

From the Editor

OIL CRISIS RAISES THE STAKES FOR ENERGY PLAYERS

The Gulf Crisis has caused many Americans to wonder whether their country's reliance on foreign oil has become a security risk. Fully one half of U.S. oil needs in the first six months of 1990 were satisfied by imports. Domestic exploration and production, on the other hand, has decreased in the last decade - made unprofitable by the low prices of abundant foreign crude.

Israel's dependence on foreign oil has always been an economic fact of life. Since less than 10 per cent of the oil used in the country is supplied locally, Israel has always viewed a continuous supply of imported oil as critically important to its security, and a major priority. The 1973 oil crisis brought skyrocketing inflation.

So Israel sought technological responses - first to insure its own survival in the face of subsequent threats to its oil supply, and secondly to better insulate its economy from the effects of oil-inflated prices.

One might think that, being in the middle of a veritable ocean of subterranean oil, exploration would be a simple matter. Not so. The prospects of striking oil, even here, are entirely dependent on how many (very expensive) oil exploration and drilling programs are instituted. Douglas Ball - a highly knowledgeable consultant - states that in the U.S., only one well in 32 is a "gusher". And each well costs millions.

On a recent visit to Israel, Dr. Armand Hammer predicted the country would be "more than self-sufficient" in oil before the end of this century. His promise of tens of millions of dollars to this end is thus certainly good news, but only a drop in the proverbial bucket when financing oil programs. Time will most likely prove Dr. Hammer to be right but only a highly accelerated oil exploration program will bring that day closer.

Free-world nations are having to face the prospect of varying degrees of negative economic fallout due to the current uncertainty about the possibility of maintaining oil prices in a satisfactory range. Twice since the beginning of the Gulf Crisis, prices have shot above \$30 per barrel. Even before the crisis, Israel was trying to pep up a nearly non-growth economy in order to meet the challenge of massive immigration from Russia and Eastern Europe. The Government recently approved a 16.7% rise in the cost of gasoline at the pump. An even steeper price rise had been mooted.

Under these conditions, how likely is it that Israel will be able to secure an additional measure of energy independence for itself and income for exports? Israeli industry already provides alternative energy solutions. Foremost among these are solar energy-based power plants. Selectively coated solar panels - in widespread use in Israel - are also being exported. Solar ponds, in their infancy locally, could also aid the drive for greater energy independence. Industrial heat-recovery systems are another answer.

In the slightly more distant future, we can look to academic programs such as the ongoing efforts to commercialize the extraction of oil from shale, the most abundant fossil fuel in Israel. A prototype system already exists.

A novel application for the use of the abundant sun is the 50 kilowatt solar furnace at the Weizmann Institute of Science, and the 180-foot high solar tower there develops a maximum of three megawatts from heat.

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Whether or not Israel's survival continues to rely on foreign oil is in large part dependent on the extent to which the above-mentioned alternatives to oil are exploited.

NEWS FROM INSTITUTES OF HIGHER LEARNING

PROTEIN AND ALZHEIMER'S DISEASE

The function of a protein involved in nerve-cell development has been revealed by Prof. Irith Ginzburg of the Weizmann Institute's Department of Neurobiology.

The tau protein, a component of the neuronal cytoskeletal system, is essential for normal nerve cell development and for the preservation of its complex structure.

Prof. Ginzburg has succeeded in tracing the expression of genes leading to the production of the tau protein. By creating reagents that block the expression of such genes in tissue culture, she has shown that tau is essential for axonal stabilization. Blocking its expression prevents normal nerve tissue differentiation.

This protein has attracted particular attention because of its increased concentration in the lesions characteristic of various brain pathologies, in particular the neural degeneration associated with Alzheimer's disease.

Prof. Ginzburg discovered that there is little tau expression in the initial stages of neural development; only at a later stage, when stable contacts are formed between cells, does tau become crucial as a cytoskeletal building block. Ginsberg has characterized not only the genes that code for tau, but also those coding for various tubulin isoforms - the major building blocks of the cytoskeleton.

Whether or not an abnormally high level of tau protein is one of the primary defects involved in Alzheimer's disease or merely an accompanying symptom remains to be determined. The question of whether other disorders also result from such tau abnormalities must also be addressed.

