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THE PROBLEM OF DOMESTIC FUEL*

IN India at present, about 80 million tons of cowdung cake, equivalent to about 40 million tons of coal and about 35 million tons of fuel-wood, equivalent to about 19 million tons of coal, are being used as domestic fuel. All the fuel wood and charcoal is derived by cutting down trees in forests, wastelands and private gardens. Forest statistics indicate that afforestation is lagging far behind deforestation. The devastating results of deforestation and insufficient afforestation as well as of burning farm waste, such as severe soil erosion, extensive floods, irregular weather conditions and growth of waste lands are now well known. It is therefore imperative that in order to improve the fertility of the Indian soil and to develop the country's agricultural resources and production, the consumption of fuel wood, charcoal and farm waste must be cut down drastically, and the fuel habits of the public should be changed so as to replace the present fuels with coal and coal products.

If India is to have a rational fuel policy for the future, it is necessary to consider the present and the likely future patterns of energy utilisation in the country. Approximate estimates indicate that the annual total energy required by about 1970-75 would be about $5{,}000 \times 10^{12}$ B.T.U. as against about $3{,}600 \times 10^{12}$ B.T.U. at present. It is further estimated that the future energy pattern would include about 60% from coal, about 30% from wood and farm waste, and the rest from oil and hydropower. The present level of wood and farm waste consumption for fuel is therefore expected to be reduced by more than 50% and coal and oil energy correspondingly increased. Approximate calculations made on this basis show that about 20 million annual tons of semi-coke would be needed as domestic fuel, assuming that no increase would take place in future in the quantum of energy derived from wood and farm waste. Likewise, the railways are also expected to expand in future in the direction of diesel and electric locomotion, reducing the present wasteful method of steam locomotion based on raw coal. It is thus

* Abstract of the Presidential Address by Dr. S. Husain Zaheer to the Chemistry Section, 43rd Indian Science Congress, Agra, 1956.

clear that a rationalisation is absolutely essential in the development and utilisation of the fuel resources of the country if the fuel habits of the public are to progress from the 'cowdung age' to the 'coal age'.

It is not merely essential to bring about an overall rationalisation in energy utilisation in the country, but also in each sphere it is necessary to tap the right source for any desired purpose. In order to produce semi-coke by low temperature carbonisation, it is necessary from the view-point of conservation of high grade Indian coals, to depend mainly on non-caking coals, high-ash caking slacks and lignites which are unsuitable for use in blast furnaces. The reserves of non-caking coals up to 16% ash and lignites are estimated at about 8,000 million tons distributed all over India. The present demand for semi-coke in important cities and townships in the country is estimated to be more than 5 million annual tons. It is thus entirely feasible to establish a series of low temperature carbonisation plants in the important coal- and lignite-bearing areas of the country so as to regionalise production and facilitate distribution.

Enormous possibilities exist in this country for the development of low temperature carbonisation industry. On the basis of the types of coals available in our country, it would be desirable to establish plants in four major regions from the points of view of availability of raw materials and necessity for convenient distribution of smokeless domestic fuels. These regions are Neyveli in Madras State, Kothagudium in Hyderabad State, Madhya Pradesh and Bengal-Bihar coalfields. It would be further necessary to instal suitable size tar distillation and processing and tar acid recovery plants to produce tar crudes or finer chemicals or other products as desired.

Dr H. K. Sen was the first to draw the attention of Indian scientists in 1940 to the possibilities of low temperature carbonisation of coal, and a plant designed by him is in operation at the Lac Research Institute, Ranchi. About five years ago, the Central Laboratories for Scientific and Industrial Research, Hyderabad, studied the low temperature carbonisation of non-caking coals available in large quantities in the State and decided to instal a 25 tons/day plant of Lurgi-Spuelgas type. The plant has been in intermittent operation since January 1954 and so far about 4,000 tons of coal have been processed. About 2,200 tons of semi-coke, 'coalsite' as it has been commercially termed, have been sold in the two cities of Secunderabad and Hyderabad as domestic fuel. The semi-coke is sufficiently hard to withstand all stages of handling and has proved a good domestic fuel. Two types of coal from Hyderabad coalfields were tested in this plant and further tests on the influence of temperature and time of carbonisation are in progress. A 3 tons/day tar distillation plant will be installed shortly to produce commercial products for direct sale and for recovery of tar acids and diesel oil. Laboratory investigations to increase the yield of pitch for road tar preparation by air-blowing are in progress. Work has also been taken up on extraction of pure tar acids from tar oils and liquors and the identification of tar acids by chromatography. Based on these tests, the Government of Hyderabad has submitted proposals for a 800 tons/day L.T.C plant for inclusion in the Second Five-Year Plan of the State.

It is understood that proposals for such plants have also been submitted by various State Governments for inclusion in the Second Five-Year Plan. The total semi-coke production from all these proposals is expected to be about 2·9 million annual tons with about 360,000 tons of low temperature tar as by-products.

BENJAMIN FRANKLIN

IN connection with the 250th Anniversary of Benjamin Franklin which is being celebrated in 1956 the world over, the following extract from a letter addressed by him to Joseph Priestley, dated February 8, 1780, will be read with great interest:

> "The rapid Progress *true* Science now makes, occasions my regretting sometimes that I was born so soon. It is impossible to imagine the Height to which may be carried, in a thousand years, the Power of Man over Matter. We may perhaps learn to deprive large Masses of their Gravity, and give them absolute Levity, for the sake of easy Transport. Agriculture may diminish its Labour and double its Produce; all Diseases may by sure means be prevented or cured, not excepting even that of Old Age, and our Lives lengthened at pleasure even beyond the antediluvian Standard. *O* that moral Science were in a fair way of Improvement, that Men would cease to be Wolves to one another, and that human Beings would at length learn what they now improperly call Humanity."