



CENTRAL UPSTATE NEW YORK'S
GREEN INDUSTRY SECTOR:

Opportunities and Prospects

Prepared For:

Metropolitan Development Association of Syracuse
and Central New York and Creative Core's
Regional Green Team

Prepared By:

Battelle
Technology Partnership Practice

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Final Report

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EXECUTIVE SUMMARY

Introduction

The Central Upstate New York region recognized that it had key assets in environmental and energy systems (E&ES) more than ten years ago; and the region's business, government, and academic leaders have worked to grow this industry cluster. (See Appendix A for a map of key E&ES assets in the region.) In Vision 2010, the Metropolitan Development Association (MDA) of Syracuse and Central New York targeted seven industry clusters, including "Environmental Systems". Indoor Environmental Quality (IEQ) was chosen as an initial focus, and the New York Indoor Environmental Quality (NYIEQ) Center, Inc., was established in 2000. NYIEQ was an independent, nonprofit organization created to foster industry-university collaborative research, technology transfer and commercialization, and outreach to advance human health and performance in urban and built environments by creating products and services to enhance indoor environmental quality. In 2001, Syracuse University (SU) partnered with the MDA and NYIEQ to create a Strategically Targeted Academic Research (STAR) Center for Environmental Quality Systems. Syracuse University was awarded \$15.9 million for the STAR Center in 2001 and another \$22 million to establish a Center of Excellence in Environmental Systems in 2002. In 2004, the focus of the Center of Excellence was expanded to include energy systems.

The region's public, private, and academic leaders came together again in 2006 to form a coalition with the mission of expanding and marketing the region's green (environmentally sound) and sustainable assets, and thus accelerating the growth of the E&ES industry sector. MDA and its partner organizations engaged Battelle's Technology Partnership Practice (TPP) to conduct a market analysis and competitive assessment of the E&ES sector in the Central Upstate New York region. Battelle's TPP, which includes leading analysts and practitioners in technology-based economic development, helps clients develop, implement, and evaluate technology strategies, policies, and programs.

Project Goals

This project was designed to

- Understand the market potential of the E&ES cluster and the components that make up the cluster,
- Identify leading and emerging firms within this sector,

Project Goals

- ▶ Understand market potential of E&ES cluster
- ▶ Identify leading and emerging firms within this sector
- ▶ Assess Central Upstate New York's competitive position
- ▶ Identify potential actions to develop E&ES cluster and brand the region as center of green industry

- Assess Central Upstate New York’s competitive position in the E&ES sector, and
- Identify potential actions that could further develop the E&ES cluster and brand Central Upstate New York as a center of green industry development.

Project Methodology

Market Analysis

Battelle prepared a market analysis that examined market trends and drivers for four major industries and their subsectors within the broader E&ES area (Table ES-1).

Table ES-1: Environmental and Energy Systems Industry Sector

Core Industries	Subsectors
Indoor Environmental Quality	<ul style="list-style-type: none"> ▪ Air Filtration, Ventilation, Conditioning, and Other Treatment Technologies ▪ Air Sensors and Air Analysis/Monitoring Instrumentation
Renewable Energy	<ul style="list-style-type: none"> ▪ Biomass ▪ Wind ▪ Solar ▪ Fuel Cells, Including Portable/Micro-Fuel Cells
Green Buildings/Sustainable Design	<ul style="list-style-type: none"> ▪ Green Structural and Exterior Finish Materials ▪ Green Interior Systems, Surface and Finish Materials
Water Quality and Water Resources	<ul style="list-style-type: none"> ▪ Water Filtration, Purification, Desalination, and Other Treatment Technologies ▪ Water Sensors and Analysis/Monitoring Instrumentation ▪ Water Engineering and Watershed/Resource Management Consulting

For each industry subsector, data were collected to provide an overview and to identify technology trends, challenges, and key market opportunities. Battelle also developed a list of current market leaders and identified smaller, emerging firms for each industry subsector.

