

# India's aggressive program for petroleum development

by Ramtanu Maitra

The oil shocks of 1973-80, it is well known, had an especially devastating effect on the developing sector. During the first half of the 1970s, the price of oil jumped from \$1.30 per barrel to \$10.00 per barrel in 1974, and by 1979-80 had quadrupled to \$40.00 per barrel on the spot market. From 10 percent in 1970, oil and oil product imports took up fully 55 percent of India's total import bill by 1980.

But India, unlike almost every other less-developed oil-importing nation, had the capacity to respond. The nation's oil exploration and development capability—built up patiently, and with vision and determination, during the 1950s by Jawaharlal Nehru's friend and adviser, K. D. Malaviya—was ready to meet the challenge of freeing India from the stranglehold of imported oil.

While today just over 45 percent of India's needs are

being met with domestic oil production, the drain of foreign exchange on the oil account has at least been plugged, and by 1983 it is expected that domestic production will meet 60 percent of total demands. India's Oil and Natural Gas Commission (ONGC) presently estimates that India could be producing 60 million tons of oil per year by 1990—three times the present level!—two thirds of that from offshore fields.

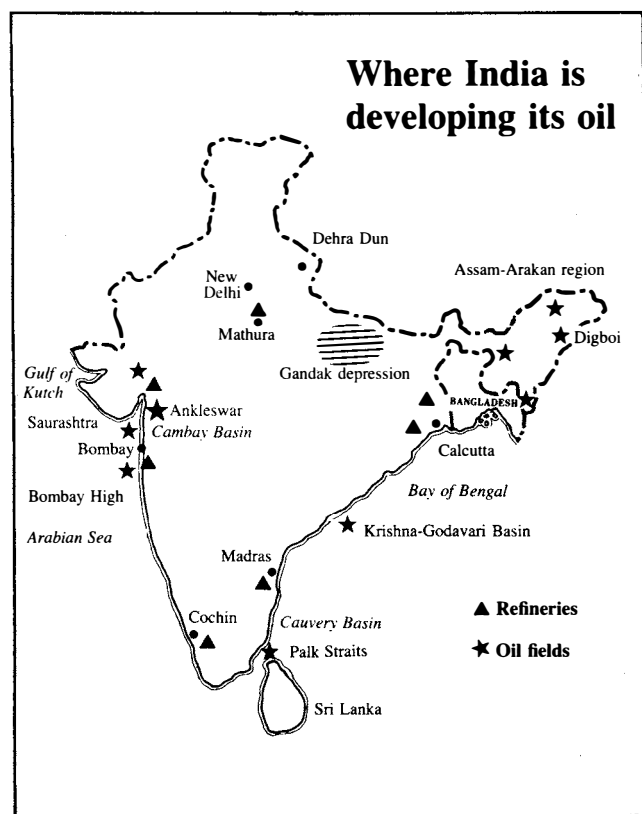
By all indications from ONGC and Oil India Ltd. (OIL), the two state-sector enterprises charged with the nation's oil production effort, are meeting the test. In the eight short years since 1973, India's production of crude oil overall has doubled. Onshore production, which at Independence in 1947 was .4 million tons per year, is now more than 8 million tons. But it is the vast offshore areas, where 77 percent of India's total geological oil reserves are estimated to be located, that will lead the production gains in the coming years.

Forty-two percent of the total land area of India, or 1.4 million square kilometers, consists of sedimentary basins—the type of geological formation that carries oil. It is estimated that another 380,000 square kilometers of sedimentary basins exist offshore along India's coast up to a water depth of 200 meters. Although it is not yet clear how much is commercially viable for development, current estimates place India's known reserves at around 2.5 billion tons of oil and 840 billion cubic meters of gas.

Only a fraction of the country has been explored, especially the promising offshore basins. For comparison, the United States, which is statistically the best-explored area in the world, has an exploration drilling capacity of one well in every 15 square kilometers of prospective area—while that of India is about 1 exploratory well in every 750-1,000 square kilometers. But India benefits from the fact that its oil-exploration program is among the most efficient in the world, with a "success ratio" of one in seven, or one strike for every seven wells drilled, compared to a ratio of one in 42 for the United States, for example.

## Part of nation-building

The advances made and the horizons opened up in India's oil development program are part of a systematic effort to establish the modern industrial base for an independent nation. The oil program in particular was built in the face of



skepticism and outright opposition from British and other forces hostile to India's bid for self-reliant development.

