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Innovation Industry & Science

The State of Israel –
Promoting and Securing Innovative Green Energy Solutions

- Arava Power Company – Eventful Year of New Projects
- Nation-E – Making Energy Cyber Security Affordable
- Shikun & Binui Renewable Energy – Green and Profitable Is Possible

THE JERUSALEM POST

EILAT EILOT Renewable Energy

Green building in Israel brings home renewable energy

Green building and renewable energy in Israel

Very quietly, without expending too much energy, hundreds of buildings are going up that are in the process of receiving green building certification. The Israeli green building standard No. 5281 validates the building's energy efficiency.

The field of green building in Israel provides opportunities for RE developers to streamline energy efficiency in buildings and turn them into energy producers. Green building and RE are two integrated fields aiming to create buildings that are healthier and more environmentally friendly.

Developers, let's build homes that produce energy themselves.

You're invited to take part- the future is in green building.

המשרד להגנת הסביבה

الوزارة لحماية البيئة

Israel Ministry of Environmental Protection

www.sviva.gov.il

Contents

***** All interviews, except Shikun&Binui or if else mentioned, were conducted by Uri Schlesinger

Dear Readers,
Dear Convention Participants,
Traditionally, there have been two sorts of occupation: the **White-Collar** workers who usually work in offices, a clean working area, and the **Blue-Collar** workers, craftsmen, who usually work outside offices in a 'dirty' working area.
In the last years a new sort of occupation has emerged, namely, the **Green-Collar** workers who are employed in occupations and endeavors that are related to protecting the environment. This new area of occupation requires low- as well as hi-tech skills. As such, it can offer occupational opportunities for both young beginners and experienced 'gray haired' professionals who could equally be men or women.
The world is changing... The internet and communication technologies as well as the cheap mass production, especially from the Far East, are changing the market's demand for occupations. Some occupations are vanishing and others, such as green-collar ones, are created.
Analysis of the employment data in Israel reveals that unemployed adults at the age of 45 and above are facing huge difficulties trying to return to the labor market. After a time, many of them are giving up, dropping out completely from the labor force and sliding into poverty. In the hi-tech industry, reemployment chances for those aged 45-plus are far lower compared to the whole population.
The "How is life 2013" report published by the OECD showed that the percentage of Israeli women living below the poverty line is the highest among the OECD countries. The percentage of men is the second highest. Furthermore, the report revealed that 30% of women and 25% of men in Israel are living below the poverty line.
These days the Israeli Knesset Members and Ministers are voting for the country's budget for the year of 2015. Yes, we have disproportional security challenges in Israel, but also an unbearable security budget. Security is an important necessity but not the essence of life and living.
Essential is to offer equal employment opportunities and quality of living to all the citizens of the State of Israel.
The first step towards overcoming the security challenges should be primarily directed towards improving and upgrading our relationships with our neighboring countries, or at least reaching a realistic status quo with them.
Furthermore, taking into consideration all the data presented above, one would expect that the Israeli politicians as well as regulators will join efforts to encourage, and not hinder, the Green Industry in Israel, and by doing so, contribute to improving the quality of life and standard of living of the citizens of the State of Israel...

Yours,
Dipl.-Kfm. Uri Schlesinger
Editor & Producer - Eshel Initiating Production & Editing

Responses, suggestions, comments and enlightenments:
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Dear Readers,
Dear Convention Attendees,
Welcome to all the participants of the sixth Eilat Eilot Green Energy Conference!
Never a dull moment! The price of solar energy has been drastically reduced, and the pace of solar projects being installed all over the world is increasing rapidly, though in Israel the regulator has not released quotas that will allow Israel to meet its goal of 10% renewable energy by 2020.
True, challenges exist such as storage, regular 24/7 supply of electricity and development of "smart networks"-- methods of electricity flow management -- but these continue to develop. And in a country like Israel with so much sunshine, we should be able to reach the point of producing all the electricity required during the day and lower power loads at peak hours.
At present, about 700 MW of solar energy have been installed in Israel; 64 MW in the Arava. In another one to two years, we should reach production of 150 MW in the Arava during daylight hours, which is equal to 100% of Eilat and Arava daytime consumption. Our next big challenge is to increase daytime solar production and partially divert it for afternoon and evening use, thus achieving full energy independence in the area.
At Eilat Eilot, we have advanced the Capital Nature Technology Center, and today eight start-up companies are operating in the Arava. We have completed Stage 1 of an innovative laboratory center for research and technology companies, and we have established a Test and Validation Site for unconnected Internet technologies for Third World and disaster-affected areas.
In addition, we have turned solar fields into open tourist sites, creating 70 new jobs in the field and turning the area into an international training center. The International Youth Conference/Competition for green energy has become a byword for innovation, attracting the finest students from universities the world over who come to compete and experience the location and the field.
Our goal for 2020 is production of 400 MW of solar energy and 400 jobs, so we still have a long way to go.
At this conference you will learn about new global trends regarding smart cities and management by Internet of all aspects of energy production and usage; about the world of biofuels attempting to break through, versus the world of standard fuels; about the world of storage, security, possibilities of building modern life systems on unconnected Internet systems; and, of course, all the financing options and financial models that can support and lead the world's solar revolution.
We're happy to see that you, too, have not given up and are our partners in lowering greenhouse emissions, allocating profits among a wider range of investors and developers and facilitating clean and available energy to all inhabitants of the world.

Regards,
Dorit Davidovich-Banet and Noam Ilan
The Eilat-Eilot Renewable Energy convention founders and chairs

EILAT EILOT Renewable Energy

THE JERUSALEM POST Special Supplement

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Another Year and Still "Almost There..."

A busy year for Arava Power but no new PV projects on the horizon

By Jon Cohen*

PV remains slotted to play the dominant role in Israel's renewable Energy Mix, towards achieving the 10% renewable goal set by the government in 2009, and again in 2011, for the year 2020.

Numbers for 2014 show that renewables are off target for the 10% goal and slipping further and further behind. This is despite the fact that dozens of PV projects are in line, already advanced at substantial costs to developers, through to "eligibility for tariff permit"; projects capable of producing hundreds of megawatts of green energy within nine months from tariff permit. These projects are totally stuck. Quotas, and regulation, are still not in place. Developers are now entering the third year of sitting on the sidelines and waiting for the call back to work. This freeze has crippling implications on an industry that was established a mere five years ago.

Nevertheless, an Eventful Year for Arava Power

2014 was an eventful year for the **Arava Power Company**. Six PV projects were launched, and Ecoppia automatic cleaning systems were installed at Ketura Sun, already showing convincing results Five additional Ecoppia systems are now under construction. The Phoenix Insurance Company replaced Siemens as the second-largest shareholder in Arava Power. We are proud of the Phoenix decision to invest in us and are grateful to Siemens for five years of partnership. Construction of Ketura Solar (40MW) is well advanced.

We participated in and won the Supergas tender, adding numerous projects to our portfolio and to the Operations and Maintenance activity of Arava Power. Simultaneously, we deepened our penetration into the new field of cogeneration and announced our intention to play a central role here as we continue to develop our PV pipeline.

The Changes that are Needed...

However, no developer can comfortably survive a three-year freeze of the core business of developing solar projects. Our projects are ready to go, ready to meet Grid Parity tariff challenges. They are still collecting dust on the shelves of the PUA.

What needs to happen to transform "almost there" to "back in business" status? In truth, very little, and all totally achievable within the first quarter of 2015.

On October 15, 2014, the long-awaited and crucial government decision to issue PV additional quotas was passed. This decision was the vital preemptor to the call back to work. All that remains is to add content to the government's decision in three interdependent stages:

- Ongoing regulation needs to be published by the beginning of 2015. This process *must* ensure that assets accumulated by projects over the past years are maintained – licensing, rezoning, IEC slots, building

Ketura Sun - Ecoppia robots automatically clean panels daily

PV remains slotted to play the dominant role in Israel's Renewable Energy Mix, towards achieving the 10% renewable goal set by the government, in 2009, and again in 2011, for the year 2020


Ketura Sun - Ecoppia robots automatically clean panels daily

permits, and more. Millions have been invested in these accumulated assets. The PUA must address the need to maintain these assets when determining the rules of conduct going forward. PUA regulation will determine whether the industry makes a smooth transition into the Grid Parity Era or whether it is back to the Stone Age, whether projects will be built in 2015, whether developers and overseas investors will remain active in Israel or move to more rational markets abroad.

■ The Ministry of Energy must publish its updated Master Plan for Renewables now. It is a given that PV will be slotted to provide hundreds of additional megawatts, beyond the 340 megawatts quotaed in the recent government decision. It is another given that these additional hundreds of megawatts must achieve financial close by 2018 to participate in the 10% by 2020 goal set by the Government of Israel. Now is the time to make order, to announce PV quotas for the next three to four years to ensure that the goals are met and to ensure that PV fulfills its role in meeting these goals.

■ Thirdly, the Director Generals' Committee, proposed by Kandel, confirmed by government decision last month, must start work immediately. This committee has been established to ensure a smooth transition into Grid Parity and to dismantle numerous roadblocks, bureaucratic dead ends and unnecessary costs that distance developers from achieving fundable business models that meet the challengingly low Grid Parity tariff.

Numbers for 2014 show that renewables are off target for the 10% goal and are slipping further and further behind

Developers have prepared for Grid Parity tariffs. More output, lower costs are a pre-condition to survival at Grid Parity. The correct regulation, the announcement of PV megawatts to be quotaed over the coming three to four years, and pro-active measures to ensure a smooth transition into Grid Parity are all that is needed to ensure that the 2020 goals are met, and far beyond in the following decade, with a substantial and measurable benefit to the national economy.

Marching in Place

Basically, the situation has remained unchanged. The solar energy industry in Israel, which could have been well on its way toward fulfilling the goals determined, is marching in place.

Two years ago I stated in this same publication that "There are tens of projects that have been developed and are in place to receive tariff permit and financial close. The industry desperately needs additional quotas that would enable the deployment of hundreds of megawatts of green energy to the national grid."

Today, two years down the road, the message is identical, and the projects defined as "ready to go" are the same projects in exactly the same predicament.

* CEO of Arava Power Company.

Please visit our website: www.aravapower.com


Ketura Solar – 40 MW field under construction at Ketura: Clearing and leveling the site


Ketura Solar - Substation


Ketura Solar – First panels – October 2014

Israel's Energiya Global Greens Africa's Power

Implementing the spirit of the Start-Up Nation paradigm for changing the world

By Sara Halevi

Managing Director Chaim Motzen put two years of sweat equity into the project

Rwanda's President Kagame and Start-Up Nation guru Saul Singer greeting co-founder Yosef Abramowitz

The Rwanda Green Power Initiative

Twenty eight thousands solar panels, on trackers, follow the sun on sloping, green hills at the Agahozo-Shalom Youth Village, located about 60 kilometers east of Kigali, Rwanda's capital. The commercial-scale solar field, the first of its kind in East Africa, increases the country's generation capacity by about six percent and heralds what could be a new era in power generation for the continent.

This new initiative to launch solar fields in Africa and throughout the developing world comes from the founders of Israel's **Arava Power Company**. **Chaim Motzen, Managing Director of Energiya Global and of Gigawatt Global**, shepherded the groundbreaking 8.5 MW project from concept to completion in record time. The solar field provides a quadruple bottom line: a steady double-digit return to investors over 25 years, an environmental benefit, a humanitarian benefit (fees from 25-year land lease are going to the orphan village), and the initiative strengthens Israel's offering to African countries.

"The human race bears a moral and practical imperative to provide power for all, while also transitioning from burning fossil fuels to harnessing renewables," said **Yosef Abramowitz, CEO of Energiya Global** and one of the pioneers of the solar industry in Israel. "Israel can be a leader in providing renewable solutions and we are pleased to partner with the Overseas Private Investment Corporation (OPIC) of the American government and other multilaterals to provide 100% financing for these initiatives." Abramowitz has been named as one of the six leading Green Pioneers worldwide by CNN, and received the "Person of the Year" award from the Israel National Energy and Business Conference.

