

Israel Ministry of Energy
The Chief Scientist Office



RESEARCH AND DEVELOPMENT

2018-2020



Ministry of Energy
www.energy.gov.il

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The Chief Scientist Office



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2018-2020

January 2021

Foreword by the Minister of Energy



The Ministry of Energy realizes the importance of the national and international challenges that we are facing in the energy sector, which includes the global climate crisis; air pollution; efficient and reliable management of electricity; long-term development of the energy industry, which takes into account the immediate and long-term developments of technology.



The Chief Scientist Office (CSO) encourages research and technological development in the following areas: solar energy; electricity storage; energy efficiency; hydrogen engines; electric vehicles; cyber protection and much more. Costing the government hundreds of millions of shekels each year. The CSO is collaborating with the 'U.S Department of Energy' on a large-scale research of these fields. By doing so the office promotes Israel's contribution to the latest developments towards clean and environment friendly energy.

As a Western country, that is a main player in the electricity sector and due to our national efforts in reducing greenhouse gas emissions by 80% until the year 2050 and reducing air pollution it is obvious that we cannot rely only on existing technology. Therefore, we must continue improving and developing the relevant areas.

Furthermore, after consulting the CSO I have decided to announce the Ministry of Energy's "award for ground breaking research in Carbon Capture and Electricity Storage" in order to encourage innovation, new developments and achieve targets that could benefit us and the entire world.

I wish the Chief Scientist Office, researchers, companies and entrepreneurs that aid us in achieving a smarter energy industry success and fulfillment.

May we strive for a cleaner and greener environment.

Well Done!



Dr. Yuval Steinitz
Energy Minister

Foreword by the Director General



The ministry of energy is responsible for the entire energy sector, natural resources and infrastructure in Israel. The climate change crisis requires making transformations in energy production and consumption.

As part of the strategic missions, following the Paris conference in 2015, the Israeli government adopted a resolution that determines a national target aiming to reduce greenhouse gas emissions and increasing electricity production from renewable energy up to 30% by the year of 2030.



The CSO, which supports innovative solutions that connect academia, industries and technologies in diverse fields, is a significant basis, which continues achieving goals by encouraging development.

As part of its new approaches in diverse fields:

- The CSO promotes clean transportation projects by deploying fast charging stations for electric vehicles.
- The CSO collaborates on international joint clean energy projects.
- The CSO holds a start-up fund, which encourages entrepreneurs to examine the feasibility of original technological concepts in the various fields of energy.
- The CSO promotes academic research and development on earth and marine sciences, nuclear energy and much more.

Israel is a key player in the global energy technology market and at a time of economic and health crisis, the ministry of energy, through the CSO's, endeavors direct budgets for R&D and necessary policy initiatives for the future electricity economy in order to stimulate the state's economy.

We are proud of the Israeli start-up companies that have received the CSO's grant and delighted to see them leading the industry.

This booklet illuminates some of the CSO's important international activities and collaborations in all energy sectors. We invite you to cooperate in the fulfillment of our national goals and common global goals.

Sincerely,

Udi Adiri

Director General
Ministry of Energy

Foreword by The Chief Scientist



I am happy to present this bi-annual publication, which gives a glimpse to our activities over the last two years. Behind the figures, numbers and text and behind our achievements and success stands a wonderful team which makes what you see happen. Contact information is listed at the end of this brochure.

We strongly believe in what we do - keeping Israel's energy and natural resources markets as one of the best in the world. We rely on the Israeli human capital and aim to maintain its leadership in innovation.



In recent years we have expanded our reach, and no longer concentrate only on encouraging entrepreneurship and innovation, or providing the knowledge required to develop a longterm strategy in all areas of our Ministerial responsibilities. We now actively participate in the implementation of novel technologies in the Israeli energy economy. For example, we led the ministry push for electric transportation, we are now involved in integrating smart network technologies into the electricity market and are trying to promote Agri-PV as a main contributor to solar electricity production.

We feel fortunate to be in the center of the energy revolution – supporting exciting new technologies that will make our world cleaner and change the energy economy towards sustainability. Some of this is presented in this booklet, and we hope you will enjoy it as much as we do.

We tried to arrange the information in this booklet in a readily accessible manner, highlighting our activities as well as the innovative ideas and achievements of Israel's talented entrepreneurs at the heart of Israel's growth and its worldwide reputation as the "Start-up" nation.

For updated information on our activities please visit our web page:

https://www.gov.il/en/departments/topics/research_and_development

For the recent years' portfolio of R&D projects we have supported please visit our projects web site: <https://studiesandcontracts.energydmz.org/CSOSupportedProjects/#/>

We welcome any comments, questions or suggestions. Please feel free to contact me any time at: gideonf@energy.gov.il.

Sincerely,

Dr. Gideon Friedmann

Acting Chief Scientist, Ministry of Energy

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About the Chief Scientist Office (CSO)



The Chief Scientist Office (CSO) in the Ministry of Energy (MoE) serves as a knowledge center for the MoE and the local market in the areas of energy and natural resources. It encourages innovation and entrepreneurship, leads the government to embrace broad and long-term views, by identifying opportunities and good practices and developing programs and projects that will serve as the basis for evidence-based policymaking. It also facilitates and develops international, inter-agency, academic and commercial support programs and collaborations to sustain new research and commercial initiatives. In doing so, the CSO supports the MoE in reaching its future goals, according to the economic and social growth of the state of Israel.

OUR GOALS



Promote innovative projects in the Energy and Natural Resources Sector.

Encourage innovation and entrepreneurship, and prepare the energy sector in Israel for future needs and challenges.

Initiate and lead policy that is imperative to the development of a sustainable energy sector in Israel.

Communicate science and innovation to the general public.

FINANCIAL SUPPORT

Single Point of Contact for Multiple Development Stages



Renewable Energy

- Solar
- Biomass
- Wind
- Wave power
- Dual use of land



Smart Grid

- Energy storage
- Electric Vehicles
- Grid infrastructure
- Micro grid
- Demand & Production Management



Clean Transportation

- Electric vehicles
- Bio fuels
- Natural gas
- Fuel cells
- Hydrogen



Energy Storage

- Batteries
- Hydrogen
- Synthetic Fuels
- Compressed Air
- Flywheel
- Heat/Cold
- Supercapacitors



Energy Efficiency

- Buildings
- Industrial
- Water
- Smart Energy Management



Water Energy Nexus

- Desalination
- Reduce water losses
- Water & Wastewater
- Water supply
- Supply Management



Earth & Marine Sciences

- Oceanography
- Oil & Gas
- The Geology of Israel



Environment

- Waste to Energy
- Reducing environmental Impact of Energy Infrastructure



Mining & Quarrying

- Economic potential
- Environmental impact
- Substitutes



Earthquake

- Seismic risk
- Monitoring
- Paleo seismicity
- Risk assessment



Nuclear Energy

- Nuclear waste
- Risk assessment
- Safety & security
- Small Modular Reactors
- Cooling



Policy & Resource Planning

- Energy Security
- PR & Education
- Regulation
- Public opinion

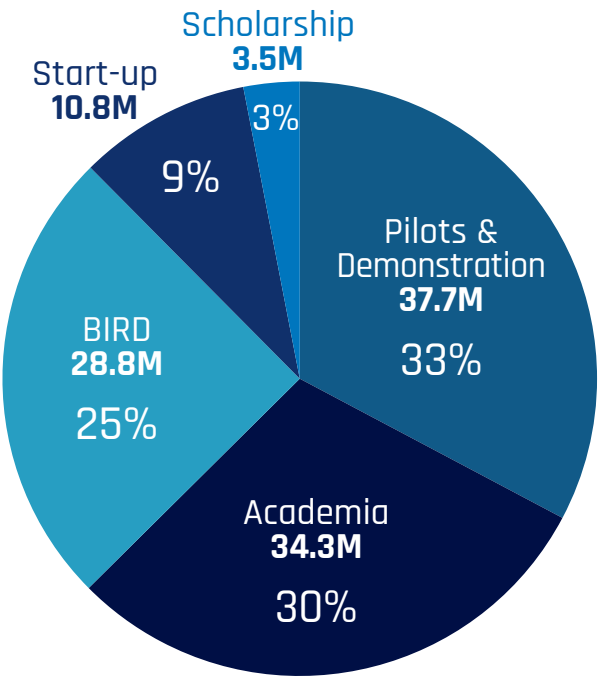
We fund different projects via several channels



Every year, the CSO publishes calls for proposals for researches in all fields of activity, as well as for the various stages of R&D, from inception to implementation, according to the R&D areas of focus and the priorities defined by the Ministry. We provide financial support as follows:

- Academia
- Start-up
- Pilot & Demonstration
- Scholarships
- BIRD Energy

In 2018-2019 the CSO invested over 115 Million NIS in 134 projects and 3.5 Million NIS in Scholarships for 35 students



