

Global Cleantech<sup>'14</sup>

**100**

**A Barometer of the Changing Face  
of Global Cleantech Innovation**

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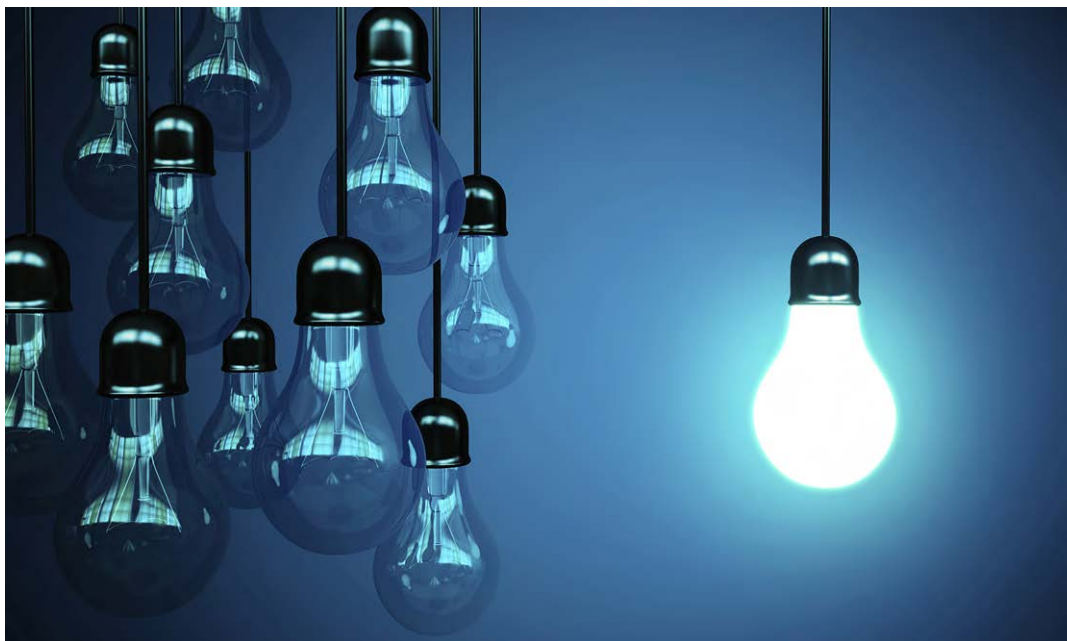


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## Executive Summary

- **5,995** companies were nominated for the 2014 Global Cleantech 100 – with the end result of 100 companies across 17 countries and 17 sub-sectors.
- The **84** external panelists active in helping Cleantech Group reach the final list of 100 were drawn from **41** corporations and **43** financial investors located in Asia, Europe and North America.
- The corporate expert panelists tended to vote more strongly for companies with long-term market potential whereas financial investors focused more on track record and strength of team.
- In the first year ever, there was a majority of retentions (**52%**) compared to new entrants (**37%**) on the Global Cleantech 100 list.
- M-KOPA (Kenya), is the **1st** company from the Africa region to make the Global Cleantech 100 - now in its 6th edition.
- **28%** of the Global Cleantech 100 companies are from the Europe & Israel Region - led by the UK (7), Germany (6) and the Nordics (6).
- **17** sectors are represented, showing a diversity of interests and a continued focus on water & wastewater, advanced materials and other areas of sustainable innovation that take us well beyond the narrower confines of just energy.
- There are many B2C models trending amongst the Global Cleantech 100, testament to the idea that the consumer's mind-set is the most open to disruptive change.
- Over **15%** of the Global Cleantech 100 companies are providing services to Oil & Gas companies, representing the mounting case to clean-up the industry's operations.
- At least **25%** of 2014 Global Cleantech 100 companies are already focusing, or will soon focus, on growing their business into Asia and other emerging and highly-populated markets.
- There were more solar companies in 2014 (**9**) compared to 2013 (**6**), suggesting a renaissance of new business models that will continue to help raise deployment figures.
- Across a variety of sectors, companies are building business models that represent a 'circular economy' mentality. We will watch out for the 'waste to wealth' megatrend to continue to penetrate the Global Cleantech 100 (in 2015 and beyond).
- Big data services for Utilities is a big emergent theme in this year's 100, as companies are continuing to innovate on ways to address ongoing energy challenges.



# Acknowledgements

The list would not have been possible but for the willingness of our 84-strong expert panel (listed in Appendix 1) who gave up their time during the summer months to provide expert input and opinion. This is in addition to the many hundreds who made company nominations. Thank you all.

Second, many people at Cleantech Group made small contributions, but particular thanks are due to Alois Kirner, Eric Vermeiren, Heather Matheson, Madeleine Steger and Emma Zolbrod in helping with this report, the website, the awards, and the communications with all the companies.

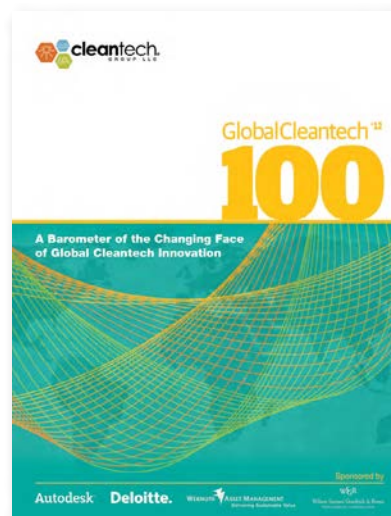
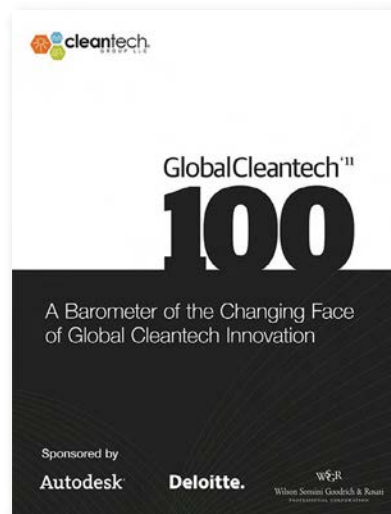
Last, but certainly not least, we wish to acknowledge the support of the Chubb Group of Insurance Companies, the headline sponsor of the 2014 Global Cleantech 100 Program. We wish to thank them not only for their support of our activities but also for the consistent and dedicated manner in which they are bringing to SME's in our field much-needed advice and risk management expertise.

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## Foreword

For the sixth year running, Cleantech Group (CTG) is proud to present the annual Global Cleantech 100 list, **our barometer reading of the global innovation community's shifting views on which companies, and which types of companies, are most likely to have big commercial impact in a 5-10 year timeframe.**

The final 100 would not be one person's 100; there is much disagreement and conflicting opinion on what and who is working. **The final 100 is therefore, by its very nature, a compromise, the median of all those opinions, delivered to us directly as part of our annual research exercise.** We pull together thousands of data-points, objective and subjective, quantitative and qualitative, from all over the world, with the end objective of identifying where the consensus of sentiment and opinion seems to lie amongst the international cleantech community. FAQs on the 100 and our methodology can be found on page 24.

We therefore do not definitively state any year's 100 to be the best or top companies in the world, as that would need a common measure or metric. They do, however, stand for where "consensus sentiment" lies both in terms of **which companies active in sustainable innovation are in favor and are more commonly admired, and perhaps even more importantly for what kind of sub-sectoral areas and themes are in vogue.**

What is most exciting to us, is the privilege of seeing and reading these viewpoints and interpreting them as part of our annual barometric read of the shifting sands within global sustainable innovation. Yes, there are 101st companies, unlucky not to be on the list, and individual disappointments that go with that. However, **this report is more focused on what this year's list tells us, relative to previous years, about this innovation and investment theme and where it is all going.** We hope you find our report thought-provoking and our read of the state of the market useful to you in planning the coming months.

Congratulations to those who made the 2014 list. We look forward to following yours and hundreds of other companies' progress in the coming 12 months.



Richard Youngman  
MD, Europe & Asia, Cleantech Group



Michele Parad  
Senior Analyst, Cleantech Group

**"We do not definitively state any year's 100 to be the best or top companies in the world as that would need a common measure or metric. They do, however, stand for where 'consensus sentiment' lies both in terms of which companies active in sustainable innovation are in favor and are more commonly admired, and perhaps even more importantly for what kind of sub-sectoral areas and themes are in vogue."**



# The Global Cleantech 100 by Sector



- Energy Efficiency (24)
- Water & Wastewater (12)
- Biofuels & Biochemicals (10)
- Solar (9)
- Smart Grid (7)
- Energy Storage (7)
- Transportation (7)
- Advanced Materials (6)
- Conventional Fuels (4)
- Air (3)
- Recycling & Waste (3)
- Agriculture & Food (2)
- Fuel Cells & Hydrogen (2)
- Biomass Generation (1)
- Nuclear (1)
- Resource Sharing (1)
- Wind (1)

**The 100 Sector Stats:**  
 ■ The widest array of sectors (17) were represented in the 2014 Global Cleantech 100

# The Global Cleantech 100 – Alphabetical List

ACAL Energy

Airbnb

AlertMe

Alphabet Energy

Ambri

Anesco

Applied Solar  
Technologies India

Aquion Energy

Arcadia Biosciences

AutoGrid Systems

Avantium

Axine Water  
Technologies

Beta Renewables

BlaBlaCar

BuildingIQ

C3 Energy

Cambi

ChargePoint

Clean Power Finance

Desalitech

Digital Lumens

Electrochaea

Elevance Renewable  
Sciences

Enerkem

Eniram

Enki Technology

Enlighted

FilterBoxx

FirstFuel Software

FRX Polymers

General Fusion

Genomatica

Glo

Global Water FATHOM

Green Biologics

Gridco Systems

Harvest Power

Hicor Technologies

HYLA Mobile

i2O Water

Imprint Energy

Innovari

Ioxus

Kaiima

Kebony

KiWi Power

LanzaTech

Leosphere

Liquid Light

LP Amina

Lucid

LUXeXcel

memsys

Microvi  
Biotechnologies

M-KOPA Solar

Mosaic

MTPV Power  
Corporation

NexSteppe

Next Step Living

Noesis Energy

Novomer

Oasys Water

O-Flexx Technologies

OPXBIO

Organica Water

OSIsoft

Ostara Nutrient  
Recovery Technologies

Phononic

Principle Power

Project Frog

Proterra

QBotix

RelayRides

## The 100 Key Stats:

- 37 companies are new entrants represented in blue compared to 51 in 2013.
- Out of the 63 alumni, 52 are retentions from 2013, and 11 are returnees from previous years represented in orange.

