

**THE PANEL OF THE UNITED NATIONS COMMISSION ON  
SCIENCE AND TECHNOLOGY FOR DEVELOPMENT**

**9-11 November 2009  
Geneva**

**Implementation of new and emerging technologies in Israel**

**By Amnon Samid**

**The views presented here are the participants' and do not necessarily reflect the views and the position of the United Nations or the United Nations Conference on Trade and Development**

## Implementation of new and emerging energy technologies in Israel

### **Background:**

Israel is one of the world's leading high tech centers in many technological fields - agro-tech, hi-tech, nano-technology, solar energy, battery technologies, water and renewable energies. It has an extensive and well-developed technological infrastructure covering a wide variety of industries, supported by advanced scientific research and an outstanding spirit of entrepreneurship.

As in most of the developed countries, Israel is highly influenced by recent global trends such as global warming and volatile oil prices. However, due to the country's size, climate and geopolitical status, some local parameters apply with greater force:

- Need to expand the Israeli power generation capacity: Israel's per-capita energy usage increased by 44% since 1990 (for comparison: at the EU average per-capita energy usage increased by 15%).
- Israel has become more dependent on fossil fuels than ever before, while its energy intensity has not decreased.
- Israel has no electrical interconnections with neighboring countries, and must depend on its extremely low reserves to meet demand during peak hours.

As a result, recent governmental discussions and decisions have explored alternatives beyond the addition of natural gas (combined cycles) and clean coal power plants. For that matter budget for grants was allocated to support development of new technologies, and enhancing existing solutions, as well as supportive regulation has been initiated towards greener solutions and turning to clean energy sources.

In his speech last month at the 2009 Presidential Conference in Jerusalem, *Prime Minister Benjamin Netanyahu* stated as follows:

"...I would like to talk to you about one of the more significant matters on the global agenda: eliminating the world's dependence on fossil fuels... We all know the simple truth: dependence on oil endangers the world. It is a threat to our security, our economy and the environment. ....

Is Israel the country that will discover the breakthrough that will free the world of its dependence on fossil fuels? I believe so, because Israel has two significant resources that provide us with a good chance of doing so:

- We have the minds and the hearts.
- The capability, the will.

What I propose to do today is to establish a national commission comprised of scientists, manufacturers, engineers, businesspeople and government officials, with the goal of formulating a practical plan for efficient development in technologies and engineering in order to replace fossil fuels within the decade. I ask the minds and talents who are here, and around the world, to help.... Most of the world shares this interest. But Israel has a strong and clear interest in achieving this."

### ***Governmental activities:***

***The Ministry of National Infrastructures*** is responsible for developing and managing the energy and electricity marketplace. Its mission is to ensure the continuous supply of energy in the quantities and quality needed for the economy at the most optimal economic, social, and environmental cost, while preserving strategic sources of supply for the State of Israel, including supplies for emergency situations. The Ministry of National Infrastructures has announced a newly-stated goal to produce 10% of electricity from renewable sources by 2020. Reaching this target requires the construction of large solar and wind plants, as well as a mixture of small biomass and PV systems. Recently, the R&D division of the Ministry of National Infrastructures published two calls for proposals, one for research in the field of energy and the second for funding start-ups, enabling them to get closer to commercialization of their most promising energy technologies.

Historically, Israeli inventions have also made their way towards the renewable energy sector, with past and present giants such as Ormat (NYSE: ORA), BrightSource/Luz II and Solel (purchased lately by Siemens), spanning decades of global activity and encompassing thousands of installed clean energy megawatts. All those three industries were funded by the Israeli government, through the Ministry of National Infrastructures, in their early research stages.

The southern part of Israel was declared a renewable energy high priority district by the Ministry of National Infrastructures. A special regional Renewable Energy Authority was established, with the objective of promoting the area in terms of independent power generation (on a regional level) on one hand, and the area's socio-economic status (by attracting business and high quality workforce) on the other. The authority encourages entrepreneurial renewable energy activity, while striving to mitigate bureaucracy and create a friendlier business environment.

