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# American Exploitation of Fuels and Minerals

**By Will Lissner**

In the whole field of industry from mine tunnel to retail outlet there is no more striking change than that which is taking place in the position of anthracite and bituminous coal among the energy fuels, coal, petroleum, natural gas and hydropower. Coal, solar power stored into matter æons ago, is losing ground. This reaches into every facet of modern industrial civilization. But apart from the industrial problems it has raised, it has presented no threat to the position of the United States as the foremost industrial nation. For besides being the world's leading producer of both anthracite (hard) and bituminous (soft) coal, contributing even lately almost one-third the world's coal output, and containing a far larger amount of high-rank coals than any other country, the United States is the world's greatest supplier of petroleum, accounting for 60 per cent of the world's production. It is to petroleum that the greatest part of the shift away from coal has moved. Whereas the coals supplied 80 per cent of the country's total energy two decades ago, recently they have been providing only 60 per cent.

Spurred by technological developments, this shift has had repercussions throughout the world. The scramble for colonies containing oil deposits, the frantic efforts of the leading industrial nations to develop highly-integrated electrification systems based on water-power or lignite (brown coal) or coal substitutes like coke, have a background reaching into the early days of the industrial revolution.

At that time nations evolved manufacturing centres where there was ready access to raw materials and closeness to markets for manufactured goods. But with the development of mechanical energy applied to large scale production, new centres arose, in some cases depopulating the older ones. Competition then became more closely related to the supply of

power-generating fuels and particularly to that of coal, the primary and still the pre-eminent source of energy for heat and power.

Development of the steam engine, water turbine, gasoline motor and dynamo revolutionized the processes of production by making vast stores of crude and refined energy available. This created demand for vast stocks of fuel to create the energies and large stores of minerals for metals to harness the energies. Industry, and now what we know particularly as heavy industry, gained ascendency over agriculture and made over the world, moved vast populations about, changed their ways of working and their ways of living.

The end of this period of basic social change is not in sight. For the shift from coal to the other fuels—to whatever extent it may be permanent, which is still a moot point—is representative of present-day intensive exploitation of the fuels and minerals. This process is causing as far-reaching changes in the patterns of our civilization as their earlier extensive exploitation. Many, if not most, of the political, economic and social problems which oppress the world to-day have their roots in the efforts of the individual, the community and the State to adjust themselves to these unspent progressive forces, powerful alike for good or ill.

In this period of change it would be idle to prophesy, but if coal has been losing some of its pre-eminence it can still be said that it gives no sign of losing its world importance. The world's annual production is normally in the neighbourhood of 1,250,000,000 metric tons. About 10 per cent is used in the production of pig iron, 7 per cent in steel and 5 per cent in gas works. For the manufacture of power, 29 per cent is used for the raising of steam, 23 per cent for railway power, 6 per cent for electric generating stations, 3 per cent for water transportation. For domestic purposes 17 per cent is used ; in the United States in 1923, a typical year, about 60 per cent of the anthracite production and 13 per cent of the bituminous was used for domestic heating.

Germany, with coal reserves which are the largest in Europe, though not of high rank, is the world's second largest producer of coal (including lignite) and the largest producer of lignite which accounts for half of the total. The United Kingdom is the third largest producer. The Soviet Union has achieved a tremendous increase in production to become one of the world's larger producers. Deposits occur in thirty-two nations throughout the world, but geologists believe that from 70 to 80 per cent of the world's coal is in North America.

Not merely the distribution of the deposits but the distribution of the richer deposits is pertinent to the competitive struggle between England, Germany, France and the United States. Deep mining and the use of less efficient methods (the latter as a result of the coal royalty system which is being changed but not materially improved) has caused the coal output per man employed to decrease more rapidly in England than in Germany and France, a major factor in the weakening of England's trade position. Output per man is much lower in France, however, than in Germany (normally), and England and France are deficient in certain types of coal,

The United States has a special problem in the case of anthracite, the most efficient of the coals. American deposits are virtually all concentrated in one district in north-eastern Pennsylvania and are becoming rapidly exhausted, but this does not threaten the country's trade position. The growth of the chemical industries, largely on by-products of the coking process, is making coke an economically-feasible substitute for anthracite.

But in all the nations that are leading producers the internal problems of the coal mining industry have brought forth a variety of experiments in stabilization and control. Nowhere have the results of these programmes been substantial enough to report. In the United States, regulation and control have served to promote greater efficiency in consumption, technological development of substitutes and higher fuel costs to industries beset by other problems as well. And this is true in all countries. The National Bituminous Coal Commission announced in its 1939 report that the soft coal industry, vital to people in thirty States, had increased its net losses per ton from six and one-half cents in 1936 to 25 cents in 1938, a record of a sort.