Renewable Funding

Scinor Technology

Sefaira

Siluria Technologies

Skyonic

SolarEdge

Solidia Technologies

Sonnenbatterie

Space-Time Insight

Stem

Streetline

sunfire

Sungevity

SunPartner  
Technologies

SunRun

TaKaDu

The NanoSteel  
Company

Transphorm

Uber

Ubitricity

UtiliData

va-Q-tec

Varentec

Verdezyne

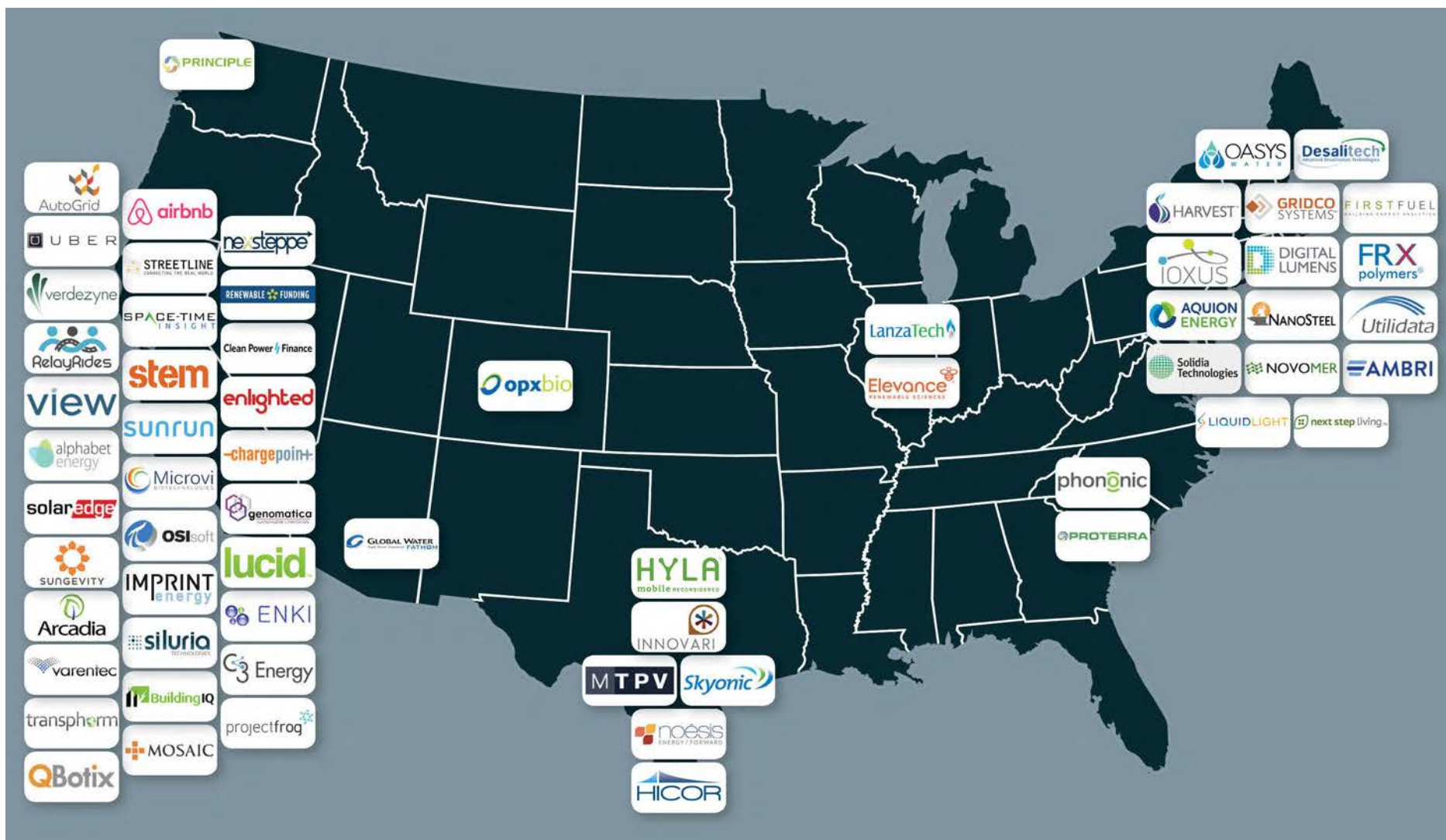
View

Yunicos

ZenRobotics

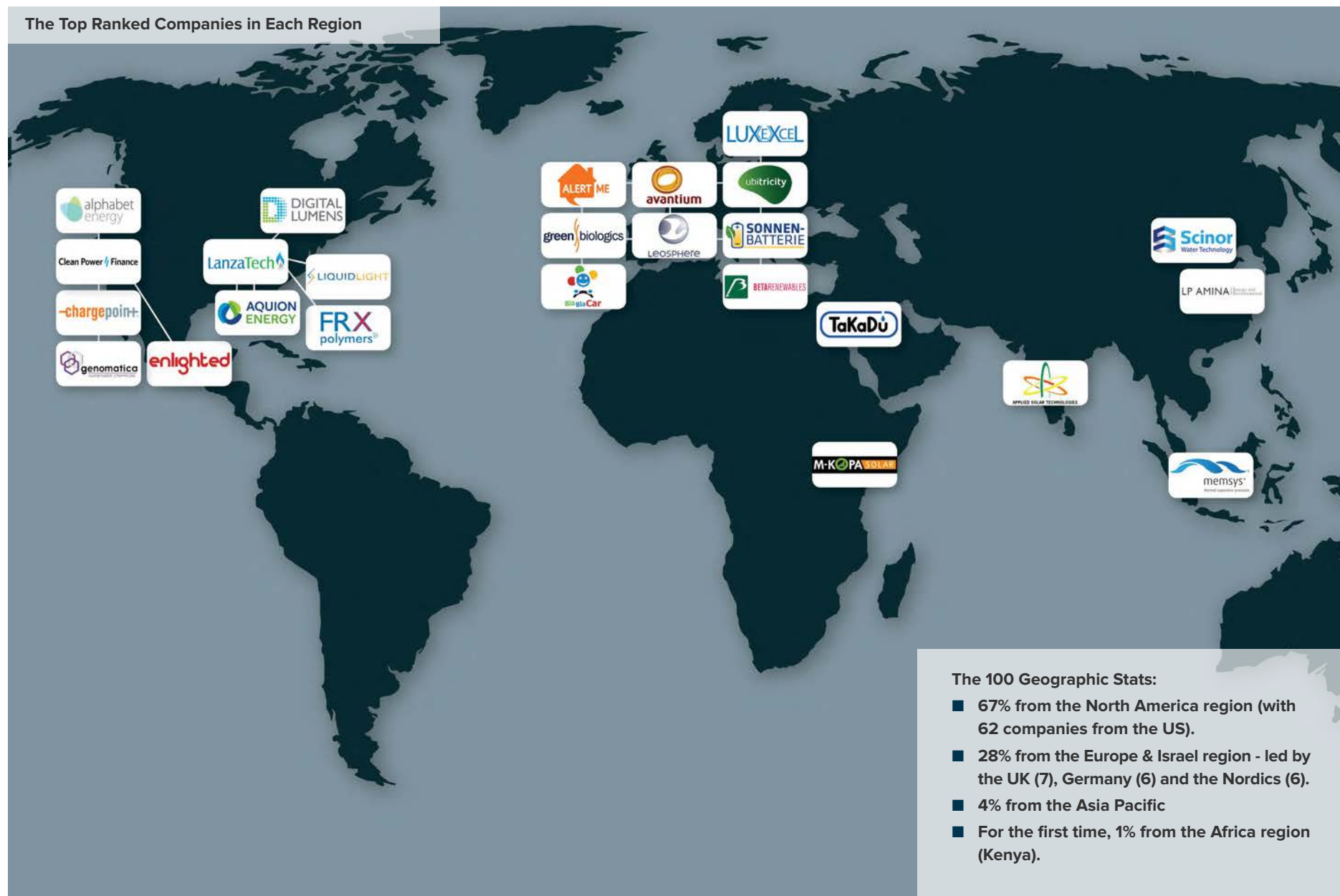


# Global Cleantech 100 by State in the USA



Arizona	1	Illinois	2	New Jersey	2	North Carolina	1	Rhode Island	2	Texas	6
California	33	Massachusetts	10	New York	1	Pennsylvania	1	South Carolina	1	Washington	1
Colorado	1										

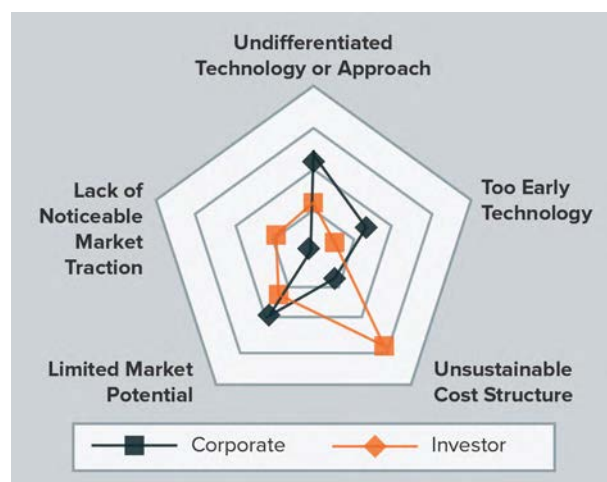
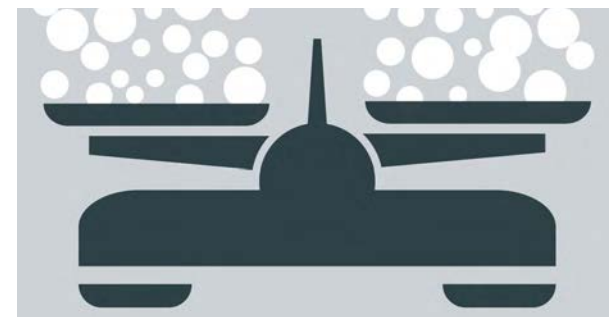
# Geography and the Global Cleantech 100



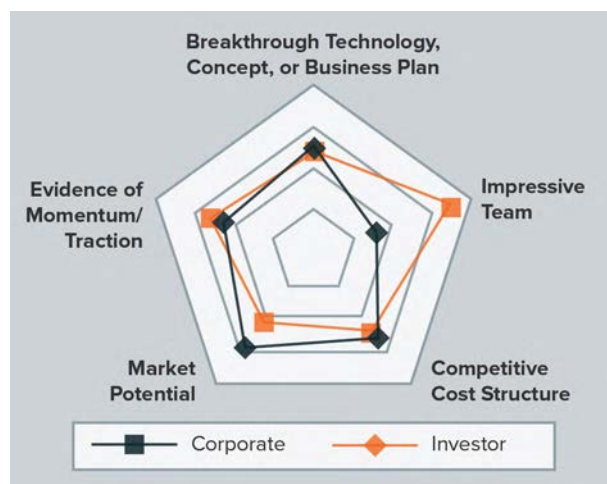
# Through the Looking Glass of the Expert Panelists

## What Impresses our Expert Panelists? What Drives their Voting?






The 2014 Expert Panel was comprised of representatives from 43 financial investors and 41 corporations (or corporate venture units) from all over the world. As well as nominating companies in Phase 1 (see FAQs on page 24 for more), they provided their views on companies in the Phase 2 shortlist. It is interesting to see the differences in how corporates and financial investors judge whether a company has the “greatest likelihood of having the most significant market impact over the next 5-10 years” and the reasons they cite for admiring certain companies.



Of the five most common reasons that all expert panelists gave for positive comments (as shown in the table below), investors were most excited about companies with an impressive CEO or management team, with the right background and leadership to take the company to the next stage. In contrast, the corporate representatives commented more frequently on the longer term market potential of the company, such as, what is the potential demand size for the product or service. The other three most commonly cited reasons (breakthrough technology, evidence of traction and competitive cost structure) held equal weighting and importance in the minds of investor and corporate panelists. On the other hand, companies gained negative votes on behalf of investors for their unsustainable cost structure and lack of market traction, while corporations commented mostly about un-differentiated technology or un-proven/early stage technology.