Aiming to achieve this ambitious goal of total regional energy independence in the Negev desert, 200MW solar power stations are planned near Timna in the Aravah valley, in the form of two 50MW plants and 5 to 10 smaller deployment initiatives. This program is aimed to feature a showcase of experimental cutting-edge solar power generation methods.

In addition, two major large-scale solar thermal projects are under way near Ashalim in the western Negev desert - one of the largest solar power projects worldwide. The Ashalim solar power project will comprise construction and operation of two thermo-solar power stations with a production capacity of 80-125 megawatts each, based on a Buy-Operate-Transfer (BOT) basis. A separate tender at the same site was issued for a photovoltaic plant with an installed capacity of 15MW with provision to expand by a further 15MW.

In addition to the solar advantage, Israel has the potential for up to 600 MW of wind energy. About 80 MW of wind facilities are already being planned to be established mainly in northern Israel. The most prominent wind facility to date has been the 6 MW Golan Heights Wind Farm, which is currently in advanced repowering expansion stages to 12.5 MW.

Israel's environmental legislation is managed by the **Ministry of Environmental protection**, covering the entire expanse of environmental issues, and uses all forms of legislative instruments - laws, regulations, administrative orders and bylaws to execute the national policy.

The **Ministry of Trade and Industry** is about to issue an RFP, calling upon local and international entities to establish a **Renewable Energy Technology Center**, which will be funded up to 50% by the Government. The Center will join forces with Israel's most highly skilled and motivated entrepreneurs in order to bring the world the next generation of leading renewable energy technology brand names. Besides, the Center will provide the following services:

- Test Site: setting up a site of at least 100,000 square meters for testing renewable energy technologies. Site will be made available to companies, institutions and others on a commercial basis.
- Academic Research: plan for collaboration with recognized academic institutions in Israel and abroad for joint research activities.
- Solar innovations Education Center: a non-profit arm that will provide a wide range of information to entrepreneurs and renewable energy companies, assist them in selecting required components and providing renewable energy education to people with engineering or exact sciences degrees.

Israel's pioneering use of renewable energy began decades ago with the nearly universal adoption of passive solar energy water heaters for domestic use. Israel is the per capita leader in this segment with over 80% of homes using solar water heating. Today, Israel has over 1.3 million solar water heaters producing the equivalent of approximately 3% of Israel's electricity consumption.

The Israel government's incubator program has traditionally supported the establishment and growth of high-tech startups in the country. Lately, increasing numbers of incubators have started to invest in clean technology companies, mainly purifying water and developing clean energy technologies.

43% of all renewable energy companies in Israel are in the solar industry. Within the solar segment, PV companies lead with a 31% share of the total, followed by thermo-solar companies (28%), solar power generation companies (28%), and PV cell technologies (13%). Biofuels follow the solar segment with a 24%, comprising biomass, gasification, ethanol and biodiesel companies. Wind companies account for 8% of the total, comprising power generation and wind turbine companies. Other technologies like geothermal, fuel cells, electric vehicles and energy storage comprise a small portion.

### ***Government policy regarding Solar Power plants:***

The Public-Electricity Utilities (PUA) determines a pricing policy aimed at encouraging clean and renewable energy generation. Under this policy, the Israel Electric Corporation will buy energy from solar power plants at a premium. The current feed-in tariff for solar thermal is as follows:

Plants with installed capacities of over 20 MW: 0.70 NIS/kWh (~18.5US¢/Kwh)

Plants with installed capacities of 0.1-20 MW: 0.87 NIS/kWh (~23US¢/Kwh)

Much higher feed-in tariffs are expected soon.

Israel Electric Corporation is obligated to buy from the plants all the energy generated

The policy allows for using up to 30% fossil fuel

Premiums are computed for a "clean enterprise", i.e. using no fossil fuel, which is priced separately. Rates are based on the production cost and are fixed for 20 years.

