



TOGETHER
for a sustainable future

OCCASION

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An aerial view of a city skyline at sunset, with the sun low on the horizon, casting a golden glow over the buildings and the water in the foreground. The sky is a mix of blue and orange.

The Global Cleantech Innovation Programme for SMEs

Fostering Clean Technology Innovation

2015

“We are creating an innovative, global program supporting small- and medium-sized enterprises by leveraging the Cleantech Open’s global platform with UNIDO’s international network and resources.”

— Dr. Naoko Ishii, CEO and Chairperson, Global Environment Facility

ENTREPRENEURIAL INNOVATION IS THE ANSWER TO THE WORLD’S MOST PRESSING ENVIRONMENTAL CHALLENGES, AND THE KEY TO ECONOMIC GROWTH

- Innovators are developing ingenious solutions to major challenges in energy generation, distribution and storage, air and water pollution, waste management, new forms of transport and construction techniques.
- Entrepreneurship thrives in countries where there’s minimal red tape, strong rule of law, ready access to venture capital, government funding and a vibrant support network for entrepreneurs.
- Almost all net new jobs are created by growing small businesses.

THE GEF, UNIDO AND CLEANTECH OPEN BRING PROVEN EXPERIENCE, DRIVING POWERFUL RESULTS

- UNIDO and the Cleantech Open, with the support of the GEF, have joined forces to launch cleantech platforms and competitions in developing and emerging countries, based on the Cleantech Open’s proven accelerator model originally created in Silicon Valley.
- UNIDO has been supporting SMEs in developing countries for over 20 years.
- The Cleantech Open runs the world’s largest cleantech accelerator, supporting innovators and entrepreneurs through extensive training, mentoring, showcases and access to capital:
 - Over 1,000 startups have completed this process in the United States alone
 - Those companies have now raised capital totalling over \$1.1 billion, creating thousands of jobs
- Participating countries have access to UNIDO’s in-country resources and to the Cleantech Open’s events, training, materials and an online global platform connecting entrepreneurs to a global network of mentors, investors and experts.

THE GLOBAL CLEANTECH INNOVATION PROGRAMME FOR SMEs

The Global Cleantech Innovation Programme (GCIP) for SMEs* is a far-reaching programme that leverages the power of entrepreneurship to address our most challenging energy, environmental and economic problems.

GCIP brings together the world's largest accelerator for cleantech startups with resources in developing countries. By enhancing emerging cleantech startups and bolstering the local entrepreneurial ecosystem and policy framework, the programme delivers both environmental benefits and economic vitality.

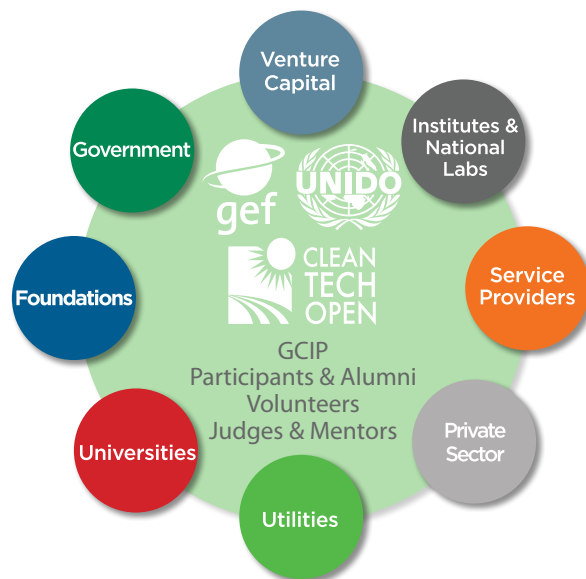
Selected startups in each country participate in a rigorous, competitive national acceleration programme that trains, mentors, promotes, and connects them to potential investors, customers and partners. As the best cleantech companies progress, they are continuously developed and assessed. The very best startups from each country are brought together to the Cleantech Open Global Forum in Silicon Valley, California for recognition, awards and connections to potential partners, customers and investors from around the world.



Each country receives \$1M to \$2M in funding from the Global Environment Facility matched by \$2M to \$6M+ in co-financing (including in-kind) from in-country public- and private-sector partners. The programme is led by a local executing partner in each country, supported by local stakeholders and advisors. An integral part of GCIP is the development of the institutional capacity of local implementing partners, typically government agencies focused on SME development, clean technology and innovation. The programme seeks to reinforce, strengthen and connect existing in-country initiatives rather than duplicate existing activities.

In most countries, the initial GEF funding will be for three years with the intention of holding two to three cycles of the annual programme. Some countries will launch nationwide programmes from the start; others will start regionally and expand as experience and capacity grow. At the end of three years, the aim is for each national programme to be fully operational with sustainable support from the public sector and private sector co-sponsors.

BUILDING AN INNOVATION AND ENTREPRENEURSHIP ECOSYSTEM



*originally launched as the GEF UNIDO Cleantech Programme for SMEs

PARTICIPATING COUNTRY STATUS REPORT | SPRING 2015

After a successful pilot in South Africa in 2011, a growing list of countries is now engaged in the Global Cleantech Innovation Programme for SMEs. South Africa, Malaysia, Armenia, India, Turkey and Pakistan formally launched GCIP in 2014 and Thailand has also received funding under the GEF-5 cycle (July 2010 - June 2014). Several further countries have already expressed a desire to launch similar programmes under the GEF-6 replenishment cycle (July 2014 - June 2018). The diversity of applicants in size and region will allow a strong foundation for regional collaboration, South-South technology transfer, and expansion.



“Today’s clean technology innovations will fuel the next industrial revolution that will shape tomorrow’s global economy and job market. Recognizing the vital role SMEs play in catalyzing breakthrough technology innovations, the Global Cleantech Innovation Programme for SMEs is unique in terms of fostering the expansion of SMEs into cleantech products, thus strengthening the entrepreneurial innovation ecosystem in emerging economies and developing countries.”

