Recently the Imperial Chemical Industries, the Interessen-Gemeinschaft of Germany, and the Standard Oil Supplies of America have pooled their resources and patents and the I.C.I. have made arrangements with the British Government to make a start immediately with a large plant to be erected at Billingham-on-Tees to produce 100,000 tons per year of first-grade petrol—*i.e.*, 30,000,000 gallons to be marketed through existing channels. In this plant about 400 tons of coal per day will be put through the process and another 600 tons per day will be required to make the necessary hydrogen and produce the required temperatures and processes in the circuit. It is understood that the capital cost is 2 to 2½ millions sterling, which will be provided by I.C.I. from their existing resources. This is not the total cost, however, since part of the plant for production of hydrogen is already in existence in connection with the production of nitrogenous fertilizers and other allied industries.

It is estimated that the cost of production of petrol at Billingham will be about 7½d. per gallon, including all interest and obsolescence charges.

The British Government has pledged itself to give the petrol produced by the hydrogenation process a preference of 4d. per gallon for nine years reckoned from April, 1935; alternatively a preference of 8d. per gallon for 4½ years or something intermediate as circumstances demand. The constructional work is to be spread over a period of one year and a half, and it is stated that the construction will give employment to seven thousand men directly and five thousand men indirectly.

Position in New Zealand.

It will be appreciated that costs of production in New Zealand are likely to be higher than in Great Britain, even allowing for the probability that coal can be mined cheaper, because of the more favourable seams. It is probable that the cost of production of petrol from coal in New Zealand would be of the order of 11d. to 1s. per gallon (New Zealand currency) for a plant of 20,000,000 gallons capacity per annum—*i.e.*, one-third of New Zealand's consumption, which is presumably as large a plant as it would be wise to install in any one place. The capital costs would be in excess of £3,500,000 (New Zealand). The cost of production per gallon of petrol may roughly be divided as follows:—

	d.
Cost of coal (including that for power)	1½
Interest on capital 5 per cent.	2
Obsolescence: Chiefly process obsolescence	4
Processing and maintenance	3½
Piping to port	?

These figures indicate the important part which interest on capital and obsolescence plays and appear to indicate clearly that we must await the first six months' operations of the plant to be erected in England in the hope that experience will show that the capital cost may be reduced. It would appear that a larger remission of duty would be necessary in New Zealand than is the case in Great Britain. The total coal used by such a unit as the above would be of the order of 240,000 tons per year, which, with modern methods of mining for regular production, would hardly employ more than of the order of 300 men in the mines, though there would probably be another 350 men employed in the works. The steady employment of this number of men would, of course, give occupation in other industries and services, but there is no data to show how many. There would be considerable employment during erection and it would be a matter for consideration as to what money would be returned to the State both in the form of saved employment pay and from receipts for taxation. It does not appear that these advantages would at present offset the enormous interest charge on the capital involved and obsolescence charges.

Allied Industries.

There is another consideration in connection with the success of such a project in New Zealand—namely, the development alongside of hydrogenation of other intimately associated chemical processes such as the production of ammonia for fertilizers and the economic utilization of carbon dioxide, which is a by-product of the production of hydrogenation. Judging by experience elsewhere, hydrogenation cannot well stand by itself. Both Billingham and the Interessen-Gemeinschaft works at Leuna illustrate the intimate way in which apparently each chemical manufacture must be linked together if even a small measure of economic success is to be attained. There is a further possibility in the hydrogenation of coal in that by controlling the catalyst, fair yields can be obtained in the main and subsidiary processes of such materials as phenols and formaldehyde, the bases of the synthetic resins and moulded products industries which are at the present time undergoing rapid expansion. It would thus be unwise to consider hydrogenation of coal for oil by itself, and the production of ammonium compounds such as ammonium nitrate and possibly ammonium phosphate would need to be considered alongside. There is, of course, the point of view of Defence, regarding the production inside the country of petrol and of nitrogen compounds, which latter are the basis of explosives. Moreover, all these factors enter into the question of a suitable site. It is important that the production of petrol should be near the centre of large consumption or, alternatively, that it should be produced as near as possible to a port, since the cost of piping would add considerably to the unit cost. It is difficult to estimate on this point, but it clearly indicates that coal resources near the centre of consumption of petrol or near a port are the only ones which need be considered.

Another question to consider is the availability of large supplies of water for cooling.

Taking the whole evidence into consideration, it would appear safest to wait for a few years until the experiments at Billingham has been thoroughly completed on the large scale at present under consideration.