It was not until 1956 that India's oil policy took shape, with the establishment of a Petroleum Division under the Geological Survey of India. Later in the year, the Petroleum Division was raised to the status of a commission: the Oil and Natural Gas Commission, with K. D. Malaviya at its head. In 1957 Malaviya assembled a handful of young geologists and geophysicists in Dehra Dun in the Sivalik range foothills of the Himalayas, the site of ONGC's headquarters today and the base of operations of the pivotal K. D. Malaviya Institute of Petroleum Exploration.

The first major success in exploration came in 1974, when, with India's first offshore drilling rig, the "Sagar Samrat" purchased from Japan, oil was struck in the Bombay High. Today the Bombay High field is producing at the rate of 8 million tons per year, a rate that is expected to rise as further field development proceeds.

But this was just the beginning.

### The Sixth Five-Year Plan

In the late 1970s, pressure on India's balance of payments prompted planners to recommend a stepping-up of the oil program. On land, oil exploration in the Assam-Arakan region was considerably stepped up until widespread disturbances caused by Chinese and other external provocateurs in the Northeast region toward the end of 1979 put a halt to further work, and virtually shut down production in Assam.

It wasn't until Prime Minister Indira Gandhi's return to power in 1980 that the oil effort was put into high gear. The Sixth Five-Year Plan (1980-85) put a higher emphasis on increasing the production of petroleum products, and an ambitious plan for both on-shore and offshore exploration was drawn up. This program calls for increasing efforts in the Assam-Arakan region. Exploration in the Krishna-Godavari and Cauvery basins, where the presence of hydrocarbons in significant quantities has been established, is being reinvigorated.

The Plan also calls for stepping up activities in West Bengal, the Ganges valley, the Himalayan foothills, Rajasthan, the Orissa coast and in other areas. The total exploratory drilling the plan envisages would require 300 on-shore wells, and 882,700 meters of drilling.

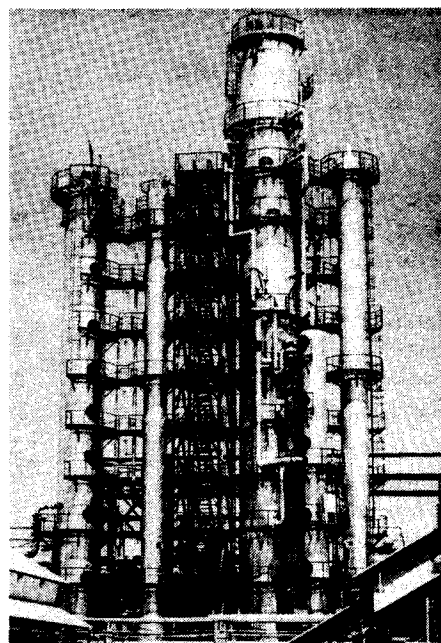
The Sixth Plan was equally ambitious in offshore activities. It projected a continuation of exploratory work in the Mahanadi Delta area, and in the Bombay offshore basin—extending the limit beyond 300 meters water depth. ONGC will also be responsible for exploring rock structures off the coast of Saurashtra, and in the Gulf of Kutch, the Andaman and Nicobar shelf, as well as in the east-coast basins like Palk Bay and the Krishna-Godavari basins. Within this program, the detailed work required in the continental shelf and beyond, up to 500 meters water depth, is to be completed.

The Plan also envisaged utilization of natural gas from the Bombay and South Bassein fields along the west coast. It is estimated that more than 90 percent of the total recoverable

**Figure 1**  
**India's dependence on imported oil**  
(million tons)

Year	Domestic Production Crude	Crude	Imports Petroleum Products	Total
1973-74	7.19	13.95	3.63	17.58
1974-75	7.68	14.49	1.72	16.21
1975-76	8.45	13.62	2.22	15.84
1976-77	8.90	13.90	2.69	16.58
1977-78	10.76	14.51	2.88	17.39
1978-79	11.63	14.66	3.88	18.54
1979-80	11.77	16.12	4.72	20.84
1980-81	10.51	16.25	7.25	23.50
1981-82	16.00	15.40	5.47	20.87
<b>Sixth Plan Projections:</b>				
1982-83	19.95			
1983-84	22.77			
1984-85	25.22			

Source: *New Wave Newsweekly*, Aug. 1, 1982.