— Mr. Li Yong, Director General, United Nations Industrial Development Organization (UNIDO)

KEY ACTIVITIES

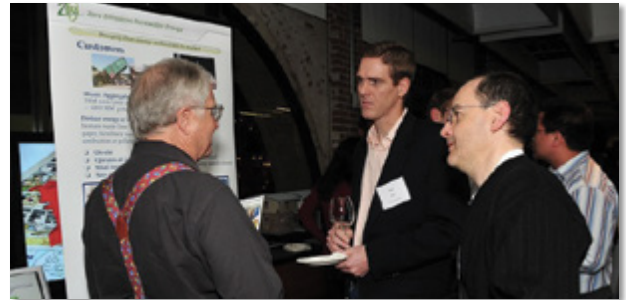
The Global Cleantech Innovation Programme for SMEs is built around four major activities:

National Academies,
National Webinars and
Regional Training

Practice Judging and
Business Clinics

Local and international
mentors (generalists and
specialists)

Business Clinics



**ACCESS TO
CAPITAL**

Relationship with Strategic
Investors, Angel Groups
and VC firms

Pitch Panels, Networking
and Investor Connect



SHOWCASING

Regional event
and showcases

National Conference
and Global Forum

Press exposure

TECHNOLOGY CATEGORIES

The Global Cleantech Innovation Programme (GCIP) for SMEs focuses on four clean technology categories, with each country covering all or part based on national priorities. Applicants are encouraged to use climate resiliency as a key design criterion. As the programme evolves, additional categories of technology innovation will be added.



RENEWABLE ENERGY



WATER EFFICIENCY



ENERGY EFFICIENCY



WASTE TO ENERGY

CASE STUDY 1

FOSTERING CLEAN TECHNOLOGY INNOVATION IN SOUTH AFRICA

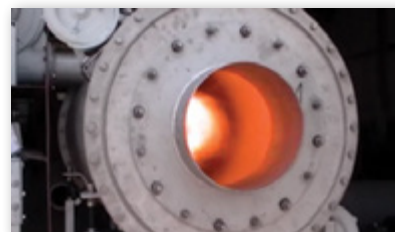
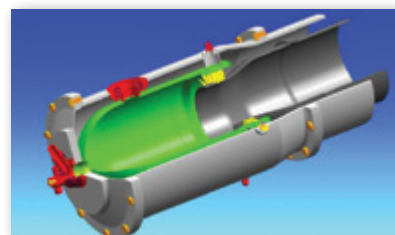
Building on the success of the 2011 Clean Technology Innovation Competition, UNIDO and the GEF have developed the Global Cleantech Innovation Programme for SMEs in South Africa (GCIP-South Africa), in cooperation with the Technology Innovation Agency (TIA) and the Department of Trade and Industry (dti). The project primarily aims to promote an innovation ecosystem in South Africa by: (i) assisting the identification and early-stage nurturing of the most promising innovative local clean-energy technologies; (ii) coordinating various existing and planned national programmes, funds and competitions relating to the promotion and development of clean-energy technologies, and providing pre-selected candidates and applicants for them; and (iii) connecting the most promising startups of South Africa with mentors and potential business partners abroad. Leveraging on the legacy of 2011 and the existing capacity, GCIP-South Africa was initially based in Pretoria and Johannesburg and as of 2015 has begun to gradually expand to further regions of South Africa.

Under the 2014 Cleantech Competition and Accelerator Programme, GCIP-South Africa received applications from over 70 entrepreneurs; 24 of which were selected to take part in the Accelerator Programme, receiving mentoring and training from South African and international experts, investor pitch coaching and networking opportunities. A Gala Dinner and Awards Ceremony was held in October 2014 to recognize the efforts of all entrepreneurs throughout the Programme and to announce the National Winner who, in addition to a cash prize, was also given the opportunity to attend and pitch at the Cleantech Open Global Forum in Silicon Valley, USA.



2014 GCIP-SOUTH AFRICA WINNER

CLEAR SKY ENERGY (Pty) Ltd



The Company

Clear Sky Energy was registered in 2010 and has secured the patents and exclusive global rights to manufacture and develop fully certified Waste to Energy technologies and solutions. Their breakthrough technology facilitates complete combustion 99.8% through their patented Counter Flow Vortex Combustion Chamber “Afterburner” with generation of up to 2,500°C of heat in the core of the chamber with minimal primary heat input for the design, manufacture and supply of waste to energy plants that are cost-effective, highly efficient, have small footprints and are fully emissions compliant.

4 and 12 ton per day feedstock for the conversion of wood, coal, nuts and coconuts to steam based activated carbon and the production of synfuel; iii) Containerized afterburner modules (CSCFV130): up to 130 ton per day feedstock for the conversion of waste coal ultra-fines, waste oil and waste liquid (at sufficient calorific value (CV) value) to heat, steam and/or electricity; iv) Afterburners as retrofit gas clean-up device for flue and pyrolysis gases; and v) Counter Flow Vortex Burners that can be retrofitted to kilns, ovens, pyrolysis chambers and incinerators.

The Technology

The technologies include: i) Pyrolysis plants (CSMED10 and CSBIO50) for the conversion of solid carbonaceous waste to energy utilizing the afterburners as a gas clean-up device. These plants are primarily used for 10 ton per day medical & hazardous waste feedstock to energy; 50 ton per day industrial waste feedstock to energy; and municipal solid waste or refuse-derived fuel (RDF) to energy; ii) Activated carbon plants (CSCARB4 and CSCARB12):

Developmental Impact

- Due to the unique afterburner technology, air emissions are well below the new South African legislative levels for medical waste destruction. Capital and operating costs are up to 50% less than that of competitor plants.
- Adjacent markets for potential application and expansion include retrofitted gas clean up modules and the thermal treatment of industrial, hazardous, and mine waste to energy.

