THE NIGERIAN COAL INDUSTRY AND THE PROBLEM OF FALLING COAL CONSUMPTION AND IN NIGERIA

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Introduction

Nigeria, unlike most other developing countries in Africa, is lucky to possess an abundance of primary energy resources. Of about fourteen energy resources known to exist in the country, only wood fuel, coal, petroleum, natural gas and hydro-electric power (HEP) are now widely used.

Until the mid fifties, coal was the most important energy resources in Nigeria, accounting for 64 per cent of all energy consumed in the country, excepting wood fuel. During the same period, petroleum products accounted for 32 per cent of energy consumption while hydro-electric power, mostly from power stations located around the Kuru Falls area of Bukuru, made up the remaining 4 per cent of energy consumed (For details see Appendix I).

By 1960, as a result of structural changes in the energy market of Nigeria, the ascendancy of coal was overtaken by petroleum and was further threatened in subsequent years by the increased utilization of such other energy sources as HEP and natural gas. In fact, by the beginning of the Nigerian Civil War in 1967, the percentage share of coal in the energy market had declined from 64 per cent in 1955 to 2 per cent at the end of the war in 1970. As a result of the post war reconstruction programmes of the Federal Government, particularly with the reopening of the Eastern section of the Nigerian railway, coal consumption rose slightly to 5 per cent in 1972 and fell back again to 1 per cent in 1973. The slight improvement in coal consumption immediately after 1970, was due largely to the reactivation of the old railway steam engines. Subsequent years as shown

on Appendix I have not indicated any remarkable improvement rather the situation has continued to worsen with the result that by 1983 coal only accounted for a mere 0.1 per cent of the energy market. The reason for the decline in coal consumption will be considered in detail below. But we would first look briefly at the development and growth of the industry.

The Discovery of Coal and Extent of Coal Reserves

Sub-bituminous coal was discovered at Udi in 1909 by two British geologists, A.E. Kitson and E.O. Thiele who were members of the Mineral Survey of Southern Nigeria. In fact began as far back as 1903 when Dr. John Parkinson and Mr. L.H. Hubbard were commissioned by the Director of the Imperial Institute, Professor W.R. Dunstan to undertake on behalf of the government of Southern Nigeria, the mineral survey of the region. The aims of the survey were two. First, it was assigned the responsibility of obtaining general information on the mineral resources of the region. Second, the survey was empowered to study in greater detail those areas which possessed minerals of economic value. As a result of their eventual exploration by the colonial administration, deposits of workable coal deposits of lignite were discovered west of the Niger in the Asaba Division, at Ibuza and Ogwashi-Ukwu. Lignite was also found at such other places as Nnewi and Ogbaku in Aboh Division. In all these places, the lignite deposits were mostly from power stations located around the Kuru Falls area of Bukuru, made up the remaining 4 per cent of energy consumed (For details see Appendix I).

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The lignite were, however, relegated completely to the background when sub-bituminous coal was discovered in 1909 on the steep escarpment which runs south and north through Udi. Between 1910 and 1913 when the mineral survey was finally terminated, detailed prospecting had been carried out by members of the survey team, and by 1914, it has become recognised that a large coal field had been discovered which was at once confirmed by the government as an asset of considerable economic value.

The most important coal deposits belong to the lower coal measures of the Campanian - Maestrichtian formation situated in the upper cretaceous. The Lower Coal Measures comprise a rhythmic sequence of alternating sandstones, shales, sandy shales and mud stones with coal seams or carbonaceous shales at various horizons. 6 Five economically significant seams outcrop at regular intervals along the Enugu escarpment in a north-south direction for a distance of ninety miles from Enugu to Okigwe. The main outcrop for example, can be seen from map 1 at Enugu, Ezimo, Okpula (Okprakpa) Okaba and Ogboyoga in the Benue basin. Studies by the Nigerian coal corporation (NCC) have estimated a total proved and improved coal reserves in Nigeria at over one billion tons (Table I).

Table 1: Nigeria's Coal Reserves

State	Location	Proved reserves million tons	Unproved reserves million tons
Anambra	Enugu	54	200
	Ezimo	56	60
	Inyi	20	unknown
	Owukpa (Okpka)	57	75
Benue	Okaba	73	250
	Ogboyoga	107	320
Bendel	Asaba (Lignite)	250	unknown
Plateau	Lafia-Obi (Cooking Coal)	32	
Total		649	905

Umakpa, E. (Jr.) Nigeria Coal Industry, Business Concord, vol.2 No. 95 September 20th 1984 pp. 8-9.
Also Ugwu, F.N. (G.M. NCC) Plans for Expansion of Coal Industry Unpublished Ms. Enugu undated, p.2.

