INDO-ISRAELI BUSINESS

EXPLORING NEW VISTAS

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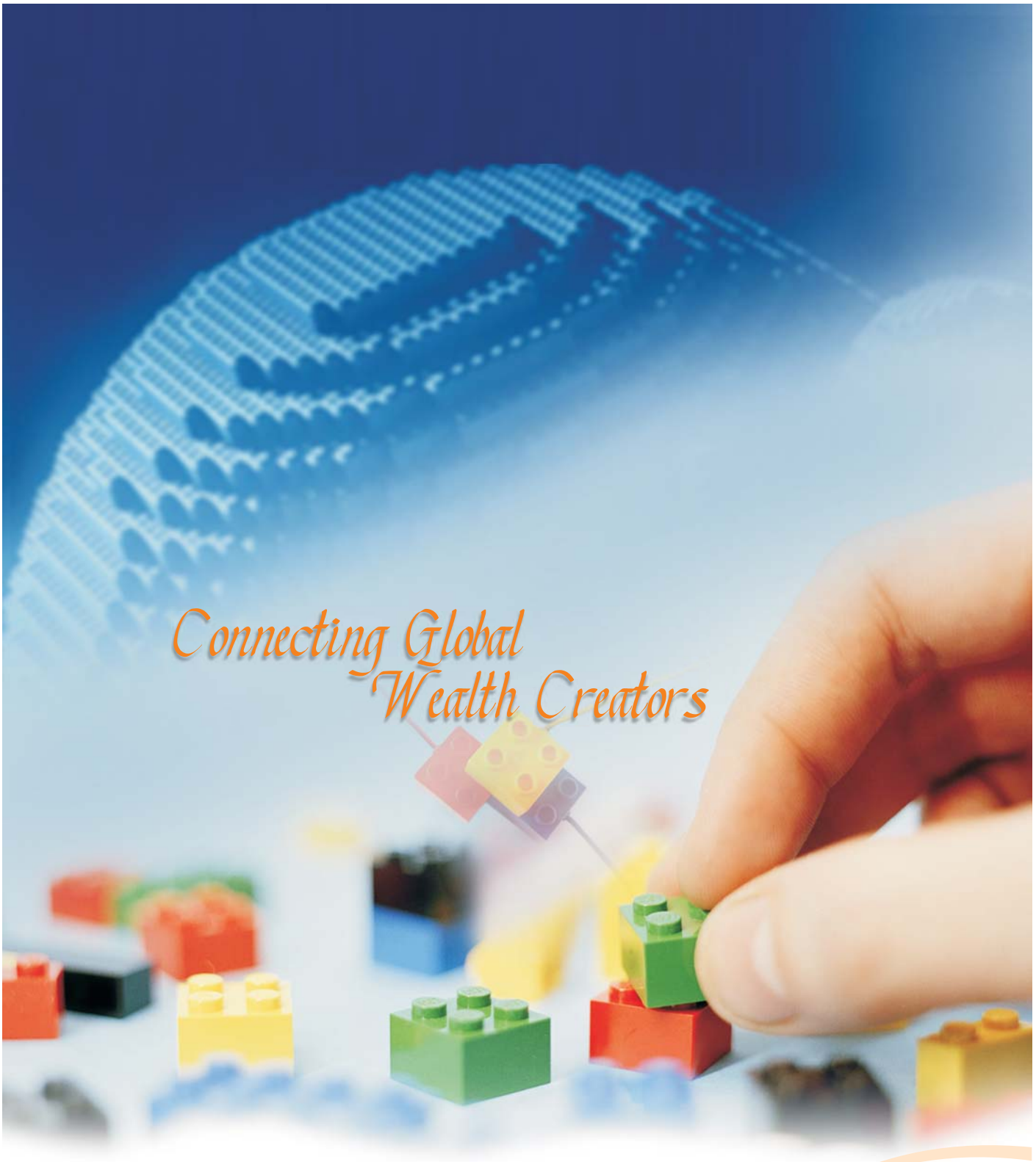
Creating Wealth from Water



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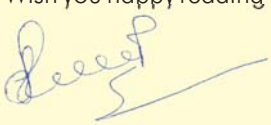
In This Issue

Dear Reader,

Greetings and welcome to the inaugural issue of Indo-Israeli Business. India and Israel, both vibrant democracies, have redefined their relations in the last few years. Apart from economic aspirations, both countries share similar security concerns, being victims of terrorism. Rightly, they have stepped up cooperation in the field of defence, though their bilateral trade has widened in scope, ranging from irrigation and water management to productive agricultural practices, and from science and technology to launching of a spy satellite. For India, where nearly 70 percent of its population depends on agriculture for its livelihood, irrigation and water management become crucial for sustaining and enhancing productivity. Israel, a country tucked in a dry and arid region, has by necessity pioneered water management and developed the revolutionary drip irrigation system, practised in agriculture the world over today. The focus of the current issue is on Israeli capabilities in water management and what it could offer to India. Orna Sagiv, Israel's Consul General in Mumbai in an interview with Indo-Israeli Business says that the potential for bilateral trade is huge and economic cooperation, especially in areas involving advanced technologies, are of mutual advantage. Sharing Ms. Sagiv's optimism, Israeli Ambassador to India Mark Sofer reiterates that the agricultural sector tie-ups have strengthened the ties between the two countries and a proposed Free Trade Agreement has the potential to treble the two-way trade between the two countries. Since the establishment of full diplomatic relations with Israel in 1992, much progress has been made in every aspect of bilateral trade. The magazine presents a bird's eye view in this regard. When most countries were reeling under the impact of recession, Israel could manage to minimize the damage to its economy through innovative fiscal measures, prompting the International Monetary Fund (IMF) to praise the country's effective crisis management. We carry a write-up. We also present an analysis of how India has redefined Its relations with Israel in the last two decades. The Israeli economy has always been investor-friendly and conducive to the growth of a competitive business climate. We carry a detailed report. Israel, which depends largely on oil imports to meet its energy needs, has made remarkable progress in developing alternative sources of energy. We carry a write-up. Israel, which perennially faces a water shortage, has developed innovative waste water treatment and recycling solutions to meet its growing needs. In this context, we highlight the remarkable accomplishment of Israel in the field of desalination of seawater to make it potable. We present a case study of Ashkelon plant, the largest of its kind in the world. Effective use of water through micro irrigation has been Israel's gift to the world. India's Finolex has been awarded Israeli honours for popularizing micro irrigation in India. We carry a report. In this context, we also highlight the achievements of the Jain group, which has emerged as a one-stop shop for irrigation systems. The magazine presents a case study of how a historic lake is being preserved against odds in a Mumbai suburban setting. In a success story, we highlight the initiative taken by the small central Indian state of Chhattisgarh in harnessing water for irrigation and power generation. India has entered a fast track with regard to generation of wind and solar energy. We carry a couple of write-ups. We hope the inaugural issue of Indo-Israeli Business fully meets the information needs of business communities and general readers from both countries.

Wish you happy reading



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Potential in High Tech Bilateral Tie-ups Huge

- Israeli Consul General Orna Sagiv

India shares very cordial and expanding bilateral relations with Israel. In the last few years, trade between the two countries has become more diversified and wide-ranging - from water management in agriculture to advanced technologies and homeland security. For India, where nearly 70 percent of its population depends on agriculture for its livelihood, water management becomes crucial for sustaining and enhancing productivity. Israel, a country tucked in a dry and arid region, has by necessity pioneered water management and developed the revolutionary drip irrigation system, practiced in agriculture the world over today. India and Israel have already signed agreements in the field of agriculture, water management and renewable resources. Israel is more than happy to extend this cooperation further says Orna Sagiv, Israel's Consul General in Mumbai in an interview with Indo-Israel Business. She says that the potential for bilateral trade is huge and economic cooperation, especially in fields such as advanced technologies, are of mutual advantage to both of countries.

As the Consul General in Mumbai, how do you look at the prospects of bilateral relations between India and Israel?

The trade between India and Israel has been expanding constantly. When India and Israel established diplomatic ties in 1992, the bilateral trade was USD200 million. At the end of 2008 the bilateral trade between our two countries was USD4 billion, and we believe that the potential for growth is still huge.

The trade is not only expanding in amounts, but also in variety. If diamonds were about 60-70 percent of the trade up until a few years ago, they consist of about 50 percent and today and the trade and cooperation in other fields have been growing steadily.

Recently we've witnessed more Israeli advanced technologies entering the Indian market, such as desalination plants, advanced security equipment for homeland security purposes (civilian), telecommunications products and more.

The Government of Israel attributes a lot of importance to its relations with India. In the past year, we had visits of three major Israeli delegations to India, in the fields of Homeland Security (HLS), IT and Telecommunication. Reciprocity visits of Indian companies in Israel have been promoted as well.

A large delegation of more than 40 CTO's visited Israel in November, to participate in the "Next Generation Technology Yatra", a specially large event, which took place for the first time, sponsored mainly by the Israeli Ministry of Foreign Affairs and organized by the CTO Forum (9.9 Media). This event exposed Israel and its high technological capabilities to technological decision makers in the main and largest Indian companies all around India.

Israel is one of the leaders in water management and technology. Could you cite some successful join initiatives in this field?

Since most of the Indian population is involved with agriculture, we believe there's a big potential for cooperation in that field. Being a small country with hardly any natural resources, suffering from arid lands and lack of water, Israel has developed throughout the years very advanced methods and

technologies to overcome these problems, saving water and increasing productivity. There's an ongoing cooperation between our two countries in the agricultural field, and we are happy to extend it even more.

In the past few years, Israel has become one of the worlds' most important innovation hubs, especially in the water sector. The drip irrigation, now used very commonly all around the world, was invented in Israel during the 60s. The largest desalination plant is located in Israel and we are the leading country in the world in terms of water reuse - almost 80 percent of all urban waste water is reused for agriculture.

Today Israel can offer diverse solutions from comprehensive management of water resources and water saving irrigation technologies, to cost saving purification, reclamation and desalination methods. We can also offer water security solutions, a problem that may threaten the worlds' water reservoirs in the future.

What is your message to the readers?

Israel and India have been developing the bilateral ties since 1992. The ongoing good and close relations in every field - have been growing steadily and we believe the potential is still huge. The trade and economic relations, especially in fields such as advanced technologies, are of mutual advantage to both of our countries. We regard our Consulate General as a "bridge" and wish to assist business people from both countries to discover the opportunities of the bilateral cooperation and to enlarge the "people to people" contacts between Israel and India. ■

Israel Eyes India as Major Trading Partner

Israel and India have had a long, though unofficial, economic relationship until it was openly announced in 1992. Since then, the volume of bilateral trade between India and Israel had grown by 10 folds to about $4 billion in 2008.

"Israel and India are complementing economies, meaning we do not compete we complete," said Elad Goz, Israeli Consul for Economic Affairs in Mumbai.

"Therefore the Government of Israel has declared India as a preferred partner for increasing trade volume in the coming years," Goz added.

Elad Goz, Consul, Economic Affairs, Consulate General of Israel, Mumbai, India

He said Israel is keen on investing resources to assist Indian and Israeli companies forge alliances and joint ventures, especially in the following sectors:

• Water & Environmental Technologies • Renewable Energy Resources • Home Land Security • Telecommunications • Bio-Technology • Software • Infrastructure

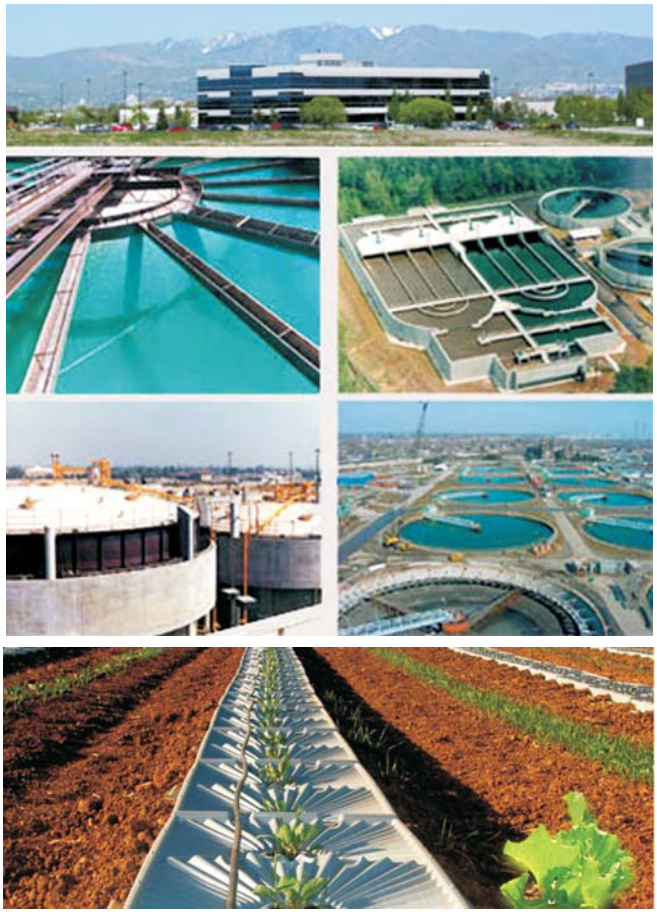
Israel will continue to support companies seeking to form agricultural and rural development initiatives as well.

"The main obstacle that we encounter is in finding the right local partners for Israeli companies wishing to start operations in India,' Goz said. "Israeli companies find it difficult to understand the way the Indian market works, and therefore, need a suitable local partner to assist them," he added.

Goz said that finding a local partner is a difficult task, and "one of our main missions Goz said at the Economic Department of the Consulate General is to assist in this task."

He pointed out that another obstacle is in understanding the Indian laws and regulations, especially those concerning direct foreign investment (FDI) and tariffs.

"We are trying to assist Israeli companies to understand and to overcome these hurdles in order to promote Israeli FDI and exports to India,' Goz said.



In a message to Open Trade readers, who comprise diplomatic personnel represented by 23-member countries of the Trade Commissioners' Forum in Mumbai, decision-makers in government and the corporate sector, Goz said: "I would like to stress that Israel sees India as one of our main trading partners, and we look forward to expanding and broadening the great relationship between our countries." ■

Planned FTA Can Triple Two-Way Trade in Three Years

Farm Sector Cooperation Boosts Indo-Israeli Ties

By H.E Mark Sofer, Ambassador of Israel to India

The dynamics of the bilateral relationship between Israel and India, perhaps especially in the economic sphere have few parallels indeed in contemporary international relations. In the 17 years since the establishment of full diplomatic relations, mutual civilian trade has risen over twenty-fold and has topped USD4 billion. Two-way investment, too, has reached billions of dollars and should we be able to further the proposed Free Trade Agreement between India and Israel, these figures may well triple themselves within 3-4 years.

Economic relations between our two countries involve almost all sectors of activity, including IT, Software, Defence, Homeland Security, Healthcare and much, much more.

At the heart of the economic ties between Israel and India lies the growing agricultural cooperation between our two countries which, since the signing of the Memorandum of Understanding between our respective Ministers of Agriculture in 2008, has undergone a metamorphosis. Six excellence centres, covering production of vegetables and fruit using ultra-modern technologies, are in advanced stages of planning and construction in Haryana and Maharashtra and new projects for the use of saline water and drip irrigation are progressing in Gujarat and Rajasthan.

Indeed, it is the growing scarcity of water that presents a serious challenge to world food production, especially in a country such as India with 700 million people dependent on agriculture for their daily lives. The growing cooperation between Israel and India in the field of water management and technologies is of paramount importance to our two populations.

Underlying all of this cooperation lies the mutual capacity to develop, absorb and implement state-of-the-art innovation which will increase production levels at appreciably lower cost to the farmer and the consumer.

Indian-Israeli relations will undoubtedly continue to flourish, not least due to the depth of good-will existing among Indians and Israelis towards each other. Indeed, the warmth that we feel from vast sectors of the Indian society towards Israel, and the wish for cooperation in those sectors in which Israel is among the world's leaders, including agriculture, hi-tech, information technology and medical innovation is only matched by the awe and admiration felt by all Israelis for Indian culture, history, capabilities and striving for betterment.

The shared values of democracy, rule of law, freedom of the individual, self-improvement and mutual respect truly augur well for the future of the Indo-Israel relationship, and we can look to the future with a sense of true optimism. ■

Forging Indo-Israeli Bond: A Bird's Eye View

Israel and India established full diplomatic relations on January 29, 1992. However, even before that, Israel had a Consulate in Mumbai, operating since 1953. Following the establishment of diplomatic relations an Embassy opened in New Delhi, and the Consulate in Mumbai became Consulate-General. In addition, an Honorary Consulate operates in Kolkata.

During the years since the establishment of diplomatic relations, much progress has been made on the bilateral level. India is increasingly becoming central to Israel's policy, politically, commercially, in science and culture. Israel is appreciative of the fact that Jews in India were never persecuted.