AT A GLANCE

Company	Clear Sky Energy (pty) Ltd
Location	Johannesburg, South Africa
Technology Category	Waste to Energy
Technology Stage	Commercialization
Next Steps	Finalization of two current projects
Email	mark@clearskyenergy.co.za
Website	www.clearskyenergy.co.za

CASE STUDY 2

ACCELERATING CLEAN TECHNOLOGY VENTURES IN MALAYSIA

In early 2013, the Malaysian Industry-Government Group for High Technology (MiGHT) joined hands with UNIDO to implement the Global Cleantech Innovation Programme for SMEs in Malaysia (GCIP-Malaysia). The aim of the programme is to develop a platform that will nurture and accelerate the next generation of Malaysian cleantech entrepreneurs.

An integral part of GCIP-Malaysia is the development of the institutional capacity of MiGHT, the local executing partner and an agency under the purview of the Prime Minister's Department of Malaysia, mandated to nurture high technology industries via its strategic intervention and initiative. Furthermore, GCIP-Malaysia seeks to reinforce, strengthen and connect existing in-country initiatives rather than duplicate existing activities. This is achievable by building a conducive ecosystem for the growth of entrepreneurs in the field of clean technologies. Thus, GCIP-Malaysia will bring together stakeholders to find, fund and foster entrepreneurs with solutions to address today's most urgent energy, environmental and economic challenges.

Under the 2014 cycle of the Competition and Accelerator Programme, GCIP-Malaysia attracted over 60 applicants and selected 26 semi-finalists to take part in the four-month Accelerator Programme. In cooperation with various project partners from both the public and private sectors, GCIP-Malaysia provided a platform for Malaysian entrepreneurs across the country.



2014 GCIP-MALAYSIA WINNER

FREE THE SEED Sdn. Bhd



The Company

Free the Seed Sdn. Bhd. was selected the National Winner of the 2014 GCIP Cleantech Competition and Accelerator Programme in Malaysia and is a Biotech & Green-tech-based company focused on Bio-Packaging; and R&D and Manufacturing of Biodegradable Packaging Products from Biomass Waste Materials using a Patented Bio-Enzymatic Technology, for the reduction of global carbon footprints.

The Technology

Free the Seed's initiative is implemented in the northern region of Malaysia and involves 1,300 paddy smallholders. Existing stockpiles of rice husks and rice straw are purchased and converted using Free the Seed's patented biotechnology process utilizing protease serine enzymes, delignified cellulose fibers and enzymatic gratification methods to produce Biodegradable Packaging products that compost organically in 180 days for the global market and in compliance with current sustainable packaging initiatives. As these waste stockpiles deplete, so does the incidence of open burning while the readily compostable nature of the end product ensures no further addition of harmful waste material to the environment. As the project progresses, the sector will see a stream of direct and indirect benefits in the form of additional

income from the purchase of paddy waste material and associated pre-processing activities and the introduction of sustainability and stewardship standards which will lift the sector overall.

Developmental Impact

- The pilot phase (2015) of this project will directly impact the lives of 1,300 farmers; this number is expected to grow to 30,000 as the project goes full stream in 2017.
- An estimated 47,000 hectares of paddy field is expected to achieve Zero Open Burning, translating into an estimated reduction of 600,000 kg of CO₂ per annum. With these achievements, the paddy crop sector could lead the way, showcasing what is possible through the thoughtful application of technology, and paving the way to establish Malaysia as a low-carbon agriculture production country while remaining sensitive to the needs of farmers.
- It is also expected that this initiative will catalyze the creation of an entire biodegradable product packaging value chain, the emergence of knowledge workers and significant economic activity which will have positive impacts on the local and national economy.

AT A GLANCE

Company	FREE THE SEED Sdn Bhd
Location	State of Kedah, Malaysia
Technology Category	Waste to Energy
Technology Stage	Implementation & Pre-Commercialization
Next Steps	Reduction of 600,000 kg of CO ₂ annually
Email	ramaness@freetheseed.com.my
Website	www.freetheseed.com.my

CASE STUDY 3

PROMOTING CLEAN ENERGY TECHNOLOGY INNOVATIONS AND ENTREPRENEURSHIP IN INDIA

The Global Cleantech Innovation Programme for SMEs in India (GCIP-India), in partnership with the Ministry of Micro, Small and Medium Enterprises (MSME) in India and the national executing agency, the Federation of Indian Chambers of Commerce and Industry (FICCI), aims to play a catalytic role in channeling innovative solutions for the adoption of clean technologies in India and bringing these to the global market. Specifically, GCIP-India promotes clean-energy technology innovation and entrepreneurship in selected MSME clusters across India through a cleantech innovation platform and competition. The MSME sector in India plays a vital role in the Indian economy, contributing 45% of manufacturing output, 40% of exports and employing more than 69 million people.

Tackling climate change and seizing the economic opportunity for green industry requires increased design, deployment and scaling up of innovative clean technologies by SMEs across India. Through new collaborations across disciplines and sectors, GCIP-India will build the national capacity for clean technologies and develop a supportive local entrepreneurial ecosystem for MSMEs developing clean and resource efficient innovations. An important aspect of this cleantech innovation platform is the ability to connect with other synergistic initiatives and entrepreneurs in countries around the world. Through the growing community of national partners in GCIP-India, selected Indian cleantech entrepreneurs will be connected to potential partners throughout the GCIP network and around the world.

In 2014, GCIP-India attracted 183 applications from across India to take part in the initiative, with 31 semi-finalists receiving expert mentoring and support as they progressed through the Accelerator Programme. In 2015, GCIP-India will further expand its geographic reach, aiming to reach out to and support entrepreneurs in clean technologies across the country.



2014 GCIP-INDIA WINNER

GYATK RVCR APPARATUS P Ltd.



The Company

GYATK was founded to commercialize the globally patented Roto-Dynamic Variable Compression Ratio (RVCR) technology, by developing pilot products based on RVCR technology for licensing product-specific intellectual property (IP) rights to industry players. GYATK owns the IP rights of RVCR technology that originates from patents granted to it in 49 countries. Currently, GYATK is developing the first RVCR 'Fuel-Hybrid/Multi-fuel' Engine prototype and has formulated its know-how and know-why. Along with the engineering R&D, GYATK has also devised customized 'proto/pilot RVCR engine project planning' and 'Process Management' tools for enabling efficient RVCR engine development project operations.

