Cleantech Group

Italy CLEANTECH Network

# Italy Cleantech 10

## A LENS ON INNOVATIVE SMEs IN ITALY

DECEMBER 2013

BROUGHT TO YOU IN COLLABORATION WITH:

ITA
ITALIAN TRADE AGENCY
ICE - Italian Trade Commission

ITALIAN CLEAN TECHNOLOGY
TASK FORCE FOR NORTH AND SOUTH AMERICA

AREA SciencePark

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# Acknowledgements, Disclaimer, and Copyright

There is a lot of work involved and support given for this report to come together. We would like to acknowledge and give thanks accordingly.

Firstly, the list and this report would not have been possible without our partner, Italy Cleantech Network.

Secondly, the list would not have been possible but for the willingness of our advisory panel (see Appendix), who generously gave up their time to provide their inputs and opinions. For the avoidance of doubt, the final report and which companies have been featured in it—be that as part of the 10 or within the general text—is the responsibility of Cleantech Group and its methodology. The Advisory Panel and Italy Cleantech Network performed an advisory role only.

Thirdly, many people at Cleantech Group made small contributions, but particular thanks are due to Lorenzo Chiesura, an Italian national who is currently doing an internship at Cleantech Group.

Finally and most importantly, this report came about because of three individuals and their passion to assist the Italian Cleantech community. They are Dr. Corrado Clini, Director General of the Italian Ministry for the Environment, Land, and Sea (Ministero dell'Ambiente e della Tutela del Territorio e del Mare), Giorgio Einaudi, Senior Advisor, Italian Ministry for the Environment, and Claire Servini, Head of the Clean Technology Desk, Italian Trade Agency in New York.

Thank you all.

## DISCLAIMER



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# About Cleantech Group

Cleantech Group's clients—corporations, utilities, government agencies, and investors—recognize that innovating is crucial to business growth, yet can be challenging to pursue. The company partners with its clients to accelerate innovation. With more than a decade of experience covering 18 sectors of resource technologies, Cleantech Group is uniquely positioned to guide clients along the innovation journey through three lines of business. The i3 platform allows subscribers to discover and vet companies, as well as explore technology sector trends strategically using proprietary real-time data. Cleantech Forums, held around the globe, convene investors, entrepreneurs, and international policy makers to examine trends, develop innovation strategies, and make deals happen. The firm's Advisory Services help clients design and implement corporate strategies for sustainable growth and innovation sourcing, and then market the results. Details at: http://www.cleantech.com.

Each year, Cleantech Group publishes the "Global Cleantech 100," a list of the top 100 private companies in clean technology. Collated by combining proprietary research data from Cleantech Group's i3 platform, with over 9,000 nominations and specific input from an expert panel, these companies represent the most innovative and promising ideas in cleantech—the companies that are best positioned to solve tomorrow's clean technology challenges.

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# About Italy Cleantech Network

Italy Cleantech Network is an aggregation of university spin-offs, start-ups, small, medium and large Italian enterprises involved in innovative cleantech activities and projects. Promoted by Corrado Clini and Giorgio Einaudi on behalf of the Italian Ministry for the Environment Land and Sea, together with Claire Servini of the Italian Trade Agency (ICE) Clean Technology Desk for the NAFTA Region, and in collaboration with AREA Science Park in Trieste, the Network is open to all Italian cleantech companies and investors, free of charge.

The mission of the Network is to support those industrial activities which are "green" and sustainable by fostering investment in production processes that respect the environment. It does this by promoting Italian innovation and research, give visibility to the Italian green activity in the world and to disseminate news and information on what is hot in the international green community.

In a moment of great opportunity for new investments in clean energy technologies around the world, it is important to spur the promotion of international projects that address global technological challenges and promote sustainable economic growth, while simultaneously reducing emissions.

With this in mind, it is necessary to work both at a national level, through new policies and strategies for technology advancement and financing incentives, and, at an international level, through new and structured initiatives for the technological cooperation between developed and emerging economies in order to facilitate global innovation and the dissemination of low-carbon technologies.

The Network aims to contribute in spreading knowledge and new ideas and in fostering partnerships between investors from different countries, thus leading to joint ventures which finance the expansion and the globalization of start-ups and small and medium size companies involved in innovative, clean energy, technologies.

In particular the Network looks to promote Italy's cleantech expertise and spur new innovative potential which are all contingent on educational, entrepreneurial, public and private financing, institutional and cultural forces. Actions to stimulate innovation needs to take into account all these aspects, making clear and well defined plans for the medium/long term. The Network tries to take those steps needed to improve the system, to attract foreign investments in Italy and to help Italian innovative firms in cleantech achieve international visibility and take advantage of market opportunities.

Requests for information can be addressed to info@italycleantech.it, or by visiting www.italycleantech.it.

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*For further information, please visit www.italycleantech.it or contact Claire Servini:CServini@italtrade.com*

# Foreword

Cleantech Group, in partnership with Italy Cleantech Network, is proud to present this report on Italian cleantech innovation. The report was prepared to help Italian SMEs active in clean technology innovation gain more international visibility, and to act as an invitation for the world's leading technology and innovation scouts to come and visit Italy, and discover innovation for themselves.

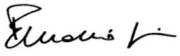
On the one hand, we have tried to provide you, the reader, with a general overview of the innovation company ecosystem in Italy; on the other hand, we have highlighted several companies by name to illustrate the points made. The objective has been to characterize, not to be comprehensive.

With the 2013 **Italy Cleantech 10 list**, we have gone one stage further and identified the 10 Italian SMEs that seem to have the strongest admiration from the players who are active with, and knowledgeable of, Italian clean technology. We do not definitively state that these 10 are the best or the top companies, but rather they appear to represent "consensus sentiment," according to the methodoldogy we have used (as described in more detail on the following page).

This research fits neatly and squarely within Cleantech Group's mission to help international corporations, investors and financiers, as well as professional service firms and governmental agencies connect with cleantech innovation worldwide, and within Italy Cleantech Network's mission to highlight Italian companies for international linkages and opportunities.

We hope you find this report encourages you to spend more time discovering Italian cleantech SMEs. We look forward to following the progress of these and all clean technology companies in Italy in the years to come.

**Richard Youngman**
MD, Europe & Asia
Cleantech Group



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# Innovation in Italy: An Overview and Characterization

