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# Policies to Support Eco-innovation in Israel

Ernst & Young, Tel Aviv (Israel)

Environment Directorate

For further information
please contact Xavier.Leflaive
Email: xavier.leflaive@oecd.org

## FOREWORD

This report completes a series of country profiles on eco-innovation policies in non-European OECD members. Similar reports on Australia, Canada, Japan, Korea, Mexico, New Zealand, Turkey and the United States were released in 2008. Similar country profiles are developed for selected non member countries (China, 2008; South-Africa, forthcoming, 2011). This series complements the eco-innovation roadmaps developed by EU member countries under the Environmental Technology Action Plan. It provides an empirical basis for further investigation on national strategies and policies to support eco-innovation.

A short introduction presents the background for this series of country profiles, including the methodology, and a brief overview of some of the instruments identified.

Country profiles are based on extensive desk research and on field missions in selected countries (Canada, Japan, Korea, United States). Country experts have commented earlier drafts of their country profile.

This report was developed by Ernst & Young, Tel Aviv, Israel, under the supervision of Itay Zetelny.

The report on China was developed by Wanxin Li, City University of Hong Kong and Tsinghua Graduate School at Shenzhen. The report on South-Africa was developed by Inga Jacobs, Richard Meissner and Cebile Ntombela, Council for Scientific and Industrial Research (CSIR). Other reports in the series were drafted by Xavier Leflaive, under the supervision of Brendan Gillespie. Carla Bertuzzi has provided data and information on measurement issues and has drafted selected sections. IEEP was commissioned for the initial desk research and preliminary identification of policy issues. Country experts have provided most valuable inputs, in terms of time, information and policy relevance: Warren Hughes (Department of the Environment, Water, Heritage and the Arts, Australia), Javier A. Gracia-Garza (Environment Canada), Graham Campbell (Natural Resources Canada), Tim Karlsson (Industry Canada), Honi Kabalo (Ministry of Environmental Protection, Israel), Noriko Kishimoto (Ministry of the Environment, Japan), Kyu-Shik Park (Ministry of Environment, Republic of Korea), Carlos Muñoz Villarreal (Ministry of Environment and Natural Resources, Mexico), Vera Power and Alison Stringer (Ministry for the Environment, New Zealand), David Widawsky (USEPA), Sebahattin Dokmeci (Ministry of Environment and Forestry, Turkey).

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# INTRODUCTION

## Background

This report is part of the OECD work programme on eco-innovation policies. It complements a series of similar country profiles for non-European OECD countries (Australia, Canada, Japan, Korea, Mexico, New Zealand, Turkey and the United States) and for selected non-members (China, South Africa). In addition, European countries developed roadmaps for eco-innovation policies in the context of the European Commission Environmental Technology Action Plan (ETAP).

The objective of this work is to complement the knowledge base on eco-innovation policies in OECD countries and to provide empirical material for additional research on policy issues related to eco-innovation. The outline of each country profile is similar to that of ETAP roadmaps, to facilitate comparison.

The work on OECD countries was implemented in coordination with country delegations, which have identified experts in each country who could provide additional information and review initial drafts of the country profile of their country.

The report on Israel was developed by Ernst & Young, Tel Aviv, Israel. It presents information which was up-to-date at the beginning of 2011.

The report on China was developed by Wanxin Li, City University of Hong Kong and Tsinghua Graduate School at Shenzhen. The report on South-Africa was developed by Inga Jacobs, Richard Meissner and Cebile Ntombela, Council for Scientific and Industrial Research (CSIR).

For the other country profiles on non-EU OECD members, a consultant (IEEP, Brussels, Belgium) was commissioned to collect information publicly available in English on eco-innovation policies in each country. Field missions have been organised by the country experts in four countries (Canada, Japan, Korea, United States). During these missions, the OECD Secretariat met with the agencies identified and selected by the country expert. Draft country profiles have been developed on the basis of desk research and field missions. They have been reviewed by national experts and revised accordingly. All country profiles present information which was up-to-date at the end of 2007. In most cases, more recent information has been taken into account.

## Policy instruments to support eco-innovation

The country profiles confirm that eco-innovation policies deploy a variety of instruments. They have to adjust to the features of the domestic economy, in particular the knowledge base, the size of domestic markets, and the *vigueur* of the venture capital industry.

In most non-EU OECD countries, public research and development (R&D) remains a major orientation. The United States and Japan typically allocate significant public finance to environment-related R&D. However, three trends have emerged: i) some countries are concerned by the competition and trade issues related to such support; ii) public resources are increasingly channelled via Departments not

directly in charge of environment policies (Energy, Agriculture, Transport), making inter-agency cooperation even more necessary; iii) the role of research organisations is being redefined, to intensify linkages with the private sector and stimulate the development of marketable outputs; incubators in the United States, or the National Institute of Advanced Industrial Science and Technology's (AIST) Technology Licensing Office in Japan illustrate innovative arrangements in this area.

Attracting private funds to finance environmental R&D is another major policy orientation. The main issue is to reduce risks for private investors investing in environmental R&D projects, while making sure that public money is used effectively and does not crowd out private initiatives. A variety of funds have been established to reduce risks to private investors (e.g. Sustainable Technology Development Canada-SDTC in Canada), or incubators (e.g. The Clean Energy Alliance in the United States, Environmental Technology Business Incubator in Korea). Measures are taken to stimulate the venture capital industry and to provide incentives for environment-related projects; e.g. this is the role of the Environmental Venture Fund in Korea.

Environment-related performance standards are being set with the aim of stimulating innovation in goods and services. Such standards are pursued in particular in the field of energy and resource efficiency. However, standards may provide disincentives and can only have a lasting positive effect on innovation if they are timely revised. Schemes such as the Top Runner programme in Japan aim to address this challenge.

Market-based instruments are burgeoning in non-EU OECD Countries. A number of new projects and initiatives have been identified at national or local level. One interesting case is the all-encompassing Emission Trading Scheme envisioned in New Zealand, where equitable sharing of responsibility across sectors and stakeholders is based on the principle of equity across sectors.

There is some evidence that, besides environmental policy instruments and regulation, soft instruments such as voluntary commitments, eco-audits and eco-labels play a role as determinants of innovative behaviour in firms. Voluntary initiatives can become mandatory over time (cf. Stand-by Korea). Industry initiatives abound and, in particular contexts, can change the relationship between the administration in charge of environment policies and the business sector. This is illustrated by Performance Tracks in the United States, where the U.S. Environmental Protection Agency (USEPA) and firms enrolled in the programme construct a collaborative relationship. This typifies what can be seen as a new phase in environmental policies which sets out to promote broader sustainability, rather than address one single environmental issue. In that perspective, governments rely less on regulatory tools and endeavour to work with industries, in sectors which use materials and/or energy.

In line with the OECD Council Recommendation on Improving the Environmental Performance of Public Procurement [C(2002)3], green procurement initiatives are burgeoning at local and national levels. Guidelines are supported by websites, green products databases, and *pro forma* requests for tenders. The Green Purchasing Network is an international network active in this area.

Some initiatives set out to promote technologies and products developed by one country. Others try to alleviate barriers to the deployment of environment-friendly technologies and products; shared definitions, standards and labels contribute to a level playing field for the creation and diffusion of environment-friendly technologies, products and life-styles. Such efforts are still plagued by institutional problems related to intellectual property rights and international monetary transfers. Typically, the capacity of a national agency to (financially) support one country's side of a multinational joint venture depends on how countries will share the intellectual property rights. Few cooperation projects reach developing countries (with the exception of East Asia, and China in particular).

# COUNTRY PROFILE OF ISRAEL

## Country definitions of eco-innovation

Israel is known for its entrepreneurial spirit, level of innovation and quality of technology development. In the last few years, Israeli innovation was broadened beyond the Hi-Tech industry into Cleantech. Cleantech is now considered as one of the growth engines for the local economy and therefore attracts more of the decision making attention. There are some 500 Cleantech companies in Israel amongst a few global leaders.

Now that Israel has entered the OECD (Organisation for Economic Co-operation and Development), the government has made significant efforts to push environmental initiatives, such as the promotion of eco-innovation, in the country. New laws aimed at environmental protection have been approved and an additional number are still in the approval process. A number of programs to promote energy efficiency, alternative energy and GHG reduction have been developed. In addition, Israeli banks are incorporating environmental aspects into their credit operations and the stock exchange commission requires additional environmental disclosure from public companies that will stimulate companies to implement environmental technologies. The following report provides an overview of governmental efforts to stimulate eco-innovation in the business sector and households.

### *Definitions related to eco-innovation used in the country*

Israel promotes the transfer of environmental technology in a wide variety of fields including sustainable agriculture, combating desertification, solar and renewable energy, and environmentally-sound management and treatment of water resources.

**Eco-Innovation**[1] – Increasing the potential of new technologies, products and services which contribute to financial and ecological efficiency.

**Eco-Efficiency** [1] – Eco-Efficiency refers to efficient usage of natural resources in order to satisfy human needs and demands. This is a key term in development of sustainable production conduct.

## Institutions playing a major role in eco-innovations

A number of ministries are involved in eco-innovation promotion. Each ministry, depending on its overall objectives, has specific tools to promote eco-innovation. In addition, there are a number of research institutes that are active in the field of environmental technologies.

### *Key ministries involved in eco-innovation policies*

*Ministry of Environmental Protection* [2]

Until 1973, the environmental responsibility was divided among several ministries in Israel. Within a year of the Stockholm Conference, the Government established the Environmental Protection Service as a first step in the creation of a comprehensive and modern environmental administration in Israel. In December 1988, the Ministry of the Environment was established in Israel. This proved a landmark in

Israel's environmental development and in the Government's determination to tackle environmental issues. The Ministry's current and future roles and work plans are as follows:

- Minimization of emissions and wastes which damage the environment and human health
- Protection, increased efficiency of use and rehabilitation of environmental resources and ecosystems for future generations
- Prevention and reduction of population exposure to risks and hazards
- Increased capacity to confront and prepare for environmental risks (climate change, chemicals, pests, etc.)
- Fair distribution of environmental costs and benefits among different population groups
- Improved access to a high quality environment for public wellbeing
- Promotion and use of Israeli environmental technologies
- Increased efficiency and effectiveness of policy tools: regulatory, informative, economic and operational to achieve ministerial targets

*Ministry of Industry, Trade and Labor* [3]

The Ministry of Industry, Trade and Labor focuses on the promotion of economic growth in Israel. The Ministry is engaged in the encouragement and support of export and international commerce, in order to assist Israeli businesses in enhancing their exports and entering new markets abroad.

