

The Future of the Clean (Green) Economy

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Nothing is more daunting or dubious for investors, economists, and businesses than gauging the health and direction of the U.S. clean (“green”) economy. Is this a sector to “bank on”? Can it, will it, fuel the regional and national economy with substantial new investment, jobs, and business opportunities? The short answer is yes. But clarity on these questions is clouded by both the hype and unwarranted expectations of a substantial federal investment in the green economy in 2009, and a definitional challenge regarding the scope and nature of the green economy. This article describes the trends and job prospects in the clean economy, with an emphasis on the clean energy sector. Also highlighted are key issues and strategies for accelerating and meeting the growing demand and the opportunities to do this with the tools of community reinvestment community

Market Trends

In 2009, the federal government invested \$800 billion in the economy as a partial answer to the Great Recession. This economic stimulus was neither large enough nor enduring enough to fix the spiraling U.S. economy, nor the numerous problems of going to scale with a relatively new industry. Since then there has been considerable political chatter and media hype about the fallacy and failure of green jobs, defying mounting evidence about the promise and reality of a U.S. clean economy. The fact is, despite its faltering start, a robust clean economy has been and continues to be an important pathway to restoring America’s economic competitiveness and jobs. And if produced at scale, it comes with such ancillary benefits as energy security; climate change mitigation; critical infrastructure improvements; reduced government, business, and household waste and expenses; and improved family health and community development.

Part of the challenge in measuring the impact of the clean economy is the lack of a clear definition. The Brookings Institution’s 2011 study, “Sizing the Green Economy,” offers the broadest and most accepted definition: “The ‘green’ or ‘clean’ or low-carbon economy is defined as the sector of the economy that produces goods and services with an environmental benefit.”

This definition suggests that the clean economy permeates all sectors of the economy. It also suggests that the thrust of business and job opportunities is not in an “emerging sector,” but in the growth of new materials, technologies, processes, and services offered by businesses in traditional sectors. The cumulative effect is that we can expect to see growth in existing manufacturing, construction, retail, and professional services in addition to new business devel-

opment, because of a growing demand to reengineer all aspects of the economy to be greener.

The trends highlighted in the Brookings's study are informative. The report determined that although the sector is still modest in size relative to the overall U.S. employment base, it is larger than the fossil fuel and the bioscience industries. Moreover, although growth between 2002 and 2011 was slightly less than the national average, growth has been above average within the clean energy segments (renewables and energy efficiency). The study suggests that the sector holds considerable promise, particularly given that its wages are above national averages.

Market Drivers

Several factors propel the market opportunities in the clean economy. The continued growth prospects are fueled by policies, investments, economics, and to a growing extent, consumer demand. New energy efficiency performance standards are driving growth in auto, appliance, lighting, paint, metal parts (e.g., wind turbines) and a range of new product manufacturing. In addition to manufacturing, transportation services and jobs in public administration are emerging from related public policies and investments.

The bulk (57 percent) of the clean economy, however, centers around the real estate and construction industries. The two key drivers behind the green building industry are infrastructure development and clean energy (energy efficiency/renewables). There is a tremendous market to retrofit America's physical infrastructure to better withstand extreme weather and become greener.

There is greater awareness of and need to re-engineer and rebuild the nation's aging infrastructure, most of which relates to how we harness, distribute, and use natural resources. Specifically, in 2013, the American Society of Civil Engineers gave America's infrastructure a cumulative grade of D+ across 16 categories.¹ The infrastructure most in disrepair and at risk of failure (D grade and lower) included energy, drinking water/wastewater, levees/inland waterways, transit/roads, aviation, and schools.² A total of \$2.75 trillion of infrastructure investment is needed between 2013 and 2020 to upgrade all infrastructure to a B grade. Only \$1.66 trillion in funding is available, however, leaving a \$1.1 trillion gap.³ Super Storm Sandy racked up \$65 billion in damage in the New York tri-state area, mostly instigated by the failure of the energy infrastructure. It is increasingly clear that the electric grid is inadequate to handle the effects of extreme weather.