### Example Positive Voting Comments:

<b>Breakthrough Concept</b>		<i>“A breakthrough hybrid thermochemical/biological technology that would overcome the challenges of yield and tolerance to contamination.”</i>
<b>Impressive Team</b>		<i>“Strong management team and investor base to support projected growth.”</i>
<b>Competitive Cost</b>		<i>“Its innovative designs can deliver cost savings in Fuel Cell systems and performance improvements in PEM that could accelerate the adoption of PEM Fuel Cell technologies in key markets.”</i>
<b>Market Potential</b>		<i>“Accessible markets with significant market potential (linear organic diacids for polyamide or polyurethane polymers).”</i>
<b>Evidence of Traction</b>		<i>“Lucid has an “easy to use solution with the capability to connect to over 150 metering and building systems has given them traction in a wide variety of end user types.”</i>



# The “Lust List”: Who Commands Unequivocal Peer Admiration?

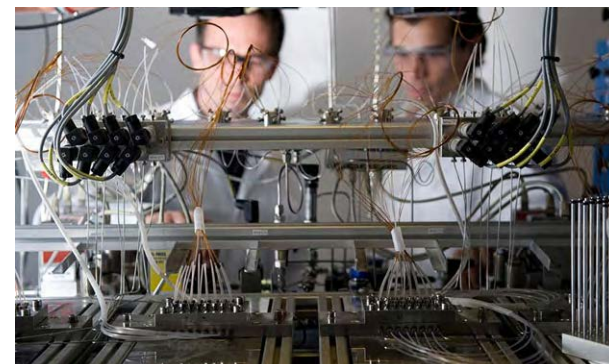
At the top of the 2014 Lust List — as measured by companies that received the most peer validations in the expert panel assessments without any negative cases made against them — are the following three companies:



**Biofuels & Biochemicals**  
Amsterdam, Netherlands

**Avantium** (GCT100 Alumnus 2010-2014), a specialist in advanced catalytic research, has developed a sugar-to-furanics technology that allows for the production of bio-based PEF plastics which has the potential to replace many petrochemical materials (bottles, films, fibers) **“if cost and performance goals are met.”** **Avantium is “not only leading the way with renewable chemicals, but the R&D specialization offering they provide is very relevant,”** said one expert panelist.

The company has achieved impressive financing rounds, including a recent \$50 million infusion to build its first commercial PEF scale plant. With strategic backers and partners like Coca-Cola, Danone and ALPLA, Avantium continues to gain traction **“with some of the biggest consumers within the plastics industry.”**



**Clean Power Finance** (GCT100 Alumnus 2012-2014), is acting as a key enabler of distributed generation by expanding third-party financing of rooftop solar, **“a field that is poised to grow tremendously”** in many countries. The company connects solar professionals with institutional investors through its CPF Market, an online business-to-business marketplace for solar finance products (loans, leases, PPAs).

## Clean Power Finance

**Solar**  
San Francisco, CA, USA

CPF has **“a low capex business model that is stronger than its peers”** and **“will probably disqualify (for the Global Cleantech 100) through IPO soon.”** Although it has several competitors, the company’s innovative business model, impressive list of project finance backers, and new channel partners (Kilowatt Financial and North American Power) make revenue growth and traction real. The company was already on the “Lust List” last year, and described as **“the Ferrari of the third party solar financing companies.”** The sentiment seems to remain in 2014.



**Advanced Materials**  
Cheimsford, MA, USA

**FRX Polymers** (GCT100 Alumnus 2012 and 2014), has developed non-migrating, phosphorus-based polymer additives for use in halogen-free flame retardants. The company’s patented plastics products – Nofia – have multiple market applications to consumer electronics, building and construction and transportation markets. This **“new halogen-free flame retardant will change the plastics industry,”** said one panelist, and is **“very important for security reasons,”** said another.

The company recently received funding from a strong syndicate of investors including the Flemish Government and chemicals corporates BASF and Evonik – closing a \$20 million Series C financing round in May 2014. FRX Polymers is now entering an accelerated growth phase, following the launch of its first commercial plant in Antwerp, Belgium in 2013.



# Top Picks by Corporate Type

This section, segmented by different industrial verticals, looks at who and what caught the eye of the corporations on our expert panel.



## Diversified Industrials

Energy efficiency start-ups generally tend to be popular among corporations in the Diversified Industrials vertical, who see a variety of applications for these technologies. This year, building energy management systems companies BuildingIQ and Enlighted are the running favorites.



Building IQ is a specialist in HVAC for commercial buildings.



Enlighted specializes in lighting efficiency along with extended building services such as real estate analytics.

Both are entering a phase of accelerated growth in the United States and rapidly expanding into Asia too.



## Materials & Chemicals

Avantium and Lanzatech appeal particularly strongly to the Materials and Chemicals corporations on our panel. They recently received \$50 and \$60 million respectively from prestigious investors.



*“Avantium has the potential to replace many petrochemical materials with renewable feedstock,”* which is why it emerges as a natural winner amongst Materials & Chemicals corporations.



Similarly, Lanzatech converts carbon-rich wastes and gases into valuable fuel and chemical products. A *“fascinating technology with a large addressable market,”* said one of the panelists.



## Oil & Gas

Faced with ever-higher operational costs and more stringent environmental standards, Oil & Gas corporations focused their attention on solutions that may improve the performance and safety of their operations.



Liquid Light, which develops an electro-catalytic technology enabling the conversion of CO<sub>2</sub> into high-value chemicals, was remarked upon for its potential impact on the Oil & Gas industry, a large emitter of carbon dioxide.



Houston-based Hicor Technologies offers a system of trailers that carry natural gas from compression sites to the customer’s door at a cost lower than traditional transit infrastructure. Hicor promises to *“make it easy for customers to switch to natural gas as a primary energy source.”*



## Environmental Services

Environmental Services corporations are showing interest in water and wastewater treatment solutions that align with their business operations and help them address a variety of markets.



Cambi is a supplier of thermal hydrolysis systems for treatment of bio-waste prior to anaerobic digestion. The company has *“impressive growth in sludge pre-treatment,”* and *“enjoys unrivalled domination of the market for large-scale municipal installations.”*



Global Water FATHOM provides a geospatial platform that help water utilities optimize their back operations. FATHOM’s AMS service allows utilities to repair aging water networks, and is *“the only vehicle available that allows customers to track their own consumption in real-time.”*



## Utilities

As indicated by their voting, Utilities remain interested in start-ups that offer solutions to enhance the viability and economics of existing technologies in which they have a vested interest.



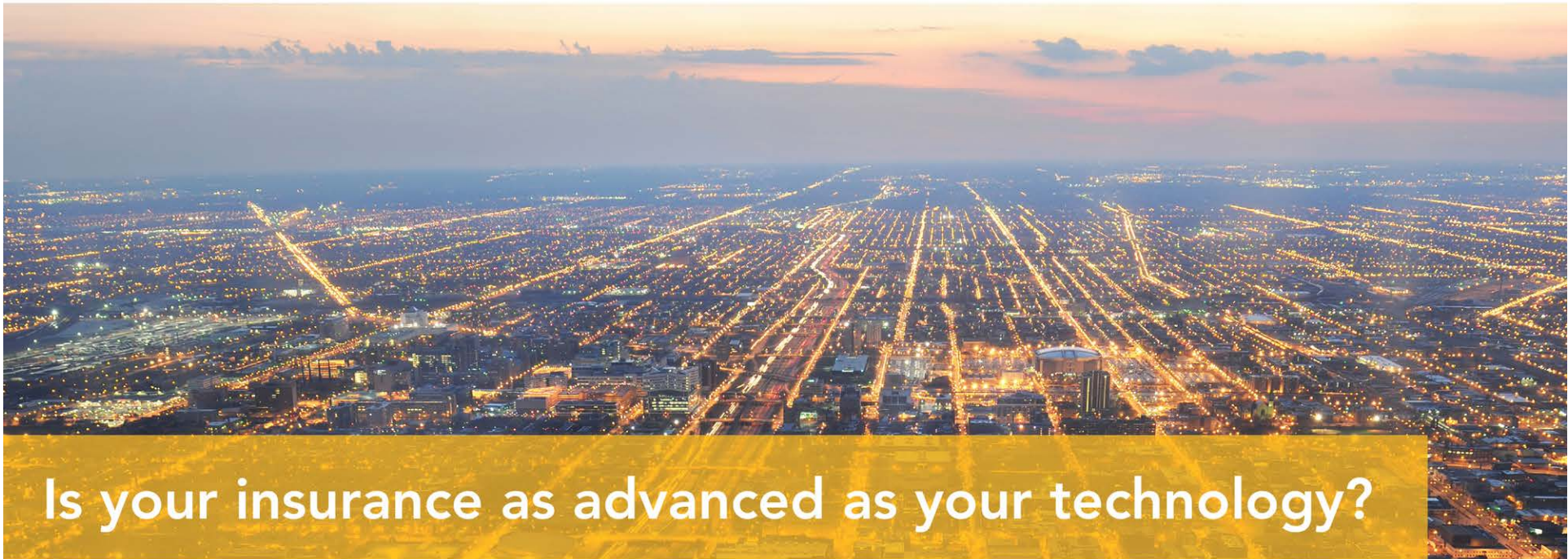
loxus has developed ultracapacitors that prolong the lifespan of batteries used for various alternative energy applications, including micro-hybrid for electric vehicles. *“Wait til Elon Musk figures that out to improve his Teslas!”* said one panelist.



QBotix creates rugged and intelligent solar tracking robots that deliver significant project cost savings, high system level reliability and flexibility of installation in the commercial and utility-scale solar power plant sectors.



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*\*According to the Cleantech Group.*

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# The Megatrends of the 100



*In this section, Richard Youngman, creator of the Global Cleantech 100 program, provides a few reactions to the composition of the 2014 Global Cleantech 100 and what it says about the state of innovation and key mega-trends.*

By identifying the companies who are today top of mind prospects as future winners and who carry the most evidence of widely-held admiration amongst market players, we get to see how sentiment shifts each year, and more markedly over the six years that we have been doing this, **and how some trends last the course, others blow hot and cold.**

We get to see both ongoing trends playing through, as well as new ones emerging. In the words and the pages that follow we identify and illustrate six of these, using example companies to bring them to life.

We don't have time or space to do justice to all trends and themes. Below we provide four reactions we had in looking at this year's 100 and in the pages that follow, we expand on six themes we see evident in the 2014 Global Cleantech 100.

## Reaction 1: The major themes identified in the 2013 report feel as valid today as they did then.

They were:

1. **Market Growth and Deployment levels continue to trend upwards**
2. **Emerging market demand continues to show hunger for technology and innovation**
3. **Many service-based and solution-driven businesses are flourishing**
4. **New opportunity sets continue to appear**

The last 12 months have felt like a continuation of the improvement that has been ongoing after a very rough few years for clean technology companies. This innovation and investment theme is off its bottom, and moving, steadily if not spectacularly, in the right direction. The sub-title of our May 2014 trends report, *The Best is Yet to Come*, remains valid.<sup>1</sup> The third of the 2013 themes is picked up again on page 17, under the title, ***The Consumer-Centric Business Models***, and the second on page 18, under the title, ***Emerging Market Demand and the Next Go-To Markets***.

## Reaction 2: The 2014 Global Cleantech 100 is an interesting mix of old timers and new pretenders.

The 'old timers' tend to be capital-intensive businesses, which have survived a tough valley of death phase to which many competitors have succumbed. On the whole, they are characterized by having gotten a plant funded and operational and so have now been able to prove out their technology at some kind of scale. Their valuations may not in every case do justice to their future potential, **but now that they are one of the survivors in spaces where the very few ultimate winners will surely win big, they tend to retain the backing of the market, year on year – for the time being, at least.**

And so, some 'old timers' have consistently made the 100 each year, some are returning this year, recognition from the market that they have toughed it out and are looking good again for the coming years. Companies such as **Avantium**, **Digital Lumens**, **Harvest Power**, **LanzaTech**, **Novomer**, and **Ostara** have been on the list for all of the last 5 years; companies such as **Genomatica** and **Elevance** also fit well the idea that their competitive positioning is strengthening each year, as the financial and time barriers to entry increase the 'lock-out'. Three of these companies are highlighted as examples of the trend featured on page 21, ***From Waste to Wealth: Recovery of a Trillion Dollar Market***.