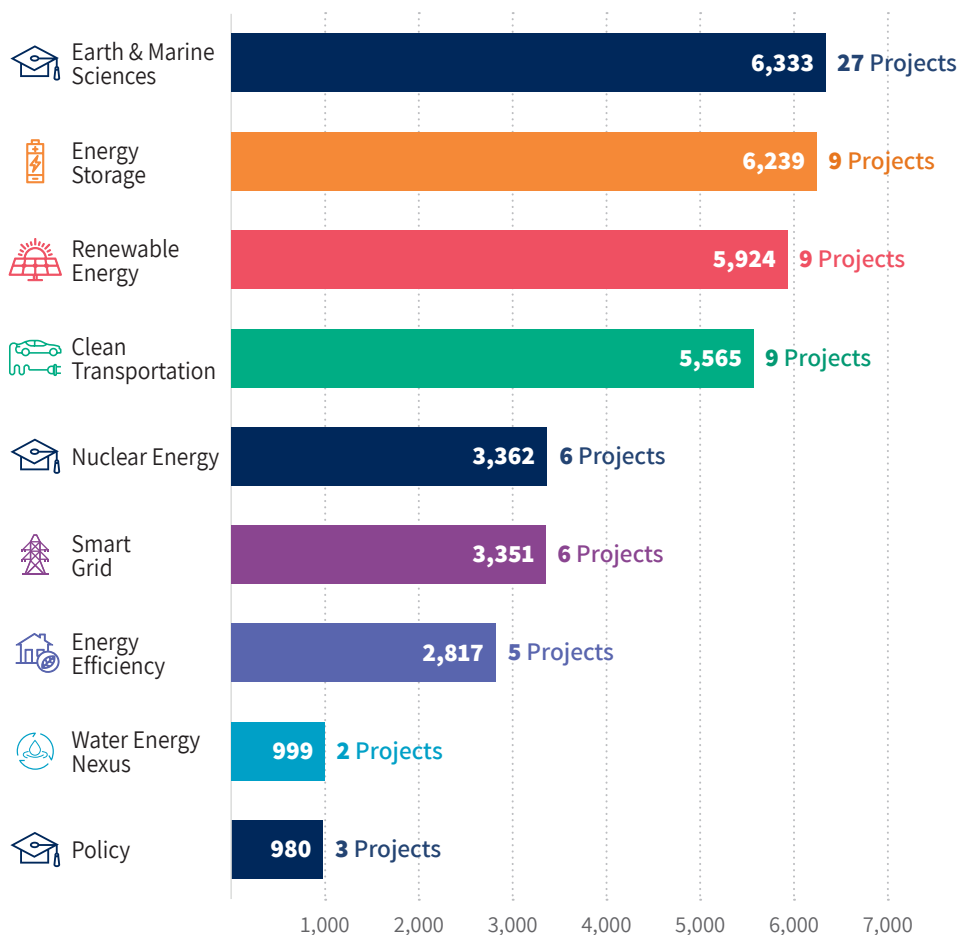
🎓 Academic Research Fund

The CSO assists in funding academic research in Israel. Each year, the CSO covers up to **100%** of the costs of dozens of academic research projects, reaching a total budget of tens of millions of NIS.



In 2018 and 2019, the CSO invested over **34 Million NIS** in **76 projects**

Academia - Distribution of funds (K NIS) & number of projects by field, 2018-2019



Scholarships

The Ministry of Energy grants scholarships to outstanding students in the fields of energy, geology and geophysics.



In 2018 and 2019 the CSO granted **32 academic scholarships** totaling in **2.64 Million NIS** and another **3 postdoctoral scholarships** abroad totaling in **861K NIS**

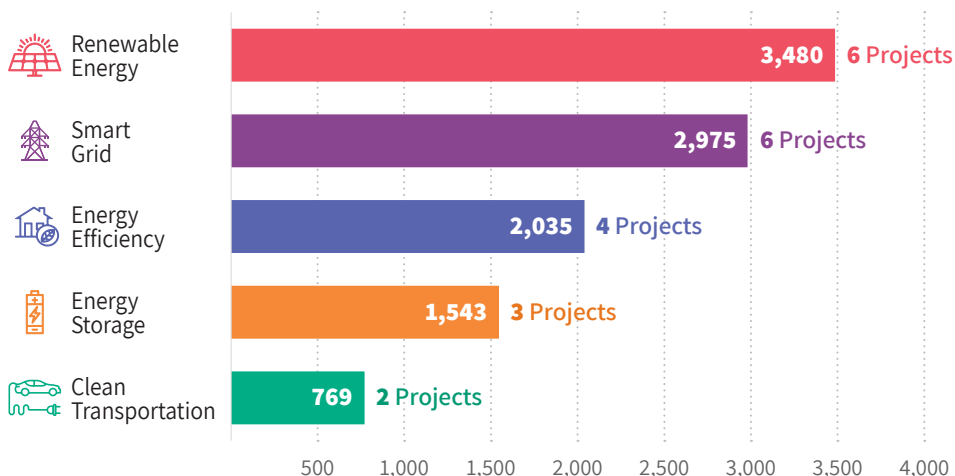
Start-up Fund

The Start-up Fund is designed to enable entrepreneurs to test the feasibility of novel technological concepts in the various fields of energy, or to build a prototype. The program grants up to **62.5%** funding per **a 1.2 Million NIS** project.



In 2018 and 2019, the CSO invested **10.8 Million NIS** in **20 projects**

Start-up: Distribution of funds (K NIS) & number of projects by field, 2018-2019



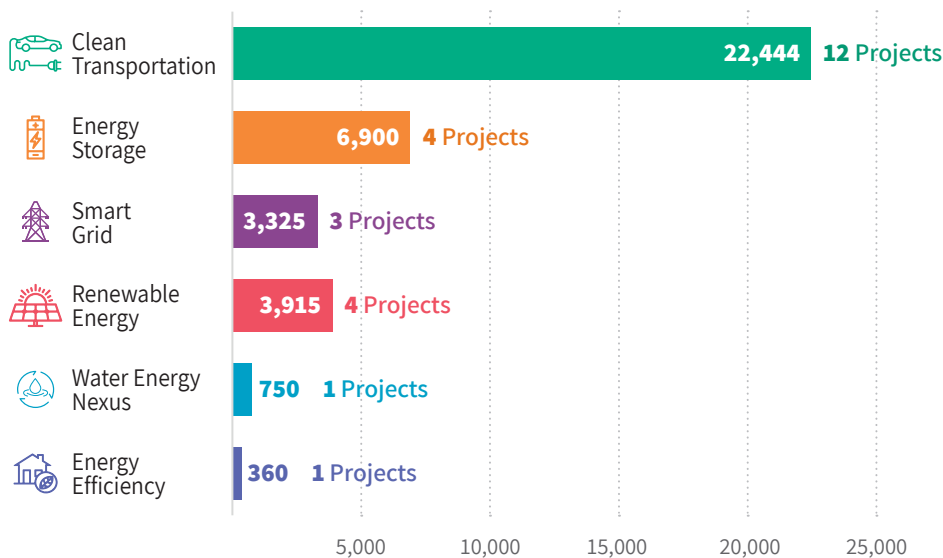
Pilot & Demonstration Fund

The purpose of this fund is to assist companies to scale their innovative products to production and demonstrate them under real Israeli market conditions of the Israeli market. The program grants up to **50%** funding per **3 Million NIS** project.



In 2018 and 2019, the CSO invested over **37 Million NIS** in **25 projects**

Pilot and Demonstration: Distribution of funds (K NIS) & number of projects by field, 2018-2019



International R&D Cooperation



The CSO maintains a broad range of relationships with key international research entities, including research funds, international research institutes and research agencies.

🌐 The BIRD Energy Fund

The Israel-U.S. Binational Industrial Research and Development (BIRD) Foundation has been supporting U.S.-Israel innovation partnerships for almost four decades. Since its establishment in 1977, BIRD has approved more than 1,000 joint U.S.-Israeli projects, leading to some major innovations, some of which have had considerable impact, and produced revenues of more than \$10B.

In 2009, a new program named BIRD Energy was initiated jointly with the DOE & the MoE. The program has been separately funded by each government in the key areas of support.



**Renewable
Energy**



**Smart
Grid**



**Clean
Transportation**



**Energy
Storage**



**Energy
Efficiency**



**Water Energy
Nexus**



From 2018 to 2019, the BIRD energy fund invested over **28.8 Million NIS** in **13 projects**

For more Info, visit the website: [BIRD Energy](#)

U.S. – Israel Energy Center

The Energy Center has been established by U.S. DOE and by the MoE jointly with the Israel Innovation Authority and is managed by the BIRD Foundation. The Energy Center goal is to promote energy security and economic development through the R&D of innovative energy technologies, by facilitating expanded cooperation between consortia of U.S. and Israeli companies, universities and research institutions. The Energy Center is a 5-year program, covering 4 Topics: Fossil Energy, Energy Storage,

Energy Cyber and Energy-Water Nexus. For each topic, a consortium of U.S. and Israel companies and/or universities and/or research institutions jointly perform R&D, leading to know-how/technology transfer from academia to industry and significantly accelerating deployment of technology. In 2020, three consortia were chosen for the topics of Fossil Energy, Energy Storage and Energy-Water Nexus lead by Universities from both countries. While a call for proposals for Energy Cyber was recently closed and we expect to declare a winner shortly.

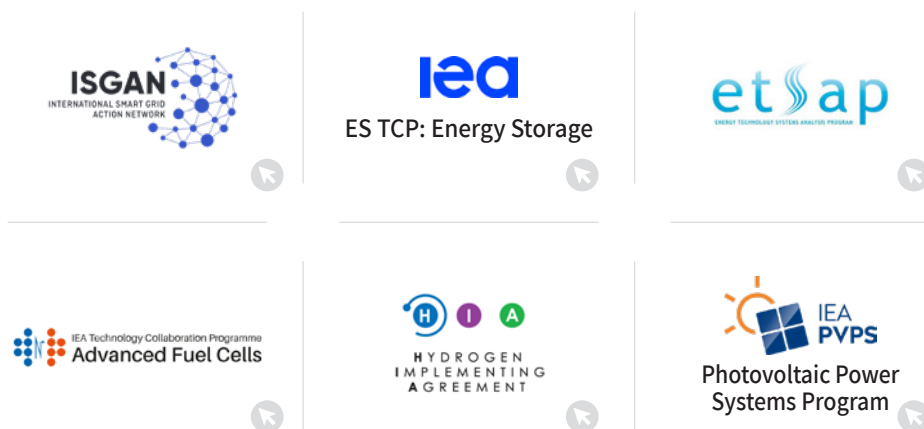
For more information: <https://us-isr-energycenter.org/>

The IEA - International Energy Agency

The CSO works closely with the IEA, an independent organization operating within the OECD, which unites 30 developed member countries and 8 association countries around the world.

