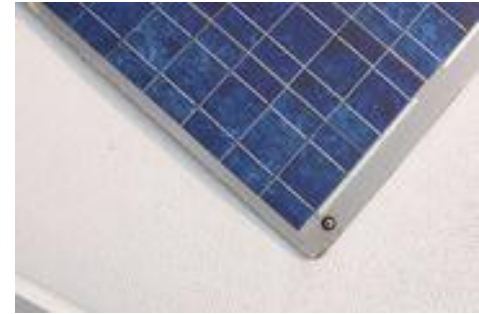




# Cleantech: Business at the Border

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# What is CleanTech?





# What is CleanTech?

- **Clean technology is an emerging sector of a range of products, services and processes that harness renewable materials and energy sources, reducing the depletion of natural resources and reducing or eliminating pollution and waste to create sustainable and secure energy sources.**



# Examples of CleanTech

## **Renewable Energy**

- Biomass
- Geothermal
- Hydro
- Solar
- Solar Thermal
- Wave
- Wind



# Examples of CleanTech

## **BioFuels / SynFuels**

- Biofuels
- Biodiesel
- Synfuels
- Alternative fuels
- Hydrogen



# Examples of CleanTech

## **System Integration**

- Water - Energy synergy
- Distributed Generation / On-Site Power
- Energy Storage
- Enabling Transmission
- Power Systems Simulation
- Smart Grid and Grid Solutions



# Examples of CleanTech

## **Environmental & Water**

- Water - Energy processes
- Bioremediation or desalination
- Recycling
- Smart Fertilizers
- Waste Management and utilization
- Water Purification or treatment
- Air Quality



# Examples of CleanTech

## **Transportation**

- **Electric or Hybrid Vehicles**
- **Fuel Cells**
- **Hydrogen**
- **Zero Emissions**
- **Pollution Reduction**
- **Alternative Fuels**
- **Clean Burning Fuels**



# Examples of CleanTech

## **Buildings & Construction**

- Architecture & Design
- Construction Materials
- HVAC and Lighting
- Efficient Appliances
- Indoor Air Quality
- Energy Supply & Storage
- LEED Buildings



# Examples of CleanTech

## **Industrial Processes**

- Manufacturing
- Catalysts
- Material/Chemical
- Recycling
- Waste Disposal



# Examples of CleanTech

## Industry Initiatives

- Agriculture
- Life Sciences & Medical
- Materials
- Nanotechnologies
- Bioplastics
- Eco-friendly products and technologies

