Coal Industry and the State.*

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THE world's production of coal in 1929 was around 1,560 million metric tons. It went down in 1932, the worst year of the depression, to 1,124 million tons and it has not yet attained the 1929 level. The current year may bring about complete recovery, seeing that a great stimulus has been given to the metal industries by intensive war activity in several of the most important countries of the world. The depression was shared by practically all countries, even by those whose currencies had depreciated, except perhaps in the case of the Soviet Union.

Since the last War vital changes have taken place in the ideas of individuals and nations in various directions. One of these is the relationship between private or company-owned industry on the one hand and the Government as representing the nation on the other. In the case particularly of the basic industries, the Governments of many countries have realised the need for co-ordination, supervision and control, and have put a stop to the individualistic *laissez faire* policy of former days. The coal industry presents an example of governmental control even in countries where private enterprise has the fullest freedom of action. It is proposed in this note to present a few salient facts regarding the organisation of the coal industry in a few important coal-producing countries. The information and figures given here have been taken mostly from papers presented before the third World Power Conference held at Washington D.C. in 1936, occasionally supplemented from other sources.

At one end of the picture is the Soviet Union where all sources of production, and agencies of distribution entirely belong to and are controlled by the Government. Whether the degree of co-ordination claimed has been achieved is a question the correct appraisal of which is difficult, because of the usually violent partisan attitude of most of the observers who have written about that country. At the other end are countries where all industries are run by private interests which are often powerful enough to control governmental policies. There are various stages in between these. As remarked above, the tendency of governments to control industry is now very evident in most countries, though the method of approach and the manner of achieving the control differ considerably.

Germany.

There has been some measure of control in the German coal industry for several decades past. The coal industry can be conveniently considered under two heads, bituminous coal and brown coal.

Proved resources of bituminous and higher rank coals in Germany, to a depth of 1,000 metres, are 87,330 million tons. Probable resources, to a depth of 2,000 metres, are estimated at 288,000 million tons. Of this total, 74 per cent. is said to be in the Ruhr area, 18 per cent. in Upper Silesia, 3·5 per cent. in Aachen, 3·2 per cent. in the Saar basin and 1 per cent. in Lower Silesia. Stated differently, 23 per cent. of the proved resources is semi-bituminous to anthracitic, 35 per cent. bituminous coking and 21 per cent. open burning long-flame coal and 21 per cent. gas coal.

In German mining law the ownership of surface is mostly divorced from the right to the mineral underground. The State has reserved for itself, in some areas, the rights for certain important minerals, *e.g.*, coal and salt. The mining regulations control safety and health of the workers, insist on support to the surface over mining areas and safeguard public welfare. Specific rules are in operation for the use of explosives and electric installations particularly in 'fiery' mines. The Provincial Mining Authorities have charge of making regulations to suit local conditions of mining. The mine operator has to submit plans of operation to the State Authorities and may proceed to mine if no objection is raised within fourteen days.

The State-owned mines contribute an important part of the output. Their share in the total production was over 17 per cent. in 1935, *i.e.*, 23·7 million tons out of a total

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of 112·5 million tons. This includes 100 per cent. in the Saar area, 80 per cent. in Lower Saxony (Hanover) and 8·6 per cent. in the Ruhr District.

The original form of enterprise in Germany, the "cost-book" company (bergrechtliche Gewerkschaft) is now superseded to a large extent, though in some districts it still accounts for 25 per cent. of the output. The stock company or "Aktiengesellschaft" is the most important in all the fields, though in Saxony and Upper Silesia the limited liability company has attained importance.