Reciprocal visits between Israel and India indicate the growing mutual acquaintance and the strength of the relations. Israel's President visited India in early 1997, following visits by its Minister of Foreign Affairs and other cabinet ministers. During 1998 and 1999 there have been visits in Israel of Indian cabinet ministers and MPs, Attorney General Soli Sorabhjee, and the Prime Minister's principal secretary Brajesh Mishra. In the summer 2000, India's Home Minister L.K. Advani and Foreign Minister, Jaswant Singh visited Israel. Close at their heels was the visit of West Bengal's Chief Minister and CPI(M) leader Jyoti Basu. Deputy Chairperson of the Rajya Sabha Najma Heptullah, also visited Israel in 2000. In December, 2001 a delegation of the Knesset, led by Prof. Amnon Rubinstein, came to India.

The Minister of State for Science and Technology Shri Bachi Singh Rawat and the Minister of Science and Technology of Israel Mr. Eliezer Sandberg holding delegation level talks on Scientific cooperation between two countries in New Delhi on December 22, 2003.

Shimon Peres, Minister for Regional Cooperation visited India twice, in August 2000 and January 2001. Peres visited India for the third time (January, 2002) as Deputy Prime Minister and Minister of Foreign Affairs. In the same year (February, 2002) Tzachi Hanegbi, Minister for Environment visited India. Pramod Mahajan, Minister for Communication & Parliamentary Affairs, visited Israel in January, 2002.

In September 2003 Israeli Prime Minister Ariel Sharon paid a two-day state visit to India together with Deputy Prime Minister & Minister of Justice Joseph Lapid, Minister of Education Limor Livnat and Minister of Agriculture Israel Katz. During the visit India and Israel signed agreements on Environmental Protection, Cooperation in Combating Illicit Trafficking and Abuse of Narcotic Drugs and Psychotropic Substances, Visa Free Travel for Diplomatic, Official and Service Passport Holders, Cooperation in the fields of Health and Medicine, Cooperation in the field of Education and Cooperation in the field of Culture. The Delhi Statement of Friendship and Cooperation between India and Israel was issued.

In December 2003 Israel's Minister of Science & Technology Eliezer Sandberg visited India and signed a MoU with the Indian Space Research Organization (ISRO) for the launch of the Israeli TAUVEX UV telescope on an Indian demonstrator Satellite GSAT-4. In January 2004 Indian Minister of Commerce & Industry Arun Jaitly headed the Indian delegation to the Joint Economic Committee, which met in Israel. In February 2004 Israel's Deputy Prime Minister & Minister of Foreign Affairs Silvan Shalom and the President of Israel's

The Israeli Vice Prime Minister Mr. Ehud Olmert meets the External Affairs Minister, Shri K. Natwar Singh in New Delhi on December 8, 2004.

Supreme Court Chief Justice Aharon Barak visited India. Vice Prime Minister of Israel and Minister for Industry, Trade, Labour & Communications Ehud Olmert, with a large business delegation, visited India from 6th December to 9th December 2004.

India's Minister for Science and Technology Kapil Sibal visited Israel in July 2005. During his visit a bilateral agreement was signed to pursue technological ventures together via the establishment of a joint industrial research and development fund. Minister of State for Rural Development Kumari Selja, paid a visit to Israel in September 2005.

Minister for Commerce & Industries Kamal Nath visited Israel in November 2005 during which a Joint Study Group (JSG) was established in order to boost bilateral trade from US $ 2 billion to US $ 5 billion by 2008. Such an agreement will realize the full potential of India-Israel economic relations in a comprehensive manner.

The former Prime Minister of Israel, Mr. Ehud Barak calls on the Prime Minister, Dr. Manmohan Singh in New Delhi on November 17, 2005

India's Minister for Agriculture, Consumer Affairs, Food and Public Distribution Sharad Pawar visited Israel in November 2005 to represent India at the official memorial ceremony for the late Prime Minister Yitzhak Rabin, marking the 10th anniversary of his assassination. During his visit the two sides exchanged ideas regarding the broadening and intensification of bilateral cooperation in agriculture, including in micro irrigation and dairy farming.

Former Israeli Prime Minister Ehud Barak participated in the Hindustan Times Leadership Summit in Delhi in November 2005 and lectured on "The Middle East- risks and opportunities for a stable world". In February 2006 the National Security Advisor of Israel, Maj. Gen. (Retd.) Giora Eiland, visited India and held

The President Dr, A.P.J. Abdul Kalam giving away the Pravasi Bhartiya Samman Award to the Agricultural Scientist from Israel Mr Eliahu Bezale, at the last day of the Pravasi Bharatiya Divas, in Hyderabad on January 9, 2006

talks with his Indian counterpart M.K. Narayanan and other Indian dignitaries. His visit was held in the framework of Indo-Israel National Security Council dialogue.

A large Indian delegation led by Agriculture Minister Sharad Pawar visited Israel again in May 2006 on the occasion of the Agritech 2006 exhibition. The delegation comprised the chief ministers of Rajasthan, Gujarat and Nagaland and included senior officials from other Indian states. During the visit a three-year Work Plan for Cooperation in the Field of Agriculture was signed by the two governments.

Israel's former Minister of Foreign Affairs, Prof. Shlomo Ben Ami, visited India in August 2006 as part of the on-going dialogue with the Indian government and with civil society institutions.

Israel's Deputy Prime Minister and Minister of Industry, Trade and Labour Eliyahu Yishai, with a high level business delegation, paid an official visit in December 2006. During the visit both countries have embarked upon negotiating a Preferential Trade Agreement eventually leading to a Comprehensive Economic Cooperation Agreement (CECA).

Chief Minister of Madhya Pradesh Shivraj Singh Chouhan, led a 16-member delegation to Israel from 29 January to 1 February, 2007 at the invitation of Minister of Agriculture & Rural Development of Israel Shalom Simhon. Chouhan and the delegation met with Simhon and visited various institutes at Volcani Centre. The delegates also visited companies involved in irrigation and agricultural projects as well as water treatment & management.

January 29, 2007 marked the 15th anniversary of full diplomatic relations between India and Israel which were established on January 29, 1992. According to the statement issued on this occasion, "the upgrading of relations between Israel and India was a historic milestone in the long journey to achieve normal and prosperous relations between India and Israel, in accordance with the vision of the fathers of the State of Israel".

The Deputy Prime Minister of Israel, Mr. Shaul Mofaz meeting with the Union Minister of External Affairs, Shri Pranab Mukherjee, in New Delhi on March 20, 2007

The Minister of State for Industry, Shri Ashwani Kumar in a meeting with the Israeli delegation led by Israel's Deputy Prime Minister and Minister for Trade and Industry, Mr. Ellie Yishai at Jerusalem on August 05, 2007

The 6th meeting of Indo-Israeli Joint Working Group on Counter-Terrorism was held on March 13, 2007 at New Delhi. It was preceded by the 3rd round of Dialogue on Disarmament and Non-Proliferation on March 12, 2007. The Israeli delegation was led by Miriam Ziv, Deputy Director General, Strategic Division, Ministry of Foreign Affairs, while the Indian side was headed by K.C Singh, Additional Secretary (International Organizations), Ministry of External Affairs.

In March 2007, Israeli Deputy Prime Minister and Minister of Transport & Road Safety Shaul Mofaz, visited India (19-22 March 2007). During the visit India and Israel explored the ways to enhance ties in areas such as civil aviation, railways, shipping and road safety programs.

To mark the 15the anniversary of Indo-Israel bilateral relations a major musical concert by "The Idan Raichel Project" was organized in Delhi, Mumbai and Kolkata during April 2007.The Idan Raichel Group performed in front of thousands of audiences in all three cities. In Delhi, they did a fusion with a local group called "Rajasthan Roots" from the "Jaipur Festival", which was enthusiastically received by the audiences.

The 10th round of the Foreign Ministry consultations between India and Israel, were held in the Ministry of Foreign Affairs, in Jerusalem on 15 May 2007. The Israeli delegation was led by Deputy Director General Amos Nadai, Ministry of Foreign Affairs and the Indian side headed by Secretary (East) N. Ravi, Ministry of External Affairs. Comprehensive and positive discussions were held on bilateral, multilateral and regional issues. Ravi also called on Deputy Prime Minister and Minister of Foreign Affairs Tzipi Livni.

India and Israel have emphasized that efforts should be made to fully utilize the potential for enhanced economic cooperation between the two countries. Union Minister of State for

ISRO successfully launched PSLV C-10 at Sriharikota for the Israel Aero Space Industries, on January 21, 2008

Commerce and Industry of India Ashwani Kumar headed a high-level FICCI delegation to Israel in the month of August 2007. During the meeting with his Israeli counterpart Eliyahu Yishai, Israel has put forward a proposal for a Free Trade Agreement (FTA) with India to boost burgeoning economic and bilateral ties. Kumar also met with Israeli President Shimon Peres during his stay in Israel.

Israeli Home Minister Meir Sheetrit paid a two-day visit on 8 and 9 November 2007 to New Delhi to attend the second Asian Ministerial Conference on Disaster Risk Reduction. During his visit the Minister called on India's Minister of Foreign Affairs Pranab Mukherjee, Minister of Home Affairs Shivraj Patil, Panchayati Raj Minister Mani Shankar Aiyer and discussed matters of mutual interest and means to strengthen the cooperation between the two countries.

Israel's Minister of Agriculture & Rural Development Shalom Simhon paid a 10-day visit to India in January 2008. During his visit the Minister met with Union Agriculture Minister Sharad Pawar, Raghuvansh Prasad, Union Minister for Rural Development, Rajasthan Chief Minister Vasundhra Raje Scindia, Rajasthan Agriculture Minister Prabhu Lal Saini, Rajasthan Irrigation & Water Minister Sanwar Lal Jat.

Other visits arranged by the two governments include those of industrialists and businessmen, exchanges of academic and political delegations, artists, scholars and more. Bilateral consultations between the Indian Ministry of External Affairs and Israel's Ministry of Foreign Affairs are held annually, alternately in Jerusalem and New Delhi since 1999. Periodical discussions are also held on strategic matters and on counter terrorism. Both countries are committed to enhance ties in the fields of science, culture and economics. It should be noted, that many other visits have taken place without governmental involvement. Israel welcomes this as a healthy trend, which also indicates the growing professional, academic, cultural and economic ties between the two countries. ■

(Source: Embassy of Israel, New Delhi)

The Union Minister of Consumer Affairs, Food and Public Distribution and Agriculture, Shri Sharad Pawar meeting with the Agriculture Minister of Israel, Mr. Shalom Simhon, in New Delhi on January 22, 2008.

IMF Pats Israel for Tiding Over Recession

The International Monetary Fund (IMF) has praised Israel over the way it has managed its economy in the face of the global recession. Following is the IMF assessment.

In the face of global crisis, Israeli output growth was amongst the last to fall below trend, among the mildest hit with output projected flat overall in 2009, and amongst the earliest to stage a recovery with output up in both Q2 and Q3, 2009.

Though bonds and equities fell sharply in late 2008, there was no melt down in markets, even without the full swathe of emergency financial stabilization measures typical elsewhere. Indeed, since early 2008 Israel appeared to acquire safe haven status, experiencing sharp increases in net capital inflows and real exchange rate appreciation, despite sustained foreign reserve accumulation. And in September 2009, the Bank of Israel (BoI) was the first central bank globally to raise policy rates for over a year, one of several steps it took then to begin the exit from the monetary measures that had been adopted in response to the global crisis.

Though output was shielded from the global downturn by the composition of trade, the absence of housing or bank credit booms, and high household savings rates, the strength of output in Israel also owes much to the public debt reduction and structural reforms of the past decade, as well as the specific policy responses to the crisis. In particular, the decisive relaxation in the monetary stance including "unconventional" measures, the accommodation of the automatic stabilizers in 2009 and its expression in the adoption of a two year budget for 2009-10, and suitably focused measures to stabilize credit flows were all both timely and appropriately strong.

The financial sector passed through the crisis relatively well

While the bond market and equity valuations suffered heavily at the peak of the global financial crisis, banks have proved remarkably resilient despite support measures considerably less extensive than were applied elsewhere. In the context of proactive supervision and a conservative bias, banks have mostly eschewed exposure to structured instruments, remain heavily deposit funded, and are backed by a strong comprehensive government guarantee. In these circumstances, their risk-weighted capital ratios, also reflected in strong raw capital, represent an adequate standard for bank capitalization. This should be reflected in the determination of the level and types of capital to be set in the Basel II standards in the coming year.

But various steps to strengthen the banking prudential framework are recommended

A significant upgrade of macro-prudential and financial stability analysis is needed. Priorities for the new unit in the BoI should include comprehensive banking stress tests to provide a better understanding of risks to regulators and banks. Scenarios could include the lower bounds of staff's 90 percent confidence intervals for the global and the associated Israeli projections. In addition, the BoI should begin publication of a financial stability report, preferably semi-annually, and consideration could be given to including stress test results. Over the longer term, the BoI should also work with the other regulators to broaden the analysis to cover the entire financial system and its macroeconomic linkages. Further consideration should also be given to introduction of an explicit deposit insurance scheme to provide additional options to deal with the resolution of non systemic banks, as well as to clarify banks' liability for funds used in payouts.

The difficulties in non-banks call for their supervision to be reinforced

Given global stabilization and increased evidence that Israel has proven resilient to the recent global shock, asset valuations have recovered significantly from their mid-crisis troughs. But the particular severity of the declines in the peak of the financial crisis, the closure of the corporate bond market in that

context, and the decline of several insurance companies' solvency ratios to below their regulatory floors are indicative of underlying fragilities in these institutions and markets. Various steps, including the Hodak committee proposals and initiatives by the Israeli Securities Authority (ISA) are underway to address the difficulties.

Beyond these steps, however, a more fundamental strengthening of the budget, staffing, and autonomy of the non-bank regulators is appropriate. To this end, the ISA should be given full operational independence, and the Capital Markets, Insurance and Savings Division (CMISD) of the Ministry of Finance should be given formal autonomy, in line with international best practice. Such changes should maintain the full flow of information to other supervisors and to the monetary and fiscal authorities and coordination of strategic priorities among the various regulators should be reinforced. Concurrently, the CMISD and ISA should significantly strengthen their transparency, going well beyond the provision of data, through the publication of timely analysis of developments, issues, and risks. Finally, an assessment should be made of the risk that even the relatively targeted emergency support measures for the nonbank sector has given rise to moral hazard there and, if so, this should be reflected in the content of supervisory guidelines to be adopted.

But the economy has not been unscathed

While output, consumption, and confidence are in the neighborhood of their fall 2008 levels, exports, imports, and fixed investment are far from fully recovered. Unemployment has edged up to some 8.0 percent, and the stock of bank credit to corporates has fallen through much of the year with inflation above target for much of that time. And though safe haven factors that earlier put upward pressure on the currency appear to have eased along with global financial sector stabilization, concerns with the strength of the shekel have not entirely been put to rest.

On the policy side, automatic stabilizers took a heavy toll on hitherto steady progress of deficit reduction, taking the deficit close to 5.0 percent of GDP in 2009. The earlier well-established framework of fiscal rules comprising ceilings on deficits and on the growth of real spending was abandoned, appropriately, to accommodate this, but it is unclear if the credibility of the ceilings which replaced them has been fully established. And the BoI's programmed foreign exchange purchases have been replaced on a transitional basis by a regime of discretionary intervention. This will shift the IMF classification of the exchange rate regime from "free floating" to "floating".

Still in the Woods

Public debt is back on an upward track, heading towards 80 percent of GDP by end-2010. And external uncertainties remain elevated: though the WEO central projection shows global growth of 3.0 percent in 2010, this is subject to 90 percent confidence margins ranging from ½ to 5½ percent. The corresponding range for projected growth in Israel in 2010 is 0 to 4 percent. Further ahead, significant reductions in the growth of potential output of the major economies will likely lower Israel's medium-term potential growth rate by some ½ a percentage point annually to 3-3½ percent.

The Challenge Ahead

In this context, our core advice is to strengthen the policy frameworks to anchor long run expectations and reinforce policy credibility, thereby both securing greater flexibility to address short run shocks and supporting long-term growth. This approach is reflected in advice in the fiscal, monetary, and the financial stability areas.

The declining path for ceilings on fiscal deficits, supported by annual caps on real spending growth, the renewal of the program of US guarantees on public debt, and steps to early entry to the OECD all aim to anchor long run expectations. These steps are reflected in the "two year budget" which envisages unfettered automatic stabilizers which are projected to lower the deficit in 2010 if growth picks up and to provide fiscal support if not. On the foreign exchange regime, the shift from preprogrammed to discretionary intervention is a transitional step anticipating a free float. Progress towards adoption of the BoI Law strengthens the outlook for the long-run monetary framework, and the recent policy rate rises are measured and balanced steps to tighten the stance of monetary policy as recovery takes hold. And though the various emergency financial sector support initiatives remain in place, take up has been limited and is expected to remain so. Various actions to strengthen the content of supervision are in

process, including establishment of a financial stability unit in the BoI, and proposals by the Hodak committee and regulators to strengthen due diligence practices, bond structures, remuneration arrangements, and investment portfolio guidelines.

