THE BRITISH COAL MINING INDUSTRY

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Prior to the World War favorable environmental conditions made coal mining one of the more prosperous industries in the United Kingdom. Besides furnishing outward cargoes for vessels that returned with food supplies and raw materials for manufacture, coal is a valuable item in the total export trade of Britain. Owing to the increased coal production of the world, the changes in the centers of production, the political issues, and the use of alternative sources of power, the export of this commodity from Britain has fallen, and low prices have made it unprofitable to work many mines owing to high production costs. In addition, the industrial depression at home has materially decreased the demand for coal in Britain itself. These unfavorable economic conditions have largely offset the geographic advantages of the past and are mainly responsible for the present distressed condition of the British coal industry. Only by complete reorganization in methods of production and marketing can this industry regain its former importance.

TABLE I—BRITISH COAL PRODUCTION BY DISTRICTS.*

Districts	1913	1925
Pennine Group—		
Northumberland and Durham	56,352,000	43,448,000
Cumberland and Westmoreland	2,321,000	1,986,000
Lancashire and Cheshire	24,629,000	17,422,000
North Stafford	12,929,000	11,524,000
York, Derby and Nottingham	80,706,000	75,132,000
Midland fields	13,500,000†	10,074,000†
South Wales and Monmouth	56,830 000	44,630,000
Scotch Group—		
Ayrshire	4,689,000	4,120,000
Clyde Basin	23,313,000	16,994,000
Fife, Clackmannan and Lothian	14,454,000	11,914,000
Total—England and Wales	244,891,000	210,148,000
Total—Scotland	42,456,000	33, 028,000

* From U. K. Statistical Abstract, 1927, pp. 230-1.
† Estimated.

FIG. 1. Map showing coal fields of Great Britain. (*Courtesy of the Manchester Guardian Weekly.*)

DISTRIBUTION AND CHARACTERISTICS OF BRITISH COAL FIELDS

An examination of Figure 1 will show that the coal fields of Great Britain may be divided into three main groups:

A. Fields lying on or near the flanks of the Pennine Mountains.

B. Fields located adjacent to the coast of South Wales and Monmouth.

C. Fields of the Scottish central lowlands.

The comparative significance of these main groups and of the chief producing areas within each may be seen in Table I.

A. THE PENNINE GROUP

The Pennine group comprises five fields: (1) Northumberland; (2) Cumberland; (3) York, Derby, and Nottingham; (4) Lancashire and Cheshire; and (5) Midland fields.

Geologically these fields are closely interrelated. The oldest formation in the region is mountain limestone. This was overlaid by successive deposits of clays, coal, and magnesian limestone, in almost horizontal beds. Erosion, following the upfolding which formed the Pennine mountain system, removed the more recent deposits from the crest of the upfold and exposed in many places the mountain limestone. Thus, the beds of coal which originally were continuous across much of the area were divided into eastern and western groups. Subsequent deposition has effectively preserved the coal measures that outcrop on the flanks of the mountains.

(1) Northumberland and Durham Coal Field. This covers an area of 700 square miles. It extends along the coast for about 50 miles and inland to a maximum distance of 30 miles. There is an estimated reserve of 10,000 million tons. The seams, fairly regular in character and averaging from three to five feet in thickness, outcrop on the western flank, dip somewhat steeply towards the east, and continue under the sea. As shown in Figure 2, most of the largest mines lie near the coast and are of considerable depth. The mouths of the rivers Tyne, Wear, and Tees form nearby commodious harbors through which 70 per cent of the output is shipped. Blyth, Newcastle, Sunderland, and Middlesbrough handle the bulk of this trade. Deep water has been provided to permit the use of large ocean boats and modern loading machinery

has been installed to facilitate rapid loading (Figure 3). This field normally provides about one-third of the total export of the country.

The abundant supplies of coal, together with the accessibility of the area for the receipt of raw materials and for the distribution

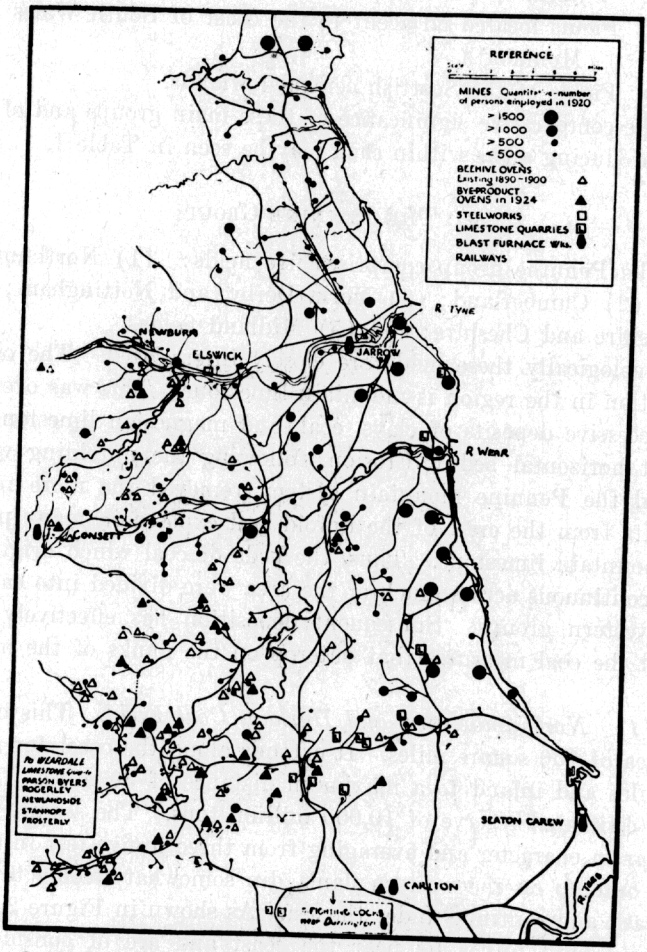

FIG. 2. Most of the large mines in Northumberland and Durham are located near the coast. (*Courtesy of Ll. Rodwell Jones.*)

of manufactured goods by sea and land, are the bases for the great industrialization of the region which provides employment for a dense urban population. Agriculture is of minor importance. Many of the smaller urban centers are almost entirely dependent upon the mining industry.