The earliest effort at control was made in the Rhine region, after several years of fluctuating prices and speculative mining activity, through the establishment in 1893 of the "Rheinisch-Westfalisches Kohlensyndikat" for price control and for ensuring stability in production. This was a co-operative voluntary organisation, on which was founded the State Law of August 23, 1919. District organisations were thus introduced which were members of a more general regional organisation and in which workers had representation. They regulated output and sale under the superintendence of the Coal Council (Reichskohlenrat). The Coal Council had 60 members, of whom 18 were workers' representatives and 13 consumers' representatives. The Trusts in the different mining districts were consolidated into a general coal organisation (Reichskohlenverband) in which both workers and consumers were represented. Under the law, this had supervisory powers over the District Trusts, especially in the matter of price control. The Coal Council had powers of approval over company contracts and could prevent uneconomic competition. By the Coal Mining Law of April 21, 1933, the Coal Council was dissolved and its powers assumed by the Reichsminister of Economy, who is virtually a dictator.

Since the War, the coal industry has had to meet increasing taxation and financial burden which was possible only through the reduction of operating costs by mechanisation and the consolidation of working units. The rationalisation scheme has been extended from the mining to the processing and manufacturing fields. Even in the year 1924, there were only 376 mining units and the number has been since reduced to 224 in 1934. In 1924, there were 6 mines with an output exceeding one million tons per year, and the number has steadily increased to 26 in 1934. Extensive mechanisation has enabled the output per man-shift to be increased by 60 per cent. between 1926 and 1935 (in Upper Silesia from 1670 kg. to 2435 kg. per man-shift).

In transportation, coal enjoys specially low railway freights which aid it to compete with foreign coal even when the haulage is long. Special tariffs are in operation for special areas or particular industries which suffer from handicaps (*e.g.*, domestic lead-zinc ores or Siegerland iron ores, etc.).

German Brown Coal.—The lignite industry of Germany is independent of the bituminous coal industry and is organised separately. Lignite is worked in open-cast quarries. The production in 1933–34 amounted to 147 million metric tons of which 33 million tons were pressed into briquettes. About half of the raw brown coal is consumed by electric power plants and over 20 per cent. by the chemical industry. Nearly 74 per cent. of the briquetted brown coal was used for household heating and for agricultural purposes. The available reserves (*i.e.*, excluding that under towns, canals, railways, etc., and also allowing 10 per cent. waste for surface mining and 35 per cent. for underground mining) have been calculated at 56,758 million tons.

The ownership of the brown coal deposits belongs to the State in some areas and to the surface owners in others (Prussia, Saxony, Hanover, Silesia). In Saxony, the State assumed the ownership of coal in 1919, except in the case of the mines actually working. Under the law of 1924, the mining rights for brown coal in Hesse-Nassau, Brandenburg, Saxony, Lower and Upper Silesia were reserved to the State. In other districts, however, private companies have the freedom of acquiring properties.

Under the Mining Law of February 28, 1935, all matters relating to mining come under the Supreme Authority of the Reichsminister of Economy. He is empowered to interfere on behalf of public welfare and safety and to control and fix selling price. The brown coal industry is controlled by three regional syndicates: Central German Brown Coal Syndicate with headquarters at Leipzig, East Elbe Brown Coal Syndicate at Berlin and Rhenish Brown Coal Syndicate at Cologne. There is also a local syndicate in Bavaria. The duties of the syndicates include regulation of output and the consumption and sales to their members. The

maximum prices are fixed by the Reichsminister who exercises powers of supervision and control. The syndicates sell to wholesale and retail dealers who have fixed areas for sale. The syndicates have agreed prices in overlapping areas and in areas where they compete with bituminous coal. The duties and rights of the members are defined in detail, and they are under discipline; they are liable to penalties or expulsion if they infringe the rules.

Belgium.

In Belgium the minerals belong to the surface owners but operators have to get a licence from the State which submits the applications to the Mines Council. Fixed royalties are paid on areas and on the net proceeds. Concessions may be ceded or transferred only with the permisison of the State. The properties are generally leased in perpetuity.

France.

France is estimated to contain about 20,000 million tons of workable coal. The coalfields are situated in the northern and north-eastern part of the country and also along a N.-S. line through the middle, the fields being called the 'Pas de Calais and Nord', 'Lorraine', and 'Centre et Midi'. The annual production averages 47 to 50 million tons of which 30 per cent. is good bituminous coal, 40 per cent. shaley high volatile coal and the rest semi-bituminous dry coal. The seams are rather difficult to mine, on an average 3 ft. thick, and at depths of 1,200 to 1,500 ft.