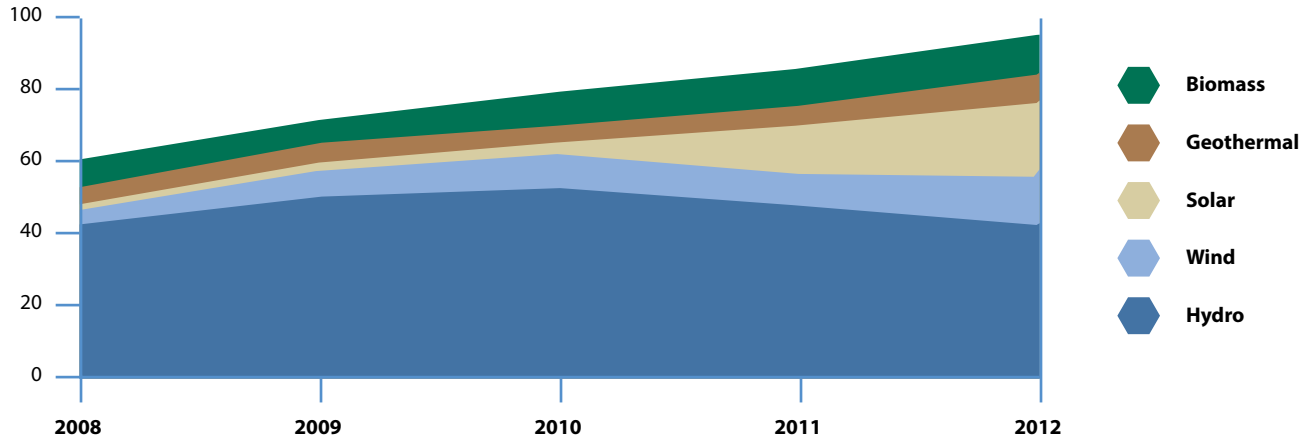
## AN OVERVIEW OF THE MARKET CONTEXT

Italy has become a leader in renewable energy generation—particularly in hydro, geothermal and solar power—due to the country's geographic advantages and economic incentives offered through the *Conto Energia and Tariffa Omnicomprensiva* (Feed-in Tariffs). Overall, renewables' gross production has grown by 59 percent since 2008 to approximately 90,000 GWh in 2012.[1] Solar production has increased dramatically since 2010 (as illustrated by the chart below). Despite Italy lowering its Feed-in Tariff support by 20 percent in 2012, Solar PV deployment has still shown signs of growth in the past year. After Germany, Italy is the second largest country worldwide in terms of PV installations (currently around 16.9 GW).[2]

The Italian government has also funded large initiatives for energy efficiency, such as a heating and cooling support scheme, set up in 2011 to support small-scale projects for improvement of building envelopes, installation of energy efficient appliances, or introduction of renewable-energy systems (such as heat pumps and biomass boilers). Moreover, the electricity and gas authority (*Autorità per l'Energia Elettrica e il Gas*) instituted a "white certificates" trading scheme, as a policy framework to oblige electricity distributors and suppliers to develop energy efficiency projects, or else pay a sanction.[3]

Relative to other industrialized countries, Italy has a fairly low per capita consumption of energy. The country scores high in efficient transportation use (e.g. vehicle miles travelled per capita or use of public transit)[4], likely due to the high price of gasoline in the country and the government's long-term transportation plans.

### Gross Production (per 1000 GWh)




*Source data from Gestore Servizi Energetici (GSE)

[1] Gestore Servizi Energetici (GSE) statistical report

[2] Gestore Servizi Energetici (GSE) statistical report

[3] Italian Regulatory Authority for Electricity and Gas (AEEG) presentation

[4] The American Council for Energy Efficiency Economy 2012 International Energy Efficiency Scorecard

# Innovation: Key Areas of Strength

Italy is globally-competitive in several cleantech-relevant areas, as outlined below. This section is envisioned to provide a taste of innovation in Italy, and may not do justice to all the cleantech activity in the country. It is designed to highlight which areas of strength in Italy (such as Solar, Green Chemistry, Transportation and Agriculture) are seeing start-up and growth company activity. Other lesser known, or "under the radar" sub-sectors are also examined.

## SOLAR

Demo plant of molten salt parabolic through by Archimede Solar

Despite the slowdown of activity by American, German, and Italian solar manufacturers (e.g. solar cells, solar equipment makers) and the growing competition from lower-cost Asian rivals, market opportunity is still strong for Italian PV installers, financiers, and asset holders given the mass deployment of solar in the country. **Amplio Solar**, for example, is building solar plants in Sardinia, with €18 million in leasing financing secured from Unicredit in April 2013. In March 2013, **Mitsubishi** and **Innovation Network Corporation of Japan (INCJ)**, together with **Solar Ventures**, a builder and manager of large scale solar plants in Italy, acquired **Solar Holding**, a leading solar energy producer and plant operator in Italy, through a joint venture deal. The three shareholders plan to further grow the solar business in Italy, and become market leaders in the country.

Concentrated solar power (CSP) is also a strong-point in Italy, with pioneers like **Archimede Solar Energy (ASE)**, continuing on a steady growth path. In July 2013, the world leader in solar receiver tubes for CSP plants, partnered with **Chiyoda Corporation**, the large Japanese engineering company, to develop an advanced CSP installation with thermal energy storage. Located in Perugia, Italy, the plant is one of the first in the world to showcase molten salt technology to substitute conventional thermo oils as a heat transfer medium.

## WIND

Carousel power plant designed by Kitegen

Wind turbines are becoming ever more lightweight, efficient, and cost effective, thanks in part to innovators in Italy. By way of example, **LEITWIND** is a premier builder and designer of gearless small-scale and large-scale wind turbines. The company was contracted in 2012 by **Elce Energia** (the renewable energy subsidiary of EffeBi Holding) to install and commission the wind farm "Deliceto" in Apulia, with 16 of its patented gearless turbines producing 57 GWh of electricity annually (representing 18,000 households).

Kite technology is a relatively immature sub-sector of the wind energy industry, yet there are a few "hot" Italian innovators in this space. Examples of developers of power kites used to generate electricity from high-altitude winds include Italian companies **Kitegen** and **Kitenergy**.

## GREEN BUILDINGS

Italian ventures are increasingly innovating in areas such as "super ceramics," and other advanced materials for tiles, roofs, etc. to make it easier to insulate buildings. Such companies include **Climatica Ceramiche**, **Cottafava**, **EcoTecnoMat**, and **VASS Technologies**. Italian start-up Green Prefab, a provider of an online cloud platform for architects, is currently collaborating with **Microsoft** and the **Danish Royal Academy** to develop a 3-D computer model which simulates and tests the environmental credentials of materials and components while buildings are still in the blueprint phase. Additionally, the **Green Building Council Italia**, is providing building certification and rehabilitation services to help retrofit historic buildings in Italy.

## SUSTAINABLE TRANSPORTATION

There is currently a lot of momentum in the sustainable transportation space in Italy: bike-sharing (**BikeMi**), car-sharing, electric cars and scooters are becoming ever more prominent across the country. Italians generally have a better awareness of electric cars, and show greater optimism for future use of the technology compared to their counterparts in other European countries.[5] There are several Italian electric car models newly available in the market, including the Bolloré Bluecars– jointly developed


by **Bolloré** and designer **Pininfarina** (shown above), and the Volpe city electric car, developed by Italian supercar designer **Zagato**.

**Eni** and **Enel**, Italy's chemical and utility giants, are also helping to increase electric vehicle use, by investing in public infrastructure and installing over 5,000 charging stations across various roads and motorways. In addition, car-sharing is also an exploding model: last year, **Carpooling.com**, the European ridesharing network had reported a 76 percent increase in rides in Italy. Other car-sharing sites available in Italy include **Iniziativa car sharing, Roadsharing.com**, and **CIVITAS**.

## RECYCLING & WASTE

Overall, Italy has a strong recycling system, recovering 33 million tonnes of secondary materials each year. Nonetheless, the majority of residential and municipal waste is still being treated through landfill and incineration, providing margin for growth for resource recovery technologies. There are several innovative Italian companies that are addressing the need for treating waste flows and increasing the co-efficiency of waste cycles. Examples include **Biosansa**, developer of a technology to environmentally dispose of olive pomace for use as an eco-fuel in boilers, and **Nesocell**, the developer of a process that uses cellulose scraps from paper mills to improve thermal and acoustic insulation of buildings. Companies are also making creative use of water for recycling, including **Greentech Innovation**, the developer of water jet technology for reclaiming used tires (UTs), and **NRE Research** the designer of a "waste & $CO_2$ buster," which provides non-thermal waste treatment for municipalities and biogas plants at dairies and farms.