The IEA carries out a program for cooperation between Several OECD countries in the field of energy, aiming to develop and implement new and improved clean energy technologies. Israel's participation in these programs is important for promoting R&D, collaboration and forming work relations with key entities worldwide.

The State of Israel, via the CSO in the Ministry of Energy, is a member in 6 technology collaboration programs (TCP) in the field of energy:



More information can be found at the IEA official website:

www.iea.org/about

The European Union

The CSO operates several joint programs with the European Union and publishes annual calls for proposals. Unlike the collaboration with the USA, in which grants provided to projects are distributed through the BIRD foundation, in the European collaboration programs each country bears its own costs, and funds are distributed directly by the CSO.



Water JPI

The Ministry is a member of the Water JPI (Joint Programming Initiative) organization, which aims to tackle water challenges via promoting cooperation between European countries in the various fields of research related to water.

ERA-NET Cofund scheme

ERA-Net (European Research Areas) is a program for European cooperation in R&D that is supported, through Horizon 2020.



Solar ERA Net: cooperation for promoting technologies related to Generating electricity from the sun, in which more than 20 countries are members.



ERA Net Smart Energy Systems: cooperation for promoting a smart electricity network, which will also engage in smart energy, with 21-member countries.

JRC



The JRC (Joint Research Center) of the European Union is operated by the European Commission to determine European policy, regulation and standardization, based on technology. The JRC hosts specialist laboratories and unique research facilities and is the home to thousands of scientists.



Horizon Europe

Horizon Europe will be the ninth framework program for research and innovation (FP9). It builds on [Horizon 2020](#) which ended on 31 December 2020.

The European Commission proposed a total budget allocation of €100 billion to finance science, research and innovation projects during the 2021-2027 period. The main aims of the program are to strengthen science and technology, to foster industrial competitiveness, and to deliver on the EU's strategic priorities, on climate change, and tackle global challenges that affect the quality of people's daily lives.



Relevant Links:

[Horizon Europe – ISERD website](#)

[Framework program for research and innovation 2021–2027](#)

[The next research and innovation framework program](#)

[Horizon Europe Factsheet](#)

[Horizon Europe Strategic Planning Factsheet](#)

[Presentation outlining Horizon Europe](#)

CSO's Library



The Ministry's library is hosted at the Chief Scientist Office, and serves both the Ministry's staff and the general public. The library has a unique and rich collection of books, research reports, journals, maps and standards in the subjects of energy, water, earth and marine sciences.

<https://www.gov.il/he/departments/general/library>



Earth and Marine Sciences

The MoE is responsible for the following governmental research institutes:



The Israel Geological Institute (GSI)

The Israel Geological Institute is a governmental research institute operating as a support unit to the Ministry of Energy. The GSI was established in 1948. The GSI's goal is to create a scientific & technological basis and to use it with regard to monitoring, research and sustainable development of the earth and subsurface, for the benefit of the Israeli society and economy.



The Israel Oceanographic and Limnological Research (IOLR)

The Israel Oceanographic and Limnological Research Ltd., established in 1967, is a national research institute that operates as a non-profit governmental company. The research in IOLR is interdisciplinary and combines diverse scientific disciplines, such as physical oceanography, marine chemistry, biogeochemistry, geology, biology and ecology. IOLR's scientists have long lasting scientific cooperation with leading universities and research institutes in Israel and abroad.



The Geophysical Institute of Israel (GII)

The Geophysical Institute of Israel (GII) is a governmental company established in 1957. The GII specializes in the application of diverse geophysical methods, to map the structure and characteristics of the subsurface, mainly for the oil and gas industry in Israel and worldwide.



Nuclear Energy

The MoE is considering the introduction of Nuclear Energy into Israel's energy mix. The need for including Nuclear Energy as a substantial source of energy for electricity production stems from three considerations:

- The need to diversify energy sources in order to secure sustainable electricity production at stable prices under varying economical and security conditions.
- Israel's commitment to reduce Greenhouse gas emissions commitment which implies reduced dependency on gas as an energy source.
- The difficulty of renewable energy to contribute all of Israel's energy requirements due to space limitations and their impact on the environment.



RENEWABLE ENERGY: Companies and R&D

In October 2020, the government updated the target of electricity generation from renewable sources by 2030 from 17% to 30%.

According to this vision, by the year 2030, Israel will mostly rely on natural gas and renewables for its energy needs. This goal will be achieved in tandem with closing all coal power plants and the sale of new polluting cars powered cars.

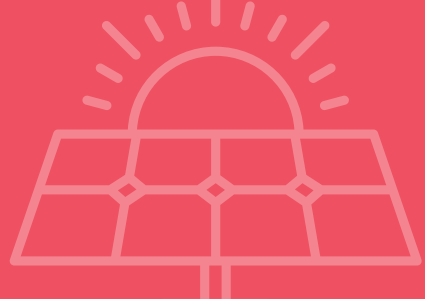
The CSO firmly believes that the need to integrate renewable energy is based on strong rational foundations, in order of importance, as follows:

- Increased energy security due to the diversification and decentralization of the sources for generating power.
- Reduction in pollution and emissions along its health benefits.
- Electricity at maintenance costs at the end of the project period (20-25 years). Even current costs are now competitive in some cases with fossil fuels.
- Development of the Israeli industry.
- Price stability and certainty, since the prices are capped at the project set up.

The CSO prioritizes research in these fields:

- Increased solar conversion efficiency and dual use of land for energy production in: Farm land (Agri-PV), water reservoirs, rooftops, parking lots, roadside and interchanges and new sources of renewable energies.

However, the very high penetration of variable renewables into the electricity market will still need to rely on hybridization with other sources of energy and energy storage.



Agri light

Agri-Photovoltaic has developed and now piloting a fully integrated agri-voltaic system with the aim of increasing both energy generation and agricultural output.

Agri-Light's solution is a solar system, powered by proprietary algorithmic models, that combines photovoltaic bifacial panels with a tracking system and IoT sensor inputs to best capture the sun's energy and optimize agricultural crop cultivation.

Agri-Light's technology automatically adjusts the tilt angle of the solar panels to ensure sufficient solar radiation, required for the photosynthesis process of the agriculture crops, based on crop type, geographic location, season of the year, weather, and time of day.



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BrightSource Energy

BrightSource Energy, with its R&D division in Jerusalem Israel, designs, develops, builds, and operates Concentrating Solar Power (CSP) central tower plants. Our innovative technology includes the tens of thousands of wireless heliostats which focus solar energy on the receiver, the control system that coordinates their movements to maximize energy collected and a range of other aspects making this renewable technology work. BSII stands behind the Ivanpah 392 MWe project in the desert near Las Vegas, the Ashalim 130 MWe project in the Negev and the Noor Energy 1 project with 100 MW + 15 hours storage now under construction in Dubai.



BrightSource

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Eco Wave Power (EWP) Onshore wave energy

Eco Wave Power (EWP) is a leading onshore wave energy technology company that developed a patented, smart and cost-efficient technology for turning ocean and sea waves into green electricity. Eco Wave Power's mission is to assist in the fight against climate change by enabling commercial power production from sea and ocean waves.

EWP's technology is co-funded by The Chief Scientist of the Israeli Energy Ministry and is recognized as a "Pioneering Technology", in addition to being labelled as an "Efficient Solution" by the Solar Impulse Foundation.

The company was also recently recognized by the United Nations in receiving the "Climate Action Award".



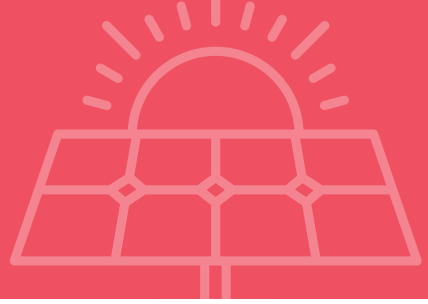
 www.ecowavepower.com

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 +972-3-509-4017

About the collaboration with the Ministry of Energy - Eco Wave Power is in advanced construction of the first grid connected wave energy project in Israel. The project will include the construction and installation of ten floaters on 30 linear meters on a pre-existing breakwater within the Port of Jaffa, having an installed capacity of 100 KW. The Jaffa Port installation will be EWP's second grid connected project after its Gibraltar project which was launched in 2016.





Ener-t International

Ener-t International is a renewable energy technology expert, EPC (Engineering, Procurement, and Construction) contractor and project developer of concentrated solar thermal power plants (CSP), solar PV projects, biogas systems, Hybrid Solar-Fuel systems and Storage Systems. Ener-t offers complete EPC package, including the supply of the solar field, power block, storage system and balance of plant using its patented high-efficiency, proven and bankable technology.

At present, to be economically feasible, CSP is limited for use in installations of 100 or more megawatts, situated on hundreds of hectares of land. For smaller size sites, the current collectors are too large, the solar field configuration doesn't fit the various shapes of the small sites, the loops are too long and the whole plant is too complicated for operation and economical and competitive.

The goal of this project is to create a CSP system that would be economically and competitive for use in relatively small sites.