Key Message

A key message that needs to be underscored to the public is that the global environment places a high premium on avoiding actions which might compound downside risks. This concern precludes early commitments to sizeable permanent remuneration increases, notwithstanding the encouraging economic performance so far. In particular, wage settlements for public sector employees due in 2010 should be tightly restrained. This would send an appropriate signal to private sector wage setters, help keep inflation and interest rates low as output strengthens, and thus promote continued good economic performance.

A further key message is that high public debt represents an enduring vulnerability and far from being eased, this problem is likely aggravated by the recent elevation of public deficits and debt internationally and the associated pressures on global savings. In periods of market stress, costs of financing for high debt countries like Israel tend to rise particularly sharply, curbing scope to allow fiscal support to cushion shocks a concern reflected in Israel's decision in 2009 to raise the VAT rate to cap the headline deficit. And high debt attenuates and may even more than completely negate the stabilizing impact on output of fiscal support in downturns. Given Israel's particular exposure to global and geopolitical shocks, these are primary concerns. Public debt needs to come down decisively.

Both concerns are compounded by the likely decline in potential output growth globally and therefore in Israel in the wake of the global crisis and by the likely loss of windfall revenues associated with the prior global financial boom. For these reasons, the difficulty of securing public debt reduction has increased. Accordingly, efforts to do so need to be redoubled, anchored by adoption of a formal long-term anchor for policies targeting public debt reduction, strengthened budget procedures, and efforts to improve supply side efficiencies, including through liberalized planning rules and competitive privatization. ■

India Redefines Relations with Israel

By Dev Varam

Israel, the tiny little Middle Eastern country inspires admiration, bordering on the awe among most Indians. Its exploits, from the six- day war in 1967 when in one swell swoop the Israeli Air Force destroyed as many as 450 enemy aircraft in probably the riskiest operation in aviation history or the rescue of more than 100 Air France hostages from Entebbe in Uganda in 1976 in one of the most daring commando operations or the bombing of the Osirak nuclear reactor outside Baghdad in 1982 - belong to the stuff of legends.

But Israel's achievements on the economic front, research and development and agriculture are no less spectacular.

The country has achieved miracles in agriculture, converting the desert into lush green croplands, vegetable and fruit gardens through most innovative and pioneering water management practices. Israeli innovations of drip and computer-controlled irrigation and water purification and reuse that are utilized around the world for economical plant cultivation and water conservation. Israel's Tahal group is a major supplier of computerized water management systems - software that ensures that not one drop is wasted. Among dozens of other countries, including Egypt, Tahal systems.

Israel, which lacks natural resources, has to depend on the brains of its citizens to produce a wealth of ideas. Today, Israel is one of the world's leaders in the per capita registration of US patents by its scientists, doctors and engineers. During the last decade, Israel has been recognized across the world as a powerhouse in computer programming innovations, medicine, engineering and many other fields, which has led to the sales of start-up companies to foreign investors, publicity and prestige.

Sea Change in Diplomatic Relations

India has redefined its relations with Israel in the last two decades. Though India recognized Israel in 1949, a year after its creation in the midst of the Arab world, full diplomatic relations were established only in 1992. India's delay in developing close diplomatic relations with Israel stemmed from its reluctance to hurt the sentiments of Arab nations with which it has traditionally enjoyed cordial relations. But the 1986 resolution of the Organization of the Islamic Conference (OIC) supporting Pakistan's claim on Kashmir, which India has all along maintained as its own territory, also prompted the country to re-evaluate its Middle-East policy. On its part, Israel has consistently backed New Delhi's stand that the 1972 Shimla agreement between India and Pakistan could be the only basis for a final settlement of the Kashmir issue.

However, India's establishment of full diplomatic relations on 29 January 1992 had a lot to do with changing times that prompted the country to radically alter its foreign policy options in the wake of its economic liberalization on the home front and the demise of the Soviet Union, the end of the so-called "Cold War Era" on the external front. And one factor that has brought India and Israel has been the rise of Islamic extremism which has hit both the countries in equal measure.

Defence Cooperation

No wonder, cooperation in the field of defence has been high on the agenda of Indo-Israeli relations. In fact, Israel has overtaken Russia as the largest supplier of military equipment to India in 2009. Early this year, India launched a military satellite for Israel through its Indian Space Research Organization (ISRO). The most advanced spy satellite, called TecSar, weighing just under 300 kg, was developed by the Israel Aerospace Industries' Space Division MBT and has the ability to create images of objects on Earth in cloudy weather conditions and can see through certain rooftops that are not made of concrete.

In the 17 years since the establishment of full diplomatic relations, bilateral trade has risen over twenty-fold and has topped USD4 billion. As Ambassador of Israel to India Mark Sofer predicts, the two-way investment should treble within three to four years if the proposed Free Trade Agreement between India and Israel materializes.

Vibrant Democracies

India at 62 and Israel at 61 are young and vibrant democracies sharing many similarities. Both are ancient lands of wisdom.

Peoples of both countries have highly evolved civilizations to boast. Historically, India has never been touched by anti-Semitism and the early Jewish settlers in this country had been welcomed with open arms and never been persecuted as happened in Europe and elsewhere.

This aspect was noted and highlighted at the world's first Jewish-Hindu interfaith leadership summit, held in February 2007 in New Delhi, jointly by Hindu and Jewish organizations in India and Israel respectively as well as the American Jewish Committee. The chief Rabbi of Israel, Yona Metzger, who was actively involved in the dialogue, observed," "For thousands of years we have marched on parallel causes and have now built bridges of cooperation between the two religions. Jews have lived in India for over 2000 years and have never been discriminated against. This is something unparalleled in human history."

Since 1992, several Indian political leaders have travelled to Israel. These included chief ministers of several states. Many of these trips were undertaken to learn from Israel's expertise in farm irrigation. These visits have resulted in an estimated 180 joint-ventures between Indian and Israeli companies.

As Israel entered the seventh decade of its existence with great promise about its future, it is relevant to recall an observation that British Prime Minister Gordon Brown had made about the country last year. Congratulating Israel on its 60th anniversary of independence, Brown called the state's creation the "greatest achievement" of the 20th Century. ■

Investor-Friendly Israeli Economy Inspires Intense Business Activity

The Israeli economy is highly competitive and Investor-friendly. Reform-oriented and liberal the government's policies have over the years soured intense entrepreneurial activity that has become the hallmark of the business environment, attracting the attention of foreign and local investors.

Israel's Foreign Trade Policy

International trade plays a vital role in Israel's economy. Indeed, the Israeli economy has integrated into the global trading system in a rapid and efficient manner, by implementing multilateral and bilateral trade agreements, as well as by pursuing a unilateral process of trade liberalization and structural reforms. In harmony with the policy steps, aiming at the full integration of the Israeli economy into global trade trends, the Israeli economy has undergone a substantial process of structural reforms. In a relatively short time the Israeli economy has developed into a liberalized marketplace trading in a wide range of manufactured goods and services worldwide.

Throughout the 1990's, mass immigration from the former Soviet Union, proactive economic policies, fiscal and monetary reforms pursued by the Israeli government, initiated a period of innovation and growth. The Israeli economy became open to competition from within and without, driven by the private sector.

Intense entrepreneurial activity became the hallmark of the business environment, attracting the attention of foreign and local investors.

The Israeli technological, research and knowledge based industries have gained world wide recognition and have served as an engine for economic growth.

Objectives

Israel's trade policy objectives are as follows:

- Continued integration of the Israeli economy into the global trading system, through the use of policy instruments that relate to trade in goods, services, investments, competition, environment, intellectual property, development and others.
- Promoting and maintaining Israel's export competitiveness by expanding and updating the network of international agreements designed to promote trade, facilitate market access, eliminate non-tariff barriers and achieve sustainable economic growth.
- Increasing the efficiency of resource allocation, by enhancing reforms that aim at the introduction of greater competition and increased transparency in the domestic market.
- Creating an attractive climate for investors, businesspeople, consumers and the public as a whole.

Israel's trade policy is enhanced by a wide range of international agreements and commercial arrangements with countries and international bodies. In recent years, the Government of Israel has been pursuing its international trade policies in a well coordinated effort, along three paths in parallel: multilateral, bilateral and unilateral.

Bilateral Trade Agreements

Israel's bilateral trade agreements cover a substantial portion of Israel's international trade. Israel has had free trade agreements with its major trading partners for many years - with the European Union since 1975, with the United States since 1985, as well as with the

EFTA states since 1993. In November 1995, Israel and the European Union concluded a more comprehensive agreement to cover wide aspects of economic relations beyond trade in goods, enabling Israel's participation in the European Union's Research and Development Framework Programs

In recent years Israel and the EU have signed several agreements and protocols to further liberalize trade in agricultural goods, to include Israel in the Pan-European system of cumulation of origin, and the participation of Israel in the European space project of Galileo. During the last two years Israel and the EU have been involved in a wide ranging dialogue within the framework of the European Neighborhood Policy. This includes issues such as negotiations on standardization, services and dispute settlement procedures.

As part of its policy to further open markets, and to maintain Israel's exports competitiveness in European and North-American markets, free trade agreements have also been signed with Canada (1996), Turkey (1997), and Mexico (2000). Israel continues to explore new initiatives to expand its market access to other countries through either multilateral or regional agreements. Recently, Israel has been focusing its attention on Asia and Latin America, in the light of the growing importance of these regions in world trade. Israel and the MERCOSUR (Argentina, Brazil, Paraguay, and Uruguay) have concluded a Free Trade Area agreement. The Agreement awaits ratification. When entered into force, this Agreement will gradually eliminate most customs duties on trade in goods from both sides.

Economic relations with its neighbors in the Middle East are of particular importance to Israel. Israel has also initiated and signed regional trade arrangements; Qualified Industrial Zone (QIZ) Agreements, operating under the framework of the Israel-US free trade area agreement, have been concluded with Jordan (1997) and Egypt (2004). The QIZ Agreements have contributed enormously to the bilateral growth of trade between Israel and Jordan on the one hand and Israel and Egypt on the other hand. Israel is confident that regional economic cooperation will contribute to the peace process and to the well-being of all people in the region.

Unilateral trade liberalization

Israel has a liberal and open trade policy. An Import Policy Department is active within the Foreign Trade Administration. Its mandate is to explore ways to further facilitate the flow of trade into, and out of, the Israeli market as well as to carry out liberalization steps.

The Free Import Order was last updated in 2008, and will be updated again towards the end of 2009. This order deals with free imports of goods into Israel subject to licensing requirements and/or standards, so as to ensure the safety and security of consumers

and the public as a whole. As a result, the Government of Israel has introduced more transparency into the import licensing procedures, thereby removing bureaucratic barriers to trade.

Investment Promotion Center

Invest in Israel is Israel's Investment Promotion Center at the Ministry of Industry, Trade and Labor. The center promotes foreign direct investment into Israel, and encourages additional investment by multinationals already invested in the country.

FDI plays an important role in the economic development of Israel by enhancing competitiveness through tech transfer, infrastructure development, productivity and increased employment.

Invest in Israel provides the potential and current investor an array of professional services during the pre, present and post stages of the investment process. These include:

- Current and accurate information on incentives available to the investor.
- Coordination of investor visits and introductions to relevant businesses.
- Maintaining a liaison with government and non-government agencies responsible for investment policy.
- Providing comparative analysis on services and information on costs of business operations in Israel.
- Business reports of Israel's leading target sectors and implementation of activities to promote these sectors.

Israel's Breakthroughs Record

Israel has a proven track record of breakthroughs owing to its talented workforce, which includes the world's highest percentage of engineers and scientists and is supported by sophisticated infrastructure. Israel has the highest investment in R&D as a percentage of GDP per capita and has continued to attract foreign investment, which reached $10.5 billion in 2008, despite the present economic challenges.

A small country with limited resources, Israel is ranked as the 23rd most competitive economy out of 134 countries by the World Economic Forum.

Investment Incentives

Investment incentives are outlined in the Law for the Encouragement of Capital Investment* which was recently revised. The new Law differs from the previous one in that it adds a new path for incentives - an automatic one. The incentive programs can be divided into 2 main types: 1) The Grants program - administered by the Israel Investment Center (IIC), a department of the Ministry of Industry, Trade and Labor 2) The Automatic Tax Benefits program administered by the Tax Authorities.

To qualify, investment projects must meet certain criteria including: international competitiveness (as described in the law), minimal designated investment, high added value and registration of the company in Israel.

Once these criteria are met, the enterprise gains Approved Enterprise status from the IIC if it chooses the grants program, and Beneficiary Enterprise status by the Tax Authority if it chooses one of the tax benefits programs. It is the negligible for incentives, such as grants of up to 24 percent of tangible fixed assets (grants program only) and/or reduced tax rates, tax exemptions and other tax related benefits.

Location

The government grants scheme is affected in part by the location of the company's activities. Several

regions in Israel have been declared National Priority Regions:

Priority Area A includes: The Galilee; Jordan Valley; The Negev Jerusalem (for hi-tech enterprises). Priority Area B includes: Lower Galilee; Northern Negev; Area C includes the rest of the country.

Grant Program

The amount of the government grant is calculated as a percentage of the original cost of land development and investment in buildings (except in Area C), in machinery and equipment. This cost includes installation and related expenses. The percentages are:

Time to Completion

Under the provisions of the grants scheme, 20 percent of the approved program for industrial projects should be completed within 24 months of the date of approval. The investment program must be completed within 5 years from the date of approval.

Tax Benefits

Grant Program: Companies choosing the grant program also receive tax benefits for a period of 7 consecutive years, starting with the first year in which the company earns taxable income (grants are not considered income). Tax benefits are determined by the percentage of foreign control: the more foreign control in the enterprise, the higher the benefits. If at least 25% of an Approved Enterprise's owners are foreign investors, the enterprise is eligible for a 10 year period of tax benefits, as in the following table:

(All figures are percentages).

b) Automatic Tax Programs There are 3 types of automatic tax programs: 1. Alternative tax program. 2. Priority area program. 3. Strategic program. 1. Alternative tax program: A company can choose this program by waiving the project's rights to a grant and will receive complete exemption from corporate tax on its undistributed income, as detailed below.

Priority Area A: Priority Area B: Area C / Central Israel: 10 years of complete tax exemption 6 years of complete tax exemption and 1 year of tax benefits, 4 years for a foreign investor 2 years of complete tax exemption and 5 years of tax benefits, 8 years for a foreign investor.

Priority Area Program

For companies investing in Priority Area A, benefits include: a. Corporate tax rate of 11.5%. b. Dividend tax rate of 15%, total tax rate of 24.5%. For a foreign investor, the dividend tax rate is 4% and a total tax rate of 15%. The benefit period is for 7 years. If at least 25% of the company is foreign owned then the benefit period is 10 years.

Strategic program

This program is intended mainly for large multi-national companies meeting the following criteria: an annual turnover of at least $3 billion and a minimum investment of $130 million in the project itself. Location: Priority Area A Benefits include: a. Corporate tax 0% (i.e. complete tax exemption). b. Dividend tax 0%. c. Benefit period 10 years. N.B. Recent amendments to the law now require adherence to environmental standards as a prerequisite to recognition as an approved enterprise.

Source: Investment Centre, Ministry of Industry, Trade and Labor.

Employment Grant Program - Background

In order to complement the revised Law for the Encouragement of Capital Investments the government established an additional program to increase employment in the outlying areas of Israel as well as specific centers with high unemployment. Support will be granted for the establishment or

expansion of industrial plants, telephone call centers, computer service support centers or logistic centers. Initially the budget for this program was 450 million NIS (approximately $100 million) spread over 3 years -150 million NIS per year, for the period 2005-2007. The program was then aimed at specific and mainly lower-earning workers, by means of a special bidding system.

Recent Developments

However in the wake of the global economic recession and its impact on the Israeli economy, specifically the rise in unemployment levels, this track was expanded to include new target groups of workers. The Ministry of Trade, Industry and Labor restructured the special Employment Track of the Investment Centre in order to encourage investments as well as add new workers to the employment force. In light of the above the Ministry singled out the following special needs groups: Persons with medically recognized physical restrictions. Population groups of low unemployment, such as the ultra-orthodox, minorities, single-parents. Businesses in the Sderot and outer-Gazza region.

Incentives for Industrial R&D

The Office of the Chief Scientist (OCS) at Israel's Ministry of Industry, Trade & Labor is responsible for the implementation of governmental policies regarding the support and encouragement of industrial research and development in Israel.

A variety of ongoing R&D support programs developed and offered by the OCS, have played a major role in enabling Israel to become a key center for hi-tech entrepreneurship. This section highlights the OCS's local and international support programs.

Technological Incubators

Provides a framework and support for nascent companies to develop their innovative technological ideas and form new business ventures in order to attract private investors.

The program is open to private investors to become owners of incubators and to invest in the nascent companies at an early stage, enabling a greater return on investment.

From 2002 to 2008, 22 of 24 technological incubators have been acquired by private investors.

Establishment of a designated Bio-Technology Incubator, open to bio-tech projects, provides professional services with larger funds and extended incubation term.