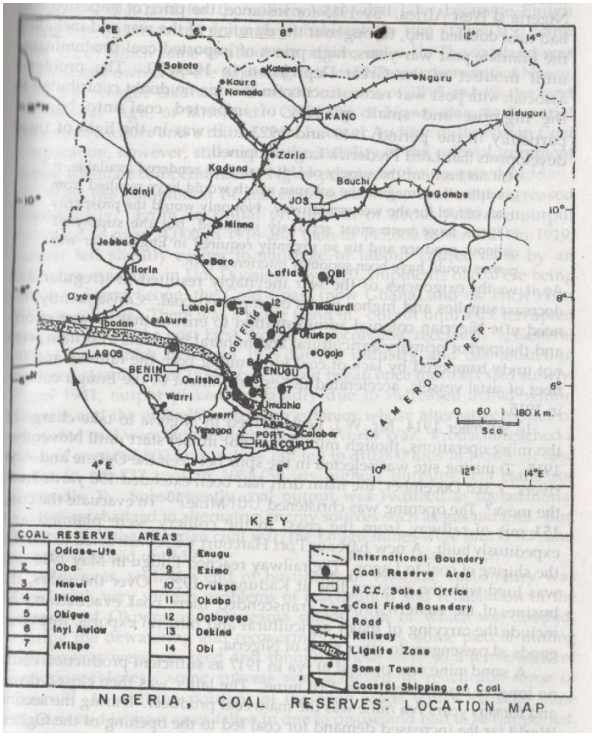
Benne has about 65 per cent of the total proved coal reserves of Nigeria. Most of which could be mined by open-cast methods, but presently, only the Okaba mine, opened during the period of the civil war in 1968, and producing about 200,000 tons of coal annually is in operation.

Apart from the Okaba mine, Nigeria's coal production has continued to take place around the town of Enugu where the necessary infrastructure has been developed over the years for the servicing of the coal industry and the railway system.

Establishment of the Coal Industry

There was, a strong economic need for mining coal in Nigeria, and it was made more urgent by the First World War. Firstly, the increasing

local consumption of imported coal (98,884 tons by 1914) called for immediate exploitation of the newly discovered coal. Secondly, other West African colonies particularly the Gold Coast and Sierra Leone could buy coal more



cheaply from Nigeria. Thirdly, and probably more importantly, was the fact that which the First World War posed to the external supply of coal to Nigeria and West Africa. By 1915 for instance, the price of imported coal had nearly doubled and throughout the duration of the war and including the immediate post war years, high prices of imported coal associated with post war reconstruction in Europe no doubt contributed to the outcry of the Great Depression in 1929/30. The problems had their price and small quantity of imported coal into Nigeria, particularly in the period 1919 and

1923. It was in the light of these developments that Lord Frederick Lugard pointed out:

Had it not been for the supply of Udi coal, thus rendered available, it is not difficult to imagine the collapse which would have resulted from the lack of fuel for the western railway. Nor only would the supply of coal have been more seriously impeded, but the prosperity of the Nigerian produce and tin industry required it. In 1916 the exports of tin concentrates to England for smelting amounted to 3,386 tons. The Udi colliery

The exigencies of the war inevitably resulted in irregular and decreased supplies and higher prices of imported coal. Consequently, the Nigerian colonial administration to ensure that its war efforts needed the export of primary agricultural and mineral products to Britain were not unduly hampered by lack of coal for running both the Enugu colliery and the railway system.

In September 1914 Mr. W.J. Leck arrived in Nigeria to take charge of the mining operations though mining did not in fact start until November 1915. The mining site was selected in the spur between the Ogbete and Aru rivers. By 31st December, the main drift had been extended 130 yards from the surface. The opening was christened Udi Mine. To evacuate the coal, 151 miles of railway from the coast to the Mine 10 feet above sea level was constructed. A new harbour port at Port Harcourt was constructed to handle the shipping of coal to Lagos. The railway reached Enugu in May 1916 and was linked with the western line at Kaduna in 1929. Over the years, the business of the eastern railway transcended mere coal evacuation and included the carrying of major agricultural and mineral exports, imported goods and passengers to other parts of Nigeria.

A second mine was opened at Iva in 1917 as sufficient production could not for many years Iva mine was the main coal producer. The latter was then closed down and for many years Iva mine was the main coal

producer. During the Second World War the increased demand for coal led to the opening of the Okpara mine. By 1960, the Nigerian Coal Corporation (NCC) had opened three additional mines (Hayes), Onyeama, Okpara and Ekulu, while the Ogbete mine was closed down for declining productivity. The Ekulu mine was not reactivated at the end of the civil war in 1970, thus leaving Onyeama, Okpara and Okaba as the only coal producing mines now.

Meanwhile, land for the collieries and what later became the Enugu Township was acquired from the inhabitants in two stages, in 1915 and 1917, all of which came to about ten square miles. [11] The ceded land was communally owned by the adjoining Udi and Nkanu communities of Ngwo, Nike and Akegbe-Okuno. Until the cessions of 1915 and 1917, the land was mainly Agù, or farmland. Chief Oji of Ngwo clan, an influential community leader and a retired chief Internal Auditor of the Nigerian Coal Corporation, however, still regrets the inability of the colonial government to pay adequate compensation to Ngwo people for their acquired land. [12]

With the completion of the eastern railway, coal output increased dramatically. From an initial production of about 7,000 tons, output increased to over 24,000 in 1916 and then to 145,000 tons in 1918. In 1919, output fell slightly owing to shortage of labour caused mainly by an influenza epidemic in Udi Division. By 1920, shipments of coal were being made to Sierra Leone, the Gold Coast (now Ghana) and the French West African colonies. There was a rising trend in output until 1929, interrupted only in 1923 by the great World War economic recession. The General Depression which began in 1929 hit the industry and coal production declined steadily until 1934 when output began once more to expand slowly. From 1941, output picked up rapidly due to increased demand within Nigeria and the other West African colonies whose alternative supplies of imported coal were cut off by the Second World War. Production reached a peak of over 668,000 tons in 1944 but fell to 610,000 tons in 1952/53. It rose again to 905,837 tons in 1958/59, its highest output.