Competitive Analysis

Battelle examined Central Upstate New York’s E&ES sector and compared it with a number of other regions. The Battelle team interviewed firms and organizations involved in the E&ES sector in the region to gain an understanding of the region’s key assets and to identify any gaps that need to be addressed to further grow this sector. Battelle identified, using the North American Industrial Classification System (NAICS), those industries that make up the E&ES sector and its subsectors. Employment and establishment data were developed to examine the size, concentration, and growth rate of each subsector.

Project Tasks

- ▶ Market Driver and Trend Analysis
- ▶ Identification of Market Leaders and Emerging Firms
- ▶ Competitive Assessment
- ▶ Gap Analysis
- ▶ Potential Actions

Using the input from the interviews, the examination of employment data, and the regional profiles, Battelle identified potential actions that could be undertaken to accelerate the growth of Central Upstate New York's green economy.

Understanding the E&ES Market

Significant opportunities exist for the growth of the indoor environmental quality (IEQ) industry, and Central Upstate New York is well positioned to grow this sector. Increased interest in improving the energy efficiency of IEQ systems, recognition of black mold threats, financial and real estate concerns regarding sick building syndrome, and the need to protect against airborne attacks are all factors that are driving growth of the IEQ market (Table ES-2). The global expansion of high-tech manufacturing and research, increased demand for home indoor air quality (IAQ) instrumentation, and expansion of the residential air filtration market are examples of areas of market opportunity. There also exists a growing market for IAQ monitors and for specialty instrumentation measuring volatile organic compounds (VOCs), gases, and particles.

Central Upstate New York has significant assets in the IEQ area. Pall Corporation, a billion dollar company and world leader in the filtration industry, has a facility in Cortland NY; and Carrier, a leading global company in air filtration, conditioning, ventilation, and treatment technologies, has located one of its 16 design centers in Syracuse. The focus of this design center is on IEQ. The region also is home to a number of small innovative IEQ firms, such as Air Innovations and NuClimate.

Approximately 2,400 people were employed in the IEQ sector in Central Upstate New York in 2005. This is a much larger employment base than that found in any of the competitor regions, all of which had less than 400 total employees. The region experienced a 42.7 percent decline in IEQ employment from 2001 until 2005; a result, in part, of the loss of 1,200 jobs when Carrier Corporation closed two plants at its Syracuse site in 2003. At the same time, however, the number of IEQ establishments increased by approximately 23 percent, suggesting that the number of small, start-up IEQ firms is increasing. Accelerating the growth of these companies would provide additional employment opportunities in the region.

Central Upstate New York also has research strengths in IEQ. Significant investments have been made in the region's universities to support the development of the E&ES sector through the Syracuse Center of Excellence in Environmental and Energy Systems (Syracuse CoE), which includes a focus on IEQ, and its partner Centers, which include the Clarkson Center for Air Resources Engineering and Science, the EQS STAR Center, and SU's Building, energy and Environmental Systems Lab. Through these Centers, the region has received capital equipment and research funding from the Environmental Protection Agency (EPA). These resources could be used to attract companies and to help existing companies with new product development; but, it must be recognized that there is competition from other regions.

California is clearly the leader in both indoor and outdoor air quality. University Centers, such as the Berkeley Center for the Built Environment, Carnegie Mellon's Center for Building Performance and Diagnostics, and Penn State University's In-

door Environment Center, are established programs, with which the Syracuse CoE must compete.

Actions that could further build this cluster include strengthening industry-university partnerships and aligning the research focus of Syracuse CoE with areas of interest to the region’s companies, which will require greater resources that can be dedicated to both operating expenses and focused research and development (R&D). Attracting IEQ companies to the region will require that the Center and its partner institutions continue to build its critical mass of world-class researchers in the IEQ area.