Over 1.3 billion people around the world live without electricity; 600 million of these people live in Africa. While the demand for energy grows exponentially, the price of burning diesel, coal and fossil fuels becomes increasingly more costly, both financially and environmentally. While we sit today on the precipice beyond which climate change will be irreversible, a significant re-thinking of energy generation and oil-dependency is paramount.

The Rwanda field, also a flagship project of the US Government's Power Africa initiative, brought together an international consortium of financing partners. Debt was provided by FMO (Netherlands Development Finance Company) and EAIF (Emerging Africa Infrastructure Fund); mezzanine debt provided by Norfund (The Norwegian Investment Fund for Developing Countries); equity from Scatec Solar ASA (who also served as EPC contractor and serves as O&M provider), Norfund and KLP Norfund Investments (a vehicle jointly owned by KLP, the largest pension fund in Norway, and Norfund). Grants were received from the United States government via the OPIC's ACEF Grant and from EEP. Norton Rose Fulbright served as international legal counsel.

The field will earn a healthy return and is a strong model for impact investment for institutions and private equity investors to follow. Chaim Motzen, co-founder of Energiya Global said about the Rwanda project, "We hope that our project proves the viability of financing and building large-scale solar fields in sub-Saharan Africa. And that this initiative serves as a catalyst for many more future sustainable energy projects in the region."

Start-Up Nation and Social Responsibility

Energiya Global embodies the Start-Up Nation paradigm that actively exports the expertise in technological advances that Israel is known for to every country in the world.

At Energiya Global we believe the time has come for the Start-Up Nation to grow into a superpower for social responsibility. Through impact investment and the development of industries of goodness we can utilize our vast resources to change the world.

The final product sits proudly on a hillside — a testament to progressive thought and good will

Harnessing the Sun to Produce Alternative Energy

Megalim will use BrightSource cutting-edge technology to efficiently harness solar energy

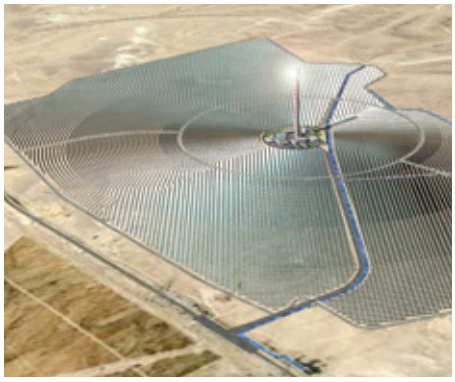
SOLAR POWER MEGALIM

Very soon, heavy construction equipment will start to prepare the 3.15 square km. land near Kibbutz Ashalim for one of Israel's most innovative energy endeavors. Three partners -- **BrightSource**, **Alstom** and the **Noy Infrastructure Fund** -- have won the government tender to produce 121 MW by using concentrated solar power [CSP] technology. For this purpose, the three partners established **Megalim Solar Power Ltd.,** which will plan, finance, build, operate and maintain the power plant throughout a concession period of 28 years and then transfer the ownership back to the State of Israel. The project, which combines BrightSource's advanced solar field and power tower technology with Alstom's experience in turnkey power plants and key power equipment, is scheduled to come online in 2017. We met with **Eran Gartner**, the newly appointed **CEO of Megalim**, to learn more about this unique and promising project.

Eran Gartner, CEO of Megalim

Could you describe the process of harnessing the sun?

The Megalim project in Ashalim will feature BrightSource's concentrated solar power tower technology similar to that used at the Ivanpah project at the Nevada/ California border. More than 50,000 computer-controlled heliostats (mirrors) will track the sun in two axes and reflect sunlight onto a boiler at the top of a 240-meter high tower. When the concentrated sunlight strikes the boiler, it heats water in the boiler to create superheated steam. This high-temperature and pressure steam is then piped from the boiler to a steam turbine to produce electricity.



Rendering of the solar field

How will such a large project be financed?

Bank Hapoalim and the European Investment Bank are the leading lenders to the project. Both of these entities have supported the project throughout its development and now into the realization phase.

The costs of the whole project are estimated to be around NIS 3 billion, including the construction and 25 years of operation.

What will your contribution be to the electricity economy in Israel?

The Megalim power station represents about 1% of Israel's installed capacity of over 13,000 MW. The Solar Thermal power station will generate enough power to meet the electricity needs of more than 120,000 homes. The station will be connected to the national grid, and our main customer will be the Israel Electric Corporation. As such, we will help in reaching the 10% target of supplying the country's electricity production from renewable sources by 2020.

What will such a project contribute to national employment?

The project will provide hundreds of new jobs in the Negev area. During the peak time of the construction phase, it will provide approx. 1,500 new jobs for engineers, technicians and other workers. During the operational phase, the number will be substantially reduced to about 45 permanent staff, but it will continue to provide employment positions in the region and offer the usual multiplier of economic opportunities that such projects bring about.

What is unique about the solar technology used by Megalim?

BrightSource's technology produces energy similar to traditional energy facilities -- by creating a high-temperature steam turbine. However, instead of using fossil fuels or nuclear power to create the steam, BrightSource utilizes the sun's energy. BrightSource uses advanced software to operate a field of mirrors, called heliostats, which reflect the sunlight onto a solar water heater at the top of a tower, which produces steam at high temperature and high pressure. The steam then flows to conventional energy facilities and produce clean, cheap and reliable energy.

As a green project, what is being done to preserve the ecosystem?

Much effort has already been made at the planning stages to take all environmental aspects into account, be it preserving wildlife or the natural landscape. Instead of the extensive land grading and concrete pads used by other competing solar technologies, BrightSource is installing mirrors on poles that are placed directly into the ground and allow the construction of a solar field by the natural contours of the land and indirect areas of sensitive vegetation. This design also allows for vegetation to exist alongside the solar field.

Could You describe the tower's architecture?

A significant architectural competition was held for the design of the 240-meter tower. It will be a monument that is designed to reflect its own surroundings. The materials chosen for the tower will reflect light from the sky or, if you go closer to the tower, the color of the sand and the rocks. It's going to be like a natural sculpture.

To summarize, what is the uniqueness of this project and what is planned next?

One of the elements is its large scale. Another unique point is that we are bringing Israeli technology together with international technology back to Israel. The next phase of CSP will include energy storage. BrightSource and Alstom are working, in tandem with the project, on the development of such a solution.

Yaron Szilas, CEO of Shikun & Binui Renewable Energy (Photography: Rami Zarnegar)

The New Pioneers

Shikun & Binui Renewable Energy is realizing innovative national projects that assist Israel get closer on the road of being energy independent

Realizing Ben- Gurion's dream in the Negev: The photo-voltaic field at *Sde-Boker*, which was connected to the national electricity grid in February, 2014. Similar projects are already operating at *Hatzerim* and *Timna*, and additional projects at *Nevatim* and *Ein-Hashlosha* are under construction. (Photography: Eagle Aerial Photography)

The pioneering thermo-solar facility at *Ardom* – The facility that was inaugurated in 2012 adjacent to *Yotveta* is intended to demonstrate improved thermo-solar technology that was developed by Shikun & Binui Renewable Energy. (Photography: Rami Zarnegar)

Building the Future...

Shikun & Binui Renewable Energy has taken on the challenge presented by the Government of Israel and is taking part in implementing the targets set by the Israeli Government - to increase the portion of clean electricity generated from renewable energy to 10% of the electricity generated in Israel, by 2020. The Company, which is part of the **Shikun & Binui Group** is a leading player in the Israeli solar market. Currently, Shikun & Binui Group is active in approximately 20 countries, on 4 continents, in a wide variety of construction and infrastructure projects, including the construction of hydro-electric power plants in Guatemala, and large scale roads and bridge projects across Africa.

Leading in Renewable Energy

Yaron Szilas, CEO of Shikun & Binui Renewable Energy explains "Shikun & Binui Renewable Energy engages in initiating, planning, constructing and operating facilities for generating electricity and holds and operates a wide range of solar projects in Israel and Spain. Our professional teams possess extended knowledge and complex technological capabilities, including both technologies that are currently being applied in commercial projects and future technologies that are being explored. In the thermo-solar field, the Company constructed and operated a demonstration facility, which is the first if its kind, in the *Ardom* Industrial Zone, adjacent to *Yotveta*. Concurrently, the Company is progressing with two mega thermo-solar projects, one adjacent to the *Kibbutz Tzeelim*, and the other adjacent to *Moshav Ashalim* in the Negev."

In the photo-voltaic (PV) field, the Company is advancing projects that generate electricity using solar system on industrial buildings, public and business institutions and on designated lands. To date, the Company has constructed small and medium photo-voltaic facilities, in a scope of approximately 30 MW, which have been connected to the national

grid, and it is currently constructing facilities with an additional scope of approximately 23 MW at *Ein Hashlosha* and *Nevatim*.
"Alongside the activity in the photo-voltaic projects and the thermo-solar energy field, we are currently examining additional fields of renewable energy, and aiming to continue initiating projects in Israel and around the world."

Ashalim: A Green Power Plant in the Negev

The thermo-solar power plant at *Ashalim*, in *Ramat Hanegev*, is the first BOT (Build Operate Transfer) project of its kind in Israel for the construction of a thermo-solar power plant using the parabolic trough technology, and it is one of the largest of its kind in the world. The facility, which has a total production capacity of approximately 110 MW, will provide approximately one percent of Israel's electricity consumption.
In June, 2013, Negev Energy, a company owned in equal parts by Shikun & Binui Renewable Energy and Abengoa from Spain, won the tender to finance, construct, operate and maintain the power plant, following tender proceedings that lasted several years. The electricity that is generated at the facility will be sold in its entirety to the Israeli Electric Company, through a 25-year agreement. The project, with a projected investment of approximately 1.1 billion dollars, is expected to be constructed by 2017. The construction of the project is being handled by the EPC division of Shikun & Binui Solel Boneh, along with its Spanish partner.
Szilas says, "The *Ashalim* project exemplifies all of our strengths and advantages as an entrepreneur, builder and operator – we are taking part throughout the entire course of the project, including the design and the financing. The technology which shall be used in the project is similar to the parabolic trough technology which we demonstrated at the *Ardom* facility."
"The project is currently in the midst of the financial closing stage, and preliminary works have begun concurrently on site. I expect the *Ashalim* project will significantly contribute to the development of the Negev.

Dr. Navot Bar, VP Business Development, Shikun & Binui Renewable Energy (Photography: Rami Zarnegar)

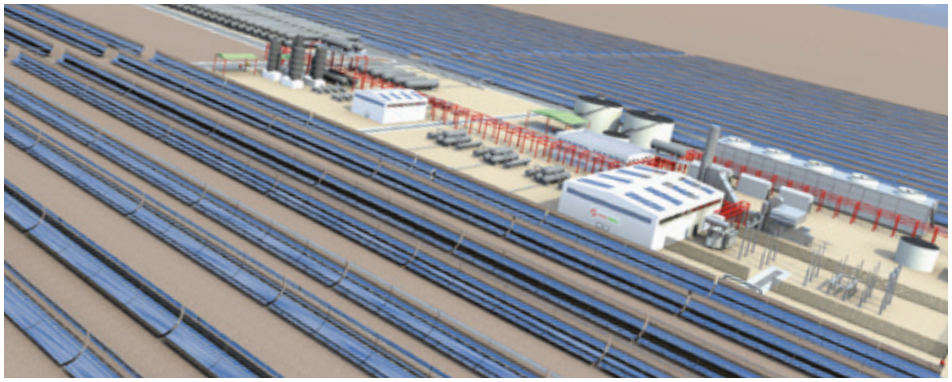
In the framework of the project hundreds of employees shall be employed during the three years of construction, and dozens of direct employees will be employed throughout the duration of the facility. The first circle of employees will include engineers, technological staff and operators, to be subsequently surrounded by additional circles of suppliers and service providers."
"We believe that the impact of the *Ashalim* project, as well as additional projects we are advancing and examining in the area, in *Kibbutzim* and *Moshavim*, along with international and local partners, will contribute to the acceleration of the regional development, to the development of infrastructures, and to economic growth and prosperity, all in addition to and alongside the direct benefits of generating green and clean electricity."