Oil—petroleum and related fuels, that is—faced for years the spectre of scarcity which now haunts anthracite. In 1925 it was estimated that the petroleum reserves of the United States were about 5,000,000,000 barrels. Since then the country has consumed 11,500,000,000 barrels and to-day there is in addition about 15,000,000,000 barrels of oil in reserve in the ground in developed pools, 270,000,000 barrels in storage, gasoline stocks of 75,000,000 barrels and gas and fuel stocks of 100,000,000 barrels. Moreover, twice as many gallons of gasoline are obtained from a barrel to-day, more by-products are recovered and consumption has increased only 50 per cent.

The industry, latterly with government sanction, has been practising production control since 1926. In 1927 the United States produced 71 per cent of the world total and in 1938, 61 per cent. But the prorationing system raises a variety of issues. It serves to maintain a condition of monopoly by the few. It affords a larger share of the supply to the producers with the larger capital investment ; thus it pays an uneconomic premium for the inefficient employment of capital. Most important of all, it lodges price control in the hands of the owners of the resource.

World consumption of petroleum and related fuels in 1938 was about 1,908,000,000 barrels, or about 7,000,000 barrels less than in 1937. Increasing consumption abroad offset a decline of 35,000,000 barrels in the United States. These figures are exclusive of military consumption, which cannot be estimated in total.

How important oil is to modern military forces is indicated by the fact that the wars in Spain and China and re-armament in Central Europe caused foreign military consumption (possibly together with foreign military stocks) to increase by 70,000,000 barrels in 1937 to a level of 160,000,000 barrels and to remain at that high level throughout 1938.

Oil stocks in Europe on 1st January, 1939, had increased to 122,415,000 barrels.

Improvements in drilling and other techniques have extended the available amounts of petroleum beyond calculation. World production of petroleum and related fuels has increased steadily. In 1937 and 1938 it exceeded 2,000,000,000 barrels, of which in 1938, the United States contributed 1,264,970,000 barrels, Russia 210,000,000, Venezuela, 190,000,000, and Iran, Netherlands East Indies, Rumania, Mexico, Iraq, Colombia, Trinidad, Germany, Peru, Argentina, British India, Bahrein Islands, Canada, British Borneo, Poland, Japan, Ecuador, Egypt and twelve others varying amounts up to 76,000,000 barrels. Nearly every country has shale oil deposits, from which an oil substitute can be derived at an expense presently five times that for petroleum. This, as well as the process for the hydrogenation of coal (which accounts to-day for 60 per cent of Germany's limited consumption of gasoline), helps to offset, to a small extent at least, the current strategic advantages and disadvantages in the uneven distribution of oil deposits.

The United States was naturally endowed with vast coal deposits and oil pools, and these stores of energy were co-existent with workable combinations of mineral stores capable of harnessing them. The rapid rise of the country to the chief position among the industrial nations was the result. Primarily it is upon the sources of iron ores that the commercial development of the major powers and of six minor powers is dependent. No satisfactory substitute for iron ores in industry is known. The United States has the largest reserves in the world. Supplies are also to be found in Newfoundland, Canada and Cuba ; in France, Great Britain, Sweden, Russia, Germany and Spain ; in India and in the Union of South Africa. The reserves of Japan (even if the captured reserves of North China are included), Argentina, Mexico, Germany, and other European countries are very limited and are inadequate for any significant degree of expansion.

Ore production statistics are inadequate. At least 49,571,804 metric tons of all varieties of ore were mined in thirteen States of the United States in 1936 (when world production was 172,000,000) and this rose to 73,250,649 tons in 1937. A better indication of the use of ore reserves is given by the data on ingot production, for which they provide the principal raw materials. For the nine years ended with 1929 world ingot production totalled 772,410,000 gross tons while for an equal period ended with 1938 it totalled 815,270,000 tons. At the same time United States production has been much less than in the twenties ; it amounted to 47,768,000 tons in 1936, 50,569,000 in 1937 and 28,500,000 in 1938. The European increase reflected re-armament everywhere and industrial expansion in the autarchical States while the American decrease reflected unsettled home and world business conditions and the halt in the progress of the American economy. Normally the United States produces one-half of the world's output of pig iron and, together with Germany, Britain and France, more than three-fourths. The four powers control at least

three-fourths of the iron ore deposits. Probably about 37 per cent of the world's output of iron ore in 1937 and 29 per cent in 1936, came from the United States.

In coal, petroleum and iron ore the United States is pre-eminent. But this is not the limit of the natural endowment that has made this country one of the richest in the world in natural resources. In 1937 the United States produced 36 per cent of the world's output of copper, the metal which is the modern age's " super-highway for power " ; 32 per cent of the world's zinc, the most widely applied of the common metals, one of which the United States has been the leading producer for three decades ; 27 per cent of its aluminum, the copper substitute which makes everything from paint to airplane structures and the youngest of the metals ; 25 per cent of its lead, indispensable element in high-compression gasoline, the most durable of the metals and the chief raw material of the munitions industries ; 34 per cent of its phosphates, chief of the fertilizers and also an element in steel, a war gas and a baking powder ; and 12 per cent of its potash, without which agricultural land would ultimately become barren, matches, glass and soap could not be made and for which there is no substitute.