The 'new pretenders,' on the other hand, are typically in less capital intensive businesses, and are often leveraging the power of data and analytics to provide efficiencies of some sort. The downside for them, in distinct contrast to the capital-intensive 'old timers,' is that they tend to have fewer barriers to competitive entry. Alternatively, the new pretenders may be representative of some emergent hot space. In May 2014's trends report, *The Best is Yet to Come*, we called out Robotics and 3D printing as two of the technology trends to watch out for in the coming 10 years – whilst at the same time warning of the dangers of the human tendency, captured in Amara's Law, of over-expecting in the short-term, whilst underestimating the long-term. Newcomers **Qbotix** and **ZenRobotics** attest to the growing influence of robotics; **LUXeXcel** to the power of 3D printing.

<sup>1</sup>Looking Back, Looking Forward: the Best is Yet to Come, May 2014 – download from here: <http://info.cleantech.com/10-Years-Report-Submit-CTG.html>



### Reaction 3: A number of sub-sectors remain well-supported, even if we are yet to see a major winner from within them.

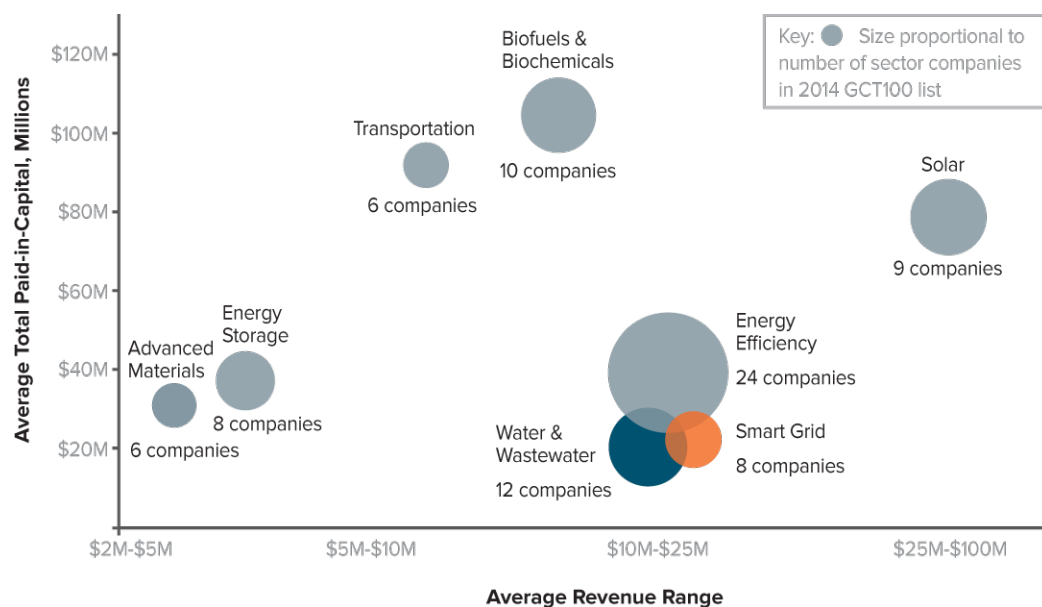
Energy Efficiency remains the hottest sub-sector in the Global Cleantech 100, a lead position it took from Solar in 2010 – in large part because of its relative capital-efficiency (as illustrated in the diagram below). The following sub-sectors remain quite well and consistently represented in the 100: Advanced Materials, Biofuels & Biochemicals, Energy Storage, Smart Grid, and Water and Wastewater – albeit, at a micro level, there is some turnover of which companies in these areas make the list. What is interesting to note about this constancy of support is that no private company winners have really emerged in these

Solar is a more mature category which has seen the biggest shift over the years. Not only has its representation fallen since 2009, but the swing from hardware to services, from upstream to downstream, from Europe to other emerging solar markets, is very marked since 2009. See page 20 and the theme, **Towards Downstream Solar and Decentralized Energy Services.**

### Reaction 4: The old industries most likely to be on the move in the coming years are well-illustrated by the 2014 Global Cleantech 100.

One of the big issues young companies with sustainable technology solutions have had is their ‘speed to market,’ the pace at which their target industries have adopted new products and services. In the same trends report of May 2014, *The Best is Yet to Come*, we highlighted four industries where we made the case that their search for resource-efficient solutions was only going to increase in the coming 10 years, as the players sought to adapt to the drivers of change in their industry. The four were:

Select Sector Representation in 2014 Global Cleantech 100 by Paid-in-Capital/Revenue



spaces when you look at our Global Cleantech 100 graduates – those who have listed or been acquired. This is in contrast to some other areas (where there have been successful GCT100 graduates like Nest, NovaLED, SolarCity and Tesla, for example).

- Utilities: See page 22 and the theme, **The Big Data Solutions Providers for Utilities**
- Oil & Gas: See page 19 and the theme, **Cleantech Goes Inside the Oil & Gas Industry**
- Transportation: Most of the companies in this category in the 2014 GCT 100 are software companies, the fastest-moving part of the changing dynamics around Mobility.
- Agriculture & Food: This is touched on under the theme **Emerging Market Demand and the Next Go-To Markets**, on page 18

With all that said on these old industries, it remains the case that the consumer still stands out today as the more progressive customer for sustainable solutions. This is taken up in the first theme on the next page, **The Consumer-Centric Business Models.**

Those are our thoughts. What are your reactions to the GCT100? Feel free to share your thoughts with us through twitter using the hashtag "#cleantech100".

This, it seems to us, plays to the idea that the need and importance of such solutions has only strengthened over time, and to the idea that **many in the market still believe big winners will emerge – eventually.** Less clear is who they are and will be, and how to pick them.

## 1: The Consumer-Centric Business Models



### Smart Home: The Full-Service Solutions

With the endless number of energy-saving tools on the market, a number of companies are seeking to make it simpler and easier for the everyday consumer to make energy efficiency changes in their home.

Users of **AlertMe's** smart home monitoring system can connect to their home's broadband and remotely control household appliances, thereby cutting domestic energy consumption and costs. UK-based AlertMe is *"leading the trend towards an ever more connected world on the consumer level - it is a company to watch,"* said one panelist.

**Anesco** provides comprehensive energy efficiency solutions to homeowners (from audits through to recommendations, installations, maintenance and capital funding plans). Anesco's success has impressed panelists, who praised its *"strong growth,"* its *"impressive financial performance"* and *"excellent execution of strategy."*

**Next Step Living** offers a 'whole-home approach' to energy efficiency: it provides both home energy audits and a suite of integrated energy-saving solutions (energy efficient windows, HVAC systems, weatherization and community solar options). The Boston-based company has helped almost 75,000 New England homeowners achieve an estimated \$18 million in energy savings. *"Home energy audits and diagnostics are poised to grow,"* commented one panelist.



### Mobile Devices: A Second Life

**HYLA Mobile** collects used mobile devices and refurbishes them to meet certification standards – and subsequently sells them to consumers in developing countries at an affordable price. This consumer-centric recycling solution improves resource efficiency rates in the US while enlarging access to affordable technology

in the developing world. The future looks bright, according to one panelist: *"it has grown top line revenue in near hockey stick mode, it has strong partnerships with phone providers, and is still only tapping a small part of the market."*

### Consumer Products: A New Level of Energy-Saving

Some sophisticated energy-saving products and systems have been made accessible to the 'everyday' consumer.

**Phononic** commercializes solid-state heat pumps that displace compressors for home refrigeration, cooling, and heating, thus making home appliances quieter and more efficient. According to Phononic's CEO Anthony Atti, the company aspires to become the 'Intel Inside' of refrigerators and air conditioners. *"This area of materials has the best chance to impact energy efficiency in the future,"* commented an expert panel member.



Germany's **Sonnenbatterie** manufactures battery systems that allow homeowners to store energy generated from residential solar installations. Sonnenbatterie's customers can avoid peak demand prices and optimize their energy consumption. *"A revolutionary technology that is much needed in the residential solar space,"* commented a panelist.

### Car-sharing: The New Norm in Transportation

In the age of the 'sharing economy,' consumers are more interested in gaining access to various modes of transportation, without the burden of owning a car.

**"Next-Generation Mobility solutions are reducing both congestion and pollution while providing tremendous consumer convenience and operational efficiencies."**

— Chris Thomas, Founder and Partner, Fontinalis Partners

**BlaBlaCar** has established itself as the leading car-pooling platform in Europe, with more than 2.9 million members and 500,000 monthly ride shares to its credit. Building on this success, the company is starting to noticeably reduce congestion and decrease CO2 emissions. *"An easy inclusion on the GCT 100 list,"* one panelist concluded.

**RelayRides** allows car owners to rent out their vehicles via an online interface. A market leader in peer-to-peer car sharing in the North Americas, Relay Rides has aggressively grown its customer base and has expanded its reach into airport parking. RelayRides' service results in *"increased resource efficiency rates."*

Through its mobile app, **Uber** allows users to book and pay for on-demand private car service, and also enables passengers to share rides. The company's success and high valuation *"signal the market's acceptance of the changing nature of mobility."*

## 2: Emerging Market Demand and the Next Go-To Markets

73% of corporate judges and 56% of investor judges commented on companies' ability to take advantage of new growth opportunities - and expansion into new and emerging markets was the most commonly cited of those reasons.



### Feeding the Developing World with Agronomics

**Arcadia Biosciences**, a California-based developer of enhanced agronomic products, works with agricultural organizations across the emerging world. Alongside Argentina-based agricultural co-operative Bioceres, it formed Verdeca, a JV specializing in biotech

enhanced soybean varieties. It works with Indian agronomics research companies Advanta and Bioseed Research to develop next-generation products such as salt-tolerant and nitrogen-use-efficient sorghum. Arcadia also has partnerships with research center CIMMYT (Mexico) and the African Agricultural Technology Foundation (Kenya).

In just seven years, Israeli seed technology start-up **Kaiima** has expanded its activities well into emerging markets, with customers in China, Niger, Madagascar, Brazil, Peru or Mongolia – to name a few. It is working with Philippines-based International Rice Research Institute (IRRI) to bring to the developing world new-generation high-yielding crops. Kaiima's solutions are **“critical for water-constrained agricultural regions – there is a huge market opportunity”** said a panelist.



### Modernizing Wastewater Treatment Systems

UK-based **i2O** is supplying its water pressure management technology to leading utilities across the emerging world. It boasts Malaysia-based Syabas and Philippines-based Manila Water, two of Southeast Asia's largest water utilities, as customers. i2O works with

JOAT Group, one of South Africa's leading water management organizations, to implement its solutions in some of the country's major metropolitan areas. i2O is also active in South and Central America, where it has partnerships with Chile's Glemans and Aguas de Antofagasta, Peru's Esboña Corporation and Mexico's Grupo SCR Mexico.

**Organica Water**, a Hungary-based developer of biological wastewater treatment plants, has gained multiple customers across China, India and Indonesia. Organica boasts partnerships with India's engineering conglomerate Larsen & Tombro and China's famous Foxconn Group. It delivered a commercial wastewater treatment plant for the latter's industrial park in Shenzhen, China. **“The company is thriving in rapidly urbanizing Asian countries, where the sewage networks are not keeping pace with new-build,”** said one panelist.



### Sustainably Fuelling Growth in the Emerging World

Italy's **Beta Renewables** transforms non-food, cellulosic biomass into biofuels through a conversion technology marketed as Prosea. Beta Renewables has established development partnerships with Malaysia-based chemicals companies MyBiomass and Hock Lee Group. It is also active in Brazil and will license its Prosea technology to the world's next largest cellulosic ethanol bio-refinery, located in Fuyang, China and partially owned by one of Beta Renewables' shareholders, the chemicals company Gruppo Mossi and Ghisolfi.

