GREEN NYC2025

Opportunities in Cleantech's Digital Evolution

NYCEDC
Center for Economic Transformation

GREEN NYC 2025 — OPPORTUNITIES IN CLEANTECH'S DIGITAL EVOLUTION

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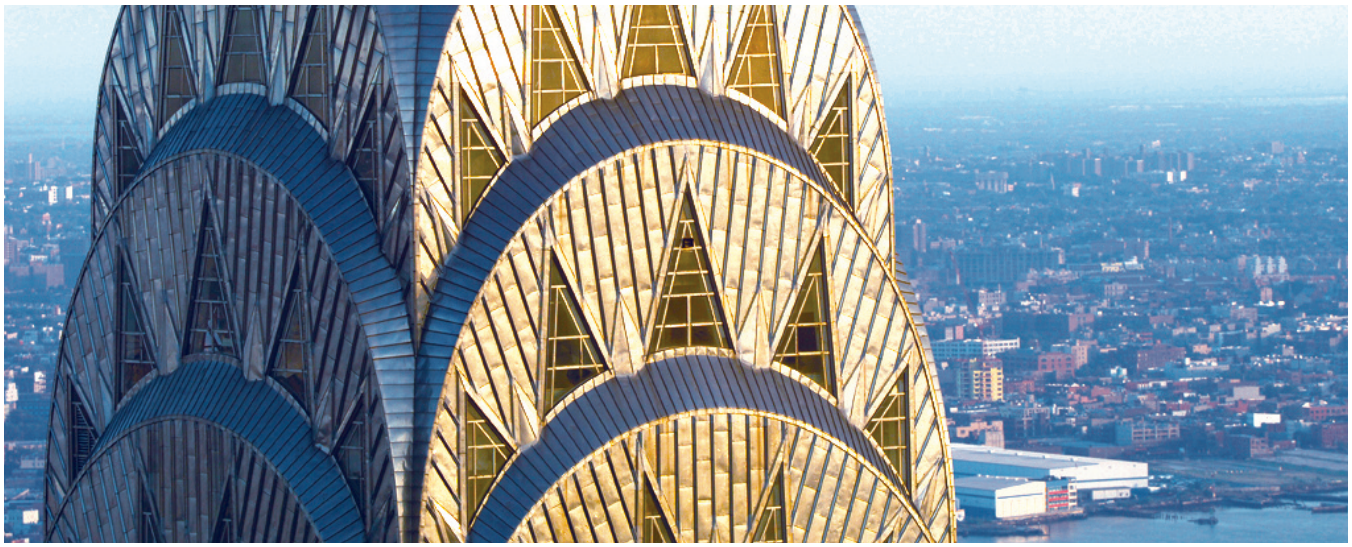

LETTER FROM THE PRESIDENT & CEO OF NYCEDC

New York City has maintained its competitive edge over the decades by adapting to overcome challenges. For instance, under Mayor Michael R. Bloomberg's leadership, this Administration has taken bold steps to strengthen the city's position as a world leader in industries such as finance, media and technology. Because a strong economy and a sustainable future go hand in hand, we are working to foster economic growth while also protecting our city's physical environment by setting the standard for sustainable and livable cities.

Mayor Bloomberg's landmark sustainability blueprint, *PlaNYC*, launched in 2007, has set New York City on the path towards a more sustainable and prosperous future. Building upon this foundation, the New York City Economic Development Corporation (NYCEDC) launched Green NYC 2025 in 2011 in order to identify opportunities in the rapidly emerging green sector while developing strategies to overcome obstacles to future growth. Our in-depth examination of the green sector, outlined in this report, draws upon the insights and recommendations of nearly 80 industry stakeholders and experts. Through this analysis, we identified promising industry segments, such as digitally-enabled cleantech or "Green 2.0," and developed programs to cultivate a robust green industry cluster in New York City. These programs include, for example, a Clean Technology Entrepreneur Center, an incubator and multi-use space slated to open this fall that will support startups focused on solving urban challenges related to sustainability, energy and resilience.

Recent climate-related events such as Hurricane Sandy have only further demonstrated that we must make our city more sustainable and resilient in order to secure our future prosperity. I am confident that the strategies outlined in the Green NYC 2025 Report will help us attract the green industries of the future, strengthening our economy while helping solve the great sustainability challenges of the 21st Century.

Kyle E. Kimball
President & CEO
New York City Economic Development Corporation

EXECUTIVE SUMMARY

Green and clean technologies have long promised to drive economic growth while addressing sustainability challenges, but progress to date has been unevenly distributed. Green NYC 2025, launched by NYCEDC in 2011, set out to identify and create opportunities to fulfill this promise in New York City over the coming decade.

Already the largest end-use market in the United States, New York City is well positioned to become the world's leading urban green and cleantech market. With over one million buildings, eight million residents, $15 billion in annual energy spending and forward-thinking sustainability policies, the city has a growing demand for energy efficiency and other cleantech products and services. Despite this large and growing local demand, New York City has not yet played a major role in supplying this industry. At stake is a global market that is already measured in trillions of dollars and growing; estimates show the total global cleantech economic opportunity growing from $2.7 trillion in 2011 to as much as $5.9 trillion by 2025.

Seeking to maximize New York City's chances of capturing a larger share of this market, NYCEDC, working with knowledge partner A.T. Kearney, engaged with industry leaders through interviews, workshops and panel discussions to determine:

- why New York City has lagged other regions in supplying this global market;
- what will be the highest-potential opportunities for New York City over the next decade; and
- where targeted actions could help accelerate growth locally.