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Kfar Saba Economic Development Corporation (EDC) Solar systems for urban rooftops

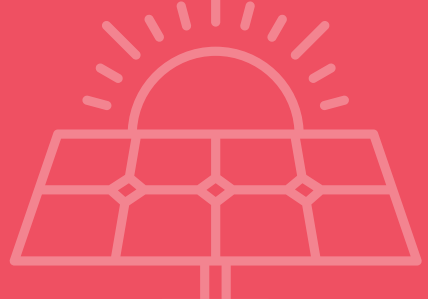
The Kfar Saba Economic Development Corporation (EDC) is a leading urban execution arm in Israel and a pioneer in implementing breakthrough innovative urban technologies. As a municipal subsidiary fully owned by the Kfar Saba municipality, the company's main objectives are to create and promote economic projects whose promotion will ensure a positive, public and economic return to the city. EDC, has an extensive experience of working with Public Sector as well as private sector bridging the gap between them, using Kfar Saba as an Urban-Living-Lab.



 www.ksaba-com.co.il/english

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The supported project has been initiated as part of an extensive program the EDC is leading in the solar sector, to install and operate solar systems on urban Roof Tops. The purpose of this program is to prove and quantify the optimal use of roofing real estate for the benefit of the city's needs in the field of energy production, regulation of runoff originating from rain, energy savings for cooling and heating buildings, and for creating ecological habitats. In fact, the combination of these systems may improve the performance of the systems but most importantly it will benefit the energy balance of the city.



Luminescent solar power PV/CSP hybrid solution

The luminescent solar power company is developing a new 24/7/365 solar energy solution that replaces fossil-fuels turbines and is cheaper than gas. The technology that recently emerged from the Technion, is modular& scalable.

Recently, we developed, patented, and experimentally demonstrated a new concept, named **Luminescence Solar Power (LSP)**, where solar radiation is focused onto a photoluminescence (PL) absorber, which absorbs the high-energy solar photons and emits low-energy photons having a high quantum efficiency (QE) at high temperatures. The emitted photons have sufficient energy to drive the adjacent PV nearly as efficient under direct illumination but without the excessive heat, which conventionally reduces the PV efficiency. This by itself allows Concentrated-PV (CPV) with minimal heating. More importantly, by absorbing high-energy photons and emitting low-energy photons, the PL-absorber accumulated the excessive heat, which is nearly 50% of the total impinging energy, and is heated to 500°C. The high-quality heat at the PL-absorber is collected by a Heat Transfer Fluid (HTF) stored and later converted to electricity at a turbine efficiency of 40%. **In other words, without reducing much of the photons available for PV conversion leading to 20%-30% output power, an additional 50% of energy is efficiently used by CSP.**



Luminescent
Solar Power



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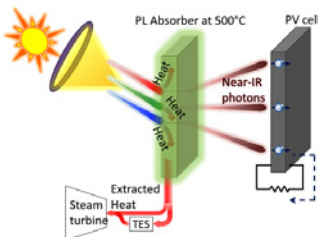


Illustration of the LSP concept. (a) Concentrated sunlight illuminates a PL absorber. The red-shifted PL emission is then coupled to a PV cell with a matched bandgap, while the residual heat (at 500°C) is stored and transferred to a steam turbine.

NAYAM WINGS LTD

Wind propulsion for ships

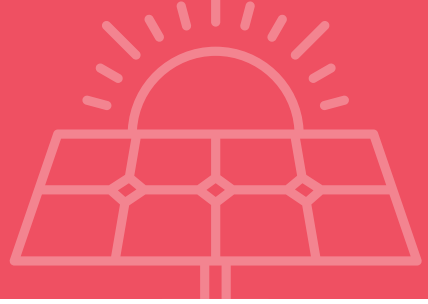
NAYAM WINGS LTD (NYW) is a maritime wind propulsion venture based on breakthrough technology that utilizes aircraft-like wing for harnessing wind energy for thrust for flat deck ships. NYW provides the best solution for IMO2020 (International Maritime Organization) regulations for reducing emissions to the atmosphere from maritime vessels. NYW have the highest efficient forward wind propulsion and fuel consumption reduction compared to all its competitors. The demand for wind propulsion is growing exponentially in the maritime world since 1/1/2020 when the IMO2020 regulations came into force. The company had established a consortium for building its first full size prototype on a ship by 2022.



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Orion

Implementing Agrivoltaics in orchard plantations

The overall aim of ORION is to develop an intelligent integrated framework for the use of organic photovoltaics (OPV) in the greenhouse industry. To achieve this, ORION will develop, test, and evaluate innovative organic photovoltaic modules, which will be incorporated on top of the greenhouse roof or inside the greenhouse above the crop. Co-developing the same area of land for both photovoltaic electricity generation as well as for the production of agricultural products (vegetables, fruits and flowers) is one of the main objectives of this study. In parallel, ORION will develop a wireless sensor system for smart management of the whole system (crop, microclimate and energy from OPV) and a computational fluid dynamic code for extending, via simulations, the use and adoption of the proposed system in different greenhouse types, different areas and different crops.

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The project results will contribute to optimizing the application of OPV in greenhouses. The project will advance the technological development of the most intensive branch of agricultural production (greenhouse). The participation, in the project, of universities, research institutes and industry, with experts from both the photovoltaic and agricultural sectors, provides a unique synergetic approach.

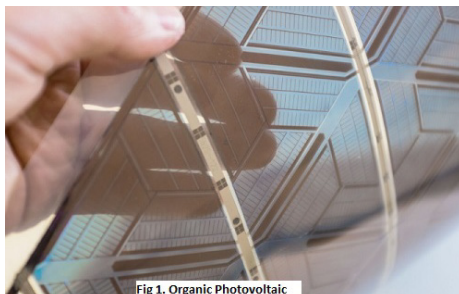


Fig 1. Organic Photovoltaic



Fig.2. OPV in greenhouse

Organuz Energy Marketplace LTD

Marketplace for PV solar energy

Organuz is an online energy marketplace that focused on PV solar energy. Organuz designed to create a common arena for stakeholders in which they can: find potential projects, share knowledge, gain exposure, participate in worldwide projects, characterize and examine projects with high reliability, find innovative financing solutions, and easily compare and select equipment, suppliers and contractors.



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PV Nano Cell

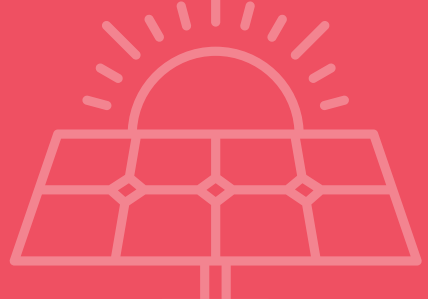
Printed contacts for PV

PV Nano Cell offers the first-ever complete solution for mass-produced inkjet based, printed electronics. The proven solution includes PVN's proprietary Sicrys™, silver-based conductive inks, inkjet production printers and the complete printing process. In the heart of PVN's value proposition lies its unique and patented conductive silver and copper inks - Sicrys™. Those are the only inks made of Single Nano Crystals – which enable the inks the highest stability and throughput required for mass-production. Our solutions are used worldwide in a range of applications such as: automotive, IoT, photovoltaics, printed circuit boards, flexible printed circuits, antennas, sensors, heaters, touchscreens and many more.



 www.pvnanocell.com

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SolAround Bifacial PV

SolAround, an Israeli start-up company with R&D labs in Konstanz, Germany, has developed and launches its novel bifacial p-PERT PV cell technology, that possesses n-type performance (higher efficiency, bifaciality and stability) at a standard p-type production cost, all leading to significantly higher financial profits for solar power-plants' owners.

SolAround's technology provides state of the art bifacial solar cells with high performance similar to more expensive technologies: high front efficiency (>22%), high bifaciality (>90%) and high stability while utilizing the standard industrial low-cost silicon.

This combination of low production costs, high stability and high energy density with a total of 27-30% energy equivalent efficiency allows for over 10% LCOE reduction, compared to most advanced solutions.

SolAround samples fully industrial cells in semi-industrial lines in Germany, has successfully demonstrated its process in a fully industrial fab in Asia. SolAround owns solid IP with significant technology barriers, sustainable business models, mass-production pilot experience and a large variety of potential clients.

The company is seeking strategic mass-production and/or energy partners and investments for mass-producing and commercializing its product in India, Taiwan, China, in the US and in Europe. The company was supported by the IIA from its early incubation stage, through additional bi-lateral R&D consortia with Germany, as well as by the bi-lateral Israel Taiwan fund, assisting the company to mass-manufacture.



SolAround

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SolarWat

An efficient and low-cost solar panel

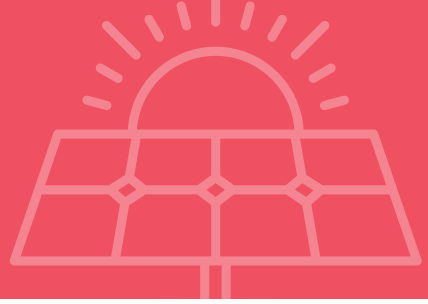
SolarWat has developed an innovative, cutting edge, and tested patent protected Solar (PV) panel that provides a significant 10% higher energy yield under regular sunshine conditions and 35% more under partial shading conditions, a two-fold increase in system lifespan, at a low system cost per watt. The SolarWat Panel may be implemented with all types of solar cells. The SolarWat panel manufacturing process is similar to the regular panel process and uses the same technology, materials and machines. The system is successfully operational on the company field-site for more than three years. SolarWat panels have been tested and verified by the Fraunhofer Institute (Germany) and awarded a Seal of Excellence by the European Commission. SolarWat is the only PV panel technology that provides a higher power yield at a lower panel cost per watt.



