Israel Ministry of Energy and Infrastructure
The Chief Scientist Office



RESEARCH AND DEVELOPMENT

2020-2022

Ministry of Energy and Infrastructure
www.energy.gov.il

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The Chief Scientist Office



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2020-2022

December 2023

Foreword by the Minister of Energy and Infrastructure



The energy and infrastructure sector under my responsibility holds a vital role in the lives of each and every one of us. Ensuring a seamless supply of electricity, water, fuel, and other natural resources, both in everyday scenarios and during emergencies, is a challenging yet paramount task. A reliable energy economy is the cornerstone of a normal and thriving life. Concurrently, we recognize the imperative to transition to a clean energy economy, one that prioritizes reduced emissions.

The far-reaching impact of the climate crisis touches every aspect of our lives, and energy markets, whether in Israel or worldwide. Like many other nations, Israel is steadfastly committed to curbing greenhouse gas emissions to address the climate crisis.

Within this context, the Ministry of Energy and Infrastructure is dedicated to exploring all feasible avenues to promote a reliable, efficient, and low-emissions energy market. Our initial focus revolves around the extensive integration of renewable energies into it and promote energy efficiency in all sectors. However, we understand that achieving our global goals for emissions reduction by 2050 demands further exploration and implementation of innovative solutions and cutting-edge technologies.

Under my guidance, the Chief Scientist Office at the Ministry supports Israeli innovative technologies and novel approaches in diverse fields, including but not limited to: Alternative fuels such as Hydrogen, the advancement of Smart Grids and modern electricity markets, energy storage, renewable energy sources, energy conservation measures, and the promotion of waste to energy and more.

I am very happy to present you with a summary of the Chief Scientist Office's work for the years 2020-2022.

Israel Katz
Minister of Energy and Infrastructure

Foreword by the Director General of the Ministry of Energy and Infrastructure



As part of our united global effort to address the urgent climate crisis, the Ministry of Energy and Infrastructure has embraced ambitious goals for an isolated country like Israel, aiming for an 80% reduction in greenhouse gas emissions from the energy sector by 2050 and a 30% increase in renewable energy production by 2030. We are committed to transforming this ambitious vision into a concrete reality. Over the past year, under the leadership of Minister Israel Katz, we have been actively promoting improvements in the electrical grid, fostering cross-country subsea electrical grid, collaborating with the Electricity Authority to facilitate permits for an additional 2,000 megawatts of renewable energy integration into the grid, and eliminating barriers to the implementation of renewable energy sources, among other initiatives. Our dedication is centered on exploring every possible avenue to reach our set targets. Throughout this journey, we remain steadfast in ensuring the uninterrupted functionality and reliability of the energy sector.

Acknowledging the challenges that lie ahead, we recognize the need for a diverse range of solutions. Some of these solutions are already familiar to us today, while others are still in development. We comprehend their pivotal role, not only in Israel but also on a global scale, as we strive towards emissions reduction by 2050.

Taking on the crucial role of the Chief Scientist Office (CSO), we try to bridge technological gaps and equip qualified personnel to implement these vital policies at the appropriate time. With a firm focus on evidence-based, scientific, and technical support, the CSO enriches policy-making within the Ministry's domain.

Moreover, our support extends to academia and startup companies, cherishing local knowledge and expertise through grants and scholarships. The CSO also cherishes international collaboration in all energy-related fields, ensuring Israel's prominence in the global economy and international arena.

In this booklet, we extend a warm invitation to collaborate and stand shoulder to shoulder with us in achieving our national goals. Together, we can shape a brighter, cleaner future for generations to come.

Jacob (kobi) Blitshtein
Director General
Ministry of Energy and Infrastructure

Foreword by The Chief Scientist



It is my pleasure to present to you a snapshot of the work of the Chief Scientist Office (CSO) at the Ministry of Energy and Infrastructure.

Our unit is special, in that it has a very wide view point of the energy market, while also the ability to influence it at many points. By learning the needs of all the professional units at the ministry, we are able to try to push for innovation for all aspects of the Ministry work. By getting to know the energy markets in Israel and abroad, both private and public, we are able to understand where and what kind of technology is needed – and thus give focused support to private enterprise. This wide knowledge is also what enables us to give long-term and medium term policy advice at the ministry.

The transition to clean energy is our main goal in recent years. As leaders of innovation at the ministry our current push is in two directions – using technology to increase the share of renewables in the Israeli energy mix, and strengthening Israel's contribution to the global transition to clean energy by bringing Israeli innovation to the market. We are particularly glad when we see some of our research support make it from early stage, even academic research, to world class industrial products. We have such examples in many fields, but I will mention here only key areas of solar, storage and EV.

We are especially proud of our main achievements in the last 3 years:

1. Initiating the Agri-Voltaics market in Israel with large scale multi-participants pilots. We believe Israel can be a leader in this field.
2. Founding two National Energy Research Institutes in collaboration with Academia, Industry and other government institutes – in the areas of Storage and Nuclear Fusion.
3. Roughly doubling the Ministry investment in clean energy Research, Development and Innovation support for 2021 and 2022.

However, there is much more to our work than these, and this book presents more information.

I would like to use this occasion to thank all the members of our team, who with daily hard work made all of this possible. I believe our team is one of the top performers in the Israeli government, and this is only possible because of the special people who, together, make the complete picture. Thanks! I really appreciate your efforts.

Sincerely,

Dr. Gideon Friedmann
Chief Scientist, Ministry of Energy and Infrastructure

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About the Chief Scientist Office (CSO)

The Chief Scientist Office (CSO) in the Ministry of Energy and Infrastructure (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.

CSO MAIN TOPICS OF SUPPORT



Renewable Energy

- Solar
- Biomass
- Wind
- Wave power
- Dual use of land
- Geothermal
- RE at sea



Smart Grid

- V2G
- Micro grid
- Grid infrastructure
- Demand & Production Management
- Cyber security



Clean Transportation

- Electric vehicles
- Bio fuels
- Natural gas
- EV charging
- EV charging management



Energy Storage

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



Energy Efficiency

- Buildings
- Industrial
- Water
- Smart Energy Management



Water Energy Nexus

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



Hydrogen

- Green hydrogen
- Full cells
- Hydrogen storage
- Hydrogen vehicles
- Fulling stations



Environment

- Waste to Energy
- Reducing environmental Impact of Energy Infrastructure
- CCUS



Earth & Marine Sciences

- Oceanography
- Oil & Gas
- The Geology of Israel

Cyber

- Critical infrastructures
- Grid
- Natural gas
- Water
- Renewable energy

Mining & Quarrying

- Economic potential
- Environmental impact
- Substitutes

Earthquakes

- Seismic risk
- Monitoring
- Paleo seismicity
- Risk assessment

Nuclear Energy

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

Policy & Resource Planning

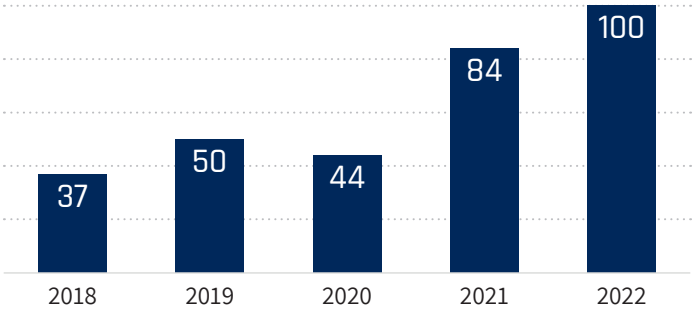
- Energy Security
- PR & Education
- Regulation
- Public opinion

The CSO support programs

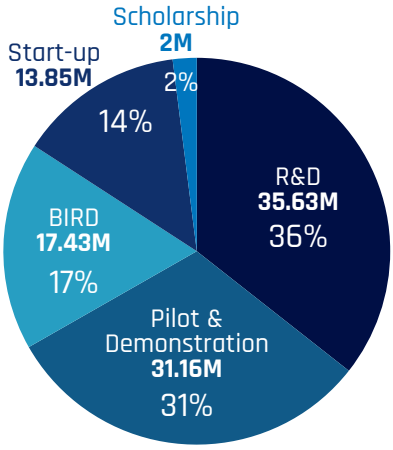
Every year, the CSO publishes calls for proposals for researches in all fields of activity, as well as for the various stages of R&D, from inception to implementation, according to the R&D areas of focus and the priorities defined by the Ministry. We provide financial support as follows:

Academia | **Start-up** | **Pilot & Demonstation** | **Scholarships** | **BIRD Energy**

Distribution of CSO funds (in millions NIS) over the years 2018-2022



In 2022 the CSO invested over 98 Million NIS in 110 projects and 2 Million NIS in Scholarships for 37 students

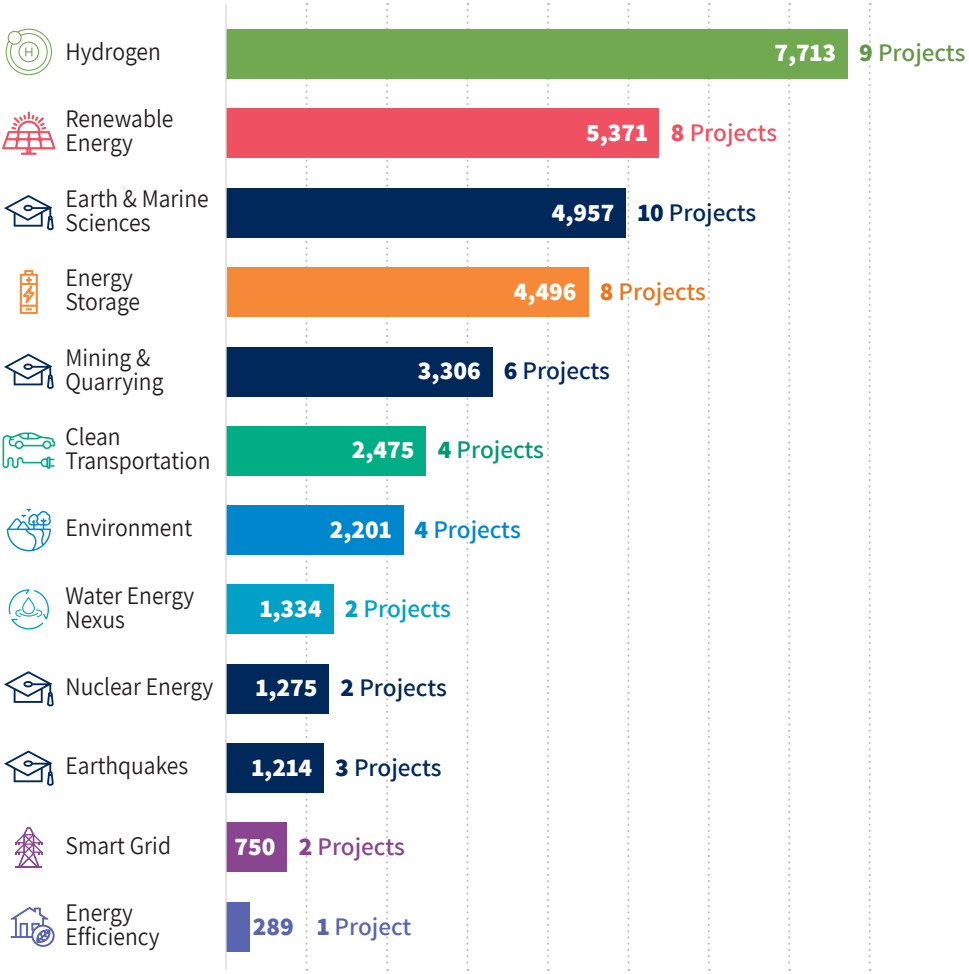


Academic Research Fund

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 2022, the CSO invested over **35 Million NIS** in **60 projects**