[5] European Commission 2012 report: Attitude of European car drivers towards electric vehicles: a survey

## BIOPLASTICS

A world front-runner in the bioplastics space, **Novamont,** is headquartered in Italy. (No doubt it would have made the Italian Cleantech 10, were its revenues not in excess of €50 million). The company has developed a proprietary biodegradable polymer called the Mater-Bi, which has applications in agriculture, packaging, accessories and the automotive sector. The company has had a number of partnerships with large corporations including **Eni**, the Italian Chemicals giant, and **Syngenta**, the multi-national agro-industrial company. With Eni, the company formed a joint venture to transform the petrochemical site of Porto Torres, Italy into the world's first integrated third generation bio-refinery. With **Syngenta**, the company is assessing the integration of biodegradable mulching film within the farming system, specifically to manage agricultural plastic waste.

## AGRICULTURE & FORESTRY

Biological pest management has been a crucial practice in Italy since the first half of the nineteenth century, for the sake of food quality and economic development in the country. Universities across the country have conducted research on integrated pest management (IPM) of horticultural crops. Innovative companies in the arena today include: **Bioecopest**, the developer of bio-pecticides, and **SAcom**, the developer and retailer of green biotechnology solutions for agriculture.

Additionally, there are several Italian companies playing in the field of where farming meets cleanweb (the use of data, software and social platforms) to protect their agricultural supply, monitor their water resources, and optimize crop management. Examples include, **Smartground**, a provider of a digital platform for smart irrigation systems and **Grow the Planet**, a developer of a web-based networking platform to enable agricultural producers to meet food needs.

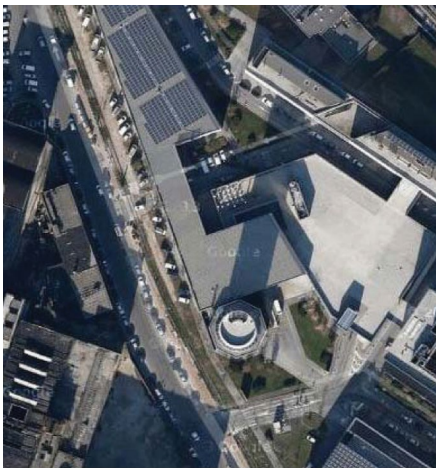
# The Innovation Ecosystem

## CLUSTERS AND PARKS

Support for early stage companies in Italy is abundant and concentrated around certain regions—mainly in the north and center of Italy, and also in major cities like Milan, Trieste, Rome and Venice—and is highly correlated with the activities of universities and industrial hubs.

Italy's first scientific park, the **VEGA ParcoScientifico**, is located in Venice, and is home to over 200 companies in various sectors including ICT, environmental technology, and nanotechnologies. VEGA for example, incubated Solwa, the developer of a desalination technology using solar energy. The **Environment Park** in Torino combines technology and eco-efficiency, and also features various "labs" for areas like green buildings, biomass, and hydro. The **Polo Tecnologicio Navacchio**, located near Pisa, offers various support services to companies like **Eco-green services**, a provider of technical advice and energy certification for the home. **Biclazio**, the business innovation centre in Rome also incubates various cleantech startups such as **Nablo Quadro**, a provider of services to help improve road mobility. Additionally, Sardinia is home to **Il Parco Tecnologico della Sardegna**, a large science and technology park with a dedicated renewable energy cluster program.

In the North East of Italy, you will find **Progetto Manifattura**, a 9 hectare innovation hub (once a tobacco facility) specialized in green buildings, renewable energy and environmental technology and **AREA Science Park**, a multi-sectoral technology transfer park with projects across urban mobility, renewable energy and energy efficiency (and a sponsor and supporter of Italy Cleantech Network). **Pont-tech**, a public-private consortium for research and technology transfer in the Pontedra area, provides incubation services to various technology companies including **BMSolar** (see page 16), and **Glayx**, a developer of photovoltaic and solar thermal plants. In Lombardy, the **Parco Tecnologico Padano** (part of the Lodi Cluster) hosts many organizations involved in the agriculture-biotech sector and the **Lombardy Energy Cluster**, promotes collaboration among key players in the energy sector.



Google Maps view: VEGA ParcoScientifico

## INCUBATORS

The city of Torino, known as the "Detroit of Italy", and home of the big automobile (Fiat), machinery and equipment industries, is also very strong in R&D activity for alternative energy sources. Torinio has a number of incubators in the area, including the Innovative Enterprise Incubator (**i3P**), a collaborator of Politecnico di Torino as well as **2i3T**, the incubator of the University of Torino. i3P has helped startups in various cleantech sectors such as **Safen** (industrial efficiency) **Wave for Energy** (hydro & marine power), while 2i3T has worked with **TitaC** (advanced materials) **Bioops** (water & wastewater), and **AG3** (geothermal).

Other organizations with highly visible incubator programs include the utility **Enel**. Enel Labs is a "ycombinator" style incubator dedicated to cleantech startups. Additionally, Politecnico di Milano holds both the incubator **PoliHub**, and organizes the Italian CleanTech Challenge (winners get €5000).

## PUBLIC FINANCE

The Italian Parliament is keen to help start-ups and growth stage companies flourish and has passed a number of laws, including an innovation bill in December 2012 to support start-ups and venture capital. The government is also committed to translate into law over 50 measures and policies that the agency **Destinazione Italia** has initiated to help improve the competitiveness of Italian companies globally. In July 2013,

Italy became the first country in Europe to implement equity-crowdfunding laws, specifically applicable for startups less than four years old and engaging in a high-tech business.

There are a number of public agencies working to provide grants and loans to stimulate innovation in Italy. **GSE**, Italy's renewable energy agency, in partnership with the UK Trade & Investment (UKTI), launched the UK-Italy Springboard in September 2013. The organization helps innovative Italian startups to internationalize in the UK market. Furthermore, **Invitalia**, the national agency for inward investment and enterprise development, has launched the Smart&Start project to provide grants and to promote innovation in the southern regions of Italy.

## VENTURE CAPITAL

There are a number of Italy-based investors who take an interest in clean technologies and the environmental sector. These investors include **Ambienta** (a specialist growth stage investor), as well as the more generalist funds like: **Innogest, 360 Capital Partners, Vertis, Principia, dpixel, A.M.E Ventures, Quadrivio Capital** and its technology transfer arm (**TT Venture**), **AladInn Ventures** (managed by Frulia). With recent closes made by 360 Capital Partners and Innogest, and with Ambienta targeting a €300 million second fund at the time of writing, there are good reasons to expect investment capital potential for companies in the environmental sector in the upcoming years. Additionally, **IMI Fondi Chiusi** (part of Intesa San Paolo, a large Italian bank), holds both a private equity and a venture capital unit (**Atlante Ventures**), and is providing finance to start-ups. The bank also runs the "Intesa San Paolo Start Up Initiative," an accelerator dedicated to matching start-ups in cleantech and other areas with financial and corporate investors.

Private investors in Italy are also continuing to collaborate through the **Italian Venture Capital Hub**, an organization which holds quarterly meetings based in Milan and London to increase information sharing and to enable investors to discuss dealflow, potential shared programs and co-investments.

## BUYOUTS

Historically, there have been some foreign and multinational private equity firms interested in investing in Italian technology companies. French buyout firm **Omnes Capital**, and UK firm **Xenon Private Equity** have been past participants. Last year, Russian investor **Teregroup** acquired **T.M. de Modena**, a specialist in biodiesel production from algae as well as $CO_2$ filtration.