**Lanzatech** has gained remarkable traction across Asia, establishing partnerships with big players such as steel companies Baosteel, Jindal Steel, and POSCO; oil giants Petronas and Indian Oil; and in the near term with global industrial multinational Mitsui. LanzaTech has established itself as an industry leader in China, where it has forged solid relationships with the government, steel mills and other state-owned companies.



### Reducing the Cost of Electricity Consumption

**Innovari**, a provider of a load duration management platform, is connecting utilities with commercial energy partners to incorporate demand-side management into the grid. The Texas-based start-up is now exporting its solution in the emerging world, for example, by helping Colombian utility EMCALI to implement a demand side management platform for its local distribution system. And it announced it would deploy its Interactive Energy Solution to the customers of Reliance Infrastructure, India's largest power utility, in Mumbai.

**Utilidata**, a Rhode Island-based supplier of voltage optimization products already caters to multiple utilities across North America, but it is now going global with partnerships in Saudi Arabia, Russia, South Korea and China. Utilidata's main partner is Saudi Aramco, the largest oil and natural gas company in the world. **“We see a big opportunity to scale in Asia, where the benefits of increased efficiency and intelligent control could significantly reduce the cost of electricity, enabling sustainable growth,”** said one of Utilidata's recent investors.

**“Pollution and other environmental challenges bring huge social pressures to developing countries. As a result, we are seeing examples of 1st rate Western technologies being implanted in China and other emerging countries.”**

— Nicolas Chaudron, Partner, Idivest Partners

### 3: Cleantech Goes Inside the Oil & Gas Industry

Many promising cleantech start-ups are working with Oil & Gas corporations to help them address the growing technical, financial and environmental challenges facing both upstream and downstream operations. Here are five ways in which cleantech startups in this year's list are potentially shaping changes in the Oil & Gas industry.

#### Converting Oil & Gas by-products and waste-heat into resources

**Alphabet Energy** manufactures easy-to-install thermoelectric products that transform waste-heat in exhaust gas into electricity.

**MTPV Power Corporation** develops thermo-photovoltaic technologies for converting waste-heat to electricity. It enables Oil & Gas companies to reduce their operating costs by re-using the exhaust heat.

**Skynic** uses a thermolytic process to capture carbon dioxide at the source of emission and transform it into valuable chemicals. Oil & Gas companies, one of the largest industrial emitters of GHGs, could use this technology to curb carbon dioxide emissions generated during the production process.

#### Facilitating the treatment of Oil & Gas process water



**Axine Water**'s chemical-free, scalable system treats high concentrations of recalcitrant toxic materials in Oil & Gas process water. Axine's solution has huge potential in water treatment of offshore production.

**FilterBoxx**'s wide experience in treating process water from Enhanced Oil Recovery operations and unconventional drilling methods makes it a natural partner of the Oil & Gas industry.

**Memsys** develops thermal separation processes based on membrane distillation. The technology is geared towards the unconventional gas marketplace, which faces complex wastewater treatment challenges.

**Oasys Water** works with oilfield engineering firms to deliver forward osmosis water reuse solutions into the global Oil & Gas produced water market.

"As heavy industries like oil & gas and mining seek to be more sustainable, important treatment components like dewater technology will be increasingly relevant in these markets."

— Mia Javier, Senior Open Innovation Officer – Americas, Veolia Environnement

#### Ameliorating drilling equipment with advanced materials



**The NanoSteel Company** delivers nano-structured steel alloys with a unique combination of high strength, ductility, and wear resistance. With these properties, NanoSteel's metallic coatings meet demand for next generation material technologies that hold up to the challenge of drilling in high pressure, high temperature environments.

#### Improving the overall performance of Oil & Gas through software and data analytics

**OSIsoft**'s real-time data analytics help Oil & Gas companies maximize asset performance, optimize production flows and centralize enterprise expertise.

**Space-Time Insight**'s solutions for Oil & Gas leverage geospatial and visual analytics software to enable pipeline integrity monitoring, crisis mitigation, hydrocarbon supply chain management, risk monitoring, situational awareness, and condition-based maintenance.

#### Disrupting the downstream segment

**Electrochaea** is the developer of a power-to-gas energy storage technology that converts excess electricity from wind and solar into renewable gas. This gas can then be injected into the existing natural gas infrastructure.

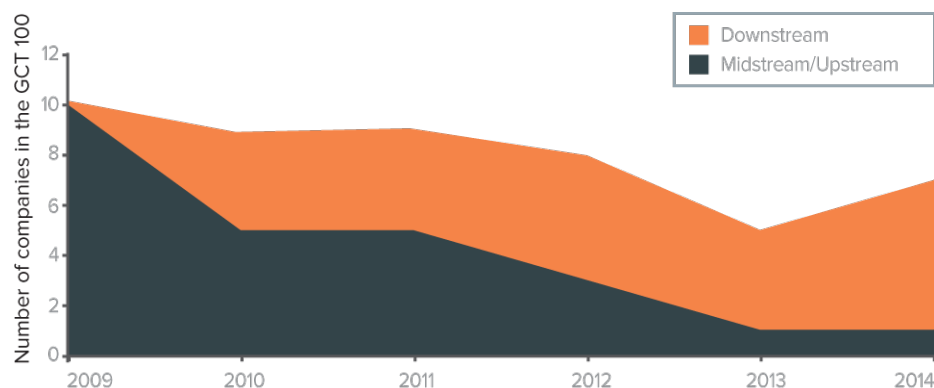
**Hicor Technologies**' compressed natural gas solution allows energy corporations to deliver natural gas to any customer who doesn't have access to a physical pipeline.

**Siluria Technologies** develops a methane conversion technology for creating fuels and chemicals from natural gas.

## 4: Towards Downstream Solar and Decentralized Energy Services







In last year's report, we mentioned "solar was an old darling sector," – reflecting on the general downtrend of solar companies in the Global Cleantech 100, with an all-time low of six companies in the 2013 list. This year, with nine companies in the solar category, we are seeing a resurgence of positive sentiment towards solar, and in particular towards new business models and opportunity sets to increase solar deployment levels around the world. Like never before, these new 'plays,' which are part of the 'downstream category,' are offering software, financing, and other services to accelerate solar adoption. As illustrated in the figure below, downstream business models comprise a much bigger share of the 2014 Global Cleantech 100 companies compared to 2009, when all of the Global Cleantech 100 companies were innovating on the 'hardware' side of solar (i.e. photovoltaic equipment suppliers, or solar module builders). This demonstrates a 180-degree shift in investor appetite away from such semiconductor style businesses, and a resulting slow-down in new innovation aimed at higher efficiency upgrades of solar equipment and components. The second trend includes business models that favor decentralization over centralization of solar provision. Consumers are no longer going to their local utility as a one-stop-shop to obtain their energy plan. Instead, they are decentralizing decisions and processes by using smaller players with advantageous services.

Type of Solar Company over time in the Global Cleantech 100 List by Year



“There is an accelerated trend towards decentralized energy generation. The smaller-scale generating units are becoming much closer and more appealing to the everyday consumers.”

— Keimpe Keuning, Investment Director, Robeco SAM

	<p><b>Clean Power Finance</b> operates an online platform that connects the distributed generation (DG) solar industry with institutional investors who want to own residential solar assets. CPF is a good example of <b>“transactional innovation effectively lowering the cost and accelerating the adoption of rooftop solar.”</b></p>
	<p><b>Mosaic</b>, the organizer of community solar financing projects, has democratized solar investment by allowing the public to elect centers, schools, libraries etc. to go solar. The company is also <b>“making smart alliances with equipment manufacturers to accelerate the pace of deployment.”</b></p>
	<p><b>M-KOPA</b>, the provider of pay-per-use solar charging systems in Kenya, will <b>“revolutionize asset financing in emerging markets,”</b> according to one panelist. The company has developed a technology platform that combines embedded GSM and mobile payments to make it affordable for Kenyans to purchase solar energy solutions.</p>
	<p><b>Renewable Funding</b> helps residential and commercial property owners to finance renewable energy and energy efficiency projects. The company provides low cost financing for home improvements via a secondary market for clean energy loans.</p>
	<p><b>Sungevity</b>, the solar systems integrator has a ‘strong IT platform’ targeting the residential rooftop market, and provides its customers with services to secure financing and rebates. The company is <b>“scaling well and has teamed up with E.ON Benelux, to expand solar into the European market.”</b></p>
	<p><b>SunRun</b> engages customers through PPAs, by owning, insuring and monitoring the solar panels on a homeowner's roof, while families pay a low rate for clean energy and fix their electric costs for 20 years. <b>“With a good market trend and growing size,”</b> the company is bound to lower the cost barrier to residential solar and increase adoption rates.</p>

## 5: 'From Waste to Wealth': Recovery of a Trillion Dollar Market



Key innovators today are designing new business models that allow for the recovery of useable materials, chemicals or gas out of disposed goods, products and waste. The companies below are pioneering the way forward to bring solutions to the questions: how can we re-use and re-manufacture waste in current industrial processes to create economic value and less resource dependence? How can

surges? How can we use emerging technologies to help emerging markets to resolve their health and environmental challenges?







we develop a restorative society, which thrives even when the price of commodities

### Key Stats:

- The material cost savings of adopting 'circular systems' and technologies is estimated at **\$US 1 trillion per annum by 2025.** (source: Ellen MacArthur Foundation)

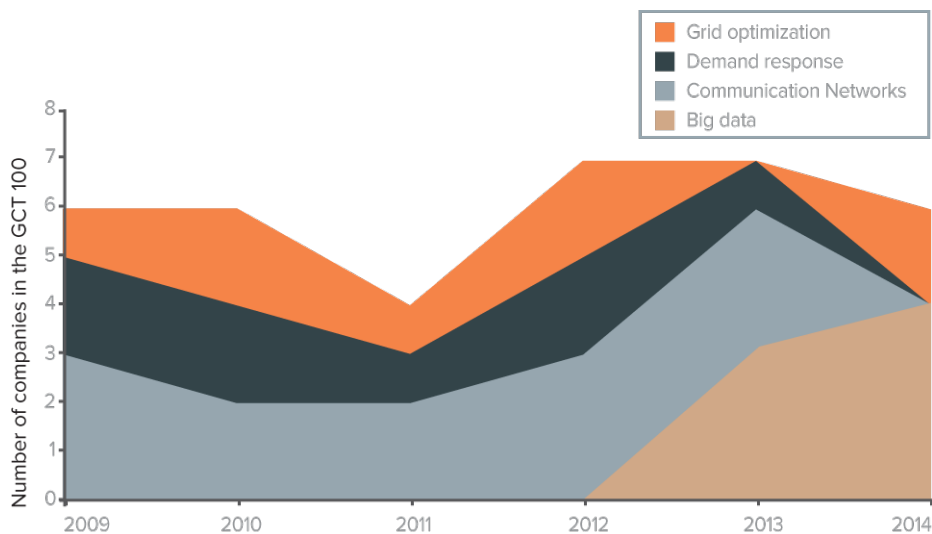
**"Waste-to-wealth is still an extremely undervalued sector that will grow increasingly important as resource constraints grow."**

— Kevin Kuhn, General Manager, Mitsubishi Corporation (Americas)