Atmospheric units at Gujarat Refinery, India

GOI

reserves of gas lie offshore. By 1983 the South Bassein oil field will be producing gas. It is expected that the already discovered gas fields on the west coast would produce at least 24 million cubic meters of gas per day—for use in 10 major new fertilizer units and at least two new petrochemical complexes.

On-shore production, a weak link in India's petroleum development program, is expected to sustain a production rate of about 2.8 million tons per annum. This would require development of the Jorajan field in Assam. Meanwhile at the Ankleswar field the plan is to reduce production from 2 to 1.

for Indian Petroleum and Chemicals Ltd.'s detergent alkylite plant. A plan was also sketched out to develop a number of fields in the Cambay basin during the Plan period.

### A 10-year perspective

The Sixth Plan has already been modified to include an accelerated production rate, and the investment targets were upgraded from \$4.05 billion to \$4.55 billion. Meanwhile, ONGC officials propose that henceforth 10-year plans be prepared, into which two five-year plans can be telescoped. Because of the continuous upgrading of the projected reserves of oil and gas, the accelerated exploration scheme can be prepared with a goal for 1990.

In keeping with this view the ONGC has presented two investment variants in its 10-year proposed plan to realize the newly established potentials. There is little doubt that ONGC has a sound case, but so far, the proposed 10-year plan has

met with little response. If either of the variants is accepted and implemented with success, the government will realize substantial returns. One of the stumbling blocks in the ONGC scheme is the included proposal that the Commission be paid the international price for the crude it produces, an implied domestic hike in petroleum product prices of considerable magnitude.

### New techniques and capabilities

Several new techniques and growing capabilities for domestic production of exploration and production equipment are continually broadening the scope for exploration and development. Extensive use of digital units for seismic data processing, continuous computerized pressure production during drilling of wildcat wells, and new indigenous sophisticated electrical rigs have been introduced in the on-shore drilling fields. Digital logging units were also introduced for effective formation, evaluation, and reservoir monitoring. Seismic coverage has been extended to the Gandak depression, Surma valley, and the Krishna-Godavari basins.

But the infrastructural inadequacies plaguing India's industry generally have also affected the oil effort. The country's offshore engineering industry has not matured fully, largely as a result of insufficient capital investment, and this has delayed mastery of offshore drilling technology.

One of the best prospects presently for new discoveries is in the eastern region—a 2,000-square-kilometer area recently dubbed the Calcutta High. According to one petroleum expert, "Calcutta is floating on a sea of oil." The ONGC has undertaken a survey, now being conducted in collaboration with an American concern and using the sophisticated vibrosis test technology developed in the United States, to explore the large "gravity maximum" that lies beneath the densely populated center city and suburbs of Calcutta. There are already unconfirmed reports that natural gas has been found, and a formal announcement by the government is expected at any time.

Also bustling with activity are the offshore and on-shore areas of the Krishna-Godavari basin. Recently the World Bank allotted \$165 million that will supplement ONGC investment in this area. The on-shore drilling is concentrated around the Rajole area where the drilling has been completed up to as much as 4,000 meters and productivity tests are in progress. Three more rigs are being added to the area.

### The international dimension

While international collaboration in certain aspects of India's oil program is increasing, ONGC itself is emerging as a force on the international oil scene. Having built up in its national oil company the depth and range of competence in every basic aspect of oil exploration and development, India has been approached for assistance by several developing-sector countries.

It is obvious why the World Bank's interest in "energy development" is viewed with suspicion in the developing

**Figure 2**  
**Oil in India's import bill**  
(in crores rupees\*)

	1970	1975	1980
<b>Selected imports</b>			
Food .....	242.4	1395.4	235.0
Petroleum oil & lubricants .....	136.0	1226.1	5586.9
Fertilizers & chemical products, of which: . . . .	216.5	824.2	1300.0
Fertilizers .....	99.9	533.8	728.1
Capital goods .....	404.0	967.7	1651.5
<b>Total imports</b> .....	<u>1634.2</u>	<u>5265.2</u>	<u>12434.6</u>
<b>Petroleum &amp; petroleum byproducts as a percent of total imports</b> .....	22	39	55

\*1 crore = 10 million  
1 rupee = \$0.12 U.S.

Source: Economic Survey, 1981-82, Government of India, 1982.

sector. On performance, as ONGC's own experience proved, the Bank proves to be a front for the multitis, and a deliberate vehicle for breaking or preventing the development of government-run national oil companies in the developing sector. One example makes the point.