Academy - Distribution of funds (K NIS) & number of projects by field, 2022



Scholarships

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

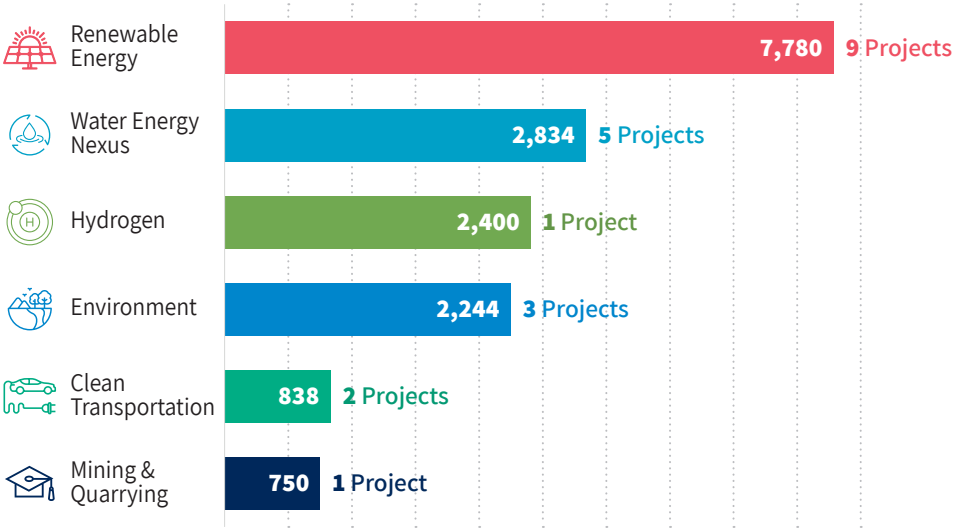
In 2022 the CSO granted **37 academic scholarships** totaling in **2 Million NIS**

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 2022, the CSO invested **13.8 Million NIS** in **24 projects**

Sart-Up: Distribution of funds (K NIS) & number of projects by field, 2022

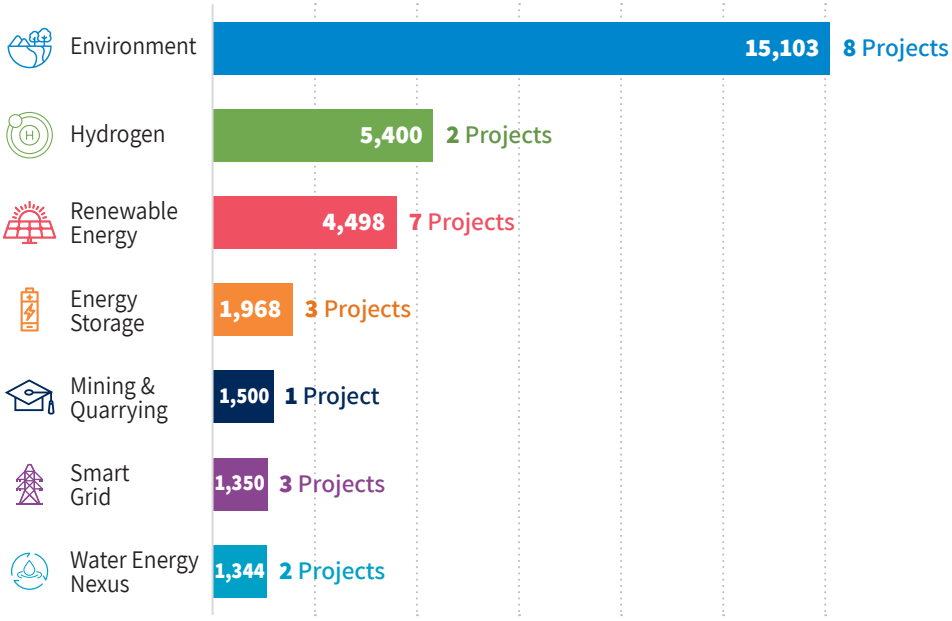


Pilot & Demonstration Fund

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

In 2022, the CSO invested over **31.1 Million NIS** in **26 projects**

Pilot and Demonstration: Distribution of funds (K NIS) & number of projects by field, 2022



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.



In 2022, the BIRD energy fund invested over **17 Million NIS** in **5 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 and Infrastructure, is a member in 6 technology collaboration programs (TCP) in the field of energy:

ISGAN
INTERNATIONAL SMART GRID ACTION NETWORK

ES TCP: Energy Storage

EQUALITY IN ENERGY TRANSITIONS
INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

IEA Technology Collaboration Programme
Advanced Fuel Cells

HYDROGEN IMPLEMENTING AGREEMENT

IEA PVPS
Photovoltaic Power Systems Program

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.

CETPartnership

The CETP is a program for European cooperation in R&D that is supported through Horizon Europe. The partnership has 7 fields of Transition Initiatives (TRIs) in order to work together on the Strategic Research and Innovation Agenda (SRIA).

The seven fields are:

TRI 1: Integrated Net-zero-emissions Energy System
TRI 2: Enhanced zero emission Power Technologies
TRI 3: Enabling Climate Neutrality with Storage Technologies, Renewable Fuels and CCU/CCS
TRI 4: Efficient zero emission Heating and Cooling Solutions
TRI 5: Integrated Regional Energy Systems
TRI 6: Integrated Industrial Energy Systems
TRI 7: Integration in the Built Environment

Israel is inviting proposal in all 7 topics and in all levels of TRL.

The Water4All Partnership

Water Security for the Planet, cofunded by the European Union within the frame of the Horizon Europe programme, aims to enable water security at a large scale and in the long term, to tackle global water challenges to face climate change, and to boost systemic transformations in the water sector.

Launched in June 2022, **Water4All** brings together a wide and cohesive group of 90 partners from 33 countries in the European Union and beyond.

The **Water4All** joint transnational calls are launched yearly, in aim to support research and innovation projects, in order to deliver knowledge to better understand hydrological processes and the water systems at different scales, and to respond more efficiently to emerging water issues.



Horizon Europe

Horizon Europe is the EU's research and innovation key funding programme for 2021-2027 with a budget of €95.5 billion.

It tackles climate change, helps to achieve the UN's Sustainable Goals and boosts the EU's competitiveness and growth.

The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges.

It supports creating and better dispersing of excellent knowledge and technologies.

Legal entities from the EU and associated countries can participate.

Relevant Links:

Horizon Europe – ISERD website

Framework program for research and innovation 2021–2027

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 and Infrastructure. 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 institute has a network of cooperation with government research institutes, Universities and entities in Israel and abroad, in order to maintain a high professional level.

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. IOLR engages in research and development in the fields of marine sciences, lake sciences and marine biotechnology, with the aim of creating the scientific basis for the sustainable utilization and conservation of Israel's marine, coastal and aquatic resources. The IOLR is also in charge of the - regional monitoring programs and is a partner in cross regional research and monitoring programs. 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, 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.

The MoE through the CSO initiated the establishment of an Energy Research Institute in the fields of Nuclear Fusion and Hot Plasma. These fields are crucial for the development of clean energies in the coming decades. The MoE considers that the State of Israel must invest and contribute in their development, in particular in the following subjects: training of professional personnel in the relevant fields (plasma physics at high temperatures, powerful lasers, materials engineering, etc.); expansion and strengthening of R&D infrastructures available to researchers at universities and research institutes and the integration of the private sector (start-up companies) in R&D activities.

Projects & Companies Supported by the CSO

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.

www.3dbattery.co.il

Erez.Schreiber@3dbattery.co.il

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.

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

finder.startupnationcentral.org/company_page/3gsolar-photovoltaics-lts

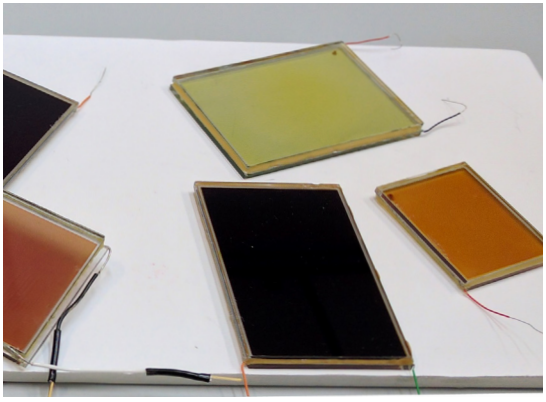
bbreen@3gsolar.com

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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.





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 and Infrastructure.

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+1-847-922-7078

Afec e.r.m.a. Ltd.

Since its foundation in 2005 Afec, specializes in advanced chemical admixtures and other materials for concrete and cementitious products.

The production of standard wall blocks relies today on the use of quarrying and mining products. These resources are becoming limited in Israel and all over the world, while the problem of landfilling industrial and building materials waste is becoming bigger.

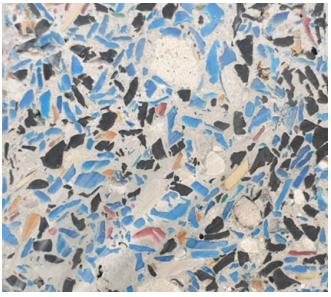
Our project with the MoE is to develop a "ProBlock" that will contain a wide range of industrial and building materials waste and some domestic waste as raw materials. The "Problock" will be identical and even superior in properties to standard blocks and will be able to replace standard blocks for construction (as required in Israeli standard No. 5).

www.afecerma.com

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AGAM Greenhouse Energy Systems

AGAM's technology gives the user more control over the microclimate in plant growing structures by converting latent heat into sensible heat, thus reducing energy consumption, purifying the air, and eliminating spores that rely on humidity.