Minerals are governed by the law of April 21, 1810, by which the State gives concessions to individuals and corporations to work coal in the areas specified. Originally, this gave perpetual rights to the lessee with power to transfer it as property, but by the law of September 9, 1919, new concessions are granted for 99 years, a condition being that the State is entitled to excess profits ranging from 10 per cent. to 75 per cent. There is a tax on mines, which was in 1934 nearly 9 francs per ton of coal raised, *i.e.*, nearly 11 per cent. of the pit-mouth value of coal. The Mines Department has rights of supervision and control of the working methods.

There are no State mines. There are about 100 coal-mining companies, the average production per mine being about half a million tons per year.

Until about a decade ago the individual producers were left to themselves. In 1928, the necessity for price regulation led to the formation of the Sales Company of Lorraine coals (Charlor). It is the recognised selling organisation in a number of Departments. The "Comptoir Commercial des Houillère du Centre et du Midi" was formed in 1935. The "Comptoir d'expansion Commercial des Mines du Nord" has been reorganised and the three organisations have, by agreement, divided the markets amongst them from 1932. The country is divided into certain zones for sales purposes and the groups have adopted the percentage of sales in 1929–30 as the basis. If one group exceeds its percentage, a money payment is made to the group which is in deficit. Certain zones are also marked as special areas for each group in which the particular group can exceed its sales quota without paying the others. This arrangement has been functioning satisfactorily. For the purpose of control of this agreement an "Office of Coal Mining Statistics" has been formed. In case of dispute between the different groups, this Office refers the matter to an expert or to an arbitrator for decision.

France produces only about 70 per cent. of its requirements, the rest being imported. France imports about 30 to 40 million tons of coal per year, the import being regulated since 1931 by licence on which there is a tax on a tonnage basis. The licences are regulated under quotas for different countries from which the coal is imported.

Holland.

In Holland the State mines produce nearly two-thirds and the private mines one-third of the total output. The surface rights are separate from underground mineral rights. The State mines operate in much the same way as private companies, none of the employees in the mines being State officials. The only point of difference between these and private mines is that the capital is State capital.

There is a Council of Mines which advises the Minister of Mines. Except for Russia, Holland seems to have been the only country in Europe in which coal-mining suffered little during the depression.

Czechoslovakia.

The mineral rights in Czechoslovakia belong to the State and are leased out by

the State. The mines can be sold, transferred and mortgaged by the lessees with the consent of the State.

The State now operates a number of mines and was responsible for 4·5 per cent. of the output of bituminous coal and 12·5 per cent. of output of lignite out of a total production of 10·7 million tons of bituminous coal and 15·2 million tons of brown coal, in 1934. The mines have to pay 10 per cent. of the selling price of coal as tax. The State is empowered by law to regulate prices. There are sales organisations for the different districts, who control most of the output. The competition between the different districts is also under control.

Hungary.

As in Czechoslovakia, coal was a reserved mineral which belonged to the State, but since 1861, the rights passed on to the landlords. Working of the mines and the production are controlled by the mining authorities. Since 1932, the price is controlled by the "Price Analysing Committee," who fix it according to calorific value and freight. The Government fixes the price for lump coal and for briquettes.

China.

The coal reserves of China amount to 250,000 million tons of which 79·3 per cent. is bituminous, 19·3 per cent. anthracite and the rest (*i.e.*, 1·4 per cent.) is lignite. Shansi and Shensi contain about 80 per cent. of the total reserves. 75 per cent. of the present production of China proper (total 21 million tons) is bituminous coal. At the end of 1935, the coal areas leased out amounted to 15·68 million hectares, and the areas under Government operation 0·6 million hectares. In addition to a small rent on the basis of the area of the concession, there is a production tax of 5 per cent. of the sale value of the coal produced. The industry is run by Chinese and foreign capital, 68 per cent. being Chinese capital, 18 per cent. Japanese and the rest European.