Table ES-2: Key Drivers of IEQ Sector

Indoor Environmental Quality: Key Drivers	
Market Trends and Drivers	<ul style="list-style-type: none"> • Security against airborne attacks • Recognition of black mold threats • Financial and real estate concerns regarding sick building syndrome • Cost-efficient technologies for urban asset enhancements • Increasing interest in improving energy efficiency of IEQ systems • Presence or absence of legislatively mandated regulatory standards
Economic Development Drivers	<ul style="list-style-type: none"> • Federal, state, and local funding for homeland security • Advances in multidisciplinary research • Improved R&D capabilities
Firm Locational Requirements	<ul style="list-style-type: none"> • Firms need partnerships with university researchers, but they don’t necessarily need to be located next to them • Scientists and other professionals with skills relevant to environmental industry cluster • Business climate that is attractive to mature industries <ul style="list-style-type: none"> - Skilled workforce - High-quality K-20 education - Family-friendly quality of life
Key Market Opportunities	<ul style="list-style-type: none"> • Global expansion of high-tech manufacturing and research • Demand for home indoor air quality (IAQ) instrumentation and expansion of residential air filtration market • Growth for market in energy recovery ventilation systems • Growth of office building remediation market • Growing market for IAQ monitors • Growing market for specialty instrumentation measuring VOCs, gases, and particles

The renewable energy sector is poised for growth, and Central Upstate New York has opportunities in the production of biomass energy and the development of fuel cell technology. A range of external factors shapes and influences the future direction of the market for renewable energy and the technologies that produce it (Table ES-3). Such factors may be technological, regulatory, or based on consumer preferences. Technological factors include large shifts in research funding and the development of innovative technologies by industry leaders who can affect the market. The extent of these technology breakthroughs is dependent in large part on R&D funding. Regulatory factors include various financial incentives and policies that can alter demand for traditional and alternative sources of energy. Finally, increasing desire for a sustainable economy, rising electric power needs, environmental concerns, and moral pressures are among the factors influencing the preferences of energy consumers.

Table ES-3: Key Drivers of Renewable Energy Sector

Renewable Energy: Key Drivers	
Market Trends and Drivers	<ul style="list-style-type: none"> • National R&D budgets and financing for energy technologies • Public policies, government subsidies, and incentive programs • Goals, mandates, targets, and standards • Increased nationwide support for a secure and sustainable economy • Growing global and domestic energy demand • Concerns over global warming/climate change • Consumer tastes and preferences going green
Economic Development Drivers	<ul style="list-style-type: none"> • Access to inputs and supporting infrastructure • Forward-thinking policy making at local, state, and federal levels • Willingness of existing utilities to partner with renewable energy companies • Pursuit of alternative energy investors and businesses
Locational Requirements	<ul style="list-style-type: none"> • Access to energy sources • Availability of incentives • Supportive regulatory and public policy environment
Key Opportunities	<ul style="list-style-type: none"> • Worldwide market for biofuels • Offshore wind turbine design/wind energy consulting services, small wind turbine design, energy storage systems • On-grid solar applications, consumer and industrial PV markets, non-silicon-based thin-film PV technologies • Portable personal electronics, portable power systems, small off-road transportation

The renewable energy sector includes industries engaged in a variety of activities from producing biomass energy to manufacturing fuel cells, wind turbines, and solar cells. Central Upstate New York has a relatively modest number of jobs in the renewable energy sector with just 378 in 2005. The number of establishments, however, increased 28 percent between 2001 and 2005, suggesting that new firms are being created. The region has a high concentration of renewable power generation jobs and its job totals exceed that of the comparison regions; however, total employment in the renewable power generation sector is just over 400 jobs, the majority of which are in hydroelectric power generation, a sector that lost almost half its total employment between 2001 and 2005. Opportunities within the various subsectors of renewable energy are discussed below.

Biomass

Among the various sources of renewable energy, biomass—plant matter and other biodegradable materials—is receiving a great deal of attention as a source of energy. Conversion of biomass into “biofuels” such as ethanol, biodiesel, biobutanol, and biogas is a major focal point of today’s economy due to the potential to relieve dependence on foreign oil and to reduce greenhouse gas emissions.

