on the coast and having distillation plants might come into consideration for the location of the proposed lubricating oil plant. However, the refineries situated in the centre of the sub-region (Mombasa and Dar-es-Salaam) and which have also communication lines with the land-locked countries (Uganda, Rwanda, Burundi and later with Zambia, when the railway line is completed) will have advantages in comparison with the other refineries, for the transport cost of lubricants and greases, (usually delivered in barrels and tins), is quite high.

The site of the plant could be determined:

(a) by the participating countries;

(b) on the basis of the detailed investigations undertaken as part of a project-study to be elaborated in accordance with the directives of the participating countries.

Financing

58. It is proposed to build the lubricating oil plant as a subsidiary plant of a refinery situated on the coast of one of the countries of the sub-region and consequently, the construction and financing of the plant, could be undertaken by the owner or owners of this refinery. Another alternative could be to form a new company which would buy feed-stock from the refinery and would undertake the construction of the lubricating plant in the vicinity of the feedstock supply (refinery).

The partnership of one of the petroleum companies having its distribution network in all the participating countries would be desirable, however, in order to facilitate the sales of lubricants.

59. The investment required for a lubricating oil plant of 80 to 100 thousand tons per year capacity could amount to from US$ 15 to 18 million.

CHAPTER VIII

ESTIMATE OF BENEFITS TO THE SUB-REGION

Investment

60. The total investment involved is estimated to be as follows:

(a) for the refineries already constructed or under construction of about 5.2 million tons capacity = about US$ 125 million.

(b) for new refinery constructed (one extension and one new) about 1.2 million tons = about US$ 30 million.

(c) for new proposed lubricating oil plant of about 80-100 thousand tons capacity = about US$ 15-18 million.

Total about US$ 170-173 million.

Gross-output and Value-added:

61. The gross-output and value-added for the existing and proposed plants, working at full capacity is estimated to be as follows:

(a) refineries with capacity of 6.4 million tons at US$ 25 per ton on average = about US$ 160 million.

(b) lubricating oil plant of about 90,000 tons capacity at US$ 130 per ton = about US$ 12 million.

Gross-output total about US$ 172 million.
Material costs about US$ 122 million.
Value-added total about US$ 50 million.

Employment

62. When in full operation, the existing and proposed plants will provide employment (direct) for about 4,500 people, distributed approximately as follows:

- chemical engineers about	100
- mechan. & elctr. engin. about	100
- economists about	100
- technicians about	300
- qualified workers about	400
- semi- and unqualified about	3,500

Indirect employment connected with the operation of the plants could amount to an additional 1,000 people.

Foreign currency savings:

63. The financial arrangement for all the plants should not come dominantly from foreign sources and would entail repayment of loans and/or export of profits. It will also be assumed that all crude oil is supplied from outside the sub-region as well as the bigger part of chemicals and maintenance materials.

Gross-output assumed equal to the c.i.f. value of imported products	= about US$ 172 million.
- supply of crude oil and other materials from abroad about US$ 115 million	
- repayment of loans and export of profit about US$ 20 million	
- salaries to foreign personnel and other about US$ 5 million	= about US$ 140 million.
Savings	about US$ 32 million.

After the repayment of foreign loans, and should some of the countries find their own crude oil, the savings in foreign currency would be greatly increased.

Formation of Petroleum Institute

64. The petroleum industry is known to be highly profitable with the highest profit rates obtained in the sphere of crude oil production and relatively lower rates in the refining and distribution of petroleum products.

The modern petroleum industry embodies an intricate and world-wide integration of closely related activities, each responsible for different phases: exploration, exploitation, refining, storing and distributing, i.e., it shows a very strong vertical integration of all activities connected with petroleum. In the world there are about seven great petroleum concerns which have in their hands about 90 per cent of the petroleum industry outside the centrally-planned countries.

However, there are today more and more "out-siders", i.e., small petroleum entrepreneurs which own oil fields, refineries or distribution networks in all parts of the world. In addition,all the crude oil-producing countries are today asking for an increased share in the petroleum economy.

65. Being aware of the importance of the petroleum economy many countries have their own petroleum institutes which are studying the situation in the world and in their own country in order to promote this industry and obtain corresponding benefits.

66. For the time being no country of the sub-region has a petroleum institute, and therefore it is proposed to establish one in the sub-region which would perform the following tasks:

(a) follow and co-ordinate exploration works;

(b) initiate new explorations;

(c) prepare and advise on exploration contracts;

(d) in the case of gas and crude oil exploitation advise on the best method of utilization;

(e) prepare and advise on the contracts for crude oil supply to the refineries;

(f) study and advise on the economy of crude oil or gas processing, (collaboration and specialization);

(g) advise on the location of new plants, construction and supply of machinery and equipment;

(h) advise on pricing and distribution of petroleum products.

67. The establishment of one petroleum institute does not exclude, of course, the possibilities of the establishment of another such institute if an individual country should find it necessary.

68. The staff, specialized in the petroleum industry, proposed, initially is as follows:

3	geologists
3	chemical engineers
3	mechanical and electr. engineers
5	economists specialized in various spheres of petroleum economy
16	other technical and administrative staff
30	Total

CHAPTER IX

SUMMARY

69. With the progress and modernization of the economies of the countries of the East African sub-region, the importance of the petroleum industry is increasing. For the period 1950 to 1960 the actual annual compound rate of growth of petroleum consumption amounted to 8.7 per cent, and it was higher by 2.7 per cent than the world average (6 per cent). The total consumption of petroleum products for the sub-region has increased from 1,015 thousand tons in 1950 to 2,330 thousand tons in 1960 or by 2.3 times.