The Office of the Chief Scientist (OCS) of the Ministry of Industry, Trade and Labor (MOITAL), empowered by the Law for the Encouragement of Industrial Research & Development – 1984 (R&D Law), oversees all Government sponsored support of R&D in the Israeli industry. This broad spectrum support stimulates the development of innovative state of the art technologies in all sectors of the economy including high-tech and Cleantech markets, creates employment opportunities and assists in redressing Israel's balance of payments. In addition to its domestic activities, the OCS is involved in a myriad of bi- and multinational industrial R&D agreements.

MOITAL also comprises Israel's Investment Promotion Center which promotes foreign direct investment into Israel as well as the Investment Center that encourages local investments in different sectors including Cleantech.

*Ministry of National Infrastructures* [4]

The Ministry of National Infrastructures is responsible for a broad range of issues in the fields of energy, water, electricity and fuel. The Ministry supervises the Israeli energy sector, including licensing and research and development activities, as well ensuring the effective use of natural resources for the benefit of all citizens and in the light of environmental protection.

*Ministry of Transport & Road Safety* [5]

The Ministry is responsible for administration and policy in the transport sector, and for land, air and sea transport systems and services; advising the Government on transport policy; generating, formulating, implementing, administering and monitoring ministry policies and strategies; negotiating bilateral and multilateral agreements; coordinating ministry activities. The Ministry's main objective is to assure top quality transportation services by planning long-term transport solutions, modernizing and increasing efficiency. Also the Ministry of Transport & Road Safety is involved in promoting green transportation systems.

*Israel Tax Authority* [6]

The Israel Tax Authority coordinates the various tax departments: income tax, land tax, VAT, purchase tax and stamp duty. The Authority provides services regarding various reforms, non-profit organizations and information for employers' representatives and the public. The Tax Authority's main relevance to environmental innovation concerns "green taxation" on vehicles and tax exemptions on R&D research.

*Ministry of Interior* [7]

The Ministry of the Interior plans and implements national policy in matters of local government, physical planning, population registry, emergency services and special functions, as well as supervision of elections and construction. The Ministry operates on two levels: the national level, which sets guidelines and policy, and the regional level, an implementation level which maintains close contact with the local authorities and the public that needs the Ministry's services. The Ministry's main relevance to environmental innovation concerns 'green building'.

*Ministry of Construction and Housing* [8]

The Ministry of Construction and Housing is responsible for initiating and operating government policies in the building and housing sector. Its main relevance to environmental innovation concerns green building and sustainable development.

*Ministry of Agriculture and Rural Development* [9]

The Ministry was appointed by the Government to deal with agriculture and rural areas. Among its main activities: planning and development of rural communities and agriculture, provision of veterinary, soil conservation and drainage services. Main relevance to environmental innovation is participation in water efficiency promotion.

***Research Institutes***

The Israel Science Foundation (ISF) [10] is Israel's predominant source of competitive grants funding basic research. Its roughly USD 60 million annual budget funds more than 1,300 grants a year, providing two-thirds of all such funds. The ISF awards grants to Israeli researchers at Israeli universities, other institutions of higher education, research and medical centers. Most funds (96%) are provided by the Government of Israel via the Planning and Budgeting Committee (PBC) of the Israel Council for Higher Education. The ISF awards grants in all fields of:

- Exact Sciences and Technology;
- Life Sciences and Medicine;
- Humanities and Social Sciences.

In addition, each of the country's universities offers environmental courses and programs to ensure a pool of professionals and researchers, capable of solving environmental problems and influencing policies and decision making at all levels. They also perform extensive research in various fields including alternative energy, water use, waste recycling, energy efficiency, etc. A list of research centers is provided below:

- Ben Gurion University of Negev, National Solar Energy Center
- The Hebrew University of Jerusalem

- Tel Aviv University, The Gordon Center for Energy Studies
- Weizmann Institute of Science, Department of Environmental Sciences and Energy and Institute for the Energies and Applied Research
- Technion, The Grand Technion Energy Program
- Neaman Institute
- Arava Institute for Environmental Studies, Center for Renewable Energy and Energy Conservation
- IDC Herzliya, Institute for Renewable Energy Policy
- The Arava Institute for Environmental Studies (AIES)
- The Jerusalem Institute for Israel Studies (JIIS)

Most of the research institutes have a special body that is responsible for the technology transfer to the industry.

**Key regulatory documents related to eco-innovation**

During recent years, a number of significant changes have taken place in the field of environmental legislation. The Tire Disposal and Recycling Law, Deposit Law on Beverage Containers, Environmental Protection Law, Cogeneration promotion regulation, etc. were adopted. An important milestone was the approval of the Clean Air Act that sets a number of tools to promote eco-innovation in Israel. In addition a number of regulations aimed at promotion of environmental friendly products, solutions and technologies are under development or being amended. For example, the regulation on minimum exposure limits of cellular radiation is being developed; hazardous substances management regulation and hazardous waste definition are being amended.

Some of the most relevant laws and policy documents (both adopted and drafts) that promote eco-innovations are described below:

***Existing laws and policies***

*Clean Air Act* [11]

The Law provides a comprehensive framework for the reduction and prevention of air pollution by setting responsibilities and imposing obligations on the government, local authorities and the industrial sector. The aim of the law is: "to improve air quality and prevent and reduce air pollution, inter alia, by establishing prohibitions and obligations according to the precautionary principle, in order to protect human life, health and quality of life and to protect the environment including natural resources, ecosystems and biodiversity, for the public and for future generations, while considering their needs."The law became effective on 1 January 2011 and is based on the Clean Air Act that was legislated in the USA.

- A multi-annual national plan for the reduction of air pollution – will be presented by the Ministry of EP until 2012, including a clear timetable with quantitative goals, defining the practical method of reducing air pollution. The plan will specify the required actions of the different ministries. The Ministry of EP's power will increase in light of the law, allowing it to enforce and develop further environment conservation actions and policies.
- Setting air quality values – The law defines various types of environmental standards which are established on the basis of considerations such as protection of health and implementation capacity. These standards will serve as the basic guidelines in any other ruling/activity regarding air pollution.
- Permits for pollution – An emission permit will be issued for each pollutant factory of the large factories in Israel.

- Enforcement and punishment – The Ministry of Environmental Protection will increase enforcement and supervision via surprise checks and administration of fines.
- Environmental supervision of vehicle fleets – Vehicle fleets of over 100 cars will be obliged to assure minimum air pollution through the installation of catalytic convertors. Also, they will need to advertise the pollution level of cars.
- Access to information for the general public – The Ministry of Environmental Protection will publish all relevant data as described in the law (e.g. emissions of polluting factories).

*R&D Law* [12]

The purpose of the Law is to encourage Israeli companies to invest in R&D projects, with the Government sharing in the risk inherent in such projects. Most of the available R&D incentive programs are received from the Office of the Chief Scientist and from the Ministry of Industry, Trade and Labor. The Office of the Chief Scientist is active according to the 1984 R&D Law, and the related rules and regulations. The main requirements under the R&D Law are:

- Royalty regulations: If an R&D project results in a commercially successful product, a sales royalty is generally payable to the Office of the Chief Scientist until the US dollar value plus interest at the rate of LIBOR (London Interbank Offer Rate) of the R&D grant has been repaid. Under the R&D Law, the standard rates for royalties from sales are 3% in years 1 to 3 after commercial sales begin, 3.5% thereafter. Payback is limited to 100% of the US dollar value of the grant received, plus LIBOR interest. The exception to this rule is if manufacturing rights are transferred abroad. In such event, the Office of the Chief Scientist is entitled to increase the royalty liability and to increase the rate by which the grant is to be repaid.
- Intellectual Property (IP): The R&D Law specifically states that the IP developed within the framework of the program, and its derivatives, shall not be transferred abroad without the Office of the Chief Scientist' research committee approval. Full refund of the grant and in some cases additional payment according to a specific payment formula is required in case of transfer abroad.

*The Law for the Encouragement of Capital Investment* [13]

The main objectives of the Law are to assist in developing Israel's manufacturing and employment bases, to increase the efficiency of exploitation of Israel's resources, and to improve the country's economic potential. Additional objectives of this law include improving the nation's balance of payments by the reduction of imports and expansion of export, and supporting the population in rural areas by defining National Priority Regions (as described below). The Law, which has recently been revised, divides the manufacturing and employment incentive programs into 2 main types:

- The Investment Grants Program - administered by the Israel Investment Center (IIC), a department of the Ministry of Industry, Trade and Labor
- The Tax Benefits Investment Program - administered by the Israeli Tax Authority.

*Freedom of Information Law* [14]

Israel's Freedom of Information Law was established to assure open access to public information. In 2005, a new amendment was enacted concerning the effect a public authority has on the environment: all information in the possession of public authorities will be made available to the public on request (with certain restrictions such as public safety, commercial confidentiality, etc.). The 2009 Freedom of Information Regulations on Public Access to Environmental Information (in force since September 2010) goes further: it provides for free-of-charge online access to information on substance that are emitted,

spilled, discharged or released to the environment and the results of measurements of noise, odours and radiation which is specified in 22 categories of information held by public authorities, covering air, water and marine pollution, hazardous and non-toxic waste, noise, radiation and soil contamination.

***Governmental programmes supporting eco-innovation***

In addition to the laws, a number of Governmental programs supporting eco-innovations have been developed.