The Technology

RVCR is seed-machine kinematics that has various downstream applications in engines, renewable energy power generators and utility machines; RVCR enables a feature called 'VCR' (Variable Compression Ratio) which revolutionizes engines. Despite multiple tests having proven that VCR leads to "multiple fuel operations capability" and a 30% increase in fuel efficiency, these models have never been commercially viable. RVCR is the cutting edge technological solution that makes VCR engines commercially viable.

Unlike conventional engines which use a piston-crank mechanism, RVCR engines use a novel kinematic mechanism where pistons revolve within a doughnut shaped chamber. The power transfer from burning fuel is direct and comparatively simple, light, and eliminates reciprocating pistons, flyweight and crank, making engines up to 54% smaller. Unique features of RVCR engines are a wide VCR range, and real-time setting of optimum power-to-economy ratio under varying loads, improving fuel efficiency and power allocation.

Developmental Impact

- GYATK's RVCR technology allows multi-fuel usage, meaning cars can refuel and run on different fuels, such as either diesel, petrol or green fuel and can be switched over during operation.
- RVCR engines use fuel much more efficiently and have a lower carbon foot print and as they allow use of any fossil or green fuels in the same engine, it provides a level playing field for greener alternatives (Biofuel, Hydrogen, Algae based fuels).

AT A GLANCE

Company	GYATK RVCR Apparatus P Ltd.
Location	Cochin, Kerala, India
Technology Category	Energy Efficiency; Transportation
Technology Stage	Early Alpha Prototype (TR-6)
Next Steps	Achieving Pilot Product
Investment Leveraged to Date	USD 5 million
Email	info@gyatk.com , ajee@gyatk.com
Website	www.gyatk.com

2014 GCIP-INDIA WINNER

HyCa TECHNOLOGIES



The Company

HyCator® Reactor System works on overall efficiency improvements in a cost effective and environmentally friendly way for applications ranging from effluent treatment, cooling tower water treatment, biogas generation enhancement to chemical processes. HyCator® Reactor Systems are stand-alone, custom designed, skid mounted units which can be retrofitted into existing setups with minimum pipeline modification and with no plant stoppage. HyCa's business model is to develop a product, conduct the initial consultative sales process and then sell/lease/license the product. The company is presently focusing on HyCator™ Reactors for BioGas Generation enhancement, effluent treatment, chemical processes, and cooling tower water disinfection as they fall under the same sales channel.

The Technology

HyCa's technology allows it to harness energy dissipated by collapsing cavitation bubbles to accelerate chemical reactions, breakdown complex molecules and particles, and do uniform mixing/blending, apart from other applications across industries ranging from effluent treatment to petrochemicals. These include: i) Effluent treatment has worked on a reduction in processing time, chemicals and energy usage, and saves water for overall efficiency improvement to a scale of minimum 15% without any civil construction. It is extremely effective in the pre-treatment of raw high chemical oxygen demand (COD) effluent; ii)

Cooling tower water treatment treats high volumes of water with significantly lower chemical usage and saves up to 25% of makeup water; iii) BioGas generation enhancement increases BioGas generation from an existing plant by up to 30%; iv) Chemical processes for particle breakdown to micron and nano sizes, online mixing/blending and molecular breakdown leading to cost effective reduction in process times and efficiency.

Developmental Impact

HyCa's products create a win-win scenario for everybody:

- Customers benefit as it is cost effective compared to existing technologies or processes
- Operational staff benefit as it requires minimal intervention
- Society benefits as it creates employment, and mankind benefits as it is environmentally friendly.



AT A GLANCE

Company	HyCa Technologies
Location	Mumbai, India
Technology Category	Waste to Energy
Technology Stage	Actively deployed and generating revenue not yet profitable
Investment Leveraged to Date	Angel funding
Email	anjan@hycator.com
Website	www.hycator.com

2014 GCIP-INDIA WINNER

NEOGI TECHNOLOGIES and RESEARCH Pvt. Ltd.



The Company

Neogi Technologies & Research Pvt. Ltd. (NTR) was established in 1986 as the Moonlight Engineering Company, manufacturing various spare parts of fuel dispensing pumps and supplying to OEM companies, government sectors and other renowned private parties. The company developed some important instruments and accessories through its own development team with a focus on new product development. In April 2014, the Moonlight Engineering Company became Neogi Technologies and Research (NTR) Private Limited.

NTR's aim is to develop innovative products using indigenous materials and technology to substitute foreign products with a view to save foreign exchange and to serve the nation's interests. In this respect, NTR has over forty years of engineering excellence from the inception of NEOGI Group, providing customized solutions with ten patents and various awards for innovation and excellence. NTR's mission is to accommodate Green-Tech Initiatives for innovation and sustainable development.

The Technology

Plastic to Fuel Oil

Generation of fuel oil from waste plastic material has been developed after four years of R&D efforts by the research wing of NTR. The journey focused on Design of Experiment (DOE) to identify a commercially viable solu-

tion for the conversion of waste plastic of less than 40 micron to fuel oil with comparable specifications as per the Bureau of Indian Standards (BIS). NTR has been successful in demonstrating the process to extract one liter of Plastic Fuel Oil from one kilogram of Waste Plastic.

Developmental Impact

- The technology is environmentally friendly as it helps to free the environment from plastic pollutants and provides a new source of alternative energy at a low cost in comparison to other fuel oils, and improved quality due to the very low content of sulphur.
- The product will allow for import substitution, thereby saving foreign currency and providing a cleaner, healthier and greener environment.