70. It is expected that a slower rate of growth of petroleum consumption will obtain for the period 1960 to 1965, namely, 5.0 per cent, which would bring total petroleum consumption in 1965 to 2,985 thousand tons.

71. A higher rate of growth of petroleum consumption is expected for the period 1965 to 1975, i.e., 7.6 per cent which will bring total consumption to about 6,100 thousand tons in 1975.

72. The refinery capacity in the year 1967 will amount to about 5.2 million tons while the consumption of the sub-region will be only about 3.5 million tons. This will necessitate the sale of refinery products outside the sub-region in order to secure economies of production.

73. After 1970 new refinery capacity should be constructed. An extension of the Dar-es-Salaam refinery and the construction of one new refinery in Zambia is proposed so that the total refinery capacity of the sub-region at the end of 1975 will amount to about 6.4 million tons and will be able to cover all the demand.

74. An integrated lubricating oil plant is recommended which will cover the total demand for lubricants in the sub-region. The capacity suggested is from 80-100 thousand tons, depending on the number of participating countries, and shall be operative in 1970. The investment cost is estimated to be from 15 to 18 million US$.

75. At the end of 1975 when the refineries should have a capacity of 6.4 million tons per year, and the lubricating oil plant one of about 80-100 thousand tons per year, the petroleum industry should make the following contribution to the economy of the sub-region:

(a) total investment of about .....US$ 170 to 175 mil.
(b) total gross-output of about .....US$ 172 million
(c) total value-added of about.....US$ 50 million
(d) total foreign currency savings about.....US$ 32 million
(e) total direct employment of about.....US$ 4,500 people

76. In order to promote the petroleum industry and to establish the necessary co-operation among the countries and industries of the sub-region, it is proposed to establish a petroleum institute which will employ about 30 professional and administrative staff.

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Table 1

ETHIOPIA - IMPORT = CONSUMPTION

Long tons

1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
								3,799	7,372	6,473	9,346			
			8,812	14,296	8,796	6,892	22,573	15,937	14,273	22,481	28,644			
			6,576	6,795	3,422	4,213	4,108	4,064	3,572	3,903	4,017			
			39,785	49,985	45,456	54,338	62,115	72,604	85,584	75,495	79,534			
			4,467	5,400	7,047	8,882	5,689	5,194	7,515	5,686	5,396			
			6,000	5,600	1,600	3,600	7,500	10,600	8,800	10,000	5,700			
40,930	38,727	46,940	65,640	82,076	66,323	77,925	101,985	112,198	127,116	124,038	132,657	164,329	183,847	

conomic Progress of Ethiopia 1948-1954
verseds Geological Surveys Statistical Summary
ales of Petroleum Companies

Table 2

SOMALI REPUBLIC - IMPORT = CONSUMPTION

IMPORT	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
BRITISH SOMALI												
1.Aviation & Motor Spirit	2,995	3,588	3,236	3,228	3,075	3,442	3,534	3,628	3,903	5,705	4,989	
2.Kerosene	417	439	454	696	564	603	532	598	738	772	849	
3.Gas, diesel, fuel oil		793	1,018	670	730	578	957	1,765	1,587	2,110	2,263	
4.Lubricating oil		133	107	146	76	131	146	170	140	59	204	
Total		4,953	4,815	4,740	4,445	5,064	5,169	6,161	6,373	8,346	8,305	
ITALIAN SOMALI												
1.												
2.												
3.												
4.												
Total												
SOMALI REPUBLIC												
1. Aviation & Motor Spirit											5,760	5,849
2.Kerosine											2,223	2,077
3.Gas,diesel, fuel oil											11,936	11,234
4.Lubricating oil											693	678
Total	12,000										19,712	19,838

Source: Former British Somali: Overseas Geological Surveys Statistical Summary

Somali Republic : Statistical Abstract

Remark: Quantity for 1955 [illegible]

Table 3
K E N Y A
Import = Consumption

Long tons

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
	7,293	9,330	14,888	8,120	24,110	11,351	17,581	13,574	16,107	10,774	20,450	14,959		17,378	
	54,882	98,917	96,987	78,559	97,493	121,169	118,340	100,263	113,100	109,227	110,711	106,527		109,727	
	12,402	15,692	12,609	10,043	11,423	11,402	12,566	12,221	63,892	43,391	63,878	74,264	96,570	64,814	
	8,822	22,234	21,782	16,830	25,870	21,101	23,699	26,885						27,692	
il	326,164	447,408	509,356	475,464	484,711	548,235	608,484	630,404	531,181	594,422	603,302	573,589		596,380	
	6,162	4,098	15,229	5,466	7,563	12,557	8,279	8,906	13,034	1,952	9,127	14,296		10,333	
	450	669	970	600	704	549	621	659	647	355	649	922	632	1,322	
	12	31	214	25	50	101	425	75	209	215	312	354	459		
	40	73	267	-											
				n.a.	7,196	10,627	14,372	13,607	9,832	17,726	12,783	16,178	16,910	10,454	
	416,247	598,452	672,302	595,107	659,120	737,252	804,367	806,534	746,032	778,062	821,212	801,089		830,100	
	5,199	7,129	6,422	258	10	-	12,316	10,052	9,475	9,527	13,955	19,264			
	11	19	28	13	16	5	3	2	1	1	1	35			
	135,478	121,764	142,437	115,813	111,659	102,985	139,542	187,373	105,639	113,035	103,557	143,820			
	258	289	297	304	264	359	427	364	514	433	458	571			
	140,946	129,201	149,184	116,388	111,949	103,349	152,288	197,791	115,629	123,796	117,971	163,696			
	275,301	469,251	523,118	478,719	547,171	633,903	652,079	608,743	633,373	654,266	703,241				