The ethanol and biodiesel markets are growing rapidly—ethanol at roughly 15 percent and biodiesel at 85 percent in recent years—and continued rapid growth of these markets both worldwide and in the United States is anticipated.

A number of projects to produce energy from biomass are underway in Central Upstate New York, including the following:

- **Northeast Biofuels** is developing an ethanol production plant at the site of the former Miller Brewing Company in Fulton NY. The plant will initially use corn as its feedstock but hopes to be able to produce cellulosic ethanol in the future. This facility will be the first ethanol production plant in New York State and in New England.
- **Catalyst Renewables Corporation** is working with the State University of New York College of Environmental Science and Forestry (SUNY-ESF) to develop a pilot cellulosic ethanol plant in Lyonsdale NY.
- **SUNY–Morrisville** is developing a **green biofuel blending facility** that will convert soy to biodiesel.
- **ND Fusion** is a small company in Potsdam NY that uses process intensification to provide green processing of chemicals, pharmaceuticals, and alternative energy.
- **ZeroPoint Clean Tech, Inc.**, also in Potsdam, is a renewable energy company that has developed a highly efficient gasification process for converting biomass into renewable gas, electricity, or liquid fuels.

Clearly, Central Upstate New York has university expertise in biomass energy and private sector firms that have been created to exploit this technology. At the moment, however, emerging biomass energy firms are concentrated in California and Massachusetts; no leading biomass energy firms were identified in New York.

Wind Energy

The market for and production of wind power are experiencing rapid growth both nationally and in the Central Upstate New York region. Technological advances along with government investment incentives and the desire to use sustainable, green energy sources are leading to rapid installation of wind turbines. Wind power can be an effective driver of economic development. Wind farms boost the local tax base, provide direct benefits to local farmers and landowners, and create jobs in the production supply chain for wind turbines and related goods.

Companies in Europe, Germany in particular, dominate the wind energy market; but, the United States has a number of emerging companies in the wind energy sector focused primarily on developing new types of wind turbines. Central Upstate New York is home to one such company, Vento Tek, which is developing “smart blades,” devices that control the flow of air around blades. Vento Tek is a spin-off of Clarkson University. Clarkson researchers are working with Warner Energy to develop more efficient, small wind turbines. Central Upstate New York has expertise in sensors, engineering, and materials that position it to develop technology to improve wind energy production. The region has several wind farms operating or under development.

Solar Energy

Electricity generation from solar energy has increased rapidly, growing annually by an average of approximately 20 percent for the past decade. The solar photovoltaic (PV) industry is one of the world’s fastest growing industries with a growth rate of approximately 40 percent in recent years. Solar PV capacity is concentrated in Germany, Japan, and the United States. In Germany and Japan, generous government subsidies have stimulated demand spurring most of this development. In the United States, a few states—primarily California—have passed major solar initiatives resulting in a broad range of installed projects. Because of its chip industry, California is the ideal setting for the development of new materials and technologies for solar cells. Not surprisingly, California is home to a majority of the emerging solar firms identified in this analysis.

The State of New York and Central Upstate New York do not have an established solar industry. Central Upstate New York’s materials expertise could be applied to the development of materials for solar cells, and the Center for Future Energy at Rensselaer Polytechnic Institute (RPI) includes a focus on high-end III-V high-efficiency cells and thermal solar. If incentives were provided to promote the use of solar energy, the increased demand that would result could be used to attract or encourage the creation of companies to meet that demand.

Fuel Cells, Including Portable/Micro-Fuel Cells

Global demand for portable electronic devices is driving growth of the micro-fuel cell (MFC) sector. MFCs have the potential to replace lithium ion batteries as an energy source providing up to 10 times the energy of existing battery technology. The low emissions and greater efficiency to be gained with fuel cells are preferable to recharging batteries using electrical power supplies. The global market for fuel cells is expanding rapidly. The market for micro-fuel cells is estimated at \$12 million in 2006 and projected to reach \$112 million by 2011 (Innovative Research and Products).¹

New York has a strong academic and industry base in fuel cells. On the university side, Central Upstate New York is home to the following:

¹ Key sources used in the analysis of each of the four major industries in the E&ES market are listed at the end of this report and in Appendix A.