## INDUSTRIAL CORPORATES

There is an increasing presence of large Italian corporations interested in engaging with innovation such as **Enel** and **Eni**, as well as Ansaldo Energia, part of the **Finmeccanica Group, Indesit** and Magneti Marelli, part of the **FIAT Group**. **Italeaf,** which helps connect startups with relevent advisors, has previously matched up **TERNI Energia**, the Italian energy giant with Italian LED lighting company GreenLED. Multinational corporations are also increasingly looking at innovation in Italy. Examples include the aforementioned **Syngenta** and also **Robert Bosch**, a key vendor for **Fluidotecnica Sanseverino,** the developer of machinery that separates water from oil pollutants.

## NETWORKS

There are several networks and agencies in Italy which are helping cleantech companies to gain market entry knowledge, meet the most relevant actors, and obtain the necessary capital to take their company to the next stage of development. **Italy Cleantech Network** is actively helping Italian innovation companies in cleantech to increase international visibility and to attract the top international technology scouts to Italy. Today ICN members include over 60 companies, research institutions, and investors; the organization continues to grow rapidly. The **Italian Trade Agency**, a governmental organization, also provides support and advice to Italian companies to enter into global markets. Together with the Italian Ministry, for the Environment, they have formed the **Italian Clean Technology Taskforce Desks**, which promotes scientific and commercial collaboration, as well as the exchange of best practices in cleantech.

# The Italy Cleantech 10

On the pages that follow this one, we profile the companies who form the "Italy Cleantech 10." How we ended up with these ten companies is explained below, in the methodology section.

## METHODOLOGY

### Who can qualify for the Italy Cleantech 10 list?

Any independent, for-profit, Italy-based, cleantech company that is not listed on any major stock exchange and with revenues under €50 million (the limit set by the standard SME definition used by the European Commission).

### What is considered cleantech?

From 2002 until today, our website has carried the same words, written by our founders, of which these are some of the most critical:

*The concept of cleantech embraces a diverse range of products, services, and processes across industry verticals that are inherently designed to (a) Provide superior performance at lower costs, (b) Greatly reduce or eliminate negative ecological impact, and (c) Improve the productive and responsible use of natural resources.*

However, what we have evolved is our taxonomy and the 700+ tags we use today to classify companies in this important area of innovation, organized under 18 top-level categories, as shown below. To see how these 18 break-down into sub-categories and how our commercial data platform, i3 (insight into innovation) is structured, please visit http://research.cleantech.com/tags/.

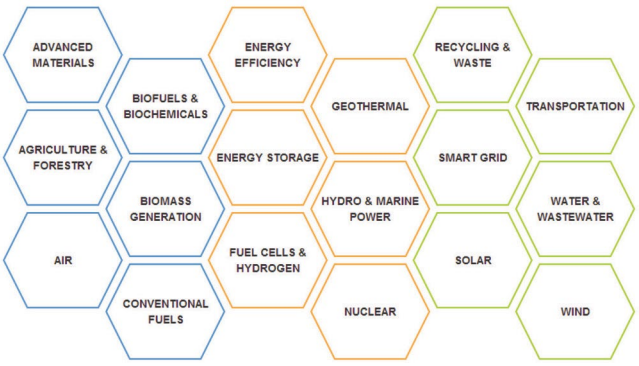
### How did this list come together?

In **Phase 1**, a long list of 150 companies was built from both active nominations made by market "insiders", and passive nominations derived from Cleantech Group analyzing market data, including investment data from our own i3 platform. Based on a proprietary scoring system, used to identify those with the broadest base of support, Cleantech Group narrowed down the results to a **shortlist of 39 companies**.

In **Phase 2**, members of our advisory panel (see Appendix), were each given a defined number of chips to place against the shortlisted companies, to support certain companies' case to make the final 10. They were asked to consider the following two angles:

**Uniqueness of Innovation/Technology** - a measure of 'future potential' given what the company has developed to date and their belief that it has disruptive and exciting potential for the future

**Market Traction** - a measure of how excited customers are by their offering today




**Cleantech Group's i3 market intelligence platform tracks $7+ billion of annual deal flow across 22,000+ companies in 18 sectors of resource innovation**

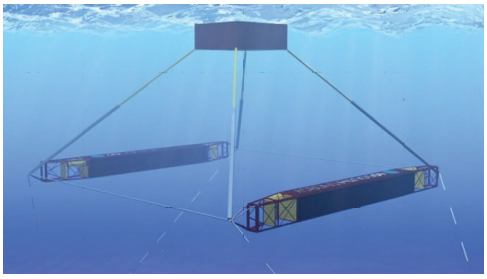
# 40South Energy

**Developer of machines that convert ocean wave energy into electricity**

| | |
|---|---|
| CEO | Dr. Michele Grassi |
| Sector | Hydro and Marine Power |
| Founded | 2008 |
| Revenue Range | € 500k – € 2mill |
| Employees | 18 |
| Location | Pisa, Italy |
| Website | http://www.40southenergy.com/ |
| Tel | +(39) 0508667350 |

## OVERVIEW

40South Energy has a patented technology for wave energy conversion into electricity. The energy converters are comprised of two fully submerged sections (Lower Member) as well as one fully submerged energy interceptor (Upper Member). The depth of the machines is controlled automatically to respond dynamically to changing sea conditions and the relative motion of the Lower and Upper member is converted directly into electricity on the machine. 40South Energy's wave energy machines can be used both for centralized (utility scale) generation, or distributed generation. They have many applications including for wave energy parks, in front of harbors, in association with desalination plants, and for off-grid communities and areas like oil rigs.



The first prototype of the R115/150kW already commercially available

## COMPETITIVE ADVANTAGE

The Levelised Cost of Energy (LCOE) is estimated to be competitive with offshore wind especially because all maintenance operations can be performed on the sea surface and due to the machine's ability to harvest energy in harsh conditions. The converters have no visual impact and do not prevent shipping vessels' course. Every coast in the world is a possible deployment site and the design of the wave converters guarantees shipping anywhere in the world via containers.

## CUSTOMERS AND PARTNERS

In 2012, 40South Energy and Enel Green Power entered into a technological partnership to develop and test a first machine (R115/150kW) . In 2013, 40South Energy is building up six other R115 converters to customers ranging from a Real Estate Company to an Independent Power Producer and further developing its technological partnership with Enel Green Power. The energy company is installing the fist R115 unit in its test site off Punta Righini (Italy) and is also collaborating with ABB to optimise the electrical conversion components of its machines.

## CURRENT ACTIVITIES

The company is setting up Wave Energy Parks (WEP) across Italy (e.g. Elba Island, Lavagna, Punta Righini), the UK (e.g. Scilly Islands) and is next targeting the US and Chile. The company is developing the intermediate prototype R380/500kW (partly funded by a grant from Regione Toscana), as part of the design process for the R1300/2MW. The first 2MW machine will be built in the frame of the technological partnership agreement with Enel Green Power and will be commercially available from mid 2014.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| Enel Green Power | INNOGEST SGR | AQUAMARINE POWER |
| ABB | | Carnegie wave energy |
| | | pelamis wave power |

# Beta Renewables

**Provider of a proprietary platform for second generation bio-refinery**

| | |
|---|---|
| CEO | Guido Ghisolfi |
| Sector | Biofuels & Biochemicals |
| Founded | 2011 |
| Revenue Range | Pre-revenue |
| Employees | 270 |
| Location | Tortona, Italy |
| Website | http://www.betarenewables.com/ |
| Tel | +(39) 01318101 |

## OVERVIEW

Beta Renewables develops cellulosic biomass from non-food materials for energy production. The company has developed a patented technology, PROESA™, which is a second-generation cellulosic biomass process that transforms crops like Arundo donax (giant reed) or agricultural waste material (like sugarcane bagasse) into sugar-based liquids. The company was established out of a joint venture between Chemtex (M&G Group's engineering division) and investment firm Texas Pacific Group (TPG), with a €250 million investment in 2011.