AT A GLANCE

Company	Neogi Technologies and Research Pvt. Ltd.
Location	Kolkata West Bengal, India
Technology Category	Waste to Energy
Technology Stage	Beta Testing
Next Steps	Commercialization
Investment Leveraged to Date	Rx.75 Lacs (approx)
Email	support@ntrindia.co.in
Website	www.ntrindia.co.in

CASE STUDY 4

NURTURING EMERGING CLEANTECH ENTREPRENEURS IN ARMENIA

In February 2013, Armenia became one of the first countries in Eastern Europe to join the Global Cleantech Innovation Programme for SMEs (GCIP-Armenia) with the support of the Ministries of Nature Protection, Energy & Natural Resources and Agriculture. GCIP-Armenia is operated in partnership with the Enterprise Incubator Foundation (EIF) and Small and Medium Entrepreneurship Development National Center (SMEDNC). The project is based at Gyumri Techno Center with a goal to establish a cleantech startup/SME accelerator which will promote clean technology throughout Armenia, and become a national center for innovative cleantech business ideas.

In 2014, GCIP-Armenia selected 24 companies to take part in the intensive mentorship and training programme to develop their business ideas into robust business models. The 2014 cycle culminated in the final Gala Event where the National Winner was announced and given the opportunity to attend the Cleantech Open Global Forum in Silicon Valley and other key events in the region. Building on the strong interest in the Programme and significant potential within Armenian universities, GCIP-Armenia launched the Innovative Business Ideas Generation and Entrepreneurship Training in early-2015 focused specifically on university students. The training, held at Gyumri Technology Center and attended by 65 students from four universities, identified five teams based on their innovative concepts and business models to receive ongoing mentorship and support. Of these five, two teams have automatically qualified as semi-finalists for the GCIP Cleantech Competition and Accelerator Programme where they will receive further mentorship and the opportunity to present their technologies to the global market. A similar approach was taken in partnership with Yerevan State University, where training was provided to 94 students, and 3 teams were selected to take part in the 2015 cycle of the Cleantech Competition and Accelerator Programme.



2014 GCIP-ARMENIA WINNER

ECO TECHNOLOGY



The Company

Ecotechnology LLC participated in and was announced the National Winner of the first 2014 GCIP Cleantech Competition and Accelerator Programme in Armenia. To decrease the cost of agriculture products, as well as provide water resource efficiency to make farming more profitable, efficient and cost effective, Ecotechnology LLC is producing and using an aquasource—biodegradable water absorbent for agriculture and decorative plants. Aquasource is a new generation of materials possessing the unique ability to absorb and retain moisture.

The Technology

By applying a water absorbent next to the root of any plant, aquasource immediately absorbs irrigation or rain water and releases it to the roots as and when required; 1 gram of aquasource absorbs and releases 350 grams of water. This cycle of absorption and desorption is repeated more than 1,200 times, which is sufficient to support the soil for up to 7 years. The utilization of aquasource, economizes irrigation by 60%, economizes fertilizers by 40%, ensures 98% of plants' survival, increases crop productivity by up to 50% and accelerates crop ripening by 10-15

days. In addition, aquasource improves soil structure and aeration of the roots; the rhizosphere next to aquasource indicates rapid growth and produces a natural fertilizer.

Developmental Impact

- Aquasource biodegradable water absorbent can be used in agriculture in open land or in greenhouses with or without drop irrigation, as well as for decorative plants and landscaping.
- Aquasource has passed validation in the scientific center of vegetables and industrial grains of the Ministry of Agriculture of Armenia, and is also validated in the field for over 3 years through the implementation of pilot projects. Currently, Aquasource can be procured in specialized shops throughout Armenia.
- The grant provided by GCIP-Armenia has become the cornerstone for new fundraising of USD 100,000 in 2015. These funds are envisioned to reorganize production, design the new packing according to international standards and by the end of 2016, reach production capacity of 20 metric tons per month. Aquasource is currently passing validation in the Russian Federation, Islamic Republic of Iran and Namibia.

AT A GLANCE

Company	ECOTECHNOLOGY LLC
Location	Yerevan, Armenia
Technology Category	Water Efficiency
Technology Stage	Ready for industrial production
Next Steps	Production of industrial quantities
Investment Leveraged to Date	USD 48,000
Email	ecotechnology.am@gmail.com
Website	www.ecotechnology.am

CASE STUDY 5

PROMOTING CLEANTECH INNOVATIONS BY SMEs IN TURKEY

SMEs are central to the Turkish economy with 3.22 million SMEs operating in Turkey (99% of all companies) that between them constitute almost 80% of total employment and 27.3% of Turkey's GDP. The removal of barriers hindering their development and expansion into clean energy products is essential to stimulate the development of a strong innovation ecosystem in Turkey. To this end, the Global Cleantech Innovation Programme for SMEs in Turkey (GCIP-Turkey), hosted by the Scientific and Technological Research Council of Turkey (TUBITAK), was launched in May 2014. Working closely with both public and private sector partners, GCIP-Turkey acts as an effective catalyst to boost more vigorous implementation of existing programmes and provides a methodology and coordination platform to optimize and expand on the support provided by existing programmes in Turkey.

Under the 2014 Cleantech Competition and Accelerator Programme, effective outreach activities with universities and project partners promoted GCIP's benefits and established partnerships with public and private entities, thus creating a network of clean technology stakeholders across Turkey. In 2014, 93 applications were received from entrepreneurs, primarily from the Ankara, Istanbul and Izmir regions. A panel of representatives from government, academia, the private sector, and financing institutions evaluated the applications in June 2015, selecting 27 entrepreneurs to proceed as semi-finalists and receive intensive mentoring and training, as well as attend networking and pitching events in both Ankara and Istanbul. The National Winner of GCIP-Turkey, along with the Category Winners, were recognized and given the opportunity to pitch at the Final Award Ceremony in Ankara in October 2014, attended by the Minister of Science, Industry and Technology.