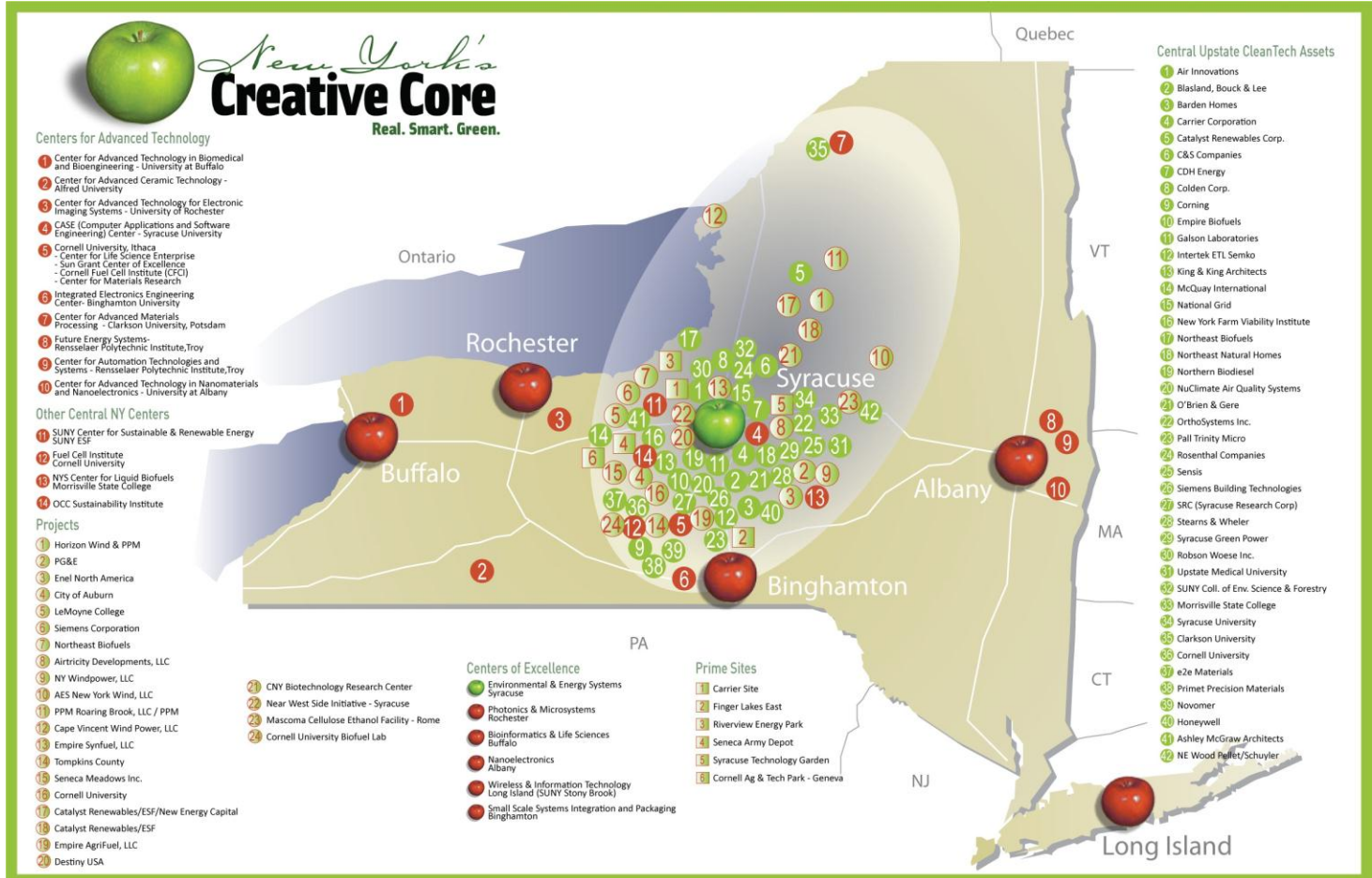


# Examples of CleanTech

## **Clean Technology Business & Policy**

- **Licensing & IP**
- **Early Stage Investment**
- **Public Sector Investment**
- **Equity, Debt and Conventional Investment**
- **Industry Investments and Partnerships**
- **Emissions trading, Carbon Credits, RECs**

# Regional innovation cluster



# Venture development ecosystem



Technology commercialization partnerships

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# SyracuseCoE



**New York State Center of Excellence in  
Environmental and Energy Systems**



# **At the Center of Innovation**

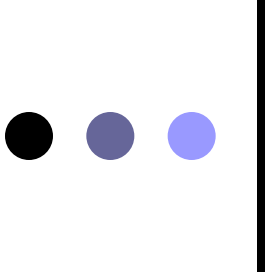
- **The SyracuseCoE is a collaborative that addresses global challenges in three areas: clean and renewable energy, indoor environmental quality, and water resources.**
- **Syracuse CoE projects leverage a community of experts available through more than 200 companies, organizations, and institutions that are members.**
- **The SyracuseCoE is recognized around the world.**

