

Chemical industry

ICI off course

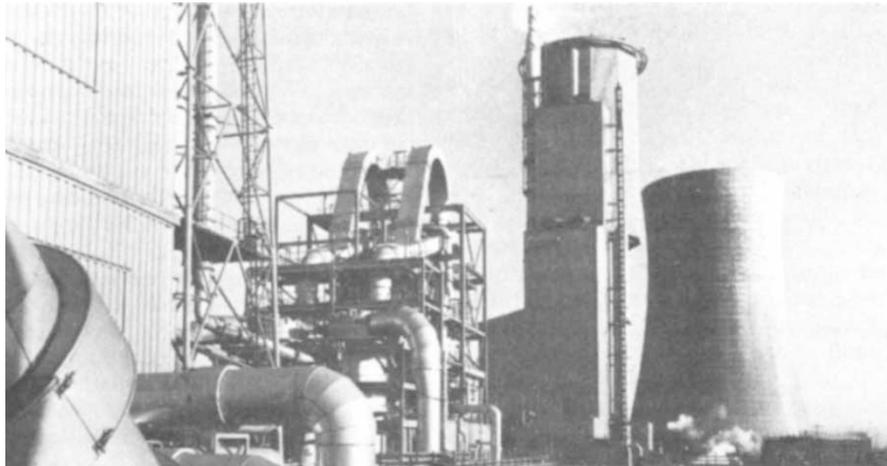
Britain's largest chemical company — Imperial Chemical Industries Limited (ICI) — is turning to biology to seek a long-term solution to its present financial difficulties. Speaking after the company's announcement of its worst share dividend since 1938, ICI's research director, Charles Reece, said that research priorities would now be in biology-related disciplines — coupled with efforts in composite materials and the by-product chemistry of new transport fuels.

A third of ICI's £200 million annual research and development budget is already linked to biology. Most of this goes into pharmaceuticals, forming the largest single component (18 per cent) of ICI's research. ICI also has the world's largest single-cell protein fermenter and has used genetic engineering to modify the protein-producing organism *Methylophilus methylotropus* to improve its carbon efficiency (see *Nature* 287, 396; 1980). The modified organism is not in production yet, but only "technicalities" delay its use.

Reece would not say what products ICI would make through genetic engineering except "the obvious ones": proteins for human, animal and plant health. The company is paying special attention to plants — too little is yet known of plant molecular genetics to expect a quick return, but since it is an area of ignorance, it is also likely to be an area of opportunity.

But this is long-term thinking. In the short run, ICI is not about to jump on the bandwagon of small-volume, higher added value products recommended by the pundits of the chemical industry — unlike, say, BP Chemicals, which last week announced a £4 million investment in a new plant at Hythe to produce hydroxyalkyl-acrylates for speciality paints and other uses. Speciality chemicals, the argument goes, are — paradoxically — bought by many small consumers, whereas bulk chemicals are bought only by one or two large buyers. So if the bulk buyers go down, so does the supplier.

Pruteen — no food for the birds



ICI is not impressed by this generalist argument. The company is more concerned to estimate the precise needs of existing customers, who in a recession are being more exacting in the use of their money. This means that research and development in ICI should be related to those needs, but the difficulty is to distinguish long-term structural changes in needs from the effects of the recession, says Reece. One structural change might be the price of steel, with its high energy intensity; this is forcing consideration of substitute materials, particularly composites (rather than new polymers).

Another structural change would be the high cost of oil causing shifts to new fuels — such as syncrude from coal — which will have new chemistries and new spin-off feedstocks for the chemical industry.

So research effort should be concentrated on "C-1 and C-2" chemistry, the chemistry of molecules with low numbers of carbon atoms as potential feedstocks. This would also provide flexibility: whatever the principal transportation fuel source turns out to be, its products could be cracked down to low-carbon molecules to begin higher synthesis.

Back in the factory, production processes could be optimized to the new economics — emphasizing thermodynamic balance for energy or feedstock efficiency, for example, or reducing the capital cost of equipment to allow product flexibility.

Tight environmental regulations are strangling new products, Reece believes. "Try to get water through regulation now — you'd fail." There is an element of double standards for new and existing products. But the regulations, seen in another light, can provide competitive research opportunities: to improve the selectivity of a pesticide, for example, so it might pass regulation more quickly.

But, overall, research in ICI is being seen as just another part of the business, which must tighten its belt and show its economic effectiveness like all other divisions. The days when ICI's corporate laboratory in Runcorn, Cheshire, was called "ICI's university" are over.

Robert Walgate

Indian oil exploration

Partners sought

Lucknow

Faced with the urgent need to find more oil, and the accompanying huge capital risk, the Indian government has decided to invite foreign oil companies to conduct oil exploration. A short list of 34 companies has been drawn up and contracts will be let on a production-sharing basis only to companies agreeing to sell their share of crude to India at a fair market price.

The government is offering exploration rights on 32 blocks — 15 onshore and 17 offshore — a total of about 0.66 million km². The public sector Oil and Natural Gas Commission will represent the government as a "non-operating" party in all exploration contracts and will be given full decision-making rights on any discovery.

At present, oil exploration is carried out by the commission and Oil India Limited. The commission has discovered 585 million tonnes of recoverable oil and gas reserves, whereas Oil India has found only 47 million tonnes. According to a report jointly prepared by Soviet and commission experts, however, there are reserves of 12,700 million tonnes of oil, of which 8,700 million tonnes are in offshore and 4,000 million tonnes in onshore areas.

Commercial reserves were first discovered in the early 1920s in the Assam region, and in the mid-1970s crude was commercially produced in Assam and Gujarat states. Offshore exploration began in the early 1960s, and in the mid-1960s reconnaissance surveys by a Soviet seismic ship, *Akademie Arkhangeliskey*, delineated certain structures including the Bombay High. Oil was discovered there in 1974 and production began in 1976. By last year, 88 exploratory and assessment wells had been drilled, of which 31 had proved to be dry. Other commercial discoveries include the offshore structures Ratnagiri, North Bassein, South Bassein and Tapti.

The Indian Planning Commission has allocated 30,000 million rupees (£1 = R17.90) for oil exploration during the sixth plan period 1980–85, which includes R18,370 million for offshore activity. So far, offshore exploration has cost R7,250 million with total discoveries of 250 million tonnes of oil and 270,000 million m³ of gas — a potential value of R50,000 million in crude alone.

India spends a sizeable amount of foreign exchange earnings on oil imports. During 1981, indigenous production will be 14–15 million tonnes, less than half domestic demand of 31 million tonnes, so R60,000 million will be needed to fill the gap. By 1985, the demand is expected to reach about 47 million tonnes, with indigenous production reaching only 21 million tonnes.

The Bombay High development is being financed by the World Bank, which recently offered a second instalment of