Excess humidity in poultry houses leads to health issues. Growers install industrial fans which AGAM estimates consume more energy than needed, however, these ventilation systems do not dehumidify in humid seasons. As a result, poultry growers take losses on both the chickens' poor health and wasted energy.

AGAM with funding from the MoE is adapting its technology to poultry house conditions and examining its effects on poultry cultivation.



agam-greenhouses.com

finder.startupnationcentral.org/company_page/agam-greenhouse-energy-systems-1

sales@agam-greenhouses.com

+972-52-220-5033

Agri light

Agri-Light is developing (with the support of the Ministry of Energy and Infrastructure) its patented **S**mart **A**agri **P**hoto **V**oltaic (SAPV) system that utilizes innovative algorithms and a unique mechanical engineering design, to optimize and protect crop cultivation, increase crop quality, and reduce water consumption, while at the same time optimizing electricity generation.

Agri-Light's SAPV controller automatically moves solar panels horizontally to give shade or sun to crops/trees, as needed depending on a wide range of data inputs generated by IoT sensors feeding continues data to the cloud. The system includes its Agri-Smart Optimizer, a cloud based AI application that both provides real time information and forecasting to farmers.

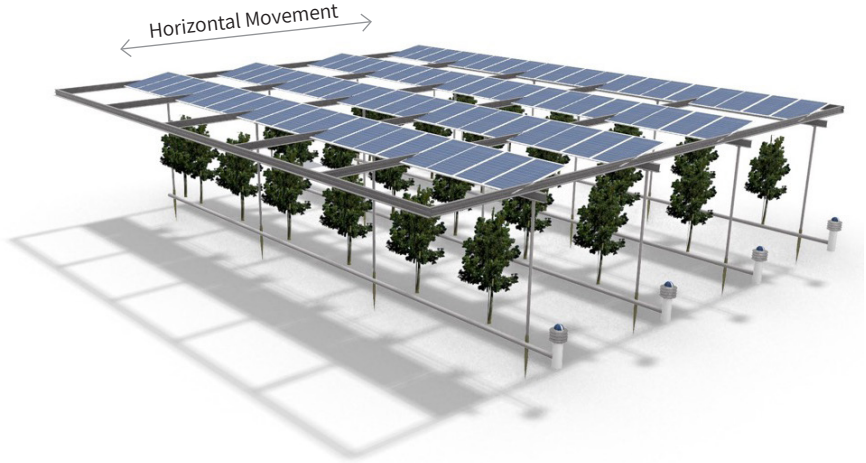
Agri-Light

www.agri-light.com

finder.startupnationcentral.org/company_page/agri-light-energy-systems

info@agri-light.com

+972-54-334-4131



Agteamize Ltd.

The suggested project aims to accelerate innovation by addressing the challenges of insufficient utilization and integration of exiting knowledge, along with wasted R&D efforts reinventing technology which has already been invented or even patented.

Agteamize addresses these challenges by developing a Machine Learning platform that provides SMEs', entrepreneurs and inventors with an analytic tool which simplifies the access and utilization of technologies in academics research and patents.

agteamize

karni.l@agteamize.com

+972-52-539-0762

The expected results framed within the project is to develop tools to effectively identify and characterization technologies databases, focusing on energy technologies, to later enablethe development of the described analytical tools.

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

www.alcon.co.il

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AMRP Advanced Modular Rotary Propulsion Ltd.

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

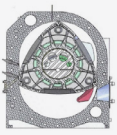
The availability of Compressed Natural Gas (CNG) in Israel is a fact. AMRP develops a series of light weight, high performance modular rotary combustion engines, that are multi-Fuel and also runs on Natural Gas.

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 1420 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, as well as existing fully indigenous manufacturing infrastructure in Israel.

The 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 part of the Israeli Ministry of Energy and Infrastructure – Chief Scientist project, promoting the use of CNG, it will also run on Gasoline, Diesel and LPG.

This year we are looking into altering the engine to run also on Hydrogen. Because of its internal construction and no valves the rotary engine is particularly suitable to run as an H2 ICE.



www.amrp-rotary.com

Avner Ronen

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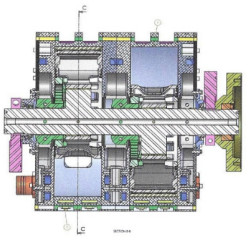
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David Segev

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+972-54-999-6934

Number of rotors	2	3	4
Rated power output (BHP)	710	1,065	1,420
Rated speed (rpm)	3,600	3,600	3,600
Torque (N*m) @ 2,200 rpm	1,620	2,430	3,240
Displacement (Liter)	11	16.5	22
Weight of short engine (Kg)	300	380	470
Dimensions of short engine WxH (mm)	500 x 600		
Dimension of short engine Length (mm)	570	750	990
Idle speed (rpm)	850		
Injection	Direct		
Ignition	Spark		
Compression ratio	10.5:1		
Fuel	Multi fuel (Gasoline, Diesel, CNG)		
Cooling	Liquid		
Air System	N/A (no Turbocharger)		
Airflow at rated power and speed (cu.m/s)	0.66		



Researcher:
Yaakov Anker, Ph.D., Ariel University

ARIEL UNIVERSITY

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Ariel University is striving to become a leading force in environmental research with its interdisciplinary nature as a rising branch among the various fields of science. The ongoing technological development and its integration into the human environment eminently increases the anthropogenic load on the surrounding natural environments, which poses new challenges that demands collaboration between researchers from different areas of science. As such, sustainable water resources management is a major goal of present and future human environment (UN millennium sustainability goals). The current program with the MoE is aimed at the Modification of the Ariel University dormitories WWTP into an energetically autonomous system, to demonstrate how essential water treatment and supply infrastructures may be operated by self-sustained renewable energy resources.



the Ariel University dormitories WWTP

Researcher:
Dr. Konstantin Borodianskiy, Ariel University

Efficient and Customized Electrode Microstructure for Intermediate-Temperature SOFC.

Metallurgy and Applied Nanoscience Lab

ARIEL UNIVERSITY

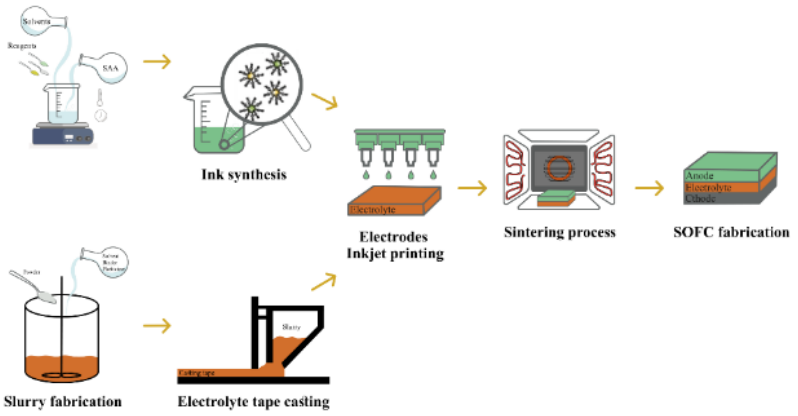
www.ariel.ac.il/wp/konstantin-borodianskiy/

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Solid oxide fuel cells (SOFCs) are electrochemical devices which convert chemical energy in the form of gaseous fuel into electricity with an exceptional efficiency. SOFCs attract many modern gadgets, automobile and zero emission household projects as the next generation power source of electricity.

Among variety of strategies, one of the most innovative approaches is fabrication of SOFC layers (anode, cathode, and electrolyte) through an inexpensive and versatile 3D printing technology. In this work synthesis of stable inks is developed with composition and rheology parameters tailored for the cell performance and printability. Microstructure and phase composition of the produced SOFC's layers are optimized to reach as high power as possible.



Auto Chen

AUTO CHEN
A BLILIOUS GROUP COMPANY

www.goldendragon.co.il

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+972-52-890-5359

BLILIOUS group is a company with over 50 years of experience in the Israeli Automotive Industry. The company import passenger cars, commercial cars and buses in Israel.

BLILIOUS is a leader in automobile with new energies solutions.

The synergy between the Group's divisions forms the basis for creating holistic solutions for transportation in general and in alternative energy in particular.

Importing, assimilating and developing an ecosystem for smart, innovative products and services with local and international partners.

AUTO CHEN is the automotive division of BLILIOUS group.

Together with our partners, GOLDEN DRAGON (one of the biggest bus manufactures in China) we have developed intercity CNG bus for the Israeli market. Our current project with the MoE is brining into Israel a Hydrogen bus.



BaroMar ltd.

The World is pleading for clean and sustainable energy, BUT for the grid to rely on it, large-scale and long duration storage is essential.

BAROMAR stores energy (GWh scale and up) in the form of compressed air in large rigid tanks anchored to the seabed for long Periods of time, the technology is based on:

- Patented design
- Unmatchable low cost compared to other bulk and long duration solutions, could reach more than 30% improvement in LCOS (Levelized Cost of Storage).
- Minimal underwater maintenance thanks to a design with no underwater moving parts or subsystems.
- Best solution for the environment: No emissions, No hazardous materials, minimal disturbance to marine life.

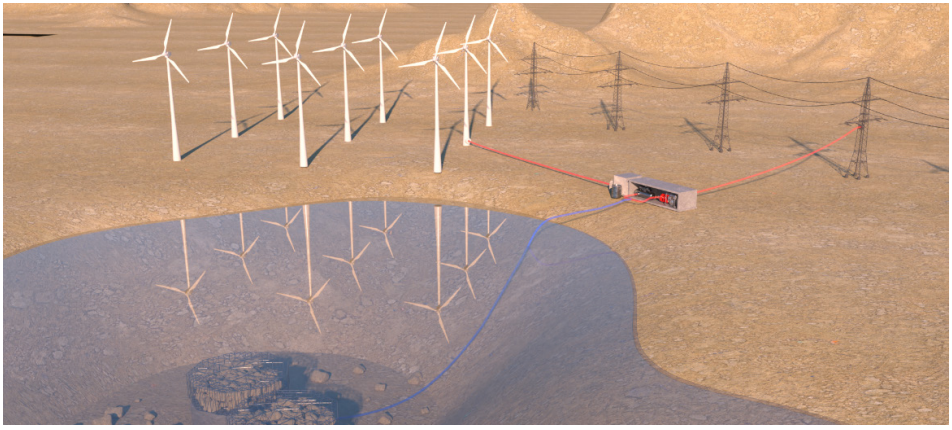
BAROMAR

www.baro-mar.com

www.youtube.com/watch?v=ibllp1zaq3M&t=2s

Sergio Koren, CEO,
sergio@baro-mar.com

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Bet Shemesh Engines Ltd.

