The Flint Clean Economy Project: Roadmap to the Future

By the BlueGreen Alliance, the Michigan BlueGreen Apollo Alliance and the Initiative for a Competitive Inner City.

September 2011

SUMMARY

This Policy Brief describes the Flint Clean Economy Project, a collaborative effort involving the City of Flint and the nongovernmental organizations authoring this report. The project's goal is to demonstrate the potential for clean economic development as a strategy for creating good jobs, fighting poverty, and revitalizing manufacturing in Flint, Michigan.

Background. In 2011, the national poverty rate surged to an 18-year high, with 46.2 million Americans living in poverty.[1] Perhaps nowhere in the country is there a greater need for economic revival than Flint, Michigan, where 36% of the population lives below the poverty threshold, including 55% of Flint families with children below the age of five.

Given the vast scope of our economic challenges, it is critically important to link environmental progress with expanded economic opportunity. Recent trends in green jobs have been promising. Between 1998 to 2007, overall national job growth was a mere 3.7%, while green jobs grew 9.1%.[2] However, until now, there has been little evidence that low-income and disadvantaged workers are faring any better in the clean energy economy than they have in the overall economy.

Promising preliminary nationwide results. This Policy Brief reports on the results of the Initiative for a Competitive Inner City's preliminary analysis of job growth in the nation's 100 largest inner city areas. The findings suggest that green jobs have grown much faster in inner city areas than other types of jobs. We develop two measures to analyze green job growth. Our preliminary findings suggest that green jobs in the inner city experienced growth in the range of six percent – twelve percent from 1997 to 2008. In contrast, overall inner city jobs grew by only 1.3% over the same time period. (See the body of this document for the full discussion of these results and data limitations.) Despite some qualifications regarding measures of green jobs, these preliminary results are encouraging. The results suggest that green jobs are growing faster in inner city jobs than other types of jobs.

[1] The federal definition says that a family of four earning less than $22,000 per year is living in poverty.

[2] These statistics are according to the most recent data, which are reported in *The Clean Energy Economy* (The Pew Charitable Trusts 2009).

It is important to note that job growth is not the only relevant metric. Job quality is another crucial dimension. A recent study by the Brookings Institution found that green jobs offer diverse opportunities and better pay and are accessible to lower-skilled workers.[3]

Project overview. The goal of the Flint Clean Economy Project is to develop and implement a clean technology economic development strategy that builds on the city's strengths: skilled labor, strong educational institutions, land availability, existing knowledge and manufacturing activity, and a history as a global technology leader. The project's recommendations will be integrated into the city's long-term master planning process. Central to the project's success will be the Flint Clean Economy Project Taskforce, an official city advisory body comprised of a diverse array of stakeholders including representatives from the labor, business, educational, non-profit and public sectors.

Future work. Once funding to support further work is secured, the NGO partners will undertake further research and policy analysis, working interactively with the Mayor's Office, the Taskforce, and other thought and community leaders in order to develop well informed recommendations. Our preliminary research confirms that a clean reindustrialization strategy makes sense in Flint due to its combination of available skilled workers, large tracts of available land, and existing industrial facilities.[4] In addition, the city is home to research capacity at its universities and within the manufacturing base.

Our proposed approach will focus on building on existing strengths and nurturing existing economic activity clusters. Most job growth occurs this way: recent research has revealed that 95 percent of job growth comes from the expansion of existing businesses or the birth of new establishments.[5] This is true in the clean economy, as well—in 2010, almost one-fifth of all 'green' jobs were located in industry clusters.[6] Companies that are part of regional industry

[3] Mark Muro et al., 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" The Brookings Institution (July). Online at: http://www.brookings.edu/reports/2011/0713_clean_economy.aspx
[4] http://www.icic.org/ee_uploads/publications/INDUSTRIAL-STRATEGIES.PDF
[5] Jed Kolko, 2010, "Business Relocation and Homegrown Jobs," Public Policy Institute of California (September). See also, Mark Muro and Bruce Katz, 2010 "The New Cluster Moment: How Regional Innovation Clusters Can Foster the Next Economy," The Brookings Institution (September). Mark Muro and Kenan Fikri, 2011 "Job Creation on a Budget: How Regional Industry Clusters Add Jobs, Bolster Entrepreneurship, and Spark Innovation," The Brookings Institution (January).
[6] The report defines clusters as counties: "with a significant number of jobs in other establishment from the same segment. The threshold was whether or not the number of other-establishment jobs in a county's segment was greater than one percent of jobs in the country for that segment."

clusters also add jobs considerably faster—a Brookings Institution model shows that doubling the size of a clean economy cluster increased individual establishments' job growth by about 2.1 percent from 2003 to 2010.[7]

We propose two approaches to furthering cleaner technology cluster development and job growth: (1) active supply chain construction involving matchmaking between specific companies, and (2) other actions that will be generally supportive of new connections and cluster growth, but are not company specific. In the case of Flint, one example of active supply chain construction would involve looking for opportunities to link local businesses to production of the Chevy Volt, an electric vehicle produced at GM's Hamtramck plant, which lies within the city of Detroit's borders about an hour from Flint. The Volt's engine generator is already produced locally, at GM's Flint Engine Operations factory. A green jobs strategy will also identify opportunities to re-deploy existing capabilities into greener product segments, as has happened in the case of a former GM skilled tradesperson who founded a solar energy company.

The body of this paper offers more discussion of the research that is underway as well as some facets of green economic activity in Flint. In developing recommendations, it is recognized that the city is severely budget constrained and that recommendations for catalyzing job creation and economic development must reflect that reality.

