



The Israel Export & International Cooperation Institute

ISRAEL Inspired by *innovation* Cleantech Industry





Color us green, color us clean

In the cleaner, greener world we're all striving for, Israel has developed water and energy technologies that could play a major role in achieving independence from carbon fuels while offering solutions for cleaner, safer water for agriculture, industry and domestic consumption.

Israel today has more than 200 companies with renewable energy solutions and about the same number with clean water solutions. Exports of energy and water technologies from Israel are approaching \$1 billion annually and are poised to grow rapidly as countries around the world take up these twin challenges.

Solar thermal energy

Israel's pioneering use of renewable energy began decades ago with the near-universal adoption of passive solar energy domestic water heaters that save the country 4-7 percent of its fossil energy imports. Given Israel's bountiful sunshine, most renewable energy research and applications are naturally focused on solar energy.

A novel solar-hybrid power generation unit, the fruit of academic and commercial cooperation, presents a new optical and mechanical dish concept that delivers heat to a special receiver and generates power through the use of small-capacity solar base units that can be linked to create a larger power plant.

A 150-megawatt solar thermal facility, under construction in Israel's Negev Desert, will initially provide electricity for 50,000 homes, and will ultimately produce 500 MW of power for Israeli communities. This Israeli technology already serves nine Mojave Desert power plants in the U.S. that produce 350 megawatts.



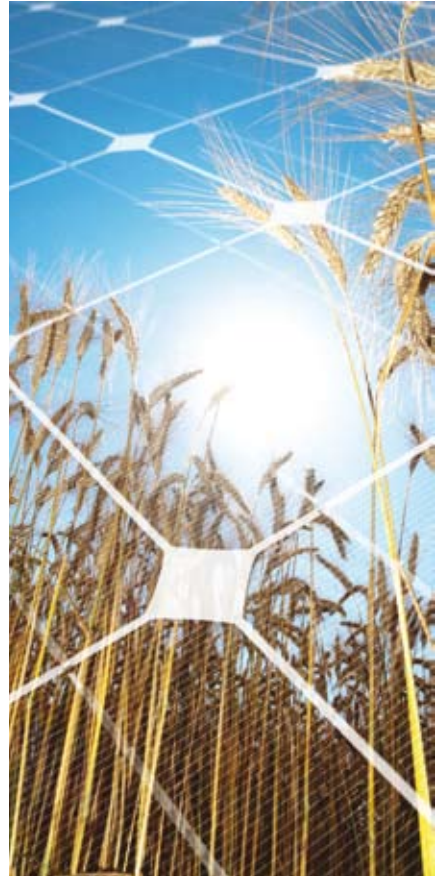


Photovoltaics

Photoelectric panels are also in use in Israel: their efficiency at converting sunlight into electricity has grown to more than 35 percent, with at least one company's CPV panels expected to reach efficiencies greater than 45 percent.

Another Israeli innovation is a "solar-on-water" power plant that uses a proprietary cooling technology to convert any water surface into a solar energy platform.

Other companies offer distributed solar power harvesting and PV monitoring systems, a proprietary optical design to extract maximum PV energy with minimal 'real estate,' and PV cells promising breakthrough efficiencies that will bring the cost of solar electricity generation to less than 25 percent of today's cost.



Wind energy

As wind energy takes hold, the power surges that are a natural aspect of windmill-generated electricity must be tamed. An especially successful Israeli power quality solution monitors and responds, in real-time, to alterations in rotor shaft rotation speed, assuring stable voltage output even when changes in wind speed cause the generator's speed to fluctuate. Another Israeli technology promises a 10-20 percent increase in annual energy production for existing wind turbines, and a similar reduction in COE for newly constructed turbines, while yet another lets turbines generate electricity even when wind speeds are low. Still another Israeli approach utilizes low-cost regenerative fuel-cell energy-storage-systems for power grid load leveling, and for solar and wind power generation plants.





Biomass energy

Much has been written about using biomass as an energy source. Here too Israeli experience may be turned to advantage. Israeli scientists have developed disease-resistant plant stocks, fruits and vegetables that thrive in brackish water, and hybrids that permit winter exports to colder climates. Private companies have also contributed to this development, among them one with an agreement with a crop-science multinational to improve wheat seed, and another that uses microbial fuel cells for the direct production of electricity or hydrogen from wastewater.

Through a combination of computational genomics, molecular biology and advanced breeding methods, Israel has become a leader in this field, continuously searching for plant species that can aid or serve in biomass fuel production. Two promising research directions are the use of drought-resistant jatropha seeds and castor beans for the production of bio-diesel. Another approach uses bio-diesel enzyme catalysts to control reactions between ethanol and methanol, resulting in cheaper and more cost-effective bio-diesel production.


Geothermal energy


A multinational Israeli company has signed agreements with power companies worldwide that use its proven geothermal technologies. To date, the company has built or supplied equipment for more than 1,300 megawatts of geothermal power in several countries worldwide.