The BS-GEN 520 Gas Turbine was initiated based on a customer request to utilize the stored thermal energy from their own TES (Thermal Energy Storage) unit.

BSEL delivers a low-cost, general-purpose solution for any heat source, based on Converting aviation turboprop engines to power producers from alternative energy reservoirs.

The BS-GEN 520 can be incorporated into a ground-based generator system, utilizing external air routing and TES units to heat pressurized air from the engine's compressor and direct it back to the turbine. The introduction of pre-heated air increases the thermodynamic efficiency of the cycle, resulting in lower (or zero) fuel consumption.



BET SHEMESH ENGINES LTD

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Blilious | Energy storage & PV for E-Bus

Blilious Group offers comprehensive end to end electric transportation services and solutions for both private EVs and public transportation, and has exclusive representation of global Li-Ion batteries producer, CATL in Israel and represents other technology leaders in the industry.

BLILIOUS ENERGY CATL

www.blilious.co.il

talm@auto-chen.co.il

In order to increase the adoption of public transportation solutions based on E-buses, as well as enabling reliable and effective operation, resulting in energy savings, Blilious Energy will develop a solution that combines an Energy Storage System with fast charging stations. This solution will be managed by an algorithm-based software that will optimize and manage the charging process. Both grid-based and locally produced solar power will be used.

CATL, the largest battery manufacturer in the world, has been BLEnergy strategic partner in Israel since 2016, collaborating on energy storage for EVs and E -buses. CATL caters to leading global EV manufacturers as well as to leading global energy storage integrators and clients. BLEnergy offers diverse purchasing and operating models, both as a solution provider as well as through a “battery energy storage as a service” model. In this model, the company’s developed operating system is used on the customer’s premises or in front of the meter, providing its customers with energy storage and electricity services. Since its foundation in 2019, BLEnergy has contracted Energy storage projects 250 MWh, many of them in PV+BESS. Additionally, the company has built the first BESS facility in Israel, a micro-grid at a community (Kibutz). The company has the capabilities and equipment to monitor, maintain and operate a large number of distributed energy storage systems and offers long-term maintenance contracts to its customers. The company is also expanding its activities in Europe.





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.

BRENMILLER ENERGY

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BrightSource

BrightSource Energy, a global technology leader that operates 700 MW at 7 Concentrated Solar Power (CSP) plants in California and Israel.

Our innovative technology has been developed over 16 years by some of Israel's brightest minds manages tens of thousands of devices to orchestrate intermittent supply with volatile demand.

BrightSource

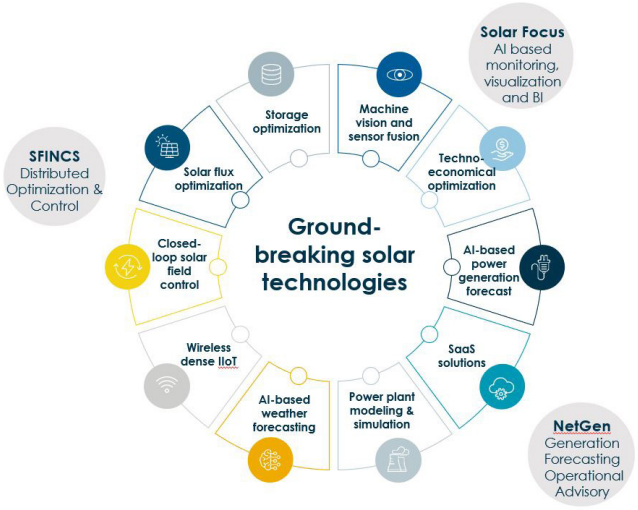
www.newbrightsource.com

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BrightSource's latest projects – Noor Energy 1 in Dubai and Redstone CSP in South Africa with 100 MW each enabling energy to not only be produced during daylight hours, but also be stored for up to 15 hours for use overnight.

BrightSource has participated in the TubeMON project with DLR and CSPServices developing and testing a new online flux density and temperature measuring systems for monitoring and optimizing the operation of external tube receivers in CSP central tower plants.



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.

censnano.com

michael@cens-materials.co.il

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

City Transformer
Folding car

City Transformer develops the world's first all-electric mobility solution that intelligently transforms its dimensions and riding behavior while driving to meet the complex challenges and needs of those who call the world's largest cities "home".

Designed by city people around what city people truly need, City Transformer electric vehicles park and outsmart traffic like a motorcycle while riding safely and conveniently like a car.

CITYTRANSFORMER

www.citytransformer.com

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City Transformer was voted one of the "top 10 cars of IAA mobility 2021" by 'Forbes' magazine and named one of the "best inventions of 2020" by 'Time' magazine.

City Transformer vehicles are engineered for superior city riding experiences without compromise, with great maneuvering capabilities, outstanding parking properties, exceptional low total cost of ownership, and 75% space and weight savings.

City Transformer is built on top of a patented sharable & autonomous-ready modular platform that provides outstanding freedom of cabin design for multiple bespoke applications & flexible engagement models.



ClimateLaunchpad Israel
lead by Ran Sasson

Many great ideas exist for reducing emissions and improving lives – private and academic. Most remain in the idea stage. At **ClimateLaunchpad Israel**, we believe that ideas can come to life with the right guidance, coaching, and support. Whether you have a theory or an idea on a napkin, we help develop it into a startup up to a full commercial pilot (TRL2-7).

ClimateLaunchpad Israel is deployed over six months - once a week online session and mentoring. Both the Israeli and international markets are exposed to the graduates of the program, and many of the grads have already been incorporated into the market. The **ClimateLaunchpad Israel's** ecosystem includes – EU EIT, Israeli government, municipalities, academics and industry.

ClimateLaunchpad Israel

CLP.org.il

finder.startupnationcentral.org/program_page/climatelaunchpad-israel

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+972-50-772-0910

You are welcome to visit our website, check out our ecosystem, and let us help you build the next big thing in energy-climate-tech.

Contel ICS Ltd.

There is a growing need in the world to produce solutions for the efficient management of local microgrid. Effective management of local power grids combined with energy storage systems has the potential to flatten the daily load curve in power systems and make it easier to deal with the supply of high demand in the system during peak hours.

Proper use of existing energy resources, optimal operation of the energy storage system and provision of work instructions for energy production assets in accordance with the purpose function.

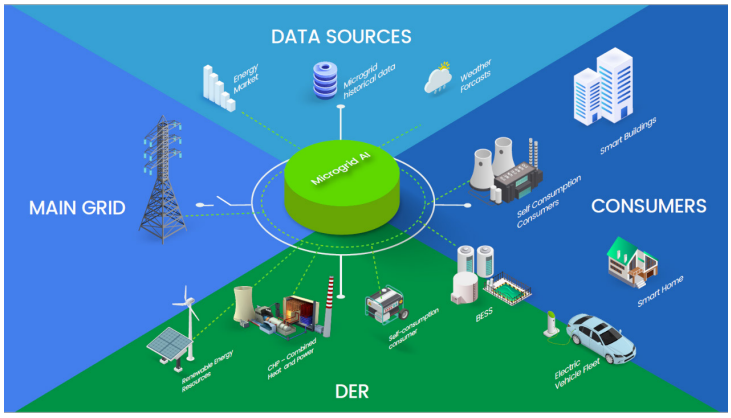
CONTEL TECHNOLOGIES
for Smart Manufacturing

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talc@contel.co.il

+972-54-926-0342

Contel in its project with the MoE applying a smart constitution engine based on algorithms and implementing existing AI functions - the system design to determine the working regime of each of the network components optimally. This is expected to result in energy savings, improved energy efficiency, reduced energy costs and overall ownership and naturally reducing environmental damage, and optimal utilization of renewable energy sources.



DataPond

itai@data-pond.co

+972-54-678-1180

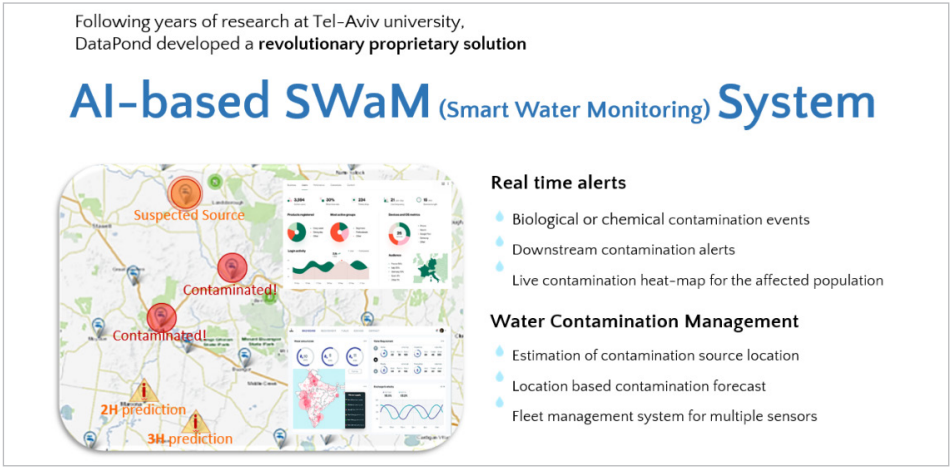
Over 2 billion people worldwide do not have access to safe water, and Every 2 minutes a child dies from water-related disease- mostly from biologically contaminated water.

Current methods for detecting bio-contamination in the water are slow, expensive, and elaborated- therefore monitoring is performed at a very low frequency. at a limited number of locations.

Today, there is no real-time in-situ and low-cost sensor for biological contamination sensing.

Detecting contamination in time is key to being able to effectively treat it.

Based on years of development at Tel-Aviv University, DataPond offers a revolutionary solution to ensure water safety, enabling **real-time and affordable** detection of coliforms in the water, using standard sensors and proprietary machine-learning algorithms.



Doral renewable energy

Doral established the first project of green hydrogen in Israel in cooperation with **H2PRO** in Yotvata, with 3.3 million shekels support of MoE.

The facility will produce the most efficient green hydrogen in the world at the end of 2023, with an initial capacity of 400kw that will produce 15 tons of green hydrogen per year.

The hydrogen will consume in the Yotvata dairy in blending with CNG.