Our study concludes that New York City's current relative position is primarily due to fundamental issues regarding cleantech itself. Over the past two decades, traditional cleantech activity has focused on capital-intensive, engineering and manufacturing dominated products, such as large-scale power generation. These characteristics are not well aligned with New York City's inherent strengths. Given higher-than-average real estate and labor costs, New York City has had difficulty competing with low-cost regions, domestically and internationally.

Looking ahead, however, technology and market trends are creating new opportunities for digitally-enabled cleantech innovation, using data and information technology to address environmental, energy and resource constraints. Leveraging the city's strengths in software, finance, analytics and media, New York City has the ability to become a leader in this emerging segment of the cleantech market, called "Green 2.0." Indeed, New York City is already home to over 40 startups in this new and growing segment.

Despite this progress, companies seeking to serve these markets face unique challenges, including:

- operating in highly-regulated markets, such as electricity;
- persuading risk-averse decision-makers, such as utilities; and
- selling to concentrated buyers, such as large corporations.

NYCEDC recognizes the need to address these issues to accelerate company formation and growth. While current incubators and other entrepreneurship programs provide generalist support, entrepreneurs in New York City's emerging Green 2.0 market have unmet needs, including:

- help navigating regulations and funding;
- dedicated space for testing and demonstration; and
- facilitation of connections to customers, investors and partners.

Supporting early-stage companies from formation to growth will create local jobs and economic opportunity while providing solutions to global sustainability problems. In early 2013, NYCEDC announced plans to create an integrated Clean Technology Entrepreneur Center, a multi-use space to serve as the local anchor and centerpiece for the sector by supporting early-stage companies and showcasing innovation. This Center will combine business incubation, product demonstration and educational components designed to support innovation-driven startups focused in energy efficiency, sustainability and other urban challenges. The Center will support the formation and growth of local companies, creating over 9,000 new jobs through 2025. Building on an already strong foundation, initiatives such as the Center are positioning New York City to be a leader in the green industries of 2025 and beyond.

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NEW YORK CITY has become home to an emerging, innovation-driven segment of the green industry, one that uses digitally-enabled solutions to address environmental, energy and resource constraints. This next evolution of the green industry, which we call "Green 2.0," strongly aligns with New York City's assets and strengths in software, finance, data and analytics. As the market for Green 2.0 grows, it brings an opportunity for New York City to lead the future of green and cleantech innovation.

INTRODUCTION

Twenty-first century cities face challenges in ensuring both long-term economic prosperity and environmental sustainability. Green and clean technologies hold out the promise for turning these challenges into opportunities, driving economic growth while using resources more efficiently. Nowhere is this potential more apparent than in New York City. By any measure, the city is the largest urban market in the United States, with over eight million residents, 50 million annual visitors and approximately one million buildings. With annual energy spending of $15 billion, New York City's demand for and cost of energy are the highest in the continental U.S. Furthermore, most New Yorkers live and work in aging buildings, often supported by outdated infrastructure. These conditions make New York City an ideal market for products and services that enable more efficient consumption of energy and other resources. The growth of this market, enabled by the City's sustainability policies, has laid the foundation for increased clean technology deployment.

New York City has emerged as a leader in areas such as energy efficiency and green buildings, ranking first in the nation in gross square footage of Leadership in Energy & Environmental Design (LEED) registered projects. Similarly, solar and other forms of renewable energy have grown rapidly. From 2007 through 2012, solar energy capacity expanded by 1,400% within New York City, adding over $116 million to the local economy.[1] By 2030, New York City will need an additional 7,300 megawatts of electrical capacity, equivalent to approximately seven typical coal-fired power plants. Rather than relying on such traditional energy sources, however, New York City plans to meet more than half of this new demand through a combination of energy efficiency, distributed generation and renewable energy.[2]

Deploying these and other technologies locally has already brought economic and environmental benefits to New York City, but the city has largely been unable to serve as home to the companies that create these technologies. This study, Green NYC 2025, seeks to understand New York City's challenges and opportunities by identifying strategies to go beyond serving as an end-use market, and support the growth of local companies able to serve global cleantech markets.

Understanding why New York City has lagged behind other regions in supplying cleantech products and services is the first step in measuring and increasing the city's competitiveness. Similarly, identifying the highest-potential opportunities will ensure that resources are directed appropriately. Finally, developing programs that address challenges facing this emerging sector will accelerate growth locally, ultimately creating a variety of high-skilled jobs and securing lasting competitive advantage for New York City.

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1 Sustainable CUNY, 2013

2 PlaNYC, 2007

Hearst Building


Bank of America Tower

NEW YORK CITY AND URBAN SUSTAINABILITY

"Green" may not be the first word associated with New York City, but its physical characteristics and the resulting lifestyles of its residents make the city an inherently sustainable place to live, work and play. Most New Yorkers choose public transportation over private cars, and more often live in small apartments than in sprawling, suburban homes. In 2011, the average New Yorker used less than half as much energy as the U.S. per capita average, including electricity and fuel for transportation and heating.[3] The city is also becoming more efficient: energy consumption declined by 7.9% from 2005 to 2011, while greenhouse gas emissions fell by 16.1% over the same period. As a result, among global cities with similar economies, the U.S.'s largest city has one of the lowest carbon footprints per capita.[4]

Despite these strong fundamentals, the city is in need of solutions to various long-term challenges, particularly the efficiency of its building stock, the reliability of its infrastructure and the high cost of energy. These challenges are significant, but they bring with them market opportunities. Replacing decades-old infrastructure allows for innovative new technologies to be adopted, while high energy costs cause energy efficiency investments to yield deeper savings and faster payback periods.