Reasons for optimism. There are several other reasons to believe that clean economy development efforts will produce meaningful progress in Flint. First, a segment of green jobs is naturally local, particularly those that involve transforming and upgrading the local buildings and natural environment. Work to upgrade buildings with energy saving and renewable energy technology, transit, and green space development and maintenance creates local work opportunities. Second, there are signs that manufacturing jobs may be poised for resurgence, in no small part due to clean energy development. Recent data from California show green jobs in manufacturing grew 10% from 2008-2009, and in 2009 manufacturing jobs made up 26% of all green jobs in California.[8] Finally, manufacturing job growth has been among the strongest of any sector. In July of 2011, 24,000 manufacturing jobs were added. The sector has added

[7] Mark Muro et al., 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" The Brookings Institution (July), p. 30.
[8] See page 11 of Next 10. 2011. *Many Shades of Green*.

289,000 jobs since December of 2009.[9] In 2010 global investment in clean energy technologies increased to a record $243 billion, up 30% from 2009 levels, consistent with 30.5% annual growth since 2004.[10]

Conclusion. In addition to working with the City of Flint to develop a green jobs strategy, we will learn lessons that we can apply to projects in other urban areas. An expanded effort would involve the same type of industrial ecology mapping research to identify local and regional strengths that can support expansion or diversification in clean technology products and services. Cities are crucial drivers of regional growth. Simultaneous progress on urban economic and environmental challenges would help to fully unleash the potential of cities as engines of innovation while driving urban and regional growth. What could be more compelling than a vision that delivers broadly-shared prosperity and progress on the moral imperatives of ending poverty and ensures a healthy environment for those living in inner city communities?

[9] http://www.bls.gov/news.release/empsit.nr0.htm
[10] Bloomberg New Energy Finance. "*2011 Summit Results Book,"* June 17, p. 5: <http://bnef.com/WhitePapers/download/41>

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ACKNOWLEDGEMENTS

The primary authors of this Policy Brief were Chris Busch (BGA), Adam Kotin (BGA), Teresa Lynch (ICIC), and Dana Sevakis (BGA). Elyse Maziarz (ICIC), Ashley McCormack (BGA), Kyle Polk (ICIC), and Claudia Preparata (Green For All) also contributed. Special thanks to the City of Flint and Mayor Dayne Walling for working with us to complete this policy brief. We would like to thank the Flint Clean Economy Project Taskforce and the following contributors for their help in providing a picture of the clean economy in Flint and Genesee County: MI State Representative Jim Ananich, Tim Barden (U of M Flint), Ed Benning (Flint Mass Transit Authority), Alicia Booker (Career Alliance), John Bradburn (General Motors), Royal Brooks (WinSol Electronics LLC), Mike Brown (Flint Area Reinvestment Office), Amy Butler (Oakland University), Howard Croft (Mid-Michigan Solar), Tom Guise (Swedish Biogas), Norwood Jewel (UAW), Janice Karcher (Genesee County Regional Chamber of Commerce), Deb Loader (Flint Area Reinvestment Office), Marsha Lyttle (MI Small Business & Technology Development Center), Laurie Moncrieff (Adaptive Manufacturing Solutions), Steve Montle (City of Flint), Bernie Scibienski (Landaal Packaging), Neil Sheridan (Kettering University), Bill Webb (U of M Flint).

About us

For more about the BlueGreen Alliance visit:

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For more about the Initiative for a Competitive Inner City visit:

http://icic.org/about

1. Introduction

This Policy Brief describes the Flint Clean Economy Project, a collaborative effort involving the City of Flint and the three non-governmental organizations authoring this report. The project's goal is to demonstrate the potential for clean economic development as a strategy for creating good jobs, fighting poverty, and revitalizing manufacturing in Flint, Michigan. In 2011, the national poverty rate surged to an 18-year high, with 46.2 million Americans living in poverty.[11] That's the largest number of Americans living in poverty since the Census Bureau started keeping records. Given the enormity of our economic challenges, it is more important than ever that environmental progress also leads to greater economic opportunity.

Nowhere is this imperative greater than in inner city communities. These communities are home to many low-income families and often suffer the worst effects of industrial pollution. In many ways these communities are faring worse than ever, tugging on the overall success that metropolitan areas stand to achieve in the context of a new clean energy economy. [12] The nation's metropolitan regions will only achieve their true potential and experience maximum sustainable economic growth if their inner cities are also successful.

National data on green jobs have been promising. Green jobs grew 9.1% from 1998 to 2007 as compared to 3.7% for the economy as a whole.[13] However, until now, there has been little evidence that low-income and disadvantaged workers are faring any better in the clean energy economy than they have in the overall economy. This Policy Brief reports on the results of initial research suggesting that green jobs have grown much faster in inner city areas than other types of jobs. Though preliminary and, due to data limitations based on less than perfect measures, these results are encouraging. While we emphasize that limitations apply – we further describe the definition and related caveats below – the inner city green jobs that we are currently able to measure grew at between six percent and twelve percent from 1997 to 2008 while overall inner city jobs grew by 1.3%.

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[11] The federal definition says that a family of four earning less than $22,000 per year is living in poverty.
[12] ICIC Research. *Why Inner Cities Matter: The Importance of Inner Cities in Regional Policy Frameworks,* Draft, May 2010.
[13] These statistics are according to the most recent data, which are reported in *The Clean Energy Economy* (The Pew Charitable Trusts 2009).

Perhaps nowhere in the country is more in need of economic revival than Flint, Michigan. In 2009, the year of the most recent available data, 36% of the population of Flint fell below the poverty threshold. Fifty-five percent of Flint families with children below the age of five were living in poverty. This qualifies all of Flint and many of its surrounding areas as 'inner city,' according to the Initiative for a Competitive Inner City's definition of the term.[14] These statistics become even more shocking when considered in light of the fact that the US Census Bureau's 2009 poverty threshold was an annual income of $10,956, or about $22,000 for a family of four.[15]

While the challenges are undeniable, Flint retains important comparative advantages that might be used to nurture clean industry. We are heartened that the Mayor and City are so supportive of this effort. We are determined to make Flint a model to demonstrate the promise of clean economic development as a strategy for fighting poverty, good job creation, and clean re-industrialization.