New Pioneers in Israel and Around the World

In his "Significance of the Negev" speech, in 1955, **David Ben Gurion** foresaw the Jewish ingenuity, science and research skills that would make it possible to "utilize the Negev's vast solar energy", "utilize the force of the winds to create electric force", as well as to "desalinize the seawater inexpensively" and "prevent waste of the small amounts of rainwater in the dry desert".
Szilas says, "Ben Gurion was a man of vision, and today, 60 years later, most of us already understand that it is important to preserve the natural resources, everywhere in the worlds – because the impact on the environment and on our quality of life is global. We at Shikun & Binui Renewable Energy are proud to be part of a group of new pioneers, in the Negev, in Israel and around the world."

Business with Values…

Dr. Navot Bar, **VP Business Development, Shikun & Binui Renewable Energy** says, "The State of Israel's decision to redistribute the sources of energy and to promote renewable energy projects coincides with our sustainability vision and with our business goals. For us, **taking the environment into consideration is not philanthropy – it is part of our business activity**. We prove, on a daily basis, that it is possible to be both 'green' and profitable."
"Creating and maintaining a dialog with stakeholders i.e.: partners, authorities, residents, and others, is a guiding value of sustainability and of our activity, and helps us reach understandings that advance our projects, and contributes to thriving partnerships with local entities, as we turn dry barren land into a source of life and energy. The attitude of involving the stakeholders is environmental both ecologically and from a human-social perspective, as it is important to us that everyone benefits."



Electricity from solar energy – Imaging of a solar panel field – The first BOT project in Israel of a parabolic trough thermo-solar power plant. The project is carried out in cooperation with Abengoa, Spain, a leading company in the global thermo-solar field. (Imaging)

A Stakeholders involvement meeting at *Ein Hashlosha* – Members and children of the Kibbutz where the Company is constructing a solar project were invited to a session together with Company personnel to discuss the impact of the project on the lives of the residents. Creating and maintaining a dialog with all of the stakeholders is part of the principles of sustainability. (Photography: PR)

Energy Cyber Security Needs to be Affordable...

NATION-E
WHERE POWER GETS SMART®

Our motto is to complete and not to compete – we are opening doors to all integration possibilities with the big IT infrastructure companies

One of the most interesting endeavours in the Israeli hi-tech landscape is **Nation-E**. We met **Daniel Jammer, the Founder, President** and driving force behind this entrepreneurship, to learn more about the essence and future perspective of this company.

How Did it All Get Started?

Nation-E started in 2010 with the idea of integrating energy storage from all energy sources. Nobody would have expected that energy storage might come online and would be part of the network. During that time, I discovered many interesting phenomena. One of them was that energy storage was completely underestimated. It is high tech, not low tech. It was the first time that energy was connected to software and to a smart grid. At that time, we developed the first round energy system – one that connected all kinds of energy sources together with energy storage, smart energy management, dynamic SCADA [supervisory control and data acquisition] and infrastructure that enabled communication with all the grid components.

With our way of thinking, we have been ahead of the market. Maybe it was too early to commercialize the product, but it was not too early to learn what the market will need in the future. Already at that time, we understood that communication is an essential part of an energy system and that all the components of this grid have to communicate efficiently with one another. It was a different language that people didn't understand. We were ahead of our time. It was very hard to understand how far behind the market was. Over the last years, this gap has closed.

In version I and II of our product, we integrated four or five different kinds of energy assets and made proof of the concept. During that time we started to hear, for the first time, the term 'Cyber Security.' At that time, it was only connected to the IT sector. It was more about data stealing from banks. We knew that energy was becoming digital and that cyber security would also enter into the world of energy. At that moment in 2010, I decided that this was our market niche that would differentiate us from other companies and that our company needed to become **The World's First Energy Cyber Security Company**.

What Are the Major Components of Your Solutions?

Our package of end-to-end solutions aims at protecting the critical energy infrastructure from cyber attacks. Our **Energy Firewall** virtualizes physical energy assets and enables data acquisition, network management and cyber security. It connects all the energy assets via our Energy Cerebrum to our proprietary energy network and establishes a secure communication channel between them.

Daniel Jammer, Founder and President of Nation-E, meets PM Benjamin Netanyahu

One Energy Firewall can communicate with up to 1,500 energy devices. Our **Energy Cerebrum – SIEM** aggregates data from multiple energy sources as well as devices and utilizes machine learning algorithms to establish baseline grid and energy behavioral patterns. It provides energy data analytics, event management and NOC [network operations center] integration. The heart of our solutions is based on the **Energy Cyber Security Center (ECSC)**, which is an advanced systems integration and testing facility. It offers a holistic approach of testing new smart grid architectures, as well as solutions, and is supported by our proprietary energy cyber security software platform. Our ECSC helps our customers to achieve their energy security and business continuity goals for their critical infrastructure by assuring an uninterrupted and reliable supply of energy. As the market and the world of energy cyber security are very dynamic, this center also operates as our R&D site to find answers for future risks.

Let me give you an example: If a device in an energy network is cyber attacked and broken, the system automatically disconnects it from the whole system. The device will be reconnected only after we ensure that it is safe.

All of our intellectual property is protected, from the beginning, by patents. Over time, we integrated into it new claims of security and cyber security. Currently we own 25 patents.

Could You Describe the Business Strategy of the Company?

From the beginning we knew that it was impossible to build a new company that would compete against the giant IT infrastructure

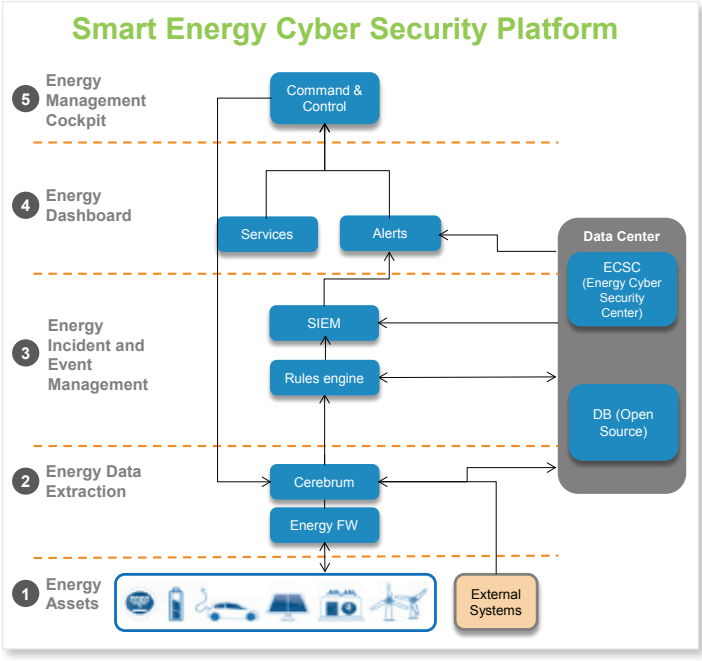
providers. As such, we understood that our business goal was to integrate and complement energy cyber security into the infrastructure solutions of those big companies.
Our motto is **to complete and not to compete** -- never to compete against existing infrastructure. On the contrary, to open doors to all integration possibilities with the big IT infrastructure companies. As I see it, our software must be a part of an existing IT infrastructure. It should make existing software better, more efficient and safely integrate the highest level of energy cyber security into it. All of this with the highest product quality, efficiency, state-of-the-art technology and, most important, price sensitivity for our customers.

Which Leading Market Players Have Already Chosen Your Technology to Complement Their IT Infrastructure Solutions?

We signed a big agreement with IBM and expect that many of their customers will integrate our solutions into their IT infrastructure. We are also negotiating with many other market leaders. Currently, our solutions are implemented in many financial institutions all over the world -- these institutions prefer not to reveal any information. We are working closely with San Diego Gas &Electric company/ California, with ConEdison in New York and many others. In Israel we are working with the domestic utility of the city of Haifa, with IEC and more. Our biggest and most important integration was in Brazil at the 2014 World Cup. We were chosen to be one of the leading companies in the area of the energy cyber security field. We managed everything very successfully. Based on the positive impression that we made, we hope to provide our services at the World Cup in Russia, as well as at the next World Cups and in other big events.

What Is Being Done to Preserve Your Position as World Leader in the Area of Energy Cyber Security?

We initiated the first energy cyber security round table discussion that took place on Dec. 2, 2014 at the Ritz-Carton /Herzliya Pituah. Prominent guests who lead the communication, security and energy industry from all over the world were invited. Among them **are Dr. Gal Luft**, who is an adviser to the United States Energy Security Council; **Rami Efrati**, who is the former head of the Civilian Division of the Israel National Cyber Bureau in the Prime Minister's Office; **Jim Woolsey**, past director of the CIA, and many others...
At this event, we discussed subjects such as future unforeseen risks, possible solutions, insurance possibilities, education needs, how governments and institutions have to interact with each other concerning energy security and much more...
This round table is part of a dynamic process of continuously learning and improving that we undergo and which we believe will enable us to offer updated and better products.



Nation-E process workflow

How Do You Expect to Compete with Cheap Products from the Far East?

I personally have a vast industrial background and experience, and so do the other managers in the company. We are expecting competition, and I think that competition is good. I think that it is good for our people to learn to be better on a daily basis. Everything in business includes the following parameters: quality vs. price vs. demand vs. guarantee. As a young and very dynamic company, we emphasize quality, price competitiveness and investing resources in R&D. All this should enable us to keep the high level of quality of our products, as well as increase our products' price competitiveness in the future.
Every market is price driven. We worked for many years in order to understand what is the best and the cheapest approach for our customers to integrate our products. It is clear to us that the most important thing is that security needs to be affordable...

Where Do You See Nation-E in Five Years?

From 2015 to 2020 the market is going to be very dynamic. It is expected that from 2015 until 2020 many government funds and regulations will drive the implementation of those technologies. We anticipate that by 2020, about 50 billion energy cyber security units will be integrated in entities all over the world. Therefore, I believe that by 2020 our company will have revenues in the vicinity of $1 billion per year.

Rio de Janeiro, 28th of August, 2014.

To
NATION-E

Subject: **Confirmation of Participation**

On behalf of the 2014 FIFA World Cup Brazil Organizing Committee I hereby certify that Nation-E presented as a world leader in Cyber Security Energy presented through the PdC protocol (Concept Test) excellency in the capacity of their monitoring system, analysis and detection alerts system installed in the camera control room at the International Broadcast Center (IBC, Central TV Compound in Rio de Janeiro during the 2014 FIFA World Cup Brazil.

Due to the tight schedule, only a limited Concept Test was possible, focused on the IBC with the following technical components: Nation-E`s Cerebrum CCU, Nation-E`s Secure Communications Gateway and Three Phase EFR Meter. The data extraction capacity and monitoring of the system and the guaranty of secure access to allow remote connectivity in real time of the monitoring system 24/7 and data analysis was shown.

As well as the resource mentioned above, Nation-E was able to provide remote data analysis of the information collected from this unit.

In this opportunity, we inform that no other advantages besides the use of the results of the system were obtained by LOC Security.