 <p><b>Energy Efficiency</b></p> <p>Hayward, CA, USA</p>	<p>More than 60 percent of the chemical energy from fossil or renewable fuels today is lost during combustion processes, primarily as waste heat. <b>Alphabet Energy</b> solves this problem by developing a thermoelectric technology which can convert heat to electricity with target markets including energy generators and automobiles and the company is working on military applications for the US Army and US Airforce.</p>	 <p><b>Air</b></p> <p>Monmouth Junction, NJ, USA</p>	<p><b>Liquid Light</b> develops a waste-to-resource technology that captures carbon dioxide gases directly at the point of emission and uses electrocatalysts to convert them into useful industrial chemicals. The company has generated enthusiasm amongst the corporate panelists who believe it is <b>"strongly positioned to become the first CO2-to-chemicals technology"</b> and <b>"is very likely to be a long term winner."</b></p>
 <p><b>Recycling &amp; Waste</b></p> <p>Waltham, MA, USA</p>	<p><b>Harvest Power</b> converts organic food waste into renewable energy and soil enhancement products (i.e. mulch and fertilizer). The company's technology <b>"enables value add to organic waste stream"</b> and the <b>"fertilizer angle is an attractive side of the recycling market,"</b> according to several panelists. Its largest anaerobic digester site in Vancouver supplies power to over 900 homes.</p>	 <p><b>Water &amp; Wastewater</b></p> <p>Vancouver, BC, Canada</p>	<p>Expert panelists praised <b>Ostara Nutrient Recovery Technologies</b> for <b>"cleverly combining wastewater treatment with the production of a revenue-generating, green fertilizer."</b> Ostara's proprietary technology recovers otherwise polluting chemicals, such as phosphorus and nitrogen, from municipal and industrial water streams and transforms them into an eco-friendly fertilizer that can increase food production.</p>
 <p><b>Biofuels &amp; Biochemicals</b></p> <p>Skokie, IL, USA</p>	<p><b>LanzaTech</b> is a <b>"pioneer in (syn) gas fermentations."</b> The company's thermochemical technology is based on proprietary microbes that are able to transform industrial waste gases into useable chemicals. The company has established strong global partnerships with multinational corporations (e.g. BaoSteel; Shaugang Group; Posco; Boeing; Virgin Atlantic).</p>	 <p><b>Recycling &amp; Waste</b></p> <p>Helsinki, Finland</p>	<p><b>ZenRobotics</b> provides a waste processing recycling system which is able to identify and extract valuable materials and improves the efficiency of excavator sorting. The company is <b>"linking the worlds of robotics, artificial intelligence and sorting waste"</b> and claims to be <b>"the most promising cure to the waste and raw material crisis."</b></p>

## 6: The Big Data Solutions Providers for Utilities

Areas of Focus for Global Cleantech 100 Smart Grid Companies Over Time



Innovation in smart grid five years ago was much more concentrated around effective communication with the grid. Global Cleantech 100 alumni companies like Silver Spring Networks, Power Plus Communications and On-Ramp Wireless were the hottest examples of the ‘communication network’ investment theme. Now that those types of companies are maturing, the new crop of hot companies are trending around the ‘big data’ theme. While ‘data’ was always a focal area for Utilities, whether for digitally optimizing grid infrastructure, or monitoring ‘loads’ for large customers, a new bucket of businesses are targeting, like never before, the streamlining of large quantities of data. These companies are seeking to help Utilities manage complexities in order to provide easily visualized options for decision-making and to address operational challenges.

Other companies are helping Utilities manage big data in buildings, with the focus on serving their clients’ needs for greater energy efficiency and better insights into energy management systems. They are prompting Utilities to change their behavior (and the behavior of their commercial customers) through providing them with tailored data to evaluate where real energy savings can be made.

“There are now a number of companies collecting and mining activity data, with some interesting solutions enabling electricity providers and consumers of all sizes to forecast and control generation.”

— Xavier Datin, Senior Vice President – EcoBusiness, Schneider Electric

### 1. Forecast & Management Tools for Distributed Generation

**Autogrid’s** software system runs complex optimization algorithms that enables electricity providers to forecast generation.

**C3 Energy’s** software applies big data, smart grid analytics, social networking, and cloud computing to all aspects of power delivery.

**Gridco Systems’** products enable Utilities to actively manage voltage and other key parameters of the distribution system with precision in real-time.



**Space-Time Insight** gives Utilities access to data about the power grid to help them to solve challenges around distributed generation, reliability and security.

### 2. Platforms for Better Energy and Building Analytics

**FirstFuel Software** has developed a platform, that uses advanced meter data analytics to track energy efficiency savings behind the meter in commercial buildings.

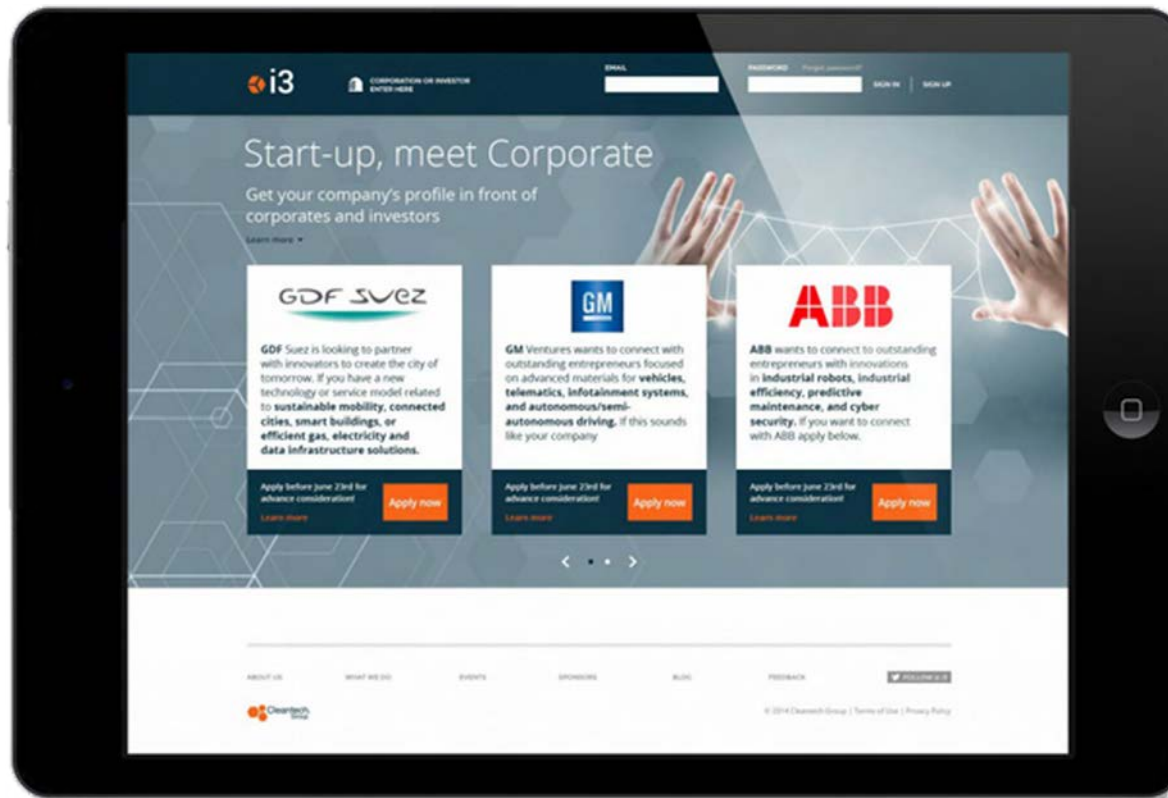
**Kiwi Power** is the developer of demand response software which can track customers’ activities and generate automated performance reports.



**OSIsoft** has developed a data infrastructure and event management software platform with applications to Utilities’ operations optimization, and real-time situational awareness.

**Stem** offers customer-sited, battery energy storage-enabled energy management systems to reduce electricity costs.

# Connecting corporates with sustainable innovation.



**Corporates use i3** to build and manage their pipeline, market their technology interests to start-ups globally, and gain insight into key sectors of sustainable innovation. **Start-ups create and manage their profiles in i3** — for free — because it is the easiest, most cost-effective and efficient way to connect with corporates and grow their businesses. **Our Advisory team works closely with corporate clients** to identify new market opportunities, develop growth strategies, and partner with or invest in advanced technology companies.

**Learn more: [www.cleantech.com](http://www.cleantech.com)**



# FAQs on the Global Cleantech 100

## Who can qualify for the annual Global Cleantech 100 list?

Any independent, for-profit cleantech company that is not listed on any major stock exchange, or is not a majority-owned subsidiary of another company.

## What is considered cleantech?

CTG uses more than 700 unique identifiers to classify companies in important areas of innovation, organized by 18 over-arching categories. To see how our 18 cleantech sectors are broken down, please visit <http://i3connect.com/tags/>.

## Who can nominate for this award?

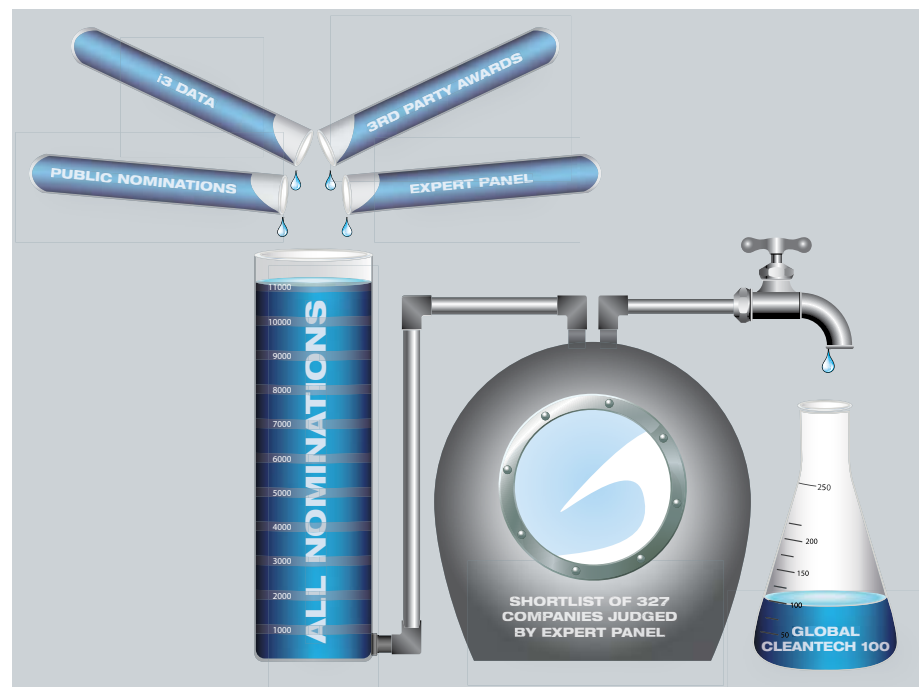
Nominations are open to **any market participant** through the Global Cleantech 100 website. Those interested in taking part in the process are asked to nominate a minimum of three qualifying companies and a maximum of nine. **Nominations must adhere to the ‘Lust List principle’** – meaning if you nominate your own company (or one you are part owner of), you must nominate at least two others that you admire (where you have no association). See more details: <http://www.cleantech.com/indexes/global-cleantech-100/global-cleantech-100-methodology/>.

**Entrepreneurs:** Cleantech entrepreneurs can nominate their company through CTG’s i3 platform: <http://i3connect.com>. This can be done by first setting up a company profile or editing a pre-existing profile – providing CTG analysts and subscribers (investors, corporations and others) with the most up to date information about your company. Email [research@cleantech.com](mailto:research@cleantech.com) with questions.

**The expert panel** all nominate companies in Phase 1, and nominations are also passively derived from relevant third-party awards and from CTG’s analysis of all market transactions (investments, partnerships, etc.)

"The case can be made that each year’s Global Cleantech 100 list represents the top of the initial wave of the Gartner cycle—the very best candidates for long-term success, many of whom have yet to wander through the “valley-of-death;” but from amongst whom will come the real superstars and long-lived success stories of energy, water, and materials for the next 100 years."