ogical Survey Statistical Summary - For 1963 Kenya Import Statistics

Table 4
TANZANYA - IMPORT = CONSUMPTION

TANGANYIKA-IMPORT	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
1.Aviation Spirit	3,789	3,288	2,998	3,813	1,413	3,275	3,513	3,614	2,724	3,174	3,481	3,047
2.Motor Spirit	40,839	37,565	41,241	49,274	52,404	53,318	65,514	75,019	72,204	66,926	74,085	58,566
3.Kerosene	9,956	17,446	19,788	17,196	17,872	24,706	21,093	30,928	25,429	30,351	29,741	30,636
4.Gas, diesel, fuel	52,258	36,556	48,609	54,876	63,788	98,829	125,588	145,554	172,645	138,339	184,033	165,573
5.Lubricating oil	5,233	4,984	9,212	2,746	4,239	7,234	5,285	4,716	6,328	4,886	6,441	6,048
6.Greases	425	268	588	453	261	412	448	374	503	506	381	650
7.Petroleum Jelly, wax	25	23	56	20	34	72	75	43	75	62	25	47
8.Bitumen					4,246	7,165	7,727	4,630	4,237	5,367	3,960	7,699
Total	112,525	100,130	122,492	128,378	144,257	195,011	229,243	264,878	284,137	249,611	292,147	272,266
ZANZIBAR - IMPORT												
1.Aviation & Motor Spirit	2,561	3,339	3,427	354	3,810	4,174	4,303	4,235	4,043	3,789	4,155	4,034
2.Kerosene	2,416	2,897	2,796	3,144	2,865	3,214	3,541	3,595	3,031	3,241	3,266	2,372
3.Diesel, fuel oil	2,561	1,233	1,865	2,259	748	2,079	2,461	2,996	3,230	3,599	3,337	3,711
Total	7,538	7,469	8,088	5,757	7,423	9,467	10,305	10,826	10,304	10,620	10,758	10,117
TANZANYA-IMPORT												
Total	120,063	107,599	130,580	134,135	151,680	204,478	239,548	275,704	294,441	260,231	302,905	282,383
TANGANYIKA-BUNKERS												
1.Aviation Spirit	897	503	763	22	-	-	1,240	610	414	831	818	272
2.Fuel oil	119	668	1,428	1,507	661	58	84	13	6	832	224	1,245
Total	1,016	1,171	2,191	1,529	661	58	1,324	623	420	1,663	1,042	1,517

Source: Overseas Geological Surveys Statistical Summary - For 1963 Tanzania Import Statistics

Table 5

UGANDA - IMPORT = CONSUMPTION

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
	1,842	1,734	2,149	4,346	4,538	6,875	4,187	4,269	4,548	3,487	3,341	3,703	3,768	5,4[illegible]	
	28,773	31,991	35,481	41,720	44,398	54,547	54,997	55,057	55,535	55,005	57,820	54,719	55,760	73,772	
	8,307	11,501	11,833	18,551	17,068	19,069	22,801	21,762	22,027	22,457	23,315	27,536	30,108	38,637	
	30,014	18,270	24,649	35,759	25,237	29,021	30,536	37,815	46,142	38,612	38,586	37,289	43,177	54,108	
	1,964	2,422	2,541	2,316	3,560	4,110	3,590	3,245	3,745	3,648	3,671	3,544	3,797	4,017	
	137	167	159	193	259	288	404	295	339	422	419	302	362	444	
affin.	13	21	31	29	61	52	43	51	64	70	85	93	126		-
	-	-	-	-	1,741	1,914	1,346	3,647	4,046	2,091	977	4,568	1,755	867	
	71,050	66,106	76,843	102,914	96,062	115,056	117,904	126,141	136,446	127,392	128,214	131,754	130,061	177,245	
	1,568	724	1,604	346	-	-	2,788	3,631	3,213	2,002	2,891	3,585	n.a.		

ogical Surveys Statistical Summary

da Import Statistics

Table 6

ZAMBIA, MALAWI, S.RHODESIA

Import = Consumption

Long tons

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
	25,582	32,720	36,229	40,042											
	5,582	6,886	7,060	6,686											
	5,677	8,145	12,449	16,693											
	2,421	3,337	3,072	3,874											
	3,121	1,840	4,672	1,341											
	42,383	52,928	63,482	68,642							130,000				
	7,938	8,388	9,405	9,964											
	2,188	1,362	2,052	2,299											
	4,525	4,640	6,031	5,653											
	907	828	1,070	829											
	15,558	15,226	18,558	18,745							34,458				
	4,602	6,526	9,491	6,269	11,209	12,552	12,541	12,331	10,944	10,062	11,486	10,267	9,417		
	80,449	91,600	99,341	103,577	175,298	188,216	215,328	221,074	240,589	239,523	237,895	244,723	240,642		
	19,157	26,513	27,634	26,904	38,935	38,598	41,494	36,546	40,801	50,406	59,919	68,996	77,699		
1	20,018	26,285	28,327	35,338	74,202	91,197	146,949	163,563	182,554	164,364	171,853	180,180	199,165		
	6,972	8,519	11,494	6,342	16,238	18,512	17,502	17,874	19,034	18,335	20,234	17,528	21,153		
	260	402	851	n.a.	1,417	2,243	1,915	2,456	1,780	2,063	2,050	1,803	2,040		
	513	467	482	520	641	743	1,099	1,435	1,060	1,210	1,637	1,462	2,022		
	9,416	17,286	18,436	7,473	16,293	26,457	22,801	27,426	23,408	25,776	29,384	17,288	21,254		
1	141,387	177,553	196,056	186,423							370,000				