SABRA SCIENTIST

After 17 years with IBM in the U.S., returning sabra physicist Dr. Mordehai Heiblum is now heading the Weizmann Institute's Joseph H. and Belle Brown Center for Submicron Research, where experiments are being conducted on minute semiconductor devices. Submicron devices could

lead to the discovery of new physical phenomena, as well as to the development of electronic and optical components far smaller and faster than those available today. Practical spinoffs are expected to include improved transistors, lasers, and electro-optic and microwave devices.

The impact of such developments may eventually be felt in a wide variety of disciplines in addition to basic physics, such as space exploration, artificial intelligence, communications, education and medicine.

The \$15-million center will provide R&D facilities for physics and materials research, and serve as the training ground for many future leaders in Israel's high-tech industries. The facility will include a range of labs capable of carrying out molecular beam epitaxy and electron-beam "writing" of ultra-small structures. Because of the sophisticated nature of these labs, and the dust-free environment, low temperatures, and high vacuums required for submicron materials research, time will be required to install and check out the newly purchased equipment before projects can begin in earnest.

QUIET AGRICULTURAL REVOLUTION

Researchers in plant genetics have in recent years used genetic interaction between wild and cultivated varieties of wheat to develop hardier varieties. The ability to increase wheat yield by chromosomal engineering, however, has remained an elusive goal. Until now.

Using chromosomal engineering, two geneticists at the Weizmann Institute have achieved a 40% increase in the yields of Israeli durum wheat (used to make pasta), and as much as 15% in the wheat used to make bread. Zeraim-Gedera Ltd. has cooperated in sponsoring field trials to prove the commercial viability of the research conducted by Professor Moshe Feldman and Dr. Eitan Millet. Their work, according to reactions from Israel's Ministry of Agriculture and a number of commercial enterprises, has immense commercial possibilities.

Wild wheat produces smaller yields than cultivated wheat, but its grain protein percentage (GPP) is nearly double that of the cultivated species - 25% vs. 13%. The Weizmann researchers identified and transferred the genes containing the chromosomes responsible. The results were unexpected. The resultant lines, rather than having a higher GPP, gained in yield.

So far, the best scientific explanation for these results is that the increased yield is the result of the

combination of wild wheat's known ability to accumulate large amount of dry matter and nitrogen before grain development with cultivated wheat's ability to maintain a high rate of photosynthesis during grain development.

Although durum wheat is particularly suited for to the climate conditions of the Levant and North Africa, one major though unnamed company is investigating the possibility of applying the same technology to wheat lines grown in other parts of the world.

AMERICAN CETUS COMMERCIALIZES CELLULOSE RESEARCH

The process whereby cellulose is manufactured in the living cell has formed the basis for a new industrial product made in the United States. The new product, called Cellulon, was developed by Prof. Moseh Benziman of the Hebrew University, in co-operation with two American firms. Cellulon is made from bacteria. According to published reports, this is the first time cellulose has been produced from bacterial cells on an commercial scale. Cellulon can be used as an alternative for thickening agents in paints, dyes, glues and cosmetics.

How cellulose is produced in living cells was first described in 1987. The research, conducted over several years, focused on a single-celled organism, *Acetobacter xylinum*.

Synthesis of cellulose in a test tube first took place in 1982. Researchers subsequently discovered the enzymes which initiate and halt cellulose production. With this information, it became possible to create cellulose in the test tube at a rate double that in the living cell. The goal was then to duplicate that achievement in living cells.

Cellulon is based largely on work done by the Hebrew University scientist, with subsequent R&D performed by the Cetus Corp. of California, and with final process development and industrial-scale production by Weyerhaeuser of Washington state - a company specializing in wood products.

The two American companies beat two other giant firms, ICI of Britain and Ajinimoto of Japan, which have invested heavily in trying to develop a similar project.

The development of Cellulon is an outstanding example of how basic university research can be applied to high-technology industry and economic development. Prof. Benziman stresses that not only is the new product a success from both the scientific and economic points of view, but it has significance

in terms of the environment, since Cellulon can serve as an alternative source for cellulose, which today comes primarily from trees.

SCIENTISTS TRAVEL TO EAST EUROPE

The first joint meeting of Israeli and East European scientists to be held in Eastern Europe took place this September in Szeged, Hungary.