- The **Cornell Fuel Cell Institute (CFCI)**, a research center with world-class expertise in materials science that focuses on overcoming challenges to commercial fuel cell production rooted in fundamental materials limitations. CFCI faculty members collaborate with leading commercial fuel cell companies, such as Ford, GM, Sumitomo Finance, Primet, and UTC Fuel Cells; and a number of small start-up companies have been created to commercialize technology developed by CFCI researchers.
- **Clarkson University’s Center for Advanced Materials Processing**, which develops innovations in advanced materials processing in collaboration with industry and also has a focus on fuel cells.
- **Alfred University’s Center for Advanced Ceramic Technology**, which conducts research on the use of ceramic materials in fuel cells.

The region is also home to a number of small start-up fuel cell companies. It must be recognized, however, that only a small number of leading-edge companies actually have products on the market (one of which is Albany-based MTI MicroFuel Cells) and that most emerging companies are still in the R&D, testing, and prototype development stage. Central Upstate New York clearly has assets that can be used to attract companies to the region and to grow companies around technology developed at the region’s research institutions; but, this sector will likely take some time to develop.

The green building materials market is underdeveloped in Central Upstate New York; but, this could change with projects underway at Cornell, the CoE, and Destiny. Demand for green building products and sustainable design is being driven largely by consumer preferences and the decline in the cost differential between green and traditional products (Table ES-4). Advocacy groups at the national, state, and local levels, such as the U.S. Green Building Council that promotes LEED® certification², have also played an important role in building support for green development.

Multiple solar panel manufacturers located in the Chicago area after the City of Chicago established a 25 percent renewable energy usage goal.

The demand for green building products and practices offers opportunities for existing companies to develop new product offerings in areas such as green furniture, cabinetry, and fixtures or to make products from composites that incorporate recycled material. All else being equal, green building product companies gravitate toward regions that exhibit potential for strong local demand for green products. This potential can be exhibited through income characteristics (e.g., more

affluent consumers), coordinated efforts toward renewing the housing stock, or significant planned developments that will create demand. Additionally, a strong driver

² LEED (Leadership in Energy and Environmental Design) certification is a recognized standard for measuring building sustainability. The LEED green building rating system is designed to promote design and construction practices that increase profitability while reducing negative environmental impacts of buildings and improving occupant health and well-being.

for locational decisions for “footloose” green building product companies (i.e., those not tied to a regional asset) is to be located where the demand for building products is most robust. Historically, these are areas of the country experiencing significant population growth. They also tend to be areas of the country with a citizenry that is committed to sustainability.

Table ES-4: Key Drivers of Green Buildings/Sustainable Design

Green Buildings/Sustainable Design: Key Drivers	
Market Trends and Drivers	<ul style="list-style-type: none"> • Commercial and consumer interest in green buildings • Decline in cost differential for green buildings • Adoption and implementation of LEED standards
Economic Development Drivers	<ul style="list-style-type: none"> • Advocacy and education by nonprofit organizations • Customer demand • Development of standards
Locational Requirements	<ul style="list-style-type: none"> • Strong local demand for green building materials, products, and components • Easy access to product inputs • Buy-in from local designers, architects, builders, etc. • Green-friendly location • Access to research, testing, and certification capabilities • LEED-based tax incentives
Key Market Opportunities	<ul style="list-style-type: none"> • Offers opportunity for existing companies to develop new product offerings • Wood plastic composites that incorporate recycled materials is a fast-growing market opportunity • Federal, state, and local legislation and policy have created strong demand for high-performance roofing • Untapped market for green roofs that incorporate vegetation • Rehabilitation of older buildings using green building practices • Opportunities to develop green furniture, cabinetry, and fixtures