The Crescentino plant, the world's largest non-food cellulosic power plant

## COMPETITIVE ADVANTAGE

Beta Renewables exclusively owns PROESA™ technology and the company built the world's first commercial-scale cellulosic ethanol plant in Crescentino Italy, with a production capacity of 75 million litres per year. Beta Renewables licenses PROESA™ around the world, offering integrated packages for the conversion of cellulosic biomass into biofuels and biochemicals. This technology allows the production of ethanol at a competitive cost compared to oil (at a $70 per barrel price point) and no land is subtracted to grow crops during the process.

## CUSTOMERS AND PARTNERS

In late 2012, Novozymes became a minor shareholder of Beta Renewables, buying 10 percent of the shares for €115 million. That same year, the company signed a contract with MyBiomass, a special purpose vehicle established by the Malaysian Government, to apply the PROESA™ technology to the EFB (Empty Fruit Bunches) of palm oil. The company has also signed agreements with Colombiana de Biocombustibles Celulósicos (ColBiocel) in Columbia and GraalBio Investimentos in Brazil for the licensing of the PROESA technology and associated engineering and technical services for respective cellulosic ethanol plants.

## CURRENT ACTIVITIES

Beta Renewables expects that six or seven plants will be operating globally by the end of 2014, with an output of over 100 million gallons of biofuels. In April 2013, Beta Renewables signed an agreement with Canergy, for the construction of a 95 million litres production capacity plant. Its partner, Chemtex, also plans a cellulosic ethanol facility in North Carolina using PROESA next year.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| GraalBio | CHEMTEX | KiOR |
| Canergy | novozymes | BioAmber |
| MYBIOMASS | TPG | |

# BMSolar

**Designer of hardware and software solutions for the optimization of photovoltaic plants**

| | |
|---|---|
| CEO | Alessandro Caraglio |
| Sector | Solar |
| Founded | 2011 |
| Revenue Range | € 0 – € 500k |
| Employees | 7 |
| Location | San Miniato basso (Pi), Italy |
| Website | http://www.bmsolar.it/en/ |
| Tel | +(39) 0571400302 |

## OVERVIEW

BMSolar was founded as a spin-off of Epik Srl, to develop and patent the BlackMagic technology which optimizes performance, prevents aging, and increases the security of photovoltaic systems. The BlackMagic product family is capable of recovering the energy dissipated as heat, protecting AC disturbances which may degrade the DC lines in a typical system, turn off the PV panels in case of fire, and secure each panel and copper cables from thieves.


The BlackMajic device

## COMPETITIVE ADVANTAGE

BMSolar is the first company to enter in the photovoltaic optimizers market, having gained three years of technology development advantage over its competitors. Black Magic has a large market potential because it is compatible with all the inverters and panels currently available in the PV market. The system can help to prevent ageing of PV systems by reducing heat loss or production stoppages and preventing high maintenance costs. Moreover, the BlackMagic family product provides a fire brigade tested solution, an anti-theft software, and a daily production forecast for systems, so that the client knows whether the plant is functioning properly and how much has been optimized based on radiation maps.

## CUSTOMERS AND PARTNERS

The company has a commercialization strategy open to both B2B and B2C customers which can range from investors in PV systems (like banks, funds etc.), EPC contractors, PV manufacturers, energy utilities, as well as small companies or households. BMSolar has collaborated with Renergies Italia, an Italian producer of photovoltaic modules, to make "intelligent" solar panels with the BlackMagic technology.

## CURRENT ACTIVITIES

In 2012, BMSolar collaborated with the Energy Service (Ussana), to apply BlackMagic devices to optimize a 0.6MWp system in Cagliari, Italy, one of the largest in the world to use the power optimizer technology. The company is implementing a 36-months development plan in start-up markets such as Romania, Brazil and South Africa as well as mature markets such as Italy, Germany and Spain.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| COGENERGY efficienza energetica | | Tigo energy |
| GIACCHI elettroforniture | | solaredge |
| FINPOLO ELETTROFORNITURE | | |

# Directa Plus

Developer and seller of engineered carbon and metal nano-structures

| | |
|---|---|
| CEO | Giulio Cesareo |
| Sector | Advanced Materials |
| Founded | 2005 |
| Revenue Range | € 0 – € 500k |
| Employees | 30 |
| Location | Como, Italy |
| Website | http://www.directa-plus.com/ |
| Tel | +(39) 0478337096 |

## OVERVIEW

Directa Plus has developed and patented two key technologies for the production of engineered carbon nano-structures like graphene (G+ process) and metal nano-structures (D+ process). G+ is a manufacturing process for structures such as graphene (2D) and carbon nanoparticles (3D) while D+ is a low temperature process for the production of nano scale metal particles and nanoalloys. These technologies can be applied in markets such as high-performance tires, water and air treatment, flame retardants, smart textiles, enhanced lithium-ion batteries and highly conductive inks.

Various applications of Directa Plus' technologies

## COMPETITIVE ADVANTAGE

Directa Plus claims that its technologies are superior to their competitors' because the firm uses cheaper raw materials, utilizes a much lower temperature to operate, and does not require high pressures. Additionally, their products are easily scalable, and can be applied to a variety of industries from electronics and energy storage to pharmaceuticals. Directa Plus is also adopting an aggressive intellectual property strategy, with 15 patents already granted and another 15 currently pending which may help to reduce the number of competitors for similar technologies.

## CUSTOMERS AND PARTNERS

Directa Plus is involved in R&D collaborations on D+ and G+ processes as well as graphene nanoelectronic properties with the German institute, ZSW (Baden-Wurttemberg), and the Polytechnic of Milan respectively. Moreover, in 2012 the company signed a joint venture for applying the G+ process at industrial scale with Vittoria Group, a world leader in the production of tires for bicycles. The agreement aims to develop a new material starting from the substitution of conventional carbon black with graphene in order to produce more resistant and impermeable tyres. Directa Plus has also signed a commercial agreement with Italian chemicals company Reda Group, to optimize LED systems using the thermo-properties of graphene.

## CURRENT ACTIVITIES

Under the purview of the Municipality of Como, Directa Plus won a tender from the European Union's 2012 Eco Innovations fund for the project "Genius," in which the company is testing the application of graphene as an eco-friendly sorbent for oil spill clean-up and polluted water treatment in Lake Como. Directa Plus is also at the core of the project called "Atanor," promoted by Regione Lombardia. The project aims to promote the use of graphene, which can be used as additive or substitute material to generic carbon black for developing a new generation of tyres.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| Vittoria | TT venture | GRAPHENEA |
| REDA | RegioneLombardia | VorbeckMaterials |
| Politecnico Milano | Ministero dell'Istruzione, dell'Università e della Ricerca | |

Powered by data from i3

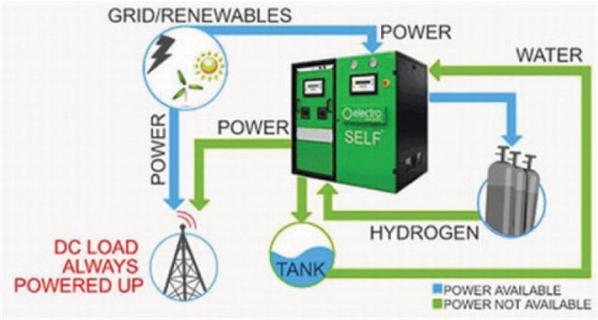
# Electro Power Systems

**Developer of self-recharging fuel cell systems for backup power applications**

| | |
|---|---|
| CEO | Carlalberto Guglielminotti |
| Sector | Energy Storage |
| Founded | 2005 |
| Revenue Range | € 2 mill – € 5 mill |
| Employees | 35 |
| Location | Turin, Italy |
| Website | http://www.electropowersystems.com/ |
| Tel | +(39) 0112258211 |

## OVERVIEW

Electro Power Systems has developed the first self-recharging fuel cell, the ElectroSelf, which allows network operators to maintain power during shortages on the grid. The fuel-cell based energy storage system recycles the water produced by the fuel cell, in to hydrogen for later use, thus being self-sufficient. The ElectroSelf has a power output between 1.5kW and 12kW and up to three units can be installed concurrently to cope with scaling power needs. Electro Power Systems' current target market is data centers, although the modular design allows for other energy storage applications, such as for telecom backup systems.