But rich as are the resources of the United States, the country is not, and can never be, economically and geologically self-sufficient even from the point of view of heavy industry. The United States requires, chiefly for her steel industry which is first among her basic industries, 40 per cent of the world's chromium, 10 per cent of the world's cobalt, 20 per cent of the manganese, 50 per cent of the nickel and 45 per cent of the tin, of all of which she has only insignificant deposits, and large amounts of tungsten and vanadium, of which United States stores are seriously inadequate. These are only the most important among the forty-one raw materials essential to important American industries for which the United States is dependent upon foreign sources. The other leading industrial nations, of course, are dependent upon foreign sources of supply for most of their basic raw materials. The resource pattern of the world has one striking lesson : modern industrialism has unified and integrated the populations of the globe and is making them as inter-dependent as the communities of a modern urban area.

Research has demonstrated the importance of the energy stores and the mineral deposits of the United States and of the world to the American people and the peoples of the world. One would think, then, that it would therefore be apparent in this advanced nation that a vital need for those who frame the country's economic policy is an inventory of the natural resources of the country ; that is, a study of the distribution of these resources within the nation's economic regions, within its counties and within the respective tax subdivisions of the States, a survey of the extent of the mineral deposits and the energy sources, the effects of present exploitation and the economic demand for its results, and, most important of all, an investigation into their ownership and control and the role this plays in the economies of the nation and the world.

A demand for an inventory was made in 1930 by the representative organization of the country's resource economists. Such an inventory has still to be taken. Why have we in the United States been so hesitant about unearthing the vast store of significant economic data about our resources ?

Ten firms, and tenants on lands owned or controlled by them, in 1936, produced 36,673,492 net tons of anthracite, which was about three-fourths of the total production for the year, according to the Commonwealth of Pennsylvania Anthracite Coal Industry Commission. These ten anthracite producing companies prior to anti-trust dissolution in 1920 were directly controlled by the railroads serving the districts in which the anthracite deposits and breakers were located ; to-day, according to the commission, the nine railroads which haul the production of the ten companies and of the about 175 independent anthracite producers are closely identified with and controlled by the same financial and other interests that control the ten producing companies. These interests, according to the commission's data, are New York and Philadelphia banks, investment houses, insurance companies and industrial firms which are themselves controlled by two principal banking groups and by a third group friendly to or controlled jointly by the two groups.

Thirty companies, in 1922, controlled over a third of immediate reserves of bituminous coal, according to the Federal Trade Commission, two steel-producing companies over half of the iron ore reserves, six companies controlled about one-third of the total developed water power, four companies nearly half the copper reserves and thirty companies over 12 per cent of the petroleum reserves. Two American concerns are said to operate with the Sicilian sulphur syndicate under a joint price and territorial agreement dominating almost completely the world supply of brimstone sulphur. One American company controls the world's major sources of bauxite, aluminum ore, and the best contiguous sources of cheap water power and it also dominates a combination of Swiss, German, French and American producers which controls the world production of the ore. The world's supply of all the essential metals is dominated in a manner similar to the previously mentioned copper deposits ; in copper the supply is controlled by a score of corporations in the United States, England and Belgium which form the membership of the world cartel. Only occasionally in the minerals is a world cartel's dominance challenged. An instance is the potash industry. Since 1924 the production has been controlled by the Franco-German international potash cartel. In recent years potash production has been developed in the United States ; last year United States fields supplied 52 per cent of American needs and they are believed to be capable of supplying all the country's needs without high-cost production. But these fields are owned or controlled by just three companies.

These instances are only the more striking among a host of similar ones. They raise a fundamental issue. Have we been so hesitant about undertaking a resource inventory because it would demonstrate that

monopolistic competition has its seat in private absolute control of industrial resource lands? Is it because it would demonstrate that our giant industrial monopolies and quasi-monopolies are less dependent upon such devices as credit control and production and marketing agreements than upon control of their raw materials, sources and supplies for their origin and nurture? Or is it because of colossal, wilful ignorance of the dependence of every man, woman and child in the advanced industrial nations upon the development of rational economic policy to assure the exploitation of our fuels and minerals in the interest of all men rather than to the apparent and transitory aggrandizement of a few?

It is not beyond expectation that when the current international tensions, which have been generated in no unimportant part by the struggle for raw materials and crude energies, have been dissipated by diplomatic settlement or by war, this problem will be dealt with. As one well-informed specialist has commented: "The problem must inevitably be met; it is intimately bound up with the future of the world." If we do not despair of the world's future, it must be probable that the development and evolution of such policy can be achieved. Its achievement will be a basic step in the economic reconstruction of society.