A new mining law was promulgated by the Nankin Government in 1930, under which all mineral wealth belongs to the State. The surface owner has no underground rights. Licences for prospecting and mining are granted by the State, prospecting for 2 years and mining for 20 years, which may be extended for two periods of 20 years each. The working of coking coal is reserved to the State. In exceptional circumstances, however, if the State considers the areas or mines inoperable by themselves, the mines may be leased out to private companies. Plans for sales quota and limitation of the sales areas for groups of mines have been under consideration for some time.

Japan.

The coal resources of Japan are estimated at 18,000 million tons, and the country's annual production is about double that of India, mainly from Kyushu and Hokkaido, which necessitates rail and ship transport. The transhipment is now done to a large extent mechanically and considerable attention has been paid to standardisation of waggons and equipment for handling coal.

The Government Railways are large consumers of coal, the annual consumption being about 4 million tons. Coals of different qualities are used and often several different kinds are mixed for use in locomotives. For dometsic consumption, briquettes are becoming popular, particularly with a view to eliminate smoke. The total coal consumption of Japan amounted, in 1935, to 38·7 million tons of which 2·6 million tons went for bunkering purposes, about 4 million tons for railways and over 6 million tons for heavy industries and 4 million tons for cotton spinning industry.

In recent years, considerable advance has been made in the control of the coal industry on a voluntary basis. Quotas for production are assigned by the Coal Mining Union on the recommendation of the Showa Coal Company, which ascertains the market demand and is also the sales organisation. Excess production by any colliery or company is penalised by an impost of 2 yen per ton. Special quotas are in force for bunkering and export purposes. In the case of the minor producers the controlling agency is the Chiku-Ho Mutual Aid Association. These organisations control more than 80 per cent. of the total Japanese output.

South Africa.

South Africa is an important coal producer in the sea-board of the Indian Ocean and is of particular interest to India as her chief competitor in the domestic and foreign markets. The total production of South Africa is around 13 million tons, the two chief coal areas being in the Transvaal and Natal. The output of the former is more

than double that of the latter, but Natal exports nearly half its output. The "Transvaal Coal Owners' Association" fixes quotas of production, buys all the coal produced by its members and sells it in the market, about 80 per cent. of the Transvaal production being disposed of through it. There are two bodies in Natal, the "Natal Associated Collieries" which is the sales organisation for internal trade, and the "Natal Coal Owners' Association" for the bunker trade. There are quotas for internal and bunker trade but not for export. Hence the export trade is keenly competitive, but is helped by cheap railway freight.

There are organisations for the recruitment of native African labour. In the Transvaal this is done by the Witwatersrand Native Labour Association, mainly from Portuguese East Africa. The wages of an African miner averages 40*s.* to 60*s.* per month and includes housing and rations, whereas the average wage of European labour is 24*s.* in Transvaal and 21*s.* in Natal per shift. Indian labour is also employed at slightly higher rates than the African.

The Government does not regulate the industry except in so far as safe methods of working and the grading of coal for export and for the bunker trade are concerned. Those participating in this trade are compelled to have a grading certificate as in India. In fact, the India Coal Grading Act of 1925 seems to have been modelled on a similar Act of 1922 of South Africa. Export trade is helped by a specially low railway tariff. For instance, the railway rate for export-coal from the Natal coalfield to Durban, over a distance of 275 miles, is 5*s.* 9*d.* per ton, whereas for the same distance for inland markets the rate is about 12*s.* 6*d.* The railway rates from the Transvaal (Witbank) coalfield to the Rand Goldfield is 8*s.* per ton, though the distance is only 100 miles. For long distances for inland trade the rates are on a sliding scale—16*s.* 10*d.* for 500 miles, 20*s.* 4*d.* for 750 miles and 23*s.* 6*d.* for 1,000 miles.