DORAL

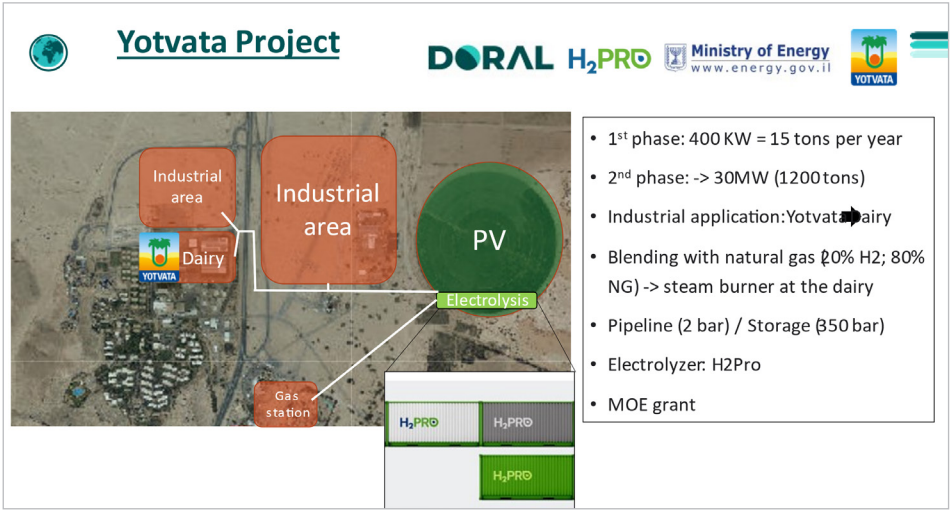
doral-energy.com/en

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The solar plant that Doral build can produce 30mw. Therefore, we plan to expand this project also for a gas station and to supply hydrogen to the close industrial area.



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.

There are two projects founded by the CSO in the Ministry of Energy and Infrastructure that improves the first generation system, into semi-commercial full battery-ICT-electronic systems with semi-automatic production and hybrid storage systems.

The projects (Elstore 1 and Elstore 2) 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.

Dr Ten

www.drten.nl

www.seasaltbattery.com

marnix@drten.nl

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%.



Eco Wave Power (EWP)
Onshore wave energy

Eco Wave Power (EWP; NASDAQ Capital Market Stock Symbol: WAVE) 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 "Global Climate Action Award".

Eco Wave Power

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About the collaboration with the Ministry of Energy and Infrastructure - Eco Wave Power has almost finalized the construction of the first grid connected wave energy project in Israel. The project includes 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, and Israel's first in history wave energy project to ever connect to the national grid.



EcoJoule Energy

EcoJoule creates grid-enhancing technologies and community storage systems for the low-voltage grid.

The electrical grid is one of the biggest bottlenecks withholding the energy transition. Using our products, system operators and communities can increase the capacity and resilience of their networks without updating the grid infrastructure and reduce billions of dollars in materials and work hours. Our EcoSTORE, a community storage system enhanced with reactive power to stabilize the distribution grid, can change how we manage our grid updates.

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nadav.mantel@ecojoule.com
+972-54-665-5797

In cooperation with the MoE & the Israeli Electric Company, our project aims to connect several EcoSTORE systems to low voltage networks with high PV penetration instead of conventional grid upgrades to create a smarter and more resilient grid for everyone.



EDF Renewables

The Yeshiva Project – the yeshiva project is a “Kosher Electricity project”. In Israel over 70,000 families consume electricity during the Sabbath from generators as the electricity from the grid is not considered Kosher. The generators they use are connected illegally and cause damage to the grid, pollution and electrical fires. We aim to replace these generators with batteries, specifically LFP based batteries which will provide “Kosher Electricity” during the Sabbath and back to the grid during the week.

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EIS Council International Ltd.
Dr. Ehud Ganani

The problem you are trying to solve, the project and its results (up to 120 words)

The Problem: The electric grid and all infrastructures and supply chains form an interdependent system, vulnerable to disruption. In a major disaster, understanding time-dependent priorities will require an AI-enhanced digital twin.

The Project: The GINOM® AI Israel Project is taking a key step toward a digital twin of Israel's critical infrastructures. Its ultimate goal: enabling AI-enhanced, prioritized interoperability of multiple corporate simulations or OS's for complex catastrophes.

EIS INTERNATIONAL

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Results: In this project, the platform will expand to allow evaluation of multisector disasters, with enhancements being developed in three key areas: A comprehensive simulation of Israel's electric grid; Virtual Decision Makers (VDMs) to enable users and algorithms to control simulated facilities; and enabling systemic impact assessment of degraded communications on VDM commands.



Eneriqs AI | Chiller AI

Eneriqs AI has developed an innovative, patented, Machine Learning based, AI technology for optimization of Chiller-based HVAC systems that operate in large commercial, public and industrial buildings.

ChillerAI saves, with a minimal up-front investment, up to 30% of the A/C required energy with a software-based solution while improving indoor comfort and prolonging equipment lifespan.

ENERIQS

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Elmor Renewable Energy

Elmor Renewable Energy is a top renewable energy company with an installation record of more than 400 MW systems in different sizes and in various disciplines, such as roofs, grounded systems connected to high voltage, construction of floating systems on top of pools and more.

In El-Mor project with the support of the MoE Solar we develop new way of installing solar systems on the sides of buildings in a cost effective way and utilize utilizing the high potential of these areas.

EL-MOR Renewable Energy

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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
East Med. Energy Exchange

www.linkedin.com/in/doron-liban-304b0b11/?originalSubdomain=il-doron@emex-gas.com

doron@emex-gas.com

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).

Energy infrastructures Ltd.





www.pei.co.il

Energy infrastructures Ltd., the national fuel and energy infrastructure company in Israel, which is fully (100%) owned by the government of Israel, considers renewable energies an integral part of its future mix of activity. The storage of energy through renewable hydrogen, and through alternative technologies, constitutes a fundamental element of the company's vision. Clean electric energy systems are expected to be widely used in the fields of transportation and industry over the next few decades. Hydrogen is an energy carrier with the potential for transportation and storage applications on a significant scale, and the company sees great importance in the implementation of hydrogen knowledge and technology. It has therefore chosen to develop a hydrogen cycle that will demonstrate the functionality of a system that will operate in the form of an energetic island. The system will produce renewable hydrogen via a PV powered electrolysis. We will utilize compressed hydrogen as well as an innovative Israeli technology for hydrogen storage and production. The hydrogen will be released upon demand, or in case of power outage to supply the facility current needs and critical needs backup. The system will also include battery storage and EV charging stations, and will enable the development of hydrogen knowhow while comparing hydrogen production and storage technologies.

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.

www.enertgroup.net

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Engis

ENGIS believes in PPG ©, Personal Power Generation. That means, diversity of green generation resources to serve the **Energy Consumption Needs** of a single, a family, a community or a factory.

All resources are controlled by a smart management system attached to the personal way of use, based on constraints, preferences, incentives and taste of the Energy consumer.

ENGIS
Storage ✳ Transformation

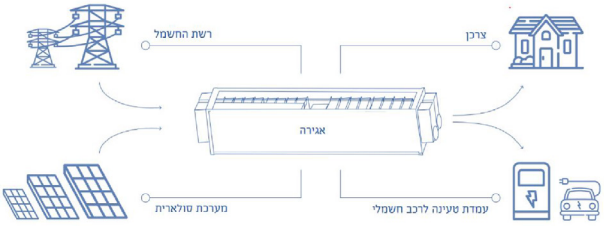
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+972-50-449-4555

In the joint project with the MoE, ENGIS established an example of PPG for office building, which wants to prioritize use of EV fleet.

100% PPG future for each one of us, each organization and community, will create a sustainable world and help to manage local and national grids ideally.





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

EV-Edge
EV Patrol Cars

EV-EDGE is the leading EV charging solutions provider and the largest public EV charging network operator in Israel with more than 850 public EV charge points. As such EV-Edge is committed to the electrification of the Israeli transportation market making EV charging available, affordable and accessible with best in class EV charging products and services.

www.evedge.co.il

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EV-Edge is continuously working on expanding its public charging network while focusing on adding more fast and ultrafast DC chargers in key locations, allowing drivers driving up north or down south to charge easily while eliminating the range anxiety. Recently EV-Edge has added 3 fast and ultrafast charging stations at IKEA Beer-Sheva, G-center Yokneam and IKEA Eshtaol with the support of Israeli's Ministry of Energy and Infrastructure. Moreover, as part of making EV charging accessible for all drivers, EV-Edge in collaboration with IKEA Israel and Access Israel organization and with the support of the Ministry of Energy and Infrastructure have introduced for the first time ever an EV charging station for people with disabilities.

One key challenge every country going through electrification needs to deal with is how much available power will be out there to allow for EV charging and primarily at home where more than 70% of all charges are expected to take place. EV-Edge together with Israel Electrical Company (IEC) and support from the Ministry of Energy and Infrastructure is piloting smart charging and load management in an apartment building with more than 30 charging stations.



EZPack Water
Efficient Hot Water Storage

EZPack Water Storage & Distribution

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EZPack® Water Ltd. is a private company, which develops, manufactures and markets unique proprietary solutions for off-grid clean water solutions.

Our off-grid clean water solutions are aimed at village/ community agriculture, small farms, etc.

Water become a big problem around the world in developed and undeveloped countries. In undeveloped countries areas that suffers from clean water shortage often do not have access to electrical grid. In developed countries there is constant need to combine modern agriculture with low CO2 emission and green energy solutions.

Drip irrigation combined with off-grid clean water systems, can provide solution for agriculture in many places.

EZPack® provide off-grid clean water solutions based on:

OFF-GRID water solutions: EZCond™ -proprietary atmospheric water generator (AWG) based on our proprietary technology of storing energy in water; EZPuro™ - compact robotic water purification and desalination system; Thermoflex™ - hybrid water heating system.

Water storage, transportation and distribution solutions based on our proprietary 2-layers bladders technology.

The company products are aimed at markets such as water supply for remote areas, family/small farms agriculture, emergency, disaster relief, firefighting, remote water supply, military, home and outdoor, and others.

The company is currently active in Israel, North America and Africa.



First Airborne

Drone-based Wind Farm Monitoring Solution

First Airborne develops and deploys unmanned robotic platforms, dedicated to performing inspection and monitoring primarily within wind farms. The Company has deployed its platform with leading players in Europe, and is now launching its upgraded stack of services and applications which shall be deployed and tested at Afcon Holdings wind farms in Israel within the framework of the Halutz project. The company's technology comprises proprietary meteorological sensing, advanced real time computer vision algorithms and an entirely unmanned end to end airborne services process. By the end of the activity the upgraded platform and services shall be proven and ready for mobilization and deployment globally.

firstairborne.com

linkedin.com/company/first-airborne

finder.startupnationcentral.org/company_page/first-airborne

hello@firstairborne.com

+972-54-558-7881



FlowLit Ltd.