2014 GCIP-TURKEY WINNER

CLEANWAVE



The Company

PROMATECH was founded in 2010 at the Istanbul Technical University ARI Teknokent as a R&D company with the aim to produce innovative technological products, develop engineering solutions and provide high quality services to the Maritime Industry. CLEANWAVE is a product of PROMATECH Maritime Technologies; it began as a R&D project and its prototype is now ready for commercialization.

The Technology

Two full scale CleanWave prototypes have been successfully developed and installed; the first in 2010 at Akçakoca, Turkey and the second in 2012 near the shore of the Istanbul Technical University Campus. Test results validated the functionality of the concept. For this first prototype, the Small and Medium Enterprises Development Organization (KOSGEB) provided grants and for the second prototype funds were granted by the Scientific and Technological Research Council of Turkey (TUBİTAK). Testing of these prototypes by the Istanbul Technical University validated the technology and it has received two patents nationally, while EU patents are still pending.

The next step for CleanWave is to manufacture a commercial ready pilot product, CleanWave 125. The company has gained all necessary know-how, is aware of all materials and components needed, and is ready to implement the project and begin with the production plan. CleanWave 125 will be placed in a series of 8 with each having a capacity of 125 kWh at a new site to be seen as CleanWave's 1MW pilot wave farm. For this, funds/investment are currently being sought.

Developmental Impact

- Being conscious of the environment while performing business activities is a key principle for PROMATECH and social responsibility is high up on its agenda.
- A key development principle of the vast majority of PROMATECH is to create a more sustainable way of doing business within the maritime industry, consequently creating a better environment. This way, not only PROMATECH as a company but all its employees, business partners, clients and stakeholders will benefit from PROMATECH's social responsibility program.

AT A GLANCE

Company	PROMATECH Maritime Technologies - CLEANWAVE is a registered trademark of PROMATECH Company
Location	Istanbul, Turkey
Technology Category	Renewable Energy & Energy Efficiency
Technology Stage	TRL 6 - Prototype Ready
Next Steps	Commercialization
Investment Leveraged to Date	No private investment yet
Email	cleanwave@cleanwavetechnology.com
Website	http://www.cleanwavetechnology.com/

CASE STUDY 6

FOSTERING COMMERCIALY-VIABLE CLEAN TECHNOLOGY STARTUPS IN PAKISTAN

Given the significance and contribution of small businesses to the promotion of job creation and overall economic development of Pakistan, UNIDO has developed the Global Cleantech Innovation Programme for SMEs in Pakistan (GCIP-Pakistan) in partnership with the Pakistan Council for Science and Technology (PCST), National Productivity Organization (NPO), Pakistan Institute of Management (PIM), and the Centre for Climate Change and Development (CCCD). GCIP-Pakistan focuses on fostering emerging and commercially-viable clean technology startups for fueling green industrial growth.

GCIP-Pakistan adopts an ecosystem approach which, among others, includes close engagement with the private sector, scaling up the momentum for sustainable industrial development and strengthening the policy framework as required. By working closely with SMEs, national ministries, academia, industrial associations, potential investors, partner agencies and autonomous research centers in the country and abroad, this programme will establish a highly-visible awareness campaign. Considering the complexities and diversity of Pakistan's SME clusters, GCIP-Pakistan has initially focused on the Punjab and Sind provinces, with expansion to the whole country in 2015.

In 2014, GCIP-Pakistan selected 28 semi-finalists from a total of 81 applications to take part in the pilot year of the Cleantech Competition and Accelerator Programme. These semi-finalists were trained and mentored by both national and international experts over a four-month period, before pitching their technologies to a panel of judges in the final round of judging. The National Winner of GCIP-Pakistan, announced in October 2014, was then given the opportunity to present their ideas in Silicon Valley to international investors at the Cleantech Open Global Forum in November 2014.



2014 GCIP-PAKISTAN WINNER

ECO FUELANTS



The Company

More than 15 million people die every year due to air pollution caused by automobiles (World Health Organization, 2014); while simultaneously the world is depleting its fuel reserves. These factors are leading to an elevation of fuel prices. Within this context, Eco-Fuelants, with the help of UNIDO and other partner organizations, is providing a clean and sustainable solution for 'converting the zero valued waste cooking oil into a billion dollar product,' i.e. bio-diesel for automobiles. This bio-diesel is the only alternative transport fuel which is not just cheap (US\$ 0.5/L), but also environmentally friendly.

The Technology

Eco-Fuelants converts waste cooking oil into a bio-diesel process using innovative Nano-Catalyst which provides 20 times faster conversion, 99% of the yield and allows operation at room temperature (25°C) rather than 140°C

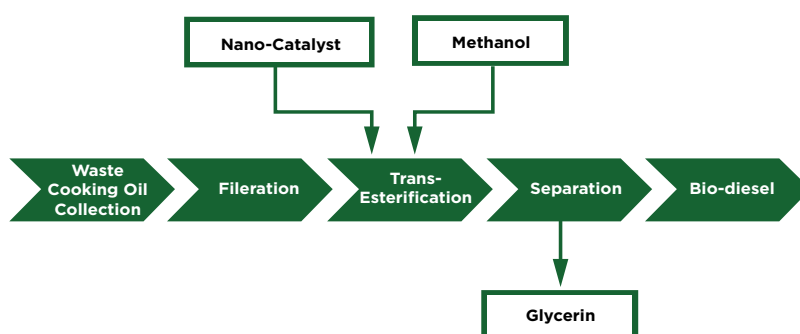
as in the conventional bio-diesel process.

The main steps of the process are summarized in the following diagram:

Developmental Impact

Implementation of the project has a significant measurable impact in various ways:

- For a 1,000 liters/day capacity unit, 30,000 tons of carbon emissions per year can be reduced. For 50,000 liters/day capacity, 1.5 million tons of carbon emissions per year can be reduced which will create a huge environmental impact.
- Every year, 2.6 million metric tons of cooking oil is being wasted and disposed of into waste water causing severe health issues. Eco-Fuelants' technology will help provide a safer and healthier environment for the 180 million people of Pakistan.