Under the Fuel Research and Coal Bill of 1930, the Government have powers to restrict export when necessary and to compel sales of coal at reasonable prices for railways and ports. Fuel research is under the control of a Board to which a chairman and two members are nominated by Government, and two members are elected by the industry. The capital cost of the Institute was met by the Government. The annual expenditure is met by a levy not exceeding $\frac{1}{8}d.$ per ton on all collieries raising more than 25,000 short tons per year, an equal amount being contributed by the Government.

Great Britain.

The ownership of coal in Great Britain is vested in the owners of surface lands who lease out the underground rights of the coal areas separately from surface rights. Sometimes lessees hold the rights for both the surface and sub-surface. The distribution of coal is in the hands of wholesale and retail merchants.

The first attempt at general control of the coal industry was made by the Government in 1930 when they passed the Coal Mines Act. This Act was to be in force till 1932, but was later on extended to the end of 1937. It empowered the Government to encourage voluntary amalgamation and also to enforce such amalgamations where uneconomic units were working in wasteful competition. As a result, the number of mines has been reduced from 2,861 in 1927 to 2,075 in 1935 though this was done with considerable difficulty. About 90 per cent. of the output of the country is said to be controlled by about 150 undertakings each of whom operates a group of mines. Even now the potential capacity is said to be 25 per cent. above the present output.

The coalfields have been divided into districts, each district with a controlling authority elected from the local mine-owners. This body fixes quotas for the output of different mines, taking all the varying factors into account. The minimum price for the different classes of coal in each district is also laid down. But the quota and price may be varied from time to time, according to market conditions.

There is also a central authority to determine the production of each district and to co-ordinate the activities of the different districts. Committees have been set up in which the owners, miners and consumers are represented, for providing an arbitration machinery to look into complaints. Export quotas are separate from those for inland consumption.

The opinion of competent observers is that price control has been much more difficult than production control. There are not only technical difficulties in

establishing and maintaining prices for different classes of coal, but in a keenly competitive market there are easy ways of evasion of price control.

Central Selling Schemes have since come into operation, in which the producers no longer sell thair coal direct to the consumers. The central organisation purchases the coal and distributes it. To avoid much dislocation in the trade, the producers' salesmen have become the servants of the Central Sales Organisation. The profits and losses of the transactions as a whole are distributed on a tonnage basis. This scheme has been able to put a stop to competition between different mines and different districts, and also to bring some pressure to bear on large consumers like railways and industries to pay reasonable prices for the coal they purchase.

The Royal Commission on the Coal Industry of 1925 found that one of the major defects of the industry was the ownership of coal by private interests and recommended that the Government should acquire the royalty rights from the present holders on payment of suitable compensation. The Government appointed a Tribunal in March 1937 to determine the purchase value of the royalty rights and have since accepted the valuation £63,500,000 recommended by the Tribunal. It is learnt that legislation is now being put through the Parliament to enable the Government to acquire the royalty rights.

The need for systematic research on coal was felt during the War, and a Fuel Research Board was set up in 1917 with a central laboratory in London. A national coal survey was organised in co-operation with the Geological Survey, and regional laboratories were established in each of the nine major coalfields. In addition to routine analyses and tests carried out in all the laboratories, the central laboratory undertakes research in carbonisation, coal-cleaning, combustion, hydrogenation, pulverised and colloidal fuel, etc., and also in some of the fundamental problems of coal technology.

United States.

As in England, the ownership of coal in the U.S.A. vests in the owners of the surface lands. Only in Alaska and some of the Western States have some unsettled areas been declared to be 'public domain', where leasing is done directly by the Government by public auction. The dead rent is fixed at 25 cents per acre for the first year, 50 cents for the second year and 1 dollar for each succeeding year. In addition, a royalty of 5 cents to 15 cents, depending on the quality of coal, is charged per short ton of output.

All the coalfields of the east and mid-west belong to private owners. Here the conditions of lease as well as of royalties vary greatly. The royalty on bituminous coal averages 12 cents per ton (range from 7 cents to 25 cents) and that on anthracite averages 45 cents (range from 25 cents to 1 dollar) per short ton. In these areas the State has jurisdiction over only the health and safety of the workers.