A number of initiatives are underway in Central Upstate New York that could drive demand for green building products and sustainable design. Cornell University, SU and SUNY-ESF are implementing campus-wide sustainability initiatives; the Syracuse CoE is being built to LEED standards; the City of Syracuse has adopted LEED standards; and the Destiny project, which involves a significant expansion of Carousel Mall, is being developed with green building products and practices and using renewable energy sources. These projects will create demand for green products; but, they can also be used to showcase green and sustainable development and encourage greater use of green products throughout the region.

The region also has research and education strengths in the green products and sustainable design area. These include the following:

- SUNY-ESF’s Construction Management and Wood Products Engineering Program, which includes a focus on green materials
- SU’s Building, Energy and Environmental systems Lab
- Cornell’s Center for Materials Research, which includes a focus on composites and chemistry, biodegradable and renewable materials. Several start-up companies have been formed to commercialize technology developed at the Center.

Central Upstate New York has slightly more than 2,500 workers employed in the green building and sustainable design sector, although this sector lost nearly 16 percent of its employment base between 2001 and 2005. This decline generally

reflects weakness in the overall U.S. manufacturing sector in which these green building activities are included. While the national green building sector contracted, two of the comparison communities, Sacramento, CA and Fort Collins, CO added jobs in this sector since 2001.

Water quality and water resources is a growing market that could be tapped by the region’s water resources consulting and engineering firms; but, at present, there is insufficient alignment between the region’s research base and its industry base. Water treatment, long considered a mature industry in the United States and other developed countries, is experiencing a revival due to increasing global demand for freshwater, depletion of groundwater resources, competing demands by users of freshwater, concerns with regard to the security of public water systems, and new regulations. All of these factors are driving the water quality and water resources market (Table ES-5).

Table ES-5: Key Drivers of Water Quality and Water Resource Sector

Water Quality and Water Resources: Key Drivers	
Market Trends and Drivers	<ul style="list-style-type: none"> • Increasing global demand for freshwater • Competing demands for freshwater for agriculture, power, and industry • Depletion of groundwater resources • Concern with regard to the management of water resources • Aging drinking and wastewater infrastructure • Concerns regarding security of public water systems
Economic Development Drivers	<ul style="list-style-type: none"> • Proximity to strong programs in electrical engineering, environmental engineering, and materials science • Access to suitable experimental settings
Locational Requirements	<ul style="list-style-type: none"> • Local demand for water testing and related services • Local demand for supersterile water or water treatment technologies to meet needs of specific industries, such as pharmaceutical companies or computer chip manufacturers
Key Opportunities	<ul style="list-style-type: none"> • Integrated approaches to wastewater treatment will be a growth area • Need to meet freshwater needs in California, Florida, and Texas • International demand for freshwater • Need to mitigate impact of household chemicals and drugs in water supply • Government policies requiring new detection and monitoring systems

The Central Upstate New York region has developed strengths in technologies related to water purification, sensing, and monitoring, and consulting services due to the scope of the Onondaga Lake restoration project. As a result, the region’s employment is 88 percent more concentrated in water quality and resources than is the nation. More than 1,500 people were employed in water quality and resources in 2005 in Central Upstate New York, although this employment level is down 10 percent from 2001.

Companies involved in water filtration, purification, desalination, and other treatment technologies tend to grow in areas in need of additional water supply. The largest markets for such systems in the United States include Florida, California, and Texas. Not surprisingly, California and Florida are home to many emerging water treatment firms. California also leads in the emerging water sensor and analysis/monitoring instrumentation market.