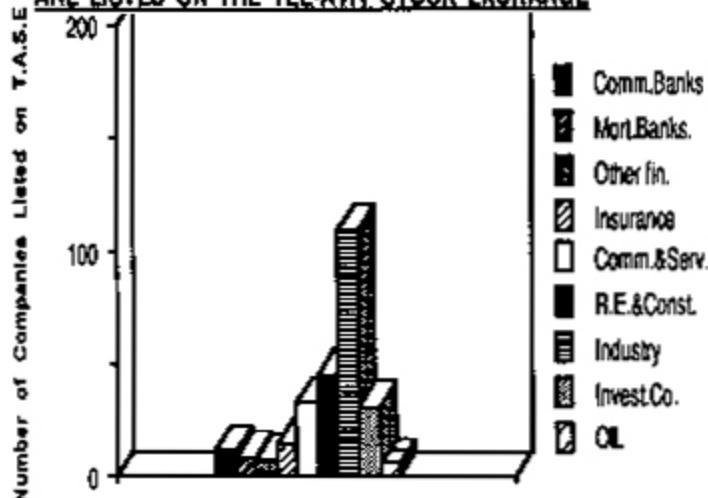
The seminar on plant molecular biology, organized by Israel's Weizmann Institute of Science and Hungary's Biological Research Center, received widespread coverage in the Hungarian media, and was referred to as "a historic event" by Prof. Lajos Keszthelyi, Director of the Hungarian institution which hosted the meeting.

"It was a success in every sense of the word," says Prof. Ada Zamir, of the Weizmann Institute, the Israeli organizer of the event. "We were received with great warmth, and found significant scope for scientific collaboration in many areas," she said.

The participants, mostly top-ranking plant biologists associated with the sponsoring institutes, discussed a variety of topics, including genetically-engineered plants, resistance to herbicides, stress responses and photosynthesis.

ISRAELI COMPANIES ON WALL STREET AND ON THE T.A.S.E.

ONLY SIX OIL COMPANIES OF A TOTAL OF 287 ARE LISTED ON THE TEL-AVIV STOCK EXCHANGE



Israeli Companies on Wall Street

Selected income and earnings summaries for the 6 months ended June 30, 1990, unless otherwise indicated. Nearly all of these companies are intensively export oriented. Prices are as of September 14, 1990 and the price changes relate to those a month ago.

<u>Company</u>	<u>Revs</u> (in \$ mil.)	<u>Net Income</u> (in \$ thou.)	<u>Price</u>	<u>Net Change</u>
ELBIT COMPUTERS Defense electronics ELBTF OTC	87,992	5,341	14.00	+2.125
ECI TELECOM Telecommunications ECILF OTC	17,696	3,632	26.25	+5.25
ELSCINT Medical imaging ELT NYSE	38,800	2,800	2.625	+1.125
FIBRONICS Fiberoptics FBRX OTC	14,748	.922	8.625	+1.125
INTERPHARM LAB. Biological products IPLLF OTC	4,700	300	5.75	+51.00
LASER INDUSTRIES Surgical lasers LAS ASE	8,700	(66)	4.375	+1.125
OPTROTECH Electro-optical systems OPTKF OTC	19,242	.867	5.00	-1.875
SCITEX LTD. Computer graphics SCIXF OTC	84,061	18,555	16.50	+1.625
IIS INTELL. Computer peripherals IISLF OTC	N.A.	N.A.	9.375	+1.125
TEVA PHARMACEUT. Pharmaceuticals TEVYF OTC	70,187	3,746	11.50	+1.375
ELRON ELECTRON. ELRNF OTC	88,000	3,746	6.625	+625

OPROTECH RESULTS

Oprotech Ltd. has announced unaudited, consolidated revenues and earnings for the second quarter of 1990. The company's revenues for the quarter ending June 30, 1990 were \$19.24 million compared with \$17.5 million for the same period in 1989 - an increase of 10%.

Net income, however, was \$58,366, or \$0.02 per share, compared with \$1.0 million or \$0.20 per share for the same period in 1989.

A comprehensive cost-reduction program, including a reorganization of the company's structure, is being accompanied by a reduction in manpower. At the same time, its sales force is being reinforced. All R&D projects are being continued as planned.

The firm's falling profitability is also leading to organizational changes. Dr. Eli Peleg has been appointed development manager, and Shlomo Weitz has been appointed head of operations.

Claridge (Israel) Ltd. - an investor in Oprotech - is said to be cooperating with Dr. Shlomo Barak, Oprotech's president, in implementing programs aimed at overcoming the company's current problem.