(2) The Cumberland Coal Fields. This comprises a narrow belt along the coast. The field is definitely limited on the east by pre-carboniferous rocks, but it extends westward under the sea and northward under Solway Firth where it becomes accessible again in southwestern Scotland. The estimated reserve of accessible coal in this area is 3,000,000,000 tons. The chief producing districts are around Whitehaven, Workington, and Maryport where artificial harbors have been constructed to facilitate coal shipments.

The lack of natural harbors, the rugged character of the hinterland, and the very considerable faulting that occurs in the coal measures are the more significant disadvantages.

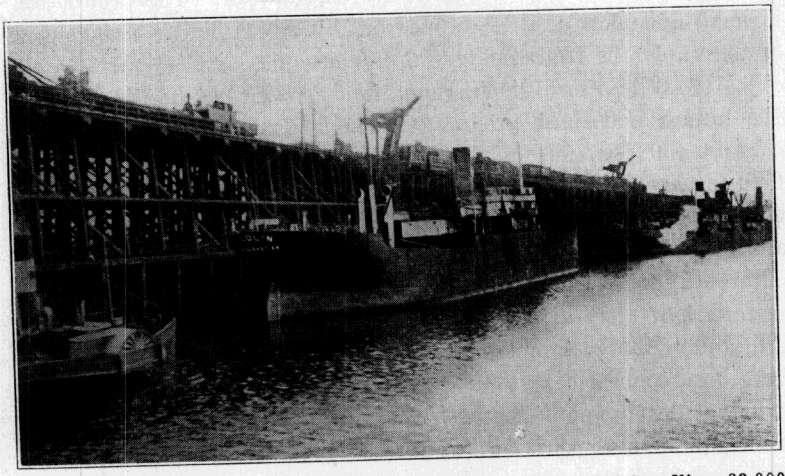

FIG. 3. One of the coal docks at Newcastle capable of handling 23,000 tons per day.

Except for its deposits of hematite iron ore which form the basis for an important iron and steel industry at Barrow, the area has little of economic significance. The population (approximately 1,000,000) is almost exclusively dependent upon the resources of coal and iron.

(3) Lancashire and Cheshire Coal Field. This field is divided into two parts. The northern area around Burnley and Blackburn is separated from the southern portion, which extends from St. Helens to Stockport, by an area of moorland, the Rosendale Hills, composed of millstone grit from which the coal has been eroded. The Pennines limit this field on the east, while extensive faulting renders the coal inaccessible to the west and south.

The location of this field relatively near to tidewater led early to the building of canals to facilitate the movement of coal to the Mersey. The chief producing districts are in the neighborhood of Bury, Bolton, and Oldham. Most of this coal is used in the local industries of which cotton manufacturing is by far the most important.

A southern extension of the Lancashire field occurs in North Staffordshire. Actually it belongs to the Midland group, but economically it is closely associated with the Mersey by way of the Weaver Canal. Practically all the coal produced is used locally, chiefly in the pottery industry. Similarly, the North Wales coalfield is a continuation of that of North Stafford. The production is small and most of it is shipped out by rail either as bunker coal or to supply the iron smelters at Carnarvon.

(4) The York, Nottingham, and Derby Coal Field. This is the largest and most productive coal field in Great Britain and contains 30 per cent of the total reserves of the country. The field covers an area of approximately 2,400 square miles, the boundaries being marked by lines joining Bradford, Goole, Derby, and Grantham. In the western half of the field the coal measures outcrop and have been worked for a considerable period. In the eastern half they dip down under a thick mantle of Magnesian limestone, Bunter sandstone, and Keuper marl, under which they have been concealed and effectively preserved. In recent years the trend of development has been eastward, and at the present time little production occurs on the western edge. The most productive and exploited area occurs down the center of the field near the eastern edge of the exposed coal measures. There the seams vary between 4 and 9 feet in thickness and consist of very high grade coal. At the present time 35 per cent of the total output of the country is mined in this field.

Owing to its inland location exports from the area are smaller and rail hauls longer than in the coastal fields. Consequently, the railroads, and to a smaller degree, canals, play a more important part in the distribution than elsewhere. Normally 20 per cent of the total production is shipped out through Hull, and 10 per cent through Liverpool. Of the remainder, the greater part is used in the local blast furnaces, steel mills, woolen mills, and other manufacturing industries which have grown up in this area and in the neighboring Midland industrial districts. In addition, the dense population creates a large demand for domestic coal.

As in the Lancashire-Cheshire districts large scale manufacturing industries are the dominant activities. Nevertheless, dairying and other types of specialized agriculture are significant, and provide employment for considerable numbers.