Tanzania had invited ONGC to drill two exploratory wells at a cost of \$5 million. For further exploration Tanzania needed foreign financing, which India was in no position to provide. The World Bank stepped in and offered the needed money on the condition that the Tanzanian National Oil Company be kept out of the picture entirely. A multinational was promptly brought in to drill three exploratory wells—at a cost of \$13 million!

India is interested in taking contracts for foreign exploratory and other work as much as possible, without cutting into domestic efforts. When ONGC Chairman Col. S.P. Wahi recently led a high-level delegation to Peking for a two-week visit, the purpose and objective of the Indian team was reportedly to explore possibilities for Indian help in developing China's oil exploration program.

One might expect demands for Indian assistance from developing nations to accelerate because the high degree of competence in India's oil sector is complemented by a positive appreciation for the requirements of nation-building, and a true sensitivity to the pressures that accompany foreign financing and the oil multitis.

Not hostile, but cautious toward the multitis, India's own experience with them has not been very successful. In 1980 the Petroleum Ministry threw open 32 blocs—17 offshore and 15 on-shore—for exploration by foreign companies. After short-listing 36 of the 60-odd companies that had shown interest, the Ministry found that only a handful offered to bid. In the meantime, more than a year had passed.

The Petroleum Ministry has, however, awarded the Saurashtra II bloc, off the Gujarat coast, to the Standard Oil of California subsidiary Chevron. Chevron will be the first multinational to be involved in India's oil development program since Asameria, Reading and Briter, and Nortromers Calsberg pulled out in 1974—after drilling two dry wells (recall that it took 51 dry wells to strike oil in the North Sea!).

Recently, the ministry has floated a fresh round of tenders, and the response remains to be seen. In the meantime, certain types of international collaboration are increasing. Besides the machinery now being used in the Calcutta High exploration work, the United States is visible in the Palk Strait (Cauvery basin) drilling. ONGC is also chartering two more drilling vessels, beside the "Gettysburg," from the United States for large depth drilling the Palk Strait structure. In the news as well is the recent acquisition of the Mexican jack-up rig "Chichen Itza," which has been taken on a two-year contract basis. South Korea has now entered India's oil exploration boom by bagging a \$250 million contract to build an offshore platform project, which will include a chemical water treatment plant to inject water into the drilling to increase pressure in the well.

## K. D. Malaviya: 'Oilman of India'

*The following are excerpts from an address by Dr. S. N. Talukdar, Director of the K. D. Malaviya Petroleum Exploration Institute of India's Oil and Natural Gas Commission (ONGC), in honor of K. D. Malaviya on the anniversary of his death. Dr. Talukdar spoke at the Nehru Center in New Delhi on May 27.*

When India became free in 1947, the country had just one producing oilfield, Digboi in Assam, and the total Indian production of oil was one quarter of a million tons per annum. During all the years when we were "the brightest jewel in the British Crown," that is nearly for two centuries prior to 1947, in the whole of what is today India, Bangladesh, and Pakistan, only British, European and American Companies had a free run to exploit India's mineral wealth. Although oil was struck in Assam very soon after Drake's famous discovery in Pennsylvania in 1859, these companies could only find that one oilfield, Digboi, in what is now the Indian Republic. Could we do better than our former masters, whom we were conditioned by years of servitude to consider as our superiors in all respects? Even today that feeling has not been fully eradicated in our intelligentsia. In the first years after Independence, it required a man of great vision and courage to overcome this mental barrier. In meeting today in memory of Keshava Deva Malaviya, we remember this. . . .

It was his leadership that made it possible to create, out of a band of young geologists and geophysicists just out of college, what is undoubtedly today the most renowned national oil company anywhere. When I look back to the first days of the Oil and Natural Gas Commission, I cannot but marvel at the utterly unconcerned way in which we took on the task of providing ourselves by our own efforts with knowledge and equipment, and thereafter making use of such knowledge and operating the equipment for what is known as the greatest gamble on earth—oil exploration. Before this, to be sure, our government had taken the courageous decision to conduct oil exploration on its own. A steady stream of "advisers" had thereafter descended on the government, cautioning it. "Oil exploration is a big gamble costing millions," they cried, "it requires very high technology and experience; a government venture in oil exploration is sure to fail." "Yours is a poor country, short of cash for more urgent needs; leave oil exploration to the great multinational oil companies," they said. "India is not highly prospective for oil, give these multinationals enough incentives to do you the favor of looking for oil in your own sedimentary basins," they said.