New York City is home to approximately one million buildings, accounting for 77% of the city's total energy use,[5] 94% of its electricity use and 75% of total greenhouse gas emissions.[6] With the highest energy costs in the continental U.S., New Yorkers collectively spend $15 billion on energy each year. While new construction in New York City is generally very efficient thanks to strict building codes, 85% of the buildings that existed in 2007 will remain in use by 2030.[7] Thus, energy efficiency retrofits and continual investments in today's building stock are crucial to mitigate these high costs.

Since 2007, New York City has been addressing energy efficiency and other environmental challenges through *PlaNYC*, the city's comprehensive long-term sustainability strategy. *PlaNYC* includes the *Greener, Greater Buildings Plan*, the most far-reaching energy efficiency legislation in the country, which promotes efficiency through stronger energy codes, while mandating benchmarking, energy audits, retro-commissioning,

[3] NYCEDC Economic Snapshot: July 2013
[4] *PlaNYC* Inventory of New York City Greenhouse Gas Emissions: December 2012
[5] *PlaNYC* New York City Local Law 84 Benchmarking Report: August 2012
[6] *PlaNYC*, 2011
[7] *PlaNYC*, 2011

lighting upgrades and sub-metering in the city's largest buildings. New York was also the first municipality to adopt property tax abatements to encourage building owners to install solar energy systems and green roofs. Public-private partnerships, such as the New York City Energy Efficiency Corporation, are pioneering new mechanisms and business models for financing energy efficiency retrofits.

As revealed in the aftermath of Hurricane Sandy in 2012, resilience to natural disasters is also critical to sustainability. Facing an uncertain climatic future, the city will need to adopt innovative solutions to minimize the damage caused by future storms. In June 2013, New York City built upon *PlaNYC* by unveiling *A Stronger, More Resilient New York*, proposing approximately $19.5 billion of investments including strengthening energy and transportation networks, protecting buildings from flooding and creating shoreline buffers.[8]

As these trends and policies illustrate, New York City is both a major cleantech market in its own right, as well as a barometer for other large global cities' needs in addressing sustainability and resiliency issues. From an economic development perspective, however, the question remains whether the city's demand for green products and services can lead to a full-fledged industry, capable of serving both local and global markets.

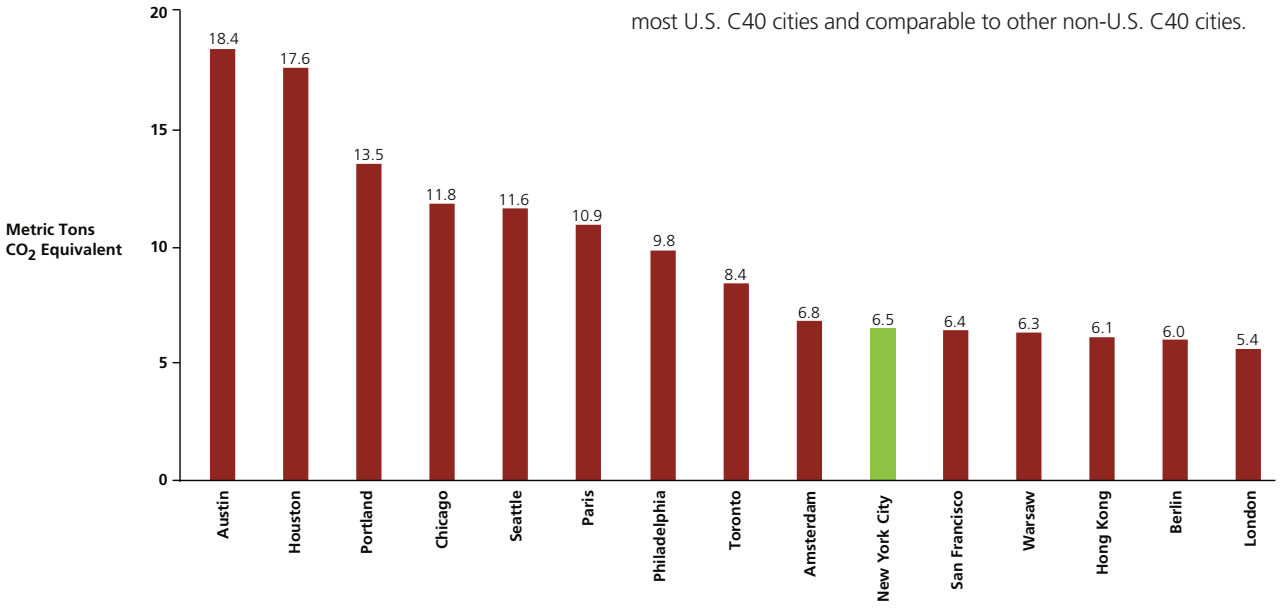
DEFINING GREEN

Products and services that benefit the environment or conserve natural resources, including:

- Renewable energy
- Energy efficiency
- Pollution and waste reduction and removal
- Natural resources conservation
- Environmental compliance, education and training and public awareness

Figure 1: Per Capita Greenhouse Gas Emissions for C40 Cities

New York City's Greenhouse Gas emissions per capita are lower than most U.S. C40 cities and comparable to other non-U.S. C40 cities.