(5) The Midland Coal Fields. This group of four small detached coal fields occupies a roughly triangular shaped area in the western portion of the Midland Plain. They comprise the South Stafford, Warwick, Leicester, and Shrewsbury fields. The area is covered with New Red Sandstone which has weathered into a deep fertile soil. Consequently, except in those districts where the coal is sufficiently near the surface to be worked profitably, the area is agricultural in character and less dependent on coal mining than is the case in many of the other mining areas. On the South Staffordshire field intense industrial activity has developed based on local or imported raw materials. The coal consists of good grade bituminous varieties suitable for industrial purposes, and most of the output is consumed locally or in the surrounding areas. Excellent rail and good canal facilities are available.

B. The South Wales Coal Field

The South Wales field covers an area of 1000 square miles and extends from St. Brides Bay on the west to Monmouth in the East, a distance of 90 miles. This is the most important coal field of Britain.

Surface conditions throughout the region are rugged, and in many places the upland extends to the coast breaking the continuity of the rather narrow coastal plain. The rapidly flowing Usk, Taff, Tawe, Neath, and their tributaries have cut deeply entrenched valleys along the sides of which the coal seams outcrop (Figure 4). These valleys and the intervening barren highlands make east-west communications difficult. Nearly all the railroads are built along the valleys, sometimes on each side of the stream, but down grades to the coast facilitate the shipment of the coal. Many of the valleys terminate near good harbors, around which the great metallurgical industries and coal docks are located (Figure 5). Owing to favorable shipping conditions most of the coal is moved out of the area by water rather than by rail. Normally 75 per cent of the total output is exported. Cardiff handles more than 50 per cent of the trade; Newport, Swansea, and Port Talbot, the bulk of the remainder. The coal-handling

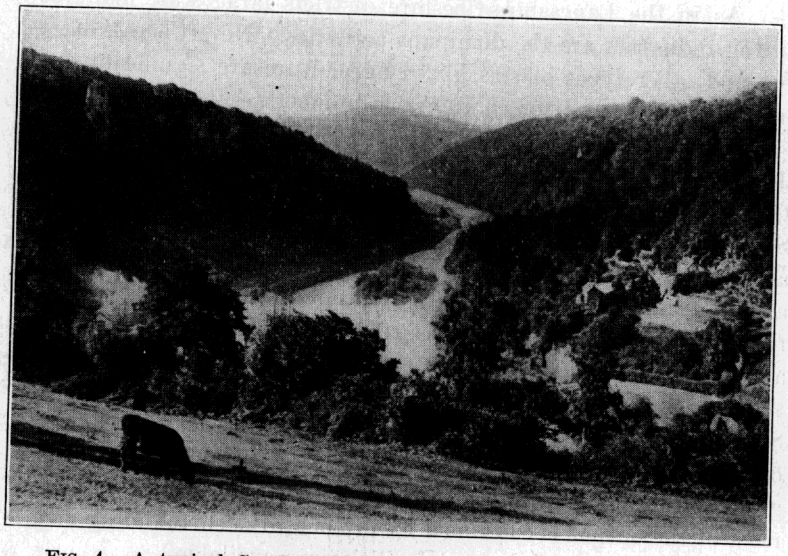

FIG. 4. A typical South Wales valley. The railroad may be seen on the right bank of the river.

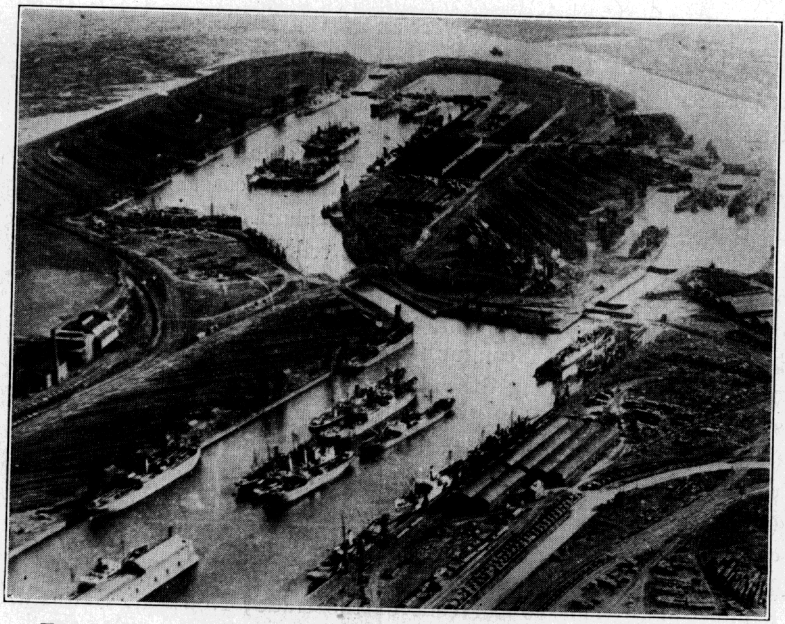

FIG. 5. An airplane view of Cardiff harbor. The coal docks may be seen on the left.

facilities of these ports have been brought up-to-date, and adequate provision has been made for handling a large tonnage expeditiously (Figure 6). Most of the mining as well as many manufacturing industries are carried on at the present time in the valleys. The towns are usually only long rows of houses, built close to the hillsides where the sun seldom reaches them. Over-crowding and cheerless conditions prevail throughout most of the mining districts. Sheep raising on the uniformly infertile uplands is the only form of agricultural activity.