A year ago the PUA announced a new feed-in tariff for photovoltaic installations. The current tariff is 1.97 NIS/kWh (~52US¢/Kwh) limited up to 15KW for residential use and up to 50KW for commercial use. A 1.58 NIS/kWh (~42US¢/Kwh) tariff for larger-scale up to 5MW Photovoltaic plants (each) is expected soon.

### ***Developing new technologies:***

Israel totally reliance on imported fuel, which is directly concerned with energy security, must drive increasing support for research and development in the clean & renewable energy sectors. Some of the best minds in Israel's academic community are willing to be engaged in the search for renewable energy technologies. Seven universities, as well as several colleges and government R&D centers, are taking up the challenge.

Despite its small size, Israel offers a medley of climatic conditions, combined with the wide range of engineers and R&D specialists, many types of technology can be developed and tested. A sunny country such as Israel, much of the energy research is naturally focused on solar energy. Israel is pioneering the research on Solar Thermal next generation, including:

- High concentrating solar systems with the potential to deliver high-temperature heat - above 1000°C for most efficient production of electricity and fuels (syngas, hydrogen).
- Solar power generation via combined cycles with the potential of solar-to-electricity conversion efficiencies exceeding 30%.
- Solar fuels production via thermo-chemical processes promises solar-to-chemical energy conversion efficiencies exceeding 50%.
- Solar receivers capable of direct absorption of concentrated solar radiation incident through high-pressure windows and absorption of indirect heat transfer through high-temperature advanced ceramic materials.
- Solar thermo-chemical processes for the production of synthetic fuels, water-splitting, and reforming/gasification/decomposition processes for the thermal decarbonization of fossil fuels.
- Developing environmentally friendly, smaller, lighter, less expensive and more efficient solar micro-gas turbine.

The Israeli biofuel industry has been experiencing sophisticated development and conversion of advanced technologies into other uses. It is working on converting the spectrum of advanced agriculture techniques for producing the third bio-fuel generation, Algae Biofuels and more.

Water desalination: Israel is categorized as a desert country with a 300 m<sup>3</sup>/y per capita. Israel is already consuming 10% more water than its resources. Thus, the

filling up of this deficit is an absolute necessity. Israeli firms have developed technologies to improve solar radiation collection and to use the solar thermal energy to distil water directly via evaporation without generating electricity first.

Project Better Place: Launched in 2007 with \$200 million of venture funding, the company builds electric-vehicle networks to be powered by renewable energy. With the intention of supplying charging spots, battery switching stations and software that automates the experience all these three, Better Place claims to accelerate the widespread market adoption of renewable energy by creating new demand for it. With the dream of replicating this model worldwide, after being proven successful in Israel, Better Place plans to activate networks on a country-by-country basis with initial deployments beginning in 2011.

**Summary:**

Israel, which ratified the Climate Change Convention in 1996 and the Kyoto Protocol in 2004, does not currently have any binding limitation on its greenhouse gas emissions since it was classified as a developing country. Towards the new global agreement that will take effect as from 2013, Israel has initiated a number of steps related to both climate change mitigation and adaptation to prepare for the expected Copenhagen protocol.

Israel is blessed with creativity, advanced technology education, self defense need & experience and a combination of hi-tech and skilled people that produce many innovations. We'll savor and exploit the promise of innovation, and its potential for developing feasible renewable & clean energy technologies that will be competitive with the price of coal and fuel oil.

\* \*

My fellow attendees of this important conference - Let me add a personal note:

We need all to address the relationship between innovations & technology to national security. We must operate as a cooperative team trying to change the world toward freedom from our addiction to fossil fuels and take this unique opportunity to move the world towards a sustainable development.

The first step in my vision is to establish 'The Peace Smart Grid', which could start in Israel, as a geography and technologically focal point in the Middle East, connecting Asia – Africa - & Europe, while its implementation could serve as a catalyst for regional development that will lead to peace with its rational neighbors, and defeat the evil forces in the Middle East.

Thank you!



Amnon Samid

[amnon@OilAway.org](mailto:amnon@OilAway.org)

November 2009