ELRON ENJOYS PROFITS FROM SUBSIDIARIES

Consolidated revenues for the three- and six-month periods were \$88 million and \$173.7 million respectively, as compared with \$38.6 million and \$75.3 million for the same periods last year. Consolidated revenues represent primarily revenues of Elbit Computers Ltd. - the company's major subsidiary. Commencing in 1990, Elbit began consolidating the financial results of Elscint Ltd. Net income for the quarter under review was \$2.1 million, or \$0.14 per share, as compared with \$0.2 million or \$0.02 per share for the parallel quarter of 1989. For the first half of 1990, net income was \$3.3 million, or \$0.23 per share, as compared with a net loss of \$0.5 million or \$0.05 per share for the same period last year.

Elron is still negotiating with several European venture capital funds to set up a joint holding company which would invest in new Elron projects. These negotiations are part of Elron's preparations for the unified European market scheduled for 1992.

Elron Electronic Industries plans to raise \$10 million through a stock exchange issue in order to improve the company's capital structure.

OPTIONS FOR ELSCINT PERSONNEL

Liberal option programs for Elscint employees are being spotlighted by Israeli media. The Elscint program is viewed critically, however, since the company has been restructured at a cost of more than 1,000 jobs. The options program is not viewed as justified.

ROBOTEC RESULTS

Eshed Robotec (1982) Limited has announced its operating results for the three-month period ending June 30, 1990.

In that time, sales increased by 67.3% to \$1.3 million, as compared to \$800,000 in the same period in 1989. The results reflect increased sales by the company and its two subsidiaries in all geographical areas.

The company's cost of sales as a percentage of sales increased due to the introduction of new product lines - manufactured by the company and other firms - with lower profit margins.

Eshed Robotec (1982) Limited designs, develops, manufactures and markets educational systems for teaching robotics and machine vision. The company's principal products include the SCORBOT-ER III, the SCORBOT-ER V+ and the SCORBOT-ER VII (each of which simulates robotic applications), various learning modules designed to instruct students in the operations of a robot, accessories for robotic systems, and ROBOTVISION+ and VIEWFLEX - machine vision systems designed for educational applications.

The company's products are marketed in universities, colleges, high schools (technical and vocational) and manufacturing companies. The company's products provide a relatively low-cost alternative to the purchase of industrial robots and vision systems for teaching purposes.

Israel High-Tech Report Index*

153.5% + 16.3%

*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of leading high-tech companies.
BASE=100 AS OF Sep 30, 1984

Eshed Robotec has two wholly owned subsidiaries: Eshed Robotec Inc. - a company registered in Delaware, and Robotec Technologies Ltd. - registered in Israel.

Eshed Robotec markets its products in the U.S. through Eshed Robotec Inc., and in Israel, as of March 1989, through Robotec Technologies Ltd. (RTL). Non-affiliated distributors handle its products throughout the world.

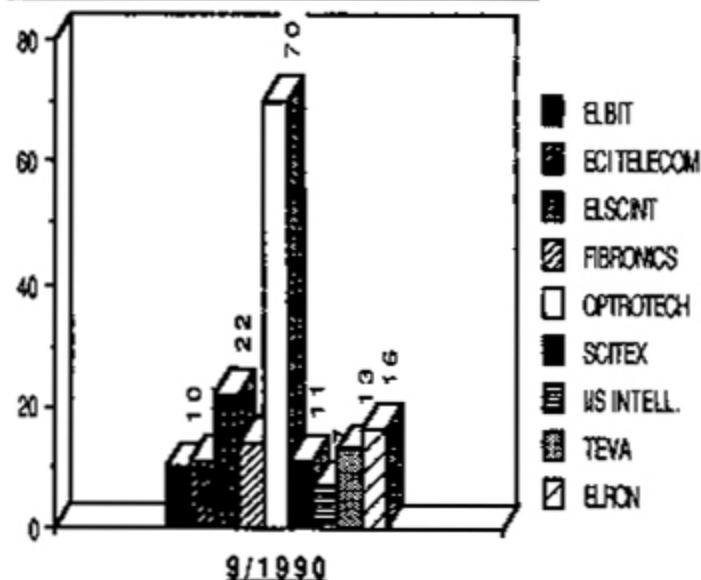
RTL sells Eshed Robotec products in Israel, and began the initial distribution of other suppliers' product lines, such as CNC milling machines and CNC lathes, to the same market segments in which the company's products are currently being sold.