Establishment of two new Industrialized Incubators, open to less innovative projects provides support and guidance towards manufacturing, commercialization and initial sales.

The program supports activities of Young Entrepreneurs Organization, in high schools. Grants are up to 85 percent of approved budget.

Competitive R&D Fund

Supports industrial competitive R&D programs.

Approved R&D program must last at least one year, and should lead to the development of a new product or a significant improvement to an existing product. The development should also lead to a new industrial process or a significant improvement in an existing industrial process.

Grants are up to 50% of the total approved R&D expenditures. The annual budget of $230 million is spent on 775 projects being undertaken by 500 companies.

Proposals are approved by the OCS Research Committee and grants are awarded according to the terms and conditions set by the OCS Research Committee.

Grants are provided as a percentage (between 20% and 50% depending on the circumstances and the estimated potential of individual projects) of the estimated R&D expenditures approved by the OCS Research Committee.

The Beta-Site Stage (interim stage between R&D and marketing) is recognized as an important and integral part of the R&D project, with the aim of testing the product in "real-life" situations, by being operated by selected end-users who give technical feedback and suggestions for product modifications. Assistance for this stage is given as par tof the R&D grant.

When a government assisted R&D project results in a commercially successful product, the company is

obligated to pay royalties, which will be used to fund future grants to encourage and support other industrial R&D programs. In general, royalty payments are 3% - 3.5% of the total annual revenues derived from the sales of a developed product which R&D was supported by OCS grants. Reports and payments are made semiannually.

Support of Traditional Industry

This support program, launched in 2005, offers separate evaluation and discussion for projects from traditional industries. Private consultation is offered to traditional industry companies applying to the OCS for the first time. OCS acknowledges traditional industry as a preferred sector and therefore, its R&D programs are supported by 50 percent.

Pre Competitive R&D Magnet Consortium

Supports the formation of consortia made up of industrial companies and academic institutions, in order to jointly develop generic, pre competitive technologies. The duration of a Magnet Consortium is 3-5 years. Grants are up to 66% of the approved budget for industry and up to 80% for the academic institution.-No royalty payments.

Katamon

Promote water technology projects by triple cooperation between industrial company, academic research group and water infrastructure company. Project's budget is up to US$1M, and its duration is up to 30 months.- Grants are up to 50%.- No royalty payments.

International Programs - Multinationals

Matimop

Promotes and assists participation of Israeli companies in international bilateral or multilateral cooperation programs for industrial R&D. Promotes joint industrial development of advanced technologies. Maintains updated database of projects in many advanced technologies and database of profiles of Israeli industrial companies seeking international cooperation.

The Global Enterprise R&D Cooperation Framework - GIRDF

This program attracts prominent multinational corporations (MNC) to forge investment cooperation deals with Israeli startups.

The Framework's main purpose is to provide a friendly, favorable approach & supportive work environment ("one-stop-shop") for Israeli start-ups looking to collaborate with the MNC.

Within this framework, both OCS and the MNC commit to invest in pre-selected R&D projects, conducted jointly by the MNC and the Israeli company.

The MNC is not requested to invest money; instead it can provide the startup with facilities like: technological guidance, borrowing equipment, lab facilities, discounted software licenses, business mentoring, etc.

The IP, created from the joint project, may be owned jointly by the startup and the MNC.

OCS operates several MNC R&D cooperation agreements with IBM, Oracle, Merck, Coca Cola, Deutsche-Telecom.

Bi-national Funds

The programs enable the participation in joint R&D projects with foreign counterparts. Grants are up to 50 percent of R&D expenses of each company from each state.

Fund Name Countries
BIRD Israel - USA (www.birdf.com)
BRITECH Israel - UK (www.britech.org)

CIIRDF Israel - Canada (www.ciirdf.ca)
KORIL-RDF Israel - Korea (www.koril-rdf.or.kr)
SIIRD Israel - Singapore (www.siirdf.com)

Bilateral R&D programs

The Government of Israel through the OCS has signed agreements together with other governments to actively support and encourage industrial R&D cooperation between Israeli and overseas industries.

International industrial R&D cooperation will usually include access to know-how and technologies that are not otherwise readily available to the participants as well as access to new markets.

Matimop, the Israeli Industry Center for R&D, operates international R&D agreements on behalf of the OCS with Italy, Belgium, Ireland, Germany, Holland, Spain, Portugal, Finland, France, Sweden, Denmark, India, Turkey, Brazil, Argentina, Uruguay, Greece, China, Russia, the Czech Republic, Hungary, Ontario (Canada), Maryland (USA) and Victoria (Australia).

The programs enable access to sources of national and regional funding; Israeli companies taking part in these programs are entitled to receive R&D grants from the OCS.

Industrial Cooperation in Israel

The Industrial Cooperation Authority (ICA) is an Israeli Government entity, operating within the Ministry of Industry, Trade and Labor. ICA initiates, coordinates and monitors industrial and commercial cooperation activities following Government, Government-owned companies, public institutes and other State entities procurement.

ICA also promotes and monitors commercial and industrial cooperation activities related to selected areas of non-government trade.

ICA is based in Jerusalem and in Tel Aviv, and also has an office at the Israel Economic Mission in New York, covering activities in North America.

First Step in Long-Term Relationship

Industrial Cooperation with Israel may be your company's introduction to one of the world's most advanced industries and economies. ICA is confident that your industrial Cooperation Program will be the cornerstone of a mutually beneficial and long-lasting business relationship with Israeli industry. ■

Мир экспорта привлекает новые экспортные возможности. Риск–Менеджмент - название игры.

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Зарубежный импортер может импортировать из Индии разные виды товаров и услуг по отсроченным срокам оплаты. Однако Индийский экспортер получает полную наличную оплату по погрузке товаров. Ответственность возмещения кредита Эксим Банку несет заграничный заемщик, а не Индийский экспортер.

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At a Glance

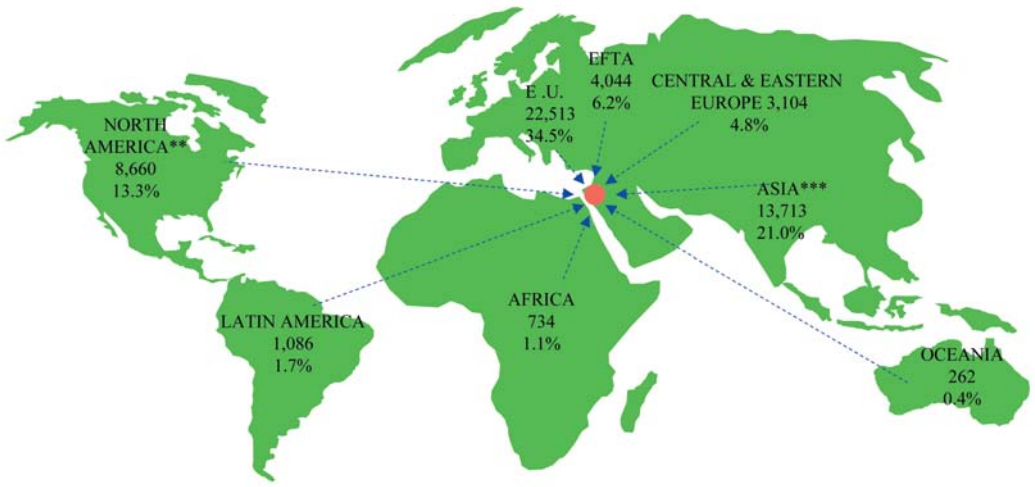
	(In millions of US dollars)
Gross Domestic Product	198,997
Business Sector Product	147,200
GDP Per Capita (U.S.$)	27,224
Investment in Fixed Capital	35,920
Imports of Goods (Net)	64,531
Exports of Goods (Net)	51,321
Industrial Exports*	46,933
of which, hi-tech	17,150
Imports of Goods and Services**	84,192
Exports of Goods and Services**	80,427
Population Average (Thousands)	7,308
Unemployment Rate (%)	6.1
InflationRate(CPI-%)	3.8

*Including net polished diamonds** Balance of payments figures. Source: Israel C.B.S*

ISRAEL`S IMPORTS OF GOODS, 2008

(MILLIONS OF U.S. $)

TOTAL IMPORTS – 65,173*



Unclassified-$11,057 (17.0%)

* Before reduction of returned goods

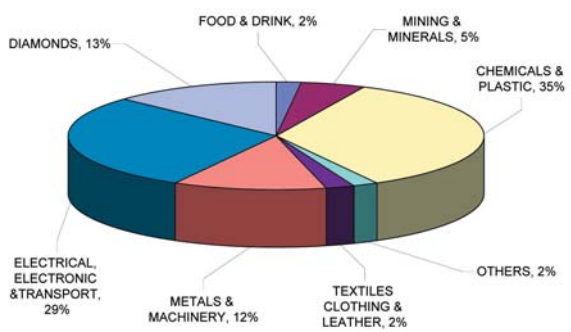
** 1. N.America including: U.S.A., Canada & Mexico
2.Import from U.S.A.- $8,034 (12.3%)

***Including Asian Republics of former U.S.S.R

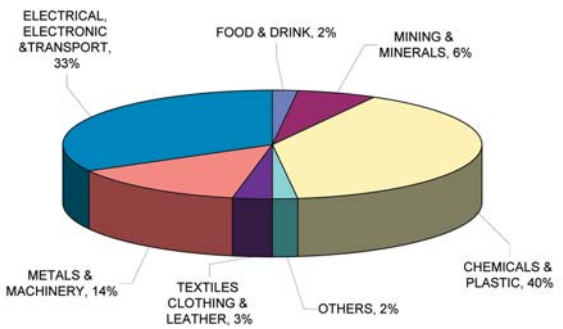
Source: C.B.S.

INDUSTRIAL EXPORT BY MAJOR BRANCHES, 2008

Total Industrial Exports 46,933* Millions of U.S.$



Exports Excluding Diamonds 40,634* Millions of U.S.$



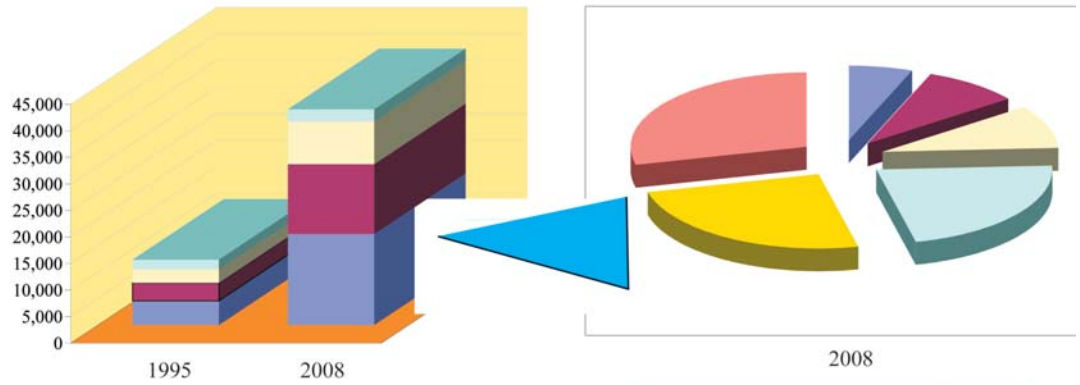
*Including Net Polished Diamonds

Source: Israel C.B.S

COMPOSITION OF INDUSTRIAL EXPORTS 1995 VS. 2008

TOTAL INDUSTRIAL EXPORTS EXCLUDING DIAMONDS:

IN 1995 -$ 12,302, IN 2008 $ 40,634 MILION

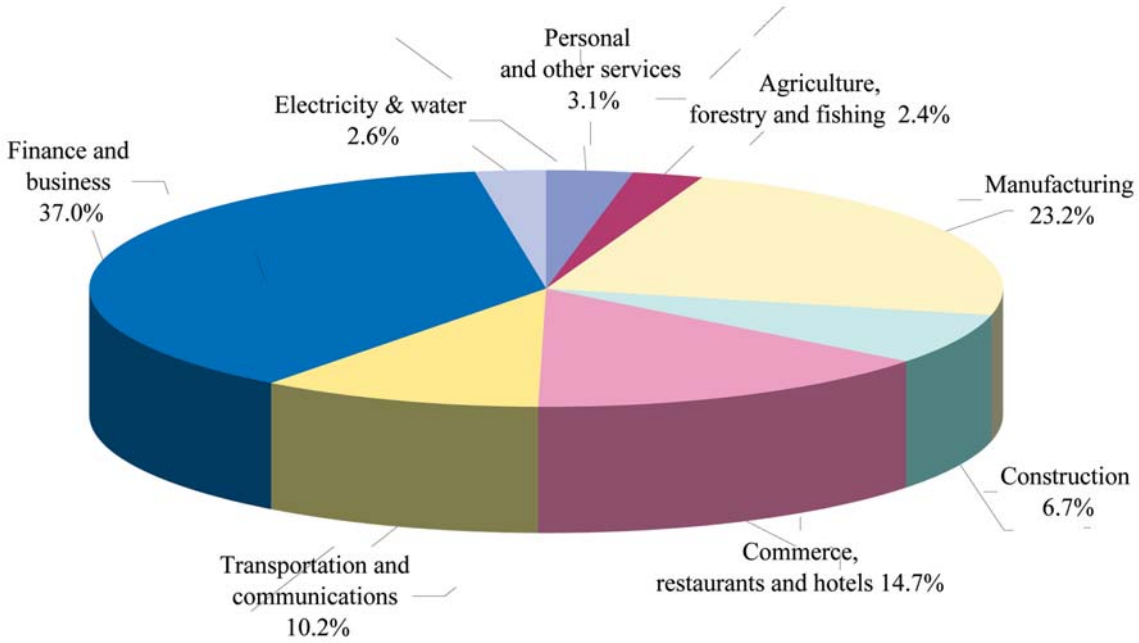


	1995	2008
HI-TECHNOLOGY INDUSTRIES	4,549	17,150
MID-HI-TECH INDUSTRIES	3,388	13,125
MID-LOW-TECH INDUSTRIES	2,542	8,081
TRADITIONAL (LOW-TECH) INDUSTRIES	1,823	2,278
TOTAL INDUSTRY	12,302	40,634

1- Office & computing equipment	1,019
2- Electronic components	1,525
3- Aircraft industries	1,587
4- Electronic communication equipment	3,830
5- Industrial medical & control equipment.	4,219
6- Pharmaceutical products	4,970

Source: Israel C.B.S

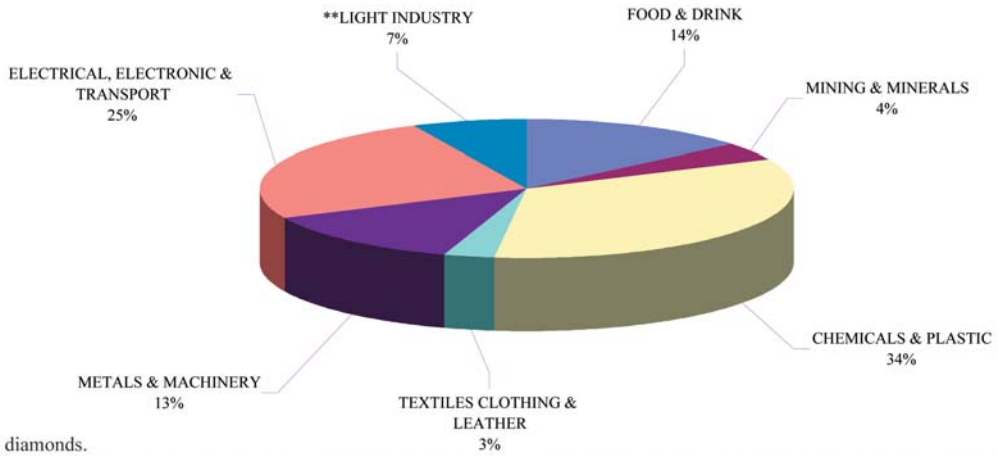
BUSINESS PRODUCT COMPOSITION 2008



Source: Israel C.B.S

INDUSTRIAL PRODUCTION* BY MAJOR BRANCHES, 2008

PERCENTAGE BREAKDOWN

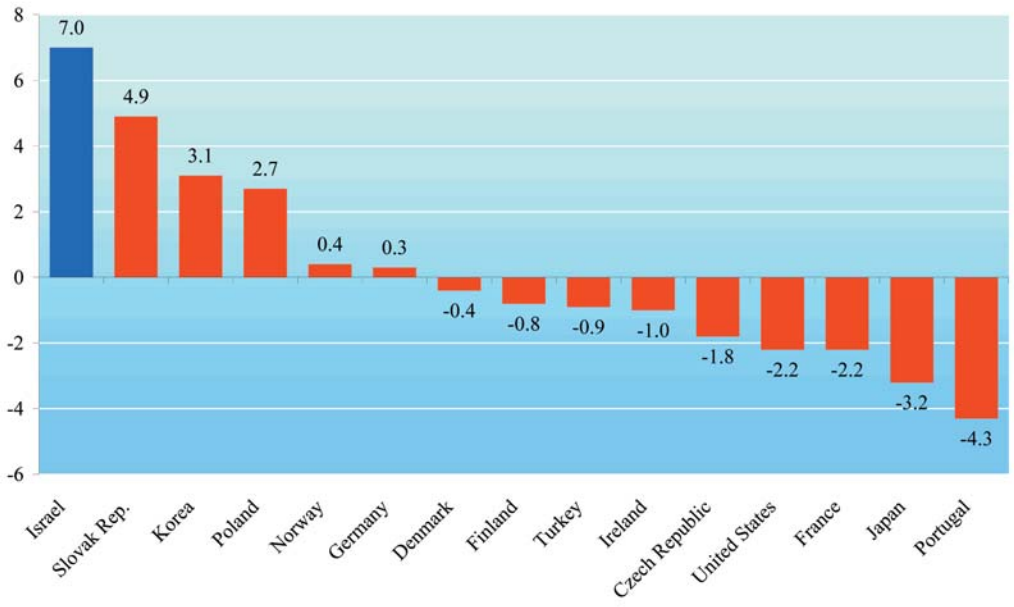


* Excluding diamonds.
**Light industries includes: wood, paper, printing, furniture & jewellery.