2. Flint Project Description

The goal of the Flint Clean Economy Project is to create and implement an economic development strategy that builds on the city's many strengths: its skilled laborers, industrial history and knowledge, educational institutions, and availability of land. The strategy will be informed by an analysis that provides Flint policymakers with the information needed to identify which industries in the green economy are poised to grow and create new jobs. With enhanced understanding of the current situation, especially as it relates to the emerging green economy, Flint will be in a better position to develop strategies that allow it to capitalize on existing strengths.

[14] Inner Cities are defined as core urban areas that currently have higher unemployment and poverty rates and lower median income levels than the surrounding Metropolitan Statistical Area (MSA).
Inner cities have 20% poverty rate or higher, or two of the following three criteria:

- poverty rate of 1.5 times or more that of their MSAs
- median household income of 1/2 or less that of their MSAs
- unemployment rate of 1.5 or more that of their MSAs

ICIC uses Census data and relevant research to identify inner cities. Census data is examined at the Tract level and compared to the surrounding MSA to determine accurate inner city locations.

[15] http://www.census.gov/hhes/www/poverty/data/threshld/thresh09.html

The city has an existing advisory body, the Energy-Environment-Economy (E3) Innovation Network, and our efforts will build on this group's progress. We will also work in concert with the city's master planning process. In addition to the day-to-day management of the City's affairs, the Mayor has embarked on a 30-year visioning exercise for Flint. We will present the Flint Clean Economy Project preliminary recommendations to the Taskforce in September 2011. When funding for a next phase can be secured, implementation and further research, policy analysis and recommendations will unfold as described in Section 10: Future Work.

In addition to making a positive contribution to Flint and Genesee County, we hope to learn some lessons and apply them to similar projects in other cities.

3. Flint Background

Located in Genesee County about an hour north of Detroit, Flint is the 7th largest city in Michigan and is best known as the birthplace of General Motors (GM). Since the early 20th century, Flint's main economic engine has been auto manufacturing. At the height of production in the late 1970s, GM employed over 80,000 employees in Flint. There has been a precipitous fall from that peak. By 2010, GM's work force in Flint had declined to 6,000, but has since rebounded to about 6,500 with the addition of a third shift at Flint Assembly.

Despite the significant hardships and job losses Flint residents have experienced over the past decades, reinvestment in the community from the public, private and philanthropic sectors is growing as the region works to diversify its economic base and repurpose its significant strengths and assets. In 2010 alone, private sector investment in the community and government contracts for existing businesses generated nearly $145 million in new business activity. The community has seen job creation success in medical technology, advanced energy and other advanced manufacturing. Non-profit organizations, like the Uptown Investment Corporation, have pooled resources from a variety of interests to invest $387 million in downtown redevelopment since 2004. GM also continues to invest in its Flint facilities with investments of nearly $250 million since 2009.

Flint is also home to several nationally-recognized institutions of higher learning, including Kettering University, University of Michigan – Flint, Mott Community College, and nearby Baker College, all of which are active partners in the City's redevelopment and efforts to meet

new workforce training needs. The Mott Foundation was founded in Flint in 1926 by the industrialist Charles Stewart Mott and continues to be a major investor in Flint's economic recovery.

4. Definition(s) of a Green Job

We must define green jobs in specific terms in order to concretely discuss the scale of employment benefits delivered by clean economic development. Clearly defined metrics are essential to sound policy development. To date, a number of different definitions of green jobs have been developed and applied to research in the field. Appendix 2 compares the different definitions that have been used.

For this brief, our working definition is as follows: Green jobs are those that result in one or more of the following benefits— greater use of clean energy; energy savings; greater resource efficiency; less pollution; or the restoration of natural systems that support life. These benefits may result from a green product or service. They may also result from improvements in the production process for "conventional" goods and services. For example, jobs producing an advanced extended range vehicle like the Chevy Volt are green jobs, as are jobs to make the steel and component parts for the car. Jobs that involve working to reduce waste in an automobile factory would be categorized as green regardless of the type of vehicle being produced.

5. Survey of Michigan Green Job Studies

The Michigan Department of Energy, Labor, and Economic Growth (DELEG) released its inaugural *Michigan Green Jobs Report* in 2009.[16] This report sought to develop an accurate picture of Michigan's green jobs through a "three-pronged methodology" that included (1) an employer survey, (2) NAICS data trend analyses, and (3) focus group discussions. The survey asked employers in certain industries to identify the share of jobs that could be classified as "green." Survey results were then used to estimate the number of green jobs in each industry as a whole. This allowed researchers to evaluate jobs in both the core green economy as well as in industries that are only partially green.

[16] http://www.milmi.org/admin/uploadedPublications/1604_GreenReport_E.pdf

The report found that, as of 2009, Michigan held 96,767 "direct green" jobs and 12,300 "support green" jobs.[17] "Clean transportation and fuels" industries held the most Michigan green jobs of any core area, at 41 percent. While the "Renewable energy production" segment held the fewest, at 9 percent, a separate analysis of 358 "green related" firms' trends determined that this cluster showed a growth rate of 30 percent from 2005 to 2008. This indicates that the renewable energy production area is "most likely to experience job growth," according to the report. Furthermore, while other areas had negative growth rates during the economic slowdown, renewable energy production boasted a 7.1 percent rate of growth.

The report also provides details on the types of jobs available, their wages, and training requirements. While 24 percent of green jobs belonged to engineers, 28 percent were classed as "production occupations" and 19 percent as "construction occupations. When asked where the job growth areas were over the next two years, employers "most frequently cited engineers, skilled trades, and certain technical specialist job titles."[18]

In terms of wages, 13 of the top 15 industries with green jobs had wages that outpaced the private sector weekly average of $811, and "eight of the top 15 green industries paid more than $1,000 per week."[19]

On training requirements, employers emphasized that, while much training could be provided on-the-job, "the basics" in science, math, and related areas were still needed. There was projected growth for jobs regardless of worker education level, but there were clear disparities in the *amount* of growth: "Median anticipated growth rate for lower educational attainment occupations is just 3.8 percent compared to 7.4 percent for moderate educational requirement jobs and 9.0 percent for high educational attainment positions."[20] The general consensus was that some demand exists for on-the-job training, but even more demand for the skills provided by higher education.