Table 6
ZAMBIA, MALAWI, S.RHODESIA
Import - Consumption

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
ORDER FEDERATION												
Total	199,328	245,712	278,096	273,811	334,438	378,518	459,700	482,705	520,247	511,739	534,458	542,247

Source: Overseas Geological Surveys Statistical Summary

Remark: Quantities for three countries for 1960 estimated

Table 7

MADAGASCAR -IMPORT-= CONSUMPTION

Long tons

1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
			3,901	5,218	5,641	6,189	8,269	8,044	5,245	5,219	5,611	4,492		
			43,122	41,388	47,662	49,777	47,141	50,114	48,226	51,522	51,533	54,354		
			11,910	12,099	11,013	15,471	12,768	16,730	15,299	17,236	16,972	17,710		
			16,344	22,419	26,614	29,188	33,575	39,415	43,102	41,495	38,832	46,105		
			3,382	2,501	2,635	787	203	79	806	656	1,093	1,207		
			5,800	2,662	3,886	5,158	5,436	4,764	5,009	5,575	3,985	5,754		
			3,729	5,348	7,720	8,741	12,485	3,639	3,927	4,104	5,289	3,520		
			48	1	162	79	178	80	25	22	117	761		
			11	20	11	7	10	14	12	17	17	21		
			418	2,264	94	218	296	37	69	107	34	18		
50,000	60,000	73,000	88,665	93,720	105,438	115,615	120,361	122,916	121,719	125,953	123,483	133,942		

ogical Surveys Statistical Summary

r 1950, 1951, 1952 estimated

Table 8
MAURITIUS - IMPORT = CONSUMPTION

IMPORT	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
1.Aviation Spirit	163	93	604	939	705	1,171	1,191	1,389	2.279	1,676	2,245	1,293
2.Motor Spirit	10,727	11,316	15,186	16,264	18,951	16,682	25,802	24,275	24,680	20,426	27,559	12,109
3.Kerosene	3,172	3,097	2,824	2,776	3,726	3,004	4,525	3,548	3,590	3,034	4,518	4,158
4.Gas,diesel, fuel	8,679	9,223	16,089	17,231	14,229	12,785	22,992	27,699	22,274	28,058	22,576	39,861
5.Lubricating oil	1,162	1,330	1,493	1,507	1,667	1,[illegible]33	1,424	1,444	1,586	1,436	1,779	2,065
6.Greases	116	168	165	176	136	137	150	109	97	156	109	147
7.Bitumen	1,712	826	1,355	1,887	1,498	2,474	1,613	4,766	3,635	2,040	5,003	4,08[illegible]
Total	25,731	26,053	37,716	40,780	40,912	37,536	57,697	63,230	58,141	65,634	63,789	63,713
BUNKERS												
1.Gas, fuel, diesel	3,975	4,642	4,466	8,413	5,266	7,506	9,988	9,797	6,023	6,312	9,425	12,556
2.Aviation Spirit				917	1,160	990	986	1,084	1,696	1,866	1,793	2,165
Total	3,975	4,642	4,466	9,33[illegible]	6,426	8,496	10,974	10,881	8,719	8,178	11,218	14,721
INTERNAL CONSUMPTION	21,756	21,411	33,250	31,450	34,486	29,05[illegible]	46,723	52,34[illegible]	49,422	57,456	52,571	48,997

Source: Overseas Geological Surveys Statistical Summary

Table 9
FRENCH SOMALI, REUNION, MOZAMBIQUE
Import = Consumption

Long tons

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
	2,718	626	3,947	9,459	845	2,246	5,019	2,397	2,232	2,290	2,176	2,645	3,015		
	725	174	1,831	982	3,323	876	167	794	676	658	689	777	868		
	-	-	-	-	2,814	5,716	3,415	3,418	4,591	3,731	4,682	5,013	6,055		
	425	95		315	241	253	246	268	261	261	295	400	467		
	3,868	895	5,828	10,656	7,223	9,091	8,847	6,877	7,760	7,040	7,842	8,835	10,405		
	4,232	5,753	6,335	4,413	6,924	8,880	10,855	11,481	13,900	13,561	15,139	16,900	18,934		
	1,235	1,407	a	753	1,297	1,829	1,388	2,158	1,748	2,205	2,243	2,538	2,683		
	2,601	3,272	a	1,072	3,471	2,311	4,282	5,264	3,751	7,098	6,577	7,895	6,469		
	a	a	a	723	629	940	658	771	735	743	1,092	1,033	1,209		
	8,068	10,432	6,335	6,961	12,321	13,969	17,183	19,674	20,134	23,607	25,051	28,366	29,295		
	22,919	24,845		28,645	27,251	30,005	31,332	32,021	32,335	34,929	39,349	36,760	10,425		
	10,323	10,146		13,337	13,754	14,498	16,863	17,371	18,429	19,104	19,131	20,357	16,523		
	18,490	24,227		27,657	34,202	38,019	46,371	54,131	66,138	66,720	81,933	75,461	31,059		
	3,041	2,984		4,132	3,703	4,340	5,210	5,819	6,020	6,656	7,175	7,093	6,130		
	46	27		37	26	30	52	47	40	38	69	80	n.a.		
	29	41		20	29	28	60	24	31	27	56	38	n.a.		
	1,308	2,296		1,712	3,451	3,176	3,893	5,242	8,939	6,025	4,716	5,269	n.a.		
	56,236	64,566	70,000	75,540	82,416	90,112	103,789	115,265	131,940	133,499	152,429	145,058			

ogical Surveys Statistical Summary
,ated for Mozambique). All three territories should have bunkering, but no data available