The urgency to make the nation's infrastructure greener is evident in public sector investments. In 2013, for example, 32 state infrastructure banks were operating to finance crit-

1 American Society of Civil Engineers, "2013 Report Card: America's Infrastructure (Washington, DC: ASCE, 2013). Available at <http://www.infrastructurereportcard.org/>.

2 Ibid.

3 American Society of Civil Engineers, "Failure to Act. The Impact of Current Infrastructure Investment on America's Economic Future" (Washington, DC: ASCE, January 2013).

ical projects (albeit mainly transportation), up from six in 2007.⁴ New York, Chicago, and Connecticut are among a growing number of cities and states developing green infrastructure banks. Since 2007, a series of bipartisan congressional proposals to create a national infrastructure bank has also been advanced, with varying levels of success, to create jobs and to keep the U.S. economy strong, including a current bill snaking through the 113th Congress for a green infrastructure bank.⁵

In addition to large-scale infrastructure projects, the efficiency/renewable energy subsector in particular has been viewed as the “sweet spot” for immediate job creation.⁶ The demand in this emerging sector is huge. Energy efficient buildings, a modernized power grid, renewable power, and public transportation not only address multiple national problems (climate change, energy security, and infrastructure crises), but are also labor-intensive job generators.

U.S. capacity for cleaner and more energy efficient economy depends on retrofitting U.S. buildings and related energy infrastructure (e.g., wastewater treatment plants). Making existing properties more energy efficient is the most important and cost-effective way to achieve the required 50 percent reduction of greenhouse gas emissions by 2050. The fact is, the building sector is the largest generator of carbon as it consumes 71 percent of generated electricity. Energy conservation in this sector, therefore, will have the greatest short-term impact.

The scale of the work entails retrofitting nearly two-thirds of U.S. building stock built prior to new energy standards of the last decades. This includes \$400 billion of potential commercial retrofits (\$41 billion of annual energy savings for commercial properties), and 112 million residential properties (\$2 billion annual savings for public housing alone). This does not include government facilities, schools, and hospitals, which also carry a big carbon footprint.

A plethora of studies stakes out the job prospects of a clean energy economy. Apollo Alliance identified 21.5 jobs in energy efficiency per \$1 million of investments. A 2008 study by Global Insight projected an addition of 4.2 million U.S. jobs between 2008 and 2038 by increasing renewable use and implementing energy efficiency measures.⁷ Another study projected an additional 2 million jobs from spending \$100 billion in public funds in a “green recovery program.”⁸ In the 2008 “Blueprint for Change”, then candidate Barack Obama anticipated 5 million jobs would be added from investing \$150 billion in stimulus funds in clean energy.⁹ The magnitude of the job creation is maximized when whole-building (comprehensive) retrofits are the goal as opposed to single measure installations (e.g., lighting), which, unfortunately, has been the trend to date.

4 The Council of State Governments, Capitol Research. “Increasing Public Awareness of Infrastructure Costs and Financing” (September, 2009).

5 Deutsche Bank Group, “Economic Stimulus: The Case for Green Infrastructure, Energy Security and Green Jobs” (New York: November 2008); Abbey Phillips “Infrastructure Banks Gains Steam,” Politico (March 2011).

6 Ibid.

7 Global Insight, “Current and Potential Green Jobs in the US Economy” (US Metro Economies , 2008).

8 Polin, Robert, et.al. , “Green Recovery: A Program to Create Good Jobs & Start Building a Low Carbon Economy” (Political Economy Research Institute, University of Massachusetts: Sept., 2008).

9 “Energy and Economic Policies” The Blueprint for Change, Barack Obama’s Plan for America (2008).

Clearly, the construction industry stands to gain substantially from the growth of the clean economy. Jobs of energy auditors, solar installers, weatherization technicians, plumbers, insulators, glazers, electricians, mechanical trades (e.g., HVAC), and laborers become “green jobs” when the skills, technology, processes, and materials used produce positive environmental outcomes. Similarly, most operations jobs in the utility sector stand to gain from “green” developments. Therefore, although the future of new construction has diminished, rebuilding and greening existing infrastructure and buildings is growing.