HILÁRIO MEDEIROS
Security General Manager
2014 FIFA World Cup Brazil Organizing Committee

2014 FIFA World Cup Brazil Organizing Committee certifying that Nation–E was presented as a world leader in Cyber Security Energy

Millennium Electric T.O.U Ltd.
www.millenniumsolar.com

Company Profile

Founded in 2000, Millennium Electric T.O.U. Ltd. is a PV manufacturer and world leader in the field of PV and PVT solar technologies. The company provides EPC service – building, operation and maintenance of solar PV/PVT power stations and has installed about 68 MW worldwide. Millennium has an annual PV production capacity of 400 megawatts for PV mono/poly crystalline high-efficiency panels

Technology

Millennium Electric T.O.U. Ltd. has developed three unique PV technologies:

- The MSS (Multi Solar System) - PVT (PV & Thermal) collector, which enables up to **30% more** PV electrical production than the usual PV system and **four to five times more thermal energy as hot water.**
- The MSS Co-Generation Power Station – combines solar PVT electricity with steam electric turbine from the PVT collectors. **Twice the output for the same $/w investment.**
- Light foldable PV panels, 100-500 WATT, with 19% to 22% efficiency using graphite bus and laser -- carved light lamination-coated cells glued on light sheet **•~30% less panel production cost •~26% reduction in fully installed system cost •~40% less in installation-related costs.**

Atari 1 Mega Schneider Electric, Italy

Key Projects Around the World: Total 68 Megawatts Installed

- Installation of 31 PVT systems in Mitzpe Klil, Israel – 1992. The largest and first PVT in the world. Still working perfectly after 22 years!!!
- Installation and supply of 1.2MW, 600 homes in Germany – 2005.
- Installation of 30KW PVT systems in Stuttgart, Germany – 2005.
- Installation of 200KW roof system for a packaging plant in Battipaglia, Italy.
- Installation of 500KW in Benevento (Motefalcone), Italy –2007.
- Installation and supply of 21MW to D.Engineering station in Pusan, Korea.
- Installation of 50KW PVT grid-connected power station at Kibbutz Yakum, Israel and 400 small systems of 30-600 KW, with Arch solar, all over Israel.
- Installation of 30KW MSS PVT grid-connected power station for Kibbutz Ma'agan Michael, Israel – 2010.
- 34KW MSS PVT grid-connected power station for Ness Ziona, Israel and 50 KW MSS PVT for Kibbutz Malcia.
- Supply and EPC of 13MW to Italy, last quarter of 2010: Rome 705KW; Sardinia 2,500KW; Livorno 900KW; Piacenza 1,000KW; Verona 1,000KW; Milan 1,170KW; Caserta 1,000KW; San Marino 1,000KW; Cascina 994KW; Genoa 1,102KW; Syracuse 1,356KW.
- EPC for 3 MW station together with Schneider Electric in Italy.

Korea 21 Megawatt

Maagan MSS PVT System

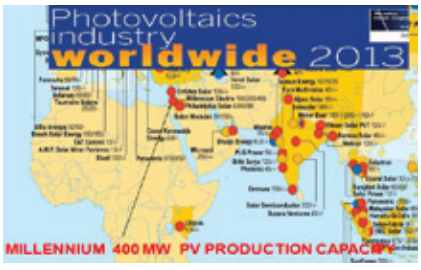
Yakum MSS PVT System

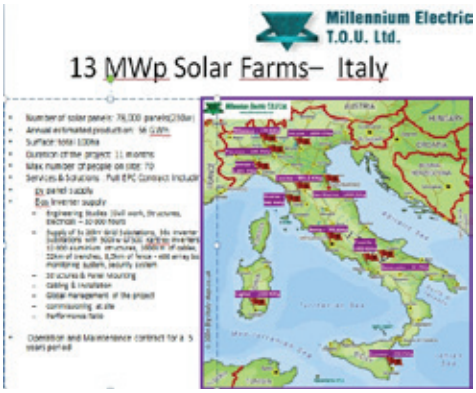
Kelil Village 31 Families MSS PVT System

Company Financials and Manpower
Revenue: $10 million -- $250 million.
Employees: 5 – 1,000 outsourcing per project.

179 Namir Ave., Tel Aviv ■ P.O.BOX 48466, Israel 6148401
www.millenniumsolar.com ■ Info@millenniumsolar.com

Millennium Projects World Wide





Thinking Out of the Box – Saving Electricity

Unique and creative solutions for saving electricity; Looking for strategic partners to distribute MILA's products in target areas

Moshe Frumberg, at the MILA Frumberg Ltd. offices

The modest office located in south Tel Aviv does not reveal the knowledge, creativity, capabilities and range of electricity saving solutions offered to **MILA Frumberg Ltd.** client's. **Moshe Frumberg, the company's CEO**, has been a renowned expert in the field of electricity and electronics since 1964. Over the years, he has gained extensive experience in developing solutions that deal mainly with the operation and control of electronic systems, as well as the ability to provide solutions that meet the special needs of his customers.

Unique Aspects of the Company

The company's name is MILA, Frumberg explains, which is an acronym of the company's main expertise: Israeli laboratory for development of electronics (in Hebrew: *Ma'abada Israelit le'pituah electronica*).The company's uniqueness is attributed to its non-schematic approach and its bespoke solutions adapted to customers' needs and requirements.

"If it is impossible to adapt a system to the customer's needs or to a special site, I'll develop a new system that meets the requirements. All solutions offered by the company are tailor made, like a made-to-measure suit for a specific person," says Frumberg.

Identifying the Needs and Characteristics of the Clients

Frumberg says, "Upon receiving an order from a client, we take a tour of the client's site and perform an examination of all existing electrical systems on location. These systems and the way they operate are examined, along with the amount of energy used at all possible nodes. We asses the overall picture of the existing systems and then we suggest where electricity-saving improvements can be made. The solutions offered to the client are tailored to what we've seen onsite."

When possible, systems previously developed by the company will be adapted and deployed. If not possible, a new system will be developed.

A system developed for a customer

Significant Electricity Savings in the Israeli Air Force

Frumberg says, "The Israeli Air Force uses systems that produce a 400 Hz frequency needed for ignition of fighter jet engines or examination of equipment. Production of the required frequency is done by an electric engine that operates a generator. Systems must be available 24/7 despite the fact that actual use is only about three hours per day. Thus during most of the day, the systems operate needlessly, using a great deal of energy and causing damage to the power network as well. The solution I designed disconnects the system half an hour after cessation of activity. This method not only saves millions of shekels in electricity costs, but it also prevents the mechanical wear and tear on the generator. Over the years, I have received many letters of appreciation from the IAF for my contribution to electricity saving and system optimization."

Potential Savings in Underground Parking Lots and Hotels

According to Frumberg, it is possible to save up to 85% of the electricity saving in underground parking lots in which 200 to 300 light fixtures are installed, by installing presence detectors combined with controllers. The same with hotels and guest houses, where guests forget to turn off lights and air conditioning. Presence detectors allow systems to disconnect when no one is in the room, enabling electricity savings of about 80% in air conditioning and about 40% in lighting.

Currently in Development: Electricity Systems in Supermarkets

Frumberg describes how one day he entered a supermarket near his home and felt a cold blast of air from air conditioners. These were operating at full power and were set to 16 degrees. He suddenly had the idea of developing a system. When the system identifies a small number of people, the controller will raise the temperature or disconnect some of the air conditioners. Every degree, stresses Frumberg, equals savings of 5% in electricity consumption. The system is in its final stages of development and is currently being tested in couple of supermarket shops in Israel.

The Company's Clients

"Our clients," says Frumberg, "are large institutions such as the IAF, IDF, Israel Police, Ministry of Construction and Housing, Ministry of Defense, Migdal Capital Markets, the Open University, Union Bank, the Association for the Wellbeing of Israeli Soldiers, etc." These clients operate out of large office buildings with a large number of rooms and air conditioners. Consequently, any amount of savings is financially significant. For example, the installation of detectors in one of Union Bank's management buildings led to 40% savings in electricity usage.

Strategic Partnerships

"Based on our extensive experience with large institutional clients in Israel, we invite large organizations abroad to contact us so that they too can benefit from significant electricity savings. In addition, we're looking for strategic partners for target areas such as Europe, North America, Africa, and the Far East to distribute our products and provide service in those locations," says the CEO.

For further information, contact Moshe Frumberg at moshe074@gmail.com

Mevo Carmel Industrial Park: **A Unique Location with Quality of Life**

Nissim Efraim, CEO of Mevo Carmel Industrial Park

The new Mevo Carmel Industrial Park is designed and managed according to values that are consistent with environmental protection; It offers cleantech and hi-tech innovators and industrialists from Israel and abroad the opportunity to take part in the park's entrepreneurial spirit and enjoy a range of residential options in the area

The science and industrial park **Mevo Carmel** is located at the northern tip of Highway 6, in the Megiddo Regional Council, near Tut Junction. The park is a joint initiative of four neighboring authorities: the Megiddo Regional Council, the Yokneam Illit Municipality, the Daliat al-Carmel Local Council and the Isfiya Local Council. **Nissim Efraim, CEO of Mevo Carmel Industrial Park**, explains that the park's unique ownership structure integrates the rural, urban and minority sectors.

Another distinctive aspect of the park is its location. Developed specifically in a central area, the park is a short distance from development centers, academic and research institutions, health centers and hospitals. It is located halfway between Central Israel and the Galilee. The completion of Highway 6's infrastructure, as well as the Haifa-Beit She'an railway, will strengthen the accessibility to the park, which is now in the advanced stages of infrastructure development.

The park's area slated for industry includes 550 dunams and 45 plots. Of these, 22 plots have already been sold to local and international companies and developers. Efraim estimates that initial building permits will be allocated towards the middle of 2015, and the first facilities will be functioning in 2016. The remaining 23 plots will be up for sale at the beginning of next year. Plots will be sold via tenders of the Israel Land Administration in conjunction with Mevo Carmel, the company that manages and develops the park.

A strategic decision made by the park's administration allows only industries that are committed to environmental protection and protection of the quality of life of surrounding towns to be established in the park. This means that the park is designed according to international standards of environmental protection, bringing substantial added value to industrial plants, hi-tech industries, cleantech and local and international real estate developers.

Recently, the area was designated as an A class national priority area, which grants preferred conditions to developers who meet the Investment Center's criteria, such as refunds on investments, reduced company taxes and tax benefits.

Advantages of Mevo Carmel Park

- The park is conveniently located at the intersection of Highway 6 and Highway 70 (five km. east of Yokneam), making it accessible nationwide from north to south.
- The park is within commuting distance of many areas: five minutes from Yokneam, 30 minutes from Haifa, 40 minutes from the Krayot, 45 minutes from Tel Aviv, 50 minutes from Nahariya, 60 minutes from Karmiel and 35 minutes from Nazareth.
- The park is accessible from Ben-Gurion Airport (45 minutes away) and from Haifa Port (30 minutes away).The Emek railway from Haifa via Beit She'an and up to the Jordanian border crossing increase opportunities for transporting merchandise to Arab countries.
- The park is close to development, academic and health centers.
- The park and Its location enable's the accessibility of green energy sources. The Israel Electric Corporation's Hagit power plant which operates on natural gas is its main energy source. The natural gas pipeline that passes in proximity to the park will enable connection to a clean and inexpensive source of energy.
- The park's central location makes a wide range of high-quality and inexpensive manpower available for hi-tech, as well as traditional industries. Transportation for workers is planned to and from the train station and nearby towns.
- The park and its location offers diverse quality of life residential options for developers and employees in surrounding areas such as Megiddo, which is a UNESCO-recognized biosphere reserve, the city of Yokneam, the kibbutzim as well as the moshavim.

The Design Concept

- The park offers plots from 4 to 15 dunams for industry, hi-tech complexes and start-ups.
- The park will include a 35-dunam commercial avenue for shopping, employment and businesses.
- The park will comprise open public areas and green belts around the facilities and roadways. During work hours, the park will serve as an industrial park. After hours, it will be an entertainment area for the surrounding towns that are partners in its establishment. Plans include playgrounds, bicycle trails and more.
- Building and environmental management plans ensure businesses a unique work environment that will impress local and overseas clients with its contemporary design and ability to blend in with its natural surroundings.

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mankal@mevoe-carmel.co.il

The Challenge of Securing Critical Infrastructures

Check Point SOFTWARE TECHNOLOGIES LTD.

"Check Point's primary activity is to protect from cyber threats: We are working with our customers to prepare for the next generation of attacks"

Alon Kantor, VP Business Development

The campus and HQ of **Check Point** are located on a side street in the center of Tel Aviv. The modest appearance of the building does not reveal the enormous task that the company's **CEO, Gil Shwed**, and his fellow founders committed themselves to 20 years ago. Namely, to protect and secure the world's cyber traffic from any malicious cyber attack. One of the more demanding challenges is to protect sites known as critical infrastructures, such as power generation facilities. To learn more about the state of critical infrastructure attacks and what is being done to protect such facilities, we met with **Alon Kantor, VP Business Development**, who is an expert in this field.

What Are Some Damaging Critical Infrastructure Attacks?