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[17] "Direct green" jobs were defined as falling into industries in five main areas: *Agriculture and natural resource conservation*; *Clean transportation and fuels*; *Increased energy efficiency*; *Pollution prevention or environmental cleanup*; and *Renewable energy production*. "Support green" jobs were defined as follows: "…the presence of green business activities…also generates additional jobs at that particular firm for support employees. These support jobs may range from accounting staff to human services staff to clerical staff."

[18] *Michigan Green Jobs Report 2009*, p. 5
[19] *Michigan Green Jobs Report 2009*, p. 7
[20] *Michigan Green Jobs Report 2009*, p. 49-50

DELEG's companion piece, *Michigan Green Jobs Report: A Regional Analysis* divides the findings by geographic region to get a more specific picture of the green jobs economy across the state. Flint is located in Southeast Michigan region, which featured the largest number of green jobs of any region: 3.9 percent of jobs here were reported as 'green,' compared to the state's average of 3.3 percent.

Within the Southeast Michigan region, green jobs were concentrated in the areas of *transportation equipment manufacturing* and *professional, scientific and technical services*. The *Clean Transportation and Fuels* area contained over 54 percent of all area green jobs. However, the region also featured a lower percentage of its green jobs in the *Producing Renewable Energy* area (5%) than the state as a whole (8%). The presence of the auto industry in this region is cited as being clearly responsible for these distributions.

Using a different methodology to categorize 'clean economy' jobs, the Brookings Institution's nationwide study *Sizing the Clean Economy* found that 'green' jobs accounted for 1.9% of all 2010 employment in the state of Michigan.[21] Brookings also reported that Michigan clean economy jobs are relatively more export-intensive than those in the nation as a whole, with each job producing an average of $26,589 in exports. Finally, the state's share of clean economy jobs considered 'green collar' (i.e. middle-wage/middle-skill) was among the highest in the nation, at 73.3% in 2010. This indicates it is not just highly-trained engineers and scientists that are benefitting in Michigan's clean economy—close to half of the green jobs are held by workers with a high school diploma or less.

6. Results of preliminary quantitative analysis

Against this backdrop, we aim to understand better whether and how the green economy is creating opportunity in impoverished urban communities across the U.S. The data analysis presented in this section examines this question by providing insights into the dimensions of the green economy in the nation's 100 largest inner cities.[22]

[21] Mark Muro et al., 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" The Brookings Institution (July), p. 50.

[22] ICIC's definition and methodology for identifying 'inner cities' is detailed at footnote 12, above. Based on this definition, Flint's 36% poverty rate in 2009 qualifies it as 'inner city.'

We use three different approaches to estimating the number of green jobs, each of which yields its own unique picture of the green economy. The first approach examines all of the industries identified by the BLS as potentially green. Unfortunately, these data include green jobs as well as other types of jobs. For example, we are unable to distinguish jobs associated with hybrid automobile production from those associated with more traditional automobile manufacturing. This method greatly overestimates the size of the green economy. It would seem to indicate that in 2008, potentially green industries accounted for 24 million U.S. private sector jobs, or 20% of the total. By this account, the green economy employed 40% more people in 2008 than Health Care and Social Assistance, the nation's largest source of private sector employment.

To circumvent the limitations to this first approach, we develop a second method that isolates the subset of BLS-identified industries most likely to produce green products and services, such as Hydroelectric Power Generation and Environmental Consulting Services. We identify 27 qualifying industries, which we term "solid green." (For a complete list of these industries, see the Appendix.) Unlike the potentially green sectors that include an unknown mix of green and other jobs, jobs in "solid green" sectors are entirely or predominately green. These industries account for just 620,000 jobs nationwide, or 0.5% of national employment in 2008.

In addition to our original analysis using potentially green and solid green measures we also cover the results reported in *The Clean Energy Economy*, a recent study by The Pew Charitable Trusts. By Pew's estimates, the core green economy accounted for about 770,000 clean energy jobs, or about 0.5% of total U.S. employment in 2007.[23]

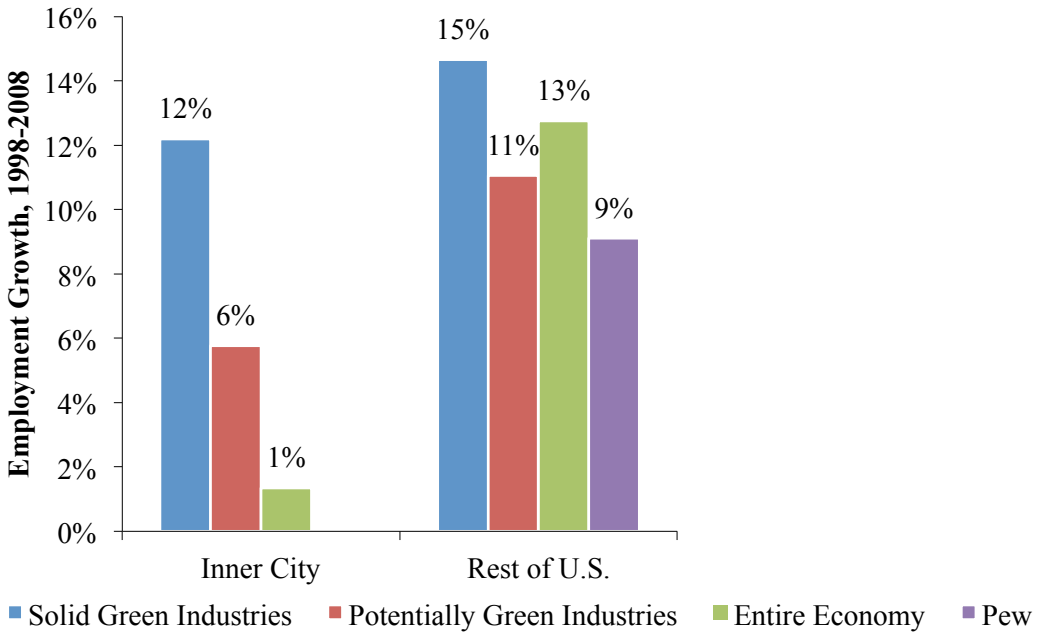
As seen above, these methods produce very different results. At the same time, as seen in Figure 1, all three methods show that the green economy has produced substantial job growth during the past decade. Between 1998 and 2008, employment grew 11% in potentially green industries and 15% in solid green sectors, compared to 13% in the overall U.S. economy. By Pew's definition, green employment grew by about 9% between 1998 and 2007.