FLOWLIT Ltd. has developed an innovative imaging technology for highly accurate and non-invasive measurements of liquid and gas flow in pipelines. This technology delivers very compact, low power, flow sensors whose size is practically independent on the pipeline's diameter, covering diameters from 3" to 14" and beyond.

Other salient advantages of FlowLit's approach are huge Rangeability values (~10000), allowing for real time detection of small leaks, determination of the flow-velocity profile across the pipe, and enabling simultaneously to monitor the density and size distribution of particles in the measured flow for quality control as well as to implement in-line various spectroscopic measurements.

flowlit

www.flowlit.com

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FlowLit's meter mounted on a 6" spool.

Fonto Power Ltd.

finder.startupnationcentral.org/company_page/fonto-power

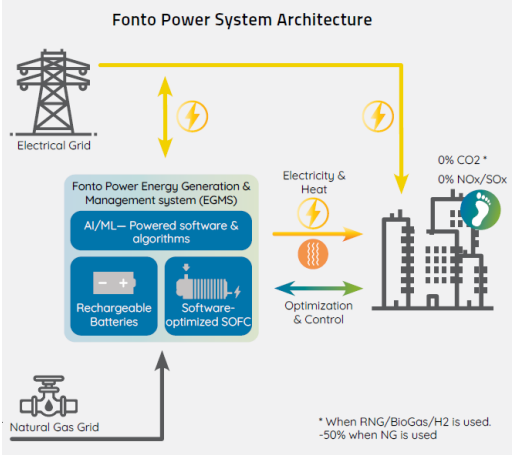
nati@fontopower.com

+972-54-468-0969

Buildings account for nearly 40% of the global energy consumption and expected to grow further due to electrification and the rapid adoption of electric vehicles. This will lead to an increased load on the public electrical grid, deteriorate its resiliency and will require massive infrastructure upgrades.

Fonto Power addresses these challenges by generating on-site green electricity and heat, enhancing energy resiliency, and eliminating the carbon footprint.

Fonto Power is developing a revolutionary AI-powered Energy Generation & Management System (EGMS) based on a high efficiency Solid-Oxide Fuel Cell system (SOFC) combined with Behind-The-Meter rechargeable batteries and advanced software & algorithms that determine the optimal combination between SOFC energy generation, on-site energy storage, in-building consumption, and the public electrical grid feed-in capacity.



Gaya Valley Holdings Ltd.

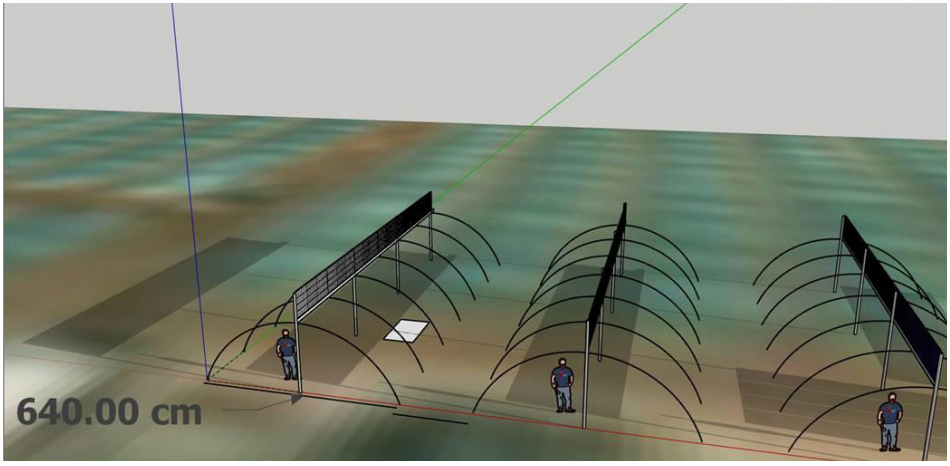
The purpose of the program is to innovate Agrovoltaic use, by placing solar panels on an agricultural structure called "tunnels", which occupy a third of the agriculture land in the Arava, for the benefit of energy production (additional income for the farmer) and as a cheap and available source of energy that will allow the farmer to operate heating or cooling measures in order to extend the harvest season.

GAYA VALLEY HOLDINGS LTD.
Since 2008

rafirabin@hotmail.com

+972-52-282-3921

The plan meets the desire to preserve the agricultural areas and as such deducts only 0.6% from the agricultural area in favor of the solar system, to prevent damage to the growing conditions and lighting of the plant and as such produces only about one hour of shade on the plants. To allow the increase of solar energy output in the field of dual use and to create financial security to the farmers so they can continue to produce fresh agricultural produce from the Arava Valley.



GridON Ltd.

Electrical grids cannot accommodate vast connection of distributed generation and renewable energy sources, due to increasing fault current levels which cause power interruptions and safety implications. GridON's Fault Current Limiting solution improves the operational flexibility and increase supply capacity in distribution networks. It enables the connection of renewable sources such as gas, wind, solar, and industrial cogeneration. The product improves the availability and power quality of distribution networks, while significantly lowering capital expenditures of network upgrades and early retirement of fit-for use equipment.

As part of this project, a power-electronics based fault current limiting interrupter will be installed at a pilot site in the Israeli network. A similar product has been installed in the UK since March 2022, connecting a 5MW private generator to the public network. The FCLi supports the massive deployment of distributed generation into public networks, by eliminating short circuit current contribution from these new generation sources. Both the Israel Electric Company and the Ministry of Energy and Infrastructure are sponsoring this project, with the expectation to approve the product for commercial use in Israel.

GridON
Protecting the Grid. Wisely.

www.gridon.com

finder.startupnationcentral.org/company_page/gridon

yvalent@gridon.com

+972-54-230-9000



Griiip

Convert Griiip'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.

Griiip 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 Griiip, 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.

www.griiip.com

tamirp@griiip.com

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

This development will allow Griiip 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.



Haifa Bay Municipal Association For Environmental Protection

Each year, the metropolitan Haifa authorities transport for burial over 1,300 tons of waste and sewage sludge, which can be converted into a fuel substitute. Haifa Bay Municipal Association for Environmental Protection proposes to construct a demonstration facility for the gasification process in which the wastes will be transformed into synthesis gas. The syngas will be used to generate methanol through an industrial company located in Haifa Bay. Gasification technology is possible to convert waste into clean renewable energy, and thus provide a solution to the challenges of climate change, air pollution from motor vehicles and suggests a promising solution for the challenge of waste disposal.

איגוד ערים
איזור מפרץ חיפה
הגנת הסביבה

www.envihaifa.org.il

mail@envihaifa.org.il

+972-4-842-8201

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.

HELIOS

www.project-helios.space

contact@project-helios.space

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 and Infrastructure, 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.

Hydro X
Fuel cell fed by hydrogen from formate

A spin-off of Hebrew University of Jerusalem, Hydro X has developed a disruptive hydrogen storage technology which enables to store and transport hydrogen in a green, non-explosive, non-flammable, non-toxic and energy efficient water-based carrier, unlocking the hydrogen economy.

The $700B of investments already committed by 2030 to hydrogen won't be enough to unlock the Hydrogen Economy.

Current hydrogen storage technologies (compressed hydrogen, liquified and cryogenic hydrogen, ammonia, etc.) are clear obstacles to this emergence.

They often require extreme conditions of compression and/or temperature. They use either toxic, flammable, explosive and/or grey materials which are cumbersome and expensive to handle. The energy efficiency of most of them, even the most modern ones, is very poor.

Hydrogen storage technology must be reinvented.

This is Hydro X mission.

HydroX

www.HydroX.earth

www.linkedin.com/company/HydroXhydrogen/

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+972-54-620-0029



Applications of Hydro X technology and products include decarbonizing industry energy use for iron & steel, petrochemicals, oil refining and other industrial processes, enabling long-term and seasonal energy storage for renewable energy (solar and wind) farms, acting as an energy storage buffer and green back-up solution to increase system resiliency, decarbonizing buildings heating and power supply, distributing energy across sectors and regions through hydrogen (truck, ship, rail) transportation and more.

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.

HydroLite

www.hydrolite-h2.com

Ervin.Tal-Gutelmacher@Hydrolite-h2.com

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IOSight

IOSight is a leading provider of data management and analytics solutions, specializing in the Utilities sector, with over 100 installations in the water and energy arenas worldwide. The company mange two projects funded by the Ministry of Energy and Infrastructure:

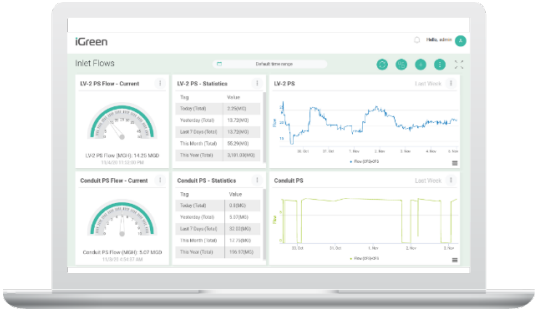
iosight.com

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1. Together with Viamaris, the BOT contractor of the Palmahim desalination plant, IOSight has won a project to optimize the entire SWRO process, by implementing a cutting edge AI based solver that will recommend in real time the best operational mode. The module will be solving multiple variables equation in a timely manner and instruct the operators on how to operation the system, starting form elevating the intake water to the pretreatment, through the pre treatment process, and focusing mainly on the production floor – the RO.

2. Together with Mekorot, Israel national water company, IOSight has won a project that aims to disrupt the Water Treatment Plants field, by implementing a cutting edge AI based software platform that will recommend in real time the best operational mode. The decision support system will focus on chemical dosing and energy consumption as its target function, and is expected to reduce the energy bill and the energy consumption significantly.



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 (Poewer On Demand) system and cloud AI, allows predictive maintenance reducing both OPEX and CO_2 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

finder.startupnationcentral.org/company_page/ket-generator

Menashe@KETGenerator.com

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.

החברה הכלכלית לפיתוח כפר-סבא

ksaba-com.co.il/home-2/

irisa@ksaba.co.il

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.

Livolt Ltd. / Natan Shahar

Livolts Standard Carbon technology provides a sustainable solution to climate change by converting CO2 emissions into energy that can be stored and deployed economically anywhere worldwide using the current utility infrastructure. This approach turns carbon pollution into clean, profitable energy and is the key to the trillion-dollar clean energy economy of the future. Our patented, independently-verified and working technology that enables a seamless transition to carbon-neutrality for a wide spectrum of industries. Our compact hardware solution takes any form of carbon exhaust and efficiently processes it into natural gas using innovative methods.

www.livolt.com
www.standardcarbon.com
natan@livolt.net



Luminescent solar power
PV/CSP hybrid solution

Luminescent is developing a small, efficient, low-cost heat engine for waste heat, solar, and cooling markets. The heat engine is small (>10kW-10MW), has high efficiency and low cost, and is the first isothermal engine.