— Stephan Dolezalek, VantagePoint Capital Partners



## What is CTG’s scoring system?

The scoring system rewards companies that have multiple validations across multiple sources, to align with our objective to synthesize and represent collective opinion. This is to say, a company that has completed numerous market transactions (tracked through the i3 platform), been nominated by multiple people in the market—both publicly and within our expert panel—and appeared in third-party rankings, will tend to score better under our methodology than a hidden gem that few know about and vote for.

In 2014, **5,995** companies were nominated; **327** companies made it to a shortlist. In phase 2, 84 expert panelists evaluated the shortlist based on the following three angles:

1. **Innovation (the problem it solves; uniqueness; sustainability of advantage, etc.)**
2. **Market (accessibility, size, growth dynamics, barriers to entry, etc.)**
3. **Ability to Execute (finances; team competences; connections and networks, etc.).**

## Where can I find more information about the Global Cleantech 100 companies?

More in-depth profiles on the Global Cleantech 100 companies can be found in the i3 platform. CTG conducts periodical interviews and posts opinion blogs on various companies in the 100 and beyond. Please see <http://www.cleantech.com/indexes/global-cleantech-100/> for the latest updates on the top 100 companies. Additional analysis and statistics which have historically been featured in our GCT 100 reports, will be provided through and downloadable from <http://www.cleantech.com/indexes/global-cleantech-100/>.

## What is CTG's i3 platform?

CTG collects information on cleantech innovation startups and shares it with investors and corporates in the form of an i3 subscription. This information includes data on companies that have received investment via venture backing, grants, project financing, etc. as well as those that have established key commercial partnerships – channel partnerships, technology development partnerships, or pure customer/supply relationships. Thousands of validation points of commercial progress (that we use as passive nominations, alongside the active nominations) are derived from such data.

The i3 platform is used to connect corporates with sustainable innovation. If you would like to demo our i3 product or learn more, please visit: <http://i3connect.com/demo>.

The screenshot displays the i3 platform dashboard. At the top, there is a navigation bar with the i3 logo, a search bar, and user profile information for 'SIU SIN'. The main content area is divided into several sections:

- OPPORTUNITIES:** Features two listings. The first is for GDF SUEZ, seeking partners for sustainable mobility, smart buildings, and data infrastructure solutions. The second is for GM Ventures, seeking entrepreneurs in advanced materials for vehicles, telematics, and autonomous driving.
- CLEANTECH GROUP PROFILE STATS:** Includes a line graph showing 'PROFILE VIEWS' from January to May, peaking in March. It also features a donut chart titled 'PROFILE VIEWS (LAST 90 DAYS)' with segments for Investment Bank (1), Government & Other (2), Strategic (5), Investor (7), and Other (1).
- FOLLOWERS:** A list of six users, including John Smith (Monsanto), Pellentesque (Google), Dapibus Mattis (ABB), and Quam Ligula (Microsoft).
- NEWS FEED:** Shows a post from Flux Power dated 06/12/2014, titled 'Flux Power Strengthens Balance Sheet with Conversion of \$2.9M Debt into Equity'.

## Appendix 1: The Expert Panel

Laura Nereng, Business Development Manager, **3M**  
Andre Loesekrug-Pietri, Managing Partner, **A Capital**  
Grant Allen, Senior Vice President, **ABB Technology Ventures**  
Rhea Hamilton, Managing Director, **Aeris Capital**  
Greg Fleming, Investment Director, **ALIAD (Air Liquide)**  
Jean-Pascal Tranie, President, **Aloe Private Equity**  
Paul Gagliardo, Manager - Innovation Development, **American Water**  
Tae Jun Park, Senior Investment Associate - Applied Ventures, **Applied Materials**  
Pascal Siegwart, Partner, **Aster Capital**  
Rob Day, Partner, **Black Coral Capital**  
Eric Landais, Managing Director, **Blue Orange (Suez Environnement)**  
Ulrich Quay, Partner, **BMW iVentures**  
Meghan Sharp, US Director, **BP Ventures**  
Sulkhan Davitadze, Investment Director, **Bright Capital**  
Dr. Paul Decraemer, Senior Investment Manager, **Capricorn Venture Partners**  
Ian Cooke, Director, Head of New Ventures, **Carbon Trust**  
Dr. Wal van Lierop, President & CEO, **Chrysalix Energy Venture Capital**  
Paul Straub, Partner, **Claremont Creek Ventures**  
Stefan Brand, Senior Manager, New Business Development, **Clariant**  
Troy Ault, Director of Research, **Cleantech Group**  
Sheeraz Haji, CEO, **Cleantech Group**  
Michele Parad, Senior Analyst, **Cleantech Group**  
Richard Youngman, Managing Director, Europe & Asia, **Cleantech Group**  
Alex Betts, Partner, **Climate Change Capital**  
Peter Kennedy, Managing Director, **CLSA Capital Partners**  
Nancy Pfund, Managing Partner, **DBL Investors**  
Olivier Dupont, Chairman of the Board, **Demeter Partners**  
Rodrigo Navarro, New Business Creation Manager, **DSM Innovation Center**



Konrad Augustin, Principal, Strategic Co-Investment Group, **E.ON**  
Valery Prunier, Director, Innovation North America, **EDF**  
Luis Manuel, Executive Director, **EDP Ventures**  
Gina Domanig, Managing Partner, **Emerald Technology Ventures**  
Carlo Papa, Chief Innovation Officer, **Enel Green Power**  
Sumit Sarkar, Director - Venture Investments, **Energy Technology Ventures**  
Wally Hunter, Managing Director, **EnerTech Capital**  
Fabrice Bienfait, Principal, **Environmental Technologies Fund**  
Dr. Bernhard Mohr, Managing Director - Corporate Venturing, **Evonik Industries**  
Dr. Dirk De Boever, Head of Investments, **Finindus**  
Ignacio Martinez, Partner, **Flagship Ventures**  
Chris Thomas, Founder and Partner, **Fontinalis Partners**  
Iyad Omari, Partner, **Frog Capital**  
Hendrik Van Asbroeck, Director Corporate Venture Capital, **GDF Suez**  
Andrew Lackner, Vice President, **GE Venture Capital**  
Colin Le Duc, Partner, **Generation Investment Management LLP**  
Nicholas Atkins, Partner, **Georgieff Capital**

Sherwin Prior, Corporate Strategy and Business Development, **GM Ventures**  
Eric Wang, Partner, **GRC Chrysalix**  
Thorbjorn Machholm, Business Development Director, **Grundfos New Business**  
Tony Pandjiris, Managing Director, **Hercules Technology Growth Capital**  
Diego Diaz Pilas, Head of New Ventures, **Iberdrola**  
Nicolas Chaudron, Partner, **Idinvest Partners**  
Kelsey Lynn, Director, Technology Ventures, **Imperial Innovations**  
Sean Petersen, Senior Investment Officer - Venture Capital, **International Finance Corporation (IFC)**  
Glen Schwaber, Partner, **Israel Cleantech Ventures**  
Joe McGee, Executive Vice President - Strategic Planning and Development, **Jabil**  
Kevin Self, Vice President, Strategy & Corporate Development, **Johnson Controls**  
Eric Tao, Partner, **Keystone Ventures**  
Guido Ketteler, Innovation & Technology Manager, **Lanxess**  
Kai Engelhardt, Head of Corporate Venture Capital, **Mahle**  
Yossi Yaacoby, Director of WaTech Division, **Mekorot**  
Kevin Kuhn, General Manager, **Mitsubishi Corporation (Americas)**  
Martin Kröner, Managing Partner, **Munich Venture Partners**  
Ravi Viswanathan, Partner, **New Enterprise Associates**  
Keith Gillard, General Partner, **Pangaea Ventures**  
Iñigo Palacio, Director, **Repsol Energy Ventures**  
Keimpe Keuning, Investment Director, **Robeco SAM Private Equity**  
Dhiraj Malkani, Partner, **Rockport Capital Partners**  
Fabien Mondini, Senior Investment Manager, **Sabix Ventures**  
Chris Brown, Partner & Chief Scientist, **SAIL Capital Partners**  
Delphine Geny-Stephann, Director of NOVA External Venturing, **Saint Gobain**  
MJ Maloof, Investment Director, **Saudi Aramco Energy Ventures**  
Xavier Datin, Senior Vice President – EcoBusiness, **Schneider Electric**

Gerd Goette, Investment Partner, **Siemens Venture Capital**  
Joshua Raffaelli, Partner, **Silver Lake Kraftwerk**  
Thierry Piret, Head of Corporate Venturing, **Solvay**  
Mark Bonnar, Investment Director, **Southern Cross Venture Partners**  
Kurt Faulhaber, Investment Director, **Stafford Capital Partners**  
Vicky Sharpe, Strategic Advisor to the Board, **Sustainable Development Technology Canada (SDTC)**  
Peleg Chevion, Global Head of Abiotic Stress Management / Crop Enhancement, **Syngenta**  
Astorre Modena, Partner, **Terra Venture Partners**  
Nick Cizek, Sensor Strategist, **The Climate Corporation**  
Mike Jackson, Managing Partner, **The Westly Group**  
Steve Kloos, Partner, **True North Venture Partners**  
Don Ye, Partner, **Tsing Capital**  
Stephan Dolezalek, Managing Director, **VantagePoint Capital Partners**  
Mia Javier, Senior Open Innovation Officer - Americas, **Veolia Environnement**  
Joseph Vaillancourt, Vice President - Corporate Venturing, **Waste Management**  
Samer Salty, CEO, **Zouk Capital**





## Appendix 2: The Global Cleantech 100 mini-profiles




### ADVANCED MATERIALS

	<b>Enki Technology</b> (United States) Developer and marketer of functionalized coatings for the solar photovoltaic industry, optimizing the way solar modules interface with their environments
	<b>FRX Polymers</b> (United States) Developer of a patent protected, non-halogen, non-burning family of transparent high flow thermoplastics in the global flame retardant plastics market
	<b>Kebony</b> (Norway) Manufacturer of sustainable hard wood created by modifying sustainably sourced soft wood
	<b>Novomer</b> (United States) Producer of sustainable polymers and chemicals that use CO2 as feedstocks via proprietary catalysts
	<b>Solidia Technologies</b> (United States) Developer of proprietary technology used in building and construction materials that can reduce CO2 emissions up to 70 percent while needing less water and lower temperatures
	<b>The NanoSteel Company</b> (United States) Developer of advanced nanostructured material solutions for the Oil & Gas, mining, power and automotive industries





### AGRICULTURE & FOOD





	<b>Arcadia Biosciences</b> (United States) Developer of agricultural technologies such as low water and nitrogen consuming plants, salt tolerant plants, and extended shelf-life produce
	<b>Kaiima</b> (Israel) Pioneer of a non-GMO technology platform and advanced breeding program that boosts the inherent productivity and resource usage efficiency of high-impact food and energy crops

### AIR


	<b>Leosphere</b> (France) Developer of ground-based and nacelle-mounted LIDAR (Light Detection And Ranging) for remote-sensing instruments and atmospheric observation
	<b>Liquid Light</b> (United States) Developer and licensor of process technologies to convert carbon dioxide into high-value major chemicals
	<b>Skyonic</b> (United States) Developer of a carbon dioxide mineralization technology for industrial use in capturing, converting and sequestering carbon emissions as valuable by-products