*The promotion of water technologies program* [15]

In August 2008 the government approved a program for the promotion of water technologies in the years 2009 – 2011. The decision includes:

- Establishment of a steering committee that will implement a program for the development of water technologies through the years 2009-2011.
- Establishment of a national center for water technologies in Sde-Boker.
- Implementation of the Katamon program as described in the 'R&D support' section.
- Support in incubators designated to water technologies.
- Promotion of water technology studies in higher education institutes.
- The Water Authority will support the academic research in the field.
- The Water Authority will provide grants to students for advanced degrees in the field.
- The Authority for Industrial Cooperation will examine possible benefits in imputed amounts of reciprocal procurement in the field (already approved – See 'Procurement' section below).
- Professional training program for the purpose of enlarging the labour force in the field will be operated in the program's years.
- Consulting services for businesses by the Ministry of Industry, Trade and Labor.
- Supporting tools: funding for participation in conferences in Israel and abroad, international marketing of the Israeli technologies and innovations, establishment of a national information center for the use of the program's target group, the Israeli Standardization Institute will take measures in order to take part in international adjustments enabling Israeli companies to compete in the international market, Integration of the subject of "water protection" in the education system.

*Promotion of the renewable energies sector* [16]

In August 2008 the Government has initiated a 5 year plan for the promotion or the renewable energies sector. This was initiated in light of the increasing global trend of broadening the usage of renewable energies, which is manifested by enormous capital investments in R&D and production, and in light of Israel's relative advantage in the field, especially in the R&D area, a national plan of research, development of technologies and electricity production in the field of renewable energies was established. The plan includes several components:

- Encouragement of industrial research – Using various channels, the plan funds academic studies and research in the field, funding of other research institutions and academic conferences. A total amount of NIS 50 million (USD 14 million) will be allocated from several ministries.
- Encouragement of applied research and development – The Office of the Chief Scientist will allocate funding from 4 existing programs (elaborated later in the 'R&D support' section: Tnufa, Startergy, Magnet and support program by the Office of the Chief Scientist of the Ministry of Agriculture and Rural Development) particularly for renewable energy research in a total amount

of NIS 35 million (USD 10 million); a new development center will be established in the Negev that will support R&D initiatives in a total budget of NIS 57 million (USD 16.3 million).

- International cooperation – Budgets will be assigned for cooperation with the European Union, the US and the International Energy Agency (IEA). The Office of the Chief Scientist will also examine other possible collaborations and the Investment Promotion Center will aim for having international companies invest in the field.
- Other initiatives – Benefits in imputed amounts of reciprocal procurement, professional training programs for the purpose of enlarging the labour force in the field, consulting services for businesses, assistance in financing international tenders application, international marketing of the Israeli technologies and innovations and establishment of a Verification Center. The Israeli Standardization Institute will take measures in order to take part in international adjustments enabling Israeli companies to compete in the international market. The Administration of Planning in The Ministry of the Interior will prepare a national plan for the national infrastructure of the energy economy. An amendment of the law of capital investments encouragement concerning renewable energy has been made.
- Other examined components –Taxation benefits for companies that will choose to invest in renewable energy, changing of electricity consumption tariffs, examination of improved allocation of land for renewable energy projects and power stations.

*Measures for improvement in energy efficiency* [17]

In September 2008 the Government has decided on measures to streamline energy efficiency according to a 20% reduction of electricity consumption by the year 2020. On this basis the following steps were to be taken:

- Improvement in energy efficiency in government facilities – An inter-governmental incentive set forth will enable all saved expenses to stay within the specific office that made the streamlining.
- Funding of projects for improvement in energy efficiency in the local authorities.
- Formation of standards and regulations that will promote energy efficiency.
- Formation of awareness-raising to the general public.
- Support to energy suppliers in receiving credit.
- Preparation of a plan to reduce energy consumption by citizens and small businesses.
- Promotion of Building with energy efficiency orientation ("green building").
- Continuation of the committee of CEOs for improvement in energy efficiency.
- Preparation of a plan by the authority of public service-electricity for the shifting of record demands for electricity for the years 2011-2015.

*A Government decision to form a national plan for reducing GHG emissions in Israel* [18]

In November 2010, the Israeli Government approved a national plan for reducing GHG emissions in Israel in order to achieve a 20% reduction of total GHG emissions in 2020, compared to a BAU scenario. During this period, the different ministries will allocate a total amount of NIS 2.2 billion (USD 600 million) in order to reach this objective.

A plan for the next two years specifying the practices of the decision has been launched. In the program:

- The Ministry of National Infrastructures received a budget of NIS 269 million (USD 74 million) to reduce household energy consumption. This target will be accomplished mainly by an operation financing the replacement of household appliances from old devices to more energy efficient ones (e.g. air-conditioners and refrigerators devices).

- The Ministry of Environmental Protection received a budget of NIS 114 million to support investments targeted at the reduction of greenhouse gas emissions in the industrial, commercial and public sectors.
- Actions for raising awareness and education.
- Support in investments for installation of new Israeli technologies.
- Promote green building.
- Financial support for conducting energy surveys in businesses, in order to examine means to improve their energy efficiency.

*The national plan for increasing the energy efficiency – reduction of electricity consumption* [19]

Following the Government's objective of diminishing electricity consumption by 20% by 2020 the next plan was prepared on July 2010. The plan, if implemented extensively, should save the economy USD 4.25 billion, but will require the establishment of a national fund of NIS 200 million (USD 52 million) per year. In order to raise the capital, an increase of electricity tariff by 1% each year should be executed. The public will gain back the investment through incentives and the decrease in its own electricity expenses. Main tools to promote energy efficiency will be:

- Allocation of financial incentives to low socio-economic populations and enterprises and institutions for the purpose of improving their energy efficiency, each in its own domain.
- Increase in tax benefits to "for-profit" companies for investments in energy efficiency improvement.
- Amendments of the Law for the Encouragement of Capital Investments, favouring development of energy efficient technologies.
- Financial securities aid to institutions and local authorities.
- In the industry sector - Encouragement of new proven technologies that have not been implemented in the country.
- Initiating awareness raising programs to alert the general public of the importance of the subject.
- Promotion of regulations for energy classification of buildings and financial benefits to energy efficient buildings.
- Promotion of awareness-raising amongst building engineers and contractors.
- In house enforcement of electricity expenses of the Government and ministries.

*Integration of Renewable Energies in the electricity production sector in Israel* [20]

In January 2009, a general goal was set by the Israeli Government to reach a 5% share in electricity production from renewable energy sources by 2014 and a 10% share by 2020. While taking into consideration the energy efficiency steps being carried out simultaneously the goal for electricity generation from renewable energy sources by 2020 is 6.43 terra-watts per hour (TWH).In February 2010, the Ministry of Infrastructures published a program aimed at developing and integrating incentives for renewable energies in order to achieve energy independence and security and to enforce Israel's enrolment to better protect the environment. The policy is an outcome of the Israeli Government's decision on energy production from renewable energy sources.

Israel's main technologies which can be implemented in its electric market are solar, wind and biomass. The integration of renewable energy was planned over a two-year period according to demand and efficiency forecasts. The Public Utilities Authority evaluates extra costs for this project at 2.75 billion NIS (0.8 billion USD) annually. Additional costs will result in an increase of electricity tariffs for all consumers, estimated by as 15.2% by the Public Utilities Authority. At this stage there are few tenders for solar stations that are in the process of being approved in a total of 650 MW.

Main policy and actions are as follows:

- Identification and development of manufacturing clusters – concentration of several production elements in a sequential cluster that will reduce damage to the open territories and ease electricity conduction.
- Electricity production using wind technologies – The Ministry is working in collaboration with the Israel Lands Administration to locate appropriate land and setting up wind measurements flagpoles.
- Bio-Gas and Bio-Mass – Application of accelerated depreciation of 25% for purification and landfill centers and addition of facility installations in existing landfills.
- Amendment of the Law for the Encouragement of Capital Investments – Facilitation of investments in innovative renewable energy technologies.
- Special tariffs for renewable energy facilities – Relevant tariffs will be determined by the Authority of Public Services –Electricity.

**Table 1. Forecast for installed capacity in renewable energies according to technology (installed MW)**

| | 2014-15 | 2016-17 | 2018-19 | 2020 | % of total installed capacity |
|---|---|---|---|---|---|
| Streamlining energy efficiency objective, percentage of the estimated demand (%) | 7 | 12 | 17 | 20 | |
| Estimated demand including streamlining energy efficiency process (TWH) | 60.4 | 61.5 | 64.5 | 63.3 | |
| Wind (MW) | 250 | 400 | 600 | 800 | 29 |
| Biogas and biomass (MW) | 50 | 100 | 160 | 210 | 7.6 |
| Large thermo solar and photovoltaic (MW) | 700 | 750 | 1000 | 1200 | 43.5 |
| Medium photovoltaic (MW) | 350 | 350 | 350 | 350 | 12.7 |
| Photovoltaic up to 50KW (MW) | 200 | 200 | 200 | 200 | 7.2 |
| Total installed capacity (MW) | 1550 | 1800 | 2310 | 2760 | 100% |
| % from renewable energy production | 5.3 | 6.5 | 8.3 | 10.2 | |
| Estimated land area required according to the installed capacity installation – 33.8M² million | | | | | |

**Table 2. Production forecast using renewable energies (TWH)**

| | Dec. 2014 | 2016-2017 | 2018-2019 | 2020 | % of total production |
|---|---|---|---|---|---|
| Wind (TWH) | 0.61 | 0.98 | 1.47 | 1.96 | 30.04 |
| Biomass (TWH) | 0.33 | 0.66 | 1.05 | 1.38 | 21.1 |
| Large thermo solar and photovoltaic (TWH) | 1.33 | 1.43 | 1.90 | 2.28 | 34.87 |
| Medium photovoltaic (TWH) | 0.60 | 0.60 | 0.60 | 0.60 | 9.1 |
| Photovoltaic up to 50KW (TWH) | 0.32 | 0.32 | 0.32 | 0.32 | 4.89 |
| Total production in practice (TWH) | 3.19 | 3.99 | 5.34 | 6.54 | 100% |

*An emergency plan for the water shortage distress* [21]

In light of Israel's severe water shortage an emergency plan for the reduction of water consumption along with the magnification of the water supply has been prepared and is being submitted for approval by the government.