Water quality and water resource firms also are likely to grow in proximity to research institutions with a focus in this area. While Central Upstate New York has research institutions with strengths in understanding, assessing, and managing watersheds—including SUNY-ESF, which has a focus on water quality and water resource planning; the Upstate Freshwater Institute, which focuses on understanding how ecosystems work; the Syracuse Center of Excellence, which focuses on sensors and monitoring watersheds; and the Center for Integrated Watershed Studies at SUNY Binghamton—the R&D being conducted on watersheds and water resources has not translated into creating companies and insufficient alignment exists between areas of research and the industry base.

Assessing Central Upstate New York's Competitive Position

Central Upstate New York is not the only region trying to grow its E&ES industry cluster. Multiple regions across the country are branding themselves as locations for green businesses and implementing policies and actions to promote the use of green building practices, renewable energy, and practices that promote environmental quality. Battelle conducted an analysis to assess the competitiveness of Central Upstate New York's environmental and energy sector and to identify policies and programs that are being used to promote this sector in other regions of the country.

Competitor Regions

- ▶ Eugene, OR
- ▶ Fort Collins, CO
- ▶ Grand Rapids, MI
- ▶ Pittsburgh, PA
- ▶ Sacramento, CA

Central Upstate New York was compared with the following five regions: Eugene, OR; Fort Collins, CO; Grand Rapids, MI; Pittsburgh, PA; and Sacramento, CA.

Key Findings

- For the most part, the initiatives to grow the E&ES sector are being driven by a citizenry that values sustainability and sees the industries that make up this sector as compatible with maintaining the region's quality of life.
- Most of these communities have adopted public policies aimed at promoting green practices and businesses. These include setting goals for the use of renewable energy, adopting green building practices for municipal buildings, committing to purchase sustainable products and technologies, and providing incentives for businesses that use sustainable practices.
- Communities are trying to build their E&ES industry sectors by (1) encouraging the growth of start-up companies, (2) helping to create a market for green products by conducting education and outreach activities, and (3) encouraging existing companies to offer new green products or enter new markets. Attracting E&ES companies from outside the region is much less common; although, in Sacramento, some international firms are opening operations to meet the demand for renewable energy, which has developed as a result of state policy actions.

- The competitor communities have put their money where their mouth is, so to speak. They can show, for example, that they have a significant percentage of buildings constructed to green performance standards.
- In some instances, including in Fort Collins and Pittsburgh, the presence of university centers focused on specific aspects of the E&ES sector is fostering the growth of E&ES businesses. Colorado State University is in fact driving the region's Clean Energy Cluster. In other regions, such as Sacramento, the region has not been able to engage the university in its efforts to grow this industry sector.
- The most common tool used to help grow the E&ES industry is to promote networking and the formation of cluster initiatives.
- The focus on promoting the growth of green industry sectors is at an early stage of development, and it will take time to see where the industry takes hold and what types of incentives are effective in accelerating its growth.

Growing Central Upstate New York's E&ES Sector

Table ES-6 identifies a number of approaches that could be undertaken to grow Central Upstate New York's E&ES industry sector and suggests actions that have been taken elsewhere that might apply in this region.

Table ES-6: Objectives and Possible Actions to Grow E&ES Industry Sector and Examples From Other Regions

Objective	Possible Actions	Examples of Initiatives in Other Regions
Stimulate the market for green products and practices	Adopt green procurement standards	In 2006, Columbus City Council changed City's procurement code to include a preference for environmentally preferable bidders, vendors, and contractors
	Adopt renewable energy goals	Grand Rapids committed to buying 20% of power from renewable sources by 2008 Eugene, OR plans to purchase 25% wind power for all existing general fund buildings
	Commit to building green buildings	City of Columbus is requiring that all new public buildings be developed to LEED certification
	Offer tax incentives to individuals and businesses that employ green technologies	City of Columbus is targeting its tax incentives to green businesses Portland OR offers municipal incentives for installation of solar power Austin offers rebates for installation of solar energy
	Educate the public on the value of using renewable energy and green building products and practices	Rochester's Greenprint proposes a public relations and education campaign, including public service announcements to increase citizen awareness about green products and practices
	Create a program to certify green businesses	San Francisco's Green Business Program promotes, recognizes, and supports firms that operate in an environmentally conscientious way
Raise profile of E&ES industry cluster in Central Upstate New York	Organize a media campaign featuring articles, op eds, and columns on the region's green companies	Northern Colorado Clean Energy Cluster, a network of 350 members with \$1.5 million budget, paid staff, and Web presence, is seeking to brand the region as a center for clean tech
	Continue to attract flagship green events to region, such as 2009 International Conference & Exhibition, "Healthy Buildings." Take advantage of opportunity to showcase companies and activities in region	Pittsburgh's Green Building Alliance is working to position region's building product manufacturers to take advantage of growth in green building products and practices
	Expand number of E&ES firms profiled on Essential Connections Web site	