The most damaging attack on critical infrastructure is known as the 'stuxnet' virus, which occurred in Iran a few years ago. This attack affected the operational ability of the centrifuges and was aimed directly at the critical infrastructure facility. The attack didn't affect the IT surroundings like a usual malware does. This attack demonstrated how cyber and software malware can compromise the physical infrastructure, and that damage is not limited to computers and data as one might assume. Furthermore, this attack affected networks that should have been entirely separated from each other and probably surprised the operators of those networks, who thought such an attack was not possible. As a result of this attack, we see an increase in understanding and awareness around the world about the importance of security for critical infrastructures.

Concerning Critical Infrastructure Security, What Shift of Mindset Has Been Seen in the Last Years Regarding Old Facilities, as well as Smart Grid and Internet of Things?

Most of the critical infrastructure sites and devices – e.g., power stations, traffic control systems, water treatment systems, and factories -- were designed under the assumption that they were not vulnerable or targets for cyber attacks. So security was either minor or entirely neglected. Most of the security was only physical security. The location was physically secured: guards, fences, as well as physical separation between a site's operational and production areas. Since cyber attacks on such sites have been perpetrated, we now see an increase in awareness and a fundamental need for cyber security to correspond to the physical security. Smart Grid and Internet of Things create more complex security aspects because by nature they are spread all over, and physical security is different for such devices. They are much more vulnerable to all kinds of attacks because the end devices -- i.e., the smart meters -- are installed in the homes and are spread all over. It is not possible to put a guard on each end device.

Power station (INGIMAGE/ASAP)

How Should Entities Prepare Themselves, and What Is the Role of Check Point?

I think the first and most important thing is awareness. Awareness of the risks and the implications of cyber security. Awareness leads to preparing a risk assessment concerning critical infrastructure activity and then to weighing the risks and deciding on a plan of how to implement such cyber security.

We have a service that is called Security Checkup, where we map security issues and risks and then provide suggestions for relevant security solutions. A solution should be multi layered, based on several layers of security, starting from the network base until the end points.

Education is also an important part of security. This is to ensure that the employees and operators are aware of the risks and know how to securely operate the site. We know that the human factor is critical for any security failure.

What Kind of Special Products Have You Developed for Such a Special Challenge?

In the past few years we have developed many products that are specifically designed for critical infrastructures; for example, many SCADA [supervisory control and data acquisition] protocols that are used in critical infrastructures. We have also developed IPS signatures for intrusion prevention on critical infrastructures which are focused on vulnerabilities that are relevant for a specific area. In addition to this, we provide network segmentation at a specific network layer as well. We also hardened our devices to an industrial grade, which allows our product to work under rough environmental conditions – e.g., in the desert and manufacturing rooms.

What Is Unique about Check Point Solutions for Critical Infrastructure?

We are world leaders in cyber security and offer comprehensive protection to our global customers that have critical infrastructure entities. At Check Point, we monitor events of the most sophisticated attacks, and we track information about vulnerabilities, as well as all kinds of cyber attacks all over the world as they materialize. We base our developments and solutions on our vast database of information that is updated on a continuing basis.

Our critical infrastructure offering is based on this extensive experience and on feedback that we get from our customers. We have a team of developers that add more protocols and more signatures every day. These are being added dynamically to the products, and our customers benefit from the ongoing updates.

Revolutionizing Bulk Energy Storage

Seeking strategic partners in the Far East

We met EnStorage's **CEO and cofounder**, ***Arnon Blum PhD.,*** and **CFO**, ***Ori Shachar***, at the company's HQ. The office doesn't reveal the revolution taking place behind these walls. Blum and Shachar agreed to share with us their insights and plans.

What Is a Flow Battery and How Is it Unique?

This technology enables the separation between the Power and Energy elements of the battery. Power could be compared to the engine of a car and energy to the fuel tank. In a normal battery those two are packaged together. A flow battery decouples these elements enabling customization based on customers' needs, e.g., for a given power how much energy, or working hours, is needed. Hence, flow batteries fit usage profiles of cases where many hours of storage are needed.

Where Was the Technology Developed and at What Stage Is it Today?

The core technology was developed at Tel-Aviv University. The core technology employs hydrogen bromine. Over the years EnStorage scaled up the technology from a lab trial to a commercial product. EnStorage's system consists of an electrochemical energy conversion device and two storage tanks. The power rating (kW) of the system is based on the energy conversion device's size, and the energy rating (kWh) is based on the storage tanks' size. 9 patents protect the accumulated know-how.

What Is the Advantage of Your Flow Battery Over Other Storage Solutions?

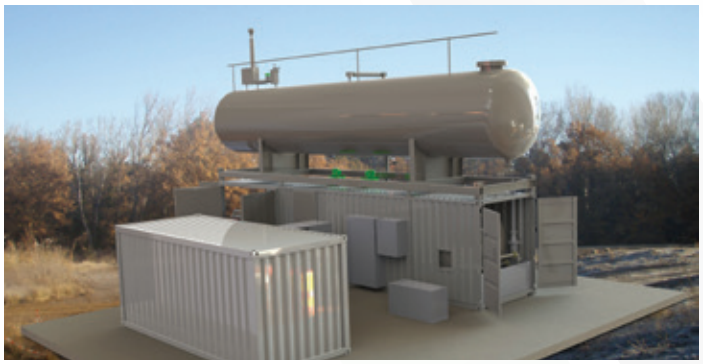
The main advantage is cost. EnStorage targets bulk energy storage projects, mostly by renewable energy developers. These developers are sensitive to energy production costs as they have to compete with the traditional energy producers. We provide a cost-effective energy storage solution which enables them to maintain a balanced supply in low production hours.

Could You Estimate the Current World Market for Energy Storage?

The worldwide market is estimated in the billions per year with a high CAGR. California, for example, has mandated the adoption of energy storage and many states are following that example.
The German government is subsidizing home owners' energy storage. With the increase of renewable energy deployments worldwide comes the realization that these solutions will hit a glass ceiling. Creating the ability to supply energy 24/7 is a necessity for this industry.

Could You Mention a Couple of Samples Where Energy Storage Breaks the Glass Ceiling?

There are numerous cases that reflect this, for example, storing electricity during nighttime and using it during peak times when prices are higher. The deferral of investment in new transmission lines is another example. Building or upgrading such lines is very expensive and localized energy storage can postpone or cancel such large investments.



EnStorage's Commercial System

Have You Already Installed Your Commercial Product?

We are currently in the process of building our first commercial systems. Our first system is being built in France and is the product of a commercialized agreement with AREVA and Schneider Electric to deploy the FlowBox, a 150KW/900KWH module.
A second sister system is being built in the US to be deployed in Texas. This endeavor is supported by the American BIRD Foundation.

Where and What Kind of Strategic Partners Are You Looking for?

Having secured deployment partners for Europe and the US, our current focus is the Far East, especially India and China. EnStorage is looking for **either** *Financial Partners* that would finance projects or storage infrastructure **or** *Technical Partners* that would manufacture the system in the Far East based on our core technology. They would also deploy the system and provide the O&M services. Such strategic partners should have a solid financial base and proven technological and engineering skills.

What Is Your Long Term Challenge?

Our main challenge is the constant drive to lower costs and increase efficiency. Lowering costs and increasing efficiency enables our customers to compete successfully and us to increase our volumes.

EnStorage's Technology Demonstrator

Please visit our website: www.enstorageinc.com

CAPITAL NATURE
INVESTING IN GOOD ENERGIES

Shirley Sheffer, VP Investments, Capital Nature

Green Energy Technology Trends

Capital Nature is looking for outstanding and innovative entrepreneurs in the field of Green Energy

By Shirley Sheffer*

Capital Nature is an investment firm focused on incubating and accelerating early stage Green Energy ventures in Israel. As such, we keep close tab on all that is happening in the space both in Israel and globally. I've selected to mention four of the major interesting trends that we expect to continue over the next couple of quarters.

The Merge Between Smart Grid and Traditional IT Technologies

Israeli entrepreneurs traditionally bring much IT innovation, along with track record of IT success stories. Many of these technologies represent some of the missing building blocks in the Smart Grid infrastructure. Technologies like cyber security, big data analysis, computer image processing, IOT, sensors, and networking while traditionally considered IT, are crucial in new Smart Grid deployments.

Solview, one of our portfolio companies, is a good example for companies active with such a solution. It is a computer imaging company that provides canvassing capabilities for automatic rooftop energy potential assessment based on Google maps and alike. The company lowers customer acquisition costs for installers. Solview's solution has pilot installations with several of the leading installers in the USA.

China Is Aggressively Addressing the Clean Energy Game

Environmental hazards in China created a growing interest by the Chinese government in green and renewable energy technologies. Last year was the first ever that China invested $56 billion in renewable energy, which is more than the whole of Europe together. China is also taking a lead in other clean energy measures – solar PV manufacturing, wind turbine deployments, and EV innovations.

And here in Israel, this year we saw more than ever Chinese delegations visiting the country, actively and aggressively seeking new technologies.

Whereas in the past the Chinese focused on later stage companies with field proven products – we (at Capital Nature) now see a willingness to explore and be introduced to technologies that are earlier stage as several important Chinese groups have demonstrated an interest in our portfolio companies.

Energy Storage – Solar After Dark

In 2013, in Arizona, 280MW Solana Generation Station, provides up to six hours of power after the sun goes down, using molten-salt tanks. In Nevada, a large 110MW Crescent Dunes Solar Energy Project provides 10 hours of molten-salt storage. In Japan, Toshiba Corp's recently announced 40MW lithium-ion battery project. These are some of the first projects of utilizing storage in solar deployments.

While the future and economic viability of storage in solar deployments is still unclear, many argue that their long term adoption is inevitable. At Capital Nature we tend to agree and thus invested in Chakratec which provides a kinetic energy (flywheel) storage solution for renewable energy commercial and industrial applications. Chakratec's innovative solution, unlike others, is truly green (no chemistry/safety issues), and has unlimited number of charge/discharge cycles.

Solar after Dark

Electric Transportation

Electric Transporation

In 2013, we've seen an increase of over 300% in all-electric cars on the road, led by Nissan Leaf and the Tesla Model S. This trend continues in 2014 with BMW delivering its first EV in Germany, and Volkswagen announcing that it will introduce 14 models of hybrids, plug-in hybrids and all-electric vehicles. BMW partners with SolarCity to give EV buyers easy access to solar charging, and IKEA teamed up with Nissan and Ecotricity to install charging stations at all its U.K. stores. Many other corporations have committed this year to collaborations that seek to vastly grow the EV charging infrastructure in the US. This revolution is significant for green cities who are also adopting cleaner public transportation, and smarter, urban transportation devices. Capital Nature invested in Roadix, that bring to market an innovative personal vehicle with a unique folding structure yet stable and secure ride for all audiences. We expect this type of vehicle to be adopted by many individuals and municipalities alike.

Capital Nature continues to seek outstanding entrepreneurs who bring viable and exciting technologies that can make a difference in the Green Energy space.

**VP Investments, Capital Nature*

We Seek Energy Projects with Attractive Risk/Reward Profile – Investments that "Make Sense"

ellomay
CAPITAL LIMITED

We seek projects that can substantiate a predictable and solid cash-flow and that will be considered by reputable international banks for project financing

Ellomay Team

The offices of **Ellomay Capital Ltd.** are located in a renovated white historical building, which was the third building in Tel-Aviv and was the residence of the Shlush family.

Rani Fridrich, Ellomay Capital Limited, CEO and Eran Zupnik, EVP of Business Development at Ellomay explained what is unique in Ellomay and what kind of investment projects they are looking for.

Ellomay Capital is an Israeli public company that is duel listed and traded in the NYSE MKT (ticker: ELLO) and also in the TASE .

Ellomay is owned by two major shareholders. Mr. **Shlomo Nehama** (37.6%) and the **Kanir Partnership** and related parties (35.2%). Kanir is controlled by Hemi Raphael and Ran Fridrich. Together these shareholders hold about 70% of the company. The rest is held by the public.

Ellomay is an energy company that in particular invest, hold and manage projects which generate electricity that is then sold to national electricity networks or to private clients. Ellomay is also exploring other energy projects such as pumped storage in the Manara Cliff or the production and transportation of natural gas from the deep sea as in the case of the Tanin and Karish oil fields.