THE GULF CRISIS AND ISRAEL'S CAPITAL MARKET

About \$1.55 billion have been raised on the Tel Aviv Stock Exchange during the first seven months of 1990. Government bonds comprised \$961 million of this amount, company bond issues accounted for \$409.5 million, and company shares and convertible bonds totaled approximately \$182 million.

In response to the Gulf crisis, the sale of shares by investors dropped the free share index by as much as 24% at one point, ending August with an 8% overall loss. A Bank Hapoalim financial subsidiary has estimated an approximate 10% erosion in the value of the public's short-term financial holdings.

P/E RATIOS FOR LEADING SCIENCE BASED INDUSTRIES



RECENT DEVELOPMENTS AND NEWS FROM SCIENCE-BASED INDUSTRIES

VENTURE CAPITALISTS MOVE IN

Discount Bank Investment Corporation Ltd. and the Athena Venture Capital Fund each has invested \$800,000 for which they have received equity in Gilat Communication Systems Ltd. Gilat obviously views the DBIC investment of major importance to its future development and will be offering the new investor the possibility of acquiring up to 50% of the company's equity at a future date.

Gilat is a telecommunications company developing innovative satellite earth stations for data communications systems. Its specialty is satellite networks for data transmission via very small antennas. The company has received in the past BIRD funding.

SERVICING RUSSIAN COMPUTERS

Maintek, a subsidiary of DPA Technology Systems, has conducted a survey of the Russian computer market. The report revealed that the USSR's two million PC's are poorly maintained. It concluded that there is a need for computer maintenance labs in Russia, where PCs are expected to number 10 million within three years.

Maintek recently signed a \$200,000 contract with a number of Russian companies to supply maintenance labs for Russian PCs and peripherals. In the first stage, Maintek will supply three labs, spare parts and training.

BIRD REACHES A NEW MILESTONE

Dr. Ed Mlavsky, BIRD Foundation Executive Director, has announced a milestone in that sales from more than 100 BIRD-financed projects have reached the \$1 billion mark, mostly as exports from Israel.

Products and systems resulting from the research have led to about another billion dollars of business, mostly in the U.S. According to these figures, each dollar of R&D funding has resulted in \$29 of sales.

PHOSPHATE PROJECTIONS

Israel Chemicals' management says Negev Phosphates, with 5% of the world market, will earn \$11.0 million in 1990. The company's profits are suffering due to falling phosphate prices. I.C. has recently approved a five-year, \$60-million capital investment and development program.

HI-TECH MODEM

Rad Data Communications is marketing a modem with 19,200 characters per second. It contains a modulator which is said to offer high performance on Bezek short-distance lines.

ADACOM IN THE RED

Adacom Technologies Ltd., the five-year-old computer communication company, is in the red due to declining sales. Management, shakeups are being implemented.

MASHOV COMPUTER EARNINGS

Mashov Computers Ltd. reported unaudited quarterly earnings of \$200,000 on sales of about \$6.0 million. The company's sales and profits are being enhanced by a growing market for its lead product - the Magic PC applications generator.

DPA GROUP ACQUIRES THREE PHOENIX

DPA Technology Systems, a Tel Aviv-based company, has purchased Three Phoenix, an Arizona-based company specializing in design and manufacture of media certifiers and disk drive test systems. DPA's purchase price of \$1.25 million was approved by the Bank of Israel. The purchase furthers DPA's goal of establishing a strong foothold in the American market.

BINATIONAL RESEARCH FOCUSES ON EPILEPSY

Eighteen years ago, the American and Israeli governments signed an agreement which established the Bi-National Science Foundation to foster and promote civilian research in fields of mutual interest. The foundation has been financed with \$50 million from each country. About 300 projects are supported each year.

Recently the BSF highlighted a project dealing with the cellular mechanisms of epileptic seizures.

Epilepsy, the "sacred disease", is a fairly common, though poorly understood neurological disorder. An epileptic seizure is characterized by a sudden and chaotic discharge of neurons in a part of the brain. Some brain structures are more likely to harbor epileptic foci than others. The structure having the lowest seizure threshold is the hippocampus - a banana-shaped structure in the cerebral cortex.