Table 10
SUMMARY FOR SUB-REGION
PETROLEUM PRODUCTS IMPORT = CONSUMPTION

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
1.Ethiopia	40,930	38,727	46,940	65,640	82,076	66,323	77,925	101,985	112,190	127,116	124,038	132,657
2.Somalia	12,000										19,712	19,838
3.Kenya	416,247	598,452	672,302	595,107	659,120	737,252	804,367	806,534	748,002	778,062	821,212	801,089
4.Tanzania	120,063	107,599	130,580	134,135	151,680	204,478	239,548	275,704	294,441	260,231	302,905	282,383
5.Uganda	71,050	66,106	76,843	102,914	96,862	115,856	117,904	126,141	136,446	127,392	128,214	131,754
6.RWANDA	12,000										25,000	
7.Burundi												
7.Zambia	42,383	52,928	63,482	68,642								
9.Malawi	15,558	15,226	18,558	18,745	334,439	378,518	459,700	486,705	520,247	511,739	534,458	542,247
10.S.Rhodesia	141,367	177,558	196,256	186,423								
11.Madagascar	50,000	60,000	73,000	88,665	93,720	105,438	115,615	120,361	122,916	121,719	125,953	123,483
12.Mauritius	25,731	26,053	37,716	40,780	40,912	37,536	57,697	63,230	58,141	65,634	63,789	63,718
Total	947,349										2145,281	
1.French Somaliland	3,860	895	5,828	10,656	7,223	9,021	9,847	6,877	7,760	7,040	7,842	8,035
2.Reunion	2,668	10,432	6,335	6,961	12,321	13,969	17,183	19,674	20,134	23,607	25,051	28,366
3.Mozambique	56,236	64,566	70,000	75,540	82,416	90,112	103,789	115,265	131,940	133,459	152,429	145,058
Total	68,172	75,893	84,163	93,157	101,960	113,172	129,819	141,816	159,834	164,146	185,322	182,259
Grand Total	1,015,521										2330,603	

Source: see Tables 1 to 9

For Rwanda, Burundi Banque d'Emission No.5 =1962: for 1950 and 1960 estimated

Table 11
PROJECTION OF CONSUMPTION
All Petroleum Products

Long tons

Population		GDP Annual Growth Rate			Refinery	PETR.CONS.Ann.Growth Rate			Petrol.Products Consumption				Petr.Cons.per Capita	
1960	1975	Actual 1950/60	Planned 1960/70	Estim. 1970/75	Capacity 1967	Actual 1950/60	Estim. 1960/65	Estim. 1965/75	Actual 1950	Actual 1960	Estim. 1965	Estim. 1975	1960	1975
in millions		per cent			th.tons	per cent.			thousands long tons				Kgs	Kgs
20.0	26.3	3.4	4.3		500	12.0	12.0	9.0	41	124	220	520	6.5	20.0
2.0	2.7	0.6	5.0		-	5.0	11.0	8.0	12	20	35	80	10.0	30.0
8.1	11.8	9.2	5.2		2,000	7.0	3.0	4.5	416	821	950	1,450	88.0	100.0
9.5	13.0	4.6	6.7		500	9.6	4.5	9.0	120	303	380	900	32.0	60.0
6.7	9.0	5.9	4.5		-	6.0	5.0	8.0	71	128	160	350	19.5	40.0
2.5	3.3	2.4	3.0		-									
2.4	3.7	2.7	3.0		-	7.2	7.0	8.0	12	25	35	81	5.5	11.5
3.2	4.9	7.0	6.5		-	12.0	6.5	12.0	42	130	180	550	40.0	115.0
2.0	5.3	6.0	5.0		-	8.2	8.0	7.0	16	34	50	100	12.5	20.0
3.6	5.5	9.2	5.5		1,000	10.0	4.0	8.0	141	370	450	950	105.0	175.0
5.4	6.8	5.8	5.5		600	10.0	5.0	10.0	50	126	160	420	25.0	63.0
0.6	1.0	2.8	5.5		-	10.0	9.5	7.0	26	64	100	200	80.0	160.0
66.8	93.3	5.4	5.4	6.0	4,600	8.7	5.0	7.6	947	2,145	2,720	5,600	32.5	60.0
0.1	0.1				-		5.0	7.0	4	2	10	20	8000	200.0
0.3	0.5				-		7.0	7.0	8	25	35	70	83.0	140.0
6.5	8.5	1.3			600	9.8	8.0	6.5	56	152	220	410	23.0	48.0
6.9	9.1				600		7.0	6.6	68	185	265	500	27.0	55.0
73.7	102.4	5.4	5.4	6.0	5,200	8.7	5.5.0	7.6	1,015	2,330	2,985	6,100	32.0	60.0