Table 1. Commercial Energy Retrofits: Jobs per \$1 million by Type of Investment

| Sector | Direct Jobs/\$1m | Indirect Jobs/\$1m | Induced Jobs/\$1m | Total Jobs/\$1m |
|--|-----------------------------|---------------------------|------------------------------|------------------------|
| Lighting | 5.1 | 4.2 | 3.7 | 12.9 |
| HVAC | 5.3 | 4.2 | 3.8 | 13.3 |
| Motors/drives | 4.5 | 3.9 | 3.4 | 11.9 |
| Water heating | 5.0 | 4.1 | 3.6 | 12.6 |
| Office equipment | 3.8 | 3.7 | 3.0 | 10.5 |
| Environmental controls | 5.0 | 4.3 | 3.7 | 13.0 |
| Building improvements (windows, insulation, roofing) | 7.7 | 3.9 | 4.7 | 16.3 |
| Average | 5.1 | 4.0 | 3.7 | 12.8 |
| Weighted average | 5.7 | 4.1 | 3.9 | 13.6 |

Source: Garrett-Peltier, H. “Employment Estimates for Energy Efficiency Retrofits of Commercial Buildings”, PERI, University of Massachusetts, Amherst, June, 2011

The Green Building Multiplier

The economic impact of green building and infrastructure development, however, goes beyond construction. The economic and job multipliers for this investment are deep and wide-ranging. A technology revolution is underway that is producing jobs in the research and development and manufacturing sectors. Professional services of architects, engineers, facilities and property managers are growing and changing at the same time.

A 2009 University of Massachusetts, Amherst, study examined the job creation potential for a \$1 million dollar investment in clean energy over fossil fuel and found 16.7 jobs in the former vs. 5.3 new jobs in the latter.¹⁰ Further analyses by Garrett-Peltier in 2011 found that for every \$1 million of investment in the energy upgrade of commercial buildings resulted in an

¹⁰ Polin, Heintz & Garrett-Peltier, “The Economic Benefits of Investing in Clean Energy” (University of Massachusetts, Amherst, PERI, June 2009).

estimated 5.1 direct jobs, and 4.0 indirect jobs, and 3.7 induced jobs, or 13-14 jobs per \$1 million investment. These averages differ by trade, with the highest multiplier (7.7) in building improvements (windows, insulation, roofing) and the lowest in lighting and water heating (5.1 and 5.0, respectively). The numbers portend the importance of whole building retrofits for achieving the greatest impact on both carbon reduction and job creation. See Tables 1 and 2 for the industry composition used to generate these jobs estimates.

The study suggests that in addition to manufacturing and installing new energy efficient technologies, employment will be generated in facilities services, as building owners employ personnel to operate and monitor their building's energy system. The majority of these costs (95 percent) will be directly attributable to personnel, with a smaller percentage used to purchase equipment to maintain the facilities' energy operations. In this scenario, \$1 million will produce 8 direct jobs and 4.4 indirect, including scientific and technical consulting, real estate, telecommunications, architecture and engineering. Finally, energy efficiency upgrades are also projected to spur new investments allied with non-energy purchases.

Table 2. Commercial Building Retrofits Job Multiplier by Retrofit Type

| Category | Direct Impacts | Indirect Impacts |
|------------------------|---|---|
| Lighting | 70% manufacturing; 30% installation | Wholesale trade; power equipment and transformer manufacturing; truck transportation; building services; machine shops |
| HVAC | 24% air purification and ventilation equipment; 33% heating equipment; 23% air conditioning and refrigeration equipment; 30% installation | Wholesale trade; truck transportation; services to buildings; machine shops; ferrous metal foundries; iron and steel mills |
| Water heating | 35% power boilers, 35% water heaters (excluding boilers); 30% installation | Wholesale trade, machine shops, truck transport; building services; business support services; architecture and engineering |
| Motors/drives | 70% motor and generator manufacturing; 30% installation | Wholesale trade; truck transportation, building services, copper rolling and drawing, crown & closure manuf; iron and steel mills |
| Office equipment | 28% photocopying equipment; 28% computer equipment; 30% installation | Wholesale trade; semiconductor manufacturing; software publishers; scientific R&D; advertising |
| Environmental controls | 70% auto environmental control manufacturing; 30% installation | Wholesale trade; scientific R&D; software publishers; building services; custom computer programming; semiconductor manufacturing |
| Envelope improvements | 8% window manufacturing; 8% insulation; 2% roofing materials; 2% painting and coating materials; 80% installation | Wholesale trade, truck transportation, services to buildings, accounting, maintenance and repair construction; architecture and engineering |