***Future laws and policies***

*A grand master water management plan in Israel* [23]

Following the emergency plan, a master plan has been also formulated for the next 10 years. The plan is based on a holistic sustainable principle relating to long term economic, social and environmental aspects. The plan will be approved in the nearby future by the Water Authority and the Government. The main recommendations and policy points include:

- Funding – Allocation of approximately 206 billion NIS by 2050, of which 52 billion NIS should be allocated in the next decade. About 90% of the investment will be obtained through water tariffs.
- Natural water sources – will be rehabilitated and conserved as a strategic value.
- Sewage system – All sewage manufacturers will be connected to wastewater institutes.
- Water quality – The importance of the water and the wastewater quality and will be a guiding principle for all water fields.
- Water for the nature – The understanding that the nature needs water as much as other consumers will be implemented thorough the rehabilitation of water dependant ecological systems.
- Urban water sector – the system in charge of the urban water management in the local authorities needs to be empowered and to improve its enforcement. Water corporations should be well selected and supervised.
- Terms of uncertainty – The water sector will be managed prepared for extreme scenarios in all of its activities.

*A national initiative for the reduction of global use of oil in transportation* [24]

Following a Government decision from February 2010 a steering committee, headed by the National Economic Council, has prepared an action plan, recommending the steps that should be initiated in order to promote oil independence in the transportation sector. The report concluded a number of measures:

- Promotion of plan's activities with other countries; establishing and strengthening international cooperation; promotion of international strategic cooperation in the Israeli industry; promotion of the political objectives of this program around the world; and initiation of 'the Prime Minister's award for innovation' in this field.
- Simplification of the bureaucracy and empowerment of the entrepreneurship and the industry in the oil-substitute sector through: an information service center for companies, encouragement of investment in venture backed companies and pilot facilities as well as initiation of implementation of innovative oil substitutes in Israel.
- Promotion of the scientific and applicable research in the field through financial instruments such as grants.

**Initiatives and encouragement instruments**

***R&D support*** [25]

R&D support is performed via chief scientist offices in different ministries. R&D in the field of water, renewable energy, resource efficiency and other environmental technologies is supported by the following ministries:

- The Ministry of Infrastructures focuses on R&D in the field of alternative sources of energy located in Israel, and of technologies for the more efficient exploitation of the conventional energy sources.
- The Ministry of Industry, Trade & Labor focuses on hi-tech/bio-tech/Cleantech industries.
- The Ministry of Agriculture focuses its R&D activities on water management, pest management, climate change, conservation of open spaces, biodiversity and gene banks and energy efficiency in the agriculture sector.

Most of Israel encouragement and support of industrial R&D is done through the Office of the Chief Scientist at the Ministry of Industry, Trade & Labor and the Ministry of Infrastructures. The role of the OCS is to assist in the development of new technologies in Israel, as a means for fostering the Israeli economy, encouraging technological innovation, entrepreneurship, leveraging Israel's science-skilled resources, enhancing the knowledge base of Israeli industries and promoting cooperation in R&D both nationally and internationally.

The Office of the Chief Scientist supports companies during their different development stages from pre-seed/seed and start-up to mature technology stages. The Office of the Chief Scientist provides a variety of support programs tailored for each stage that operate on an annual budget of approximately USD 300 million. During recent years budgets allocated for 'clean' technologies have been growing steadily. These programs have promoted the Israeli industry to become one of the world's foremost technology centers. Companies that received funding from the Office of the Chief Scientist are subjugated to the Israeli R&D Law and related regulations. The funding instruments are divided into local programs and international collaboration programs. The local programs are described below and the international programs are described in the International cooperation section.

*Pre Seed & Seed R&D*

Noffar program is designed to support applied academic research in biotechnology & nanotechnology in order to approve a technology's feasibility. Grants under this program constitute up to 90% of the budget approved by the Office of the Chief Scientist up to USD 100 thousand. There are no royalty payments under this program.

Magneton program promotes technology transfer from academic institutions to industry via mutual cooperation between a company and an academic research program. Grants under this program constitute up to 66% of the budget approved by the Office of the Chief Scientist. There are no royalty payments under this program.

Katamon program is a program dedicated to water technologies transfer from academic institutions to industry via mutual cooperation between a company and an academic research program. During the years 2009-2011 total budget is NIS 6 million USD 1.69 million). Grants under this program constitute up to 50% of the budget approved by the Office of the Chief Scientist and with a maximum budget of NIS 4.5 mln (USD 1 million). There are no royalty payments under this program.

Tnufa program encourages and supports technological entrepreneurship and innovation at the pre-seed stage. Its objective is to provide pre-seed grants to individual entrepreneurs in order to check the feasibility of their new initiative. Grants, up to 85% of the budget approved by the Office of the Chief Scientist up to USD 50 thousand, could be used for building a working prototype, preparing a business plan and filing for patent registration. Moreover, Tnufa offers specific programs for developing "green" products including renewable energy research.

Technological Incubators provide a framework and support for nascent companies to develop their innovative technological ideas. Each Incubator provides suitable facilities for R&D activity & administrative and logistic support to projects for a maximum period of 2 years (3 years for biotech). Financing provided is up to USD 500 thousand. Incubators get 85% investment from the Government and should invest additional 15% from private sources. A number of incubators in Israel have Cleantech projects in their portfolios, such as ATI Ashkelon Technological Industries, Greentech Energy Incubator, Maayan Ventures, etc. In addition, Kenrot Ventures is a pure Cleantech incubator dedicated to water and other "clean" technologies.

*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. Grants under this program constitute up to 66% of the budget approved by the Office of the Chief Scientist with no royalty payments. There are special streams on water and renewable energy.

Generic R&D is a program encouraging large companies that invest heavily in R&D to invest in long-term generic R&D. Grants under this program constitute up to 50% of the budget approved by the Office of the Chief Scientist with no royalty payments. Environmental technologies can participate in this program as well.

*Competitive R&D*

The R&D Fund supports applied R&D projects. To be approved by the Office of the Chief Scientist, the R&D program must show significant technological innovation leading to a new product. The program should last at least one year. Grants are awarded on a sliding scale from 20 to 50% of the total approved R&D expenditure. Additional 10-25% is granted to companies located in rural areas. In commercially successful products developed in the program, the royalty payment is 3 to 6% of the future product sales. Environmental technology development can participate in this program.

Traditional Industry support program offers funds for projects from traditional industries based on innovation. Grants under this program constitute up to 50% of the budget approved by the Office of the Chief Scientist and currently, the grants under this program are not subject to royalties. Environmental technologies can participate in this program as well.

***Special programs***

*Israel NEWTech – National Water and Energy Program* [26]

Israel NEWTech is a national government program promoting the water technology and renewable energy sectors in Israel. In 2006, NEWTech launched its first initiative focused on the Israeli water technologies industry. The program promotes Israel's water technologies in the local and global markets by supporting R&D, participating in water related events and creating marketing tools for the benefit of the entire sector. The Government has invested heavily in the program and allocated substantial resources towards strengthening the foundation of Israel's water tech cluster.

In 2008, recognizing the success of the water program and the strategic importance of alternative energy technologies, NEWTech launched a second initiative focused on the renewable energy sector. This program encourages Israeli companies and individuals to enter the field of renewable energy, invest in R&D, and establish connections with potential partners overseas. The objective of the program is to promote Israel's renewable energy technologies in the local and global markets.

Israel NEWTech is led by the Ministry of Industry, Trade, and Labor in cooperation with more than ten government ministries and agencies. This wide partnership shares the goal of supporting and promoting the Israeli water and renewable energy sectors.

*Technology Center of Renewable Energy in the Negev* [27]

The Renewable Energy Technology Center in the Negev will proceed with the promotion of research and development projects in this field in collaboration with university research institutions, other research institutes and industry. The Center will oversee the project from the initial stages of the research and development in the university until the technological feasibility stage and will also offer research and development services to industrial manufacturing companies in the field of renewable energy including training activity and activation of areas for experiments. Recently a tender to establish and operate the Center was carried out. It is expected that the Government of Israel and the Arava group, that won the tender, will each invest half of USD 30 million (NIS 114 million) over a five-year period. Similar center for water technologies will be launched as well.

*WaTech* [28]

The Entrepreneurship & Partnership Center for Water Technologies is a program which supports new innovative water technology solutions which are relevant to the daily operation of the National Water Company – "Mekorot". WaTech offers early-stage entrepreneurs beta-site and commercial platforms, technology analysis and support, access to global markets, and assistance with strategic partners and capital. WaTech also offers more mature water technology vendors the opportunity to enter into commercial arrangements and joint projects with "Mekorot".

***Technology verification*** [14]

The Ministry of Environmental Protection has found that the verification process for environmental technologies is a barrier for the export of Israeli Cleantech given that most clients abroad are looking for a tested and verified technology. As the Israeli market is relatively small, it has been decided that for the time being the Ministry of Environmental Protection will financially support entrepreneurs and assist in obtaining the verification from internationally accepted verification centers.

In July 2010, the Ministry concluded an agreement with the Ministry of Finance to allocate approximately USD 1.2 million to initiate the program.

***Performance standards***

*Air emissions* [29]

The Ministry of Environmental Protection is working towards the abatement and prevention of air pollution from the different emission sources. This is done through legislation and regulation, supervision as well as enforcement and economic tools. The Clean Air Act enacted in 2008 and brought into force in 2011 sets performance targets and is expected to have a major impact on the improvement of air quality. The Act includes the following tools and measures.