The Current Portfolio

In our portfolio, they describe, we have a cumulative PV capacity of 30.5 MW that we produce in Italy (12 plants) and Spain (4 plants). The PV plants generate annual income of about 16 million dollars. We also own 7.5% of Dorad, Israel's largest private power station with 820 MW. We have an opinion to increase our share in Dorad to 9.375%. Dorad is a combined cycle natural gas operated power station with diesel as backup source. The Dorad power station is the largest private electricity power plant in Israel. It was activated only a couple of months ago and is already preforming well.

Ellomay periodically raises capital through project financing facilities or the issuance of public bonds in Israel. Currently, Ellomay has cash on hand of about 20 million dollars and continuously seeks additional investment opportunities.


PV plant in Italy

The Profile of an Ideal Project

Ellomay's management is keeping an open mind in exploring potential opportunities. We are clearly continuing to seek opportunities that will increase our existing portfolio in industries such as PV, wind, hydro, and conventional power stations. We will certainly consider projects also in the early stage of development, provided such projects will likely develop into projects that produce solid cash flow of revenues. Ideally, such project will be closely tied to the energy sector and will produce electricity or similar products (like natural gas) that we will sell.

The Preconditions for Joining Ellomay's Portfolio

Fridrich and Zupnik are explaining that Ellomay Capital is not a venture capital company. Ellomay is therefore looking for fruitful projects that will more likely than not produce solid cash flow that eventually will "bring the invested capital back home". It means that we are looking for projects with a relatively high probability of materializing and with a clear and a solid future flow of returns. It could be projects that are not operational yet and are in a construction or development phase, as we did with Dorad, but they will surely generate revenues. This is typically not the character of a start-up company.

One important topic that Fridrich and Zupnik mention is that all projects should be "bankable". It means that a reputable bank should be ready to finance such a project. The energy field is a field that requires substantial amounts of money. Therefore, financial institutions are needed to finance a project. Ellomay also raised funds by issuing public bonds in Israel. The rating of such bonds is closely tied to the ability of Ellomay to service such bond obligations. The rating agencies typically require evidence of a solid and steady flow of cash.

We at Ellomay strive to evaluate and manage various risks such as retroactive legislation as already happened in the PV market in Italy and Spain or when a regulator changes the working landscape i.e.: adding taxes, changing agreements or terminating a license.

It is much harder for us to evaluate innovative technology risks or venture capital projects that may not materialize at all because market forces will prove that there is no demand for such product or venture.

Projects Locations

Ellomay looks for suitable projects all over the world. Ideally we look for relatively stable geographies such as Western Europe and clearly also look at projects in Israel. That said, we also explore projects in Central and South America. Generally speaking we are less keen on investing in the Far East. To summarize, we are looking for projects in the energy sector that make sense...

A.Ben Laish in Skolnik industries, Chicago/USA-training for hazardous waste packaging and transportation

A.B. Industrial Recycling Technologies is a private, independent company involved in advanced environmental technologies. The company was founded in 1994 by **Avi Ben-Laish** and deals with the development, marketing and management of new inroads in the field of ecology in industry, as well as improving and optimizing existing activities in this field. The company is also involved in project management in the environmental field, as well as providing counseling concerning packaging and transportation of hazardous substances and used oil. It provides counseling for the Company for Environmental Services Ltd. in the waste disposal site Ramat-Hovav and marketing counseling for Dor-Gas in setting up a company for ecological services. Ben-Laish, the company's CEO, spent 30 years as urban planner and environmental manager in the public & industrial sector in Israel, Europe, Far-East and America.
Ben-Laish has been involved with innovative industries in Israel for the past 24 years and specializes in marketing advanced environment-related technologies. He is also a consultant for factories and companies in Israel and abroad.

There are important advantages in business cooperation with A.B. Technologies:

- **Financial Profit -** A.B. Technologies focuses on developing and marketing technologies that are financially profitable. The basis for the company's activities is a business one, and the intention is to maximize profits.
- **Good Public Relations -** A.B. Technologies can assist the public relations function in an organization to project a desirable image in the public eye. For example, a company dealing in fuels and oils is perceived as being an environmental pollutant. However, when the company incorporates a recycling element and includes processes in its activities that contribute to the environment, this will serve as a framework through which the company can advance the quality of life in Israel.
- **Development of a Horizontal Orientation -** A.B. Technologies has many connections with companies in Israel and abroad. These connections enable it to serve as sole representative and supplier of technological and innovative products in the environmental field. This, in turn, expands the diversity of products and services that can be distributed.
- **Increase in Market Segment -** A.B. Technologies' involvement with environmental issues, the diversity of its products and the knowledge it has accumulated in this field allow it to steadily increase its market segment, as well as the market segment of the companies with which it is involved.
- **Cooperation with the Authorities -** Ben-Laish has maintained good relations with government ministries such as the Ministry for Environmental Affairs, the Ministry of Health, the Ministry of Transportation, the Ministry of Defense and local authorities.

A.Ben Laish in ROTO, Slovenia – cooperation in developing and marketing of bio reactors for oil-water separators

A.Ben Laish in Chemcomex, Prague/ Czech Republic – partnership with Chemcomex & Teramed in developing bio-treatment for cleaning underground water & soil

A.B. Technologies Provides the Following Services:

- Environmental Management
- Environmental Health and Safety
- Environmental Management Outsourcing service
- Environmental Engineering
- Process Water & Wastewater Treatment
- Air Emissions Treatment
- Wastewater Treatment as a Turn-Key Service in Implementation of Engineering Solutions
- Pilot plans for Industrial Tests
- Turn-Key Facilities
- Technical Assistance and Commissioning
- Landfill – Leach Treatment
- Designing, Building and Installing Carbon Filters for VOC Treatment at Power and Industrial Plants.
- B.A.T. - Vacuum Evaporators & Crystallizers - Zero Liquid Discharge (ZLD)
- Recycling Waste to Energy
- Air & Gas Depuration
- Biological Treatment
- Soil Remediation
- Odor Control - Biofilter, MonaFil, Biotrickling, MonaShell
- Agriculture – Feed Meal, Fish Meal Production Factory, Animal Manure Treatment Plant, Rendering Plant
- Food industry - Snack Manufacturer, Dairy Industry
- Due Diligence
- Environmental Impact Assessment
- Solid Waste Management Planning
- Training for Environmental Awareness Marketing of Environmentally Friendly Products --Ecolabeling

Designs, supplies, and builds wastewater treatment plants using the best available technologies for wastewater minimization and reuse. We are highly committed to adapt air emissions to the atmosphere and to the applicable laws.

Partial List of Clients:

The IDF; vendor of USA ARMY & environmental services, vendor of NATO, Aircraft Industries; Dead Sea Works; Ambar Granot agriculture cooperation; Keter Plastic; Tadir-Gan Precision Products; Ortal Magnesium; Ham-Let advance technology; Habonim industrial valves & actuators Ltd.; PCB (printed circuit board) Technologies; Efee Landfill ;Gazit-Glob Israel; Toyota; Volvo; Subaru; Strauss-Group.

A.B. Industrial Recycling Technologies
P.O.Box 6300 Netanya 4216102, ISRAEL
Tel: 972 - 52 - 2599086 ■ **Fax:** 972 - 9 - 8658597
E-mail: avib@ben-laish.com ■ **Web Site**: www.ben-laish.com

Bringing Microalgae Promise to Life

There are tremendous opportunities for producing biofuel feedstock, omega-3 and feedstock for aquafeed; Looking for investments to ramp-up the activity in Israel and abroad


Oil produced from UniVerve's biomass

UniVerve Ltd. initiates the establishment of microalgae farms as feedstock for biofuel, food supplements and feed, based on its patent-pending technology. The combination of UniVerve's selected microalgae strains, its production system's efficiency and the commercialization of the complete biomass produced, results in an innovative production process with profitability levels anticipated to exceed those currently achieved by the microalgae industry.

UniVerve's cultivation and harvesting system is scalable and simple to construct, operate and maintain. Thanks to its high-yield and low-energy consumption, the production cost of an oil barrel as feedstock for biofuel is expected to be up to $50. The ability to profitably produce a commodity such as oil also makes this award-winning technology a game changer in the production of high value/small market compounds for food, cosmetics, pharma and more. UniVerve's microalgae strain contains triglycerides that can serve as feedstock for biofuel, omega-3 EPA that can serve as feedstock for human food supplements, and full protein that can serve as feedstock for aquafeed.

The Commercial Opportunities

This presents UniVerve with a tremendous opportunity. The biofuel market value was $56 billion in 2012; it is expected to reach $113 billion by 2020. The omega-3 market value was $25 billion in 2011; it is expected to reach $35 billion by 2016, due to reduced availability and capture of Peruvian anchovy, the major source of omega-3 oils, and the rapid growth in the volume consumed in Asia. The biomass for feed market value was $15 billion in 2011 and is growing as the result of an increase in the quantity of onshore fish production. The global shortage of feedstock (oil, omega-3 and protein-rich biomass) drives up the price of these commodities, so fuel, food and feed players are constantly searching for alternatives that will lower COGS and save hedging cost. Microalgae are natural producers of these materials, thus they present immense commercial potential as valuable feedstock for these industries.

UniVerve's multifaceted business development strategy includes the establishment of microalgae farms, singly or in joint ventures, as well as technology licensing. Farms may be designated for combined oil and food/feed production or for food/feed production alone. UniVerve's revenues will include a combination of license fees, royalties, consulting fees and dividends, depending on the model chosen by each client.

UniVerve began constructing its first farm in Israel, which is planned to reach 85 hectares by 2019 (see picture). As the regulatory and infrastructure support systems for biofuel in Israel are at an early stage, UniVerve's first farm in Israel will be an omega-3 rich biomass production farm. Algal omega-3 and biomass exporters already presented UniVerve with letters of intent for the purchase of the entire production, which are expected to be replaced by binding off-take agreement in Q1/2015. UniVerve received great interest from potential off-takers in Europe, the USA and Asia and plans to begin the establishment of a second farm in Israel by 2016.

Businesses in the Far East

UniVerve has begun business development in Asia and partnered with a strong engineering company, United Engineers Limited (UEL) from Singapore, as its EPC partner. UniVerve, with UEL support, already found leading Chinese companies from the biofuel, omega-3 and aquafeed industries that are interested in becoming off-takers of materials from UniVerve's future farm in China, planned to be established by 2017. Since its establishment, UniVerve has been funded by its founders, Ohad Zuckerman and Ra'anan Herzog, who combine vast experience in the development of innovative processes in life science industries and have proven success in building and managing multinational companies. UniVerve is now seeking investment to secure the continuation of the scale-up of its farm in Israel and to strengthen its global expansion.

For further information, contact Ohad Zuckerman at ohad@univerve-biofuel.com 972-523-412-333.


The first stage of UniVerve's farm in Israel

HomeBioGas™ is Going International and Is Looking for Local Partners

Revolutionary home biodigester; Looking for strategic partners for the local as well as international markets

TevaGas™, a family-sized anaerobic digester, is a revolutionary new biodigester that provides biogas for cooking, heating and lighting. The company is expanding overseas and is looking for partners and distributors for its innovative TevaGas™ home biodigester.

Why Biogas?

Well-Being and Health: 2.7 billion people subsist in "off-the-grid" communities without access to electricity or gas. They cook over firewood, charcoal, trash or dry manure. Indoor smoke leads to respiratory diseases and deaths.

Productivity: Families spend hours collecting and carrying trash and wood for burning. They have no regular light after nightfall and no opportunity for cottage industries or for reading and doing homework.

Environment: An average family consumes 30 kg. of firewood per day, decimating forests.

Untreated sewage, uncollected garbage and soil eroded by deforestation pollute the groundwater, rivers and lakes.

Untreated organic garbage emits methane. Untreated methane contributes 25 times more to global warming than CO_2.

To Summarize: Anaerobic biodigesters provide clean energy and improve the well-being of the family and at the same time protect the environment.

Why TevaGas?

TevaGas™ is a new class of "**Off-the-Grid**" **HomeBiogas Anaerobic Digester**. TevaGas treats both food waste and animal manure, producing clean cooking gas sufficient for three meals along with 10 liters of organic liquid fertilizer per day.