Greening the Nation's Future: Building Market Demand

Different methods of defining the clean economy and estimating job creation continue to be sorted out. Enough forces are converging, however, to suggest that a clean economy is inevitable. At the same time, considerable work remains to convert this demand for clean energy into a reliable or substantial part of the U.S. regional and national economy. The requisite tools to stimulate the market are fragmented and underdeveloped. Unlike the affordable housing and community development industry, neither long-term financial incentives (e.g., the Low Income Tax Credit) nor mandates (e.g., Community Reinvestment Act) for clean energy exist at the national level to expand and accelerate the market.

Progress is being made rather randomly and state by state. The strength of the clean economy depends entirely on local politics and voter appetite and support for a clean economy. This creates an uneven playing field. The American Council for an Energy Efficient Economy (ACEEE) produces a clean energy scorecard that ranks how well states and cities are addressing their clean energy needs on a variety of criteria. California and the Northwest are among the top performers, the South and Southeast among the worst.

In general, however, substantial movement is taking place on the policy front. Local and state regulations, for example, are quickly changing the landscape for the utility sector, businesses, and the real estate industry. Twenty-five states have enacted long term ($n=3$ years), binding energy savings targets known as energy efficiency resource standards (EERS). California is one of the most aggressive with a goal of 50 percent of existing commercial and state buildings achieving zero net efficiency (ZNE) standards by 2030. Seattle is moving to completely ban coal plants, requiring conversion to alternative, cleaner energy sources. Even industry is taking action. Southern California Edison is shutting down its nuclear plant, which supplies 20 percent of its energy, in favor of alternative forms of energy.

Local ordinances are also pushing energy conservation and increasing jobs in the process. This includes new building codes and disclosure ordinances. The latter includes energy reporting requirements for commercial and, to a lesser extent, residential property owners to provide energy consumption data on their buildings. This is influencing how buildings are appraised and valued.

The development and use of new financing mechanisms are both a huge challenge and opportunity. Innovative financing tools are complementing the investments made (voluntarily or not) by investment-owned utilities. State financing mechanisms have emerged. The State of California, for example, has allocated \$2.5 billion to retrofit elementary, middle, and high schools as well as community colleges from voter approved funds. And other commercial financing tools are working their way into the marketplace, including on-bill financing and commercial property assessed clean energy PACE financing. These tools seek to ease the cost of energy upgrades by amortizing the costs into the property owner's utility bill and/or property assessments.

Finally, real estate buyers and tenants (commercial and residential) are becoming more sophisticated consumers. They want the lowest possible energy cost and they want “green and healthy” buildings.

These forces combined will inevitably make natural resource conservation in the United States ubiquitous as it is in Europe and as pervasive as technology is to the American way of life, driving a new economy in the process.

The Supply Side: Challenges and Opportunities

The economic development potential of the clean economy is not only influenced by market demand, but also supply-side challenges and opportunities. That is, transforming the energy/utility sector will require a skilled workforce and pool of contractors able to understand and meet the rigorous technical standards of the clean economy. A recent national survey (2012) of architects, engineers, and contractors (AEC), however, highlights a critical shortage of workers and contractors with the requisite skills.

Specifically, a McGraw-Hill Construction study identified the specific challenges of the AEC industry including an aging workforce, skilled workers leaving the industry due to economic downturn, an insufficient pipeline of younger workers, and a green skills shortage.¹¹

The findings are disturbing. This national survey indicates that AEC professionals anticipate that 45 percent of all design and construction jobs will be “green” by 2014 and two-thirds saw “green” as the norm by 2016. Yet, 69 percent of those surveyed expect skilled workforce shortages in the next three years; 32 percent of the architects, engineers, and contractors surveyed were concerned about a shortage of specialty trade contractors by 2014; 49 percent of the general contractors are concerned about finding skilled craft workers by 2017, and 37 percent of architect and engineering firms were concerned about finding experienced workers.