Using either the potentially green or solid green definitions, job growth in the inner city trailed the national average. However, green job growth in the inner city was much more robust than inner city job growth overall. Between 1998 and 2008, jobs in potentially green industries grew

[23] The Pew Charitable Trust, *The Clean Energy Economy,* June 2009.

by almost 6% in the inner city—more than four times the rate of all inner city jobs—and jobs in solid green industries grew by 12%. But this growth is the result of gains in just a handful of industries, and solid green jobs still account for less than 1% of inner city employment. Because the Pew estimates rely on proprietary data, we are unable to calculate a national inner city (or any sub-national) growth rates using this definition.

Figure 1: Green Job Employment Growth, 1998-2008



To better understand the implications of the varying methodologies for sizing the green economy in urban areas, we apply each of the three definitions to employment data for Flint's and Detroit's MSAs. As shown in Table 1, the alternate approaches give drastically different pictures of the green economy: The number of green jobs in Flint is 40% larger if the Pew definition is used rather than the solid green definition, but for Detroit, the Pew job counts are 60% lower than the solid green counts. The BLS classifications add little clarity: for Flint, the BLS counts are 36 times greater than the Pew counts; for Detroit, they are 60 times greater.

Table 1: Comparison of Methods – Detroit and Flint, Michigan[24]

Location	Solid Green Industries, 2008	Multiplier Magnitude, Pew over Solid Green	Pew Approach, 2010	Multiplier Magnitude, Potentially Green over Pew	Potentially Green Industries, 2008
City of Flint	270	**1.4 X**	360	**36 X**	13,000
Flint, MI Region*	300	**2.2 X**	670	**27 X**	18,000
City of Detroit	1,900	**0.4 X**	770	**60 X**	47,000
Detroit, MI Region*	5,600	**1.7 X**	9,400	**40 X**	372,000

* Regions are defined as the Detroit Metropolitan Statistical Area (MSA) and the Flint MSA.

In addition to providing dramatically different estimates of the size of the green economy at a national level, the three methods can present contradictory views of the strength of the green economy in any particular city, as captured by green economy location quotients, which measure the size of the green economy relative to the size of the overall local economy. (A location quotient (LQ) of 1.0 indicates that a local economy has the same concentration of a given type of job as the average nationally, an LQ of less than 1.0 indicates that a local economy is less concentrated in that activity, and an LQ of greater than 1.0 indicates that the local economy specializes in that activity.)

The three methods do yield similar pictures of the green economy in Flint. All show that there are fewer green jobs than would be expected in an economy the size of Flint's; the solid green and Pew approaches suggest that the green jobs gap is about 30%, the potentially green approach suggests it is about 15%. For Detroit, however, the methods yield radically different pictures of the green economy: depending on which approach is used, one could conclude that Detroit has about 20% more green jobs than would be expected based on the size of its economy (potentially green), 90% more jobs (solid green), or 40% fewer jobs (Pew). (Figure 2)

[24] The fact that different estimates are produced by the alternate approaches is evident in the different multiplier magnitudes in Table 1. The multiplier magnitudes are defined as the ratio of the value in the right column over the value in the left column. The fact that in Flint the Pew approach returns 40% more jobs than the solid green approach is indicated by the multiplier magnitude of 1.4. And the multiplier value of 0.4 attests to the fact that in Detroit the Pew approach returns 60% fewer jobs than the Solid Green approach.