Energy efficiency

Voltage regulation and control technology: Geared to maximize energy efficiency, this technology allows for energy savings and CO₂ reduction in outdoor and indoor commercial lighting and industrial motor applications.

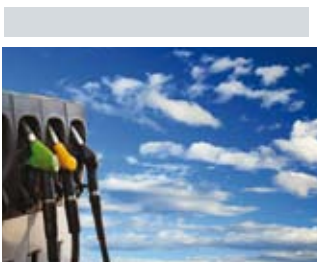
High intensity discharge electronic ballasts: This environmentally friendly technology enables users to cut lighting energy bills by 65 percent, dramatically lower maintenance costs and reduce the number of light fixtures needing installation and maintenance.





Smart power grid systems: Leveraging high-tech techniques from the IT, communications and power electronic sectors, an Israeli company has developed highly integrated, smart-grid, scalable power systems. The technology, using pluggable units and web-connected applications, will maximize cost cutting for utilities and customers.


Lighting energy controller systems: This novel technology enables municipalities, corporations and private users to maximize lighting energy efficiency. By installing the systems next to electric distribution panels, users can control the voltage supplied to lighting currents, operate lights more efficiently, and reduce maintenance and costs.



Academia in full force

The search for renewable energy sources occupies some of the best minds in Israel's academic community. Seven universities, as well as several colleges and government R&D centers, have taken up the challenge. Solar energy research complexes at Ben-Gurion University of the Negev and at the Weizmann Institute of Science back practical exploitation.

In recent years, many academic research groups and private sector companies have sought ways to exploit existing knowledge to create sustainable energy solutions. One such effort is a scaled-up prototype of a unique tower technology that produces low-cost electricity from dry desert air and brackish or sea water, while at the same time desalinating water at about half the cost of current methods. Another company has developed a unique technology for hydrogen production on board internal combustion powered vehicles that overcomes all current obstacles associated with hydrogen.



Academic strengths in renewable energy

Institution	Strengths
The Blaustein Institutes of Desert Research at Ben-Gurion University of the Negev	Desert environment, dry lands agriculture and solar energy
The Hebrew University of Jerusalem	Environmental response to human-induced disturbances such as fire, oil spills, pollution and radiation, as well as biological and biochemical markers for pollution
The Porter Center for Ecological and Environmental Studies at Tel Aviv University	Atmospheric, water and marine pollution; wastewater recycling; public and environmental health issues
The Department of Environmental Sciences and Energy Research at the Weizmann Institute of Science	Water, atmospheric pollution, climate change and energy research
The Center of Research in Environmental and Water Resources Engineering at the Technion-Israel Institute of Technology	Water quality and treatment, wastewater treatment and reuse, atmospheric pollution, environmental chemistry and microbiology, and solid waste treatment

Technological incubators: investments in cleantech

Israel boasts an extensive technological infrastructure reinforced by advanced scientific research and an entrepreneurial culture. The small size of the local market helps Israeli companies quickly and efficiently deliver niche solutions. The country is home to dozens of government-sponsored technology incubators that support some 1,500 start-up companies. Many of these companies are developing renewable energy and clean technologies.



Government regulation: support from the top

Public awareness, academic initiatives and private-sector investment have pushed the government to consider environment issues in decision making. Israel's environmental legislation now includes laws for the protection of nature and natural resources (air, water and soil), for the abatement and prevention of environmental nuisances (prevention of air, noise, water and marine pollution), and for the safe treatment of contaminants and pollutants (hazardous substances, radiation and solid and liquid waste).

Israel has taken substantial steps towards advancing the use of alternative energy. A 2002 government decision called for the introduction of renewable energy into the electricity sector so that by 2015 at least five percent of electricity consumption – beyond the ubiquitous solar panels for domestic water heating – would be derived from renewable energy. Israel has pledged to generate 10 percent of its annual electricity needs from renewable sources by 2020. In January 2011, the government approved a national plan to reduce consumption of fossil fuels, allocating \$425 million to the promotion of alternative fuels.

With its technological strengths, entrepreneurial culture, skilled workforce and government support, Israel knows how to identify market needs and to quickly create smart solutions for global application in alternative energy resources. In a large, thirsty, energy-consuming world, Israel is a small, energy-saving giant that drinks less too.




The Israel Export & International Cooperation Institute

The Israel Export & International Cooperation Institute, a non-profit organization supported by the government of Israel and the private sector, facilitates business ties, joint ventures and strategic alliances between overseas and Israeli companies. Charged with promoting Israel's business community in foreign markets, it provides comprehensive, professional trade information, advice, contacts and promotional activities to Israeli companies, and complementary services to business people, commercial groups, and business delegations from abroad.

The Israel Export & International Cooperation Institute is committed to bringing together users of cleantech technologies with Israeli companies that suit their needs, ensuring that people throughout the world benefit from the innovation and quality of Israeli industry.



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