Table ES-6: Objectives and Possible Actions to Grow E&ES Industry Sector and Examples From Other Regions (Continued)

Objective	Possible Actions	Examples of Initiatives in Other Regions
Provide business development resources to emerging green businesses	Create locations to house both start-up and established E&ES companies to encourage greater networking and partnering	A Green Building Fund has been created within CL Fund, a community development loan fund servicing greater Pittsburgh. GBF will provide loans ranging from \$200,000 to \$400,000 to help developers obtain LEED certification, and Pittsburgh Urban Redevelopment Authority makes low-interest loans for green construction
	Explore option of using Carrier's marketing channels to sell products of emerging IEQ companies	CleanStart in Sacramento provides coaching and mentoring for clean tech companies
	Provide commercialization assistance to start-up and emerging companies	New York City's Environmental Economic Development Assistance unit helps companies identify NYC programs that can support green tech companies
	Expand Emerging Business Competition to include award for Emerging Green Business	
Continue to build region's E&ES research base and link it to industry	Seek additional sources of operating funds and R&D funding that can be directed to industry needs for CoE	Colorado State University has grown its clean energy cluster to include 80 faculty who have attracted \$9.2 million in clean tech R&D funding
	Continue and possibly expand Grants for Growth program	

Conclusion

Central Upstate New York clearly has an opportunity to promote the growth of its E&ES industry sector by expanding and marketing the region's green and sustainable assets. To do so, the region's public and private organizations need to commit to practicing sustainability and encouraging the adoption of green products and practices by the community at large.

The market for E&ES is growing both nationally and globally. Central Upstate New York is a leader in IEQ and is thus poised to grow this sector locally. The Syracuse CoE can be an important contributor, but only if increased and sustained funding is obtained to support the Center's operations. Funds have been provided for equipment through the STAR program and for a state-of-the-art building through the Centers of Excellence program; but, relatively limited funds are available to hire technicians and graduate students to operate equipment or to support industry-university research collaborations.

Central Upstate New York also has opportunities in the renewable energy sector. A number of pilot projects are underway that, if commercially successful, will pave the way for the region to become a leader in the production of energy from biomass sources, including forests and agricultural crops. The Central Upstate New York region is a leader in fuel cell development with world-class expertise in both

academia and industry. The CFCI already is both attracting firms and spinning out companies based on CFCI technologies. Central Upstate New York should investigate ways to work collaboratively with Albany and Rochester, which have considerable assets in fuel cells, to support the development of this sector.

Growing the green buildings/sustainable design, solar energy, and wind energy sectors will require stimulating demand within the region and encouraging existing companies to introduce new products and services in response to this demand. Lastly, Central Upstate New York should look for ways in which to build upon the technologies developed to address IEQ, in the areas of sensors and controls, for example, and identify opportunities to apply those technologies to energy systems and water quality monitoring.

The green business sector is at an early stage of development, and most efforts to encourage it in a particular region are also in early development, making it difficult to determine best practices. Central Upstate New York can realize the opportunity to grow this sector if the region's public and private sector leaders and citizenry commit to sustainability and undertake a long-term collaborative initiative to build New York's "Creative Core" around green technologies and renewable energy.