Source: Inventory of New York City Greenhouse Gas Emissions, December 2012

[8] New York City Mayor's Office of Long-Term Planning and Sustainability, 2013

NEW YORK CITY'S POSITION IN THE GREEN AND TECHNOLOGY SECTORS

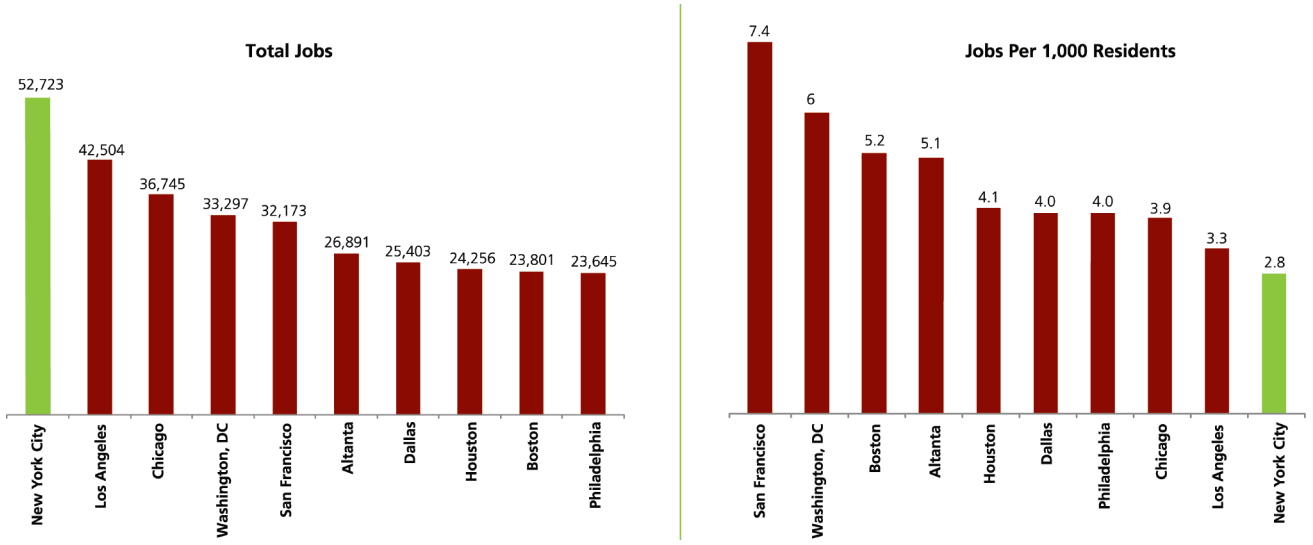
New York City's economy has always been dynamic. Once centered on agriculture and trade, the city is now a global hub for financial services, media, education, fashion, retail and tourism. International industry leaders establish their headquarters here to take advantage of the diverse and deep pool of human capital that the city continues to attract. The green industry, comprised of rapidly evolving technologies, might seem to be the ideal fit for New York City. Indeed, a 2007 report by the New York City Investment Fund identified cleantech as a potential "new engine of economic growth," noting both assets and challenges for the then-nascent industry.[9]

Six years later, the results are decidedly mixed. The growth of New York City's green sector thus far has been subject to both industry-wide and local constraints. At the industry level, green businesses across the country have faced similar challenges in recent years. In part due to a reliance on subsidies and mandates, many businesses' fortunes have risen or fallen along with the level of political support. From business models predicated on the emergence of a carbon "cap-and-trade" system, to those reliant on being the lowest-cost producer of solar cells, many high-flying firms fell to earth over the past few years. At the same time, venture capitalists and other investors have found the capital intensive needs of cleantech challenging, reducing their commitments to the sector. In the first quarter of 2013, venture capital funding for cleantech hit its lowest point in four years, a 61% decline compared to the first quarter of 2012. In addition, average deal size was down by 48%, showing that investors were favoring smaller, generally more capital-efficient businesses.[10]

Looking at the green sector more broadly, New York City is a leader in employment in absolute terms, with over 50,000 green jobs in the metropolitan area, the highest in the nation.[11] According to the New York State Department of Labor, over three-quarters of green jobs employers expect to either maintain or expand their number of green jobs,[12] while *PlaNYC*'s initiatives are expected to add 7,666 direct new jobs annually through 2030.[13] Viewed in per capita terms, however, New York City ranks last among the top ten cities for green jobs.

[9] New York City Investment Fund, 2007
[10] PricewaterhouseCoopers, 2013
[11] Brookings Institution, 2011
[12] NYS Department of Labor: New York State Green Jobs Survey, Report for New York City, 2010
[13] Analysis of Job Creation in *PlaNYC*, 2008

Figure 2: Top 10 U.S. Metropolitan Areas for Green Jobs



Source: Brookings Institution, "Sizing the Clean Economy," 2011. Note: 13,344 total jobs were measured in the New York City 5 Boroughs. Totals exclude Conservation, Nuclear Energy, Mass Transit, Remediation, Organic Farming and Waste Collection — all categories out of scope for this study.

In New York City, many of these jobs involve deploying clean technologies such as solar and energy efficiency. However, most of these products are developed and manufactured elsewhere; the city has few companies competing in manufacturing renewable energy or energy efficiency products, the ideal conditions for which are not well aligned to New York's core strengths. Compared to the national average, labor costs in the city are 20% more expensive,[14] while industrial real estate costs are well over twice as high.[15] These cost premiums are particularly problematic at a time when traditional cleantech segments are struggling with increased commoditization and steeply declining margins. Though the city has taken steps to bolster its engineering and technical talent, other regions have historically had a deeper talent pool of experienced hardware engineers, drawing cleantech companies to states such as California and Massachusetts. As such, the innovation-driven jobs producing these products and services have been slow to materialize in New York City.

Company formation and growth also requires capital, and financing local cleantech ventures has been a challenge. New York has yet to receive significant attention from national cleantech investors and federal funding sources. Since 2009, the state has received only 3.4% of the Department of Energy's Advanced Research Projects Agency funding (ARPA-E) and a small fraction of the nation's green venture capital funding, the majority of which was dominated by West Coast companies.[16]

But even as cleantech in New York City has lagged behind other regions, the broader technology industry has rapidly accelerated within New York City. Between 2009 and 2011, high-tech sector employment grew at a cumulative rate of more than 15%. In 2012, 100 New York City technology firms sold for a total price of $8.3 billion, while venture capitalists invested $2 billion into local tech companies.[17] This rapid rise of the technology industry did not start from scratch, but rather built upon New York City's leadership in legacy industries, such as media, demonstrating how quickly the city can take advantage of industry trends when aligned with complementary assets. If the green sector and the technology sector can similarly combine in a way that plays to the city's strengths, the future for cleantech companies in New York City appears bright.

