

The Road to Success for a Young Researcher Can be Paved in Green, Not Gold



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Cleantech's Great Promise for the Future

- US cleantech companies net \$17.7B in investment; outside US net \$6.7B (\$2.2B of which were in emerging markets)*
- 3,133MW of solar = 3M houses powered in the US⁺
- 13GW of wind = 10M houses powered in the US⁻
- 1.8B people gained access to improved sanitation from 1990 – 2010
- US produces 21.5M tons of food residuals/waste annually



*Cambridge Assoc. "Clean Tech Company Performance Statistics", 2013
+ GTM Research and SEIA
- Bloomberg New Energy Finance

The Scope of Cleantech

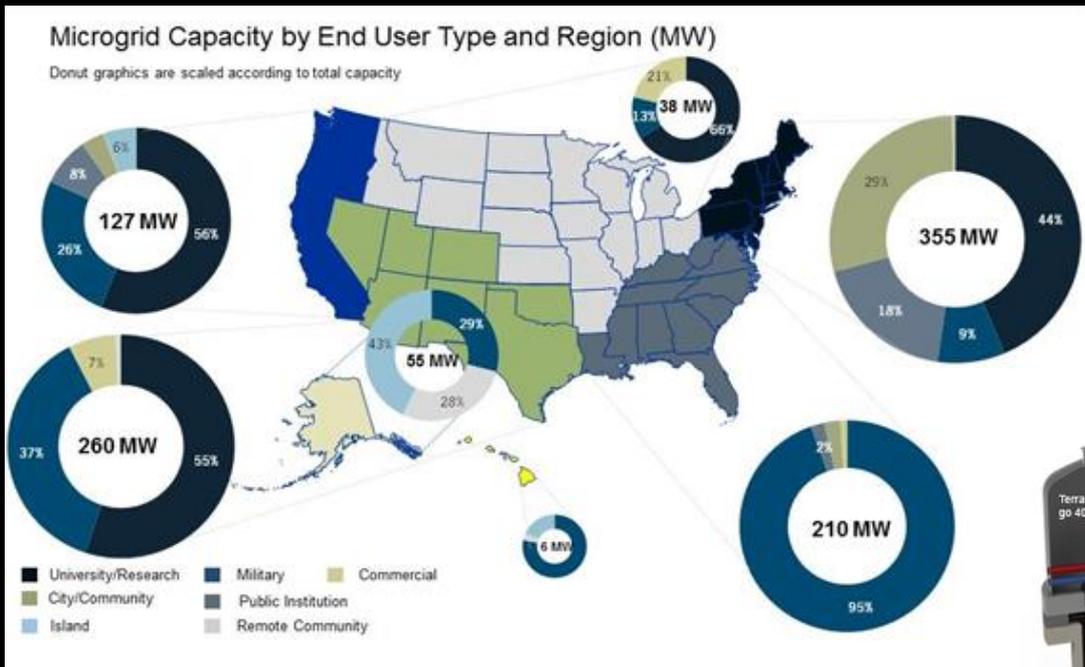
GROUP	SUBSECTOR	DEFINITION
Renewable Power Manufacturing	Solar Power Manufacturing	Technologies and processes that directly convert solar radiation into electricity or hot water
	Wind Power Manufacturing	Technologies and processes that convert kinetic energy from the wind into electricity
	Other Power Generation Manufacturing	Technologies and processes that generate electricity from other renewable inputs, fuel cells, or waste capture
	Biofuels & Biomaterials	Technologies and processes that produce fuels and materials from non-fossil fuel, biomass-based sources
Renewable Power Development	Renewable Power Development	Processes that allow for the financing, installation, management, operation, or ownership of renewable power generation projects
Energy Optimization	Energy Efficiency and Management	Technologies and processes that allow for more control over energy use and reduce energy consumption
	Lighting	Technologies and processes that reduce energy use through more efficient lights and lighting systems
	Smart Grid	Technologies and processes that work to optimize electricity transmission and distribution from the point of origin to the end consumer
	Sustainable Mobility	Technologies that contribute to the increased efficiency and electrification of transport
	Energy Storage	Technologies and processes that increase the efficiency of or reduce the cost, weight, or environmental problems associated with devices that store energy for use at a later time
Resource Solutions	Waste and Recycling	Technologies and processes that repurpose old materials into new products and reduce or eliminate the quantity and impact of undesired material
	Water and Wastewater	Technologies and processes that lead to the more efficient purification, recycling, and management of water and wastewater
	Advanced Materials	Technologies and processes that use biochemicals and substances to improve resource efficiency or serve as substitutes for more polluting materials
	Environmental Services and Agricultural Solutions	Technologies and processes that protect and allow for the restoration of natural ecosystems or contribute to more sustainable agricultural practices and techniques. Also includes companies focused on educating consumers about environmental topics
	Emissions Markets and Controls	Technologies and processes that reduce, measure, or control the release of greenhouse gases into the atmosphere