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Sustainable Green Technologies (SGTech)

Biogas production from animal waste

Sustainable Green Technologies (SGTech) is a cleantech startup specializes in providing a complete and sustainable solution to the livestock industry: SGTech has developed an innovative biological process, combining enhanced biogas production (Increased energy output by up to 30%) with simultaneous removal of nutrients from livestock manure and slurry. The process successfully removes nitrogen and phosphorus from the liquid waste and the effluent can be discharged to the sewage grid with no further treatments.

The outcomes of the patented breakthrough process are achieved owing to the precise management of the microbiome present in the process.



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Technion

Efficient heat engine at small capacity for solar and waste heat

Concentrated solar power operates at typical temperatures of 560°C (833K) for towers and 400°C (673K) for troughs. The energy density of such temperatures is low compared to fossil fuels, which challenge the efficiency of heat engines in converting this heat into electricity. Steam turbine becomes efficient (>40%) only at a capacity above 30MW. As far as we know, there is no current small capacity (<1MW) and high efficiency (>40%) heat engine. sCO₂ turbine aims to meet this challenge, but its Levelized Cost Of Electricity is too high to be applied in the solar and wasted heat market.

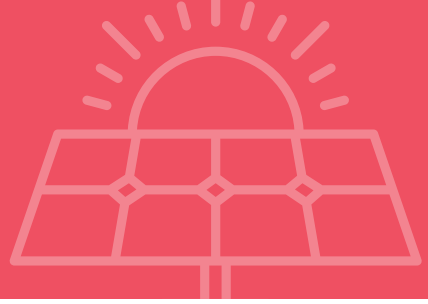
It is the aim of this proposal to demonstrate low-cost (<250\$/kW) efficient (>40%) conversion of solar heat to electricity.

We will build the first-ever heat engine where the heat transfer fluid (HTF) supplies the heat to air bubbles, realizing a near-ideal Carnot engine by allowing isothermal expansion of the air while performing the thermodynamic work. This new engine relies on a well-established hydro-electric technology with proven high efficiency and low cost. Successful realization of this HTF-engine is a game-changer in waste heat recovery and solar energy conversion. Such a heat engine can also operate on hydrogen, bio-diesel, or fossil-fuels when the sun is not available for a few days offering a 24/7/365 supply that replaces gas and coal power stations, and allow boosting the solar energy portion to above 50%.



 excitonics.net.technion.ac.il

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3GSolar Photovoltaics Ltd

Energy Solution for Wireless and IoT

3GSolar produces printed dye-based photovoltaic cells that utilize fluorescent and LED light with exceptional efficiency, as well as low level outdoor light, for powering wireless electronics. This eliminates the need to continuously replace and discard batteries within the soon-to-be >50 billion connected devices around the world. The 3GSolar product can be applied in many electronics markets such as Smart Home/ Buildings, Smart Agriculture, Industrial IoT, Electronic Shelf Labels (supermarkets, department stores) and Tracking (air and marine cargo, hospital assets, etc.).



3GSolar
Energy for wireless



www.3gsolar.com



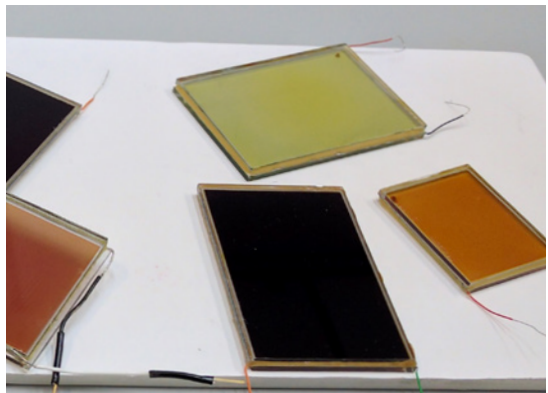
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With our initial wireless energy solution now fully developed and launched, we're shipping globally and generated first revenue. We look for more electronics companies join us as customers and partners.

In addition to our first commercial PV for electronics, more devices in our product pipeline for the IoT and Wearables markets are ultrathin and Perovskite PV.





ENERGY STORAGE: Companies and R&D

Recently, the Israeli Ministry of Energy set a new target of 30% renewable electricity (RE) generation by 2030. However, since solar and wind energy are highly intermittent non-dispatchable sources, achieving high rates of RE will require energy storage. We must find ways to utilize RE in times of demand and not necessarily at times of production. Furthermore, the shift from centralized controlled fossil-fuel-fired power plants to millions of small uncontrolled, mostly solar generators, poses significant challenges for the power grid and may require more backup, which can also be supplied by storage. Using technologies such as typical Li-ion batteries, which store energy for a few hours, can be advantageous but is not sufficient. We ought to find means to store energy for days or even weeks for periods in which renewable generation is low or does not exist (mainly during winter for Israel).

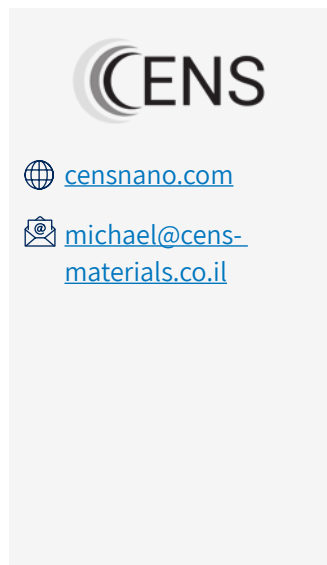
The CSO at the Ministry of Energy seeks to take a leading role in funding and supporting Israeli startups that aim to tackle these challenges. One such company is Augwind, which develops novel compressed air energy storage technology that can store energy for days or even months. Other companies, with the contact details, can be found in this booklet.

CENS

Improved Li-Ion Battery

Established by 2014, CENS technology overcome 3 main EV challenges: (a) Driving range, (b) reduce \$/kWh and (c) reduce charging time. CENS Nano technology transforms Li-Ion battery into fast charge, high energy & power unit.

CENS Nano technology is a leading solution provider for advanced Cathode & Anode materials for Li-Ion cells. We develop and license technology that could be implemented at the heart of any Lithium-Ion battery. CENS innovation and patent technology increases energy density and increases the battery cycle life. Our team consists of exceptional and highly experienced world-class Ph.D. scientists & engineers backed by known professors with deep level knowledge and know-how in nano technology, and chemistry.



With CENS disruptive technology, customers can benefits from:

- Increase Li Ion battery capacity by 40%
- Extend battery cycle life by 50%
- Reduce charging time between 50%-80%
- **Reduce EV battery cost (\$/kWh) by more than 30%**
- **Drop-in solution – doesn't require changes in production line**
- Applicable to any type of Li-Ion battery (including next generation of batteries – silicon, solid-state)

The Ministry of Energy awarded CENS with financial grant for the implementation of a full-scale pilot project using CENS technology in Electric Vehicles.

Dr Ten Sea-Salt Battery

Jerusalem-Netherlands based company, **Dr Ten**, has developed a new, green battery with low cost, abundant materials and sea-salt.

The project founded by the CSO in the Ministry of Energy improves the first generation system, into semi-commercial full battery-ICT-electronic systems with semi-automatic production and hybrid storage systems.

The project will set a practical base for scale up of raw materials, automatic battery production, investments, higher power systems and sales next. Our batteries demonstrated more than 64,000 fast discharge cycles at 100% discharge enabling kWh storage prices of ~0,03 € per kWh per charge-discharge cycle.

The new batteries proofed to stabilize solar energy, grid peaks and lower EV power. Combinations with market leading lithium and lead acid batteries (hybrids) are also possible lowering kWh storage prices and improving quality as currently these act around ~1,000-5,000 cycles, ~0,5-30 €cent/kWh storage price and discharge/material use of 50-80%.



 www.drten.nl

 www.seasaltbattery.com

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Hydrogen

Alkaline Exchange Membrane. Fuel Cells

HYDROLITE Ltd. is a start-up company, owned by Elbit Systems, which focuses on the development of novel hydrogen technologies for energy storage and conversion based on its world-leading alkaline exchange membrane (AEM) electrode and stack technology. Featuring high efficiency power-to-hydrogen (Electrolyzer) and hydrogen-to-power (Fuel Cell) devices, our unique technology reduces costs and delivers high performance and versatility. Applications for our company's technology range from stationary backup and power systems to hybrid energy banks, range extenders, off-grid platforms and microgrids, long-period energy storage, hydrogen generation and grid reliability. The world class team and development facilities established by HYDROLITE, combine Israeli innovation and technical excellence with a disruptive AEM device technology and advanced, "Designed for Alkaline" system engineering, systems integration, to enable reliable, 100% renewable energy via robust, low-cost combined storage solutions.



 www.hydrolite-h2.com

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Nostromo Energy

Energy storage in ICE

Nostromo Energy has developed the most cost-effective, safe and clean Energy storage system available, based on water!

Nostromo IceBrick™, an Ice-based Thermal Energy Storage system, stores electric power during off-peak hours/surplus solar and later uses it for cooling during peak hours. Nostromo's technology can shift up to 95% of the electricity demand used for cooling of commercial customers such as data centers, office buildings, airports, hotels, manufacturing facilities, shopping malls or any other facility that uses a centralized chiller system for cooling. IceBrick™ is energy-efficient, inexpensive and modular.