(For details see appendix 2). Subsequently coal output was reduced as the traditional customers changed to alternative energy sources such as gas and diesel. But, as a result of the Nigerian civil war, the Enugu mines were shut in 1967, and remained closed until 1970.

However, with the end of hostilities in 1970, the coal industry was faced with very serious problems of reactivation and rehabilitation of the abandoned Okpara and Onyeama mines both of which were flooded. During the dewatering and recovering operations, some pieces of mining equipment were salvaged and though, "these were in a terrible state of unserviceableness, some success was achieved in reactivating some of them. [13] In addition portions of the main roads which led to the mine districts had in most cases fallen in due to disuse and had to be re-supported. While this situation lasted, coal production was greatly hampered and was further aggravated by such other problems as poor ventilation, roof falls, constant power failures and shortage of wagons. These catalogue of problems could explain why, since the end of the civil war, the annual coal output has averaged less than 300,000 tons.

The Nigerian coal corporation (NCC) is solely responsible for developing Nigeria's coal resources and managing the coal industry. It was set up, following the virulent labour disputes of the forties which culminated in the shooting of twenty one coal miners at the Ogbete mine on November 18, 1949. The colonial government subsequently appointed the Fitzgerald Commission of Enquiry which looked into the shooting incident. Among its many recommendations was that - the colliery should be transformed into a public corporation; [14] In 1950, the NCC Ordinance No. 29 of 1950 was enacted, establishing the Nigerian Coal Corporation; 15 Prior to its incorporation, the coal industry until 1937, was managed under the Railway Department. After that date, it became the colliery department even though the Railway continued to act as its sales agent up to 1960 when the corporation established its own independent marketing department.

Market for Nigerian Coal

Appendix 3 shows the principal customers for the Nigerian coal for the period 1935-1981. Government departments, mainly the Nigerian Railway Corporation (NRC), the Electricity undertakings, 16 and the Nigerian Ports Authority constitute the principal users of coal and have accounted about 80 percent of annual coal consumption in Nigeria. Private concerns like John Holt and company, Elder Dempster Lines and the United African Company also used coal for bunkering their river fleets in the late thirties. This was between 5 and 9 per cent of annual coal consumption. By 1947, coal consumption by these non-government users had reached about 18 per cent. After that, consumption progressively declined until 1957 when it was 7 per cent. The use of oil fuel, particularly by the shipping lines, would seem to account for the reduction in consumption.

We shall now consider, in more detail, the major coal consumers.

Coal and the Nigerian Railway Corporation

At its inception, Enugu coal was termed 'railway coal', a description which showed the symbiotic relationship that existed between the coal industry and the Nigerian Railway. As mentioned earlier, the coal industry remained under the jurisdiction of the railway until 1937 when it became a separate government department. Thereafter, as before, this administrative separation, the colliery continued to depend on the railway both as a market and as the most effective means of moving its bulky product to other users. Furthermore, until 1960 when the coal corporation established its own marketing facilities, the Nigerian Railway Corporation (NRC) acted as sales agent, fixing the price inclusive of transport at which the coal was delivered to customers.

In the late thirties, coal consumption by the railway ranged between 155,000 and 231,000 tons annually or about 60 per cent of total coal output. In the fifties, consumption by the NRC averaged about 400,000 tons per annum, but in the sixties it fell to 300,000 tons, with the railway share in consumption falling from 60 to 43 per cent. In 1967 coal consumption by the railway was 19,165 tons or 20 per cent. The closure of the Enugu coal mines and the disruption of rail services in the Eastern Region during the Nigerian civil war, accounted for the low production and consumption. At the end of the war in 1970 coal consumption by the NRC was 22,470 tons or about 85 per cent of total coal production. Between 1971/72 and 1972/73 consumption rose from 90,915 to 128,557 tons. Between 1973/74 and 1978/79 coal consumption by the NRC averaged 49,207 tons. At the end of hostilities in 1970 the steam engines that had survived destruction were repaired and put back into use on the Eastern line. This development accounted for the slight improvement in the demand for coal by the railway. The 1980s however have seen consumption by the Eastern line railway drop to less than 3,000 tons. Much of the reason for the fall in coal demand is attributable to the dieselization policy of the railway which received active consideration from 1954.17 The railway corporation received active diesel locomotives were unquestionably more economical to run and maintain than steam powered engines 18 but the implementation of diesel traction was delayed until the late 1950s on both political and economic grounds. Actual implementation of the dieselization programme did not really take off the ground until 1956, when ten mainline diesel engines were added to the stock of 224 mainline and 60 shunting steam engines. By 1959 eight additional mainline and four shunting diesel engines were bought, bringing the total number of mainline diesel engines to eighteen. At the same time, the development led to the reduction in the number of mainline and shunting steam engines in use from 224 and 60 in 1956 to 214 and 57 respectively.