The coal reserves (original content) of the U.S.A. to a depth of 3.000 ft. as calculated by the U.S. Geological Survey, are shown below :—

	Million metric tons
Anthracite and semi-anthracite	19,820
Semi-bituminous	51,309
Bituminous	1,250,127
Sub-bituminous	742,453
Lignite	852,203
TOTAL ..	2,915,912

The maximum annual production (in 1929) was 552 million metric tons.

During the last few years attempts have been made to bring the industry under Government control. The National Industrial Recovery Act (N.R.A.) of 1933 strove to establish an organisation in each district for the control of production and prices, and a National Coal Administrator was appointed to co-ordinate the activities of the districts. This Act was thrown out as unconstitutional by the Supreme Court. The Coal Conservation Act of 1935, which aimed at price control by a commission of five men appointed by the President, also met with a similar fate at the hands of the Supreme Court.

Canada.

The annual production of coal of the Dominion of Canada is only about 14 million tons a year, of which 10 million tons are bituminous coal and practically all

the rest lignite. The latter is produced in Alberta, Saskatchewan and Ontario.

The Dominion Government has control over only Yukon and North-West Territories. In other provinces the ownership of the minerals belongs to the State in public lands and in areas not settled before 1887. Each Province has its own laws about leasing and tenure. In general, leases are for a period of 20 years with option of renewal for two or three like periods. The State and Dominion Governments control safety in mines but not output or prices. Special railway rates or rebates operate facilitating equal competition in markets by different producing regions. A bounty was also in force to help the use of Canadian coal in low tempeture carbonisation plants.

Research in many phases of fuel problems is being conducted by the Federal Department of Mines, the Ontario Department of Mines and the Research Council of Alberta.

The foregoing particulars will show that many countries have adopted measures for the control of the coal industry in all its phases—production, prices and distribution. The elimination of waste is an essential part of such control. This is achieved mainly through research institutes financed and directed by the State with the cooperation of all the interests concerned. A number of rich and influential private organisations also conduct researches, but they differ from the State institutions in that the problems are generally of limited interest and the results are not available to the industry as a whole. This note will, it is hoped, serve to focus attention on what is being done in other countries, so that India might benefit by their experience in the solution of her own peculiar problems.

Water Requirement of Crops.

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THE construction of the Lloyed Barrage has brought very vast areas under irrigation and one of the most important problems in irrigation agriculture is the relations of the irrigation water to the crops on the one hand and to the soil on the other. All the older irrigation schemes have taught that a careful use of water is vital for the continued productivity of irrigated lands. The dangers of the misuse of water in Sind are twofold, *viz.*, the possible rise of the water-table and the development of salt lands. Hence it was necessary to determine the "Exact water requirements of the different crops" in the area, which resolved itself into the following items for investigation :—

The minimum quantities of water neeed to produce normal yields of the more important crops ;

The mode of distribution of a given delta (total quantity of water) during the life of a crop ;

The economics of a larger or smaller supply of water than the optimum ;

The effects of different delta given on : (i) the soil and (ii) the plant performance ; and

The optimum soaking doses.

The results of some of these investigations are recorded below :—

Sind is a land of extremes of temperature, with an average rainfall of less than 4 inches per year. The soil is a deep calcareous alluvium and the irrigation water is good.

Under these conditions of climate and soil, a series of experiments were conducted over a period of seven years. The experimental plots were levelled to perfection to ensure an even distribution of water in each plot and the water given at each irrigation was measured accurately. The plots were of uniform size of one *guntha* each and in the case of cotton, all the plots were thinned to grow nearly equal number of plants. The number of replications varied according to the number of treatments in the several years but was never less than four. The lay-out was always randomised.

Optimum Amounts of Water.

Duties of 100 for *kharif* crops and 200 for the *rabi* crops were taken as standard for purposes of comparison as recommended by the Baker Lane Report—duty meaning the number of acres of a crop which could be brought to maturity with one cusec discharge of water.