[14] U.S. Department of Labor, Bureau of Labor Statistics, 2011
[15] Real Estate Research Corporation, 2011
[16] CB Insights, 2012
[17] NYCEDC: NYC Tech City, 2013

INTRODUCING GREEN 2.0

As previously noted, despite the strong local market, New York City has yet to play a major role in supplying the global green industry. Investment in green and cleantech has been dominated by capital-intensive, subsidy-dependent and manufacturing-heavy technologies. However, a shift towards less capital-intensive, digitally-enabled technologies is underway, due to the commoditization of first-generation cleantech hardware coupled with the rapid proliferation of digital technologies. This trend is quickly becoming an emerging industry in its own right, well aligned with New York City's existing assets and complementary industries.

This latest evolution — Green 2.0 — brings digital tools and business models to address environmental, energy and resource constraints. Applications include accelerating the adoption of renewable energy by improving customer engagement, using data to optimize energy efficiency measures and enabling resource sharing through social networks, which some have labeled "cleanweb."

Green 2.0 has the power to leverage digital and information technologies to enhance the use of existing clean technologies. For example, the costs of manufacturing photovoltaic panels have dropped significantly over the past decade, even nearing cost-competitiveness with fossil-based energy. As such, non-hardware "soft" costs related to financing, sales, permitting and installation have become a larger portion of the total expense. In applications from analyzing buildings' energy use to charging electric vehicles, software is becoming a critical component for reducing costs, and the proliferation of web and cloud-based platforms have set the stage for this trend to accelerate.

An analogy can be found in the information technology industry. Initially hardware-dominated, profitable technology businesses arose in software and eventually "cloud-based" services as the sector matured. As the industry evolved from "Web 1.0" to "Web 2.0," hardware still mattered, but capital was less of a barrier to entry. No longer did an early-stage company need to spend millions on computer servers to build

Cleanweb Hackathon NYC

an internet business. Instead, they could build on top of commoditized equipment, leasing hardware or paying for resources on a usage basis. Similarly, Green 2.0 is a progression from cleantech hardware to information-enabled software. A solar installation, for example, will always require hardware, but the intelligence to sell, finance, optimize and permit the system can benefit from software innovation. Because they increase the efficiency of capital-intensive products without being capital-intensive themselves, Green 2.0 products and services can yield shorter payback periods, faster returns to investors and less reliance on subsidies.

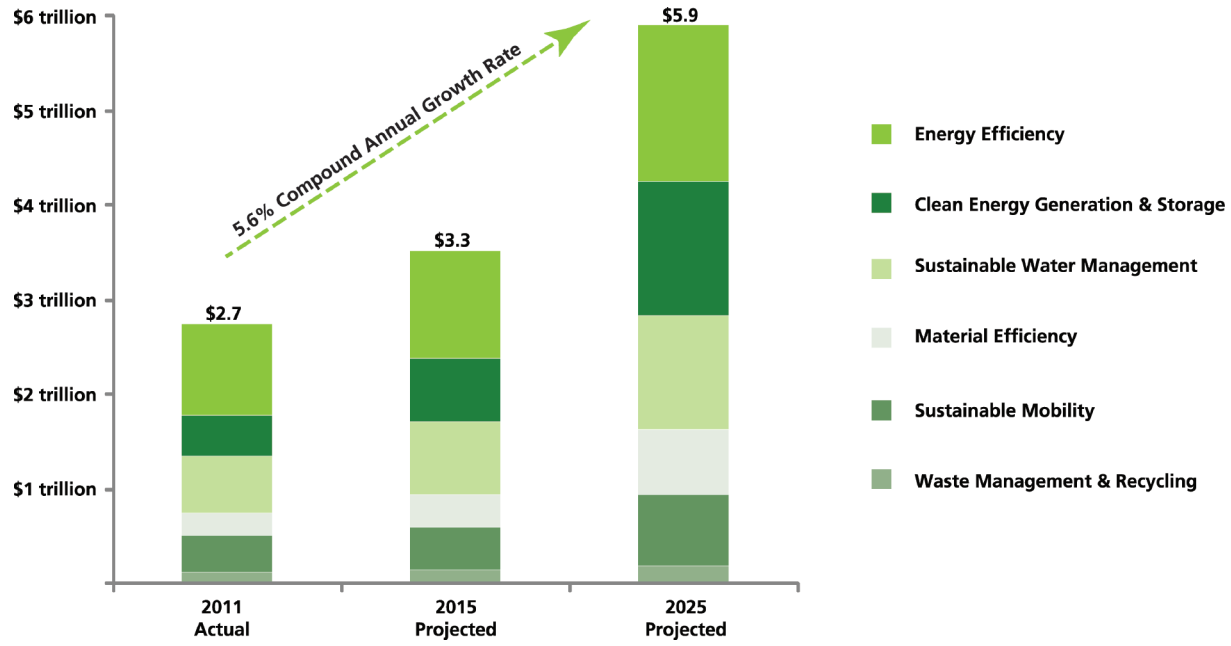
While many capital-intensive "1.0" technologies, from biofuels to wind power, continue to face political and financial headwinds, Green 2.0 has seen rapid growth and increasing investment interest. Looking at cleanweb companies in particular, $1.2 billion had been invested by 2011, representing nearly one quarter of overall cleantech investment deals.[18] The segment received 414 venture capital investments between 2009 and 2012, an increase of 55% during a time in which overall cleantech investment stagnated.[19] As the emerging sector continues to gain momentum and the attention of investors, many regions have started to recognize Green 2.0's potential as an industry "game changer" and job creator, and have made efforts to support and attract company growth.