GDP rate of Growth = Tables East African Survey by ECA

Table 12
LUBRICATING OIL and GREASES IMPORT = CONSUMPTION

COUNTRY	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
1. Ethiopia	2,560			4,467	5,400	7,047	8,882	5,689	5,194	7,515	5,686	5,396
2. Somalia	350				450			600			693	678
3. Kenya	6,612	4,767	16,199	6,066	8,267	13,106	8,900	9,565	13,680	2,307	9,776	15,218
4. Tanzania	5,658	5,252	9,800	3,199	4,500	7,646	5,733	5,090	6,823	5,392	6,822	6,698
5. Uganda	2,001	2,589	2,700	2,509	3,819	4,398	3,994	3,540	4,084	4,070	4,090	3,846
6. Rwanda	350				450			600			750	
7. Burundi												
8. Zambia	2,421	3,337	3,072	3,874								
9. Malawi	907	828	1,070	829	17,655	20,755	19,497	20,330	20,739	20,398	22,284	19,331
10. S. Rhodesia	7,232	9,001	12,345	6,342								
11. Madagascar	3,500			5,822	2,662	3,886	5,158	5,436	4,764	5,009	5,575	3,985
12. Mauritius	1,278	1,498	1,658	1,683	1,803	1,420	1,574	1,553	1,683	1,592	1,888	2,212
Total	32,809				45,006			52,403			57,564	
13. French Somaliland	425	95		315	241	253	246	268	261	261	295	400
14. Reunion	500			723	629	940	658	771	735	743	1,092	1,033
15. Mozambique	3,041	2,934		4,132	3,703	4,348	5,210	5,819	6,028	6,656	7,175	7,093
Total	3,966			5,170	4,573	5,541	6,114	6,858	7,024	7,660	8,562	
Grand Total	36,775				49,579			59,261			66,126	

Source: Tables 1 to 9

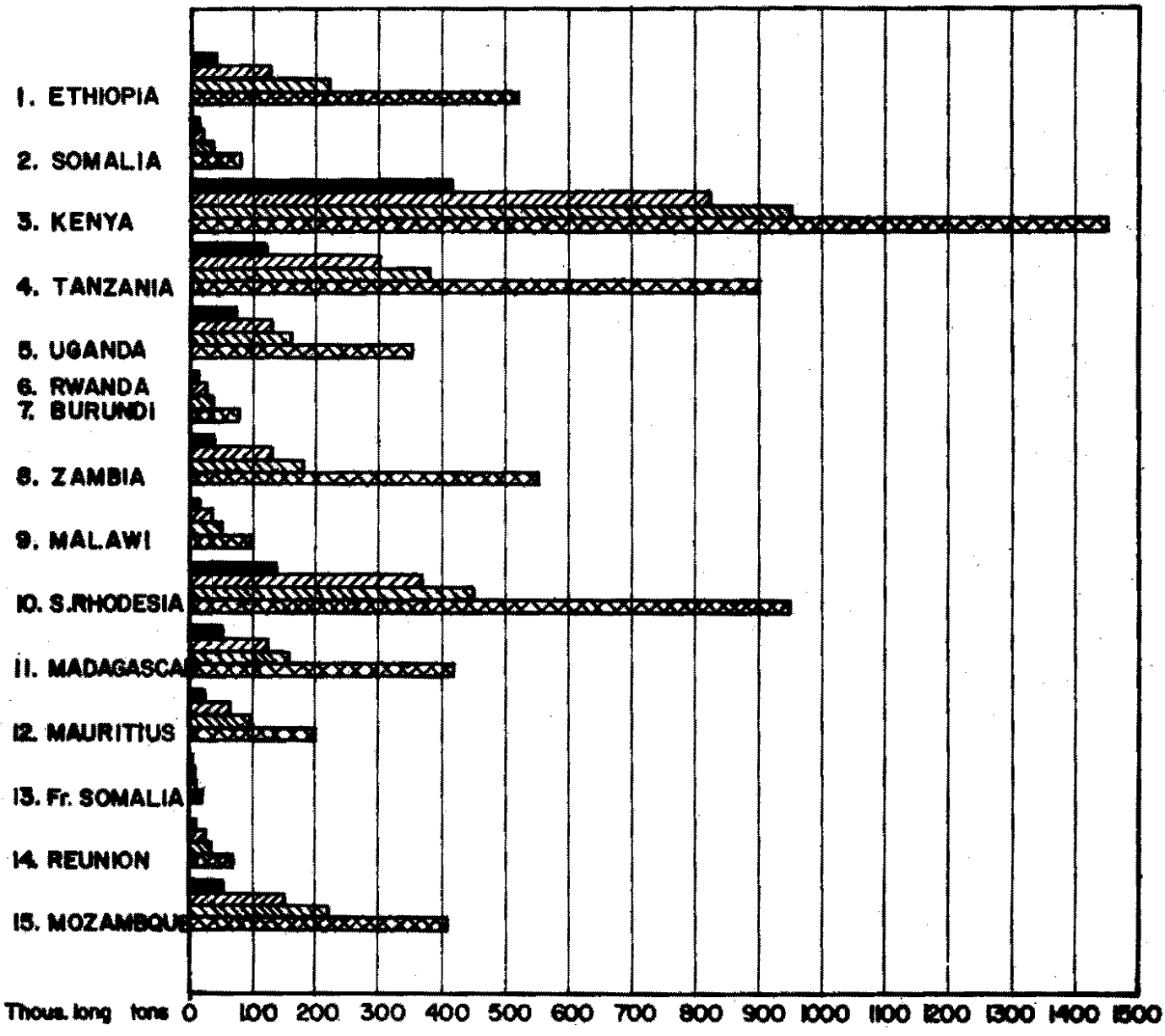
Table 13
PROJECTION for LUBRICANTS
(Consumption Actual and Estimated)