Up-to-the-Minute Cleantech Trends

- Microgrids are poised for big breakout
- LED lighting installations are growing at a 435 percent CAGR
- Developing nations lead renewables growth
- Sustainable corporate cultures are on the rise
- The IPO window is open again
- Universities are largely where cleantech innovation is happening

The Micro- Revolution

- Stronger outside the US
- 60 projects in the US of 1GW
- Island based projects much more economical - \$1k/kW vs. \$3.5k/kW



TerraPower's traveling wave reactor can go 40 to 60 years without refueling.

Micro-reactors could be the wave of the future for electrical generation if Bill Gates does for the reactors what he did for computers

Developing Nations Lead Cleantech Implementation

TOP 3 PROMISING CLEAN TECHNOLOGIES FOR SMEs BY REGION

\$ BILLIONS



TOP FIVE COUNTRIES

ANNUAL INVESTMENT / NET CAPACITY ADDITIONS / PRODUCTION IN 2013

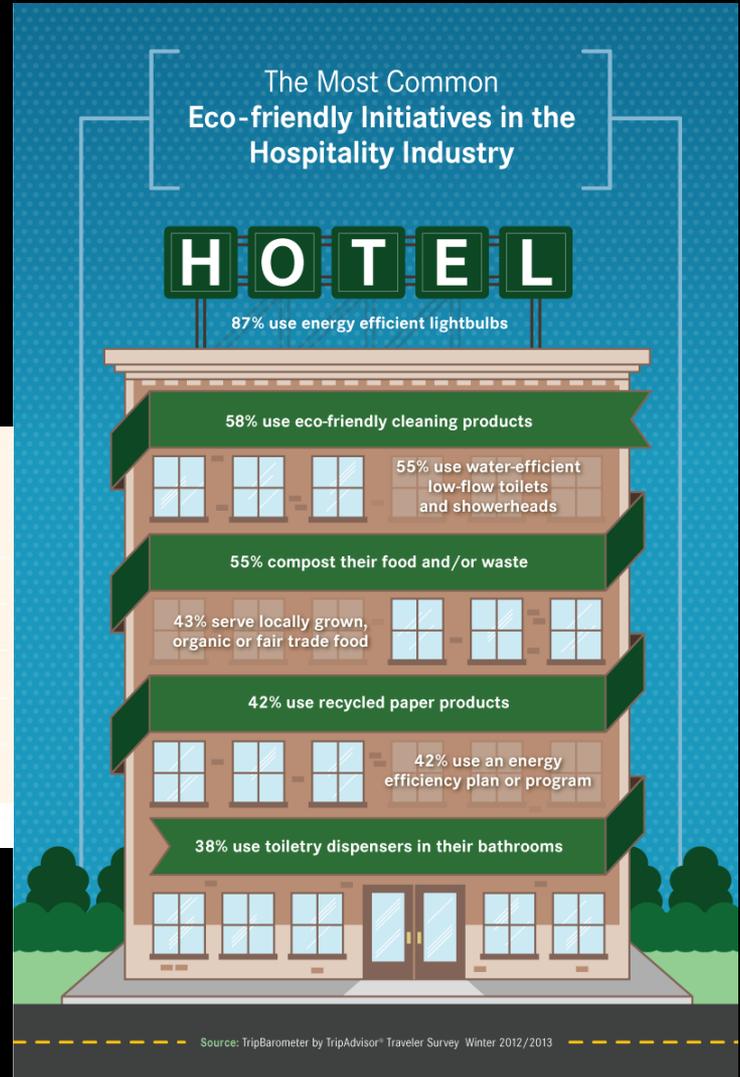
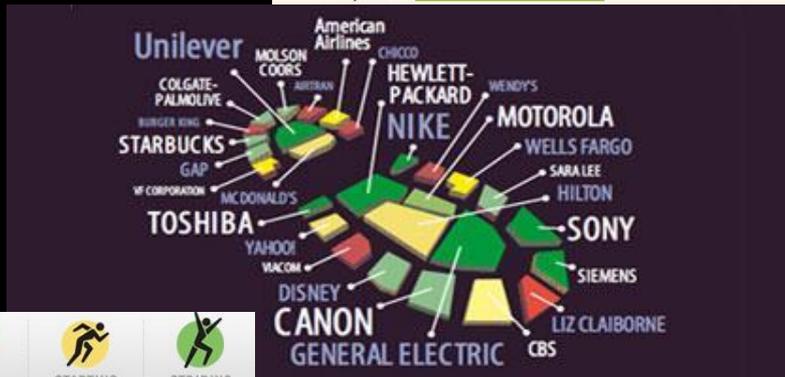
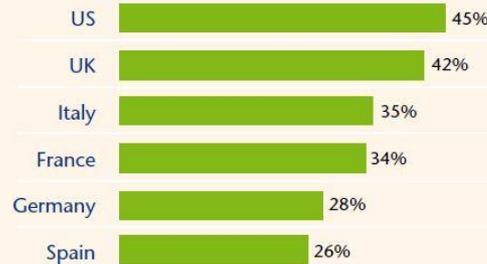
	1	2	3	4	5
Investment in renewable power and fuels	China	United States	Japan	United Kingdom	Germany
Share of GDP 2012 (USD) invested ¹	Uruguay	Mauritius	Costa Rica	South Africa	Nicaragua
Geothermal power capacity	New Zealand	Turkey	United States	Kenya	Philippines
Hydropower capacity	China	Turkey	Brazil	Vietnam	India
Solar PV capacity	China	Japan	United States	Germany	United Kingdom
CSP capacity	United States	Spain	United Arab Emirates	India	China
Wind power capacity	China	Germany	United Kingdom	India	Canada
Solar water heating capacity ²	China	Turkey	India	Brazil	Germany
Biodiesel production	United States	Germany	Brazil	Argentina	France
Fuel ethanol production	United States	Brazil	China	Canada	France