SOURCE: Israel C.B.S. and Ministry of Industry, Trade & Labor

INDUSTRIAL PRODUCTION 2008 REAL ANNUAL PERCENTAGE CHANGE

(Compared to 2007)



Source: OECD - Main Economic Indicators, Israel C.B.S.

Alternative Energy
A Creative Israeli Initiative

On account of the peculiar political situation, fulfillment of its peak electricity demands is a responsibility that weighs heavy on Israel. Additionally, the 'electric island' as it is termed is completely dependent on imported oil. Nevertheless, turning weaknesses into strengths is an old habit with Israel, as we have seen in case of water and wastewater technologies.

Saving Energy:

Devoid of extensive resources of fossil fuels, it was but natural for Israel to pioneer research in alternative energy possibilities. Throughout the country the search for renewable energy solutions is of prime concern for researchers in the private industry as well as the academia. With arid land and a predominantly sunny climate, solar energy was one of the first alternatives that Israeli researchers turned to. In other sectors, Israeli researchers are utilizing their expertise to develop technologies of global significance but with modest possibilities of application in their homeland. Research in bio-fuels and wind energy are a few examples. In the field of Geothermal Energy Technologies, Israel's Ormat is a global leader. Apparently, the obvious dangers of global warming and the incessant efforts to discover renewable energy sources ensure that all local researchers are fully engrossed in a never-ending search for new and innovative technologies.

Renewable/Alternative Energy Sources:

As early as the seventies Israel realized the potential of solar energy for heating. With a climate promising hours of sunlight on an almost daily basis, the government recognized the potential for cutting energy costs. In buildings constructed after the seventies, a law was approved, making solar heating mandatory. The private sector was quick to pick the cue and indulged in developing new equipment to harness rays of the sun for energy generation. Today, Israeli companies such as Chromagen, Elsol and Nimrod offer a wide range of solar powered water heating systems. The equipment, ranges from low scale solutions for domestic households to custom made systems for industry, hospitals etc for a round the clock supply of hot water. Anticipating the global interest in this field and using a closed loop heat transfer system that allows for use of antifreeze, water-heating systems have been developed for cold climates as well. Promising efficient service round the year in cold as well as warm climates, technology has been developed so as to ensure a supply of hot water after just a few hours of sun light. Most solar collectors are made of glass and steel; but Magen Eco Energy, an Israeli company specializes in collectors and heat transformers made entirely from plastic. This eliminates the trouble of corrosion and damage caused by pool chemicals and salts.

With global warming on the rise, cooling systems are

becoming a necessity in countries across the world. Heating and cooling determine 50% of electricity demands. Typically, peak demand for power runs almost parallel with peak solar radiation. Teaming solar water heating with absorption, cooling is a natural solution for flattening peak demands. An Israeli company has developed a solar cooling system capable of meeting the cooling needs of industry and commerce via the use of solar collectors that generate water at high temperatures and a single stage absorption chiller. The system is successfully operational at shopping malls, hotels, hospitals, schools, commercial centers, etc.

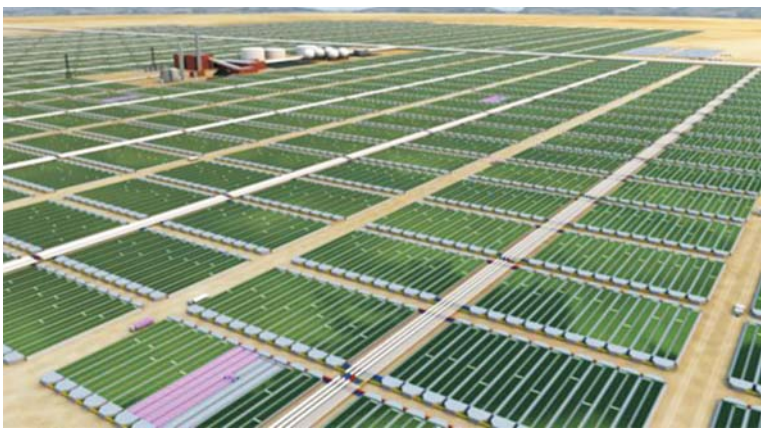
The growing demand for electricity throughout the world, will require, the setting up of several more power plants in the future. Most of them will still be based on fossil fuels, but for a multitude of reasons, those harnessing solar energy will become more widespread. Presently, governments, concerned about greenhouse issues have embarked on the clean energy route via the mode of financial incentives known as carbon credits. A host of Israeli companies are investing time and money in developing economically efficient systems that use solar energy to produce electricity. Solel, Bright Source and Aora are excellent examples. Focusing their research on the use of multi-intersection technology for enhancing efficiency, some of these systems also use photovoltaic cells. The target of lowering the cost of photovoltaic panels has prompted researchers to make efforts for improvising the existing dye solar cell technology thereby rendering it fit for commercialization. This has been achieved by replacing expensive components in the cells with inexpensive alternatives, increasing their efficiency and area utilization and scaling up the dye cells to previously unattainable sizes and aspect ratios. A combination of systems based on solar energy and gas or diesel turbines, guarantees a steady supply of energy.

Some research not limited to implementation in countries with a rising environmental awareness has focused on finding solutions for non grid applications and domestic solar systems. In fact these technologies can be used in remote areas where infrastructure development for electricity is not economically viable. Recent research also concentrates on creating systems that allow solar energy to be used for providing electricity and heat, simultaneously. Directing the available heat to thermal uses such as building control or water heating, cools the PV cells that generate electricity. Zenith Solar an Israeli company using such technology developed in Ben Gurion University in the Israeli Negev, has managed to achieve up to 75% effectiveness. Other companies have focused on unique collectors needed for concentrating solar radiation and enabling higher system efficiencies. Combining solar collectors with sun tracking equipment allows the systems to operate at higher efficiencies as well.

Bio Fuels and Biomass

Since Bio fuels are the new global buzz word, Israel is capitalizing on its rich agronomical background in the search for plant species with market advantages.

A combination of computational genomics, molecular biology and advanced classical breeding methods are used in order to improve commercial



crops that can double as resources for mass production of bio-fuels. Part of the focus is on developing "Biodiesel optimized" oilseeds of crops that show increased oil yield.

Researchers in academia are working on techniques for enhancing production of biodiesel from Castor beans and Jatropha plants. Both species have the natural advantage of being drought resistant with a high prospect for oil content utilization. Researchers are working to develop species of these plants which can be nurtured to grow more rapidly, provide seeds with higher oil content, produce larger yields and possess other characteristics that will economize the bio-diesel production process. Moreover research in this field has also focused on the development of particular enzymes that can assist in cost effective production of bio-diesel. The use of certain enzymes as a catalyst for reactions between ethanol and methanol may result in the production of cheaper bio-diesel.

A couple of Israeli companies are designing unique solutions for producing biodiesel and bio-ethanol. Algae are the main resource supporting these technologies. Recognizing their utility for the dietary supplement industry as well as for bio-fuel resources, sea water and fresh water is being used for mass production of algae. Once the algae are processed and refined, the resultant carbohydrates are used for manufacturing bio-ethanol and the oil is utilized for making bio-diesel. An exceptional advantage of sea water algae is that they can be grown in pools adjacent to power plants. The CO2 emissions from these power plants can be reused instead of being released into the environment. The filtered CO2 can be sent to aquaculture pools in order to nurture the growing algae. The use of CO2 allows the algae to produce concentrations of more than a million times their natural concentration in ocean water. Seambiotic, an Israeli company is a pioneer involved in converting this theory into reality.

The use of biomass solutions allows new areas of research to consider solid waste as a possible source of energy. Efforts are increasingly being directed towards inventing ways to produce energy from biomass. Special reactors designed for producing bio-gas from organic waste are giving the first results in beta-sites.

Wind turbines are hard to find in Israel. Golan Heights in Israel is the only area where wind power is being utilized for energy production. Nevertheless, due to its global potential, researchers have made inroads in this field too. Israeli companies such as Winflex, IQwind, IAI, TechnoSpin and others are not only developing large and small turbines but also the smart gear systems for these turbines. Besides creating wind turbines that could reach full potential in conditions with lower speed winds, research at present also concentrates on optimization of turbine utilization under changing wind conditions. Expertise in fields like power and electronics is vital in designing ways to connect these systems to the grid, while ensuring high stability, despite changes in capacity of

power production.

Using geo-thermal heat for producing energy is another field that has developed in Israel despite limited local opportunities of application. Responsible for 10% of the geothermal power capacity generated globally, Ormat Technologies Inc. is one of the leading companies in the global arena. Ormat has built or supplied equipment for approximately 900 MW (operating 410MW of that) of geothermal and has recovered energy generation power plants.

Most of Ormat's products and business activities are based on its original Ormat Energy Converter (OEC), a field-proven technology for utilization of low and medium temperature heat sources. This technology is used for producing geo-thermal power as well as for recovering heat from industrial processes that would otherwise be wasted. Recovered energy power generation involves capturing unused residual heat from industrial processes and converting it into electricity. Recovered energy power generation not only allows for saving energy and fossil fuel but also reduces the emission of green house gases.

Solid Waste Management

With limited land resources, the search for alternatives to land filling has been the prime concern of many Israeli researchers in the past few decades. A slow but steady turn to separation and recycling of municipal waste such as drinking bottles and paper is not enough. New technologies for recovery of materials from the waste stream and reduction of MSW going to land fills are under way. Israeli researchers are looking into the pro's and con's of incineration, composting and integrated alternatives in order to reduce the use of land fills. Some companies are even coming up with new materials that take advantage of recovered fractions in the production of co-mingled materials.

The Arrow Ecology process provides a fully integrated solution to the problem of recovering materials and energy resources from Municipal Solid Waste (MSW). This unique process eliminates any need for the prior separation or classification of MSW, and brings closer the goal of near-zero land filling by achieving 90% recovery. Separation is achieved by tipping unsorted waste into dissolving tanks. Plastics, which float to the surface and heavy inorganic materials (metals, glass), which sink to the bottom, allow for easy separation and sorting using a variety of technologies like magnetic force, eddy current, electro-optical and manual processes. Light organic waste is transported down a chute into a rough shredder where, it is again soaked in water to aid the process of breakdown. The biodegradable material is then pumped into a filtration system designed to further break it down into a fiber-size thin watery solution. The remaining energy-rich solution consists entirely of organic matter and is treated in bio-reactors to produce, clean fertilizer, water, and methane-rich Biogas.

Energy Efficiency and Smart Grid

Israeli companies specialize in introducing clever, innovative technologies aimed at saving energy in various industrial and domestic activities, as well as for generating energy facilities. Companies such as Alvarion are optimizing the Smart Power Grid using broadband connectivity solutions for distribution networks. Power Electronics is one such company that saves up to 30% of power used in engines

The National Program for Alternative Energy Technologies

The National Program for Alternative Energy Technologies was established in August 2008. Building on decades of Israeli experience in the field of alternative Energy, the objective of the national program is to keep, Israel's alternative energy industry at the forefront in the global renewable energy arena. Israeli companies in Alternative energy are considered to be industry pioneers in Solar, Thermal and Geo-thermal technologies. They are also lead innovators in fields like bio-mass, wind and solar technologies.

The program is led by the Ministry of Industry Trade & Labour hand in hand with Ministry of National Infrastructure and eight other government ministries. The Israeli government, recognizing the strategic importance of alternative energy Technologies, has created a comprehensive program that brings the private sector, government and academia to join forces. The program is focused on nourishing the human resources, investing in R&D, implementing technologies in the local market and penetrating the global market. ■

Israel's Innovative Wastewater Treatment & Recycling Solutions

By Oded Distel

Water consumption is increasing all over the world, and the need for smart management solutions is paramount.

Israel, a country dealing with an increasing urban population and located in an arid climate, has by necessity developed into a global leader in the recycling and purification of wastewater. However, the environmental conditions and human challenges that Israel faces are by no means specific to Israel. Much of the US faces these same pressures, making the adoption of Israeli water-quality technologies an attractive and pragmatic solution for solving problems in the wastewater and water-quality field.

One of the Israeli wastewater treatment industry's greatest strengths is its wastewater recycling and reuse. According to Israel NEWTech, the Israeli national water technology program, Israel, with a 75 percent water recycling rate, is the world's number one water recycler.

Many of the technologies that help Israel achieve its extraordinary water recycling rate are utilized by Mekorot, Israel's national water company, at the Dan Region Treatment and Reclamation Plant at Shafdan. Serving more than 2.3 million residents from the Greater Tel Aviv region, the plant purifies 130 million cubic meters of wastewater every year. This accounts for almost 30 percent of Israel's wastewater.

The plant employs a single stage, oxidation ditch, activated sludge process with nitrification. Additionally, an anaerobic conditioning step serves as a selector for enhancing the biological removal of phosphorus. Uniquely, the reclaimed and purified water is then transported by a conveyance pipeline to agricultural fields in the southern Israeli desert.

Making the Desert Bloom

The plant at Shafdan is but one cog in Israel's diverse and multifaceted approach toward wastewater treatment and water reclamation. Israel's water reclamation sector also utilizes filtration, soil aquifer treatment, long storage reservoirs, and disinfection in order to treat its water. This treated water is used for unrestricted irrigation in the Negev desert, a fulfillment of Israel's historic mission to make the desert bloom. This reclaimed water is used to grow carrots, oranges, potatoes, lettuce, flowers, and wheat, feeding an increasingly hungry global population looking for solutions to decertification, drought, and famine. The successful use of treated effluent for agriculture is ensured by a large-scale water monitoring program and strong, personal connections with farmers to troubleshoot water problems.

Israel's wastewater abilities are not only confined to large utilities like Mekorot. Israel's high-tech industry is booming, drawing in record amounts of investment from venture capitalists and multinationals. The innovation in the Israeli high-tech sector is the result of an active commitment by the Israeli government to sustain and nourish research and development. According to the Israel's Ministry of Industry, Trade, and Labor, Israel invests 4.8 percent of its GDP (gross domestic product) in research and development, the highest ratio in the world.

A sewage treatment plant in the north of Israel

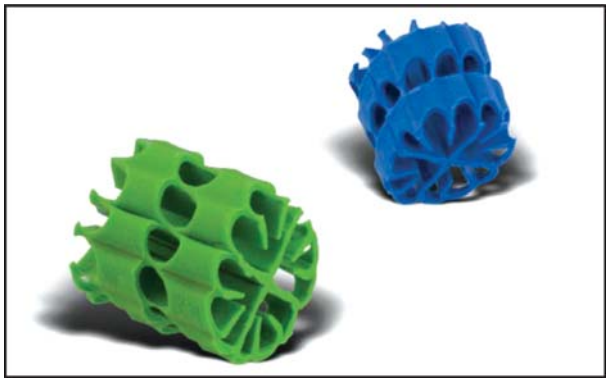
This translates directly into the development of wastewater solutions that are not only applicable in Israel, but the entire world.

An Innovative Approach to UV Light Purification

Atlantium, a company based 20 miles outside Tel Aviv, is one example of Israeli ingenuity that is providing real solutions to challenges facing the water industry. Atlantium has combined UV light technology with concepts from fiber optic technology to create a treatment process that has all the benefits of UV light disinfection without the drawbacks. UV disinfection, which uses UV light to inactivate bacteria and viruses in water, is an old concept. UV light purification was used in the U.S. as early as 1916. However, while UV light disinfection avoids the expensive handling of large amounts of chemicals and their byproducts, it was never considered as effective or reliable as chlorination and other chemical processes at disinfecting the water.

Atlantium solved this problem by using a quartz inset to bounce and reflect the UV light through the water stream multiple times, behaving as though the disinfection chamber is a fiber optic cable. This creates multiple opportunities for disinfection, killing resistant strains of bacteria, yeasts, molds, and even super resistant spores and viruses.

While conventional UV disinfection might inactivate 10,000 bacteria in a given volume of water, Atlantium's system can inactivate more than a billion.