Figure 2: Comparison of Methods – Location Quotient, Flint

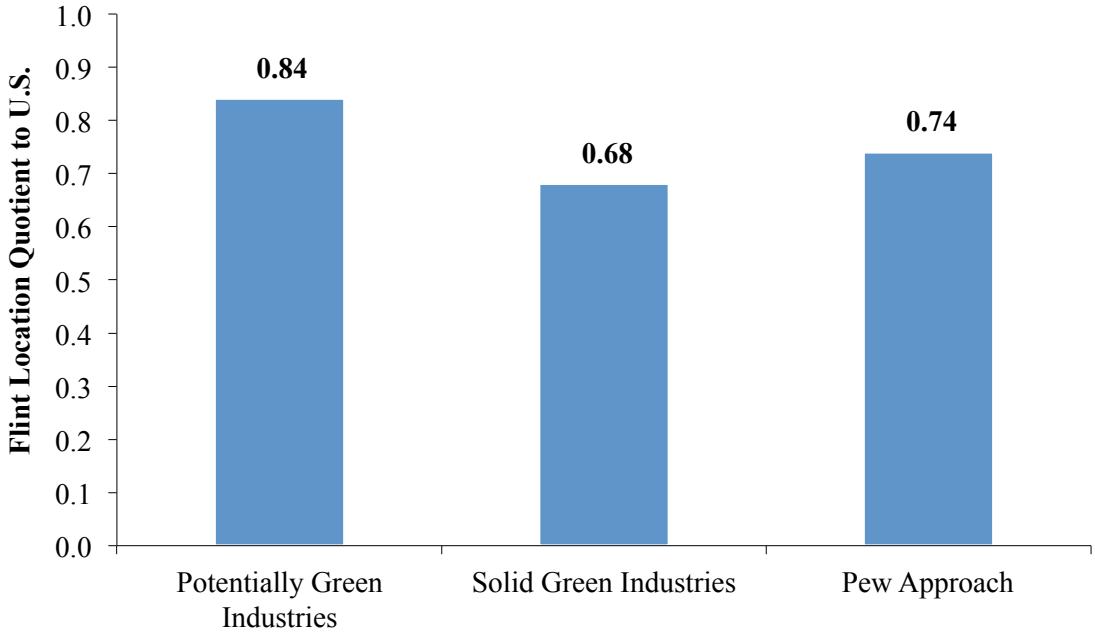
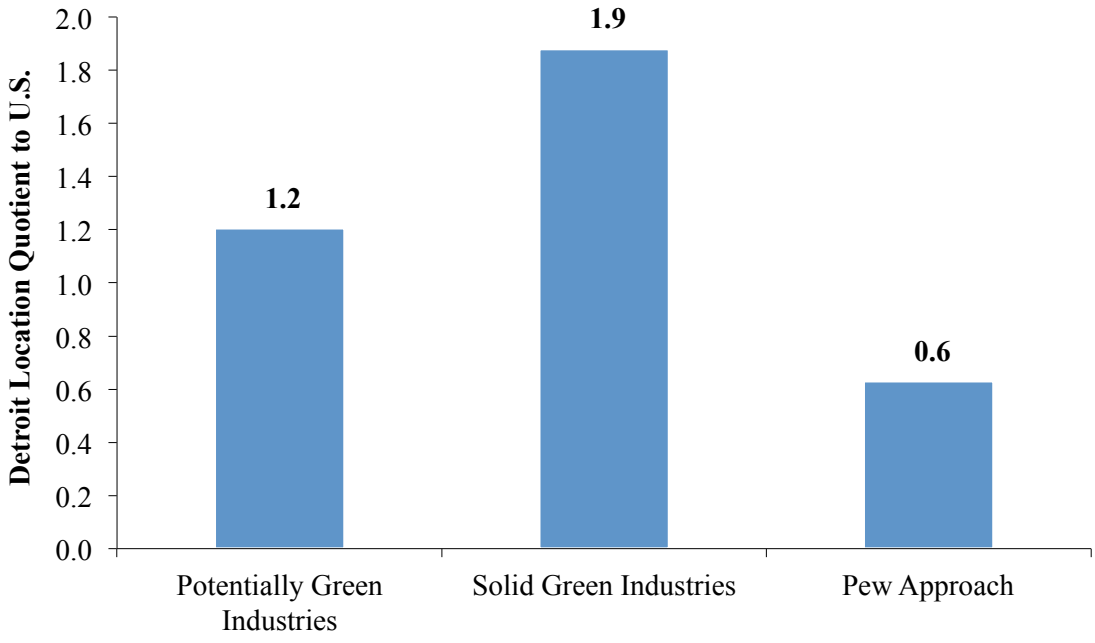


Figure 3: Comparison of Methods – Location Quotient, Detroit



These results indicate that assessments of the strength of the green economy in any given city or region will be highly sensitive to the definition of green jobs that is being used. It also means

that until there is a standard definition of green jobs utilized by researchers, it is not possible to directly compare results of different studies.

7. Emerging Strengths in the Flint Clean Economy: Survey of Two Clusters

In this section we illustrate that the groundwork is in place for the City of Flint and Genesee County to become leaders in the emerging green economy. A multitude of homegrown economic opportunities and a desire to reinvent itself make Flint the ideal proving grounds for a fresh wave of cleaner, greener innovation and manufacturing. We focus on two particular activity 'green' clusters: Cleaner Electricity and Cleaner Transportation. The Flint area is already seeing some promising opportunities in each of these areas. With the proper investment, these clusters will grow and diversify, bringing jobs and lasting economic development. The following discussion provides a picture of not only what's happening on the ground right now, but also what could soon come to be if this momentum is carried forward.

A. The Flint – Genesee Region Cleaner Electricity Cluster

Flint's wastewater treatment facility is home to a unique collaboration that creatively demonstrates the city's commitment to building a clean energy economy: Where sewage flows in, renewable energy flows out.

The facility's newest addition is an anaerobic digester that recycles organic waste products to produce biogas, which is being planned to supply "green" electricity and gas to the WWTP; effectively "taking it off the grid". ***Swedish Biogas International (SBI)***, a Swedish firm that operates the plant, was convinced to invest in Flint by a visit from Governor Granholm in 2007. SBI CEO Tom Guise says the city's clear need for economic development helped seal the deal. In addition to the original grant from the MEDC through its 21st Century Jobs Trust Fund to develop the demonstration plant, the State of Michigan in collaboration with the DOE contributed $951,500 to Kettering University to establish the Biogas Center of Energy Excellence (COEE) research projects.

After several years of development, the plant is up and running. Guise envisions this plant will serve as a model for other U.S. cities hoping to invest in a diversified renewable energy

portfolio. The benefits to Flint are obvious: in addition to the trade jobs it has provided during construction, any profits from the plant will be shared in a 50/50 partnership with the city.

SBI has grown to five full-time professionals, but Guise expects that number to double by the end of 2011. In addition to employment at SBI in Flint, its researchers collaborated with facility and students from ***Kettering University*** on the next developments in biogas production. The university-run ***TechWorks*** business accelerator, headed by Director, Neil Sheridan, has served as an incubation space for SBI since the company arrived in Flint. Researchers there are refining methodologies for converting various food wastes into biogas. SBI has begun a 2nd project in Reed City, MI which uses Yogurt as a main feed stock to create biogas, similar to the demonstration plant in Flint, MI. All laboratory, engineering and project management will be executed from SBI's home office in Flint, MI. A main reason why SBI decided to build its plant here was the promise of research collaboration with Kettering. Sheridan noted that undergraduate students, in particular, have seized this opportunity to participate in an interesting new alternative energy research operation. This partnership demonstrates the incredible value of Flint's research and development capacities as an economic development tool, an advantage which could surely be leveraged even more in the future.