**Table 3. Tools and measures included in the Clean Air Act**

| | |
|---|---|
| Abatement of air pollution from electric power production | Creating economic incentives for preferring clean technologies and fuels – the Ministry is working to incorporate the costs of health damages (external costs) caused by the operation of power stations in Government decision-making processes on development programs for the electricity sector. Inclusion of these costs, as well as the costs of constructing and operating the power stations, within |

| | |
|---|---|
| | the framework of the Government's considerations, should create a balance between the various needs of society.<br>The Israeli Government has required the Israel Electric Corporation to install pollution reduction systems in coal power stations. The project is due to be completed in 2016.<br>Producers of "clean" electricity are eligible for a premium or a higher tariff than authorized for producers of electricity generated from fossil fuels. |
| Abatement of air pollution from transportation | See Clean Transportation section below. |
| Abatement of air pollution from the industrial sector | An emission permit will be issued to each pollutant factory of the large factories in Israel. The permit will need to be purchased and will be limited to seven years. The factory will be obligated to build a monitoring station for emissions surveillance. The data generated from the station will be available to the public. Cancellation of the permit will result in the closing of the factory. In smaller factories, the permit will be an integral part of the business' license. Factories that will demonstrate substantial reduction will be able to gain taxation benefits. |

*Water use and waste water recycling* [1, 30]

Water has been a focus of attention in Israel where water is a scarce resource. Israel is the world leader in waste water recycling rates with 70% of municipal water recycled. There are a number of water regulatory acts in place. This includes the Water Law (1959) and other water regulations developed over the past ten years that establish requirements for water supply companies, industries and agriculture.

Key performance requirements and initiatives to support efficient water use for 2010-2020 are summarized below.

**Table 4. Key performance requirements and initiatives to support efficient water use for 2010-2020**

| | |
|---|---|
| Domestic (including tourism) | • Compulsory water metering per customer<br>• Installation of automated, remotely operated water metering systems (new)<br>• Supply companies take full responsibility for lost water in the pipe–grid beyond 8% loss<br>• Large scale domestic wastewater treatment program that will be enlarged further (new expansion and upgrades)<br>• Increased provision of effluent (from treated domestic wastewater) for irrigation<br>• Significantly increased tariffs (new)<br>• Two-category tariff system to impose higher tariffs on heavier users<br>• Multi-media awareness-raising campaigns for conservation<br>• Separate monitoring and quotas for municipal gardening (new)<br>• Installation of a series of large-scale desalination plants |
| Agriculture | • Compulsory water metering per customer<br>• Supply companies take full responsibility for lost water in the pipe–grid beyond 8% loss<br>• An annual quota of water supplied<br>• Increased tariff with the long-term goal of charging the true cost of water (new)<br>• Several policies to encourage preferential use of recycled water for irrigation |
| Industry | • Compulsory water metering per customer<br>• Supply companies take full responsibility for lost water in the pipe–grid beyond 8% loss<br>• Improved policies to encourage the consumption of brackish and recycled water (new)<br>• Increased tariff with the long-term goal of charging the true cost of water (new) |

**Box 1. Desalination projects in Israel**

In the wake of Israel's water scarcity crisis, desalination plants have been and will continue to be constructed to augment Israel's water potential. The Government has set an objective to reach 600 and 750 million cubic meter per year until 2013 and 2020 respectively. To mitigate negative environmental impact, a policy paper was published by the Ministry of the Environment in 2002 and complemented in 2010. These documents stipulate a set of requirements for desalination facilities, including reduction of solids, phosphorous discharge to sea, a ban on the discharge of organic material to sea from membrane rinsing, parameters for outfall pipes, monitoring and control.

*Waste management* [1]

The legislative framework for solid and hazardous waste management in Israel is based on a wide range of laws and regulations, including the Maintenance of Cleanliness Law and the Collection and Disposal of Waste for Recycling Law. The following are examples of waste recycling targets for producers:

- Deposit Law on Beverage Containers sets targets for the collection and recycling of beverage containers by manufacturers, importers and retailers;
- Tire Disposal and Recycling Law sets graduated targets for the disposal and recycling of used tires by producers and importers and prohibits tire land filling after 2012;
- Packaging Law sets target for packaging recycling as described in 'Future Laws and Policies' section.

In addition, in July 2007, a landfill levy came into effect, which aims to reflect the true cost of land filling and thereby allow competition with advanced treatment methods such as recycling and energy recovery. Money collected will go to a fund for waste recycling development (more details are given in the 'Mobilization of financing section).

More recently, a precedential packaging law [22] has been approved. It deals with waste originating from packages from different materials and for a wide range of products (both household and industrial), including paper, glass, plastic and metal. The packaging represents 20% of total waste in Israel. The main target of the law is a recycling objective of 60% reduction in package related waste within 4 years.

*Energy efficiency* [31]

The Ministry of National Infrastructures has developed a set of regulations aimed at improving energy efficiency and a national plan for increasing the energy efficiency with the objective of decreasing electricity consumption by 20% by 2020. Also, the 10% target of renewable energy in the energy mix in Israel by 2020 was set by the Israeli Government supported by the respective program. To achieve this target, a set of energy efficiency performance targets will be promoted. One already implemented initiative is pertains to a regulation concerning maximum energy consumption for a household appliance (e.g. washing machines and air conditioning). A number of standards are under development such as energy efficiency in buildings, thermal requirements for windows, energy management for organization, installation of photovoltaic system.

*Green building* [32]

In 2005, a green building standard was set by the Standards Institute of Israel defining the requirements and criteria that can be given to buildings with inferior negative effect on the environment.

Yet, the popularity and adoption of the standard is low. Therefore, The Ministry of Environmental Protection has taken the lead in promoting Green Buildings in three major areas:

- Improving the existing standard and unifying all local authorities' privately initiated various standards into one standard, scaling four levels of environmental consideration (from the least considerate building into the best considerate building). The standard is due to be finalized by July 2011.
- Creating a green building market by financially aiding the implementation of green renovation and new building in several projects (See box number 1). Out of the budget designed for GHG emission reduction, above NIS 40 million will be allocated to the promotion of environmental building.
- Providing accessibility to information by raising awareness, conducting experiments which will measure the benefits of green building and professional training for relevant academic degrees and for active constructors and project managers.

**Box 2. Two pilot projects launched by the Ministry of Environmental Protection and the Ministry of Industry, Trade & Labor**

A renovation project examining the benefits of green retrofit (green renovation) in comparison to regular renovation will be carried out with the financial support of the Ministry of Environmental Protection and the Ministry of Industry, Trade and Labor. The renovation will include isolation and household appliance (e.g. air conditioning) aspects. The purpose is to monitor and compare mainly energy and water consumption between the two renovation methods in 4 climate zones in the country.

A similar project is planned for new buildings. In both projects the Ministry of Environmental Protection will finance the balance between regular building and green building.

*Clean transportation* [33]

To reduce pollution from vehicles, a national plan was developed in 2007 that includes, among others, the following performance requirements:

- Emission standards – Mandatory emission standards from smoke emissions from diesel vehicles and carbon monoxide emissions from gasoline-powered vehicles.
- Vehicles' emission Labeling – 15 groups of emission levels were classified and now every new car must come with a clear description of its emission level group.
- Annual test for emission level - Emission standards will be integrated as part of the terms for passing the annual vehicle test. The value standards will be according to the vehicle's manufacturer.

***Government activities aimed at improvement of the performance compliance***

*Enforcement* [1]

- Inspection of permitted installations and small and medium enterprises: Effectiveness of compliance promotion activities – To assure compliance with the conditions stipulated in the business license or personal decree, the MOEP has initiated a system of spot checks, beginning in 2001. The factories are divided into 3 relative pollution risk levels.
- Non-compliance responses – The objective of enforcement is deterrence and thereby pretension of environmental offenses. Enforcement in Israel takes a variety of forms, ranging from informal

actions such as discussions aimed at persuasion, to more formal actions such as administrative enforcement and criminal actions. According to the Clean Air Act, for example, legal offenses could result in fines up to NIS 800 thousand and even more if the felon factory does not pay the fine within 30 days. In case of legal claim, the court can rule a fine of up to NIS 1.2 million or up to 2 years imprisonment.

- Environmental inspection and enforcement bodies - Green police, marine and coastal inspectors, Israel police environmental unit, Yahalom (Diamond) unit, mobile air pollution unit, cleanliness trustees from the general public.

*Transparency improvement- Pollutant Release and Transfer Registers (PRTR)* [1]

- Israel began taking steps toward establishing a PRTR in 2009, in cooperation with the Manufacturers Association of Israel and public representatives. The target of a PRTR system is to establish and maintain an inventory of national emissions to the air, land and water and of transfer of waste from industrial and non-industrial sources as well as to distribute this information to the public with efficiency and accessibility.
- Screening of existing PRTR systems has been completed and the definition of the scope for Israel (including sectors, pollutants, threshold levels, legislative and administrative preparations) is in process. A draft of the proposed legislation on PRTR has been approved by the government and will now be forwarded to parliament for approval. A pilot study on the selection of an appropriate PRTR for Israel in which some ten plants representing different industrial sectors, including the chemical sector, will participate, has been completed. The system is expected to begin gradual operation in 2012.

***Mobilization of Financing*** [34]

The investments in Cleantech in Israel grew substantially in the years 2007-2008 and, as in the case of many industries and countries diminished in 2009 due to the global crisis and the Israeli venture capital crisis. Looking at 2010 it seems the industry is recovering – especially in the energy sector. The diversity in the Cleantech industry allows for investments by a wide range of financial institutions including venture capital funds, private equities, industrial companies and real estate investors. In 2010 a major portion of the capital invested was for first and second stage companies, a trend that clearly influences the industry's ability to expand and develop. This causes financial difficulties to a large proportion of the industry. One of the key solutions in assisting seed companies is the 'Incubators' plan which was initiated by the office of the Chief Scientist in the Ministry of Industry, Trade and Labor. In addition, many other efforts are sponsored by the Government of Israel to change this reality, as will be elaborated in the following section.

Leading Cleantech sub-sectors that attract most of the financing in Israel are energy and water/wastewater technologies and projects. The following diagrams show the amount of investment in the Cleantech sector over the past 4 years as well as a breakdown by Cleantech sub-sectors (not including projects).