AGAR system biomass carriers

Pictured is a wastewater recycling plant in Monclova, Mexico, where the AGAR system has been used to increase the rate of treatment from 38,000 cubic meters a day to 58,000 cubic meters a day.

Atlantium's unique approach to water disinfection, which it calls Hydro-Optic Disinfection (HOD), has undergone successful pilot programs and is working commercially in more than 120 locations around the world.

Hagihon, Jerusalem's water and wastewater treatment plant

Attached Growth Airlift Reactor Process

Another Israeli startup providing innovative solutions for the wastewater industry is AqWise and its pioneering Attached Growth Airlift Reactor (AGAR) process for wastewater treatment. Central to the AGAR technology are polymer cylinders, called biomass carriers, which are specially engineered to sustain large populations of polymer cylinders, called biomass carriers, which are specially engineered to sustain

large populations of beneficial bacteria that break down organic material in the water. AqWise features a number of configurations, and is particularly advantageous because of its ease of integration into existing treatment processes. AqWise's AGAR system is in use in more than 30 plants around the world. At a wastewater recycling plant in Monclova, Mexico, the AGAR system has been used to increase the rate of treatment from 38,000 cubic meters a day to 58,000 cubic meters a day.

These solutions, whether pioneered by a national utility company like Mekorot or high-tech companies such as AqWise and Atlantium, will play an increasingly vital role as existing water infrastructures face the stresses of the 21st century. Water consumption is increasing all over the world, and the need for smart management solutions is paramount. Israeli water-quality companies can, and do, provide these solutions.

Oded Distel is the director of Israel NEWTech, the Israeli national water technology program. In that position, Distel coordinates the work of 10 ministries to help positionIsrael as a source for creative and innovative water technologies and to establish cooperation between Israeli water technology companies and water utilities and multinationals. Prior to his position with Israel NEWTech, Distel was the director of international investments at the Foreign Trade Administration, the first secretary of economic affairs at the Embassy of Israel in Greece, and the deputy director of the Middle East and North Africa Department of the Foreign Trade Administration. Distel holds a B.A. in business and an M.B.A.; both degrees are from The School for Business Administration Tel Aviv.

For more information, please contact the Government of Israel Economic Mission to the Midwest at (312) 332-2160 or zkogan@israeltrade.gov.il. The Government of Israel Economic Mission to the Midwest is a government agency, part of the Ministry of Industry, Trade, and Labor, that promotes trade and business relationships between Israel and the US. To get a firsthand look at cutting-edge technologies from Israel, please visit the WEFTEC Israel Pavilion at Booth 21108. ■

Desalination: Answer to Global Water Shortage

A Successful Israeli Experience to Emulate

Israel has made remarkable progress in the field of desalination in order to meet its growing demand for water both for drinking and for agricultural purposes. Desalination is the process of purifying water from the sea. Desalination uses reverse osmosis to force undrinkable water through a membrane, which then catches the salts and other particles suspended in the fluid. Over the years, Israel has perfected the technologies required for desalination and emerged as a global leader in this field. Today, water scarcity is a global phenomenon. India, where rainfall is uneven, large areas are drought-prone. Right now, the island city of Mumbai with a population of more than 15 million is facing a water shortage. The answer in the long run is desalination of sea water, which the city has in plenty all around it, round the year. This article examines the success of Israel in the field of desalination and the lessons it has for the world.

Desalination has become a national necessity for Israel where rainfall is scant and the threat of drought is large. Like other countries in the water-scarce Middle Eastern region, Israel has chronic problems over water resources, prompting the government to launch a Desalination Master Plan in 2000 to address them.

Under this plan, a number of plants have been constructed along the Mediterranean coast, to enable an annual total of 400 million m^3 of desalinated water to be produced by 2005, mainly for urban consumption. According to the plan, production is intended to rise to 750 million m^3 by 2020. A remarkable feature of the plan is to encourage Public-Private Partnerships in this field.

Ashkelon Plant World's Largest

One of these plants, also the world's largest, has been the Ashkelon seawater reverse osmosis (SWRO) plant. The contract for the Ashkelon facility the first in the series of large-scale seawater desalination units was awarded in September 2001, after an extensive tendering process beginning in July of the previous year. The concession was granted on a Build-Operate-Transfer (BOT) basis and at the end of the 25-year period, the plant transfers to the Government of Israel.

In 2006, the Ashkelon plant achieved two notable successes. In March it was voted 'Desalination Plant of the Year' in the Global Water Awards. In October, a little more than a year after it commenced initial production, the plant successfully delivered its first 100 million m^3 of water, a milestone achievement.

With a capacity of 330,000m^3 per day, the plant produces around 13 percent of the country's domestic consumer demand equivalent to 5 to 6 percent of Israel's total water needs, at one of the world's lowest ever prices for desalinated water.

The plant's output increased gradually over years since its inception. It produced 101 million m^3 in 2006, 104 million m^3 in 2007 and 111 million m^3 in 2008.

Located on Israel's southern Mediterranean coast, the new Ashkelon SWRO plant will provide around 15% of Israel's domestic needs. It is the first of a number of similar large-scale seawater desalination facilities planned.

Technological Challenges

The large scale of the plant presented a number of technical challenges and necessitated a shift from the more familiar arrangement of several identical outsized trains seen in smaller RO installations to a three-centre model.

The project included membrane desalination units and facilities for seawater pumping, brine removal, raw water pre-treatment and product water treatment. In addition, the scheme also required the construction of workshop and laboratory buildings, access roads and a dedicated gas turbine power station.

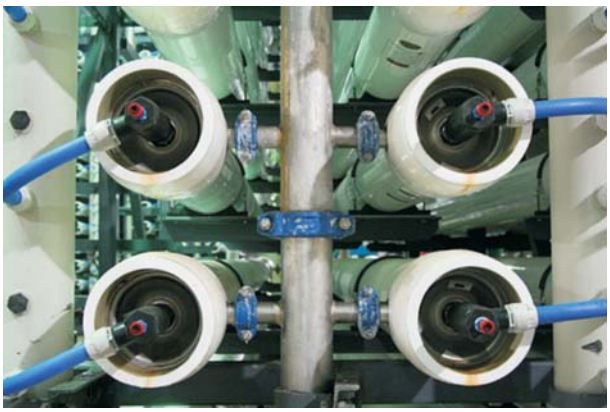
Built by VID, a special purpose joint-venture company of IDE Technologies, Veolia and Dankner-Ellern Infrastructure, the total project cost was $212 milion and was funded by a mixture of equity (23 percent) and debt (77 percent). The overall revenue over the period of the contract will be in the region of $825m.

Originally intended to produce only 50 million m^3/year, after the formal signatures were completed in November 2001, further negotiations were entered into between February and April 2002 to double the output. This second agreement was signed in April 2002 and work on the two-phase construction programme began a year later.

Design

The three-centre design model adopted for this plant involves arranging the high pressure pumps, energy recovery devices and membrane banks so that they can each operate independently and flexibly.

Separating the high-pressure pump from the energy recovery device and breaking the link between pump capacity and the RO bank capacity enables the process to be optimised for each of the constituent elements. This brings significant technological flexibility and high efficiency to the system while also reducing overall water cost in this case to $0.52/$m^3$.



To provide twice the capacity first envisaged, two almost entirely self-contained, autonomous plants have been built on the site, each contributing 50 million m^3/year of desalinated water. With the exception of the seawater intake, the product water treatment system and the dedicated power plant, the site sub-systems have been duplicated to ensure independence of operation. In addition, those elements which are shared have been designed with the sufficient in-built back-up capacity to allow separate service to each plant.

The North and South plants, which came online in September and December of 2005 respectively, each consist of a pumping centre, comprising three-plus-one large 5.5MW high-pressure pumps, to feed 16 RO banks which contain 105 pressure vessels apiece via a common feed ring. The complete facility, built over four floors, comprises 40,000 membrane elements and uses optimized, multi-stage RO and boron removal procedures.

An energy recovery centre made up of 40 double work exchanger energy recovery (DWEER) devices, collects pressurised brine from each plant's RO banks and reclaims the energy. The independent nature of this system increases both the flexibility of the system and its overall efficiency.

The whole facility occupies 75,000m^3 of industrial site, some 700m north of an existing Israel Electrical Company power station. Using the power station's cooling seawater discharge was one of a number of intake options initially considered, but was ultimately rejected in favour of using an open, submerged type, principally due to site constraints and hydrogeological limitations.

The system comprises three parallel pipes, which safeguard supply and enhance operational reliability by producing non-turbulent feed water flows. High density plastic piping simple to clean and relatively resistant to biological growth has been used to minimize maintenance.

From the pumping station, raw seawater flows to the

pre-treatment facilities through two separate lines. This ensures that the plant can at least continue to operate at half-capacity in the event of blockage or failure in one of the pipelines or static mixers. The dosing pumps at the chemical treatment facility are each equipped with real-time flow-rate adjustment and adequate redundant capacity has again been factored in to guard against down-time.

Filtration is performed in two stages, starting with gravity filters containing gravel, quartz sand and anthracite media. The combination of long residence time and a distribution system designed to minimise clogging and preferential channel formation contribute to achieving high filtration efficiency.

The filters, which have an automatic backwash facility, offer a 33 percent standby overcapacity and have a proven ability to cope with storm turbidity levels. Two parallel batteries of cartridge filters form the second stage, with a built-in spare capacity of 40 percent.

High boron ion reduction was an important design consideration. The method selected is highly flexible and readily adjustable to feed water temperature fluctuations, being capable of delivering a removal efficiency of more than 92 percent, when necessary.

These demands, coupled with a number of other key requirements, including high pH tolerance, continuous low pressure operation, low membrane fouling and cost-effective, reliable performance, led to FilmTec elements being selected for the RO operation.

Post treatment with lime re-mineralizes the product water, before it enters the national water system.

Dedicated Power Plant

The provision of a dedicated power plant is a major factor in both safeguarding operational reliability and reducing energy costs."

In keeping with the project's general drive to ensure reliability, efficiency and continuity of operation, electricity is provided from two separate sources. A dedicated gas turbine power station, fuelled by natural gas, has been built adjacent to the desalination plant, while an overhead line provides supply from the Israeli national grid.

The provision of a dedicated power plant is a major factor in both safeguarding operational reliability and reducing energy costs, as it is offers protection from daily or seasonal demand fluctuations. The desalination system is expected to run at a continuous base load for most of its operation.

Key players

The contract was formally awarded by the Israeli Ministries of National Infrastructure and Finance, on behalf of the Government of Israel. VID, the special-purpose JVC, comprises IDE Technologies (50 percent and lead partner) and Veolia (50 percent). Originally, Veolia and Dankner-Ellern Infrastructure held 25 percent each. However, Dankner-Ellern's stake was later sold to Veolia Water (earlier Vivendi Water).

The engineer, procure and construct (EPC) contractor was OTID, a joint venture company formed by IDE and OTV (Veolia Group). Israel Chemicals and Delek Group are equal-share partners in IDE Technologies. Operation and maintenance is the responsibility of Adam, a joint venture company of IDE and Veolia.

The reverse osmosis membrane elements were provided by the Dow Chemical Company and the temperature and pressure transmitters by Smar. Mekorot distributes the product water. ■

Finolex Honoured with Israeli Award

Popularizing Micro Irrigation for Prosperity in India

Although 71 percent of the earth surface is covered with water, less than 1.0 (one) percent of the earth's water is readily accessible for irrigation, drinking and household use indicating acute scarcity of water. Three percent of this water is mainly consumed for domestic use, 14 percent for industrial use and 83 percent for agricultural use.

Even though the demand of water for agricultural use is going to increase from 470 BCM in 1985 to 740 BCM by 2025, the actual availability of the water will reduce from 83 percent to 69 percent, because of the fact that priority is being given to domestic and industrial use. Thus tremendous amount of pressure lies on suppliers and users of agricultural sector.

India is endowed with a rich and vast diversity of natural resources, water being one of them. Its development and management plays a vital role in agriculture production. Integrated water management is vital for poverty reduction, environmental sustenance and sustainable economic development.

India can still store only relatively small quantities of its fickle rainfall. Whereas arid rich countries (such as the United States and Australia) have built over 5,000 cubic meters of water storage per capita, and China can store about 1,000 cubic meters per capita, India's dams can store only 200 cubic meters per person. Moreover, India can store only about 30 days of rainfall, compared to 900 days in major river basins in arid areas of developed countries.

Irrigation is an ancient art, as old as civilization but for the modern world, it is a science for survival. The pressure of survival and the need for additional food are necessitating a rapid expansion of irrigation in India, but in many parts water is becoming a scarce commodity.

Adequate efforts have not been made so far to adopt efficient water and fertilizer use technology. Many parts of the irrigated area where traditional methods of flood/furrow irrigation is followed, have become water logged and affected by soil salinity resulting in low productivity of fertile land. It is reported that seven

million ha of fertile land has been affected due to soil salinity as a result of indiscriminate use of water and fertilizer inputs.

The ultimate irrigation potential of India is estimated as 139.95 million ha is by major and medium projects, 17.4 million ha for surface water minor Irrigation projects and remaining 64.05 million ha from ground water irrigation projects. About 65.6 percent of the ultimate irrigation potential is already developed leaving a scope for bringing additional 48.16 million ha area under irrigation.

The water use efficiency (WUE) in Indian Agriculture, at about 30-40 percent, is one of the lowest in the world, against 55 percent in China. This requires a paradigm shift in conservation and in agriculture policies, which should lead to saving of water, fertilizer and energy resulting in crop diversification and equitable distribution of resources.

The Government of India has played a catalytic role in promotion of efficient management of water through the use of modern methods of irrigation, leading to coverage of around 1.6 million ha under micro irrigation.

Micro irrigation which allows application of water to root zone of the crops through specially designed equipment known as emitters, has already been adopted by some countries for transforming their agriculture. India introduced this technology on a commercial scale in the eight plan. However, the coverage so far has been minuscule in the face of the fact that almost 69 million ha could be covered through this improved system.

The recent drought again brings into sharp focus on the need for conserving our water resources. A number of initiatives have already been taken to conserve land and water resources. States are also encouraged to promote drip and sprinkler irrigation through supply of equipment at subsidized rates.

States like Andhra Pradesh and Gujarat have made special attempts to polarize use of micro irrigation among the farmers. It has resulted in large coverage of area in short duration of time. Farmers from this area realized the benefits of micro irrigation. But these efforts have to be intensified in all other states.

Development of micro Irrigation suffers from the following constraints:

1) The initial cost of establishing MIS is high, hence out of the reach of poor farmers

2) Not integrated with total water management system, hence generally viewed in isolation.

3) Lack of credit facilities

4) Generally perceived as a technology driven movement, hence receives resistance from certain quarters

5) Poor institutional support system

6) Lack of skilled human resources, availability of appropriate material and technical know-how.

For its promotion, micro irrigation should be viewed as a total plant support system starting with planting material to post harvest management and marketing. Water source development and recharge of wells through Watershed Management should also form a part of the package.

Micro Irrigation helps save and conserve water resources, expand irrigated area and add to the productivity and GDP. There is need to emphasize the use of micro irrigation to the extent of making it compulsory for any agriculture use, so that it benefits to larger number of farmers with the same amount of water.

Finolex realized the importance of water management and irrigation two decades ago and introduced the concept of micro irrigation technology in Indian agriculture in 1992 with an Israeli joint venture. It was the first Indo-Israeli joint venture in the field of water management and irrigation. Since then, Finolex has been popularizing the use of micro irrigation as a concept and emerged as one of the major players. Finolex provides the complete water management, fertigation and automation solutions to hi-tech cultivation like green house.

In recognition of above, recently an "Award of Honor" was given to Fenolex by the Prime Minister of Israel, at the conference for Export and International co-operation held in Tel Aviv, Israel. ■

Jain Group - A One-Stop Shop for Complete Irrigation Systems

Jain Irrigation Systems Ltd is a leader in micro irrigation which has taken advantage of Israeli know-how in this field. **Anil Jain**, Managing Director of the company tells **Indo-Israeli Business** about the opportunities existing in the field of agriculture, especially water management. Excerpts.

India being an Agricultural country and Israel a leader in agricultural development, what are the opportunities available for association and bi-lateral growth for both the countries in this field?

There are many opportunities for association and bi-lateral growth. Some of the important areas are irrigation, fertigation, seeds, planting material and most importantly the know-how. One of the key factors of the association is the capacity building of Indian farmers, training & extension services, so that the know-how of growing the crops for higher productivity, reaches the farmers in India.

Israel is one of the leaders in Water Management and Technology. Could you cite some successful joint initiatives in this field?

In the field of water management for agriculture, there are few joint initiatives both at the government level as well as by the private sector in India. Central government departments and some states have joint initiatives with their counterparts in Israel and there are few programs already under implementation in India.

One of the important private sector initiative is by our company, which has taken 50.001 percent holding in an Israeli company by name "NaanDanJain Irrigation Systems CS Ltd". This initiative has brought many tangible benefits to the farmers in India in the form of technology transfer in the field of on-farm irrigation.