Even when cut into thin (e.g. 0.5 mm) slices and maintained in a dish under artificial physiological conditions, hippocampal tissue can be readily

induced to generate epileptiform activity. Neurons in hippocampal slices can be monitored for several hours, and the changes in single cells as they are involved in excessive, highly synchronized seizure discharges can be recorded and analyzed.

In the normally functioning brain, neurons excite each other by releasing a chemical neurotransmitter at sites called synapses. Prof. Robert K.S. Wong and his group at the Columbia University School of Medicine in New York have provided strong evidence that these neurotransmitters can build up in the synapses to produce epileptiform discharge. Working on rat hippocampal slices, Dr. Yoel Yaari and his group at the Hebrew University School of Medicine have shown that neurons can excite each other and produce seizure activity even when synaptic excitation is entirely suppressed. A BSF grant supports the collaboration of these two groups, which seek to resolve the specific roles of the two types of neuronal interactions in the initiation and spread of epileptiform activity in the hippocampus. The goal is to facilitate development of new strategies for controlling epileptic seizures.

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ISRAEL HIGH-TECH REPORT

NEWS AND INVESTMENT OPPORTUNITIES

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views the DBIC investment to be of major importance to its business development and has agreed to offer DBIC to acquire additional shares up to 50%, at a future date.

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PROF. YUVAL NEEMAN IN MOSCOW

Minister of Science and Energy Prof. Yuval Neeman during a visit to Moscow, with Finance Minister Yitzhak Modai, concluded agreements with the Russian Academy of Science for increased cooperation between the scientific communities of both countries. There is speculation that the visit may be a prelude to the normalization of relationships and the reestablishing of full diplomatic ties between the U.S.S.R. and Israel.

Minister Modai reported that there are prospects of immediate business deals between the two countries. Some deals that have been suggested include swaps of Israeli agricultural produce for Russian oil.

XSIRIUS SUPERCONDUCTIVITY AIMS AT U.S. MARKET

Xsirius Superconductivity Inc. the American parent of the Jerusalem based Xsirius startup is negotiating a marketing agreement with an American electronics and defense company which has established ties with Israel.

THE NEW ECONOMIC POLICY TO SPEED RAPID GROWTH

The New Economic Policy recently approved by the Cabinet is now awaiting approval by the Knesset, Israel's parliament.

The various measures represent a major effort to reduce Government intervention in the business sector and in the financial and capital markets. IHTR discussed the concepts of the program with officials of the Bank of Israel, Israel's central bank. Its Governor Prof. Michael Bruno is the economic advisor to the Government. Finance Ministry officials along with the Governor are to be viewed as architects of the program. Essentially the program is

based on the need to accommodate the massive influx of Russian immigrants. A year ago the projection for 1990 was put at 40,000. In fact the 100,000th Russian immigrant arrived in Israel by September 14 and at the current rate of arrivals by the end of 1991 more than a quarter million immigrants will reach Israel.

Employment solutions are the first priority and housing takes second place, according to the economic planners. To accommodate the immigration the economy will need to grow at a rate in excess of 8% next year. The moneys required to achieve this figure are in the order of \$ 5 billion, in 1991 alone.

Even after taking into account "sin taxes" on cigarettes and beer; capital gains on the sale of apartments valued in excess of \$300,000; taxes on corporate capital gains on Tel Aviv Stock Exchange transactions, among others, the total extra tax income will fall considerably short of the sums required to put into effect a major program of investment in infrastructure. Taking a leaf from the Franklin Delano Roosevelt program during the early 1930s the Government will attempt to expand employment opportunities by investing in the improvement of roads to more conveniently link Israel's cities and its seaports. The country's telecommunications are also to get a major boost.

The Israeli public is already among the highest taxed in the world and the Government harbors few illusions that it will be able to increase taxes sufficiently to pay for the growth.

Supplemental funds will be needed and will be sought in the form of international loans and grants. To some the \$25 billion, used as a minimum required for implementing a five year program may be too big a sum to be financed from external sources. The hope expressed at the Bank of Israel and by a growing number of business people is that only if the Government truly moves into the direction of reducing its intervention in the capital markets and other key areas only then industry, especially exporting sectors will act as a catalyst in accelerating economic growth.

More business translates into more jobs. There is some improvement in the results of certain sectors of industry including electronics. The average rise in exports may exceed 7% for 1990 and profitability is also moving upwards.