All of this is made possible by Kettering TechWorks' business and research incubation services, which are a tremendous asset to clean technology clusters in the region. From its home in Kettering's brand-new Innovation Center, TechWorks helps technology entrepreneurs build their businesses and develop products for the market. Despite its long history with the traditional automotive industry, Kettering is fast becoming a regional mecca for clean technology development. Its transformation is emblematic of Flint's own economic rebirth in the aftermath of GM's departure: Pretty impressive for a university that was known as "General Motors Institute" until just over a dozen years ago.

Another local success is ***Prismitech***, a company owned and operated by Kettering graduate students and faculty, which has developed a technology that achieves impressive energy use reductions in commercial refrigerator systems. Although still in its early stages of growth, it has already done more than $90,000 in sales, says Sheridan. The company has hired two new employees in the past year or so, and its owners are committed to keeping future expansions centered locally. Sheridan thinks that Prismitech is just the first of many exciting new business

opportunities to emerge from Flint-area research centers like the Innovation Center, however. "Clean green areas are of enormous interest to our students," he says, estimating that several thousand Flint-area students and alumni have already received university training in green technologies.

In other words: Flint is home to incredible innovative potential in cleaner technology, just waiting to be further unleashed.

Reinventions

Innovation does not only include exotic new ideas, but also the process of reinvention for existing assets. While the auto industry is enjoying resurgence, diversification using existing resources will also be important to building a thriving economy in Flint. Howard Croft is living proof that former autoworkers are the true building blocks of Flint's clean economy. He worked at GM for fifteen years before getting laid-off. Now he runs one of the most promising small businesses in Genesee County, ***Mid-Michigan Solar***.

Howard's firm designs, engineers, and installs solar systems for residential and commercial purposes. In April, the two-year-old company was honored as one of the Genesee Regional Chamber of Commerce's "Genesee 10 to Watch" recipients. Howard has used his extensive experience and connections to turn this small business into a growing employer for the region. Including contractors and part-time employees, Mid-Michigan Solar has about 30 people on the payroll, including five new hires in the last year alone. The recent hires included office support staff, an engineer, a master electrician, and an apprentice electrician.

Croft's mission extends far beyond just the company payroll, however. He wants to leverage his own success to create opportunities for others. "When you look at sustainability, it's my belief that it's not necessarily the number of direct employees, it's the [overall] impact I have on the economy," he says.

This philosophy has yielded some fruitful collaborations with older engineering firms, other emerging solar companies, and electrical contractors. To help build momentum and capacity for opportunities in the solar realm, Croft worked with local firm Weinstein Electric to give its electricians firsthand exposure to solar installations. "We do things they can't do. I do solar

every day. Other companies that only get a solar job every three months don't have capacity to train for solar," he says. Howard's crew took some Weinstein electricians out on a recent job, and he now has plans to work with them on future projects. He also tries to involve engineering students in jobs when he can, offering invaluable training opportunities in the emerging solar job market.

For his next big project, Croft plans to build a showroom that will offer hands-on exposure to solar technologies for members of the public. His view is that the more chances people get to interact with solar projects, the more interest they have in building the clean energy sector as a whole. Given its recent successes, *Mid-Michigan Solar*'s collaborative philosophy towards businesses and students appears to be working quite well.

"We're trying to be the difference maker by leading the pack of how to use this attention the right way," he says. "This is a good position to be in—I look at is as a responsibility rather than just a [business] opportunity."

Building Local Supply Chains—Keys to a Cluster

Clean tech innovation on its own has little economic development value. The challenge is to translate these technological advances into local jobs. A prime way to expand the green economy in a region is to develop local supply chains for 'green' manufacturing processes. Since its inception, TechWorks has offered 'Manufacturing Introductions' to connect tech innovators with local manufacturers. The center is now developing a program for 'Manufacturing Incubation,' which will connect local suppliers with businesses pondering a move to the Flint area.

But it's not just new companies that are helping to fuel Flint's drive towards clean electricity production. Several longtime Genesee-area manufacturers are taking the lead as well.

Creative Foam Corporation has been based in Fenton since 1969. Throughout its long history, it produced foam and plastic components for the auto industry. In the mid-2000s, the company sought to diversify its operations, so it began producing foam composite kits for use in wind turbine blades. A plant in Longmont, Colorado made those parts until 2010, when Creative Foam received a $362,386 tax credit from the Michigan Economic Growth Authority. This allowed

Creative Foam to expand a plant in Fenton to add capacity for turbine component production. This five-year, $1.5 million investment will create 63 new jobs.

At nearby ***Epic Machine Inc.***, also in Fenton, a 32-year-old tooling facility is likewise seeing new opportunities in the clean energy economy. As is the case with most local manufacturers, Epic has largely made its business working for the auto industry. But in recent years the company's 30-worker, 39,000 square foot facility has begun producing components for solar panels.

The desire to get involved with clean technology has reached industries far beyond component manufacturing. The 53-year-old, family-owned business ***Landaal Packaging*** is both profiting from and contributing to Genesee's newfound sustainability focus. The company has contracted with WindTronics to package its Michigan-made consumer wind turbines. To suit its new 'green' customers, Landaal developed several techniques to reduce shipping costs, save fuel, and reduce waste. Its plants are working steadily towards a 'zero landfill' goal; Bernie Scibienski, Landaal's Vice President of Operations, says they used to ship two 40-yard containers of waste per day, but now ship only two each *week*. The company's decision to diversify into sustainable products and work to never have any customer greater that 25% of their business has paid dividends—it recently added ten hourly positions and two new salary positions, with an eye toward recruiting for an additional two salary positions.