GREEN 2.0

Digitally-enabled products and services that use information, data and technology to address environmental, energy and resource constraints.

Looking ahead over the next decade, Green 2.0 will be a part of the continued growth of the global market for clean technology products and services. Despite ups and downs with particular technologies or geographies, the industry collectively is expected to grow at 5.6% annually through 2025. Whether enabling more efficient use of resources or accelerating the deployment of hardware, Green 2.0 has a role to play with each of the categories that comprise this $5.9 trillion projected future market, from energy efficiency to sustainable mobility.

Figure 3: Global Market Growth of Cleantech Segments



Source: Roland Berger Strategy Consultants, 2012

[18] The Cleanweb Initiative; The Cleantech Group, 2012

[19] The Cleanweb Initiative; The Cleantech Group, 2012

NEW YORK CITY AND GREEN 2.0

With over 40 startup companies active in the city, entrepreneurs have recognized that New York City is an ideal location to create a new Green 2.0 business. The characteristics of Green 2.0 play directly to the city's existing strengths and assets. New York has long been an industry leader in media and financial services, and now enjoys increasing strength in web, software, analytics and consumer-facing sectors — all necessary elements of Green 2.0. With these complementary industries at their disposal, New York-based companies are able to leverage their services to aid in product development.

The availability of engineers and software developers is also critical for Green 2.0 businesses. *Applied Sciences NYC*, launched by Mayor Bloomberg in December 2010, is an unprecedented initiative to build and expand world-class applied sciences and engineering campuses in New York City. Through programs including a new campus on Roosevelt Island, *Applied Sciences NYC* is expected to more than double the number of full-time graduate engineering students in New York City and generate more than $33 billion in overall nominal economic impact over the next three decades, adding over 48,000 jobs and launching nearly 1,000 spin-off companies. At the secondary school level, the city's programs, such as the Academy for Software Engineering and the Bronx Academy for Software Engineering, will help 4,500 public school students develop critical computer science skills over the next three years, ensuring a long-term pipeline of talent.[20]

In addition to complementary industries and world-class talent, the city's need for solutions to sustainability challenges provides a strong local market for Green 2.0 companies to pilot and scale their businesses. *PlaNYC* and the City's sustainability policies have set the stage for the industry to thrive, increasing renewable energy and energy efficiency deployment. The Solar America Cities Partnership has facilitated the rapid growth of rooftop solar photovoltaic power, the *Greener, Greater Buildings Plan* has mandated stricter energy efficiency standards, and the *Municipal Entrepreneurial Testing System* (METS) provides opportunities to demonstrate the effectiveness of new technologies on City-owned buildings. As the use of clean technology hardware grows across the city, Green 2.0 can provide software, analytics and intelligence to optimize their performance and cost-effectiveness.

For the local activity in the sector, it is clear that New York City's entrepreneurs, stakeholders and policymakers have already acknowledged Green 2.0's potential and importance. The pipeline for the formation of local Green 2.0 companies appears strong, as evidenced by the 2013 NYC BigApps competition, which challenged developers to create innovative software applications using public data. In a dedicated "Cleanweb" track, teams aiming to address issues such as food waste, grid reliability, solar energy adoption and climate change resilience attracted hundreds of participants developing nearly 40 projects, some of which might form the seeds of successful Green 2.0 companies.

GREEN 2.0 ACTIVITY IN NEW YORK CITY

Building on strengths in industries as diverse as IT and media, activity has begun to take hold locally, including:

- **NYC ACRE** (Accelerator for a Clean and Resilient Economy), an incubator in lower Manhattan founded in 2009 by NYU-Poly, with funding from the New York State Research and Development Authority (NYSERDA). Its 14 tenants represent a diverse cross section of Green 2.0, including cleanweb, transportation, real estate, energy efficiency, lighting, finance, policy research, project consulting, utilities, smart grid and energy storage. www.nycacre.com
- **ThinkEco**, whose "smart" electrical sockets enable consumers to monitor and control energy use, including a program with utility Con Edison that has turned thousands of standard window-mounted air conditioners into intelligent, demand response devices. www.thinkeco.com
- **Honest Buildings**, a social networking-style platform that shares data on approximately 1.6 million buildings, covering over 26 billion square feet and allowing owners, tenants and others to make better decisions about building performance and energy. www.honestbuildings.com
- **Cleanweb Hackathons** bring together hundreds of developers, designers, businesspeople and policymakers for competitive events using software and data to create innovative solutions to sustainability and resource challenges. In partnership with the Cleanweb Initiative, New York City has hosted three successful competitions since 2012, with hundreds of participants creating dozens of projects. www.cleanweb.co

[20] NYCEDC: NYC Tech City, 2013

OVERCOMING THE BARRIERS

Despite the opportunity for Green 2.0 in New York City, the industry faces unique barriers that can hinder further growth. The market is complex, with key segments, such as electric utilities, made up of a concentrated group of risk-averse customers. Like all startups, Green 2.0 companies need access to affordable space, mentorship and funding; however, addressing the sector's unique needs will require additional and specifically tailored programs.

First, the energy sector is complex and highly regulated. Prior to commercialization, products must navigate and clear a variety of regulatory hurdles. In New York City, permitting, building codes and utility regulations hinder the speed of renewable energy and other clean technology deployment. As many Green 2.0 products aim to streamline the satisfaction of these requirements, understanding the intricacies of the processes is vital. Moreover, these regulations are dynamic and vary regionally, adding even more need for entrepreneurs to have guidance and gain experience in regulatory issues. Equally important to address are the regulations and complexities surrounding public funding sources. Funding applicants would benefit from seasoned guidance on how to best navigate the processes and gain access to startup funding that is critical to a young company's success.