At this juncture, the NCC and the Eastern regional government became apprehensive of the consequences that would follow from a

reduction in coal demand by the railway. In fact, the NCC in 1959 was to demand from the Federal government guaranteed minimum purchase of about 200,000 tons of coal per annum. [19] To prevent the coal industry starving to death, most of the locomotives on the eastern line continued to be steam engines up to the civil war, although the western and northern lines were by then largely deselized. The civil war removed the last constraint on the policy of dieselization. And in 1968 it was laid down that steam locomotives which had been written off should be replaced by diesel engines. With the complete phasing out of steam locomotives from the services of the NRC in the 1980s, the railway, has been transformed into an insignificant coal consumer.

Coal and the Electricity Corporation of Nigeria (ECN) now National Electric Power Authority (NEPA)

The next most important market for coal in Nigeria used to be provided by the Electricity undertakings. Between 1950 and 1959, coal consumption by the Electricity Corporation of Nigeria ('ECN') rose from 64,000 to 156,000 tons i.e. 11.6 to 24 per cent of total production. This situation was made possible as a result of the commissioning of new coal thermal stations at Oji River in 1956 and the Ijira B power station in 1957. Consequently, between 1961 and 1966 coal consumption by the ECN rose to an average of 182,000 tons per annum. The civil war affected both coal production and consumption by the corporation. [22]

At the end of hostilities in 1970 coal consumption was about 2,000 tons but by 1972 when ECN became the National Electric Power Authority (NEPA), demand for coal had risen to about 64,000 tons. By the following year, 1978/79, coal consumption declined to 43,190 tons and fell further to 14,000 tons by 1981. That supply was used mainly by the Oji River power station. The station now operates at a third of its pre war capacity. A major factor that worked against the NCC, was the fact that, NEPA, at the end of the civil war, found itself in a position to pick and choose which energy

resources it would employ for the future generation of electricity. But, judged by current development, it would appear, NEPA has finally opted for the utilization of Hydro Electric Power (HEP) and gas fired thermal station in the generation of electricity. This development has created further economic nightmares for the coal industry, as the earlier proposal to build four new coal fired power station at Oji, Makurdi, Onitsha and Gombe between 1987 and 1990 cannot now materialize as a result of the poor state of the Nigerian economy. Until these plans are implemented coal is not likely going to feature prominently in the future energy calculations of NEPA.

Nonetheless, on a long term basis, the Federal Government should assist the ailing industry by establishing at least one new coal fired thermal station in the coal belt. For one thing, if the Federal Government could, despite its present financial constraints continue to fund the building of more dams for hydro-electricity in the north, and the Egbin gas thermal station in Lagos; there could be no justification, therefore, for its failure to upgrade the Oji power station near Enugu to 120 megawatts as envisaged in the 1981-1985, Fourth National Development Plan. The N36 million which the Oji project would cost is but a mere 5.1 per cent of the 700 million budgeted for the Egbin gas thermal station. The reactivation of Oji power station would undoubtedly make for more diversified sources of electricity for the country in general and Anambra state in particular, which has presently embarked upon a massive plan of rural electrification.

Nigerian Cement Company Nkalagu (Nigercem) and the Demand for Coal

The Nigerian Cement Company, Nkalagu, (Nigercem) is presently the only assured market for coal in Nigeria. The company was commissioned in 1957, and between 1958 and 1966 its cement output rose from 112,000 to 500,000 tons. [21] During the same period coal consumption by the Nigercem grew from 30,600 to 50,000 tons. The Nkalagu cement

industry uses the "wet process of cement production which requires more fuel than the dry process." [22]

As a result of the civil war, the factory was shut down in mid 1967. Because of the extensive damage it suffered during the civil war, Nigercem could not start operation soon after hostilities ended. But owing to the importance of the cement industry to the reconstruction programmes of the then East Central State, (now Anambra and Imo States), the reactivation of the company was given top priority by the government. By 1977 cement output had reached 397,784 tons with corresponding coal consumption of 105,641 tons or 42.3 per cent of total coal output. The major factors that determined the siting of the cement industry at Nkalagu included the existence of extensive limestone deposits from which good quality Portland cement could be made. [23] The proximity of Nkalagu to the Enugu collieries, together with its good rail and road connections, have combined to make coal the most readily available and the cheapest sources of energy for the cement industry. For instance, in pre-civil war era, the total cost of delivering a ton of coal at Nkalagu was N6, compared to N11.50k for oil from the Port Harcourt refinery at Elesa-Eleme. 24 This comparative advantage of coal over other energy sources is likely to continue. To the NCC itself, the importance of the Nkalagu market need hardly be over-emphasized. From table 3, it is seen that coal consumption by Nigercem has generally been on the increase since the end of the civil war. Between

Table 2: Coal Consumption by Nigercem Nkalagu 1970/71 - 1981

Year	Total coal sales (tons)	Consumption by Nigercem	Consumption as % of total coal sales