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# The Clean Tech Center

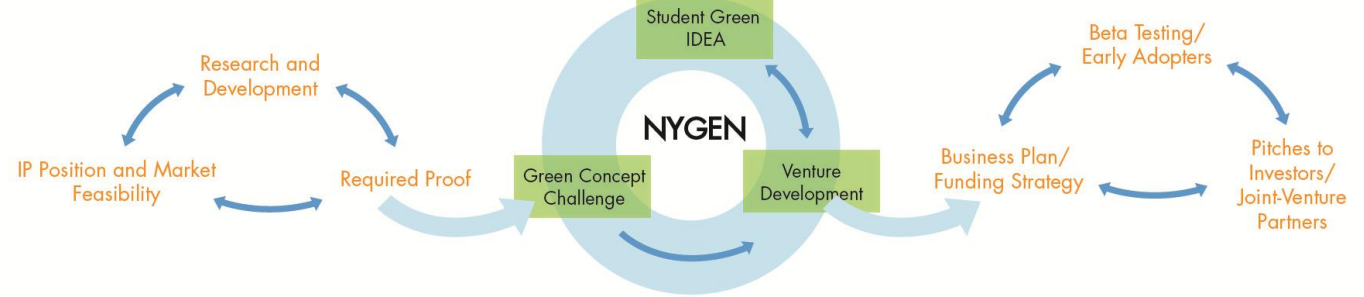


**NYSERDA funded clean energy incubator**

- 
- **The Tech Garden is an award winning incubator/accelerator closely networked with the academic, entrepreneurial and investor community across New York State.**
  - **The Clean Tech Center is a NYSERDA-funded initiative to provide early stage support for developers of renewable and clean energy technologies.**
  - **The Clean Tech Center is a partnership project with the SyracuseCoE and others.**



Venture Framework



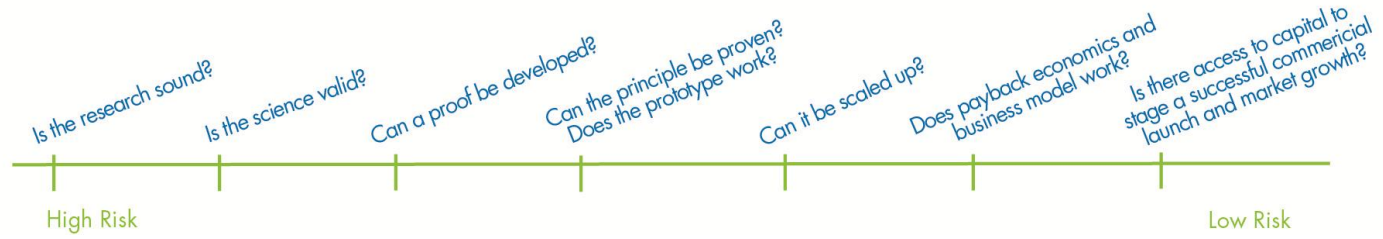
Product Cycle



Funding Cycle



Risk Cycle





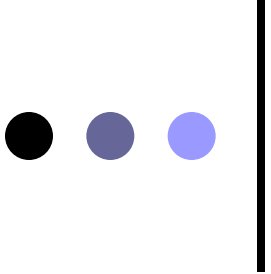
- CASE Center
- SUNY Center for Sustainable and Renewable Energy at SUNY ESF
- NYS Center for Liquid Biofuels at Morrisville State College
- Center for Advanced Materials Processing at Clarkson University
- Integrated Electronics Engineering Center and NYS Center of Excellence in Small Scale Systems Integration Packaging at Binghamton University

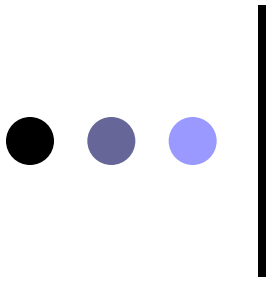
- 
- **Cornell Center for Materials Research, Fuel Cell Technology and Sun Grant Center of Excellence**
  - **Cornell Energy Frontier Research Center**
  - **CNY Biotechnology Research Center**
  - **Shingley Center for Innovation at Clarkson University**
  - **Cornell Center for A Sustainable Future**
  - **Cornell Center for Sustainable Global Enterprise**



