Present and Future Energy Sources

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The world is now using energy supplies at an almost unbelievable rate. In the last fifty years, the production of coal increased 736 per cent, natural gas, 2166 per cent and oil, 3346 per cent in the United States. Similarly the installed horsepower increased 2016 per cent (1). The figures give but a bare idea of the tremendously increased energy use which has resulted from and accompanied present day mechanization.

Coal is our chief source of energy, supplying 58 per cent of the world's needs. It is estimated that in the United States there is enough coal less than 3,000 feet below the surface to last us two thousand years at the present rate of consumption. Then too, present mining methods remove only 34 per cent of the available coal, leaving the rest behind because it is uneconomical to recover it. Improved mining methods and advancing prices should make it feasible to recover still larger amounts and to lengthen the time estimate.

One possible method of recovering more coal is now being tried by the Russians (2). Controlled amounts of waste oxygen and air are blown into burning drift coal and the resulting gases are drawn off through a ventilator shaft. They reported that 750,000–900,000 cubic feet of gas with approximately one-tenth the fuel value of natural gas were obtained daily while blowing, and about half that amount during subsequent non-blowing periods. This process mined and gasified coal not otherwise easily accessible.

A method of increasing our potential supply of coal is in the further application of fuel research. Already, this has increased the efficiency in burning fuels and resulted in great savings. Two examples will illustrate. It required 254 per cent more coal to produce one kilowatt hour of electricity in 1910 than it did in 1934. In this same year, the British steel industry used six million tons less coal than before, but produced the same amount of steel, a saving of $21,375,000 (3). If such savings are possible in two great industries, why not elsewhere? They are, but it requires expensive installations and large scale operation to effect these savings. This and reluctance to change, accounts for our present barbarous methods of burning coal.

Coal might be regarded as a raw material, great coking ovens erected near mines and the coal converted to coke and the by-products—

gas, ammonia and coal-tar chemicals. The coke could be used for the generation of electricity and both gas and electricity piped to the consuming centers. This would do away with atmospheric contamination and greatly improve efficiency. Of course, it would mean the construction of transmission cables and pipe lines, and no doubt the demise of certain railroad systems. A major change of this kind in the public utilities would probably mean a rather extensive social readjustment.

Petroleum is the second largest source of energy, furnishing about 23 per cent of the amount used in the United States. Here again, the mining methods are not very efficient for only 20 per cent is removed. The United States produced 910 million barrels of oil in 1934, about two-thirds of the world production (4). Thirteen billion barrels of underground oil were available by present methods in our country on January 1, 1935. At the present rate of consumption, barring new oil field discoveries, our supplies will be exhausted in fifteen years. However, this figure is low, for new fields are being found. The wells are deeper in many places and more expensive, yet oil is being discovered. As prices rise larger amounts will also be recovered from existing wells. Then too, there are vast quantities of oil known to exist in various places in a condition that makes economical recovery at present impossible. For example, a thirty-five foot limestone layer under Chicago contains seven million barrels per square mile (6). Then there are the oil sands, oil shales, etc., none of which are used to speak of at present.

Research work has made possible great savings in oil resources. The cracking process, which makes it possible to produce more gasoline from a quantity of petroleum, saved nine hundred million barrels of oil last year. The waste gases from storage tanks, cracking stills, etc., which were formerly wasted, are now used to make gasoline by a new polymerization process. It is estimated (7) that about one-fifth of all the gasoline used in America in 1934 could be made from natural gas in this way without curtailing the normal supply. This polymer gasoline has a high antiknock value, having octane ratings as high as one hundred.

Various methods are now in use for converting coal into gasoline and other liquid fuels. Germany, France and England are now operating commercial or semi-commercial plants for this purpose. Peat, lignite, cottonseed and alcohol have all been converted to gasoline and lubricating oils on a small scale but their use is uneconomical at present. However, the picture may change in the future. The petroleum supplies in our country are so vast that little interest has been aroused by these attempts, but those countries with limited supplies are vitally concerned.

Natural gas, like oil, is a wasting resource. Its use has increased considerably within the last few years and it now furnishes about 8 per cent of the world's energy. Indications are that our present supplies will last from 50–75 years. Here again, conservation and research can

increase the expected life of the supply. Removal of some of the higher hydrocarbons does not materially affect the usefulness of natural gas but does increase our gasoline supply, as mentioned above. When the gas supply runs low, we shall no doubt turn again to artificial gas from coal.

Water power is an everlasting source of energy. Intensive agriculture, with increased subsoil drainage may somewhat decrease the amount of water available for power but this decrease will be slight. Extensive development of water power sites has lagged behind because the natural power sites are frequently long distances from consuming centers and so require lengthy transmission lines, and the cost of constructing generating stations from water power is four to five times greater than for steam. Recently, however, the government has seen fit to undertake such construction on a large scale and we can expect a considerable increase in available energy from this source.

Power can be developed in other ways too. There are hot springs and geysers which could be used to supply heat and energy. Wells are known which are producing large quantities of water at 190°–230° F.

Volcanoes might someday be made to give part of their heat energy in a useful way. Abbott's solar power plant is a possibility for obtaining energy directly from the sun. The late Passamoquoddy Bay Tide water project offered possibilities from a new source. Then too, there is the wind, alcohol, warm ocean currents, and others—all of which may someday be made to contribute a portion of the needed energy.

All estimates that have been made as to how long the various resources will last are of doubtful accuracy for one very important factor has been omitted. This factor is man's ingenuity. Present day civilization has developed because man was capable of applying himself and overcoming obstacles of all kinds. It is quite unlikely that he will be daunted by certain natural resources playing out when he has modern scientific achievements to guide him and spur him on. The problem will be solved in some way and the world will continue to be a place where human beings live and work.

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