Even as ONGC was being established, the chief geologist of Burmah Oil Company, an eminent Briton who had spent a major part of his working life in the pre-Independence years in India, published his opinion in a scientific journal that

there was no possibility of finding oil in Gujarat. Privately, he said that he would drink every drop of oil produced there. He would have had monumental indigestion in later years had he carried out his threat!

It was a team from the U.S.S.R. led by Prof. N. A. Kalinin, that provided the optimistic dissent from this cacophony, and it shows Malaviyaji's capacity to judge at its best that he immediately took action on the recommendations of this team. . . .

The Oil and Natural Gas Commission practiced self-reliance from the very beginning, as a result of the insistence of K. D. Malaviya. Our first oil strike occurred within two years of the inception of the organization, at Cambay. . . .

We became a growing concern when oil was struck in the large periclinal Ankleswar prospect in 1960, after earlier seismic surveys in Gujarat. ONGC's own geophysical personnel had mapped this structure. So you see that in a very short period of time ONGC became self-reliant. After Ankleswar, there was no looking back. The field was drilled up by ONGC personnel and put under full production in two years. Subsequently, for the first time in India, pressure maintenance by means of a large water injection scheme was also started in 1966, and that scheme has been operational since then. Ankleswar has now become the grand old lady of the ONGC, still producing nearly 2 million tons of oil per annum. All this has been largely due to ONGC's own efforts in reservoir engineering, etc. The source of inspiration for all this was K. D. Malaviya himself.

It was during Malaviyaji's earlier stint as Minister in charge of Petroleum that discussions were initiated on exploration of the large continental shelf off the western coast of India. In 1965, a seismic survey ship was hired from the U.S.S.R. for carrying out reflection seismic surveys on our continental shelves, principally concentrating on the Arabian Sea side, as this is a continuation of the Cambay Basin where ONGC had its principal discoveries at that time. It was on the basis of the seismic surveys then carried out, with equipment which would appear incredibly primitive by today's standards, that the major prospects to the west of Bombay were outlined. . . .

It was due to K. D. Malaviya's early appreciation of the primacy of exploration in the petroleum industry, and his staunch support during the periods, which, alas, occurred only too often, when repeated failures occurred, that today we have built up not only a very capable organization in the ONGC, but also a very sizeable inventory of petroleum resources. We are in the process of planning for a really big increase in production from the known reserves, as well as for a big increase in exploratory effort in order not only to replace the produced oil and gas, but to find enough for the country's growing future needs. Malaviyaji always used to say that we should take the risks, be bold, and drill, drill, drill. We are translating his inspiration and instructions into concrete plans, and we shall astonish the world by our progress. . . .

# Italy's state-sector is taken over by an

by Bonnie Mesaros

A coup carried out in the last week of September transferred control of the Italian state sector economy to a group of Aquarian technocrats. The appointments of new directors to the state-run consortia IRI, ENI, and Consob brings to fruition a long-term project of European oligarchs, especially Italy's fascist "black nobility," to use the state sector as the vehicle to dismantle Italy's post-war industrial achievements as a whole.

The most important appointments are: Romano Prodi to head IRI, the giant industrial conglomerate controlling over 120 companies; Umberto Colombo as president of ENI, the giant state-sector energy consortium; and Luigi Spaventa to run Consob, the agency that oversees the Italian stock market.

Prime Minister Giovanni Spadolini's recently recycled government is responsible for these appointments. Spadolini's five-party coalition was collapsed last August by the Socialist Party of would-be "Duce" Bettino Craxi, because of its failure to adopt the extreme austerity measures demanded by the International Monetary Fund. Spadolini, a leader of the tiny Republican Party, was only allowed to form a new government on the basis of promises to break the power of the trade unions, termed "lowering the cost of labor," and put an end, once and for all, to the control of the political parties by the constituency machines or lobbies, through what has euphemistically been termed "reform of the institutions."

## The 'new management'

Romano Prodi, who will head the largest single industrial entity in Italy, is a top-level technocrat associated with the Aquarian thinktank, Il Mulino, which in the 1960s used funds supplied by the Rockefeller family's Twentieth Century Fund, to profile the relationship between Italy's two big parties, the DC and PCI, basic industry, and the working-class. Il Mulino's report denounced the ideological bent for progress inherent in this relationship. Standing by at Il Mulino to help consummate the new post-industrial order, are its director Giorgio Galli, who writes anti-labor editorials for the weekly