The first prototype of the R115/150kW already commercially available

## COMPETITIVE ADVANTAGE

The company offers logistics-free energy storage solutions, through the self-contained and low maintenance fuel cell technology, while other conventional technologies require frequent replacement of batteries or fuel top-ups. This high level of self-sufficiency and reliability translates to an advantage for remote or distributed systems, while leaving no carbon emissions or heavy metals to be recycled. Its modular design and non-toxic emissions allow for its application for indoor or outdoor locations at any scale.

## CUSTOMERS AND PARTNERS

Electro Power Systems' target customers are telecom network providers, grid operators, and other backup power operators. With customers such as battery manufacturer and distributor Century Yuasa and cellular network operator 3 Indonesia, Electro Power Systems has expanded into Asia-Pacific from its Italian home market.

## CURRENT ACTIVITIES

Electro Power Systems is set to expand into North America, Australia and New Zealand, particularly targeting remote grid backup in both developed and developing countries. The ElectroSelf's modular design can cater to every scale from the home power backup market to utility grid storage market, adding to the integration of renewable power sources into the grid.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| CenturyYuasa | 360 CAPITAL PARTNERS | BALLARD |
| 3 | ERSEL GESTIONE DI PATRIMONI DAL 1936 | CelliEra |
| | Holding 77 | ReliOn |

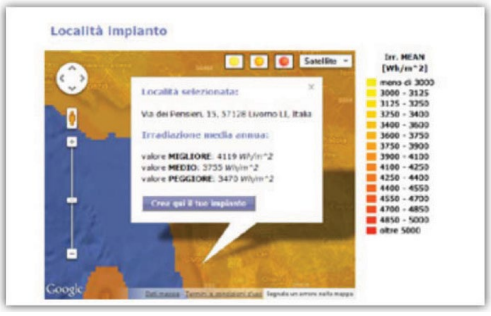
# i-EM

**Developer of systems for monitoring and managing renewable energy sources connected to the grid**

| | |
|---|---|
| CEO | Emilio Simeone |
| Sector | Smart Grid |
| Founded | 2013 |
| Revenue Range | Pre-revenue |
| Employees | 12 |
| Location | Livorno, Italy |
| Website | http://www.i-em.eu/ |
| Tel | +(39) 0586505016 |

## OVERVIEW

i-EM (Intelligence in Energy Management) offers complete ICT solutions for the management of distributed generation, energy efficiency, storage systems and smart grids. In particular, the company designs systems for planning energy production from monitoring renewables output to managing smart grids and virtual power plants. i-EM was founded after it won the Enel Lab Competition, and the company subsequently spun out of Flyby, the developer and provider of remote sensing technologies.




Screenshot of the functionality of one product of i-EM

## COMPETITIVE ADVANTAGE

i-EM introduces an innovative way for management systems to analyse data because their technology gathers information from different sources (e.g. consumption levels, satellites, weather forecasts, and electric grid) and then fuses the data according to complex mathematical models. For example, the systems can identify anomalies in the production such as dust on solar panels with a cross combination of the data. The results of the analysis are then presented in a simple way suitable for any type of user, from the technician to the executive managers. Moreover, the systems provide additional services such as forecasting for different energy efficiency scenarios and interventions.

## CUSTOMERS AND PARTNERS

i-EM offers four lines of products designed for O&M companies, EPC contractors, inverter manufacturers, grid managers, energy managers and utilities. The company is already providing systems for the management of photovoltaics and mini-wind energy parks for Enel Green Power. i-EM is also providing management systems to Global Power Service, which operates in the high voltage electrical industry and NIDEC, which has recently built a 20 MWp photovoltaic plant in China.

## CURRENT ACTIVITIES

i-EM is actively involved in networking with regional and national associations. For example, the company is working to improve the energy efficiency of "Comune di Cascina" within the GreenLab association, a collaboration of 18 green companies and the technological cluster of Navacchio. i-EM has also developed a partnership with Enel in Brazil, Greece and Romania to provide its system solutions for distributed generation and smart grids in those markets.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| Enel Green Power | Enel | viridityenergy |
| GP SERVICE | | WHITEQUBE |
| Nidec | | |

# IpadLab

**Developer of a diagnostic testing service for the identification of plant diseases of agronomical relevance**

| | |
|---|---|
| CEO | Camilo Gianinazzi |
| Sector | Agriculture & Forestry |
| Founded | 2010 |
| Revenue Range | € 0 – € 500k |
| Employees | 7 |
| Location | Lodi, Italy |
| Website | http://www.ipadlab.eu |
| Tel | +(39) 03714662535 |

## OVERVIEW

IpadLab has developed proprietary molecular biology methods, products and services for the detection of plant pathogens. PLUS (Pre-Unit Lab System) is the two-phase model the company applies in phyto-diagnostics. The first phase requires that customers have a laboratory for phyto-diagnostic to manage the extraction process of the plant material. In the second phase, the material is analysed by the labs and the results are forwarded to the customer.

Analysis process of plant samples in IpadLab

## COMPETITIVE ADVANTAGE

IpadLab's business model allows the company to mail plant samples over long distances without losing information about pathological agents and without risks of spreading diseases. The technology used by the company sends genetic material only (DNA/RNA) instead of conventional biological specimen. In this way, logistics and regulation barriers are by-passed, thus enabling entry into global markets. Although the PLUS model requires an investment by the customer to set up a small laboratory and train an employee, the company claims that this procedure reduces the costs for a complete phyto-diagnostic as compared to traditional methods. Moreover, the analysis takes a short time (maximum three days after the sample delivery) and the customer is free to decide when and what to analyse.

## CUSTOMERS AND PARTNERS

IpadLab's customers regard crop health as the critical factor for the success of their business. The company helps wine growers such as Zonin to promptly identify any vine disease, thus fully exploiting the investments made in vineyards. Similarly, fruit and vegetable growers as well as nurseries and laboratories can benefit from IpadLab's services. The company is already working in regions such as Piemonte, Veneto, Puglia, and Sicilia but they are looking to sell to international markets like Japan, Georgia, Tunisia, and countries in South America.