The main coal field occupies a synclinal basin in which the seams dip somewhat steeply, especially on the south. The coal measures contain from twelve to forty seams with an aggregate thickness of from 21-120 feet of coal. Workable seams extend to depths of more than 4000 feet. Since most of the outcrops have

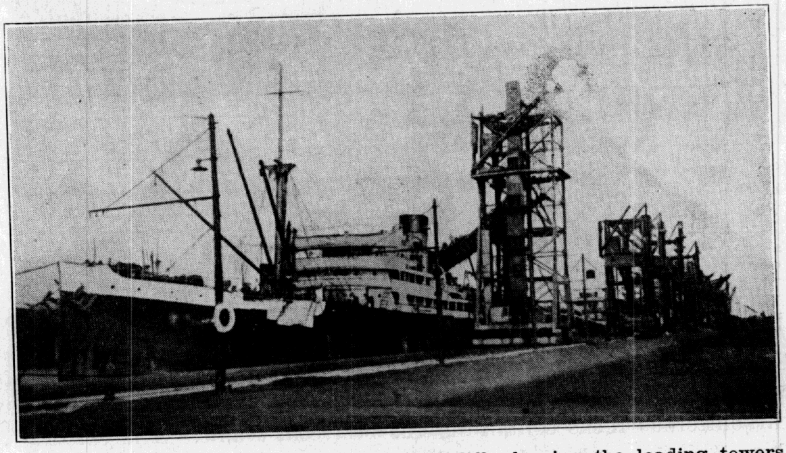

FIG. 6. One of the coal docks at Cardiff, showing the loading towers and chutes into which the coal is dumped from the cars.

been exhausted, shaft mining at considerable depths is now the chief mining method employed. This is true of most of the British fields. Several varieties of very high-grade coal, ranging from bituminous to anthracite, are produced and their high quality gave them a veritable monopoly in the markets where they were sold. In general, the coal becomes more anthracitic in character from east to west, bituminous coal in the east, smokeless steam coal in the central parts, and anthracite in the west (Figure 7). Approximately 30 per cent of the reserves are bituminous, 47 per cent steam coal, and 23 per cent anthracite. These are estimated to amount to 30,000 million tons.

Geologically, the strata are more disturbed than those of any other British coal field. Faulting, loose jointing, and rotten roofs make mining more hazardous than usual. The seams, particularly in the anthracite districts, are irregular and their continuity is interrupted. The dry, fiery character of the coal dust is a serious handicap. Consequently, large scale operations are difficult and mining is more costly than in other parts of Britain.

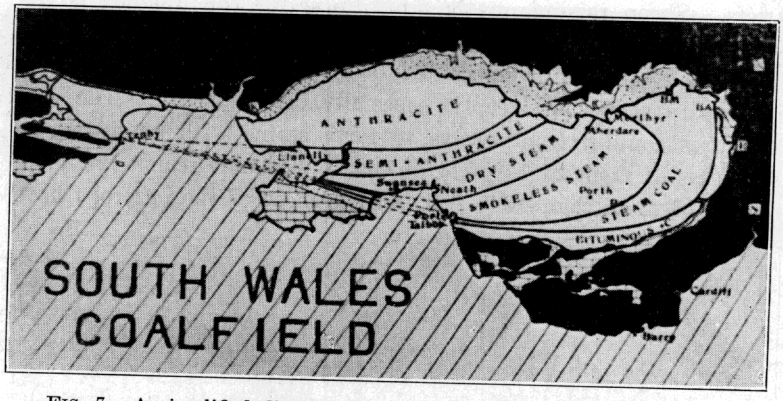

FIG. 7. A simplified diagram showing the varied character of the coal in the South Wales field.

C. THE SCOTTISH COAL FIELDS

The coal of Scotland is confined practically to the Central Lowland. Formerly, carboniferous rocks, covered by volcanic and glacial deposits, extended throughout the region. Erosion, subsequent to the formation of the rift valley, removed most of these carboniferous rocks containing the best coal seams. The existing deposits occupy three basin-like areas within which the coal has been preserved.

The most westerly of these deposits is known as the Ayr Basin. Most of the output, some 4,000,000 tons annually, is exported from Androssan, Ayr, Irvin, and Troon to Northern Ireland, chiefly to Belfast.

The second and most important deposits, since it supplies half the total Scotch production, extends along the Clyde Valley for some twenty miles above Glasgow and northeastward under the Forth to Clackmannan. This coal, eminently suitable for metallurgical purposes and for gas production, lies near the surface and can be mined easily. The effectiveness of communication by sea, river, canal, and railroad, the high grade of the coal, together

with local and imported supplies of raw materials, have favored intense industrial development there.

The eastern deposit, in the Fifeshire Basin, extending under the Forth from Midlothian to Fifeshire, and separated from the Lanark Basin by a ridge of volcanic and older rocks, has been worked less extensively than either of the others. Since it contains almost half the total Scottish reserve, a fuller development may be expected as the Lanark supply is depleted. The total Scotch reserves amount to some 20,000 million tons.

In addition to great diversity in manufacturing, agriculture is one of the basic activities of the region. Rich soils derived from volcanic, glacial, and other sources, a not unfavorable climate, and a dense urban population which constitutes a large local market, have been important factors in its development.

CONDITIONS FAVORING COAL PRODUCTION

British coal fields are located advantageously in respect to their utilization. The enormous demand for coal created by the great industrial development of the country, which has taken place either on or near the coal fields themselves, has stimulated mining. Excellent railroad transportation has been provided, so that coal can be distributed readily to any part of the country. Since all the coal fields are either adjacent to, or within easy reach of, tidewater and good harbors which have been equipped to handle coal in bulk, there is a large movement of coal by water. The proximity of Britian to the great industrial and densely populated areas of Western Europe, the abundant and uniformly high grade of the coal, the world-wide British commercial interests, and a large merchant marine, have been important factors in the development of a large export trade in coal.