TevaGas is a completely new solution, designed for enhanced living:

- **Clean Energy** – Produces clean biogas for cooking, water heating and gas lighting;
- **Improved Health** – Eliminates indoor smoke caused by cooking over charcoal/wood/manure fires;
- **Better Environment** – Treats organic waste locally, saving transportation impact, reduces groundwater contamination and deforestation;
- **Increased Food Yield** – Produces clean, organic liquid fertilizer for the garden;
- **Well-Being** – Clean cooking fires, hot water, nighttime lighting and labor saving.

Ban Ki-moon, the secretary-general eneral of the United Nations, and Reuven Rivlin, president of Israel; inspecting TevaGas™. "More than 4 million women and children die each year due to indoor smoke from open fires(*). This is just the thing they need. You should sell them to the UN! It can save lives." (*) WHO Report, 2012

Great User Experience

- **It's a DIY (Do It Yourself) Kit**– Easily assembled in less than three hours;
- **Sealed** – Cover prevents odors and thwarts insects and mosquitoes;
- **Above Ground** – No digging and heavy construction;
- **User-Friendly Interface** – Dual-purpose sink for manure or kitchen waste feeding, built-in food waste grinder, optional water tap;
- **Gas Pressure –** Patented gas pressure system delivers continuous gas under pressure;
- **Manual Grinder** – The only home-scale biogas system with built-in food grinder, improving digester efficiency by up to 300%;
- **Gas Filter** – The only system with a built-in filter; removes H_2S and water from the biogas;
- **Sludge Outlet** – Convenient operational outlet for periodic sludge removal.

Status

TevaGas has been thoroughly tested, certified and approved by the local Environmental Protection Ministry and the Energy Ministry for safety and environmental impact. TevaGas is ISO compliant.

The first units were installed in villages of Beduin families in the Negev, and additional units are being delivered to Beduin villages in the Palestinian Authority.

Environmental Protection Minister Amir Peretz, introduced TevaGas to **Pelegrin Castello, the minister of mining and energy in the Dominican Republic**. Castello initiated a pilot project, deploying 50 TevaGas units in two villages in the Dominican Republic. The prime motivation of the DR government is to prevent the local forests from being cut down for use as firewood for cooking and heating.

Bedouin Family in Umm Batin using TevaGas family biodigester

Summary

The Family Benefits: Clean free energy for cooking, heating and gas lighting. Indoor air is smoke-free, it is labor-saving, and provides free, clean fertilizer for the garden.

The Community Benefits: Reduces garbage, trees are saved, improved health and well-being, cleaner groundwater and water sources, reduced global warming

The Business Opportunity: HomeBioGas is going international and looking for partners and distributors.

Contact info:
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Ami Amir – Business Development and Marketing
+972.546.450.667

A Social View of Environmental Protection

Promoting initiatives that are aimed towards improving standard of living

David Leffler, Director General of the Environmental Protection Ministry

Amir Peretz, Former Environmental Protection Minister

David Leffler, Director General of the Environmental Protection Ministry told us that former **Minister Amir Peretz** brought a new social spirit into the Ministry. We are engaged, he explained, with many projects that are aimed directly towards improving the standard of living of the citizens of the State of Israel as well as our neighbors.

Amir Peretz: "environmental justice and social justice are the same."

Electricity Savings Projects

The initiative contains three elements. **The first one** is a national project of decreasing greenhouse gas emissions by saving electricity with a total budget of about $40 million. For this purpose, the Environmental Protection Ministry has allocated a grant for municipalities and businesses. The effect was very impressive with a return on capital of about 25%. Municipalities such as *Yeroham* and *Ma'alot Tarshiha* saved an impressive amount of money by cutting electricity expenses. Such savings are meaningful for small towns. We hope, says Leffler, that the government will renew this project, possibly as the result of the international tendency to get a serious work plan for greenhouse gas emissions.

The second element is done together with the Israel Electric Corporation. The Ministry allocated about $10 million for the areas surrounding the power plants in Hadera and Ashkelon for the purpose of installing scrubbers. The project, which was planned for execution a couple of years ago, was postponed. Peretz demanded, as compensation to the population surrounding these plants, the initiation and financing of an electricity efficiency program.

The third element is a project which calls for proposals of municipalities to support local activities of electricity efficiency. For this purpose about $3 million were allocated.

Local Activities with International Aspects

Recently we conducted a conference dealing with environmental aspects of the Jordan River. We welcomed a big delegation from Jordan. The Israeli side contributed its share to the mutual efforts to preserve the river by allocating more fresh water to it. This contribution will join the common cleaning efforts of the river. Furthermore, Israel has committed itself to take care of the sewage along the river within its territory. It was impressive, said Leffler, to see the cooperation between the two countries. The Jordan River has a significant symbolic role for many people around the world. We hope that in the near future, the Palestinian side, which is responsible for the Jordan River going towards the Dead Sea, will join in and cooperate with Israel and Jordan.

Environment and Social Justice

Peretz is known for his social agenda. He said that "environmental justice and social justice are the same." We therefore allocated funds for the peripheral areas aimed towards the weak populations, especially for Arab communities. The environmental conditions in their towns and villages are far behind the Jewish ones. In a governmental decision, we allocated about NIS 200 million that will be invested in all Arab and Druse towns and villages during a period of four years. This project is planned to significantly alter their living conditions regarding vast environmental aspects e.g., taking care of municipal waste, environmental education, enforcement of environmental laws, etc. Consequently, starting to close the existing gap of environmental standards or standard of living between the Jewish and Arab populations.

Wind farm (INGIMAGE/ASAP)

The German-Israeli Chamber of Commerce on the Latest Trends in Making Municipal Services Greener

How remunicipalization of public services influences local sustainability in Germany: Selected trends and their impact on Israeli municipalities and business

By Benjamin Friedländer and Gregor Schlosser

The team of AHK Israel is at your disposal to support your internationalization efforts to Germany

After decades of privatizing public services, we are currently observing that many municipalities in Germany are buying back privatized utilities and canceling concessions that had been awarded to external private suppliers. Remunicipalization is a trend of reversing previously privatized public supply and disposal services to local authorities. It strengthens municipal sustainability efforts in Germany. This, in turn, may have influence on Israeli municipalities and businesses, generating new market opportunities for Israeli companies in Germany's public sector and serving as a role model for future sustainability projects in Israeli municipalities.

A Revival of Public Services in Germany

Particularly in the energy sector we have witnessed a revival of public services in Germany. In recent years many public utilities have been established, and a lot of concessions have been awarded to public enterprises. Remunicipalization efforts in the energy sector are mainly influenced and pushed by the German Federal Government's proposed energy transition. The required objectives of this action plan, such as reduction of greenhouse gases, expansion of renewable energies and reduction of primary energy consumption, should be mainly achieved by decentralization of energy supply. In its essence this means an enhanced development of local supply. Therefore, public utilities – as decentralized suppliers and producers – are becoming (again) an important partner for local authorities to obtain the mentioned energy policy objectives, which can contain a significant potential for sustainability in German cities and municipalities.

Current initiatives underline the mentioned importance. Many public utilities already offer green electricity from renewables. Larger ones have already invested in their own renewable sources, such as wind and solar energy, but also biomass and water energy. As a shining example, Munich's public utility wants to produce enough green electricity in its own power plants by 2025 to cover all the electricity requirements of its 1.4 million inhabitants.

Also in the field of water, wastewater and waste, a slight trend of reversing previously privatized public services to municipalities is observable. Although this trend comprises more or less individual cases like – just to mention some prominent examples – the Remunicipalization of the Potsdamer Wasserbetriebe and Berliner Wasserbetriebe or the reorganization of waste management in Aachen and Bergkamen (North Rhine-Westphalia), this slight trend can become a significant contribution to municipal sustainability efforts as well. For instance, public water utilities are solving technical and economic problems resulting from demographic trends and regional disparities (e.g., underutilization vs. overutilization of public pipelines) by sustainable and flexible solutions such as heat recovery from wastewater or use of rainwater as drinking and process water. In addition, more and more public wastewater plants are

using resource-saving and energy-efficient technologies to improve energy efficiency.
In the field of municipal waste management, the reduction of pollutant emissions and energy consumption, as well as waste recycling, is at the focus. A sustainable and resource-efficient waste management system has been requested by strict legal rules since the 1970s (incl. Waste Disposal Act 1972, Waste Act 1986 and the Closed Substance Cycle and Waste Management Act 1994). Greenhouse gas emissions from waste management have been reduced significantly since the 1990s. This contributes substantially to achieving the Kyoto climate-targets.

New Opportunities for Israel

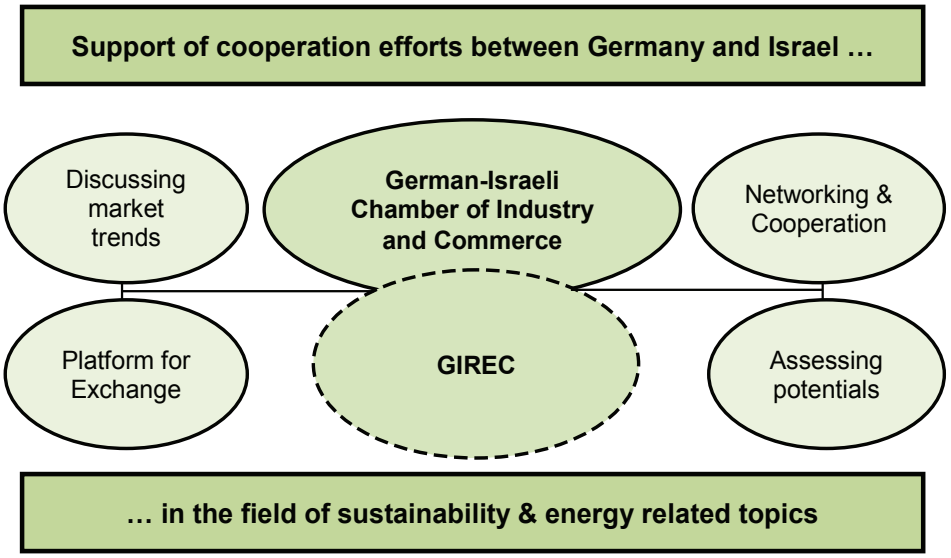
The presented tendencies also influence Israeli municipalities and business. The process of strengthening public services and sustainability efforts provides Israeli companies with new opportunities for cooperation and sales in Germany. And the sustainability commitment of Germany's municipalities can be understood as a role model not only for other European countries but also for Israel. Potential "spillovers" depend strongly on further exchanges between both countries' key actors in this field. Under certain conditions (see below), realistic market opportunities exist for Israeli energy, water and waste management companies in Germany – especially in the public sector. Israeli companies develop and produce innovative technologies, e.g. technologies for generation of bio and solar energy or waste and sewage treatment. Know-how and R&D efforts offer a very competitive performance and excellent standards. Israeli technologies are in demand worldwide. On the German side, sustainability projects show the amazing expertise that municipalities and public enterprises already have in this field. This know-how is a real pull factor for foreign investors. In Germany, most of the so-called "services of general interest" are performed by municipalities and public utilities. That is why the public sector is an important source of demand, which generates turnovers and profits in billions every year. Large cities like Hamburg or Leipzig and their hundreds of public companies invest millions of euros in modernizing infrastructure and implementing new technologies.

Some Obstacles Exist

However, the future success of Israeli technologies in Germany will probably depend on the question of whether these technologies will meet Germany's legal requirements, such as the strict Emission Control Act and Waste Water Regulation. New technologies must be a real alternative to existing technologies in Germany so that they can displace existing capacities. This is possible only with completely new advantages. In any case, economic and technical utilization should be adapted to the specific requirements onsite, which – depending on the technology – include e.g. number of citizens or energy demand, as well as the amount of waste in a specific region. Taking these factors into account will be essential to guarantee cost efficiency, which in Germany is much more important due to long-term contracts between local authorities and public or private operators. In order to avoid costly failures or bad investments on both sides, a prior assessment of market and cooperation opportunities by German industry experts would be advisable.