As much as 45% of the annual electricity peak demand between latitude 45° north to 30° south is consumed for cooling demands. The electricity infrastructure is designed to supply demands during that peak; therefore, cooling demands are shaping the electricity grid. Nostromo's technology shows zero degradation over 20 years of operation and is based on water. Water is cheaper, safer and cleaner than Li-Ion or any other electrochemical solution.



 www.nostromo.energy

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3DBattery

High storage density

The need for batteries that have better performance is a fundamental aspect of the E-Mobility revolution and part of the transition into a greener and cleaner future.

By inducing silicone into the anodes inside Lithium-Ion Batteries one can increase the capacity of the cell, but with over doping rate the physical structure of the electrodes is damaged over time and the performance is deteriorating.

3DBattery proprietary technology - the SiAnoSep, overcomes this problem and allows the company to create battery cells with an energy density of over 1000 Wh/L, with reduced degradation.

Our team consists of leading scientists with an electrochemistry research background, which are developing further our commercial batteries and simultaneously working today on the solid-state battery of the future

In this program, a pilot production line will be built in order to bring this innovative technology to a commercial product, sold to intl. car OEMs worldwide.



 www.3dbattery.co.il

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SMART GRID: Companies and R&D

The smart grid is a crucial part in the process of transitioning to electricity production from renewable energy. The CSO sees the development of the smart grid as an important milestone in the transition to smart energy, which will include combined and smart management of the consumption and distribution of the entire energy system, including electricity, gas, water and fuel. A close relationship exists between renewable energies and the smart grid, which is needed to optimize the use of renewables. Electric vehicles are also an important part in the smart grid.

PDP Technologies Smart detection of utilities malfunctions

PDP's solution is an IoT system for continuous partial-discharge monitoring of critical electric equipment.

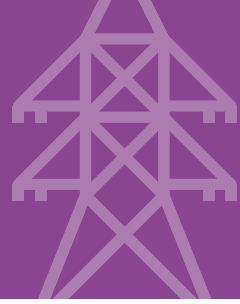
The company enables smart maintenance approaches, and O&M optimization for owners and operators of utilities, and O&M companies.



 www.pdp-tech.com

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Ratenergy Ltd

Mobile energy storage

Ratenergy is a developer in the clean energy arena in Israel, concentrated on Energy Storage, starting from Advanced (HPS) Hydro Pumped Storage (344MW, 3,200MWh), and continuing in gravity liquid metal integrated HPS plan, Hydro-pneumatic energy storage to advanced battery based solutions for HLS, Mil. and RE integrated users.



ratneryo@ratenergy.co.il

Within the Ministry of Energy Chief Scientist's plan, Ratenergy develops an array of mobile (container based) battery energy storage system (BESS), to be deployed in restricted grid access RE developments, hazard stricken areas (FEMA scenario) and grid congestion areas (grid bridge).

The mobile BESS units (5MWh each) would be transportable by rail, trucks, ships and heavy loaders, could assemble for high voltage grid connection point or give an offshore firming services to damaged areas.

Sympower Demand Response Aggregation

One of the greatest challenges in the transition towards a sustainable electricity system is maintaining the balance between supply and demand of electricity. As the proportion of renewable electricity production increases, so does the need for **flexibility** in the system. Renewable energy sources (solar and wind energy) are intermittent, volatile and cannot be controlled.



 www.sympower.net

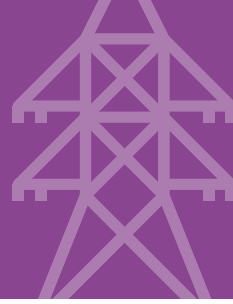
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Historically, flexibility for balancing the grid is provided by adjusting the supply side, i.e. fossil-fuel based resources (generators and peaker plants), whose operation is among the most polluting and expensive.

With today's technological advancements in the field of IoT and smart grids, we are able to provide **an alternative tool for balancing the grid sustainably and cost effectively - by changing the demand side**. This approach is called **Demand Response (DR)** – the adjustment and management of energy consumption to better match the demand for power with the supply.

Sympower is leading the demonstration project for **Demand Response Aggregation** in Israel in close collaboration with the Israeli System Operator. DR aggregation is the act of combining flexibility from distributed energy assets, maximizing use of that flexibility, and providing it to the electricity market.





Synvertec | Grid Stability

When renewable energy and other power sources within the grid reach high levels, the variations within the grid's rotational speed and rotor field increase significantly, potentially causing large fluctuations in power angle, grid voltage, grid frequency and power flow. Synvertec developed a patented control algorithm called Synchronverter. The algorithm in the grid inverters transforms their behavior to that of a synchronous generator. The grid becomes more stable, as it recognizes the inertia produced by the algorithm-supplemented inverters.

By integrating the Synchronverter with existing renewable energy inverters, the Synchronverter transforms them into virtual synchronous generator devices, which effectively enhances grid stability. As a result, stable grids are able to withstand high penetration of renewable energy sources.



 www.synvertec.com

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Source (Shoresh)

Located in the Tirat Hacarmel industrial zone adjacent to Haifa Israel, SOURCE was founded in 1989 by Yoki Gill and Daniel Benoziliyo and now employs more than 250 workers.

The company strives to minimize its carbon footprint and constantly advances itself towards the goal of environmental sustainability.

As part of its vision and in response to the global climate crisis, SOURCE became a local industry pioneer, striving to reduce its GHG emissions to zero.

As part of this effort, SOURCE initiated in 2020 a project for 100% renewable energy use with storage capacity at its Sandals factory with the aim to disconnect the factory from the national electricity network. The project is managed by ARAVA EC&T and is led by Elad Topel and Tomi Cohen.

The project includes PV solar system, battery system, and energy management system, with target to operate the Sandals factory entirely off grid, thereby manufacturing the world's first Zero Carbon sandals.



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CLEAN TRANSPORTATION: Companies and R&D

Israel is almost entirely dependent on oil for transportation fuels. This situation is deleterious both environmentally and geopolitically. The CSO is pushing for clean transportation via a transition to electric vehicles, and clean fuels. We support R&D starting from academic research, through preliminary implementation stages, and up to pilot and demonstration projects.

As part of the activities for promoting the use of alternative fuels in the transportation sector in Israel, the CSO leads an intra-ministerial task force.

Among the activities of the task force:

- Establishing the first hydrogen fulling station in Israel
- Deploying 2,500 charging points for electric vehicles across Israel (including more than 100 fast and ultra-fast points)
- Setting long term tax incentives for the purchase of electric vehicles
- Amending Israel's building codes to include mandatory preliminary charging infrastructure installment in newly constructed buildings
- Preparing the Israeli electric grid for the adoption of electric vehicles
- Encouraging the use of zero-emission vehicles by advertising and focus groups
- Supporting R&D in battery storage, hydrogen technologies and fuel cells

AMRP Advanced Modular Rotary Propulsion Ltd.

Modular Rotary Multi-Fuel Combustion Engine (Gasoline, Diesel and Gas)

The availability of Compressed Natural Gas (CNG) in Israel has become an established fact. AMRP develops a series of light weight, high performance modular rotary combustion engines, that are multi-Fuel and also runs on Natural Gas. Each module that comprises the engine, is rated at 355 BHP and the 2, 3 and 4 module engines, are rated at 710 BHP to 1,420 BHP. The engines are characterized by their simple mechanical construction and low number of parts, no intake and exhaust valves, high reliability, low weight and compact size, high-power density. In addition, there is fully indigenous manufacturing infrastructure in Israel. This project is a rotary multi-fuel, two rotors configuration engine (710 BHP) – coupled to a 300 KW Gen-Set. This engine is being designed to run on Compressed Natural Gas (CNG) as well as Gasoline, Diesel and LPG.



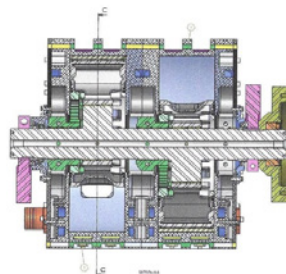
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Blilious

Energy storage & PV for E-Bus

Blilious Group established more than 50 years ago, leading in public transportation, car and busses imports, is also an early mover and innovative player in electric transportation , both for private EVs and Ebusses, and in Energy Storage. The company provides holistic end to end solution in these sectors, defining , designing , providing installing and operating EV & Ebuss fleets and Energy storage systems with the best in class technologies and system solutions. Blilious Energy is representing CATL , global producer of Li-Ion batteries, as well as other technology leaders. To promote the adoption of public transportation based on Ebusses and enable reliable operation plus energy saving , Blilious Energy will develop a solution combining an Energy Storage System with fast charging stations, managed by a dedicated software to optimize and manage the charging operation. Energy will be originated both from the grid and from a local solar energy installation.



 www.blilious.co.il

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City Transformer | Folding car

At City Transformer (CT) we develop personal mobility solutions for our ever-growing cities. Our core innovation is a patented electric foldable platform of our revolutionary city vehicle.

CT vehicles fold and expand according to drivers' needs, allowing drivers to enjoy the benefits of both motorcycles and cars.

CT enables ease of parking and great maneuverability - being only 1 meter wide. It also ensures maximal safety and stability in its wider mode - allowing driving of up to 90 Km/h.

The CT vehicle is closing the gap in micro-mobility between cars and E-scooters/E-bikes sharing services. CT foldable vehicles are safe and suit all people yet they can operate in all weather, are super flexible and convenient.

CT will be offering its **expandable, fully-customizable city vehicle** initially to sharing fleets, logistics & last-mile delivery companies, first responders, and municipalities that saves time, money, and space while enjoying a 100% electric, environmentally-friendly vehicle that is highly reliable, cheaper to own, maintain & repair as well as being future-ready for autonomy and connected mobility.