Secondly, newly-developed products require substantial testing and demonstration in order to attract both funding and customers. In contrast to consumer-driven products such as social networking applications, decision-makers in Green 2.0's target markets are typically risk-averse and reluctant to be early adopters, preferring companies and products with proven track records. Utilities, governments and large corporations ask for reference cases, performance data and test results to address their economic and safety concerns; this environment proves difficult for new companies to find their first customers and build positive references and case studies. To overcome this barrier, Green 2.0 startups need space to test, demonstrate and showcase their products to potential customers and investors.

Finally, the energy efficiency and management sectors are made up of a relatively concentrated set of buyers: utilities, governments, real estate and building management companies. Compared to consumer-facing internet startups, Green 2.0 entrepreneurs must overcome challenges in making connections to potential customers. Guidance from experts in the field facilitating these connections will help new companies gain a foothold in the market and build networks to potential customers and partners.

BARRIERS TO GREEN 2.0 GROWTH

- Highly-regulated energy sector
- Risk averse decision-makers
- Concentrated buyers

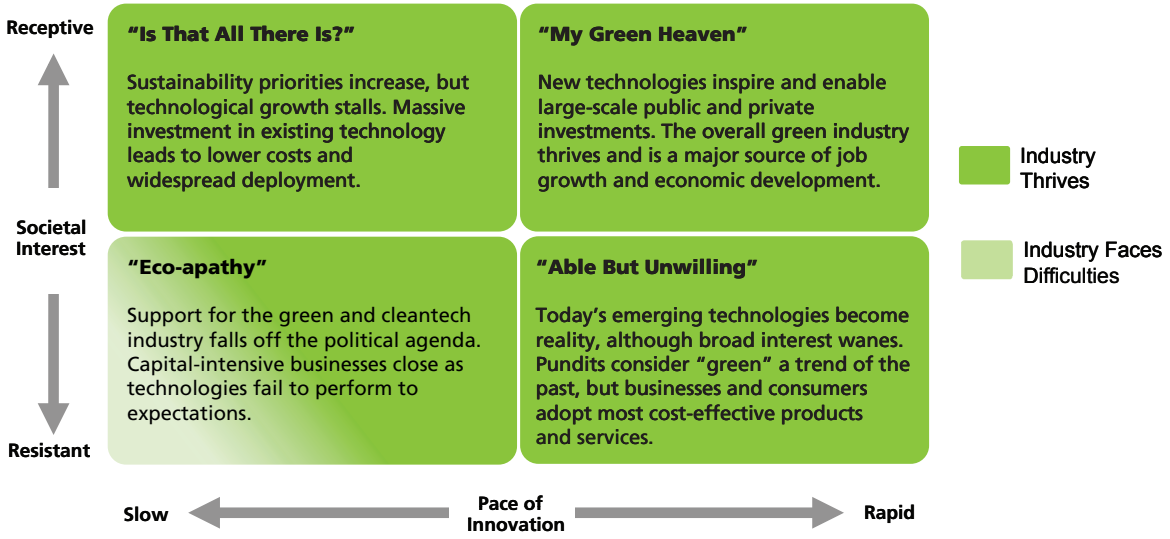
SOLUTIONS TO OVERCOME BARRIERS

- Assistance navigating regulations and funding
- Dedicated space to test and demonstrate
- Facilitate connections to customers

Empire State Building

Figure 4: Green 2.0 — Scenarios for Growth

Before recommending particular actions for a nascent industry, it is important to consider the variety of possible paths for development. While long-term, accurate predictions of future policies and technological changes is impossible, the future of Green 2.0 appears bright under any scenario. The green markets of the future will be most impacted by varying degrees of social interest and the pace of innovation. While capital-intensive Green 1.0-type cleantech needs both high social interest and innovation to thrive, Green 2.0 can withstand more volatile scenarios. Because Green 2.0 more easily satisfies the need for cost savings, it thrives even in scenarios where social interest in sustainability wanes and innovation slows.



RESULTS AND RECOMMENDATIONS

While some parts of the cleantech industry have proven sensitive to external factors, from subsidies to international trade policy, Green 2.0 appears resilient to any future scenario. Given underlying market fundamentals, it will represent a significant commercial opportunity for New York City regardless of future policies. However, this sector is still in its infancy, and its economic value to New York City remains uncertain. Most local companies are in early phases of development, seeking support in refining concepts and bringing their products or services to market.

To maximize the local economic development impact, New York City must take action to remove barriers hindering these businesses' growth. While NYCEDC's business incubator model has been successful in supporting startup companies in other sectors, Green 2.0 companies require solutions tailored to the barriers unique to their markets.

To develop such solutions, NYCEDC and A.T. Kearney conducted extensive research and analysis with key industry stakeholders. Our conclusions are the result of roundtable workshops and interviews with experts both within New York City and from other regions. With feedback from diverse perspectives — cleantech companies, policy makers, utilities, real estate management companies, investors, non-profits and incubator operators — we developed and evaluated potential actions to address gaps in existing public and private sector services supporting the sector.

Following this evaluation, we recommend actions in five distinct areas:

- **Business Incubator and Demonstration Space**
  Appropriate, affordable space is a challenge for many early-stage companies, but particularly acute for Green 2.0 businesses that need flexible space in close proximity to their customers, partners and investors. Existing incubators provide office space and support services, but the market continues to need both additional real estate and new types of space. A waiting list at the NYC ACRE incubator, for example, shows the need for additional capacity. In contrast to a pure internet-

based company, the ability to test and demonstrate new projects is critical to the growth of new Green 2.0 companies, which often combine software and hardware. A space dedicated to demonstration purposes will help startups develop their products and reach potential customers and investors.