AHK Israel as a Permanent Link Between Both Countries

The conference on the topic of "Energy Efficiency in Local Authorities," which was organized by the German-Israeli Chamber of Industry and Commerce (AHK Israel) in November 2013, has repeatedly shown that Israeli municipalities are more and more interested in opportunities of energy saving and a sustainable use of resources. With a number of consultancy projects and initiatives (e.g., Tag-Hasviva), Israeli NGOs attempted to show local authorities quite plainly their role as a model of sustainability and the saving potential for public money.
Nevertheless, we should not lose sight of the fact that the level of development in Israeli municipalities differs considerably from Germany. A comprehensive use of solar and wind energy, energetic renovation of public buildings or a sustainable wastewater and waste treatment are mostly still future topics. Major projects are in most cases still in an early stage. Further cooperation and exchange between both countries is an indispensable prerequisite to advance the cause of sustainability in Israeli municipalities. A successful example of town-twinning in this field is the partnership between Tel Aviv-Yafo and Freiburg in which the topics of sustainability and climate protection in an urban context are at the focus.
AHK Israel constantly helps to take the development further: from November 2 to 6 2014, a delegation of high-ranking officials from Israeli public authorities and associations traveled to Northern Germany to learn more about the integration of wind turbines into an existing electricity grid and the legal, social and environmental obstacles that have to be tackled in this process.
Other events organized by AHK Israel made a considerable contribution to cooperation over the past years, especially by providing companies in the energy efficiency industry, decision-makers, NGOs and research institutes from both countries a regular platform for mutual technical and economic exchange. In that respect, AHK Israel is acting as a permanent link between Israel and Germany. Taking this process forward by a further extension to topics such as sustainable water, wastewater, waste, and public infrastructure management would definitely make sense.



AHK Israel & GIREC are important partners for Israeli companies in the field of energy related topics.

The Challenge for the Future: to Anchor Sustainability in Israeli Society

One of the most important (and also difficult) future challenges in Israel will be to create more understanding of environment, resources and climate not only in municipalities and the business sector but also in the entire population. Sustainability – as cohesion of ecology, economy and social affairs – must be firmly anchored in the Israeli society.
Although Germany can certainly serve as a role model, it should be borne in mind that current situation and framework conditions in Israel are fundamentally different. These range from a different resources situation (both energy and water) through a different culture and mentality to an extremely delicate security situation, which understandably makes sustainability a subordinate question.

Renewable Energy – Global and Local View

Renewables are here to stay and Israel should take advantage of this opportunity

Dr. Miki Haran*

Dr. Miki Haran, Head of Environmental Studies at Ono Academic College

Global Perspective

Today, global installed capacity and electricity production from modern renewable technologies is far more significant than it was merely a decade ago. Heating directly by using biomass, solar, and geothermal modern sources is also rising steadily. Technological advances, decreasing prices, determined governments with clear supportive policies and smart financing mechanisms have made renewable energy available to an increasing number of consumers all over the world.

In many developing countries renewables are assisting in providing energy security by providing electricity to remote areas where electricity was not previously available and creating new jobs. In developed countries renewables and energy efficiency help reduce carbon emissions, thereby slowing the process of global warming and lowering health impacts of fossil fuel emissions from power plants, as well as generating new businesses and new employment opportunities.

The last **Renewables 2014 Global Status Report** published by REN21[1] states that the most significant growth of renewable energy in 2013 occurred in the power sector, reaching global capacity of 1,560 GW (gigawatts), more than 8% higher than in 2012. Hydropower rose by 4% to 1,000 GW and other renewables rose by 17% to more than 560 GW. Out of all the renewables growth, the Solar PV has continued to expand at the most rapid rate and new capacity installation increased in 2013 by about 32%, reaching a record 39 GW new installations, for a total exceeding 139 GW. In wind power more than 35 GW of wind power capacity was added in 2013 for a total of 318 GW. Throughout 2013, renewables achieved high levels of penetration in some countries. For example, In **China** new renewable power capacity surpassed new fossil fuel for the first time in 2013. **Denmark** is another example, where wind power met 33.2% of total annual electricity demand – the highest per capita renewable energy in the world. In Spain it met 20.9% of demand and in **Italy** solar PV met 7.8% of total annual electricity demand. Scotland declared that it aims for 100% electricity from renewable sources by 2020 and 20 million citizens of **Germany**, representing over 25% of this second most populous country in Europe, are already living in what is known as 100% renewable regions. Even though the penetration of renewables differs from country to country, there are at least 144 countries with renewable targets and most of them have working policies to support achieving this goal. Therefore, it is not surprising that an estimated 6.5 million people worldwide are employed in "green collar" jobs associated with renewables.

Reduction in Investments

On the other hand, total new investment in renewable power and fuels was US $ 214.4 billion in 2013 (not including hydropower projects), down 14% relative to 2012 and 23% lower than the record level in 2011. Investments in solar PV declined nearly 22% relative to 2012. In Europe the decline in investment in 2013 was even greater - down 44% from 2012. The decline is due in part to reductions in support in some countries but also due to significant reductions in technology costs, especially in the solar PV markets. In wind power the market was down nearly 10 GW compared to 2012 due to project cancellations or downscaling, mainly

Man installing alternative energy photovoltaic solar panels on roof (INGIMAGE/ASAP)

[1]REN21: The Renewable Energy Policy Network for the 21st century


Wind farm (INGIMAGE/ASAP)

in the U.S. market.
The conclusion from this data is that albeit the reduction in investments, new countries are joining the renewables industry and more companies and people are taking part in the renewables business.

Avoiding Conflicts

Renewables can also help prevent conflicts over resources. There are more than 1 billion people in the world who have no access to electricity and 2.6 billion who cook and heat with traditional biomass. In Africa, where the growth of electrification is lower than the growth in total population (2.3 compared to 3.5)[1] only 43% of the population enjoyed electricity in 2013. People who have no access to electricity usually also have no access to clean water as well because desalination, pumping and purification consumes electricity. These people or governments cannot pay for electricity or pure water and the result is usually confrontations and conflicts for these resources with neighbors. It is fair to say that unnecessary conflicts arising from wars over natural resources can be avoided by the development of low priced sources of energy. Renewables, especially, can provide solutions because cost-effective technologies are already available and there is no need for costly infrastructure.

Pricing and Demands

Market structure and pricing can promote or mitigate the use of renewables. A survey of OECD households[2] shows electricity prices and their effect on demand in different OECD countries. According to the survey, household demand for electricity decreases with the price of electricity and increases with household income (as expected). When the price of electricity is low people spend more on electricity, especially in higher income households while the demand in low income households is more inelastic.

Local Perspective

The survey shows that the average annual electricity consumption per household in Israel is relatively high, about 7,000 Kwh, compared to the average annual consumption per household in Australia and Japan (about 5,000 Kwh), the Netherlands (4,000 Kwh), Spain (less than 3,000 Kwh) and Chile (less than 2,000Kwh). In all the above mentioned countries the average price of electricity is much higher than the price in Israel.
Actually, the current price of electricity in Israel would be much higher if externalities were also calculated, such as the price of health expenses related to the damage of air pollution from power plant stacks, carbon tax for the emission of greenhouse gasses and subsidies to the Israel Electric Company such as the price of the property of power plants and the transformation lines. With such a low price, it is almost impossible for renewables to compete with fossil fuel electricity production without incentives.
Looking to the future of Israel, we can expect a steady growth in the demand for electricity. This is because the rate of population growth in Israel (1.9% in 2013), which is similar to rates in the poorest developing countries in the world while GDP per capita (34,770 USD per capita in 2013 according to IMF), is more like that of a developed country. Enlarging the share of renewables up to the modest target of 10% in 2020 as declared by the government can help Israel cope with its growing demand for electricity.

Suggestions to Promote Renewables in Israel

The first step to advancing the use of renewables in Israel is to revisit the issue of electricity price from fossil fuels. There is a debate in Israel as to whether electricity should be taxed and if the price of electricity should be raised. World experience supports the view that the price of electricity should be raised in order to include externalities, promote energy efficiency and allow renewables to compete without a subsidy. On the other hand, because of the high cost of living in Israel, a price hike in electricity is bound to raise enormous opposition. One possibility to protect low income households is to apply a progressive tax on household electricity usage. Tax can be implemented in accordance with the amount of electricity consumed and the number of people per household while industries using renewables and/or introducing efficient energy would receive a discount in electricity fees. Some of the tax funds could be directed to promoting energy efficiency and support research in the field of alternative energy. In addition to research in the field of oil alternatives and more efficient usage of sun and wind power, energy storage is another important research field that can improve the possibility of implementing alternatives to fossil fuels not only for power, but for transportation and heating as well. Adapting the electricity grid in Israel is also an important element to enable high production of electricity from renewables. Furthermore, incentives for development of renewables in Israel can improve the ability of Israeli companies to compete more successfully.
A motivated government policy aided by innovative technologies and smart financing can enable us to achieve this goal and take part in the growing global market of renewables. Renewable energy is a growing field that poses real opportunities for Israel at home and abroad if the right steps are taken in time.

**Head of Environmental Studies at Ono Academic College*


Electrical towers (INGIMAGE/ASAP)

[2]OECD (2013), Greening Household Behaviour: Overview from the 2011 Survey, OECD Studies on Environmental Policy and Household Behaviour, OECD Publishing

Promoting Awareness for Green Energy

Educating to understand the meaning of environmental friendly life

Children experimenting with solar power near the 'Energy Dome' in Binyamina Visitor Center

The Solar Garden, an educational initiative founded in 2010, was established in order to promote awareness and use of green energy sources and environmental technologies. The Solar Garden aims to stimulate people's imaginations, encouraging them to think about ways to live in a more environmentally-friendly way. Activities are designed to raise awareness of the consequences of the lack of action and promote sustainability education programs, exposing participants to existing environmental products and technologies, as well as ideas and green technologies that are being developed. Educational programs consist of workshops and seminars that are held at the Visitor Center in Binyamina, as well as any other location across Israel, spreading practical knowledge and techniques in disciplines such as alternative energy sources, energy efficiency, green building, Israeli cleantech innovations and more.

"One of our main goals is to encourage youth to pursue higher education and conduct research in these fields, which is why we target school groups as our most important audience. I believe raising an environmentally-conscious generation will influence the development of a leading green energy industry in Israel." says **Yaniv Fieldust, founder and CEO** of this unique project.

Guided tours of the facility are led by knowledgeable and passionate instructors, and are tailored to suit different target populations according to the nature of the group, participants' ages and their prior knowledge. Visitors include school

groups, students, teachers, university faculty members, environmentalists, foreign tourists and senior delegations, families and elected officials.

The Visitor Center is divided into compounds – **Energy**, **Water**, **Green Building** and **Resources**. Each compound presents the current situation and the local and global problems it creates, along with various existing technological solutions and those currently under development. For example, in the Energy Complex, visitors will be exposed to the Israeli power industry as it is today, the downside of coal power plants and the growing need for clean energy production, pros and cons of transition to natural gas and government policies relating the adoption of renewable energy technologies. The Solar Garden presents the opportunity to take a closer look at the current and future electricity generation systems, including photovoltaics, solar thermal, wind, biomass and geothermal, and provides a glimpse of leading Israeli companies in the field.

Despite its name, The Solar Garden deals not only with energy, but also with promoting sustainability as a way of life, while energy is a common thread in all subjects. The global water problem can be solved by using desalination technologies, but existing methods exhaust vast amounts of energy and release a tremendous amount of pollutants into the atmosphere. Consumer culture stemming from the global economic model of infinite growth not only draws raw materials from every continent on the planet, but also consumes huge amounts of energy – mining resources, the production process, and transporting every part of every product thousands of miles around the globe.

Yaniv added: "Israel is a small country whose residents are known as early adopters in the technological world. The Solar Garden will continue to spread sustainability knowledge and values amongst the people of Israel as a first step in changing the culture and summoning the environmental revolution."

Yaniv Fieldust, founder and CEO of The Solar Garden, concentrating the sun using a sun-cooker made from an old satelite dish

Yaniv Fieldust with MK Dov Lipman, chairman of 'The Lobby for Renewable Energy' in the Israeli parliament

Masha Dolev teaching permaculture at The Solar Garden

Teachers from Nazareth learning about renewable energy, acquiring knowledge and learning tools to be taught back at their school

Entities Participating in the Magazine [By ABC order, left to right]:

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