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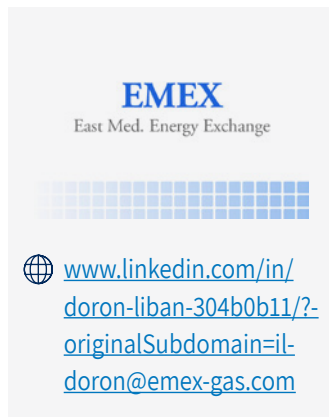
EMEX - East Med Energy Exchange

Wholesale Market Exchange for Natural Gas

Key lessons from liberalized markets show that open access to energy markets and competition are key elements in fostering economic development and innovation.

An important part of this is the wholesale energy exchanges, which have proven to be an efficient tool in developing the gas and power markets by generating the right price signals for optimizing short-term behavior and long-term investments. Price signals help market participants optimize their market activities accordingly.

EMEX creates a platform that facilitates energy trading activities in the East Mediterranean region, as well as contributing to the social welfare and supporting efforts for regional peace. To accomplish this, we established a joint venture with European Energy Exchange (EEX), part of *Deutsche Börse* Group (www.eex.com).



EV-Edge EV Patrol Cars

While some developed countries are showing strong penetration of EVs, the Israeli market penetration is still below the benchmark. Therefore the Israeli government is pushing forward to catalyze the market and all stakeholders towards EVs.

One main path for achieving the required transformation is via fleet operators. EV-EDGE is the leading EV Charging solutions company in Israel. The EV-EDGE pilot aims to electrify petrol stations in municipalities. We offer the municipalities a FSL (Full Service Leasing) service including EV cars, charging stations and a fleet management software.

We believe that after the municipalities transform towards EV, they will stay with EV's for the long run and the citizens will be less reluctant to such a change as private consumers. Our pilot consists of 25 vehicles and will take place in 2-3 municipalities.

EVEDGE

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EV Meter (Nayax) Managed EV Charging

EV Meter, a daughter company of Nayax, has developed innovative technology providing convenience to the drivers and operators of electric vehicles. Our universal level 2 EV chargers are powered by Nayax's cashless payment solutions that allow open and prepaid payment options. Our products are suitable for private residences, multi-family residences, workplace environments and public locations in municipalities. Working with municipalities and electric infrastructure contractors, our features including dynamic load management, smart app, facility management and reporting allow us to futureproof the grid.



 www.evmeter.com

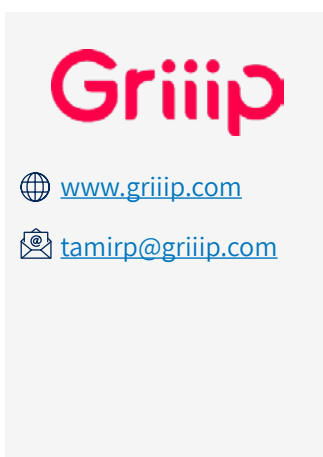
 niso@evmeter.com

Griip

Convert Griip's Formula 1000 racing car into Electric racing car

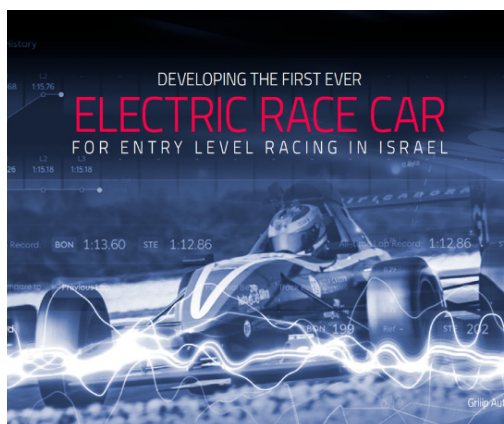
For decades, racing has served as the development platform for the automotive industry. Many of the new technologies implemented today in street cars have first been introduced in race cars, using the fast paced environment of the race track to accelerate the development and bring it to perfection.

Griip is doing the exact same thing, using race cars as a platform to introduce and develop new technological solutions. In this project, the G1 - a race car developed by Griip, is being transformed from using a combustion engine to an electric drivetrain. First, we are defining a regulation that can globally support this unique design.



Next, we are developing the world's first electric race car for entry level racing categories.

This development will allow Griip to create a new racing category in the Motorsport world - entry level electric racing series. This will further promote the use and adoption of electric cars. In addition, we will be able to offer a development platform for local companies to integrate their products, and position Israel as a country that brings innovation to the Motorsport industry.



Menolinx Systems

EV Charging from Street Lamps

Menolinx Systems provides solutions in the fields of energy efficiency, intelligent street lighting, and smart grids. The company delivers a wide range of products to the municipal, industrial, retail, and transportation industries. Menolinx LampID platform is a control, communication, and management system focused on indoor and outdoor lighting systems. LampID system can be implemented as an upgrade/retrofit or as a new street lighting solution, resulting in a reduction of energy and maintenance costs up to 50%. Menolinx received a grant to demonstrate smart electric vehicle charging by using current street light electrical infrastructure. This solution will eliminate the need to expand the power connection and enable the grid manager to avoid or postpone any unnecessary investments at the grid.



MENOLINX
Smart Lighting Systems Control

 [www.linkedin.com/
company/meno-
linx-systems/about/](https://www.linkedin.com/company/menolinx-systems/about/)

NrgStorEdge

Fuel cell fed by hydrogen from formate

Founded in 2016 based on the results of research conducted at the Hebrew University of Jerusalem, NrgStorEdge redefines hydrogen energy storage.

NrgStorEdge disruptive hydrogen storage technology is based on hydrogen chemical reaction with potassium bicarbonate, converting it into water and formate during the loading of hydrogen on the solution. On demand, hydrogen is extracted from the water and from the formate, converting them back into the original material – ready for new hydrogen loading.

In this project, a small vehicle will be continuously charged by our technology. It will include small plastic tanks for the hydrogen carrier aqueous liquid, a Hydrogen Release Unit (HRU) that extracts the hydrogen from the liquid in a special catalytic process, and a fuel cell that converts hydrogen into electricity. The residual heat of the fuel cell serves to heat the HRU, thus increasing the total energy balance.

A real-green technology, it uses water as a storage medium, is not inflammable and nontoxic. Operating in near-to-room conditions with extremely low energy consumption, NrgStorEdge offers **an unprecedented cost-effective solution**. It solves the most critical challenge of the hydrogen economy, the **overall low well-to-wheel energy efficiency** of the current mature technologies for the storage and transport of hydrogen.



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NrgStorEdge technology **unlocks the potential of hydrogen** which is expected to aid the **decarbonization of 45% of global GHG emissions, representing a 2.5 trillion dollar market and 18% of the world's final energy demand** by 2050.

Technion start-up

Anion Exchange Membrane for Fuel Cells

The start-up being created out of research at the Technion will commercialize a series of new anion-exchange membranes with unparalleled chemical stability. The membranes developed at the groups of Prof. Dario & Prof. Diesendruck are orders of magnitude more stable to aggressive alkaline environments compared to other membranes in the market. These membranes are adequate for Anion-exchange membrane Fuel Cells, Electrolyzers, Flow Batteries, and other technologies and devices that require low cost ionic-conducting membranes with superior chemical stability for long operation time.



 diesendrucklab.com

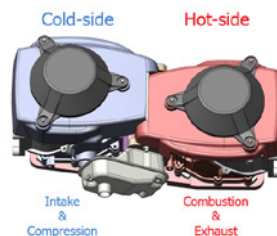
 dekel.technion.ac.il

TourEngine Efficient Motor

TourEngine has developed an engine that reduces fuel consumption and harmful emissions by utilizing a novel thermal management strategy. In addition to being useful for current internal combustion engines, the technology can also be integrated into hybrid engines.

TourEngine has a patented opposed-cylinder split-cycle combustion engine with the potential for substantial efficiency gain as a result of its improved thermal management. It also offers significant reduction in noxious emissions. Unlike hybrid and electric engine technologies that offer improved efficiency but are expensive and complex, TourEngine is simple, as it is based solely on current cylinder/piston technology.

The TourEngine splits the conventional four-stroke cycle between two opposing cylinders: a cold cylinder that hosts the intake and compression strokes, and a hot cylinder that hosts the combustion and exhaust strokes. Splitting the cycle allows flexibility in the design and thermal management, consequently leading to improved energy utilization.





ENERGY EFFICIENCY: Companies and R&D

On November 16th 2020 the Ministry of Energy presented the updated national plan for energy efficiency for the years 2020-2030. The ministry recommends an intermediate target of 11% improvement in energy consumption by 2025 compared to 2015, and an 18% improvement in energy consumption intensity by 2030 compared to 2015. The implementation of the policy measures is expected to lead to a reduction in energy consumption of about 16.5 tera watts. In order to achieve these goals the CSO support innovation in four main fields of energy conservation: cities and buildings; transport; and industry and waste.

Aluminum Construction Group BIPV screen walls

Aluminum Construction Group is one of the principal companies in the field of external screen walls for skyscrapers and other intricately designed buildings. The Group specializes in constant research of new systems, development, engineering, design, production, installation and maintenance of façades for skyscrapers - both residential and commercial - which serve to enhance the cognition and sense of wellbeing of the people behind the building's envelope.



Aluminum Construction Group
Simply Professional

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Brenmiller Energy

Heat Storage

Brenmiller Energy provides sustainable thermal energy storage solutions. The company was founded by Avi Brenmiller, former CEO of Siemens CSP and Solel, and a team of experts in the field of renewable energy. Over the past years we have developed an advanced thermal energy storage technology with a capital investment of \$70m. Our award-winning patented technology is based on storing heat at high temperatures of up to 750°C in crushed volcanic rocks. The storage is charged from different sources of energy – thermal or electric, and delivers energy on demand in the form of steam, hot water, air or electricity. The technology is suitable for the industrial and power sectors. The Chief Scientist Office supported Brenmiller Energy in the development and launching of the hybrid thermal energy storage pilot projects for the mid-temperature segments.