At present these advantages are largely offset by an increasing cost of mining resulting from deeper mines and thinner seams, by the increase in railroad rates in recent years, and by the competition of more recently developed mining regions in continental Europe where cost of production is lower.

Great Britain has large supplies of high-grade coal suited for the many purposes of a highly industrialized country. The character of the coal varies both in the different areas as well as within the individual fields, but it is uniformly high in quality. In South Wales smokeless or anthracitic varieties predominate. South-

west Durham is famous for its high-grade coking coal. The cannel coals of Scotland are excellent gas coals.

The estimated reserves of workable coal in Great Britain are 180,000,000,000 tons, or sufficient to last several hundred years at the present rate of production. Approximately 60 per cent of the coal is in England, the principal reserves being in the Pennine and South Wales regions[1].

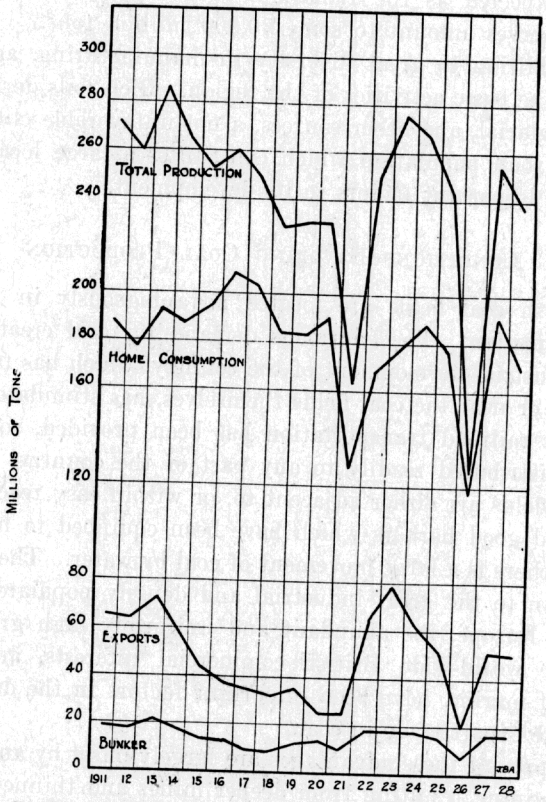

FIG. 8. Graphs showing the production and utilization of coal in Great Britain from 1911 to 1928, based on Board of Trade data. Imports of 20,000,000 tons in 1926 account for the apparent discrepancy in the total production and consumption for that year.

TRENDS IN PRODUCTION

Prior to 1914, the world production of coal was increasing at the rate of 30 million tons per year, and this had been a constant factor in the organization of the industry. The steady advance was interrupted only by strikes and temporary depressions in business.

[1] Sargent, A. J.; *Coal in International Trade*, pp. 16-17.

and the resumption of normal conditions soon made good any losses which had occurred in the meantime. As a result, more miners were recruited year by year, workings were extended, new mines were opened, and facilities for production were increased. In all the great coal-producing countries productive capacity was being increased constantly to take care of the expected increase in demand.

In Great Britain the peak was reached in 1913 with a total of 286,000,000 tons (Figure 8). From that time there has been a decline. In 1928, production was only 237,000,000 tons, a decrease of 49,000,000 tons. About four-fifths of this difference was due to

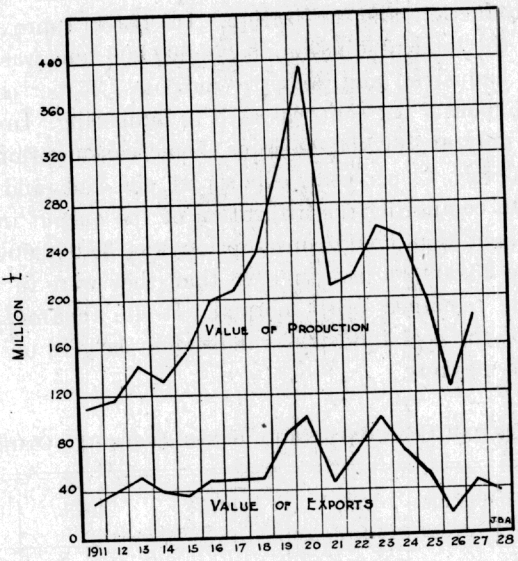

FIG. 9. Graphs showing the trend in the value of coal between 1911 and 1928, based on Board of Trade data. It is estimated that costs of production have trebled since 1913.

the loss of exports. Except for 1926, when the mines were closed for seven months because of a national stoppage, the year 1928 can be considered the worst on record and probably will prove to be the critical turning point in the organization of the industry. The depressed condition of British manufacturing industries as a whole resulted in a decreased demand for coal for home consumption. This is particularly true in the case of the heavy industries, especially iron and steel, all of which are suffering as a result of foreign competition and loss of markets due to the dislocation of trade occasioned by the war.

Owing to the low price of coal (Figure 9) and high operating costs resulting from irregular working, it is estimated that since the end of 1926 the coal industry has been carried on at a loss of more than $70,000,000. Table I shows the production of coal in Great Britain by districts for 1913 and 1925. From this it will be seen where the chief decline in output occurred. Conditions in 1928 show still greater decreases compared with those of 1913, but complete data for individual districts for 1928 are not available.