**Figure 1. Investment in the Cleantech Sector**

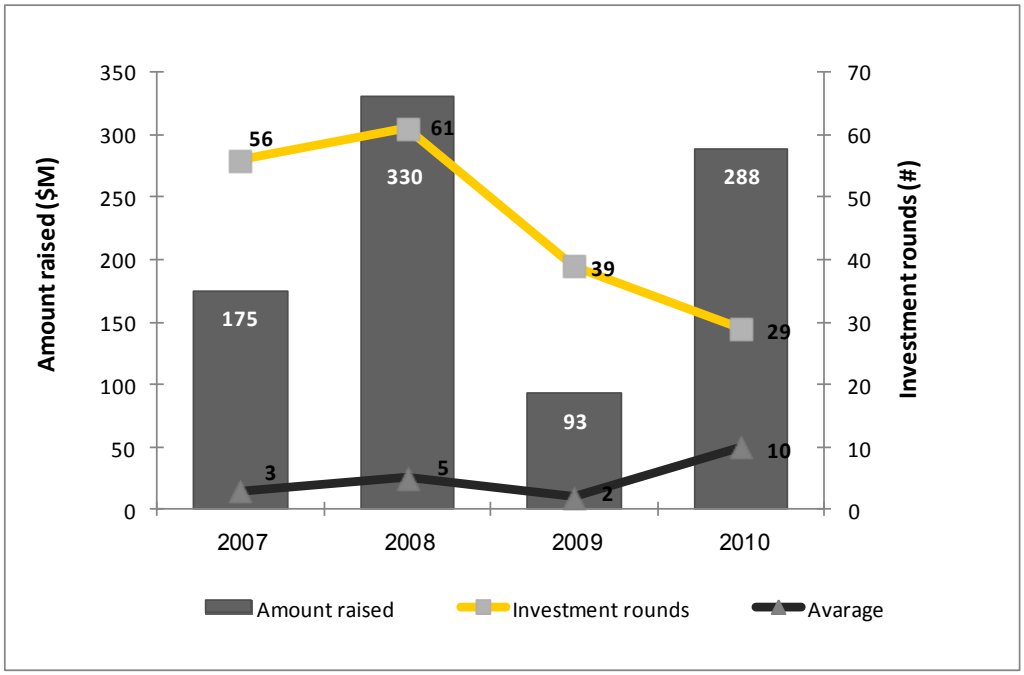
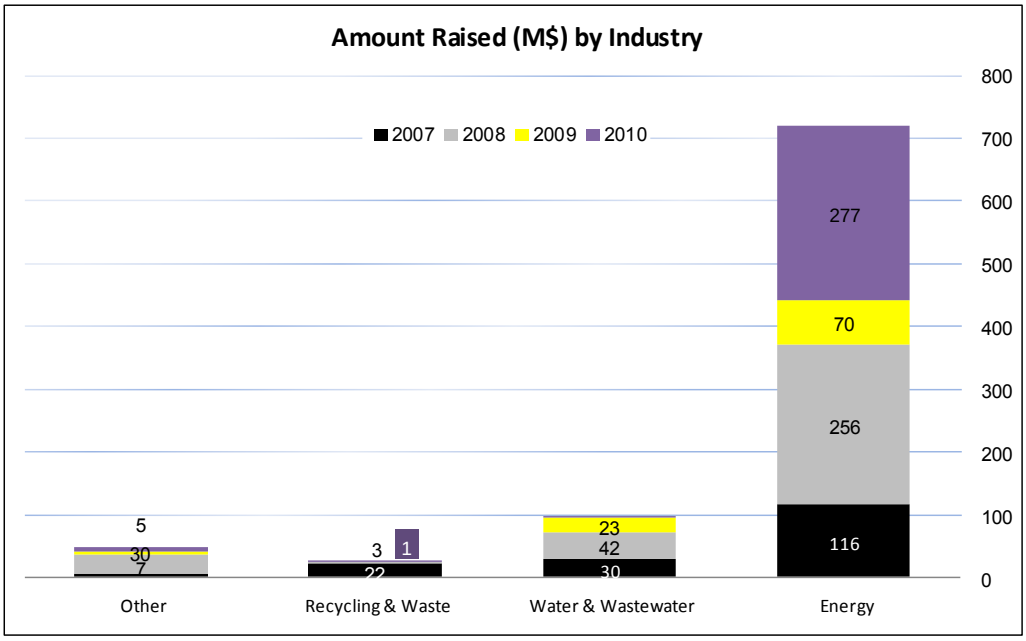



**Figure 2. Investment in Cleantech Sub-sectors**




However, there is a strong need for additional financial support of innovative technologies. Government takes action to promote investments in eco-innovations using different tools:

- Tax benefits;

- Feed-in-tariffs;
- Grants/project financing from different governmental agencies.

*Tax benefits* [35]

Investment support in Israel is governed by the Investment Law that enables companies to benefit from a corporate tax rate. In addition, companies located in priority areas are entitled to investment grants of up to 24%.

Recently an amendment of the Law of capital investments encouragement in the field of alternative energy was made. Local alternative energy technology providers now have more flexible rules to get benefits under the Law .Also an accelerated depreciation rate (25% per year) for investments in renewable energy research and development and in the manufacture of renewable energy equipment, or direct investments for the adoption of renewable energy technology by factories are in place. Energy efficiency technologies are also in the scope.

In addition to the Law there is a reduced tax rate for "green" transport. Starting 2010, a differential tax is imposed on vehicles, based on the "green index" published by the Green Tax Inter-ministerial Committee. The index is based on the pollution level of vehicles. It should be noted that all pollutants that affect public health and the environment are taken into account in comparison to European standards that take into consideration only $CO_2$ emissions. In addition, the purchase tax for a new hybrid car is only 30% of the car value in comparison to 83% for a regular car. Electric cars will have only 10% purchase tax.

*Feed-in-tariffs* [36, 47]

Economic incentive measures for renewable energy have been developed in Israel for the sale of renewable energy. A feed-in-tariff and licensing arrangements for solar, wind, biogas and biomass energy generation are available. Some types of the renewable energy sources are not covered by the feed-in-tariffs, however, it is possible to get a premium from Public Utility Authority – Electricity (PUA) calculated based on savings in GHG emissions. As of today total installed capacity of renewable energy sources is 69 MW including 24 MW from wind, water and biomass energy sources and 45 MW from solar energy sources.

There are a number of arrangements made by the Public Utility Authority – Electricity aimed at increasing the renewable energy generation in Israel. This is done by arrangements for electricity production from renewable energy sources. Below is a list of existing arrangements:

- Small photovoltaic arrangement for self consumption in a devalued tariff until 2016. Currently there is 50MW capacity installed, while the allotment is set for 200MW.
- Medium Photovoltaic arrangement for the "conduction grid" use in a devalued tariff until 2017. The 300MW allotment is set that is expected to be fully reached by 2014.
- Solar arrangement for the "conduction grid" that is still being decided upon. 600MW allotment is under discussion.
- Wind arrangement for the "conduction grid" in a feed-in-tariff that is still being decided upon with a 800MW allotment under discussion.
- Biogas electricity for the "conduction grid" in a feed-in-tariff that is still being decided upon with a 160MW allotment under discussion.

*Grants/project financing from different governmental agencies*

There are a number of incentives provided for Cleantech companies. The Ministry of Industry, Trade & Labor provides the following incentives for a broad range of Cleantech companies:

- Financial support to a consortium of two or more Israeli Cleantech companies for pilot installation abroad – the Government provides 50% of the project cost;
- Financial support to a cluster of Israeli Cleantech companies for marketing campaigns abroad – 50% of campaign costs and up to USD 50 thousand per company per project.

In addition, incentives aimed to find solution for specific programs are provided.

*Innovative water technologies* [37]

In addition to the NewTech and Watech programs described above, the Israeli Government has made a decision to provide financial grants to water corporations and local authorities for the sake of implementing beta phase products based on Israeli technologies. To manage the program, a new Jurisdiction Committee will be established according to a Government decision from December 2010.

In addition, the Ministry of Agriculture and Rural Development provides on-farm investment grants for installing drip irrigation and other water efficient technologies and enhanced water management systems.

*Waste management* [38]

In November 2010 the Ministry of Environmental Protection has announced that it will allocate 300 million NIS (82 million USD) to local authorities and private entrepreneurs for the support in establishing recycling factories and the production of clean energy from waste. The initiative will enable the integration of about 0.5 million residents in the waste separation process by 2013 and the recycling of 150,000 tonnes of household waste per year.

*Renewable energy and energy efficiency* [40]

In the context of the national plan to reduce greenhouse gas emissions adopted in November 2010, the Cabinet will take actions to promote new Israeli technologies and green construction. 114 million shekels will be allocated in 2011-2012, to support investments targeted at the reduction of greenhouse gas emissions in the industrial, commercial and public sectors.

In addition to that plan, there are a number of ways in which the Government provides support for renewable energy and more efficient energy consumption. This includes:

- Direct financing of projects, for example, support of the first solar village in the Negev Desert or a water pumping computerized control system at a water plant;
- Startergy fund - The Ministry of National Infrastructures has set a new start-up fund in the fields of renewable energy and streamlining energy efficiency. The fund will assist entrepreneurs who are looking to promote their product to proof of concept stage through financial participation of up to 62.5% of the authorized budget for the plan, or NIS 625 thousand (USD 176 thousand).
- Financing of pilot energy saving projects for governmental buildings and amendments of the Energy Sources Law to cover governmental buildings by energy efficiency incentives;
- Grants for replacement of equipment with more energy efficient equipment – as of now the initiative covers hotels where the Government provides financing of 30% of the project cost. Similar initiative for industrial enterprises is under negotiation. Another one for higher education facilities is under development;
- Energy survey grants – the Ministry of National Infrastructures provides grants of 30% of the energy survey if a company commits to implementing energy efficiency opportunities identified by this survey.

In the future a focus will be placed on reduction of residential energy consumption and a number of economic incentives will be implemented.

*Green transportation* [40]

An initiative to get old cars of the road was launched. The aim of the initiative is to get cars older than 20 years of the road in light of their high polluting impact. It should be noted that as opposed to a similar initiative in the European Union, the grant received after scraping is not dependent on buying a new car. Also, there are considerable benefits for LPG (Liquefied Petroleum Gas) and a new fuel mixture of diesel oil and water that reduces emissions by heavy vehicles.