AT A GLANCE

Company	Eco-Fuelants
Location	Islamabad, Pakistan
Technology Category	Waste to Energy
Technology Stage	Startup
Next Steps	Manufacturing and testing of commercial pilot
Investment Leveraged to Date	USD 10,000
Email	hafizmali@gmail.com
Website	https://gust.com/companies/eco_fuelants

CASE STUDY 7

THAILAND

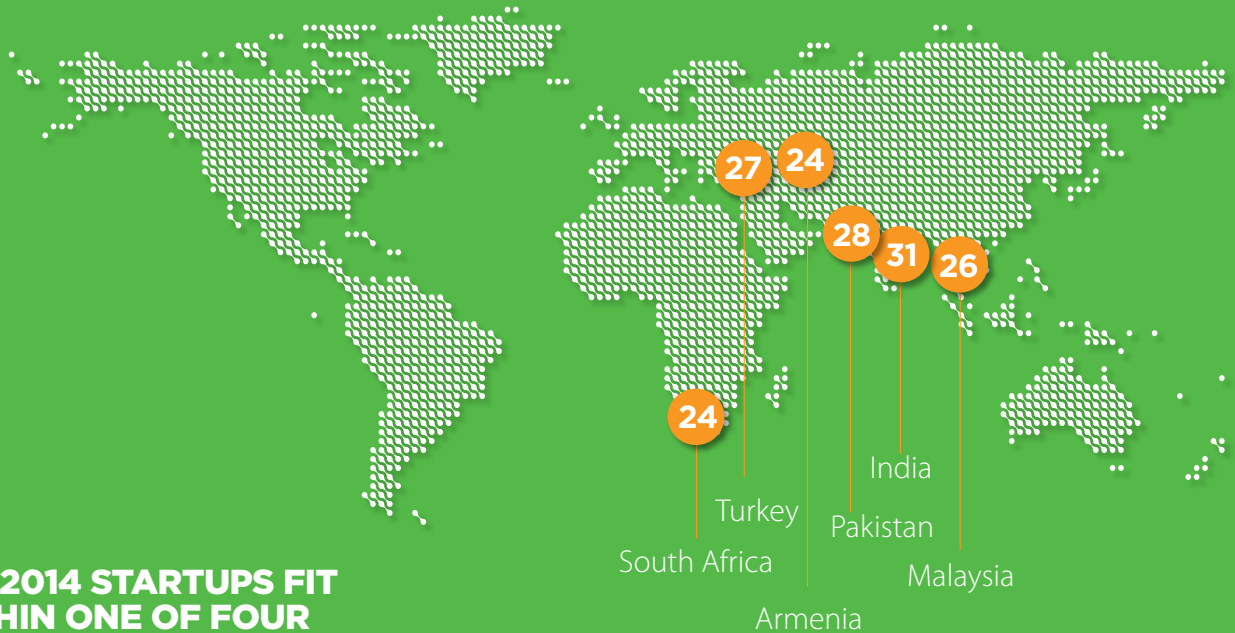
The Global Cleantech Innovation Programme for SMEs and Start-ups in Thailand (GCIP-Thailand), approved by the Global Environment Facility (GEF) and endorsed by the Thai Government in November 2014, is scheduled to run its first Cleantech Competition and Accelerator Programme in 2016. GCIP-Thailand, implemented by UNIDO with the support of the Department of Industrial Promotion (DIP) under the Ministry of Industry, aims at promoting clean energy technology innovations and entrepreneurship that can address the most urgent energy, environmental and economic challenges in Thailand. Clean energy technologies developed and promoted as a result of GCIP-Thailand will lead to reductions in overall national GHG emissions, and will contribute to Thailand's sustainable green growth, thereby addressing the global issue of climate change and national issues of energy security, employment creation and competitiveness of SMEs. This programme will be funded for a period of three years with the competition cycle expected to take place two to three times.

The 2016 Competition and Accelerator Programme cycle expects to receive an estimated 150 entrants. Around 25-50 would then go on to receive support through the Accelerator Programme from which 10-15 finalists will be selected, with the best expected to pitch/compete at a global level. In addition to receiving prize money, GCIP-Thailand will fund the National Winner to participate in the Cleantech Open's Annual Global Forum to be held in Silicon Valley, USA. These winning ideas will then be put forward into a global cleantech network where they will be able to connect with potential partners, customers and investors.



2014 GLOBAL CLEANTECH INNOVATION PROGRAMME (GCIP) FOR SMEs

In its first year, GCIP received 555 qualified applications across six countries. From this total, 159 participating startups were selected to join the accelerator programme.



ALL 2014 STARTUPS FIT WITHIN ONE OF FOUR TECHNOLOGY CATEGORIES

 **Renewable Energy**
58 companies (36%)

 **Waste to Energy**
32 companies (20%)

 **Energy Efficiency**
41 companies (26%)

 **Water Efficiency**
28 companies (18%)

2014 GCIP WINNERS

GCIP National Winners from 6 countries at the 2014 Cleantech Open Global Forum



NATIONAL PARTNERS

SOUTH AFRICA

The Technology Innovation Agency (TIA or the Agency)

The Technology Innovation Agency (TIA) was established in terms of the TIA Act, 2008 (Act No. 26 of 2008), with the objective of stimulating and intensifying technological innovation in order to improve economic growth and the quality of life of all South Africans by developing and exploiting technological innovations. TIA's core business objective is to support the development and commercialization of competitive technology-based services and products. The Agency primarily uses South Africa's science and technology base to develop new industries, create sustainable jobs and help diversify the economy. It invests in the following technology sectors: Advanced Manufacturing, Agriculture, Industrial Biotechnology, Health, Natural Resources, Energy and ICT. The Agency seeks to achieve its mandate by providing Financial and Non-Financial Support to its stakeholders, namely, Science Councils, Public Entities, Higher Education Institutions, private research institutions and entrepreneurs. www.tia.org.za



MALAYSIA

Malaysian Industry-Government Group for High Technology (MiGHT)