1970/71	26,474	59,202	32.99
1971/72	179,453	120,617	37.42
1972/73	322,344	146,334	53.50
1973/74	273,498	146,334	53.50
1974/75	273,498	140,210	43.57
1975/76	296,321	115,121	47.27
1976/77	264,212	113,586	76.50
1977/78	240,272	121,094	65.43
1978/79	185,069	126,100	76.30
1979/80	165,259	81,084	77.70

1981	104,358		

Source: Sales Department, NCC Headquarters, Enugu

1971/82 and 1981, coal consumption by Nigercem has averaged about 53.1 per cent. The increased coal consumption was due largely to the expansion undertaken by the company in 1974 and 1977/78. [25] As a result, the Nigercem has become presently, the largest consumer of coal in Nigeria. Hence the commercial Manager Mr. U.O Okpara observed that nowadays, whenever Nkalagu sneezed the NCC caught cold. [26] To the Nigercem, coal is an important complement in the manufacture of the Nkalagu cement, and according to the Production Manager, Mr. G.C. Nwala, 'in the manufacture of 100 tons of cement, the coal/cement ratio is about 32 tons of coal to 100 tons of cement.' [27] This means in effect, that about one third of the raw materials required for the making of cement is coal. This complementarity of interest between the coal industry and the Nigercem is so inextricably linked that, indisputably, each needs the other for survival. The mutual interest would further be enhanced when the Nkalagu cement industry starts operating at its optimum capacity. More reassuring, however, is the fact that the Nigercem has no immediate plans to change to any other fuel than coal in the manufacture of cement.

Conclusion

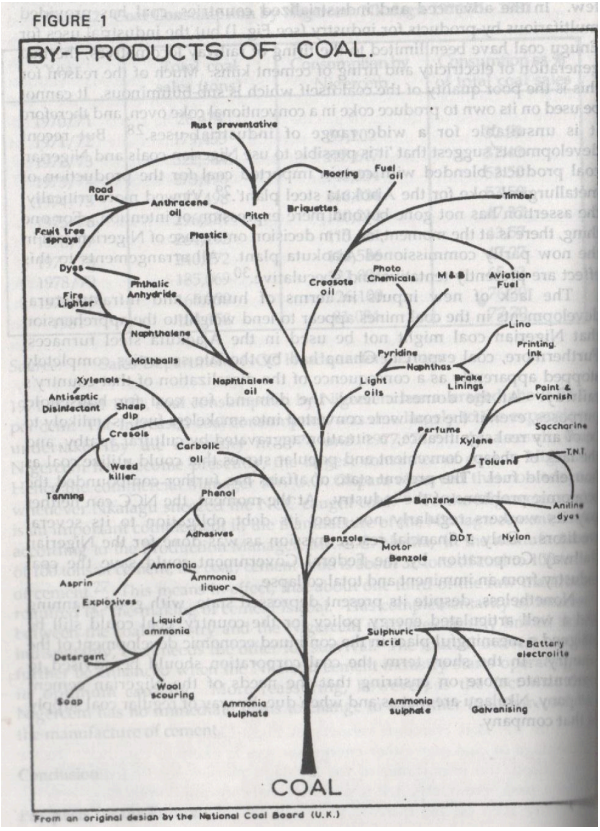
Prospects for the Future

It has been shown that the uses to which Nigerian coal could be put are few. In the advanced and industrialized countries, coal has provided multifarious by-products for industry (see Fig. 1) but the industrial uses for Enugu coal have been limited to the firing of railway locomotives, thermal generation of electricity and firing of cement kilns. Much of the reason for

this is the poor quality of the coal itself which is sub-bituminous. It cannot be used on its own to produce coke in a conventional coke oven, and therefore it is unsuitable for a wide range of industrial uses. [28] But recent developments suggest that it is possible to use Nigerian-coals and Nigerian coal products blended with certain imported coal for the production of metallurgical coke for the Ajaokuta steel plant. [29] Viewed more critically, the assertion has not gone beyond mere expression of intention. For one thing, there is at the moment, no firm decision on the use of Nigerian coal in the now partly commissioned Ajaokuta plant. All arrangements to this effect are presently tentative and speculative. [30]

The lack of new inputs in human and infrastructural developments in the coal mines appear to lend weight to the apprehension that Nigerian coal might not be used in the Ajaokuta steel furnaces. Furthermore, coal export to Ghana had by the late seventies completely stopped apparently as a consequence of the dieselization of that country's railway. At the domestic level, the demand for coal, for household purposes, even if the coal were converted into smokeless-fuel, is unlikely to be of any real significance, a situation aggravated by cultural apathy, and the lack of cheap, convenient and popular stoves that could utilize coal as household fuel. The present state of affairs has further compounded the economic problems of the industry. At the moment, the NCC can neither pay its workers regularly nor meet its debt obligation to its several creditors. Only a financial rescue mission was done for the Nigerian Railway Corporation by the Federal Government, could save the coal industry from an imminent and total collapse.

Nonetheless, despite its present depressed state, with good planning and a well articulated energy policy for the country, coal could still be assigned a meaningful place in the continued economic development of the country. In the short term, the coal corporation should be advised to concentrate more on ensuring that the needs of the Nigerian cement company, Nkalagu are met as and when due, by way of regular coal supply to that company.



From an original design by the National Coal Board (U.K.)