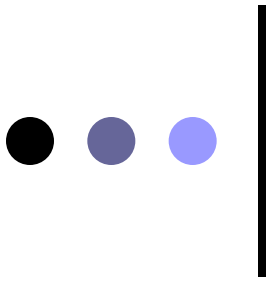
# **A pipeline for talent**

- **35 colleges and universities**
- **138,000 college students**
- **Corridor with the highest concentration of undergraduate and graduate students in the country**

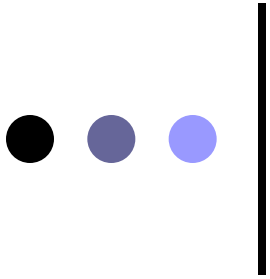
- 
- **25,000 graduate students**
  - **The region's six largest research institutions have over \$1.2 billion in annual R&D, which is 10% more per capita than the national average**



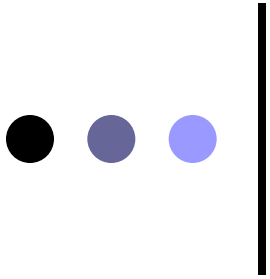
- **28,000 “knowledge-industry” workers**
- **10,000 “green sector” workers, among the highest per capita concentrations in the country**



- **A regional workforce that is 20% more educated than the national average.**
- **Workforce that is consistently rated as one of the most productive nationally.**



- **Labor force of more than 400,000**
- **Personal income of \$23 billion**
- **Transportation and market access that is unsurpassed**



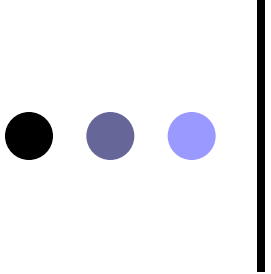
- **A region-wide commitment to sustainability and smart growth**
- **Regional collaboration among organizations, counties and localities**
- **A common vision**



# **Regional accomplishments**

- **The region is at the forefront of the US Green Building Council movement.**
- **Headquarters of Greening USA.**
- **The region is the winner of the Green Large City of the Year Award.**
- **The region was the recent site of the Green Earth Summit.**
- **Syracuse is the nation's 17th greenest city, according to National Geographic's Green Guide.**

- 
- Green Guide Magazine ranked Syracuse ahead of San Francisco as a Green City.
  - msn.com picked Syracuse as one of the top 12 green cities in the country.
  - The Clean Tech Center is the winner of The North American Sustainable Enterprise Award.
  - The Clean Tech Center is a co-founder of the Global Cleantech Cluster Association – *hosting its first world summit in Montreal in August 2011.*

- 
- **The region’s green “rebuild” effort ties together the goals of the U.S. Green Building Council and the National Trust. This one of only a handful of regions across the country working on both fronts.**
  - **Syracuse University and the SyracuseCoE are working on the first LEED neighborhood in the US.**
  - **The SyracuseCoE headquarters is a global showcase and clean tech test-bed**



# **Industry drivers**

- **Investment is flowing to this sector. Venture investment in the clean technology sector has grown from \$506 million in 2001 to projected more than \$10 billion in 2011.**
- **Enhanced funding through federal programs including the SBA, USDA/Rural Development and the DoE will continue to stimulate the market for entrepreneurship in clean technology.**



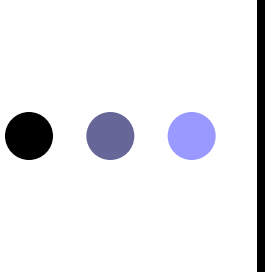
# **Market growth projections**

- **The leading sector in Q1 2011 by amount invested was solar (\$641 million), followed by transportation (\$311 million) and materials (\$296 million). Solar was also the most popular sector measured by number of deals, with 26 funding rounds, ahead of energy efficiency (22 deals) and biofuels (13 deals).**
- **65% of deals were follow-on funding, accounting for 93% of dollars invested.**



# **Impact of the economic slowdown?**

- **Dampening market appetite for new investments**
- **Need market demand for new technologies**
- **Less tolerance for risk**
- **More focus on efficiency, which is the “low hanging fruit” and which can be implemented more profitably with shorter payback and higher rates of return**