ALL PETROLEUM PRODUCTS							LUBRICATING OILS AND GREASES							
Ann. Consump. Growth rate			Quantity				Ann. Consump. Growth rate			Quantity				
Actual 1950/60	Estim. 1960/65	Estim. 1965/75	Actual 1950	Actual 1960	Estimated 1965	Estimated 1975	Actual 1950/60	Estim. 1960/65	Estim. 1965/75	Actual 1950	Actual 1960	Estimated 1965	Estimated 1970	Estimated 1975
per cent.			thousands long tons				per cent.			thousands long tons				
12.0	12.0	9.0	41	124	220	520	8.8	2.0	3.0	2.5	5.7	6.0	7.0	8.0
5.0	11.0	8.0	12	20	35	80	5.8	7.0	7.0	0.4	0.7	1.0	1.5	2.0
7.0	3.0	4.5	416	821	950	1,450	4.5	2.5	5.0	6.6	9.8	11.0	14.5	18.0
9.6	4.5	9.0	120	303	380	900	2.0	3.0	5.0	5.7	6.0	8.0	11.0	13.0
6.0	5.0	8.0	71	120	160	350	7.8	4.0	4.5	2.0	4.1	5.0	6.0	7.5
7.2	7.0	8.0	12	25	35	60	8.0	7.0	7.0	0.3	0.7	1.0	1.5	2.0
12.0	6.5	12.0	42	130	180	550	11.0	3.0	4.5	2.4	7.0	8.0	10.0	12.0
8.2	8.0	7.0	16	34	50	100	2.0	-	7.0	0.9	1.0	1.0	1.5	2.0
10.0	4.0	8.0	141	370	450	950	7.0	-	3.0	7.2	14.3	14.0	16.0	19.0
10.0	5.0	10.0	50	126	160	420	5.0	4.5	2.5	3.5	5.6	7.0	8.0	9.0
10.0	9.5	7.0	26	64	100	200	4.0	6.0	6.0	1.3	1.9	2.5	3.0	4.5
8.7	5.0	7.6	947	2,145	2,720	5,600	6.0	2.5	4.2	32.8	57.6	64.5	80.0	97.0
	5.0	7.0	4	8	13	20	-	8.0	7.0	0.4	0.3	0.5	0.7	1.0
	7.0	7.0	8	25	35	70	8.0	2.0	5.0	0.5	1.1	1.2	1.5	2.0
	8.0	6.5	56	152	220	410	9.2	2.0	2.5	3.0	7.1	7.8	8.8	10.0
	7.0	6.6	60	185	265	500	8.5	2.5	3.0	3.9	8.5	9.5	11.0	13.0
8.7	5.0	7.6	1,015	2,330	2,985	6,100	6.5	2.5	4.0	36.7	66.1	74.0	91.0	110.0

um Products Table 11

CONSUMPTION OF ALL PETROLEUM PRODUCTS

(INTERNAL CONSUMPTION PLUS BUNKERING)