On a long term basis, the central government should assist the ailing industry by establishing one new coal fired thermal station in the coal belt. Alternatively, the Oji power station should be reconstructed to ensure more diversified sources of electricity supply for the country. Oji's nearness to the Enugu mines and its possession of such infrastructure as the aerial

ropeway which could be easily reactivated, are its added advantages. In this end, increased power supply would accelerate rural electrification and industrialization. The use of Nigerian coal as blend with imported coke in the Ajaokuta iron and steel complex should not be ignored if found feasible. It is only our willingness to harness and utilize our coal resources that can usher in the expected industrial revolution and technological transfer.

Notes

1. For a more detailed discussion of the state of Nigeria's energy resources see 'Towards a Comprehensive Energy Policy for Nigeria' Proceedings of the Energy Policy Conference, (Jos, August 2-4, 1978) National Policy Development Centre, Think Tank, Supreme Headquarters Lagos.

2. 'Mineral Survey of Southern Nigeria' Bulletin of the Imperial Institute, Vol.1, December 31, 1903, H.M.S.O. London p. 155. 'The New coal Field in West, Africa' Bulletin of the Imperial Institute vol. xiv 1916, H.M.S.O. London pp. 369-78.
3. Bulletin of the Imperial Institute vol.1 1903 ibid.

4. Bulletin of the Imperial Institute vol. xiv 1916 ibid.

5. Powell Duffryn Technical Services Ltd., 'Prefeasibility study for the expansion of the operations of the NCC, London, 1973, p.7.

6. Ibid.
7. J.O. Ahazuem, 'The Nigerian Coal Industry and Economic Development in Nigeria 1915-80 (M.Litt. Thesis, University of Birmingham 1986) Chapter 1.

8. A.H.M. Kirk-Greene, *Lugard and the Amalgamation of Nigeria: A Documentary Record* London, 1968, p.102.

9. Colonial Annual Report No. 920, London, 1915, p.10.

10. Annual Report of the Colliery Development Lagos, 1938, p.8.

11. Crown Land Acquisition, File UDDIV 4/1/45, NAE for the two land cessations of 1915 and 1917, the colonial government paid $73 and $200 respectively to Ngwo chiefs including Chief Onyeama of Eke, as compensation for damaged houses, economic crops and trees and not for the ceded land itself.

12. Chief A.A. Oji, 68 years, ozo titled elder, community leader and retired chief auditor of the Nigerian coal corporation, interviewed at Enugu Ngwo on 13/11/86. See also Intelligence Report on the Ngwo clan, Agbaja Area CSE 1/85/6114; Intelligence Report on North Akanu villages, Milgov 5/1/14 NAE.

13. NCC Annual Report, Enugu 1971/72, p.11.

14. The Fitzgerald Report' Colonial Reports HMSO, London 1951. Also see Report of the Commission of Enquiry into the Disorders in the Eastern Provinces of Nigeria HMSO, London November, 1949.

15. The NCC Ordinance No. 29 of 1950. NCC Headquarters Enugu. These became the Electricity Corporation of Nigeria (ECN) under ordinance No. 5 of 1950, National Electric Power Authority (NEPA) by Decree No. 24 of 1972.

16. The first study of the Railway's changing to either electricity or diesel traction was undertaken in 1945 but was only implemented in 1954. Nigerian Railway: Report on the Economics of Electrification or Dieselization of the sections - Ibadan and Port Harcourt - Enugu, Routes and Particulars of Traffic, NCC Headquarters. Also NRC Annual Reports 1950-74 and Annual Abstract of Statistics 1963-75, Federal Office of Statistics, Lagos.

17. By 1966/67 the direct running cost for diesel engines stood at 54.8K per engine mile as against 115k per engine mile for steam locomotives. In 1972/73 the direct running cost for diesel engines stood at 34k per engine mile while that of steam engine was 222k. NRC Annual Report 1973/74 pp. 25-26.

18. NCC Annual Report 1958/59 p.6.

19. Dr. M.I. Okpara, Premier Eastern Region, "Call for National commission on coal" The Coal Miner, June, 1963, p.l. Dr. Okpara, now late, condemned the undue haste at which the Federal Government pursued the dieselization policy of the railway and the use of gas for the generation of electricity.

20. *Became NEPA in 1972, see footnote 6.

21. "In fact, the Ijora 'B' coal thermal station in Lagos is now in the process of being dismantled in readiness for the new role as NEPA's training school.

22. S.U. Ugoh, "The Nigerian Cement Company" Nigerian Journal of Economic and Social Studies, vol. 6. No. 1 March, 1964, pp. 73-91.

23. Ugoh, ibid.

24. Nigercem at a Glance, Thompson & Group Printers, Enugu (undated) p.l.

25. L. Schatzl, The Nigerian Coal Industry Nigerian Institute of Social and Economic Research, Ibadan, 1969 pp. 30-32. In 1978 the total cost of delivering a ton of coal at Nkalagu was N2.65k, while fuel oil from P.H. Refinery was N11.80k. NRC Tariff No. 8, January 1978 p. 151.