The company enables the conversion of any open cycle small gas turbine into a combined cycle, with a potential of 100GW market. It uses any waste heat source to convert it to electricity with ROI <3.

The grant from the energy ministry scientist was the first investment in our disruptive engine.

With this grant, we start to move from idea to POC.

Luminescent
Solar Power

www.luminescentpower.com
doron.tamir@gmail.com
+972-54-816-1310

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/menolinx-systems/about/

MIGAL
Galilee Research Institute

Wastewater treatments focus on the need to reduce the concentrations of pollutants to the minimum possible level before discharge to surrounding. This approach enables the reuse of nutrients from the effluents. In order to promote circular economy, our system will first recycle phosphorus from dairy wastewater and then discharge the treated wastewater to wetlands that serve as a carbon sink.

Phosphorus is a depleting resource, reserves are known for only another 100 years. Therefore, the production of phosphorus from wastewater is important and leads to explore phosphorus fertilizer from recycled sources. The European Union has set a goal of using 30% phosphorus from renewable sources by 2030.

www.migal.org.il/en

finder.startupnationcentral.org/company_page/terrra

oribh@migal.org.il

+972-52-250-9852

Wetlands has been studied for years for their carbon capture capability. Pits contain about 80% of the carbon in the soil. The wetlands provide additional system services that are important for biodiversity, water purification and flood prevention.

NanoScent Ltd.

nanoscent

www.nanoscentlabs.com

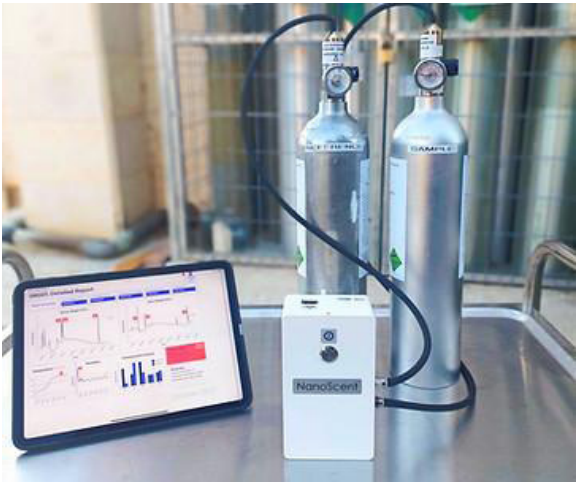
finder.startupnationcentral.org/company_page/nanoscent

oded@nanoscentlabs.com

+972-54-210-4204

Key to the green transition for energy is utilizing hydrogen as an energy source. However, hydrogen purity for certain market segments (electrolyzers, hydrogen refueling stations, fuel cells) limits market growth as hydrogen impurities can cause irreversible damage to infrastructure and materials. Existing hydrogen monitoring solutions are cumbersome in the regard that after sampling, analysis must be carried out offsite.

Our solution, **VOCID® Purity**, is an affordable and cost-efficient real time system that can be applied to various points of the hydrogen supply chain, from production to storage to refueling stations, for the continuous monitoring of hydrogen purity. **VOCID® Purity** measures Volatile Organic Compounds and hydrogen impurities onsite and provides real time alerts in the event of a contamination or leakage.



National green
Developing IoTG Technology

National Green developed a Green IoT technology - IoTG (patent pending), energy-efficient IoT. A new sensing technology adds a new layer of detection and safety to the IoT. 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, the IoT itself consumes energy and is one of the sources of fire hazards. In contrast, IoTG consumes tiny power, which significantly reduces energy consumption and fire hazards.

info@iotg.tech

The IoTG technology will be implemented as an add-on adapter to the outlet. According to its use, the adapter automatically connects or disconnects the equipment from the mains. The sensing technology enables it to operate even if it is not connected to the internet, and, as a result, the adapter saves energy and increases the safety of the equipment.

The existing technologies, GFCI and AFCI, mandatory standards for electrical outlets in the US and some EU countries exist for safety and fire hazards. The IoTG is a complementary technology that decreases the fire hazard even more, and in addition, it saves energy. The IoTG adds another layer of protection, and the internal structure of all of these technologies comprises similar elements. Therefore, we expect to dictate a new standard that will combine the IoTG with the existing technologies in all electrical outlets for a better and safer future.

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.

www.nayamwings.com

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Nostromo Energy
Energy storage in ICE

Cooling Global Warming with Ice-based Energy Storage.

Nostromo accelerates the renewable energy revolution with its sustainable water based energy storage solution that enables commercial and industrial buildings to do their part in stopping climate change by becoming large-scale energy storage assets.

NOSTROMO
Cooling Global Warming

www.nostromo.energy

boaz@nostromo.energy

Nostromo IceBrick™, Thermal Energy Storage system, stores energy 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. Nostromo's IceBrick™ is energy-efficient, safe and modular.

Nostromo paves the way to a carbon free electric grid, while offering a safe, clean and financially beneficial system to building owners. Nostromo's technology shows less than 1% degradation over 25 years of operation.

See this 3 minute video for an overview of the technology - https://bit.ly/3poTiqR.

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.

Organuz

eliyahu@organuz.com

PDP Technologies
Smart Detection of Utilities Malfunctions

PDP's solution is an loT 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.

PDPTech
Partial Discharge Monitoring

finder.startupnationcentral.org/company_page/pdp-technologies

naftali@pdp-tech.com

+972-54-496-4648

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.

PGEW Pressure Gradient Elastic Wave

www.pge-wave.com

belavsky@maltar.org.il

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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 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.

Phinergy Ltd.

Phinergy is a leading cleantech company that has developed metal-air technologies for both energy generation and energy storage. Phinergy's zinc-air energy storage technology is targeting long-duration energy storage needs created by increasingly intermittent energy sources on the grid. The "decorrelated" architecture features three separate units – charging unit, storage unit and discharging unit. It enables flexible sizing of each unit and adaptation to specific use cases. Additionally, the energy capacity can be increased at marginal cost, by increasing the storage unit size, without needing to increase the size of the charging and discharge units.

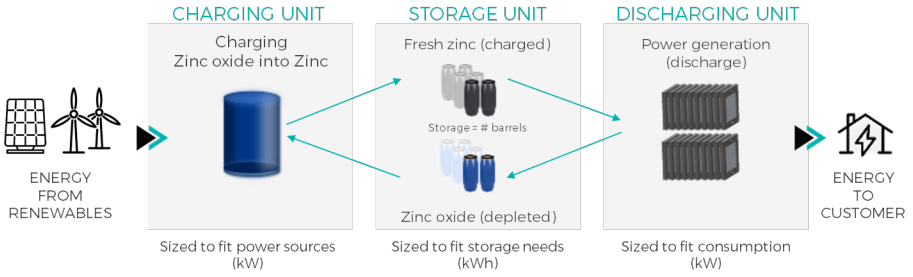
PHINERGY

www.phinergy.com

finder.startupnationcentral.org/company_page/phinergy

info@phinergy.com

The project supported by the Ministry will achieve a 360kwh demo unit connected to the renewable energy facility at the Maale Hagilboa kibbutz.



Plastic Back
Plastic to Oils

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.

Plastic Back

tal@plastic-back.com

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.

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.

pvnanocell

www.pvnanocell.com

hanan@pvnanocell.com

Ratenergy Ltd.
Mobile energy storage



ratneryo@ratenergy.co.il

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 and advanced battery based solutions for HLS, Mil. and RE integrated users.

Within the Ministry of Energy and Infrastructure Chief Scientist's program, **Ratenergy** develops two projects:

1. an array of mobile (container based) battery energy storage system (BESS), to be deployed in restricted grid access RE developments, disaster zones (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 grid firming services to damaged areas.

2. A storage (BESS) based microgrid solution for grid resilience, voltage regulation and solar energy integration for a metal processing plant, adding grid stability and health to the computerized production floor

Based on the chief scientist's programs **Ratenergy** developes a new 10MW AC, 25MW DC, DC coupled solar – storage project in Dimona, southern Israel

and a new integrated 45MW dual land use PV plant & storage cluster in Newe Ur, Northern Israel.

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.

SETPOINT
EXPERIENCE CLIMATE INTELLIGENCE

www.setpoint.ai

hannas@zero.energy

+972-54-478-3503

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 and Infrastructure to further develop the technology. Our technology is potentially a game changer in the construction industry of glass high-rise scrappers.

SKY-WALLS

www.sky-walls.com

snirg@sky-walls.com

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.

www.sol-around.com

avishai.drori@sol-around.com

+972-54-590-0053

SolAround's technology provides state of the art bifacial solar cells with high performance similar to more expensive technologies: high front efficiency (towards 24%), 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 27-32% equivalent cell efficiency allows for over 10% LCOE reduction, compared to most advanced solutions.

SolAround samples fully industrial cells in Germany, has successfully demonstrated its process in a fully industrial fab in Taiwan, and is preparing for mass-production in India towards massive field installations in Israel and other territories. SolAround's technology is optimal also for future Tandem cells as well as for PV in space. The company 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, in the US and in Europe. The company is significantly supported by the MOE for years, thru a few pioneering demo projects in Israel and in bi-lateral R&D consortia with Germany for the development of advance bifacial PV modules.



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.

SolarWat

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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.

SolCold

www.solcold.co

info@solcold.co

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.

Source (Shoresh)



www.source-israel.co.il
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+972-52-862-2911

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 Sandal manufacturing 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 with technical supervision by Mike Green. The project includes PV solar power, storage batteries and an energy management system targeted at operating the factory entirely off grid, thereby manufacturing the world's first Zero Carbon sandals.

In addition, Source industries, in continuing their vision to actively combat GHG emissions, has undertaken a pilot project to achieve greater efficiency from the sun's irradiance on multi-family apartment buildings by installing a central solar water heating and electricity producing system on the rooftop for the benefit of all the family units sharing the roof. The heart of the system replaces the flat plate thermal collectors with PV-thermal collectors that produce electricity and preheat the water in a closed circuit feeding a heat pump that boosts the water temperature to the consumer hot water level. Electricity production and water heating are controlled by algorithms to maximize the overall efficiency of the system.

The project is financed by Source industries and managed by ARAVA EC&T under the supervision of Elad Topel and Mike Green.

Electrical production coupled with water heating in a single scalable system democratizes solar electrical energy for apartment dwellers, who make up the majority of the Israeli population.