UTILIZATION OF BRITISH COAL

A comparison of the graphs in Figure 8 will show the relation between production and utilization. In 1913, approximately 67 per cent of the total production of 286,000,000 tons was utilized in Britain for industrial and domestic purposes, 25 per cent was exported, and about 7 per cent was used in bunkering. In 1928, with production only at 237,000,000 tons, home consumption took care of approximately 72 per cent, exports 21 per cent, and bunkers 7 per cent. On comparing the utilization of the output in these two years it is seen that home consumption was 38,000,000 tons and exports were 23,000,000 less in 1928 than they were in 1913. The bunker trade remained fairly normal. It is apparent that the prosperity of the coal industry is dependent largely on foreign as well as home markets.

TABLE II—BRITISH COAL EXPORTS BY KINDS, INCLUDING OTHER FUELS.*

Kind of fuel	1913	1925	1928
Coal—	Long tons	Long tons	Long tons
Anthracite	2,976,000	3,014,000	3,157,000
Steam coal	53,619,000	38,281,000	34,866,000
Gas coal	11,528,000	6,820,000	6,518,000
Household coal	1,770,000	1,710,000	1,757,000
Other coal	3,507,000	2,992,000	3,757,000
Total tonnage	73,400,000	50,817,000	50,055,000
Total value (£)	52,000,000	50,000,000	39,000,000
Coal shipped for use of steamers engaged in foreign trades	21,024,000	16,436,000	16,729,000
Coke	1,235,000	2,112,000	2,596,000
Manufactured fuel	2,053,000	1,160,000	1,032,000
Total	24,312,000	19,708,000	20,357,000

* British Official Trade Returns, 1913, 1925, 1928.

The nature of the export trade is shown in Table II. Under normal conditions prevailing before 1914, coal provided one-tenth of British exports in value and about four-fifths of them in volume. It furnished an outward bulk cargo for a large amount of shipping which returned to British ports with supplies of foodstuffs and raw materials so necessary to Britain. As a result, freight rates were considerably lower than they would have been otherwise, and this was reflected in the price of imported commodities. Owing to Britain's world-wide trade and her large merchant marine, it is essential that cheap bunkering coal be available along the lanes of ocean commerce. The transportation of this coal, likewise, provides outward cargoes to all parts of the world, and the returning vessels normally experience little difficulty in picking up a bulk cargo of some commodity needed in England. Foreign vessels also are attracted to British ports by cheap bunker coal and constitute an outlet for very considerable tonnage. An examination of Figure 8 will show that fluctuations in the bunker trade have been slight even under present conditions.

TRENDS IN EXPORT TRADE

The chief two European coal-producing countries in 1913 naturally provided the greater part of the surplus for export. The chief deficit countries were France, Austria, Hungary, Italy, Holland, Denmark, Belgium, Spain, and Scandinavia. Of these, Italy was supplied by sea, Austria and Holland by land, and Belgium and France by both land and sea. Of the two surplus regions, Germany dominated the land trade of Central Europe, owing to the strategic location of her producing areas in Westphalia and Silesia. Britain monopolized the Mediterranean markets. In the countries on the western margin of the continent there was competition between the two sources of supply. Figure 8 shows the trend in British exports from 1911-1928. In drawing conclusions from this graph it should be borne in mind (1) that war conditions led to a restriction of exports from 1914-1919, (2) that conditions in Germany in 1923 stimulated British exports, and (3) that the seven-month British stoppage in 1926 was responsible for the small export of that year, and for a very considerable import.

The year 1925 may be taken as representing post-war trading conditions in making comparisons. Table III shows the distribution of British coal exports for the years 1913, 1925, and 1928. A comparison of the overseas trade in 1913 and in 1928 shows in

which of the markets the falling off has been most serious. Actually European countries are consuming more coal than in 1913, but Great Britain is not supplying these increased needs. She is the only country in Europe whose production has decreased, and her situation is rendered all the more acute because her capacity to produce is much greater than it was in 1913. The decreased output is due to the loss of a relatively large part of her share in the world's trade. French consumption has increased by 6,000,000 tons, but in 1928 imports from Great Britain were 2,000,000 tons below normal. In 1913, England supplied 9,000,000 tons to Italy. In 1928, only 6,600,000 tons were shipped, yet the consumption of coal in Italy had increased from 10,000,000 tons to 15,000,000 tons. Political considerations rather than geographic conditions are responsible largely for these reductions. Owing to the high prices of 1921 and 1922, which resulted from a shortage in supply (Figure 9), European countries were encouraged to economize in the use of coal, and to increase the productive capacity of their own mines. Some, especially Poland, have begun to build up an

TABLE III—DISTRIBUTION OF BRITISH COAL EXPORTS.*

Country	1913	1925	1928
	Long tons	Long tons	Long tons
France	12,776,000	10,235,000	9,065,000
Italy	9,647,000	6,811,000	6,622,000
Germany	8,952,000	4,165,000	5,368,000
Denmark	3,034,000	2,783,000	1,731,000
Sweden	4,563,000	2,727,000	1,540,000
Belgium	2,031,000	2,486,000	2,260,000
Irish Free State		2,244,000	2,423,000
Spain	1,749,000	1,756,000	1,867,000
Norway	1,509,000	1,750,000	1,117,000
Holland	1,397,000	1,527,000	2,434,000
Portugal	871,000	851,000	961,000
Greece	438,000	610,000	637,000
Finland		521,000	370,000
Russia	5,998,000	64,000	24,000
Total to Europe	62,510,000	39,194,000	36,985,000
Total to South America	3,284,000	4,214,000	4,776,000
Total to other countries	7,606,000	7,409,000	8,294,000
Total exports	73,400,000	50,817,000	50,055,000
Total production	287,000,000	243,000,000	237,000,000

* British Official Trade Returns, 1913, 1925, 1928.

export trade. All those with coal resources have put their mines in order and materially increased their production. The effects of these improvements are making themselves felt to Britain's disadvantage. German reparations in coal to France, Belgium, and Italy have helped to reduce British exports to those countries. Special rebates on government railroads enable some of the continental producers to compete successfully with British water-borne coal. As a result of this combination of circumstances, British exports in 1928 were 23,000,000 tons less than in 1913. The Bristol Channel and Northeastern ports suffered most in this great contraction in the export trade.