**World Bank Group, Sept 24, 2014

Corporate Sustainability Groups Dominate



Q: Consumers who have chosen to buy a product or service because of the company's ethical, social or environmental reputation – % yes



Its Raining Cleantech IPOs and M&As

Company	Symbol	IPO Date	\$ Raised	Price Range	\$/Share	Subsector	8/15 Close	Return
O Power Inc.	OPWR	4/4/14	\$122	\$17-\$19	\$19	Efficiency-Software	\$15.94	-16%
Tecogen Inc.	TGEN	5/20/14	\$3.08	\$4.75-\$5.75	\$4.75	Efficiency-CHP Systems	\$5.93	25%
SunEdison Semiconductor LTD	SEMI	5/22/14	\$107.64	\$13-\$15	\$13	Solar - Semiconductors	\$16.50	27%
Aspen Aerogels Inc.	ASPN	6/13/14	\$82.5	\$14-\$16	\$11	Efficiency - Insulation	\$9.39	-15%*
Abengoa Yield Co.	ABY	6/13/14	\$828.75	\$25-\$27	\$29	.9 Solar/.1 Wind - Generation	\$36.66	26%
TCP International Holdings	TCPI	6/26/14	\$78.6	\$13-\$15	\$11	Efficiency - LEDs	\$6.65	-40%
Nexterra Energy Partners, LP	NEP	6/27/14	\$442.7	\$19-\$21; \$23-\$25	\$25	.3 Solar/.7 Wind - Generation	\$34.25	37%
Terraform Power Inc.	TERP	7/18/14	\$533.5	\$23-\$25	\$25	Solar - Generation	\$31.09	24%

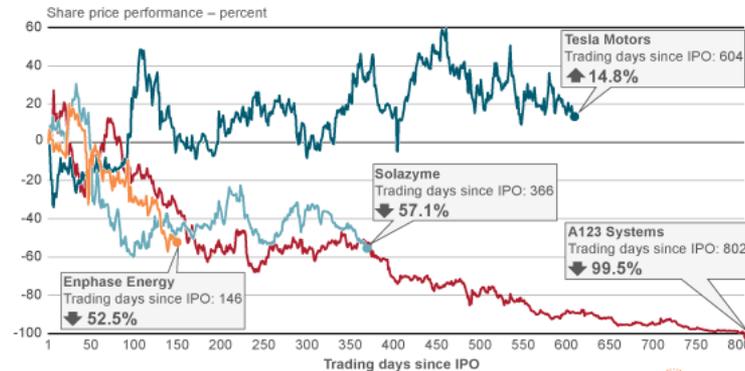
Total raised: \$2.199 billion

*Green Chipped, Aug 19, 2014

Investor*	Deal Count 3Q11-2Q13	Featured Portfolio Companies
	23	Tendril, Better Place, Codexis
	18	Skyonic, Ioxus, Glori Energy
	17	Marrone Bio Innovations, Kairma, BioAmber
	13	JouleX, Nexant, Enlighted
	12	Uber, Clean Power Finance, Silver Spring Networks
	11	NanoH2O, LightSail Energy, Ambri
	11	Solidia, BrightSource, Cool Planet Energy Systems
	9	BuildingIQ, Avantium, Plextronics
	8	Recyclebank, Harvest Power, Agilyx
	8	Trilliant, TaKaDu, Aquamarine Power