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.

SOWILLO

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Supergas Energy



SUPERGAS ENERGY
Entrepreneurship. Innovation. Reliability.

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Supergas Energy is a long-standing and leading energy supplier in Israel, owned by the ELCO Group. The company provides energy solutions to hundreds of thousands of households and dozens of factories, including; Natural Gas, LPG, Compressed Air systems, Cogeneration stations, PV systems and EV charging stations. Supergas is supplying Natural Gas and LPG to an international production factory in the "Emek Israel" area. A Compressed Air efficiency system has recently been installed at the factory, and in the coming months the construction of a 1.5MW Cogeneration station will be completed. The additional electricity consumption will be supplied from the grid. The recent changes in tariffs and the MoE grant, create an opportunity to execute a comprehensive micro-grid system in the factory, which includes CHP & PV systems, both of which will supply electricity during production hours to a storage system of 1MWh - which will discharge the electricity for use by the factory during peak hours. Execution of a micro-grid project will allow the company to learn the operational implications of setting up storage systems in a micro-grid configuration, to strengthen the synergy with the variety of energy solutions offered by the company and thereby provide added value to its customers.

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.

SGTech
Sustainable Green Technologies

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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.

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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.

Sympower
Demand Response Aggregation

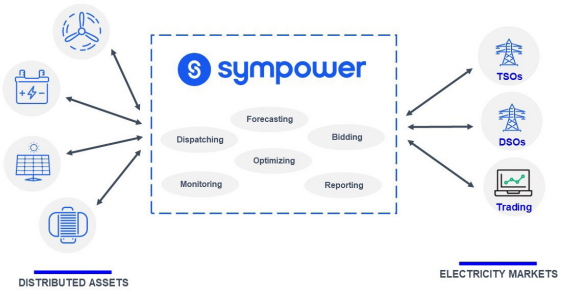
sympower
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One of the greatest challenges in the transition towards a sustainable electricity system is maintaining the balance between supply and demand of electricity. As the proportion of renewable electricity production increases, so does the need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

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.

SYNVERTEC
For Better Grid Stability

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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.

Technion start-up
Anion Exchange Membrane for Fuel Cells

To be founded during 2022, **Conduce** is based on the results of extensive research conducted at the Technion. Conduce will commercialize a series of new anion-exchange membranes with unparalleled chemical stability. The membranes developed at the groups of Prof. Dario Dekel & Prof. Charles 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.

conduce

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Technion

Efficient heat engine at small capacity for solar and waste heat

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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. sCO_2 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%.

Teralight Ltd.

Teralight is a publicly traded company traded in TASE owned by the controlling owners of Menora Mivtachim and Leumi Partners. The company operates in the field of developing and initiating solar energy projects in Israel and around the world. Teralight has an exclusive strategic partnership with the Moshavim movement, which unites 254 moshavim throughout the country. The company has accumulated projects pipeline of about 800MW in Israel as well as hundreds of megawatts in projects abroad. In the joint project with the MoE, Teralight will install solar roofing on a parking lot, combining charging stations for electric vehicles and a storage facility. The project, which received NIS 1.3 million in support, will initially include 500 kilowatts of solar, 10 charging stations for electric vehicles and storage at a capacity of 2.3 megawatts per hour.

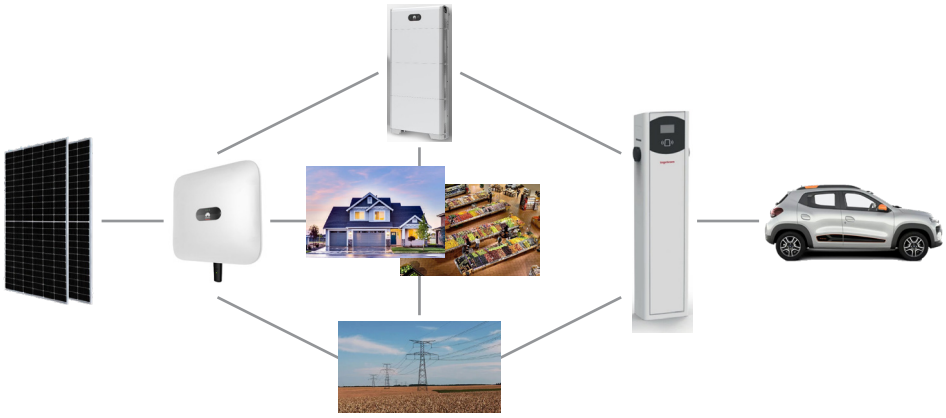
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Tigi Solar

Most of the energy produced in the world is used as thermal for various processes and needs. Almost all of it is produced by burning fossil fuels. Utilizing solar and heat pump systems for the relevant applications would lead to dramatic reduction in the use of fossil fuels by use of renewable resources and to dramatic lowering of GHG emissions.

Tigi is a startup company that develops heat generation and storage solutions from renewable sources. Tigi's core technology is it's unique thermosolar panel which offers higher efficiency and is currently developing supporting cloud services that will provide the clients with better control of the system.

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The project will be located at an industrial facility in the food and beverage sector and will replace burning fossil fuels for the production of process heat. It includes a thermosolar array, waste heat utilization, energy storage and a heat pump. This process is expected to save 460 tons of CO2 emissions annually.

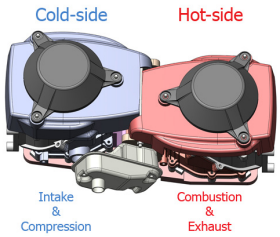
TourEngine
Efficient Motor

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.

www.tourengine.com/about

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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.

Vertical Green Energy

Vertical Green Energy has come to provide a solution for the problem of energy density per unit area. Our solution is to establish PV towers for the production and storage of electricity for maximum utilization of a land unit. Our towers use only 10% of the land unit needed to produce the same energy from a horizontally built PV field. The towers are made of a steel chassis with slewing mechanism and solar system on it.

Our solution can be built in agricultural fields far from the electricity grid or urban areas while making maximum use of land unit.

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Prof. Guy Ramon

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Technion – Israel Institute of Technology

Water & Energy Technologies Laboratory

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Energy demand for air conditioning is expected to increase rapidly over the next decades, along with its relative share of energy consumption. Moreover, current technology uses refrigerants that have detrimental global warming potential.

This project is aimed at developing a method for air conditioning, leveraging a unique variant of thermoacoustic conversion technology, which can be powered by either thermal energy (solar, waste heat, or pre-installed heating equipment), electrical energy, or a combination of both, while employing environmentally benign working fluids. The intended objective is to fabricate a single-dwelling, scalable prototype, capable of utilizing a range of energy sources, while being technically and economically competitive with current commercial technology.



Women In Energy IL

Women In Energy is a unique community that aims to promote professional women in the energy ecosystem. Women in the community are coming from the entire spectrum of the ecosystem. This includes representatives from both public and private sector players such as investors, startups, accelerators and development programs, academia, and entrepreneurs.

The community creates a platform for promoting women through dialogue, discussions, professional events, mentoring, employment opportunities, and more.

WOMEN IN ENERGY By IGNITE

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Zohar Cleantech (ZCT) Ltd.

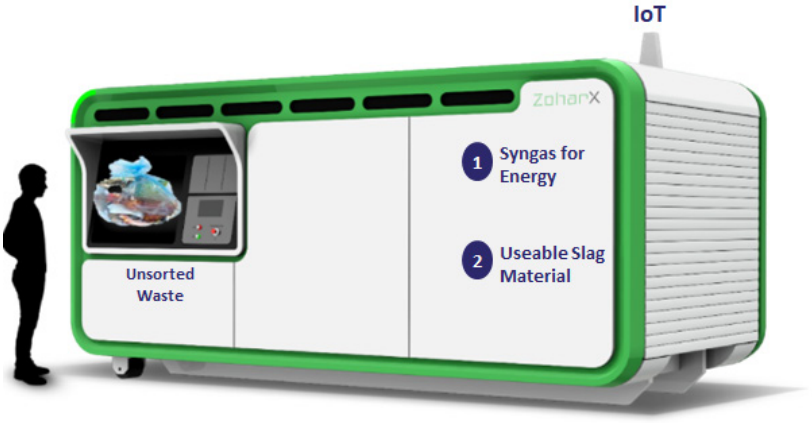
Zohar Cleantech LTD comprising an interdisciplinary team of senior engineers with vast experience in R&D of innovative projects. In the joint project with the MoE, the team is engaged in developing ZoharX system, a green-breaking patented innovation Micro Waste to Energy (WTE) system based on a genuine engineering concept, incorporating a gasification process to convert in-situ unsorted municipal solid waste to renewable energy, used off the grid, on-site, avoiding collection and disposal of municipal solid waste to a distant landfill, taking off the congested urban streets the heavy tipping trucks, reducing GHG emissions and avoiding soil and groundwater pollution, conserving the open space and yielding a sustainable and economically viable solution for the urban sector.

ZOHAR CLEANTECH
Smart Waste Systems

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Zoko Energy

Zoko Energy is part of the Zoko enterprises ltd with 7 locations across the country, and leading company for importing, marketing and selling equipment spare parts and services at the fields of infrastructure, transportation, energy, water and automotive.

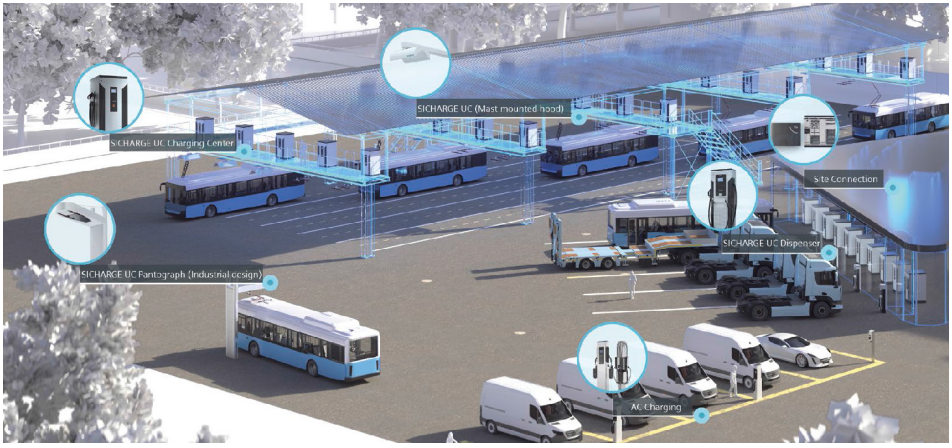
The project funded by the MoE is implementing an integrated battery storage system with DC charger for heavy machine and solar power system.



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