Malaysian Industry-Government Group for High Technology is a partnership between the industry and the public sector in Malaysia, working together to prospect for business and technology at the domestic and international market-place. It is an independent and non-profit organisation driven by a membership drawn from both the public and private sectors. Between 2004 and 2010, MiGHT operated under the purview of the Ministry of Science, Technology and Innovation. In 2011, MiGHT was transferred to the Prime Minister's Department under the Science Advisor to the Prime Minister. It acts as a think tank that underlines the key strategies that must be taken in order to develop the country's high technology industry and to further position Malaysia as a globally competitive player. MiGHT constructs these strategies based on the combined input from the high technology industry, governmental and nongovernmental organizations, and academic institutions. www.might.org.my



INDIA

Ministry of Micro, Small & Medium Enterprises (MSME)

Ministry of MSME envision a vibrant MSME sector by promoting growth and development of MSME sector, including Khadi, Village and coir industries in cooperation with all stake holders, through providing support to existing enterprises and encouraging creation of new enterprises. Worldwide, the micro small and medium enterprises (MSMEs) have been accepted as the engine of economic growth and for promoting equitable development. The major advantage of the sector is its employment potential at low capital cost. The labour intensity of the MSME sector is much higher than that of the large enterprises. The MSMEs constitute over 90% of

total enterprises in most of the economies and are credited with generating the highest rates of employment growth and account for a major share of industrial production and exports. In India too, the MSMEs play a pivotal role in the overall industrial economy of the country. In recent years the MSME sector has consistently registered higher growth rate compared to the overall industrial sector. With its agility and dynamism, the sector has shown admirable innovativeness and adaptability to survive the recent economic downturn and recession. As per available statistics (4th Census of MSME Sector), this sector employs an estimated 59.7 million persons spread over 26.1 million enterprises. It is estimated that in terms of value, MSME sector accounts for about 45% of the manufacturing output and around 40% of the total export of the country. For more information visit www.msme.gov.in



NATIONAL PARTNERS

improve competitiveness of the Armenian IT/High-Tech sector in the global marketplace, build linkages with international entities, provide assistance in investment attraction, export promotion and establishment of a venture capital institutes, start-up acceleration, as well as stimulate formation of the Armenian IT industry development infrastructure, capacity building, IT/High-Tech industry development in the regions and formation of e-society in the country. These goals are achieved through numerous initiatives including Armenian National Engineering Laboratory (ANEL), Microsoft Innovation Center (MIC), mLab-Regional Center for Mobile Solutions, Gyumri and Vanadzor Technology Centers, IBM Innovative Solutions and Technology Center, Armenian-Indian Center of Excellence, the first VC Fund in Armenia and others. www.eif.am



TURKEY

The Scientific and Technological Research Council of Turkey (TÜBİTAK)

The Scientific and Technological Research Council of Turkey (TÜBİTAK), established in 1963, is the leading agency for management, funding and conducting of research in Turkey. The Council is an autonomous institution, governed by a Scientific Board whose members are prominent scholars from universities, industry and research institutions. TÜBİTAK is responsible for promoting, developing, organizing, conducting and coordinating research and development in line with national targets and priorities. Setting its vision to be an innovative, guiding, participating and cooperating institution in the fields of science and technology, TÜBİTAK not only supports innovation and academic and industrial R&D studies, but in line with national priorities, also develops scientific and technological policies and manages R&D institutes, carrying out research, and technology and development studies. Furthermore, TÜBİTAK funds research projects carried out in universities and other public and private organizations, develops support programs for public and private sectors, publishes scientific journals, popular science magazines and books, organizes science and society activities and supports undergraduate and graduate students through scholarships. More than 1,500 researchers work in the 15 different research institutes of TÜBİTAK, conducting targeted and nation-wide research. www.tubitak.gov.tr



PAKISTAN

The Pakistan Council for Science and Technology (PCST)

The Pakistan Council for Science and Technology (PCST) is mandated to advise the Government on the development of Science and Technology (S&T) at the national level. The Council is involved in (S&T) and Innovation Policy making, planning, implementation and carrying out policy studies. The PCST is also the secretariat of the National Commission of Science and Technology (NCST), headed by the Prime Minister (who takes the major decisions for the development of S&T). The PCST works as a 'Think Tank' to identify the priority areas of research and development keeping in view the futuristic developments of science and technology in Pakistan. www.pcst.org.pk



THAILAND

Department of Industrial Promotion (DIP)

The Department of Industrial Promotion (DIP) is under supervision of Ministry of Industry. Its mandate is to support and reinforce small and medium enterprises (SMEs), community-based enterprises, entrepreneurs, and industrial service providers to achieve excellent performances and sustainability. The activities DIP carries out to deliver on its mandate comprise enhancing industrial networking of relevant public and private sectors; recommending policies and measures on development of as well as supporting capacity building of SMEs, community-based enterprises, entrepreneurs, and service providers. The target industrial sectors under responsibility of the Department of Industrial Promotion cover food, agricultural processing, rubber, packaging, textile, jewelry, furniture, and leather products. The Department of Industrial Promotion offers a wide range of services including consultancy service, revolving fund, testing and analyzing service, product design/packaging design service, training and seminars, study mission and trade fair participation arrangements, business incubation service, and industrial information service. www.dip.go.th





We are focused on supporting the development of strong innovation and entrepreneurship ecosystems around the world at local, city, state and regional levels. The Global Cleantech Innovation Programmes will not only identify the most promising entrepreneurs but will unite a diverse range of partners for the single goal of accelerating cleantech ventures with the greatest potential impact.

Our vision is a global programme that enables an entrepreneur in Kuala Lumpur or Hyderabad to receive mentoring from an expert in Johannesburg or Istanbul, license technology to a partner in Sao Paulo or Shanghai and secure funding from Silicon Valley, New Delhi or London.

JOIN THE NETWORK

If you are a country representative or a potential sponsor or partner, contact us now

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