The coal trade has been affected by a variety of other factors, chief of which are fuel economy and the competition of other sources of energy—oil, gas, and water-power. These have affected both home and foreign consumption. High prices and actual shortage during the world war drew the attention of consumers to the need for increased fuel economy. The results of these efforts are now making themselves felt after the high prices and deficiency conditions have disappeared. Within the last few years there has been a 25 per cent increase in efficiency in the consumption of coal. This has been particularly noticeable in the electrical utilities and in the iron and steel industry. In 1906, a unit of electricity necessitated the consumption of 18.5 lbs. of coal. In 1926, the average consumption was 2.53 lbs. per unit. At the present time electric utilities in Britain utilize 8,000,000 tons of coal a year, while in 1906 the same output would have necessitated 50,000,000 tons. One of the chief means by which this has been accomplished has been the replacement of small isolated plants by large central units.

Present developments point to further increases in coal efficiency. The production of gas per ton of coal used has been materially increased. Improved boilers and equipment have enabled the railroads to increase the power derived from each ton of coal by 22 per cent. The consumption of coke in the iron and steel industry has decreased by 15 per cent in 10 years. Improved coking processes, the utilization of by-product gases and waste heat, the development of continuous processes, and up-to-date equipment have made this economy possible.

The use of hydro-electric power is being rapidly extended wherever environmental conditions permit, and particularly in those countries of Europe that have no coal resources or only in-

adequate supplies. In 1925, the amount of water power actually used in Europe was equivalent to 28,000,000 tons of coal, or about one-ninth the British production of that year. Many British markets are affected by this substitute for coal. South America has increased her developed waterpower by 59 per cent and Africa by 27 per cent. Norway, Sweden, and Italy have made notable developments in this respect.

Another significant factor affecting the British coal trade, particularly that of South Wales, has been the increased use of oil for ship propulsion. Each oil-burning warship represents a loss to the coal industry of about 1,500,000 tons per year, and each oil-burning liner a loss equivalent to the total output of an average mine.

LABOR AND SOCIAL ASPECTS OF DEPRESSION

In 1913, when the output was 287,000,000 tons, upwards of 1,100,000 men were employed in the industry. By 1925, production had fallen to 243,000,000 tons but the number of wage earners was still in excess of 1,100,000. In 1928, the number employed dropped to 900,000 men, a decrease of 60,000 compared with 1927. Since 1925, some 200,000 skilled and semi-skilled coal miners have been thrown out of work, and most of those remaining in employment have been on part time.

Lack of demand led to the closing of 502 mines in 1927. This threw 56,000 miners out of work. In 1928, still more were closed, and there was a further increase in unemployment. The trends of production and numbers employed during 1928 for Great Britain as a whole and for South Wales are shown in Figures 10 and 11. The graphs show clearly the marked decrease in employment. They also show the effect which the installation of improved equipment is having upon production. The output per man is being increased, with a consequent reduction in costs.

One of the outstanding social problems has to do with the surplus mining population. It is generally recognized that the industry is overmanned to the extent of 200,000 men. The seriousness of this situation may be seen more clearly when it is realized that in many cases large towns and villages are entirely dependent upon local mines around which they have grown up. The closing down of many of these mines has thrown almost the entire local population out of work. At one time, with a population of 10,000, Brynmawr had only 400 employed persons, none of whom were

miners. At West Auckland, in Durham, 6,000 people were dependent upon two collieries. One has been closed for five years, the other for three years. Neither will open again. Nine-tenths of the 1,400 homes are poverty-stricken. In normal times these were prosperous communities, many of the miners owning their own homes which had been purchased through local co-operative societies.

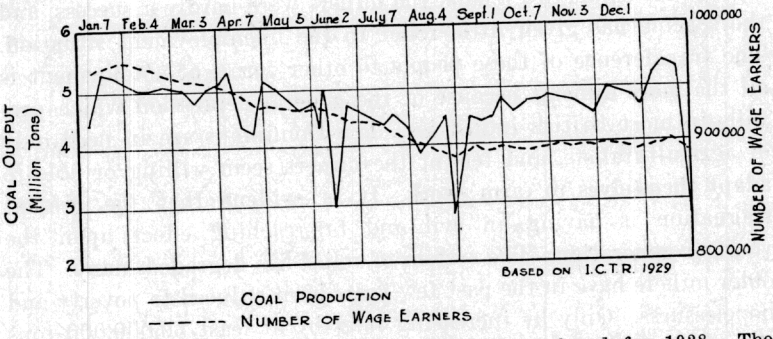

FIG. 10. Trends in production and numbers employed for 1928. The graphs are based on weekly totals.