## CURRENT ACTIVITIES

IpadLab is participating in the Tergeo project developed by the Italian wine union, and is leading the section related to teaching phyto-diagnostic practices for improving quality and sustainability of vineyards. The company has also opened a branch in the technological park of Sicily to research diseases and remedies for citrus plants as part of the National Operative Program for Research and Competitiveness financed by the Ministry of Education, University and Research.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| Casa Vinicola Zonin | TT venture | agdia |
| trèfecoli | Parco Tecnologico Padano | LCA |
| | | eurofins \| STA Laboratories |

# Newlisi

**Provider of a patented solution that converts biological sludge into clean water and fertilizer**

| | |
|---|---|
| CEO | Antonio Capristo |
| Sector | Water & Wastewater |
| Founded | 2011 |
| Revenue Range | € 500k - € 2mill |
| Employees | 15 |
| Location | Milano, Italy |
| Website | http://www.newlisi.com/ |
| Tel | +(39) 02566 0154 |

## OVERVIEW

Newlisi has developed and patented the "Zero Sludge" technology for the gradual reduction of municipal and industrial sewage sludge. Although Zero Sludge is a wet chemical process, it does not involve fresh water as an input and instead relies on wastewater and electricity. The treated sludge, or eluate, can be digested by bacterial mass at the head of the sewage water plant or can be fed into anaerobic digestion for biogas production. The eluate flow recirculation leads to the total elimination of residual sludge. The process completely eliminates the biological components of the sludge at 90 degrees Celsius.


The Truccazzano plant is able to treat 7000 tons of sludge per year

## COMPETITIVE ADVANTAGE

Newlisi's process offers an alternative to exploiting the exhausted eluate for energy purposes through biogas extraction and does not require special authorization at the purification site. Although the technology removes viruses, bacteria and additionally, heavy metals and dangerous contaminants from all the types of biologic sludge, there is no risk of contaminating the surrounding area and no odour spills during the process. According to the company, customers can save up to 10 to 20 percent of their annual costs if Zero Sludge is applied.

## CUSTOMERS AND PARTNERS

Newlisi's customers include civil sludge producers as well as industrial partners and utilities. The company aims to satisfy the demand of sludge disposal that is increasing due to urban population growth and stricter regulation on the use of landfill, land application or incineration of sludge.

## CURRENT ACTIVITIES

In September 2011, Newlisi completed the first prototype park for the public utility Cogeme, for the treatment of 700 tons of sludge. Two additional projects have been commissioned by the public utility Brianza Acque in 2011 and 2012. The first one, which launched in November 2011, in Cassano (Italy), is capable of disposing 800 tonnes of sludge, while the second one, launched in mid-2012 in Truccazzano (Italy) is a 10 year public contract, for disposing 7000 tons per year, of both sludge and metal extraction.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| BrianzAcque | Atlante Ventures | Bluewater Bio |
| Cogeme | 360 Capital Partners | Organica |
| | Micheli Associati | |

# Personal Factory

**Provider of chemical compounds for the production of dry mortars through the origami plant**

| | |
|---|---|
| CEO | Francesco Vito Tassone |
| Sector | Advanced Materials |
| Founded | 2009 |
| Revenue Range | € 500k - € 2mill |
| Employees | 20 |
| Location | Simbario, Italy |
| Website | http://www.personalfactory.eu |
| Tel | +(39) 096374257 |

## OVERVIEW

Personal Factory has developed and patented a technology called Origami, which provides relevent chemical compounds for the production of dry motars used for building construction. The Origami plant mixes raw materials such as cement and sand with chemical products provided by materials retailers. As such, the production of dry motars takes place closer to the end user which has substantial cost and time benefits.

The Origami plant

## COMPETITIVE ADVANTAGE

The business model is like that of an ink-jet printer, where the company sells the factory and the consumable (chemicals) essential to producing a high-quality end product. The Origami plant is a compact (6m2) automatized machine that allows the retailer to avoid transportation costs and reduce $CO_2$ emissions. Origami allows for just-in-time production, in which the retailer can adapt to local demand characteristics such as local climate conditions and local working techniques. The production cycle is directed by Personal Factory's cloud-based software CloudFab, which improves traceability of production and allows knowledge sharing among producers.

## CUSTOMERS AND PARTNERS

Personal Factory targets small and medium retailers, especially in the heavy materials sector. Although most of the company's clients are Italian, Personal Factory has two important international partners who are implementing the Origami platform into their stores and products: BigMat, a large European group of independent retailers for construction buildings, and Cimental, a Brazilian retailer of cement and mortar products.

## CURRENT ACTIVITIES

Since April 2013, Personal Factory has been a promoter of the "Ecofibar" project involving Calabria University and ENEA, which aims to create high quality mortars mainly from discarded and demolished materials. With operations already in Italy, Russia, Tunisia, Libya, India, and French Islands, the company plans to further expand its business in Brazil by developing a joint venture with local producers of raw materials and distribution chains. Personal Factory has also been admitted to the "Global Access Program" at UCLA which will help the company enter into the US market.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| BigMat | TT venture | MAPEI |
| isolKappa | Atlante Ventures Mezzogiorno | sto |
| Cimental Fermaflex | Vertis SGR Private Equity & Venture Capital | |

Powered by data from i3

# Underground Power

Designer and producer of a power bump technology that exploits the kinetic energy of moving vehicles

| | |
|---|---|
| CEO | Andrea Pirisi |
| Sector | Transportation |
| Founded | 2011 |
| Revenue Range | € 500k – € 2mill |
| Employees | 9 |
| Location | Paderno Dugnano (Mi), Italy |
| Website | http://www.upgen.it/ |
| Tel | +(39) 0239467102 |

## OVERVIEW

Underground Power (UP) has developed and patented LYBRA - a modular energy harvesting device that reduces the speed of vehicles by absorbing the kinetic energy otherwise wasted by brakes. In this way, it is possible to compensate the CO2 emissions produced by traffic using traffic itself. LYBRA both improves road safetly and does not require the use of new space (it is installed ground-flush).


LYBRA installation at the Auchan Mall in Rescaldina

## COMPETITIVE ADVANTAGE

Underground Power offers a commercially tested, low-cost technology which differentiates it from its competitors. The LCOE (levelized cost of energy) is estimated to be 4,5c€ per 1kWh which is competitive with fossil fuels power sources (and therefore does not require incentives). LYBRA is the first example of conversion bump in the Italian market.

## CUSTOMERS AND PARTNERS

The main customer targets for the company are large supermarkets and utilities next to slowing down areas, residential buildings nearby roundabouts, street illumination for the public sector and toll gate concessionaires. In 2013, Auchan Group purchased the first two commercial products. UP is also considering collaborating with concessionaries to install LYBRA near toll gates.

## CURRENT ACTIVITIES

In the last three years, LYBRA has been awarded a total of of €208,000 in prizes, through several competitions. In February 2013, UP closed a funding round of about €400,000 that allow the company to: i) move from garage to the factory; ii) optimize its product; iii) develop a patented stress machine to test and develop the product in house. UP is currently fundraising to start serial production and envisions next expansion plans to be in the UK, Germany and US.

| KEY PARTNERS | INVESTORS | SIMILAR COMPANIES |
|---|---|---|
| Auchan | Power One | New Energy Technologies, Inc. |
| noselab ats | | Bumperon |
| Politecnico Milano | | |

# Concluding Remarks

For a significant economy, Italy's cleantech has been noticeable for its absence on the international stage, in a way, for example, that French cleantech has not been. France has been especially noticeable for the venturing and innovation activities of multi-nationals such as EDF, Saint-Gobain, Suez Environnement, and Total – to name but a few. But France's leading clean technology SMEs are also better known and more visible beyond national boundaries.

Italy has innovation and SME activity pertinent to the cleantech theme. It has areas of strengths and strong research to build upon. Yes, it suffers from a paucity of risk capital to help its fledgling companies survive and thrive, but maybe that just presents an opportunity for international investors, be they financials or corporations.

We hope this report has helped lift the veil on some interesting start-ups in Italy that merit further exploration, and will act as a stimulant for you to get in touch with one or more of the companies mentioned in this report.