Cleantech IPOs

Stock performance of notable recent



Source: Thomson Reuters

Reuters Graphics/Stephen Culp

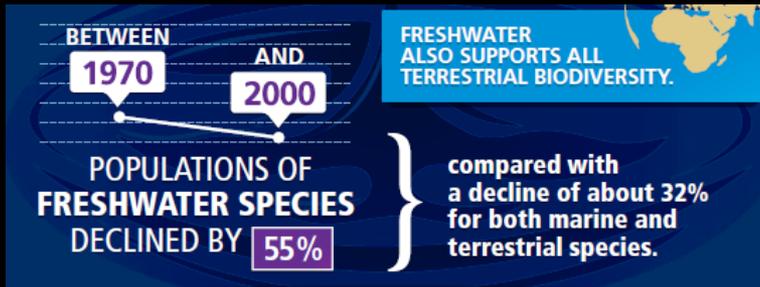
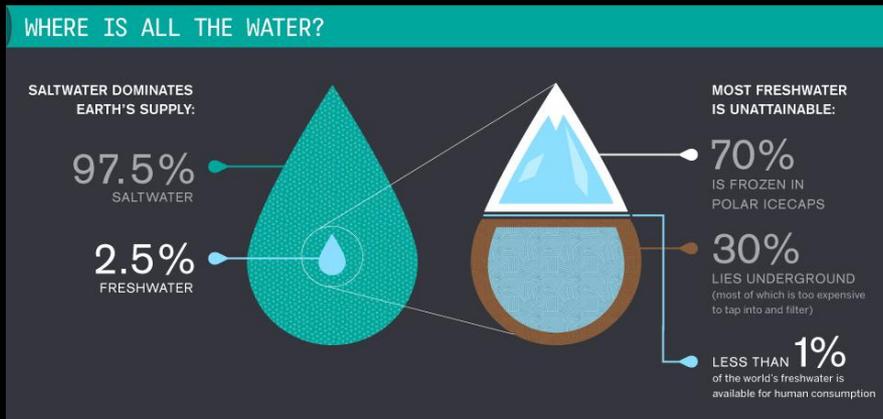
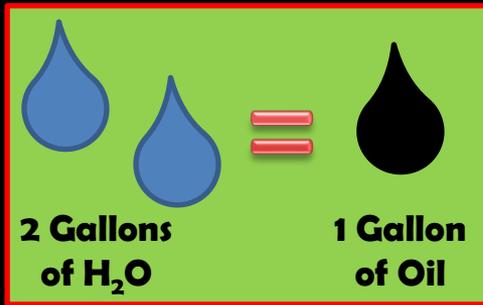
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*Includes BUs, CVCs and joint venture groups such as Aster and Energy Technology Ventures