- **Cleantech-to-Market Workshops**

  As the market for Green 2.0 is made up of a concentrated group of buyers with complex sales processes, companies need assistance connecting to customers. Workshops led by stakeholders and industry leaders will educate entrepreneurs on how to connect to customers and understand their specific needs, as well as take advantage of federal, state and local funding opportunities. Research suggests that tailored workshops that assist early-stage companies develop their sales channels will improve growth prospects by 20%.

- **Competitions**

  Facilitating competitions for innovative Green 2.0 products and services will provide a real-world test bed. Hosting a regular series of challenges, for both hardware and software products, will incentivize innovation by rewarding effective solutions to New York City-specific energy and resource challenges. Programs such as the NYC BigApps open data competition and Cleanweb Hackathons have proven to be effective in creating innovative solutions, cost-effectively. Supporting future competitions will raise the profile of the sector locally and nationally, while helping to catalyze ideas that might not have otherwise been created.

- **Mentoring**

  Across sectors, mentoring has proven to increase survival rates among startups. Industry experience suggests that each company that completes a mentoring program will create at least five jobs on average. Startups in the cleantech and energy sectors in particular need assistance navigating the complexity of the market, regulations and funding opportunities. While existing mentorship programs provide generalist support, entrepreneurs working in this sector have issues unique to their particular markets, ranging from supply chain concerns to government funding processes. Providing New York's Green 2.0 entrepreneurs with access to mentors knowledgeable in such issues will help them overcome barriers and increase their chances of long-term success.

- **External Marketing and Branding**

  Despite the recent growth of New York City-based Green 2.0 companies, public awareness has lagged that of sectors such as digital media. Interviewees, particularly those from other regions, stated that they had limited visibility into the cleantech startups and other entrepreneurial activity taking place in New York City. Thus, there is an opportunity to promote awareness of the sector, showcasing local success stories to raise the industry's profile among national and international investors, customers and partners. While we are not recommending a new, stand-alone marketing effort, publicity efforts should be considered and embedded in the actions above.

Collectively, these actions are expected to improve the success rate of startups and support new innovation-driven jobs in New York City's green and cleantech markets. Our analysis shows that more than 9,000 new jobs will be created through 2025 by implementing programs designed to support entrepreneurs' needs and address the barriers they face in bringing cleantech products and services to market.

Figure 5: Impacts of Recommended Actions

Activity		Barriers Addressed			Estimated Jobs Created by 2025
		Highly Regulated Energy Sector	Risk-Averse Decision-Makers	Concentrated Buyers	
Business Incubator & Demonstration Space		✓	✓	✓	6,750
Education and Programming	Cleantech-to-Market Workshops	✓		✓	650
	Competitions		✓		950
	Mentoring	✓		✓	550
External Marketing and Branding			✓	✓	450
Total Jobs Projected by 2025					**9,350**

IMPLEMENTATION: CLEAN TECHNOLOGY ENTREPRENEUR CENTER

Rather than creating several standalone programs and services, a single, dedicated space with multiple co-located functions will focus resources for maximum impact. We propose strengthening New York City's cleantech ecosystem with a physical structure as its anchor and centerpiece. A hub for collaboration, this space will support company formation and showcase Green 2.0 innovation, while demonstrating New York City's commitment to the sector.

In early 2013, NYCEDC announced plans to develop a Clean Technology Entrepreneur Center to achieve this vision. Following a public Request for Proposals, the Polytechnic Institute of New York University (NYU-Poly) was selected in June 2013 to develop this Center in approximately 10,000 square feet in downtown Brooklyn. This multi-use space will incorporate business incubation, demonstration and education components for innovation-driven startup companies with a specific focus on energy efficiency, sustainability and other urban challenges. The Center will also be home to workshops, mentoring events and opportunities for networking among stakeholders in the green and cleantech community.

The business incubator, outfitted with demonstration space, will serve as the physical core of the Center, enabling companies to develop, test and showcase products under a single roof. The Center's educational programs will help both resident companies and the broader cleantech community move from the startup phase into commercialization and growth. Under coordinated leadership, the Center has the potential to be a focal point for New York City's cleantech activity, concentrating and magnifying the existing efforts to support the industry.

CONCLUSION

Through a combination of industry trends, a diverse asset base and forward-thinking leadership, New York City is poised to succeed in Green 2.0. Beyond continuing its role as a major end-use market for green technology, New York stands to become a leader in supplying this new, fast-growing, innovation-driven segment. As digitally-enabled solutions emerge to optimize existing clean technologies and address resource constraints, the future of cleantech businesses is no longer limited to regions with low-cost real estate or labor.

Although New York City already has the essential ingredients for the growth of this industry, success requires addressing the barriers that stand in the way of Green 2.0 realizing its full potential. Programs underway, such as the Clean Technology Entrepreneur Center, will spur company formation and contribute to significant job growth. Providing these resources today will open the door to future growth, keeping New York City at the forefront as the industry emerges.

Looking ahead to 2025, the trillions of dollars of worldwide cleantech activity will be powered not only by hardware and infrastructure, but also by the software and business models of Green 2.0. No single city or region can yet claim to dominate this new sector, but New York City is already among the best positioned. Our city's wealth of human and financial capital provides the potential to capture a disproportionate share of this growth, further broadening our already diverse economy. Like many of our most famous residents, green may not have been born in New York City. However, its evolution has brought Green 2.0 to our doorstep, and having relocated here, it is destined to flourish.

1 World Trade Center

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Brooklyn Bridge Park

NYCEDC

New York City Economic Development Corporation