The Jain Group being one of the global leaders in the field of agriculture and irrigation how has been your experience in maintaining the standard of innovation in your factories?

Innovation and creativity are given the utmost importance in all

our factories across the globe. We have a global team of scientists and engineers who focus on R&D in the field of irrigation and agriculture. As a corporate policy, the R&D budgets of all our companies are around 2.0 percent of our sales revenue. Our R&D teams in different locations collaborate together and share their experience and expertise.

For on-farm R&D we have two farms in India with a total area of 1,000 ha each one in Maharashtra and another in Tamil Nadu. We are planning similar farms in other parts of the country too.

Improvement in manufacturing processes for cost effectiveness is another key area of creativity. We constantly strive to improve the production speeds and efficiencies in order to meet the demands efficiently.

How did you prepare to establish leadership position worldwide in diverse fields such as micro & sprinkler irrigation, agricultural inputs, agro-processed products, plastic pipes & sheets?

In micro-irrigation, our strategy has been to establish the leadership through being one-stop source for complete irrigation systems. Our product range is the widest among the irrigation industry, whereby we are in a position to offer solutions for all crops, field situations and budgets. Secondly, we are present with our subsidiary companies across the world and we constantly increase our presence.

In the field of agro-processed products, we prepare to establish leadership with the help of backward integration with the farmers and forward integration with the major processed food companies in the world. We also invest on state-of-the-art processing machinery in order to be able to produce best quality products with highest efficiency.

In plastic pipes, we invest on enlarging our production capacities and market reach with a wide range of product offerings. We intend to grow this business with turn-key projects both in India and abroad.

Would you like to share some of the remarkable achievements between both the countries in their bilateral relations?

The most remarkable achievement is effective synergy between the companies in India and abroad. We leverage our strengths and create opportunities of growth for all.

What would be your message to the readers Indo-Israeli business?

I wish to convey the message that we are open for furthering business relations between the two countries through leveraging of strengths and through investment opportunities in upcoming technologies. ■

Preserving a Historic Lake in Navi Mumbai

By A. S. Parasnis, S. C. Deshpande,
M. R. Kharche, S. S. Dahedar & P. M. Chourey

Traditionally in India, natural water bodies like lakes, rivers and so on were regarded as important sources of water; hence these were worshiped as deities by local communities. However, in the new urban set up, fresh water reservoirs are completely neglected and abused, thus, loosing their resource potential. TERI (The Energy and Resources Institute), an independent not-for-profit international research institute and the CIDCO (City and Industrial Development Corporation), responsible for the development of Navi Mumbai have jointly undertaken an ambitious action oriented project for sustainable conservation of fresh water wetlands in Navi Mumbai- a twin city of Mumbai. The project is expected to be completed in March 2010.

Introduction

Freshwater wetlands are vital for the sustainable existence of civilizations. It is observed that dependence of the communities on wetlands greatly varies based on its location and surroundings. For example, rural communities use wetlands for diverse applications, and their interaction with fresh water bodies is often more natural, direct and multidimensional. A lake in a rural setting in India could be looked upon as a resource of earning livelihood through cultivation of fish, lotus-corms, flowers, water chest-nuts and so on. Small vegetable gardens in villages thrive on the lake water; villagers often depend on the lake for various day-to-day activities such as bathing and, washing clothes and cattle.

A survey of fresh water wetlands in urban and rural areas of Navi Mumbai was conducted by TERI. The survey revealed that the lakes in Navi Mumbai are being destroyed at an alarming rate due to several anthropogenic activities like dumping of solid wastes, release of sewage, destruction of catchment areas, and so on. This has prompted CIDCO and TERI to jointly take up an ambitious project focusing on developing practical strategies for management of wetlands on a sustainable basis. As a first phase of the project, a comprehensive analysis of around 150 freshwater wetlands in Navi Mumbai is being undertaken.

Objectives of the project

The overall theme of the project is to preserve lacustrine wetlands; the fresh water bodies of Navi Mumbai. It is a specific objective to develop sustainable strategies for long-term preservation of wetlands, both in urban as well as rural areas through integration of the following.

Financial security

Financially, self-sustaining models need to be developed at the local level in order to implement the wetland preservation strategies on a larger scale. Once the financial barriers are overcome, the models could be more effectively replicated into the interior parts of the state.

Involvement of stakeholders

It is important to encourage active participation of the local communities and stake holders to ensure sustenance of any model. It was observed that the well developed wetlands quickly get transformed into wastelands as soon as the Government agencies retract from the site upon completion of the project. This could be mainly attributed to ignorance,

ownership conflicts, and the lack of a sense of belongingness towards these precious ecosystems.

Eco-friendly approaches

A strategy need to be devised to maximize the resource potential of the wetlands while preserving the delicate balance of its natural ecosystem. As a first step towards achieving the objectives of the project, a model is being developed, taking an urban lake located at Khandeshwar, Navi Mumbai, as an example. The Khandeshwar lake offered many advantages required for developing a model. Some important features of the lake are listed below. The lake is advantageously located in the heart of the city along the Mumbai-Pune highway, which is one of the most important and frequented highways of India.

Historical background & Khandeshwar Lake Ecosystem

The Khandeshwar lake is one of the prominent natural fresh water aquifers of Navi Mumbai. The lake has beautiful natural surroundings, lush green vegetation and an ecosystem representing adequate diversity of flora and fauna. The lake derives its name from the temple of an Indian god, ShivaKhandeshwar, situated on its bank. This 125-year old temple attracts large number of devotees throughout the year.

Most of the temples in India are typically located amidst vegetation and are associated with water, thus, giving a sacred status to these natural entities. In ancient India, forests, rivers, and water bodies were worshiped. Due to urbanization, the functional status of the water bodies has changed drastically. The nature of ingredients used for performing religious rituals and the type of waste that is discarded in the rivers and lakes has also changed. Although, flowers, coconuts and leaves were used traditionally as religious offerings; those are now replaced with artificial, non degradable materials like plastic, artificially painted idols made up of POP (Plaster of Paris), polyethylene wrappers, bags, and so on. The amount of waste, getting accumulated at this historic temple complex has increased exponentially in the past few years thus completely degrading its pristine environment. Unfortunately, the freshwater lakes, which were once looked upon as a dependable source of potable water, now appear largely degraded, merely serving as waste accumulation areas for the urban setup.

Panoramic view of Khandeshwar Lake surrounded with lush green vegetation

Threats to the Khandeshwar lake ecosystem

The Khandeshwar lake like many other lakes in India is not an exception to this phenomenon. The common observed threats to the Khandeshwar lake ecosystem are briefly described below.

Eutrophication

The lake water is commonly used for washing clothes, utensils and animals. The detergent run-off in the lake water has increased the nitrogen and phosphorous content in water leading to eutrophication, an induced excessive growth of algae and other aquatic plants. This process has resulted in the depletion of the dissolved oxygen in the water body, and has thus adversely affected its flora, fauna, and normal functioning.

Invasive species

The lake water is partly colonized by invasive exotic plant species like water hyacinth. These species have over-shadowed the growth of the native species, thereby, also affecting the extent of biodiversity and delicate faunal species dependant on them. This has adversely impacted the normal functioning of the lake ecosystem.

Chemical pollutants

The lake is used as an immersion site during Ganesh and Durga festivals. The idol immersions results in large-scale pollution of the lake due to mixing of toxic paints containing harmful chemicals like lead, cadmium, chromium, copper, and so on. These chemicals attain dangerous proportions in the

Dumping of waste at Khandeshwar lake due to its easy access

ecological food chains through the process of bio-magnification and often end up reaching human bodies. These chemicals in large quantities pose a serious threat to the health of human beings and other native species.

Lack of awareness about importance of water management:

There is general apathy among the local people about preservation of the lake. The wetlands are largely abused through various anthropogenic activities as listed above. It was realized that active public participation and concurrence among the diverse stakeholders would be important for developing a sustainable model for wetland preservation.

An analysis of the threats to the Khandeshwar lake has suggested that customs, religious rituals and lifestyle in the urban areas, across the country, are almost consistent. Therefore, the causes of degradation are also common to almost all the water bodies across India and, hence, the Khandeshwar lake could be considered as a representative example to develop a replicable model for sustainable preservation of urban lake ecosystems in India. Upon finalizing and approving the conceptual plan in March 2009, civil work has commenced in August 2009. The entire development is expected to get over before March 2010.

Financial models

Upon analysing the complete plan of the Khandeshwar lake complex, appropriate options for revenue generation were developed. The revenue generated would be strictly utilized for the maintenance of the lake, the lake's water quality, the ecosystem, and the complex.

Solar tree

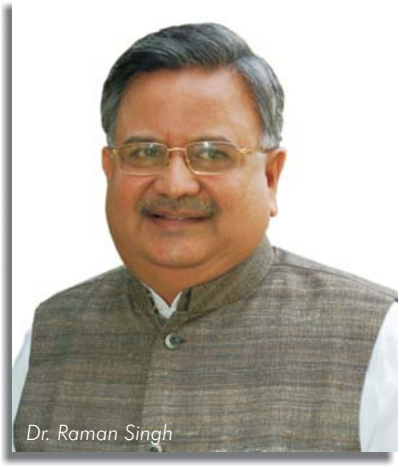
To demonstrate a concept of trapping solar radiations with the help of Solar PV panels and use it for lighting applications, a prototype working model of a solar tree with an output capacity of 500 Wp (watt-peak) has been designed. The artificial tree is made up of solar modules resting on the fabricated stainless steel branches. The solar energy will be used to illuminate 100 Wp LED (light emitting diode) lamps for decorative purpose. A schematic of the solar tree [6] is depicted in Fig.8. This will be an added attraction for the students and tourists.

Conclusion

Water woes are on the prime list of issues to be tackled all over the world. With the global scenario of changing climatic conditions the situation is getting more difficult. Wetlands and especially freshwater bodies, offer the key to the alarming situation, and it is essential to take into account the available resources and conserve them. Lake and lake environments have to be preserved to maintain the environmental balance and strategies have to be devised to preserve a specific freshwater body depending upon the end-users of the same. Thus, implementation of the concepts validated under this project could act as trend setting examples. ■

A Chhattisgarh Success Story

Harnessing Water for Drinking, Irrigation & Power Generation


Dr. Raman Singh

The Chief Minister of Chhattisgarh, Dr. Raman Singh recently addressed a conference on the effective use of potential water resources in the State, which also could help turn it into a "power hub."

Civilizations have always flourished near sources of water. Since time immemorial, reservoirs have been constructed for domestic, drinking and irrigation needs. There is a large variation in monsoon pattern. Therefore, storage of water is a prime need of Chhattisgarh. The history of water storage in reservoirs in the State goes back to the Kalchuri dynasty of the 12th century. Vallabhsagar of Kotgath and Khadga reservoirs of Ratanpur are examples of this age-old tradition of preservation and storage of water.

About 59,900 MCM of water drains into the Ganga, Godawari, Mahanadi, Narmada and Bramhani rivers from 137,000 sq km geographical area of Chhattisgarh. Excluding the use by neighboring states, only 41,700 MCM of surface water can be utilized in the State. At present only 22 percent of surface water is being used for irrigation, industrial and domestic purposes. Similarly 13,678 MCM of ground water is available, of which 20 percent has so far been harnessed.

About 80 percent population of the state is rural and mainly dependent on agriculture. The average rain fall of the state is 1300 mm and entire state falls under the rice-agro-climate zone. Variability in monsoon directly affects agricultural crops, mainly paddy. In the circumstances, more irrigation facility has become a primary requirement for the State.

Targets & Achievements

The gross sown area and net sown area of the State are 5.732 million ha. and 4.722 million ha. respectively. Irrigation potential of 1.328 million ha. was created from the government sources till the formation of the new State of Chhattisgarh (1 November 2000) which was only 23 percent of gross sown area. It has now reached 1.771 million ha., which is 30.89 percent of the gross sown area.

During the 10th Five-Year Plan (2002-2007) additional irrigation potential of 310,000 ha was created.

In addition to plan funds, the works are being executed from other budgetary provision too such as loan from NABARD, Employment Guarantee Schemes (NREGA) etc. to increase the irrigation facilities.

RIDF Programme (NABARD)

Under the Rural Infrastructure Development Fund (RIDF) 391 schemes from Phase-II to Phase-XV has been taken up. The designed irrigation potential of these schemes is 205167 ha. Tandula Canal Lining, Mata Sutiapat Project and Kharkhara Mohadipat Project are some of the main projects which have been completed.

Accelerated Irrigation Benefit Programme (AIBP)

Under the Accelerated Irrigation Benefit Programme of Government of India, Shivnath Diversion (Medium), Jonk Diversion (Major), Barnai Project (Medium) and Hasdeo Bango Project Major Phase-III have been completed. Since formation of the State, two major projects having great potential under construction are 44,127 ha. and one medium project under construction is 3,000 ha. A total of 45 minor

irrigation schemes have been completed under AIBP, which created 8,250 ha. of irrigation potential.

Schemes Under Construction

There are 10 major, medium and minor schemes which are under construction, such as Mahanadi Project (Major), Kosarteda Project (Medium), Hasdeo Bango Project Phase-IV, Kelo Project and 152 Minor. These schemes will especially cater to the requirement of tribal and drought-prone areas.

We have also submitted 17 minor irrigation schemes for central assistance costing Rs. 123.32 crore this year as well.

Chhattisgarh Irrigation Development Project (ADB-assisted)

Increase in productivity by the use of improved irrigation methods, better water management and modern agricultural methods to increase the irrigated area and raising income to reduce poverty are the main objectives of this project.

Renovation and rehabilitation of 200 minor and 20 medium schemes, repairing of 500 sluice gates of old irrigation schemes, strengthening and intensive training of Water Users Association (WUA), capacity building of departmental staff and farmers for improvement in agricultural techniques are the main components of this project. Estimated cost of this seven-year project is Rs. 300 crore The work of 96 projects worth Rs. 126.80 crore is under progress by which 119,109 ha. irrigation potential can be accomplished.

National Hydrology Project Phase-II (World Bank assisted)

Planning and design of water resources development, decision support and design aid by the use of data collection are main features of this World Bank assisted "National Hydrology Project Phase-II." To provide information about the availability and quality of surface and ground water to different institutions and users is also special purpose of the project. Total estimated cost of the project is Rs. 21.51crore.

Contribution of Water Resources in all-round Development :

(a) Drinking Water Supply: About 315.70 MCM of water is allocated/supplied to 11 cities for drinking purpose by the Water Resources Department. As one is aware that use of ground water for drinking

purpose should be minimal. These schemes use surface water for this purpose.

Hydro Power Generation

There are three hydro power generation schemes. 120MW, 10MW and 7MW hydro power is being generated from Minimata Bango Reservior Project (Korba), Ravishankar Sagar Project (Dhamtari) and Sikasar Project (Raipur) respectively, resulting not only in savings of millions of tonnes of coal but also protecting the environment.

Water Supply to Industries

The Water Resources Department has a very important role to play in the fast industrial development of the State. On receipt of a proposal from the Chhattisgarh State Industrial Development Corporation (CSIDC), the Water Resources Department takes immediate action for allocation of water to industries. This is one of the reasons that the major Industries in the state like Bhilai Steel Plant, BALCO, S.E.C.L., C.S.E.B. etc could implement their expansion projects. In all 1951 MCM of water has so for been allocated to 105 industries in State. There are primarily thermal power plants and integrated steel plants which will fetch a revenue of approximately Rs. 450.00 crore every year. Water allotment is being consented for the upcoming power generation plants without any bureaucratic delays. On establishment of these units, the dream of the Government to make the State "Power Hub" will come true.

Pisciculture:

As many as 1,467 reservoirs and tanks of the Water Resources Department are being used by the Fisheries Department for pisciculture and its development. The water-spread area of these reservoirs is 78,700 ha.. Last year, 11,321 metric tonnes of fish was produced fetching Rs. 34 crore to different societies and the Government also earned a revenue of Rs. 2.32 crore.

Construction of Anicuts

In Chhattisgarh, there were ponds in almost every small habitation. Besides fulfilling the local needs, these ponds were maintaining the natural balance of ground water in almost the whole state. These ponds lost their existence with time and excessive exploitation of ground water. As result, water tables plummeted. To overcome this imbalance, the Government of Chhattisgarh has prepared an ambitious project of creating alternate water bodies by constructing anicuts and stop-dams across various rivers and rivulets in the state. Under this project 595 anicuts and stop-dams have been identified across river Mahanadi, Shivnath, Jonk and other perennial rivers and rivulets in the "rain- shade" region. This will raise the water table and will be very useful to local populace. The estimated cost of these anicuts and stop-dams is Rs. 1,657 crore. Water will be available for drinking, domestic, agricultural and industrial uses from these anicuts. At present 104 anicuts costing Rs. 164.17 crore has been completed and 123 anicuts costing Rs. 418.22 crore are under construction.