26. Nigercem at a Glance op. cit., p.3.

27. Personal interview with Mr. U.O. Okpara commercial manager, NCC on 15th December 1982.

28. Interview with Production Manager at Nkalagu on 23rd July 1984.

29. Memo from District General Manager's Office, Nigerian Railway, P.H., to Colliery Manager Udi, date 20th September, 1961 in file 'Coke' in Experiments Nigcoal 2/1/41 NAE. NCC Annual Report 1959/60 p. 2. NCC Annual Report 1960/61 p.13.

30. A welcome Address Presented by Mr. F.N. Ugwu, G.M. NCC, to the Opening session of a seminar organized by Management of NCC and the Nigerian Coal Miners' Union held on 1st - 2nd February, 1983, p.2.

31. Prefeasibility study of a Bulk Ore Terminal at Bonny, by Geological Consultancy Unit and Development Studies Programme, University of Ife, Ile Ife July 29th 1971 pp. 21-22.

32.

Appendix 1

Percentage Share of Energy Consumption

Source	1955	1960	1965	1966	1967	1968	1969
Coal	64.00	31.00	22.00	17.00	3.00	3.00	3.00
Hydro-Electric Power (HEP)	4.00	3.00	2.00	3.00	3.00	3.00	3.00
Natural Gas	-	-	6.00	8.00	10.00	9.00	19.00
Petroleum Products	32.00	66.00	70.00	72.00	84.00	88.00	77.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

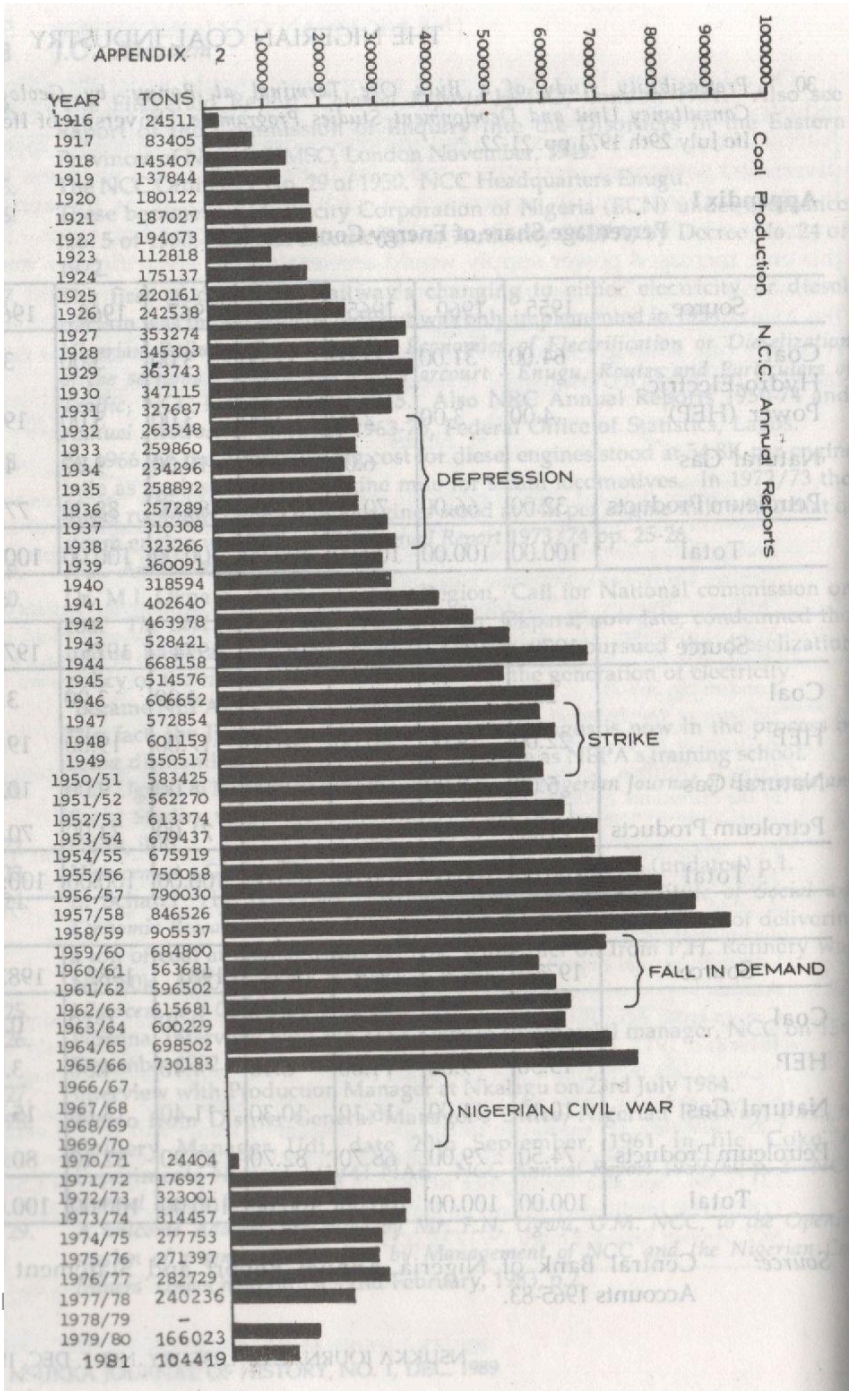
Source	1970	1971	1972	1973	1974	1975	1976
Coal	2.00	5.00	6.00	5.00	4.00	3.00	3.00