***Market-based instruments***

There are no market-based instruments such as emissions trading exchange or water quality trading policies. Some of the elements have been implemented and much more needs to be done.

The Israel Cleaner Production Center [41] is an example of market-based instruments to promote eco-innovations. In 2001, the Ministry of the Environment and the Manufacturers Association of Israel established an Israel Cleaner Production Center for the purpose of accumulating and disseminating information on cleaner production issues and providing assistance to cleaner production programs. The Center's website features, among other things, a waste material exchange bulletin board which facilitates the reuse of waste components produced by one plant in another plant.

Some other pricing mechanisms that stimulate eco-innovation are described in the 'Mobilization of Financing' section.

*Procurement* [1]

Environmental criteria are currently incorporated into the public procurement of several products and services, including recycled paper and collection of waste paper and printers in Government ministries and their affiliated bodies. Furthermore, according to a 2008 decision, the Accountant General is expected to issue directives to encourage the purchase of products and services which are accredited by an environmental standard which is acceptable to the Environmental Protection Ministry.

In December 2009, a new Government decision entitled "Green Government – Operational Efficiency of Government Ministries" was issued. The decision aims to use the Government as an example of sustainable practices. It reflects the environmental commitment of the civil service to efficient management and environmental responsibility. The decision sets targets for Government ministries in three main areas:

- Reduced consumption of resources – water, electricity, fuel and paper;
- Reduced waste in the office;
- Increased use of recycled, environmentally efficient materials.

The means to achieving these goals largely include green procurement and behavioural changes by employees. Most importantly, the decision sets targets for the reduction of paper, electricity, water and beverage containers and calls for annual reports to both the Government and the public on consumption levels and steps taken to reduce consumption.

*Reciprocal Procurement Charge* [42]

The Authority for Industrial Cooperation, which operates in the Ministry of Industry, Trade and Labor, in consultation with the Accountant General, will regard investment in Israeli renewable energy technologies, for the matter of reciprocal procurement, as an amount that equals 200% of the investment.

***Awareness raising and training***

*Market transformation activities* [43]

The purpose of these activities is to increase public awareness regarding energy conservation. These activities present to the public the possibility of carrying out ordinary financial activities – such as the purchase of electrical appliances – in a manner which will lead to efficient energy consumption. Market transformation activities include the enactment of primary and secondary legislation; and advertising, instruction and demonstrations. In this area, substantive regulations have been enacted which are intended to bring about savings in the energy consumption of refrigerators, air-conditioners, and various types of electrical motors, pumps and boilers.

*Educational program for children and youth* [44]

Environmental education has been one of the five major targets of the Ministry of Environmental Protection. A substantial budget is dedicated to several projects aimed at supporting sustainable lifestyle and awareness-raising:

- Green Schools – Encouragement of sustainable lifestyle in schools through planned formal studies of environmental subjects as part of the schools' syllabus; reduction of the use of resources such as water and/or recycling waste; contribution to the community. In addition, certified green schools receive rebates for deriving expenses.
- Green kindergartens – Educating the young generation starting from kindergarten is perhaps the best way to assure absorption of environmental values. Here too the subject is addressed in the kindergarten's annual program and agenda. Also, there are community-oriented projects.
- Green campuses – There has been a focus on introducing environmental action at the academic, administrative and practical levels using the same aspects as in green schools.
- Training for sustainability – The Ministry of Environmental Protection has sponsored training sessions for teachers and teaching assistants, community activists and local authority employees.
- Education program on energy efficiency – a program for elementary school on energy efficiency was developed; similar programs for kindergarten and junior high school are under development.
- Educating for waste treatment – A large budget was allocated for the purpose of promoting recycling amongst citizens including reduction at source, separation at source and reduction in quantity of waste transferred for landfill.
- GLOBE Project (Global Learning and Observations to Benefit the Environment) – This international project, first initiated by Al Gore, is active in dozens of schools around Israel. The program is meant to help in developing an understanding of the human-environment interrelationships while performing research projects.
- Financial support – Substantial budgets are allocated yearly to non-profit organizations which dedicate all or part of their activity to environmental issues.
- Other projects – Educational program in the Israeli Defense Force; support in informal education; events and competitions for the promotion of environmental awareness such as a national cleanup day, a green globe award contest and more.

*Promotion of sustainable lifestyle* [45]

A wide range of initiatives are being implemented or planned for implementation by Government agencies, non-governmental organizations and the business sector. Following are some highlights:

- Sustainable Consumption Index – The Ministry of Industry, Trade and Labor (ITL) has initiated the development of an index that will examine lifestyle progress for sustainability. The intention is to monitor changes in consumer behaviour of households in Israel – reducing environmental pollution and consumption of non-renewable energy (e.g. degree of recycling, water use).
- Sustainable Lifestyle – Israel took part in an OECD Household Behaviour and Environmental Policy survey in 2010. The study analyses the determinants of environmental behaviour in five key areas in which households exert pressure on the environment: energy use, transport, waste generation, food consumption and water use.
- Guidebook on Sustainable Lifestyles – In 2008, the Ministry of Environmental Protection published a comprehensive guidebook on sustainable lifestyles. It provides the public with information on wise consumption and aims to enable individuals to wisely choose their patterns of consumption and to understand their potential effect on society and the environment.
- Energy Efficiency Improvement – The Ministry of National Infrastructures performs a number of initiatives to promote efficient use of energy in households. This include tips on how to be more energy efficient on TV or web-site (http://www.mni.gov.il/baityarok/), information campaign on stand-by losses, and distribution of energy efficient bulbs among population.
- Eco-labelling – Following a Government decision from 2001, the Ministry of Environmental Protection in coordination with the Ministry of Industry, Trade and Labor and the Standards Institute have initiated "eco-labelling". Products that will prove lesser negative impact on the environment, according to a professional committee, will receive a "Green Label" classification that will distinguish them from similar non-eco-friendly products. Many product categories have already been defined. In addition, there are other labelling schemes such as energy efficiency labelling. Also, In order to simplify the process, Israel has adopted two ISO standards of environmental labels and declarations.
- Clean Coast Project – The Ministry of Environmental Protection in cooperation with the Nature and Parks Authority and the Union of Local Authorities in Israel launched this long-term project in June 2005. The project seeks to promote a variety of solutions to the litter problem along the country's Mediterranean coastline, especially undeclared beaches. The program includes: routine cleanup activities by local authorities, enforcement against polluters of the coasts, educational activities in the country's schools and youth movements, information and publicity activities. An analysis of the results of the Clean Coast Program for 2009 demonstrated that annual average - 60% of the coasts were found clean 60% of the time.
- Country-wide Free Installation of Water Saving Devices – As part of the attempt to cope with the water shortage, in the beginning of 2011, 2 million devices will be distributed free of charge to households all around Israel, covering an estimated 40% of all households.
- Substantial Increase in Water Tariffs – The purpose of the new tariffs is to directly influence the water consumption of households.
- Campaigns for Awareness Raising – A number of major campaigns launched in the country focusing on the need to save water and the encouragement of recycling bottles. Another campaign was launched in January 2011 for a year, promoting sustainable lifestyle in five areas: wise consumption, with focus to food consumption, electricity saving, green driving, paper recycling and cleanliness in public places. The campaign's budget is NIS 20 million (USD 5.6 million).
- Sustainable Industrial Zones – The Ministry of Environmental Protection and the Ministry of Industry, Trade and Labor have initiated a program to transform selected old industrial zones into

sustainable industrial zones. The scheme proposes new zone planning and infrastructure changes that will influence the chain of production, including planning for integrated environmental management, energy conservation, water consumption, solid waste, wastewater, recycling and material reuse.

***International cooperation*** [46,1]

Israel has reinforced its efforts and strengthened its commitment to active participation in global and regional programs and agreements on behalf of the environment. Israel has adopted, signed and ratified almost all of the multilateral environmental agreements relevant to its area and situation and is an active participant in meetings of the parties. The cooperation is performed in several ways:

*Export of technology*

Israel promotes the transfer **o**f environmental technology in a wide variety of fields including:

- Water - desalination, purification
- Wastewater
- Industrial waste
- Clean air - reducing air pollution
- Consulting & engineering
- Control & monitoring devices
- Alternative energy - solar & geothermal sources

The Israel Export & International Cooperation Institute, supported by over 2,600 member firms, private-sector bodies, and the Government of Israel, is the key channel to promote Israeli environmental technological innovations abroad. According to the institute, Israel's present export of environmental technologies is more that USD 1 bin/year.

Also, technological transfer takes place via international exhibitions. Five international exhibitions have been held in Israel relating to environmental technology in the past 10 years. Another exhibition is due in 2011. The exhibitions feature some 200 exhibitors; attract over 20,000 visitors including foreign delegations.

*Contribution to knowledge and its expansion*

Israel participates in international networks whose for the purpose of increasing knowledge on issues of global concern. Israel has contributed its expertise to discussions at international meetings by holding side events and workshops on issues under decision. Israel joined this year's OECD survey concerning sustainable household consumption. Israel is part of MED-ENEC, a regional project funded by the European Union. It aims to increase the use of energy efficiency measures and renewable energy systems in buildings in southern and eastern Mediterranean countries.

In addition, Israel is a member of three International Energy Agency Programs in the field of renewable energy, through the office of the Chief Scientist in the Ministry of National Infrastructures.

*R&D cooperation*

International collaboration programs consist of multinational and bi-national programs. Each program includes a research stream focused on environmental technologies.

*Multinational programs*

Israel participates in a number of multinational R&D programs. Each program offers an opportunity for Cleantech companies to develop new environmental technologies. The following is the list of programs Israeli companies are involved in:

- A number of European Union initiatives including Eureka and the Seventh Framework Programme (FP7) and participation in a number of Cleantech projects.
- Bi-Lateral R&D programs are programs that fund Israeli companies collaborating with foreign companies. The program is active with countries that signed a bi-national R&D collaboration agreement with the Israeli Government, such as Germany, Italy, China, India.
- The Global Enterprise R&D Cooperation Framework is a program attracting prominent multinationals to forge investment cooperation deals with Israeli start-ups. The program is flexible by tailoring each agreement to the requirements of the multinational company. Government support provides opportunities for Israeli start-ups to gain access to multinational corporations, while international giants in turn gain access to innovative technologies.