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Elencon Systems

Chiller Smart Management System

Elencon Systems has developed an innovative, patented, Machine Learning based, AI technology for dynamic management of Chiller A/C systems that operate in large commercial, public and industrial buildings. Elencon's Chiller Smart Management System (CSMS) saves, with a minimal up-front investment, up to 30% of the A/C required energy with a software-based solution.



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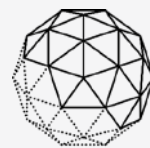
Helios

Low Cost and Efficient Silicon Production

Helios is an Israeli early-stage company that operates in the space industry. The company is developing a reactor that produces oxygen and metals on the Moon to enable the establishment of a lunar base in the coming decade by NASA and other big players like SpaceX and Blue Origin.

The nature of operating in space is such that we do not have the luxury of wasting resources, therefore processes should be as efficient as possible. The Helios solution requires no consumables and 100% of its yield is usable.

As part of Helios' long-term funding plan to reach the Moon, terrestrial applications to its core technology are being explored to establish a sustainable business in the short term. Backed by the Israeli Ministry of Energy, Helios is developing a reactor that produces Solar Grade Silicon for the PV industry. Doing so will enable a more affordable method of silicon production with zero carbon emissions.



HELIOS

 www.project-helios.space

 contact@project-helios.space

KET Generator

Gas Pipeline Monitoring

KET Oil & Gas provides a complete solution with its proprietary technology energy harvester allows long life sensors for monitoring oil and gas systems. Utilizing its POD (Power On Demand) system and cloud AI, allows predictive maintenance reducing both OPEX and CO₂ emissions creating value both for the customer and the environment.

The company aims to address legacy and new build pipelines storage and refineries addressing the immediate need of continuous monitoring to reduce fugitive emissions.

KET Generator
Sensor Power



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National green

Developing IoTG Technology

National Green developed a Green IoT technology - IoTG (patent pending), energy-efficient IoT. A new sensing technology adds to the IoT a new layer of detection and safety. In addition to internet control, the IoTG detects the use of controlled equipment. The detection allows it to automatically turn on or turn off the equipment according to its use. Moreover, while the IoT device consumes energy even in off mode, the IoTG is completely disconnected from the mains, reducing the energy consumption and the risk of fires.

 www.iotg.tech

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The GPLUG implements the IoTG technology as an electrical equipment add-on. Using the unique sensing technology, the GPLUG automatically connects or disconnects the equipment from the mains, according to its use. The sensing technology enables the GPLUG to operate even if it is not connected to the internet and as a result saves energy and increases safety.

The IoTG increases energy efficiency and fire safety. This adds another layer of protection to the existing technologies GFCI and AFCI, which are mandatory standards for electrical outlets in the US and in some countries in the EU. In addition, the internal structure of these technologies comprises similar elements. Therefore, we expect that the IoTG will dictate a standard, and will eventually be combined with other technologies in all electrical outlets.

PGE Wave Ltd. Sound Wave Based Heat Pump

The company's activity is focused on the development of highly efficient heat pumps, which operate using the phenomenon of energy transfer in gases by elastic waves (Pressure Gradient Elastic Waves) occurring (for example) during rotation.

An example of possible technical applications is the steam electric power plant in which PGE Heat Pump replaces the steam condenser. The Heat Pump, having a Coefficient of Performance (COP) value of about 5, transfers the heat energy (about 70% of the thermal energy is released during the fuel combustion) back to the evaporator, that allow us to burn less fuel to produce the same amount of electricity, decrease greenhouse gas emissions and reduce the thermal pollution created by power plants.

PGEW Pressure Gradient Elastic Wave

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Setpoint (former Zero Energy Solutions) Climate intelligence

Setpoint has developed the Climate Intelligence Platform that enables control and automation of air conditioning systems for multi-room buildings.

Setpoint's system monitors environmental characteristics in each room (temperature, presence, etc.) and controls the HVAC systems remotely using a suite of sensors, historical information such as: Usage routines, property owner instructions, real-time user habits, real-time and forecasted weather reports, current energy consumption tariffs, and much more.

SETPPOINT
EXPERIENCE CLIMATE INTELLIGENCE

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The project fund by the MoE, is the artificial intelligence software. With the help of the AI software used to operate the HVAC systems in every room, it is possible to optimize energy consumption, while maintaining indoor climate comfort for end users.



SKY-WALLS

BIPV Curtain Walls

We are a startup company developing a revolutionary curtain wall for green buildings which is climate adaptive and solar harvesting. We wish to contribute our know-how and expertise for economical and greener future which will significantly reduce buildings carbon footprint.

Recently we have been awarded an initial funding from the Israeli Ministry of Energy to further develop the technology. Our technology is potentially a game changer in the construction industry of glass high-rise scrappers.



 www.sky-walls.com

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SolCold – Cooling by Sunlight

Solar Cooled Paint

SolCold is a DeepTech startup company that develops an innovative, patented, nano-technological material that cools everything that is exposed to sunlight, without any power consumption! The material harnesses the sunlight for cooling and is most effective when it is very hot and the sun is strongest. It can be used as a coating for cooling cars, buildings, containers, apparels, airplanes, etc., and is expected to bring tremendous savings in cooling and air-conditioning expenses and significantly reduce greenhouse gas emissions.

In the project, SolCold will further advance its coating layers' capabilities, develop a large production method, and will produce the first product towards large scale outdoor tests.



 www.solcold.co

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Sowillo

Water Heating from Buildings Wastewater

Sowillo is developing a highly efficient system for recuperating building waste heat, which drastically improves the overall performance of the underlying primary heat generation system and alternatively serves as a backup heater. It is a self-contained system that extracts heat from a building's wastewater and returns it at around 60°C.

This system will employ heat pumps for driving and controlling the recuperation process. It also employs a machine learning based prediction system to only use the heat pumps when required (based on usage prediction, CoP of the installed heat pump, electricity tariffs and other parameters).

The heat pump will use a heat exchanger developed by Sowillo to extract thermal energy from building wastewater (with higher efficiency in the given workload).

System performance is constantly monitored for anomalies, allowing for automated actions whenever degradation in performance is detected such as a problem with the heat exchangers or a leak in the system.



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Sustainable Group

Village in a Box

The Sustainable Group is developing Village-in-a-Box (VIAB), a zero-carbon, circular self-sustained infrastructure for resilient and climate-ready cities. VIAB's core technology is a decentralized smart infrastructure grid that integrates 100% renewable energy resources, water, food, waste, and wastewater systems on both physical and IoT platforms to ensure sustainable and cost-efficient infrastructure for communities globally.

Our innovative software uses machine learning to optimally manage energy supply & demand, thus significantly reducing costs and required storage by 30% compared to similar microgrids.

The flagship project is a self-sustained on-grid neighborhood in Mitzpe Ramon where residents will live in a zero-carbon smart energy community that manages its resources in a circular local economy, while reducing costs of living by 30%.

Another pilot at Kibbutz Ketura will demonstrate our technology, allowing us to complete R&D and to mobilize the commercial project in Mitzpe Ramon. The pilot will be established in cooperation with the Arava Institute, Netafim, Anaergia, Siemens and other leading technology providers.

Real-estate developers, contractors and architects globally can benefit from this technology in villages, neighborhoods, campuses and hotels.





WATER ENERGY NEXUS: Companies and R&D

Water-Energy Nexus covers an interdisciplinary R&D projects on energy efficiency in water and wastewater treatment and distribution, energy for water transmission/ treatment / distribution and wastewater collection /treatment / disposal, water for energy extraction/ production, and any related topics.

ABI Energy Ltd

Suppressed Turbulence Water Flow

Our unique Pressure Waves Generator (**PWG**) suppresses turbulence in the flow in pipelines by generating special low frequency pressure waves. In pipeline transportation systems of water, oil, gas and other fluids it substantially: **Decreases energy consumption**, achieving up to 30% in savings; **Increases the capacity of** pipeline systems by up to 30%; **Decreases adhesion, corrosion and bacterial** actions up to 10%. We will be saving a substantial portion of \$1.2 T of estimated global energy expenditure in water, oil and gas. Our Technology Demo center was built with the support of the Ministry of Energy.



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EZPack Water

Efficient Hot Water Storage

EZPack Water develops, manufactures, and markets proprietary solutions for water storage, distribution, and purification. Our solutions include EZPuro, a compact robotic water purification and desalination system; water storage, transportation, and distribution solutions based on the company's proprietary two-layer bladder technology; and EZCond, proprietary atmospheric water generator. The company's products are aimed at markets such as emergency use, disaster relief, firefighting, remote water supply, military, home outdoor, and others.

EZPackTM
Water Storage & Distribution

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Plastic Back

Fuels from Plastic

Plastic Back has developed an environmentally friendly technology for converting plastic waste back into crude oil and other valuable chemicals. Based on this technology, Plastic Back has created a conversion unit that enables waste treatment and disposal sites to reduce the amount of waste put in landfills. The company's solution also provides waste producers such as factories, agriculture operations, and hospitals with an alternative to costly waste removal and treatment services.

Additional benefits of Plastic Back's solution include operation at room temperature, treatment of all plastic types with minimal need for presorting, small unit size, and reduction or elimination of greenhouse gas emissions through chemical conversion into valuable hydrocarbons during the process.

 Plastic Back



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