KEY

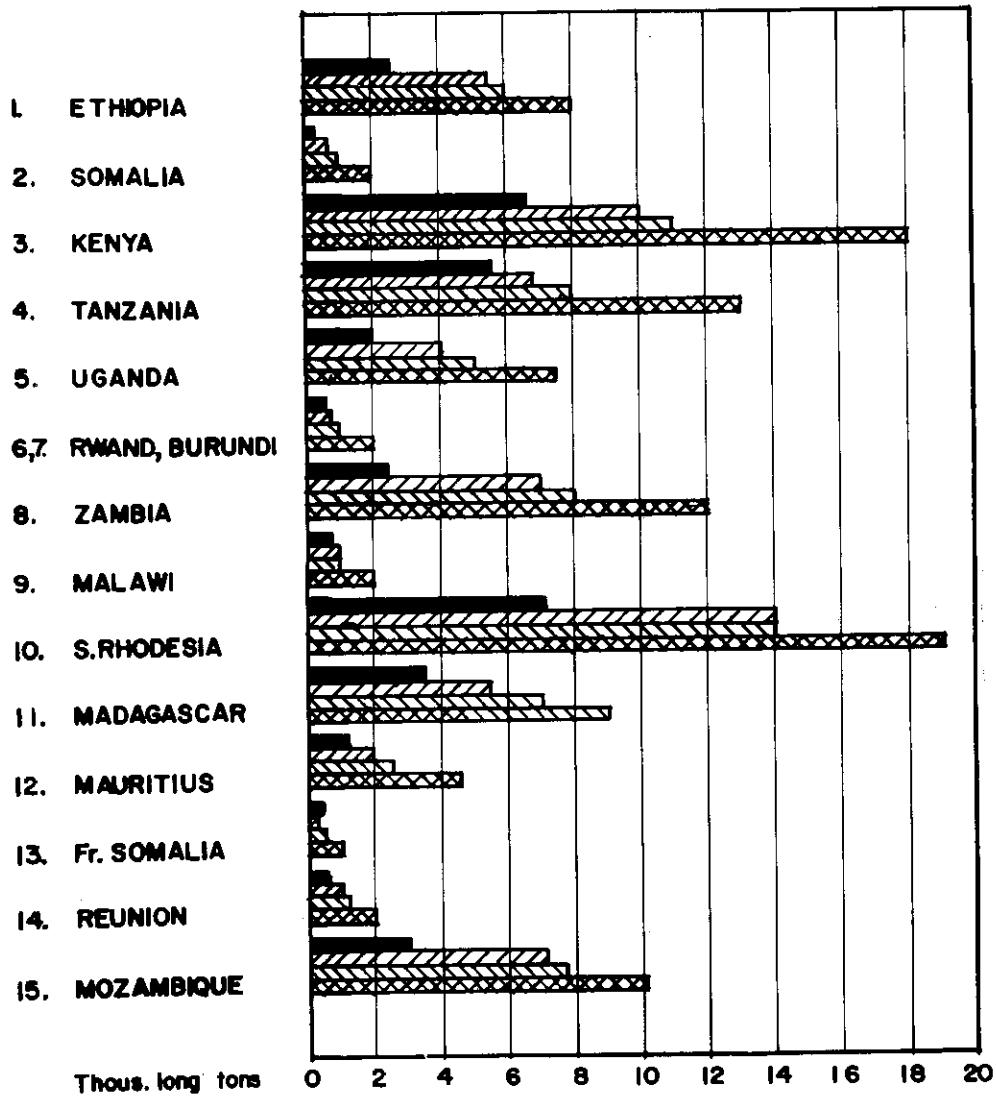
= CONSUMPTION 1950 REALIZED

= CONSUMPTION 1960 REALIZED

= CONSUMPTION 1965 ESTIMATED

= CONSUMPTION 1975 ESTIMATED

CONSUMPTION OF LUBRICANTS



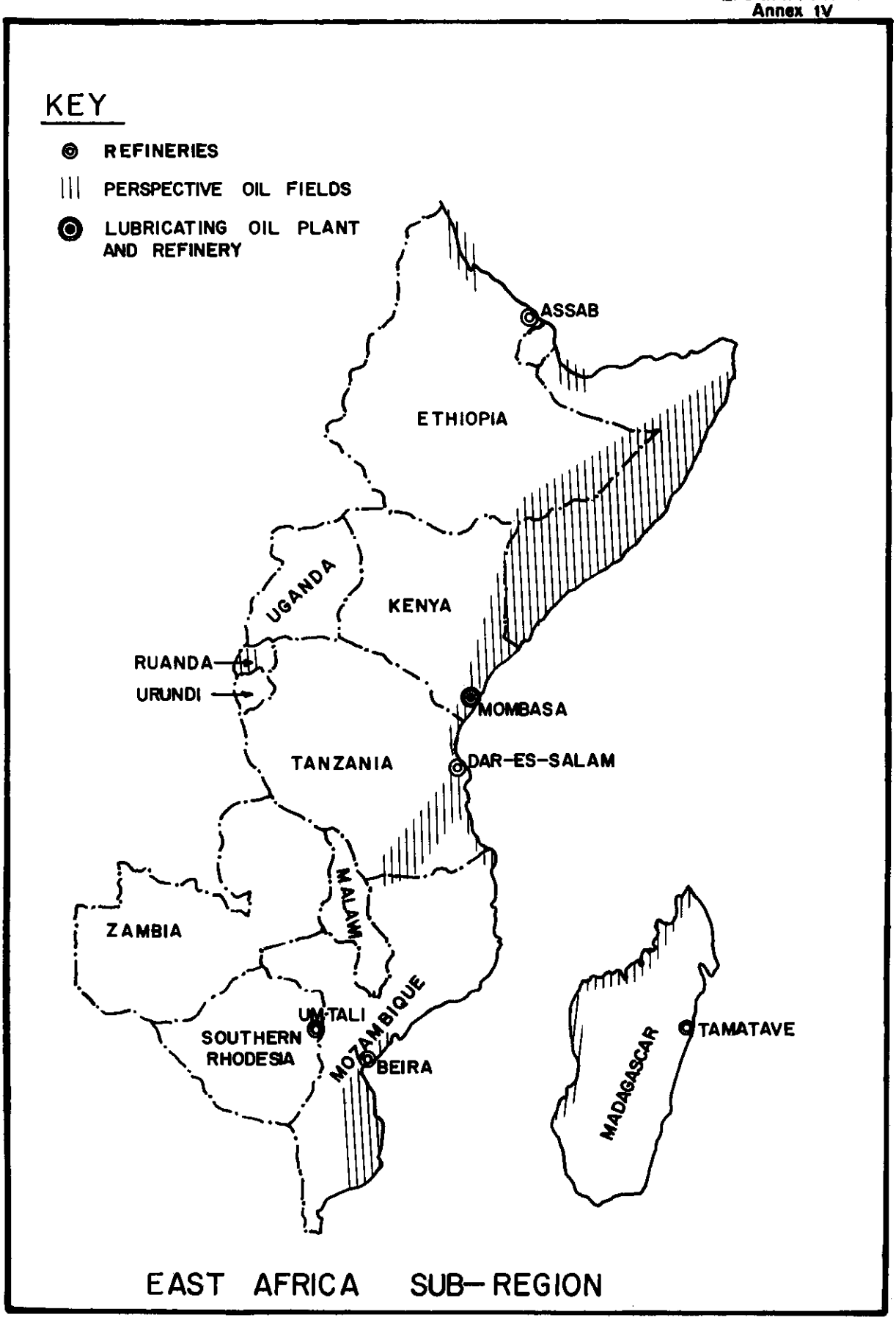
KEY

■ = CONSUMPTION 1950 REALIZED

▨ = CONSUMPTION 1960 REALIZED

▧ = CONSUMPTION 1965 ESTIMATED

▩ = CONSUMPTION 1975 ESTIMATED



EAST AFRICA SUB-REGION