Skilled “green” workers are in even more demand; 86 percent of architecture and engineering firms and 91 percent of contractors cannot find enough green-skilled employees. Senior (32 percent) and mid-level (41 percent) professionals are the most difficult to find.

This double-edged sword of green jobs but few workers creates a new sense of urgency for business and workforce development to respond. It is critical to increase the capacity of the contractor community to meet industry demand by attracting and training a qualified workforce. The good news is that the growth of green jobs may help draw more young people into the industry. The younger generation reports a strong commitment to sustainability, with 63 percent of architecture students saying they would engage in sustainable design out of a personal responsibility. This suggests that as “green” rises, so too may the interest of youth in the design and construction fields of practice.

11 McGraw-Hill Construction, “Construction Industry Workforce Shortages: Role of Certification, Training and Green Jobs in Filling the Gaps” (2012).

Construction and building operations are also ideal careers for disadvantaged youth and veterans through such programs as Helmet to Hardhats. Attracting and retaining youth, women, and veterans in the green sector, however, means a commitment to quality training, career opportunities, and middle-class wages. It will require investments in apprenticeship training programs and other workforce and business development support services. Without these efforts, the industry will have no qualified workforce.

The Role of Community Reinvestment

The scale, pace and overall direction of this emerging green building sector can be greatly enhanced by strategic community reinvestment activities. While there seems to be regulatory challenges to recognizing energy efficiency investments as a qualified reinvestment activity, there are both demand and supply side strategies that are needed and that do qualify.

Citi Community Development Group, for example, is investing in building the capacity of small, minority, women and veteran owned contractors (DBE/WBE) to create jobs in this growing building sector. DBE/WBEs are both job creators and hiring halls for minority, disadvantaged populations. A concerted effort and substantial investments are needed, however, to expand their knowledge about the changing “green building” regulatory environment, the new green building technologies, materials and applications, and what it takes to compete for lucrative public sector energy contracts. Without this support low and moderate-income communities will miss this emerging job and business development opportunity, creating an ‘energy divide’ not unlike the ‘digital divide’ of the 1990s.

Similarly, Union Bank of California is investing in local non-profit sustainable development intermediaries as a “demand-side strategy” to include the affordable housing sector in the efficiency revolution. This lowers the operating budgets of both low-income families who pay a disproportionate amount of their household budgets on the cost of utilities (12-13 percent vs. 8 percent of the average household), as well as the operating proformas of non-profit developers.

The importance of investing in workforce development – education and training - is mentioned above and is an important ‘supply-side’ strategy. Lucrative jobs are available for youth, veterans, challenged workers (e.g., ex-offenders) in the construction and related “green building” careers. These opportunities first start with STEM education in schools to prepare our youth for technical careers. Investments are also needed for community-based pre-apprenticeship programs to help match the skills of workers to the rigors of the job. YouthBuild, JobCorps, Conservation Corps, Helmets to Hardhats, are among the various construction career programs that need support to re-populate and re-skill the diminishing supply of workers in this emerging sector of the economy.

Conclusion

The clean, green economy is more fact than fiction. The trends are growing, albeit unevenly, across cities and states throughout the country. New policies, investments, and growing concern over climate change are among the drivers of this emerging sector. Within a broadly defined economic sector, substantial opportunities are developing in the real estate and construction industries as clean energy becomes the core strategy for mitigating the effects of global warming.

The full transformation into a stable and substantial sector of the national economy, however, is stymied by the lack of a national energy policy. This is critical to drive demand and to align the financial, utility, and capital markets as full participants. At the same time, even in its current nascent state the clean energy economy is challenged by supply-side issues, including a dearth of skilled workers and contractors. The conversion from the demand for clean energy into a viable economic development sector is not only possible, but necessary for U.S. energy security and overall global competitiveness. It does, however, require, substantial public, private, and community commitment and resources to make it happen. The nation marshaled the needed commitment to build a viable affordable housing and community development industry 40 years ago, and we can do it again today with a green economy.

The success of this effort can be substantially bolstered by the commitment of the community reinvestment community. At the heart of this commitment is positioning low and moderate income communities as full participants and beneficiaries of a clean-energy economy. This includes fostering jobs and business development opportunities, as well as improving greener and healthier homes and operating budgets.

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