# Appendix: The Advisory Panel

## DIANA SARACENI
## GENERAL PARTNER AND COFOUNDER
## 360 CAPITAL PARTNERS

Diana is co-founder and General Partner of 360° Capital Partners, a pan-European Venture Capital firm. She has been a Venture Capitalist for the last thirteen years and has raised and managed several funds. She has invested all over in Europe, recently with a particular focus in the medical devices and the industrial technologies/cleantech sector. Previously, Diana was Senior Advisor at Lazard Investment Banking. In Lazard she was part of the Technology Team and primarily worked on M&A transactions and IPOs. Prior to Lazard, Diana spent several years as strategic consultant with A.T.Kearney in Milan and London. Diana was/is part of several national and international start-up selection committees. She also co-founded and is now chairing the International Venture Club. Diana graduated in Engineering, received an MBA from LUISS and is fluent in Italian, English, French and Spanish.

## FABIO RANGHINO
## ORIGINATION MANAGER
## AMBIENTA SGR

Fabio Ranghino joined Ambienta in March 2011. Before he worked as a strategy consultant in Value Partners Management Consulting for 3 years on projects in Italy, UK, France and Switzerland. He developed broad experience in several different industries including automotive, energy, healthcare services, real estate, industrial and luxury goods. Projects' scope focused primarily on three years strategic plans, operational and financial restructuring and business due diligence for PE. Prior to Joining Value Partners Fabio worked in MBS Consulting as a consultant and in CRS Global Innovations, where he focused on advising SMEs on India-Italy business development. Fabio holds a Degree and a M.Sc. from Politecnico di Torino in Aerospace Engineering. Fabio received his MBA from INSEAD (Singapore and France) in 2010.

## FABIO LANCELLOTTI
## INVESTMENT MANAGER
## ASTER CAPITAL

Fabio joined Aster in 2010 after starting his Venture Capital experience at EarlyBird in Munich, where he worked in an assignment during his business school period. Prior to that he has developed experience in the Private Equity practice at Bain and Company in Milan, where he focused on Energy and Telecom sectors during multinational assignments. Fabio holds a degree in engineering from Politecnico of Milan and a MBA from IESE Business School with an exchange period at London Business School. Fabio is a native Italian speaker, is fluent in English, Spanish and French. He is responsible for managing investment in Teem Photonics and has an observer seat in Atlantium.

## CARLO PAPA
## CHIEF INNOVATION OFFICER
## ENEL GREEN POWER

Born in Palermo in 1971, Carlo holds an MSc in Economics and the TRIUM MBA jointly issued by NYU Stern, London School of Economics and HEC. He started his professional career in IBM Ireland and UK. Carlo was hired by Enel Distribuzione in 1997, the year after joined the Corporate Strategic Planning Dpt of Enel Holding. He founded and co-managed the company Corporate Venture Fund, led the business development practice in Russia and Ukraine, coordinated the Planning, Organization & Development HR Team in the Market Division, and more recently, the Chairman Office. Carlo is actively involved in research projects at IESE Business School, University of Rome Tor Vergata and in think-tank activities with the Aspen Institute and the German Marshall Fund of United States. Since December 2011 Carlo serves as Chief Innovation Officer of Enel Green Power.

## NICOLA REDI
## CHIEF INVESTMENT & TECHNOLOGY OFFICER
## QUADRIVIO CAPITAL SGR

Nicola Redi, Senior Partner and Chief Technology Officer of Quadrivio Capital SGR with responsibilities on venture capital activities. Nicola holds an MSc in aeronautic engineering from Politecnico di Milano, an MBA with greatest honors from Bocconi University, and is PhD candidate in innovation management at Aston Business School, Birmingham, UK. Nicola worked for Pirelli Tires as machinery production line manager first; later he was appointed leader of the global R&D project management office. In 2004 he joined Ideal Standard International leading EMEA new product development projects. He is lecturer of new product development at the International MBA, MIB, Trieste. Nicola holds board positions in Futura Invest S.p.A., Solar Energy Italia and International Plant Analysis and Diagnostics.

## GIOVANNI RAVINA
## SCOUTING MANAGER
## GDF SUEZ

Giovanni developed a technical background through M. Eng. at Politecnico di Torino, followed by a Master in Business at ESCP Europe. He has acquired experience in the Automotive, Venture Capital, Management Consultancy and Real Estate industries before joining the Corporate Venture Capital of GDF SUEZ, where he is in charge of Scouting activities.

## DAVIDE TURCO
## HEAD OF ATLANTE VENTURES FUND
## INTESA SAN PAOLO

Mr. Davide Turco serves as the Managing Partner and Member of Board of Directors of IMI Fondi Chiusi SGR S.p.A. Mr. Turco has been the Managing Partner at Fondo Atlante Venture and of Atlante Ventures Mezzogiorno since 2008. He serves as Managing Partner of Atlante Seed. He serves at Intesa Sanpaolo S.p.A. Previously, he joined the Private Equity team of Banca Intesa in 2002 where he was in charge of the management of up to 10 investments. He started his career in 1990 at SIGE and gained experiences in M&A equity capital markets and debt restructuring. Since 1995, Mr. Turco worked at Mediocredito Lombardo SpA as in charge of the management of private equity and venture capital investments. He has been a Director of Bolzoni SpA since March 23, 2006. He serves as a Director of Abac Group S.p.A., IGEA S.p.A., Materbi, Tethis, Novamont S.p.A., RDB and Valvitalia S.p.A. He serves as a Member of Board of Directors at Atlante Seed. He serves as Director of Surveillance of Varese Investimenti and Auditor of Atos. Mr. Turco holds degree in Business Economics from L. Bocconi University in Milan in 1990.

## LUIGI PIERO IPPOLITO
## VP INNOVATION
## MAGNETI MARELLI

Luigi Piero Ippolito, is a mechanical engineer graduated at Politecnico di Torino in Italy. Currently he's in charge as VP Innovation at Magneti Marelli SpA, a world-wide footprint company that designs and produces components and systems for the Automotive Sector. He started his cooperation with Magneti Marelli beginning 2000 as Senior Vice President for R&D and Business Development of a new Business Line focusing to chassis components and systems. His previous professional experience was gained inside Fiat Research Centre, where he built his technical and managerial career covering different position up to the responsibility for Chassis, Transmission and Vehicle Systems. From 2010 he is member of the CLEPA Board and beginning 2013 he joined the European Green Vehicle Initiative Association.

## ASTORRE MODENA
## MANAGING PARTNER
## TERRA VENTURE PARTNERS

Astorre Modena is the Founder and General Partner of Terra Venture Partners, leading early-stage Cleantech VC in Israel. Before founding Terra, Astorre was a Principal at Israel Seed Partners, a leading seed-stage venture capital in Israel with more than $260 million under management. Until recently, Astorre was an active key investor in the establishment of Cellint, a new cellular startup that is growing rapidly. Prior to Israel Seed, Astorre was with McKinsey & Co., based in Paris, where he consulted to leading Italian, French and Israeli manufacturing and financial corporations. Astorre holds a B.Sc. in Physics and Outstanding Students Program ("Amirim") from the Hebrew University of Jerusalem and a Ph.D. in Plasma Physics from Imperial College in London.

# Report Collaborators

**Cleantech Group**: www.cleantech.com/

**Italy Cleantech Network:** www.italycleantech.it/

**ITA**: www.ice.gov.it

**Italian Clean Technology Task Force for North and South America:** www.italiancleantechnology.com

**AREA Science Park:** www.area.trieste.it

# Report Contacts

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