Ayacut Development in the State:

Requirement of irrigation water has increased manifold with the development of new techniques in the field of agriculture. With a view to optimizing the use of available water, Command Area Development Programme was launched by Government of India for major and medium irrigation projects. Construction of field channels, Participatory Irrigation Management (PIM), training of farmers etc. are being executed under this programme.

For this purpose, two Commend Area Development Authorities have been Constituted in the State: (a) Mahanadi Ayacut Development Authority, Raipur This has developed 725,000 hectares. command area of Mahanadi, Sondur, Pairy, Tandula, Kodar, Jonk and Balar.

(b) Hasdeo Ayacut Development Authority, Bilaspur - This has developed 460,000 ha. command area of Minimata Hasdeo Bango (Major) project, Kharang, Maniyari and Ghonga .

Thus, Water Resources Department has contributed to the overall development of the State by creating irrigation potential, providing water for drinking and industrial purpose. ■

India Gallops in Wind Energy Harnessing

- Exim Bank Study

Global demand for energy is increasing at a breathtaking pace, and this is particularly true in a developing economy like India, says a study made by the Export Import Bank of India. In the forefront of this renewable revolution is harnessing the sustainable power of energy produced from wind. India, with a large peninsula belt, and two-season monsoon, is having significant potential in generating wind energy. Apart from onshore generation, India has also the potential for tapping offshore belts for wind energy.

Capacity & Production

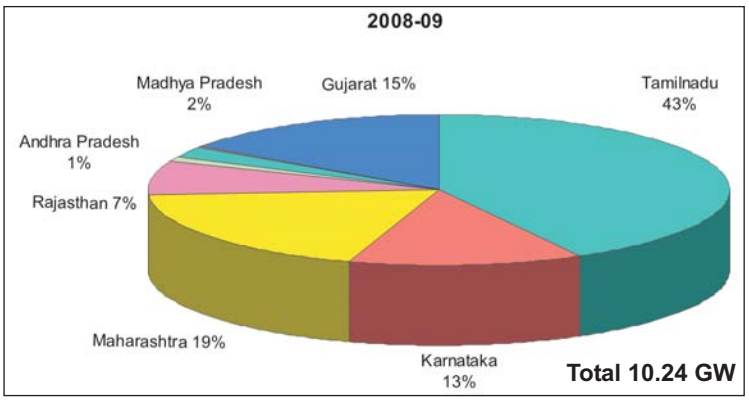
According to the Global Wind Energy Council, India added 1.8 GW during the year 2008, third largest new capacity addition in the world, next to the United States and China. According to the Ministry of New and Renewable Energy (MNRE), Government of India, wind power projects aggregating around 10.24 GW have been installed in the country till March 2009, across 10 states.

Total Installed Capacity in India

Source: GWEC, Exim Research

Specific policies have been introduced by the state Governments (through the State Electricity Regulatory Commissions) to encourage setting up of wind power projects. The policies cover regulations pertaining to types of investments, as also the buy-back of power at a contracted rate.

State-Wise Wind Power Installation Capacity (MW)



Source: MNRE, Exim Research

Exports

India exported wind mill/wind turbine, and wind-powered generating sets (ITC HS Codes: 84128030, and 85023100) valued US $585 million during the period April 2008 January 2009. Exports of wind-powered generating sets have been growing (from around US $24 million in 2005-06). Exports were mainly to USA (30 percent), Brazil (22 percent), EU, and Australia (20 percent each). Within the EU, Portugal and Spain are the major export markets for Indian wind-powered generating sets.

Wind Power: Potential in India

According to the MNRE, Government of India, the

wind power potential in India is assessed at around 45,000 MW, assuming 1.0 percent of land availability for wind farms, requiring 12 ha/MW in sites having wind power density in excess of 200W/sq.m at 50-m hub-height. MNRE has floated a Wind Resource Assessment Programme, which has so far covered 25 states and union territories, involving establishment of 1050 wind monitoring and wind mapping stations. It was assessed that over 200 stations have been found to have wind power density in excess of 200W/sq.m at 50-m height.

Wind energy has negligible fuel costs and relatively low maintenance costs. Though the capital cost appears high, wind energy has low marginal cost. The estimated average cost per unit incorporates cost of construction of the turbine and transmission facilities, finance cost, cost of risk, operating cost and return for the investment, averaged over the projected life of the equipment (about 20 years). In India the capital cost of a wind farm ranges between Rs. 6 to 6.5 crores per MW (at present); the estimated cost of generation works out to Rs. 3000 to Rs. 4000 per MW, though in the initial years it may be at a higher level.

Wind Energy & Environment

Wind power enables electricity to be produced in an environmentally friendly way where the turbines do not produce chemical or radioactive emissions. The energy sector today accounts for 40 percent of world's CO2 emissions. According to Global Wind Energy Outlook 2008, the global wind energy capacity could reach 1000 GW by 2020, producing about 2600 TWh of electricity per year. This would save as much as 1.5 billion tonnes of coal every year. It may be mentioned that India and hina are earning significant carbon credits due to wind energy development in the respective countries. According to Global Wind Energy Report 2008, there are around 650 CDM wind energy projects that are in the pipeline, with more than 25,000 MW of wind power generation. Of which about 270 projects, accounting for 5,072 MW, are to be established in India.

Outlook

According to the GWEC, India has slipped to the 5th position in total wind power installed capacity at the end of calendar 2008, with China overtaking it by a huge margin in terms of both new capacity (6300 MW as compared to 1800 MW of India in 2008) and total installed capacity (12210 MW as compared to 9645 MW of India as of end 2008). Nevertheless, India has been successfully managing to leapfrog many European countries in terms of new capacity additions during the year 2008 to rank 3rd after USA and China.

Despite the concerns about the financial crisis and its spillover into the real economy, the wind energy industry continues to be in upward strategic move to harness the potential. With the fundamental drivers (such as growing energy demand, relatively low capital cost, and relatively low generating cost, technology and financing support from developed countries) for Indian wind energy sector remaining strong, India would be in a position to capitalize the opportunity, not only in promoting wind energy for the cause of mitigating climate change, but also to use this window of opportunity to meet the growing power demand faced by the country. ■

PV Tech Effective Renewable Energy Source for Rural India - Exim Bank Study

The Photovoltaic (PV) technology across the globe is rapidly progressing and is increasingly being considered as an innovative source of renewable energy, according to a study made by the Export-Import Bank of India (Exim Bank). India is holding significant potential in generation of renewable energy using solar PV, as the country can make use of sunlight in nearly 300 days in a year. Other drivers of PV industry in India include the country's rapidly rising energy needs, the persistent energy deficit situation, and dependency of imported coal and oil for the energy generation requirements, the Exim Bank study says.

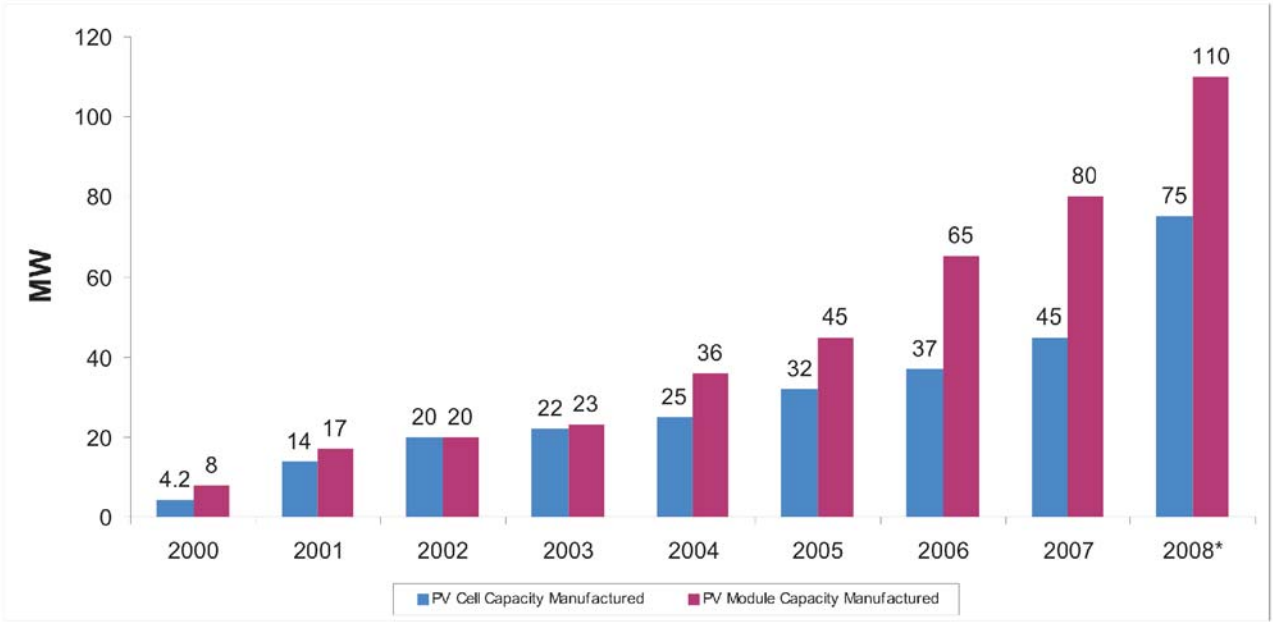
Capacity and Production

According to the Ministry of New and Renewable Energy, (MNRE) Government of India, the total PV cell manufacturing capacity in India is estimated to be 75 MW, and the total PV module manufacturing capacity was estimated to be 110 MW, in 2008. The industry thus has grown at over 35 percent in the last three years.

Solar PV Cell and Module Manufacturing Capacity in India

According to a report by the Indian Semi-Conductors Association, in the last five years, India exported more than 220 MW of PV products. The indigenous production of silicon wafer is limited in India; hence, most of the cell manufacturers are importing silicon wafers and some of the module manufacturers are also importing silicon cells. The industry also imports significantly raw materials and components for PV modules.

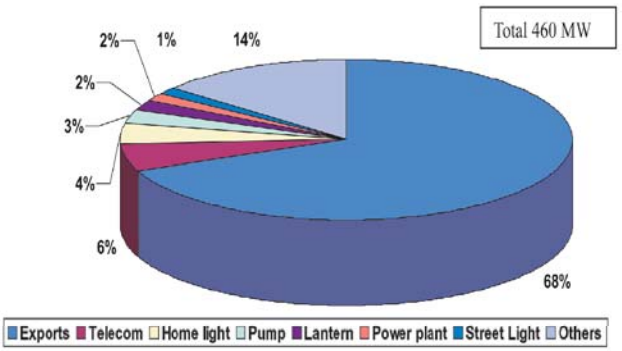
According to MNRE, Government of India, as of 2008, there were nine firms engaged in the manufacture of solar cells and 19 firms were involved in the manufacture of PV modules. In addition, about 50 firms were actively engaged in the manufacture of PV systems. PV systems with aggregate capacity of over 460 MW (about 15,00,000 systems) have been utilized in India as on 31 March 2008, for various applications, including export with an aggregate capacity of about 275 MW of PV products (68 percent).



** Estimated*

Source: Ministry of New and Renewable Energy, Government of India

Sector-wise Usage of PV Systems in India



Source: MNRE, Government of India

Trade

Directorate General of Commercial Intelligence and Statistics (DGCIS) has classified the data related to India's trade of PV products (like solar cells/photovoltaic cells including assembled modules and panels), under HS code No. 85414011. In 2007-08, India exported PV products worth US$238 million, which had increased to US$348 million during the first nine months of 2008-09 (April-December 2008), a growth of 116 percent over the corresponding period the previous year.

In terms of target markets, Germany and Spain are the two largest markets for Indian PV products in 2008-09 (April-December 2008), accounting for 42 percent and 40 percent respectively of total exports. In terms of imports too, Germany is the leading market with a share of 43percent, followed by Taiwan (36 percent), Japan and Spain (5.0 percent each). It may be mentioned that most of the imports are in the form of silicon wafers (imported by cell manufacturers), and silicon cells (imported by module manufacturers).

Government Initiatives & Policies

Various policy initiatives taken by the Government of India are recognizing the significance of the PV sector, within the renewable energy, and its potential. At a broad level such policies include: The Action Plan for Climate Change, National Solar Mission, and Semi-Conductor Policy, Specific to the PV industry. There are capital investment subsidies, introduction of generation-based incentives (similar to that of feed-in-tariffs) for grid interactive solar PV generation projects, and support for R&D in PV technologies.

The Government has introduced a Solar Photovoltaic (SPV) programme, which has accelerated the development of the PV technology in India, and encouraged countrywide usage of various PV applications through demonstrations. The R&D base in Indian PV industry has also been developed, in areas such as development of new materials, processes, systems, production and testing equipment for solar cells and modules, and electronics used in PV systems, supporting the indigenous production capabilities. Under this programme, MNRE, Government of India will support grid interactive solar power generation projects up to a maximum capacity of 50 MW. The registered companies, as project developers, would be eligible to set up solar power projects on build, own and operate basis. A maximum of 10 MW capacity solar photovoltaic power generations would be considered in a state. Preference would be given to projects from the states where State Electricity Regulatory Commission has announced/or in the process of announcing tariff for solar power. In the absence of tariff for solar power, the utility should provide the highest tariff offered for medium term power purchase, or the maximum tariff fixed for power from any other renewable energy source.

MNRE, Government of India, under this programme, will provide generation based incentive up to Rs. 12 per kWh for solar photovoltaic power fed to the grid by the project developers, after taking into account the tariff provided by the utility organizations.

Several recent government announcements and policy measures suggest that PV adoption may be entering a phase of major expansion. The states of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Punjab, Rajasthan, Tamil Nadu and West Bengal have announced their own solar PV projects, policies, plans, and incentive packages in recent months, including those for grid-connected generation. MNRE, Government of India has targeted grid connected PV generation capacity of 50 MW by 2012, which is expected to be achieved well in time.

PV Industry & Carbon Credits

Carbon credits and carbon trading would play an important role in enhancing the cost competitiveness of PV projects. For example, India could set up

(currently) high cost solar power plants and reap the economic advantages obtained by saving emissions and earning money from trading of saved emissions, instead of building a low cost coal power plant, whose overall economic advantages may not be much. It is equally important to note that such an economic environment would help to create a global market for solar energy technologies, and help to kick-start the global transition towards zero emission technologies. It may be mentioned that developing countries have more solar energy than Western countries, and if global warming is to be averted in the long run, developing countries should generate more solar energy instead of energy generated from fossil fuel. Also, developing countries have millions of settlements even today which do not have grid-supplied electricity. Solar energy systems should serve this objective in the future.

PV Market Outlook in India

Renewable resources, in the forms of solar, wind, hydroelectric, biomass, and geothermal energy, provide energy while addressing environmental concerns. Of these technologies, solar photovoltaic energy provides the most reliable, scalable, and long-term economically viable solution with the least environmental impact. Moreover, solar energy generation profiles match usage patterns well (i.e. high energy is consumed when the sun is at peak). It may be mentioned that over two-third of India's population is involved in agriculture and other rural-based activities. Around 500 million Indians are estimated to be having no access to grid electricity, as an estimated 80,000 villages are not connected to the grid. This segment presents significant opportunities for the PV industry.

The usage of photovoltaic technology in India is critical given the power shortages that the country faces and the potential the photovoltaic industry may play in mitigating this gap. It is useful for providing grid quality, reliable power in rural areas where the line voltage is low and insufficient to cater to connected load. Solar photovoltaic modules are uniquely suited for small-scale off-grid applications such as rural electrification projects. Installations can be as small as 100 kW, panels and equipment are easy to transport and install in remote locations, and facilities require little space. Another area of growth is in the irrigation sector, especially installation of solar irrigation pumps. Telecom sector offers significant growth opportunities for PV industry; cellular telephone base stations and towers are growing across the country, which could install solar PV systems than using diesel generators. The use of PV systems in urban areas is also increasing, with growth in building integrated PV, use of PV for billboards, development of street and traffic lighting solutions, and highway lighting. In the industrial sector, the PV power generation plants could replace diesel based captive power generation.

The grid parity situation will open up opportunities for new business models, such as the leasing of solar energy systems. This could remove the hurdle facing private households of making an initial solar system investment. A new type of energy company could emerge from this where one owns the PV system on the customer's roof and sells the solar electricity generated per kWh to the homeowner. With a number of companies taking the inorganic growth path and diversifying into the PV industry, the scenario envisaged is one of unprecedented growth potential and industry growth in the country. ■

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Export-Import Bank of India has signed an agreement for a long-term loan of Euro 150 million equivalent with tenor upto 15 years with European Investment Bank (EIB) in December 2008. This is the first time in the past 15 years that EIB has extended a credit line to an Indian entity. The purpose of the EIB loan to Exim Bank of India is for supporting projects that contribute to climate change mitigation and to enhance EU presence in India through FDI, transfer of technology or know-how from Europe. The borrowings under this facility will enable the Bank to on-lend for import of equipment for projects including renewable energy projects (eg. wind, solar, biomass etc.), energy efficiency enhancement (eg. fuel switching, plant modernisation etc.) as well as projects that would reduce greenhouse gases emission, clean environment, afforestation.

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