*Bi-national funds*

Bi-national Funds enable Israeli companies to participate in joint R&D projects with foreign counterparts. Four funds are currently operating in Israel:

- BIRD (U.S.-Israel Bi-national Research and Development) generates mutually beneficial cooperation between the U.S. private sectors and Israeli industries. BIRD Energy provides specific grants for U.S.-Israel joint renewable energy developments. The projects are funded by the U.S. Department of Energy (DOE), the Israeli Ministry of National Infrastructures and the BIRD Foundation.
- CIIRDF (Canada-Israel R&D Foundation) promotes and supports collaborative R&D between firms in both countries.
- KORIL_RDF (Korea-Israel Industrial R&D Foundation) promotes and supports collaborative R&D between firms in both countries. The financial support for the joint R&D projects is divided into three categories - feasibility study; mini-project and full scale project.
- SIIRD (Singapore-Israel Industrial R&D Foundation) promotes, facilitates and supports joint industrial research and development projects between companies from Singapore and Israel
- BSF (the United States-Israel Bi-national Science Foundation) is a grant-awarding institution that promotes research cooperation between scientists from the United States and Israel. The BSF Energy Research grants support joint research programs in alternative and renewable energy, and in energy efficiency.

**Country synthesis**

The following synthesis is based on the OECDs report called 'Synthesis Report on National Policies to Support Eco-Innovation' published in October 2010.

Israel is a country with a proven track record for innovation in the high-tech industry, which heavily invests in R&D. The same approach is being taken in Promotion of eco-innovation and Cleantech. Thus, as in many other OECD countries such as Austria, Denmark, Germany and Finland there is a bias towards supply side instruments. Prevalence is given to R&D support, demonstration and commercialization of new technologies with most of money sent to R&D support. However, there is growing recognition by the Israeli Government that effective and efficient policies to support eco-innovation should also combine incentives to create markets for innovative products and services. Thus, the Government is investing additional efforts into awareness raising campaigns and environmental education. As in many OECD countries these are the most common demand side measures. The shift can be rationalized by the fact that Israel has recently entered the OECD and is oriented to the leading European practice.

As in many OECD countries a number of principal ministries are in charge of the policies to support eco-innovation. Similar to OECD these ministries are responsible for environmental policies, innovation and technology. As in many of non-EU OECD countries other ministries play an important role in the process. For example, the ministry which is responsible for energy and water strategies plays a key role in promoting eco-innovation including in households.

Similar to other OECD countries Israeli policy priorities are well reflected in eco-innovation focus.

Two topics are of particular importance to Israel:

**Energy independence** – Israel is dependent almost entirely for its energy on imported coal and natural gas. The national electricity system is isolated due to its geographical location and political situation. Existing stations are working almost at full capacity and energy reserves are very limited. Thus, promotion of energy efficiency and alternative energy sources are vital for the energy security of the country. As such, instruments that support production of renewable energy are the most advanced as in many of OECD countries.

**Water shortage** - Water scarcity has been a major issue of concern to Israel since its establishment in 1948, and accelerated population along with industrial and agricultural growth have placed additional pressures on Israel's limited water resources, in terms of both quantity and quality. Nowadays preservation of water resources is one of the major challenges confronting the country today. Water scarcity is exacerbated by the deteriorating quality of water resources due to demographic, industrial and agricultural pressures. Issues of water treatment are on the top agenda of the Government, unlike other OECD countries where water and wastewater pollution abatement are their top priorities.

Similar to many OECD member states with a small local market in the field of eco-innovations, Israel is an export oriented country with more than USD 1 bln/year of exported environmental technologies (according to the Israel Export & International Cooperation Institute).

Unlike many OECD member states, Israel has not suffered significantly from the recent economic crisis and public expenditures in the field of eco-innovation have remained at the same level. However, the slowdown of VC activity in the US did have a negative impact on the Cleantech industry in Israel.

Below is a summary of policies to support eco-innovation in Israel.

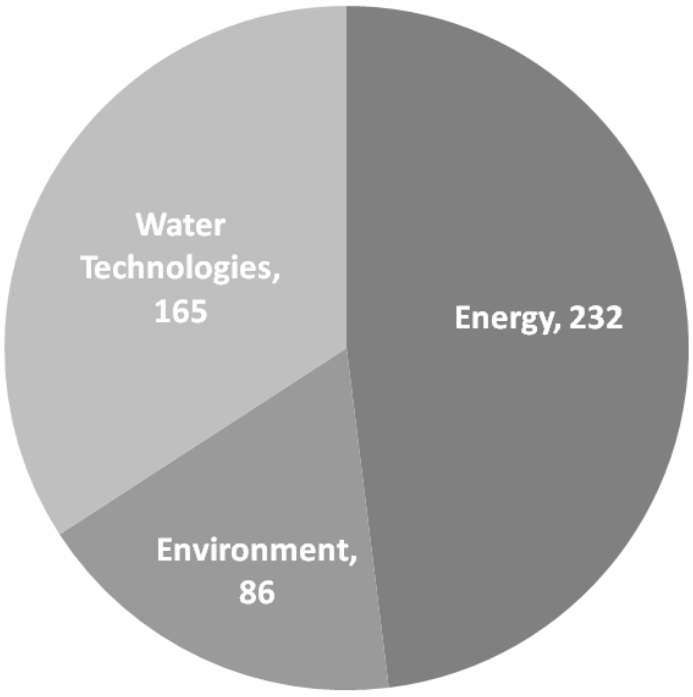
**Table 5. Summary of policies to support eco-innovation in Israel**

| | |
|---|---|
| R&D support | R&D grants from different ministries<br>Technology incubators<br>NewTech<br>Technology center of renewable energy in the Negev<br>WaTech |
| Technology verification | A technology verification center;<br>The program is at its initial stage |
| Performance standard | Air emissions: Clean Air Act<br>Water use and waste water recycling: a set of requirements for household, industry and agriculture<br>Waste management: Deposit Law on Beverage containers, Tire Disposal Law, Packaging Law<br>Energy efficiency: the National Plan for Increasing the Energy Efficiency, the National Plan for Reducing GHG Emissions<br>Green building: green building standard is under development, pilot projects<br>Clean transportation: Clean Air Act, emissions standards, vehicle labelling, annual tests |
| Mobilization of financing | Tax benefits<br>Feed-in-tariffs<br>Grants/project financing from different governmental agencies |
| Market-based instruments | Not developed yet |
| Procurement | Green Government – Operational Efficiency of Government Ministries<br>Reciprocal procurement charge |
| Awareness raising and training | Market transformation activities<br>Educational program for children and youth<br>Promotion of sustainable lifestyle initiatives |
| International cooperation | Export of Israeli cleantech technologies<br>Contribution to knowledge and its expansion<br>R&D cooperation (multinational programs, bi-national funds) |

**The Cleantech industry in Israel**

There are almost 500 Cleantech companies in Israel. The three major sectors in the industry consist of water, energy and environment (excluding companies in the Projects, Advanced Agriculture and Nanotechnology fields). The first reference in Israel to Cleantech companies and investors has begun in 2007, when initial venture capital investments were made. At that time the industry included well established Cleantech companies especially in the water field and a few start-ups in the renewable energy field. Throughout the years the investments lead to a substantial growth in the number of Cleantech companies, mostly in the renewable energy sector. Another increasing trend is the transition of high standard human resources from the hi-tech and life science industries to the Cleantech industry. The vast experience found in the Israeli technology industry is an essential component in strengthening the Cleantech industry, which depended on professionals with no experience in developing global companies.

**Figure 3. Number of Cleantech companies**




Source: Ernst & Young, IVC

The water industry is the oldest Cleantech industry in Israel. Its dominance developed accordingly with the limited water resources that exist in the country. The local demand has lead to the development of companies with various products, project companies, and international activities. One of the most renowned Israeli inventions occurred in the water dripping systems. The technology was created as an answer to efficient irrigation needs. Around this technology many companies were established, which later on broadened their activity into desalination and waste water treatment sectors. Although many companies are in products' sales phase, the market is relatively slow and limited. Venture Capital Companies invest

relatively small amounts in this market. The reasons for that are the length of time for a company to mature and the nature of the technological developments which generally relies on engineering improvements.

It is expected that the shortage in fresh water around the world will inevitably promote this sector in Israel as in other countries.

The renewable energy sector is the largest in terms of number of companies, scope of investments and development of innovation in Israel. The sector's relative proximity to the hi-tech sector accelerates its development. Solar energy is the biggest segment in Israel, in terms of number of companies and scope of private and governmental investments. Many local production units are being established in light of the feed-in-tariff benefit that has recently been initiated.

The environment sector includes various businesses such as materials, waste management, air treatment and monitoring, soil treatment, recycling and development of eco-friendly products. A large portion of the innovation in the environmental sector is in the engineering improvements, and in modern processes along with technological improvements made in existing applications. It seems most of the demand is derived from the local market needs.

The materials field which is the largest portion in the environment sector focuses mainly on the development of eco-friendly products, or materials that better exploit the efficiency of industrial processes. This field leans on vast knowledge that was accumulated in Israel in chemistry, nanotechnology sciences and others. The recycling field includes plastic, tires and various metals. Part of the companies develops new technology and other parts have applicable engineering knowledge. The recent legislation will surely promote this field. Waste management includes companies which develop technological solutions for sorting and treating solid waste. This market is growing both locally and globally. The companies in this field cope with difficulties in proving their technology and achieving the credibility needed in order to gain wins such as tenders. Air monitoring and treatment has been developed in the past few years in light of many regulations carried out worldwide and the Kyoto protocol. Yet the field is insufficiently advanced in Israel.

Many Cleantech companies have been established with the support of the government through R&D financing and cooperation with academia, as well as through marketing activities and global market exposure. In addition, a local market demand was created with the help of the government in the water and renewable energies sectors.

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