- 
- **Commercial and industrial upgrades will be a big market driver; it is estimated these will achieve rates of return of 30 to 50%**
  - **NYS is focusing on energy efficiency and smart buildings (NYE-RIC), advanced energy storage and battery technologies (NY-BEST), the smart grid (NY Smart Grid Consortium), and solar thermal (TSEC)**



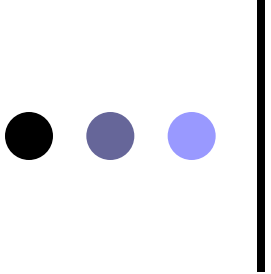
# **Market drivers**

- US venture capital investments in CleanTech increased 41% last year, while overall VC investments were down 8%**
- The hot sectors, looking ahead, are energy storage technologies, which will play a critical role in modernizing the grid, along with load management and power quality technologies**



# **The next big ideas**

- Existing and emerging storage technologies for stationary power and transportation markets
- The use of nano-materials in battery and fuel cell construction, ultracapacitors and advanced LED lighting
- Batteries are the next big thing, with rechargeable battery market growing from \$8 billion to \$63 billion market very rapidly

- 
- **Caveat: If Lithium batteries are the next big thing, 70% the world's reserves are in the Lithium Triangle of Argentina, Chile and Bolivia, creating a new set of energy security issues and creating environmental concerns over extraction techniques**
  - **The race is on to develop the next generation of rechargeable batteries to efficiently store energy – not just Lithium technologies**



# **What about solar?**

- **The perfect storm: global credit crisis, equity market decline, collapse of consumer confidence, policy uncertainty, drop of the Euro, oversupply of modules, lack of market demand in US dampened growth.**
- **Feed-in tariff incentives, ITC extension and DoE loan guarantee programs as part of Recovery Act were designed to stimulate activity in the United States.**



# How can we grow together?

- There is a market for innovation and there are resources across Upstate. We can grow together.
- We can learn from best practices: net metering, interconnection to the grid, feed-in-tariffs, overcoming regulatory barriers, funding and financial incentives, long-term procurement contracts, which build and drive the market
- *It is essential to provide resources to seed innovation and entrepreneurship*

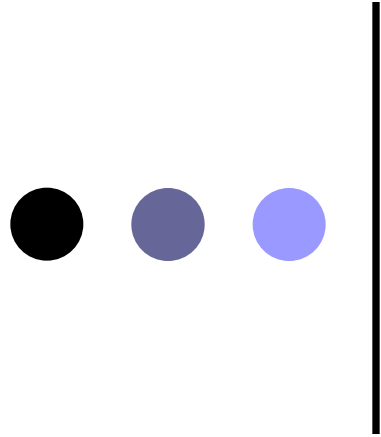


# **What communities can do**

- Set green procurement standards and renewable energy goals**
- Commit to green buildings (OCIDA “Green PILOT” is a great model)**
- Create “green revolving loan funds”**
- Create a mentoring system for “green” entrepreneurs and help fund “green” start-ups; encourage risk, create early adopter programs**

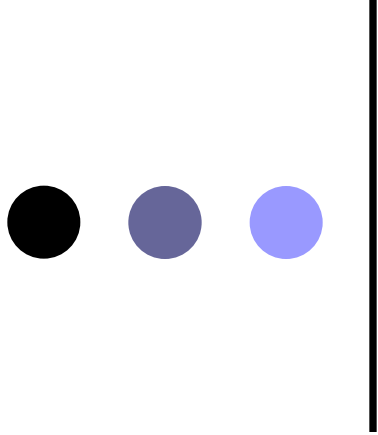


**Create the next big idea.**  
**Embrace change.**  
**Act with urgency.**



*From an entrepreneur*

**“I’d put my money on the sun and solar energy. I hope we don’t wait until oil and coal run out before we tackle that.”**



**By Thomas Edison, the most prolific inventor in history,  
with 1,093 patents**

Entrepreneur and Founder, Edison Light Company, 1879

**He said it 100 years ago**