HEP	22.00	19.00	20.00	16.00	17.00	19.00	19.00
Natural Gas	5.00	7.00	8.00	9.00	8.00	9.00	10.00
Petroleum Products	71.00	69.00	66.00	70.00	71.00	73.00	70.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source	1977	1978	1979	1980	1981	1982	1983
Coal	1.90	1.00	1.20	0.60	0.30	0.10	0.10
HEP	13.50	9.00	14.00	6.40	4.40	4.50	3.50
Natural Gas	10.10	11.00	16.10	10.30	11.40	13.00	15.80
Petroleum Products	74.50	79.00	68.70	82.70	83.90	82.40	80.60

Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Central Bank of Nigeria Annual Report and Statement of Accounts 1965-83.


APPENDIX 2
YEAR TONS
1916 24511
1917 83405
1918 145407
1919 137844
1920 180122
1921 187027
1922 194073
1923 112818
1924 175137
1925 220161
1926 242538
1927 353274
1928 345303
1929 363743
1930 347115
1931 327687
1932 263548
1933 259860
1934 234296
1935 258892
1936 257289
1937 310308
1938 323266
1939 360091
1940 318594
1941 402640
1942 463978
1943 528421
1944 668158
1945 514576
1946 606652
1947 572854
1948 601159
1949 550517
1950/51 583425
1951/52 562270
1952/53 613374
1953/54 679437
1954/55 675919
1955/56 750058
1956/57 790030
1957/58 846526
1958/59 905537
1959/60 684800
1960/61 563681
1961/62 596502
1962/63 615681
1963/64 600229
1964/65 698502
1965/66 730183
1966/67
1967/68
1968/69
1969/70
1970/71 24404
1971/72 176927
1972/73 323001
1973/74 314457
1974/75 277753
1975/76 271397
1976/77 282729
1977/78 240236
1978/79 –
1979/80 166023
1981 104419
100000
200000
300000
400000
500000
600000
700000
800000
900000
1000000
Coal Production N.C.C. Annual Reports
DEPRESSION
STRIKE
FALL IN DEMAND
NIGERIAN CIVIL WAR

APPENDIX 3 HOME CONSUMPTION AND EXPORT OF COAL, Principal Consumers

Years	Total Coal Sales and Exports	MRC	%	ECN (NEPA)	%	Ports Authority	%	Govt. Users	%	Non-Govt Users	%	Export	%
1935/36	261,311	155,002	59.32	20,462	7.83	26,269	10.05	3,989	1.53	13,611	5.21	36,728	14.06
1936/37	311,762	188,219	60.37	21,812	7.00	31,356	10.06	2,752	0.88	20,648	6.62	46,975	15.07
1937/38	376,111	231,000	61.42	23,840	6.34	30,861	8.21	4,833	1.28	33,108	8.80	52,469	13.95
1947	553,950	265,617	47.95	-	-	33,386	6.03	NA	-	98,311	17.75	156,636	28.28
1948	521,159	302,079	57.96	-	-	34,664	6.65	-	-	87,110	16.71	97,306	18.67
1949	537,552	313,351	58.29	55,780	10.38	33,282	6.19	-	-	71,807	13.36	63,332	11.78
1950	549,727	362,583	65.96	63,521	11.56	28,871	5.25	28,871	5.25	71,720	13.05	2718	0.49
1951	575,757	293,618	51.00	71,292	12.38	26,089	4.53	20,198	3.51	65,955	11.46	98,605	17.13
1952	545,618	336,696	61.71	91,966	16.86	25,646	4.70	14,202	2.60	75,636	13.86	1472	.27
1953	611,190	402,644	65.88	105,951	17.34	24,757	4.05	5,140	0.84	67,627	11.06	5071	.83
1954	638,786	389,192	60.93	128,035	20.04	28,034	4.39	4,858	0.76	72,071	11.28	25,596	4.01
1955	755,105	413,187	54.72	152,866	20.84	18,583	2.46	4,586	0.61	65,907	8.73	99,976	18.24
1956	777,353	437,047	56.22	160,435	20.64	16,657	2.14	5,310	0.68	59,511	7.66	98,393	12.66
1957	757,877	437,753	57.76	150,868	19.91	10,926	1.44	4,531	0.60	53,039	7.00	100,760	13.30
1958	800,251	442,072	55.24	164,263	20.53	13,121	1.64	5,042	0.63	77,505	9.69	98,248	12.28
1959	657,964	335,484	50.99	155,819	23.68	12,762	1.94	7,400	1.12	71,938	10.93	74,561	11.33
1960	504,497	310,052	61.46	83,892	16.63	4,949	0.98	4,727	0.94	74,097	14.69	26,780	5.31
1961	534,049	226,348	42.38	147,078	27.54	1,282	0.24	1,446	0.27	106,854	20.01	51,041	9.56
1962	619,517	292,272	47.78	179,516	28.98	605	0.10	1,734	0.28	113,191	18.27	32,199	6.20
1963	554,580	241,653	43.57	151,703	27.35	655	0.12	2,286	0.41	150,252	27.09	8,031	4.45