### BIOFUELS & BIOCHEMICALS





	<b>Avantium</b> (Netherlands) Developer of a process to convert biomass into bio-based materials and fuels
	<b>Beta Renewables</b> (Italy) Developer of cost-effective non-food cellulosic biomass for biofuels production
	<b>Elevance Renewable Sciences</b> (United States) Creator of specialty chemicals derived from natural oils for use in personal care products, detergents, additives, engineered polymers, and specialty chemicals
	<b>Enerkem</b> (Canada) Producer of biofuels and chemicals from waste with proprietary thermochemical technology
	<b>Genomatica</b> (United States) Developer of green chemicals from renewable feedstocks such as sugar and garbage
	<b>Green Biologics</b> (United Kingdom) Developer of microbial, fermentation and process technology to turn readily available waste and agricultural by-products into high value chemicals and fuels

	<b>LanzaTech</b> (United States) Developer of a carbon capture and reuse technology that transforms abundant waste and low-cost resources into low carbon fuels and chemicals
	<b>NexSteppe</b> (United States) Developer of sustainable feedstock solutions for the biofuels, bio-power and bio-based products' industries
	<b>OPXBIO</b> (United States) Manufacturer of renewable bio-based chemicals and fuels including BioAcrylic from sugar feedstocks
	<b>Verdezyne</b> (United States) Producer of bio-based chemicals from renewable, non-food sources

## BIOMASS GENERATION

	<b>Cambi</b> (Norway) Provider of a technology to convert biodegradable material to renewable energy
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## CONVENTIONAL FUELS

	<b>Electrochaea</b> (Denmark) Developer of a power-to-gas energy storage technology that converts excess electricity from wind and solar into renewable gas for direct injection into the existing natural gas infrastructure
	<b>Hicor Technologies</b> (United States) Developer of compression technology that decreases the energy required to compress and transport natural gas
	<b>LP Amina</b> (China) Provider of products and services that improve the efficiency and reduce emissions of power plants
	<b>Siluria Technologies</b> (United States) Developer of methane conversion technology for creating fuels and chemicals from natural gas







## ENERGY EFFICIENCY

	<b>AlertMe</b> (United Kingdom) Developer of a smart energy and home monitoring system that allows users to control energy usage in all appliances
	<b>Alphabet Energy</b> (United States) Developer of low-cost thermoelectric technology for waste heat recovery
	<b>Anesco</b> (United Kingdom) Provider of energy efficiency and carbon reduction solutions for homeowners, local authorities and businesses
	<b>BuildingIQ</b> (United States) Provider of a Software-as-a-Service (SaaS) solution to optimize energy use in commercial buildings that can reduce HVAC energy costs by as much as 25 percent
	<b>Digital Lumens</b> (United States) Developer of intelligent LED-based lighting systems for industrial facilities that reduce lighting energy use and provide fully integrated controls and reporting capabilities
	<b>Eniram</b> (Finland) Developer of maritime energy management technologies that reduce fuel consumption and emissions in the shipping sector
	<b>Enlighted</b> (United States) Provider of lighting control systems for energy management applications
	<b>FirstFuel Software</b> (United States) Provider of commercial energy analytics platform to help utilities and government agencies achieve efficiency targets
	<b>Glo</b> (Sweden) Developer of nanowire light-emitting diodes (nLED)
	<b>Kiwi Power</b> (United Kingdom) Developer of demand response hardware and software used by large industrial and commercial consumers of electricity as well as government regulators
	<b>Lucid</b> (United States) Provider of cloud-based, real-time performance monitoring software for commercial buildings


	<b>LUXeXcel</b> (Netherlands) Manufacturer of optical solutions for the global LED lighting industry with digital printing, optical and lighting technology
	<b>MTPV Power Corporation</b> (United States) Developer of Micron-Gap Thermal Photovoltaic (MTPV) semiconductors that convert heat to energy with high efficiency
	<b>Next Step Living</b> (United States) Provider of full-service home energy efficiency and environmental impact assessments
	<b>Noesis Energy</b> (United States) Provider of analytical tools and data to help end-users make more informed energy management decisions; formerly known as Brazos Software
	<b>O-Flexx Technologies</b> (Germany) Developer of thermo-electric products that convert heat into electricity
	<b>OSIsoft</b> (United States) Provider of enterprise software infrastructure for real time data
	<b>Phononic</b> (United States) Producer of solid-state heat pumps and fully integrated systems that displace compressors for residential and commercial refrigeration, room air conditioning, and heating
	<b>Project Frog</b> (United States) Designer and manufacturer of resource efficient and zero net energy modular buildings
	<b>Renewable Funding</b> (United States) Developer of innovative solutions for renewable energy and energy efficiency financing
	<b>Sefaira</b> (United Kingdom) Developer of cloud software for high performance building design
	<b>Transphorm</b> (United States) Developer of technology to eliminate electric conversion losses when converting power from one form to another: AC/DC, AC/AC, DC/AC and DC/DC


	<b>va-Q-tec</b> (Germany) Provider of customised vacuum insulation panels (VIPs) and heat & cool storage elements containing phase change materials (PCMs)
	<b>View</b> (United States) Developer of energy-efficient glass technologies for use in buildings

## ENERGY STORAGE


	<b>Ambri</b> (United States) Developer of an all-liquid metal battery technology for grid-scale energy storage
	<b>Aquion Energy</b> (United States) Developer of batteries based on ambient-temperature sodium-ion technology; formerly known as 44 Tech
	<b>Imprint Energy</b> (United States) Developer of thin, flexible, print-based, non-lithium rechargeable batteries that use high conductivity polymer electrolytes
	<b>Ioxus</b> (United States) Developer of ultra-capacitors and hybrid-capacitors that can be made into individual cells, pre-packaged modules, or complete systems
	<b>Sonnenbatterie</b> (Germany) Provider of battery systems specifically designed to support distributed solar photovoltaic arrays
	<b>Stem</b> (United States) Provider of energy optimization services that combines big data, predictive analytics and energy storage to reduce electricity costs for businesses
	<b>Younicos</b> (Germany) Developer of sodium-sulfur (NaS) battery systems, and provider of renewable energy and building efficiency consulting

## FUEL CELLS & HYDROGEN


	<b>ACAL Energy</b> (United Kingdom) Developer of chemicals and systems used to power fuel cells both for automotive power trains and stationary power source
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	<b>sunfire</b> (Germany) Provider of energy conversion technologies including solid oxide fuel cells as well as solutions that produce renewable synthetic fuels based on solid oxide electrolyzers
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**NUCLEAR**

	<b>General Fusion</b> (Canada) Developer of magnetized target fusion energy generation with a new compression system to collapse the plasma
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**RECYCLING & WASTE**

	<b>Harvest Power</b> (United States) Developer of systems that maximize the value of organic materials through the production of renewable energy and soils, mulches and natural fertilizers
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	<b>HYLA Mobile</b> (United States) Provider of mobile phone recycling services (formally known as eRecyclingCorps)
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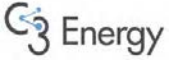
	<b>ZenRobotics</b> (Finland) Developer of robotic recycling systems that use artificial intelligence enabled waste sorting for construction and demolition waste
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**RESOURCE SHARING**


	<b>Airbnb</b> (United States) Developer of online marketplace that allows people to list and book private accommodations, improving resource utilization and decreasing idle capacity and urban sprawl
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**SMART GRID**


	<b>AutoGrid Systems</b> (United States) Provider of software and cloud-based services for utilities, grid operators and end users
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	<b>C3 Energy</b> (United States) Developer of smart grid analytics software with applications such as transmission, distribution, and advanced metering
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	<b>Gridco Systems</b> (United States) Provider of smarter power management technology for utilities and industrial power consumers
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	<b>Innovari</b> (United States) Platform provider connecting utility companies with commercial energy partners to incorporate demand-side technology into the grid
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	<b>Space-Time Insight</b> (United States) Developer of situational intelligence solutions that transform disparate information into intuitive visual displays that businesses can use to analyze their resources across location and time
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	<b>UtiliData</b> (United States) Supplier of voltage optimization products for the electric utilities
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	<b>Varentec</b> (United States) Developer of next generation digital power electronics
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**SOLAR**


	<b>Applied Solar Technologies India</b> (India) Developer of solar PV off-grid power solutions for telecom towers
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	<b>Clean Power Finance</b> (United States) Developer of an online business-to-business marketplace to connect the solar industry with capital markets
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	<b>M-KOPA Solar</b> (Kenya) Provider of pay-per-use solar charging systems
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	<b>Mosaic</b> (United States) Organizer of community solar financing projects
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	<b>QBotix</b> (United States) Developer of robotic technology to improve the operation and management of solar plants
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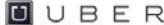

	<b>SolarEdge</b> (United States) Provider of distributed DC systems that maximize power generation of residential and large-scale photovoltaic solar sites
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	<b>Sungevity</b> (United States) Solar systems integrator targeting the residential rooftop market
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	<b>SunPartner Technologies</b> (France) Developer of thin photovoltaic surface materials
	<b>Sunrun</b> (United States) Developer of solar systems that engage customers through PPAs to eliminate the cost barrier to residential solar adoption

## TRANSPORTATION


	<b>BlaBlaCar</b> (France) Provider of a car-pooling online marketplace
	<b>ChargePoint</b> (United States) Provider of electric vehicle (EV) charging solutions
	<b>Proterra</b> (United States) Developer of battery-powered buses and other clean commercial transit solutions
	<b>RelayRides</b> (United States) Developer of a peer-to-peer car sharing platform that connects car owners willing to rent their cars that are not in use, with drivers who need short-term vehicle access
	<b>Streetline</b> (United States) Provider of smart parking solutions through wireless sensors located in parking spots and managed through a wireless mesh network
	<b>Uber</b> (United States) Provider of an integrated, mobile-based car booking and payment system
	<b>Ubitricity</b> (Germany) Developer and provider of a mobile metering technology and billing platform for EV smart charging infrastructure

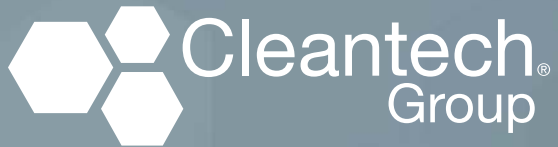
## WATER & WASTEWATER

	<b>Axine Water Technologies</b> (Canada) Developer of a low-cost, chemical-free solution for treating toxic organic pollutants in industrial wastewater
	<b>Desalitech</b> (United States) Developer of reverse osmosis water desalination projects

	<b>FilterBoxx</b> (Canada) Supplier of containerized water treatment systems to industrial, municipal, resort and aboriginal clients
	<b>Global Water FATHOM</b> (United States) Provider of cloud-based utility-to-utility solutions for municipalities to manage water systems
	<b>i2O Water</b> (United Kingdom) Developing the world's leading technology solutions for optimising the performance of water distribution networks
	<b>Memsys</b> (Singapore) Developer of thermal process modules for various water and wastewater applications
	<b>Microvi Biotechnologies</b> (United States) Developer and manufacturer of innovative biocatalytic technologies in water, wastewater, and chemical sectors
	<b>Oasys Water</b> (United States) Developer of a forward osmosis platform for desalination, water treatment, and waste heat recovery
	<b>Organica Water</b> (Hungary) Provider of Fixed-Bed Biofilm Activated Sludge (FBAS) wastewater treatment plants in urban and residential population centers
	<b>Ostara Nutrient Recovery Technologies</b> (Canada) Provider of solutions recovering phosphorus and nitrogen from used water streams and transforming them into environmentally responsible, slow-release fertilizer
	<b>Scinor Technology</b> (China) Provider of membrane-based water treatment technology
	<b>TaKaDu</b> (Israel) Provider of a web-based platform that monitors water distribution networks and alerts in real-time on inefficiencies, water loss, faults and other network problems

## WIND

	<b>Principle Power</b> (United States) Supplier of WindFloat foundations and design services to offshore wind project developers and utilities
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