Source: Cleantech Group's i3 Platform

 REUTERS

It's All About Water



Cool Cleantech Companies on the Horizon

Cambridge, MA
Material innovation
Mine tailings remediation



New Orleans, LA
Material innovation
Soil remediation



Stuart, FL
Water Treatment System
Non-ozone water treatment

Tallahassee, FL
Energy storage innovation
High performing capacitors

Union, KY
Water Treatment System
Desalinization system



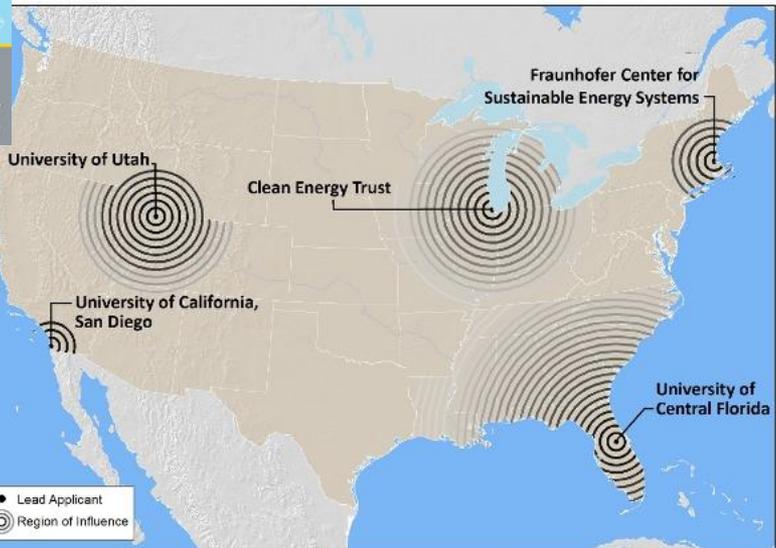
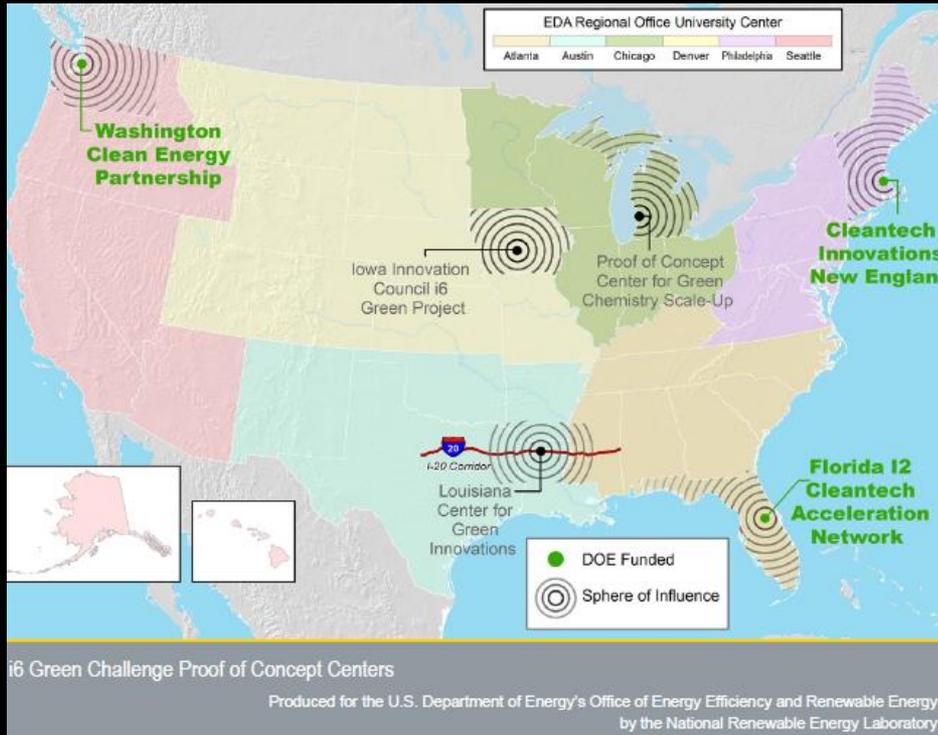
Sverige, Sweden
Water turbine
Low velocity tidal power plant



Bioadhesive Alliance
Greensboro, NC
Biowaste Re-use
Bio-based Adhesive

Cleantech Entrepreneurship Resources

- [US DOE's Commercialization](#)
- [Energy Innovation Portal](#)
- [Ashoka Innovators for the Public](#)



- [American Chemical Society ERC](#)
- [Autodesk Sustainable Design software](#)
- [NSF I-Corps](#)

Take Your Idea for a Test Run

- Launch
- Ocean Exchange
- US DOE National Clean Energy Business Plan Finals
- Rice Business Plan Competition - \$100,000 DOE Clean Energy Prize
- CleanTech Open
- Several funding mechanisms too including US government Small Business Innovation Research grants, Gates Foundation Grand Challenges, and other private grant funding sources

Questions?



SENSE
This picture makes none

**HUNDEREDS GATHER
TO PROTEST CLIMATE CHANGE.**



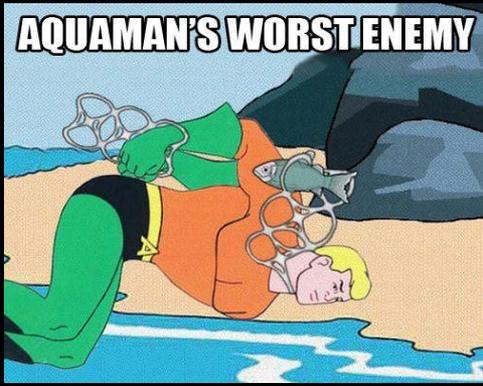
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RENEWABLE ENERGY?



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