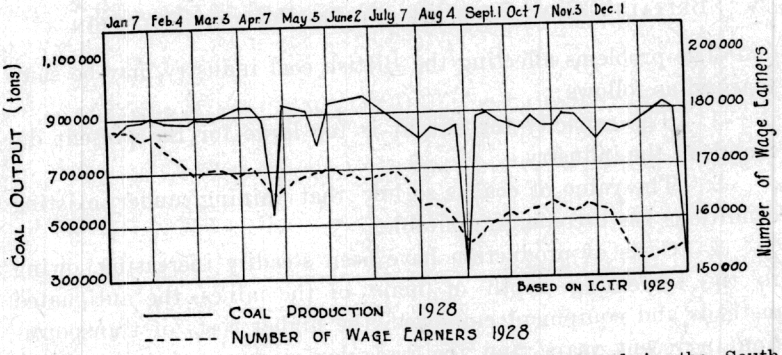

FIG. 11. Trends in production and numbers employed in the South Wales coal field in 1928, based on weekly totals.

There are many such cases where mines supporting similar communities have been closed down for as much as four years. Many of these mines will never reopen. The question of what to do for these communities presents a very serious problem. To move the people to other districts would intensify employment problems there. In many districts miners have been on half time or less for several years and their condition is tragic. Government relief barely enables the unemployed and their dependents to exist.

Most miners have long since exhausted their benefits under the National Unemployment Insurance scheme which provided unemployment pay for a period of months, and towards which the miner pays a weekly contribution when employed.

Relief in almost every form has been, and in many communities still is, necessary to keep these people from actually starving. The Miners Union has long since exhausted its funds. As harvest hands in Canada, the miners were hardly a success, and the scheme has given little relief to the unemployment situation. The transference of these people to other forms of employment is all the more difficult because of the general depression which prevails in most British industries. The Dominions are in need only of agriculturalists, and few of the miners seem willing or able to adapt themselves to farm work. It is evident that the present stagnation is having an evil and far-reaching effect upon the younger generation. The system of relief has degraded many. The older miners have in the past few years been reduced to poverty and hopelessness. Only by increasing sales by at least 50,000,000 tons per year can the present mining population be employed.

BRITAIN'S COAL PROBLEM AND ITS POSSIBLE SOLUTION

The problems affecting the British coal industry may be summarized as follows:

1. The capacity for output is too large for the present demands of the industry.

2. The value of coal is so low that mining under existing conditions has become unprofitable.

3. Costs of production have been steadily increasing, owing to the increasing depth of many of the mines, the antiquated methods and equipment employed, the higher costs of transportation in recent years, and the irregular working of most of the mines.

4. Too great a number of competing units under existing trade conditions has resulted in uneconomic marketing.

Any schemes for the solution of the present difficulties must take these factors into consideration. In view of the fact that Britain's productive capacity is equal to 300,000,000 tons per year, it is clear that either the national output must be regulated to meet the market demands or the export trade must be stimulated and expanded to take care of the surplus. Owing to the excess of coal available, not only in England but also in Germany and Poland,

values have fallen below the level at which many British producers can operate satisfactorily. Therefore, mining costs must be reduced to a point at which Britain can compete on favorable terms with continental producers. While Britain is still the chief source of supply for over-seas requirements, she is faced with far keener competition than formerly. Germany has increased her exportable surplus. Poland has become an important factor in the international coal trade. Both countries have improved their facilities for coal production and shipment. Both give preferential railroad rates on coal. Consequently, British coal operators are faced with the problem of reorganizing their units and the marketing aspects of their industry, and of reducing their costs by the elimination of wasteful and antiquated methods of production.

At the present time considerable progress has been made in respect to consolidation with the view of eliminating the less productive mines and concentrating upon those where conditions favor a larger output at lower cost. In the anthracite area 85 per cent of the production is now under one control, The Amalgamated Anthracite Collieries, Ltd. This organization includes some 200 mines, employing 136,000 workers. The better mines are being improved, equipment brought up-to-date, and the tonnage per man per shift increased. One selling organization eliminates uneconomic competition, and orders are distributed among the mines to better advantage. As a result conditions look more hopeful in this part of the country.

Under the "Five Counties Scheme" the collieries of Yorkshire, Derbyshire, Nottinghamshire, Cheshire, Cannock Chase, Leicester, North Stafford and Warwickshire, with an annual output of about 100,000,000 tons, are affiliated in what is known as the Central Collieries Commercial Association. The organization aims to regulate the output of each colliery by allotting a definite quota to all, subject to revision each month. A levy based on output is made on all members to subsidize the export trade. Export bureaus and port committees of colliery representatives are maintained at Liverpool and Hull to supply regular information as to the state of the export market. These bureaus conduct the export business at a fixed remuneration. The internal sales of this group are being handled in a similar manner. It is expected that this concentration of the sales organization will effect considerable economy in operations, eliminate uneconomic competition, and facilitate the development and extension of the export trade. This

marketing scheme is comparable with that set up by the great continental producers, particularly the Rhenish Westphalian Coal Syndicate, which has successfully stabilized prices and regulated mining operations in Germany. Similarly, sales organizations in Poland are in a few hands, effectively restricting inland competition, and assisting the development of an export trade. Belgium and France are adopting the same practices.

Scottish operators have instituted a similar scheme with the same general objectives. Output has been restricted and competition has been reduced. By voluntary agreement some of the least effective mines have been closed and their owners compensated out of a levy raised for the purpose.

These schemes for centralized control have met with some success. Over production has been checked, more up-to-date mining methods are being employed, and the opening up of new mines has been restricted. By reducing taxation temporarily, the Government has helped to reduce the f. o. b. prices on export coal. It is hoped that eventually a national marketing scheme will be developed whereby (1) uneconomic inter-district competition will be avoided in the inland as well as the export trade, (2) the lost export trade will be recovered, and (3) new markets will be found in which British coal can be marketed profitably.