One Flint start-up is taking a different role in the emerging clean energy economy by focusing directly on supply chain growth. ***WinSol Electronics, LLC*** has its sights set on making Flint <u>the</u> place to go for offshore wind turbine production. "We are toeing the line of the national push for offshore wind," says Royal Brooks, Chief Operating Officer, "We are identifying elements that have become roadblocks to entry into offshore wind development." In addition, Brooks notes, "We observe a number of other entities that have developed across the country [in wind energy production]…The major problem with them is that they didn't build a supply chain, and as a result, they didn't build employment." He points to a number of large companies—including General Electric and Vestas—that have indicated they plan to expand their wind manufacturing operations within the state. "We're building a bed to make it real comfortable for them to land."

For domestic wind turbine production to really take off, Brooks says, the manufacturing supply chains need to become far more efficient. Currently, the average delivery time of a wind turbine is approximately two years, and for offshore wind production components materials are even scarcer. Some of the inputs will have to come from Canada, Germany, or the southern U.S. no matter what. But WinSol predicts that if component manufacturing takes place in Michigan, it will significantly reduce the barriers and risks to building a healthy, homegrown turbine industry in this city on the rise.

Energy Efficiency – Building Energy Upgrades (weatherization)

For over 40 years, the Genesee County Community Action Resource Department has been weatherizing homes throughout the county. In a normal year, 150 – 200 low-income residences are serviced, employing approximately 10 full-time workers. However, with the influx of federal dollars from the American Recovery and Reinvestment Act (ARRA) to Community Action Agencies around the state for weatherization programs, Genesee County has seen its program increase tenfold with over 2,000 homes set to be weatherized by the end of March 2012. These dollars have allowed the county to hire an additional 30 employees. According to Matt Purcell, the program's director, about 70% of the homes to be weatherized are within Flint city limits and eighteen of the 40 employees doing the work are Flint residents. Long-term employment effects will depend on the continued funding beyond the current ARRA increase.

Both Flint and Genesee County have also received Energy Efficiency Conservation Block Grant funds totaling $3.7 million. Flint's $1.1 million will focus on bringing energy improvements to City Hall while also providing twelve $10,000 grants for energy efficiency retrofits for homeowners. The balance of funds will be used to perform energy audits on 100 Flint area homes. The remaining $2.6 million will fund the Genesee County Energy Efficiency Retrofit Program.

Helping local organizations gain knowledge on how to identify and access these available federal and state funds, including governmental agencies, has been one of the key roles of the Flint Area Reinvestment Office (FARO). FARO helped leverage funds from the Genesee County Community Action Resources Department's weatherization funding and the Genesee County Health Department's Lead Reduction grant to fund the Green and Healthy Homes Initiative. The

program transforms unsafe and energy inefficient housing by helping coordinate efforts to upgrade homes and by leveraging funds from government, local and philanthropic resources.

Other local institutions, in particular the University of Michigan – Flint, have made their own investments since the mid-1990's to upgrade the energy efficiency of its campus, including replacing old steam traps, which costs only $150, but saves the campus $3500-$5000 per year, per steam trap. Other improvements on campus include changing out heat exchangers with instantaneous hot water heaters, installing LED lighting on walkways, standardizing interior lighting to electronic ballasts, and installing variable frequency drives on their main air handling units. U of M facilities managers have looked into installing renewable energy systems on campus, but given the longer term payback, energy efficiency projects have been the top priority. "We chose to start with the low-hanging fruit with the hope of getting some quick 'wins' to help build on the story of clean energy investments." said Tim Barden, Assistant Director of Facilities and Operations.

B. The Flint – Genesee Region Cleaner Transportation Cluster

Given Flint's strong ties to the American auto industry, it should come as no surprise that the Genesee region houses an equally impressive array of Clean Transportation developments and opportunities. By leveraging its plethora of talented auto experts and facilitating a series of strategic alliances, the city has crafted a broad base of support to satisfy the country's growing desire for alternative transportation options. Ambitious, far-reaching initiatives—private and public alike—show the diversity and range of opportunity for Flint's reinvigorated transportation sectors.

General Motors: Driving Cleaner

With its electric-powered Chevy Volt already making waves across the country, ***General Motors*** is charging full steam ahead toward a diverse fleet that increasingly features fuel-efficient vehicle technologies. Aside from the Volt, GM has released the 2011 Cruze Eco, which offers an impressive 42 MPG Highway rating. Next up is the 2012 Sonic, which boasts its own 40 MPG Highway rating.

What do all three of these cleaner vehicles have in common? Their 1.4-liter, four-cylinder engines are all built at the Flint Engine Operations plant. In 2009, GM invested $250 million in the plant to create capacity for 1.4-liter engine manufacturing. This was followed shortly thereafter by a $138.3 million investment in 2010, and another $84 million in May 2011. There are now 252 hourly workers dedicated exclusively to making this engine, with another 112 salaried personnel maintaining overall plant operations. It seems likely that GM will continue to build investment in the Flint Engine plant as it ramps up its production of fuel-efficient and electric vehicles in the years to come.

GM's local supply chain has readily adopted new technologies and production practices to supply the Volt line. Beyond employees at the plant itself are those producing the component parts unique to an electric vehicle. Flint-based ***Rogers Foam Corporation*** produces foam "bumpers" for the Volt's battery pack—135 of them for each vehicle. With GM's tentative plans to double Volt production in 2012, that could mean quite a bit of new business for Rogers Foam. One company official was quoted as saying such an increase in demand could lead to Rogers adding a third shift and hiring 30-50 more people at the Flint facility, in addition to its current 40-50 employees.[25]

As it is now, many of the Volt's components are manufactured outside of Michigan—and in some cases outside of the U.S. But manufacturers are increasingly recognizing the benefits of closer proximity to suppliers, which include reduced shipping costs, greater certainty and predictability of delivery times, and the ability of a supplier to be more responsive. When production ramps up, we expect that the benefits of a local supply chain will become more apparent, and this may encourage GM to increasingly focus on local suppliers in the Flint area.

In addition to its newfound focus on cleaner vehicle technologies, GM is pressing forward with a commitment to 'green' principles in its operations as a whole. Many GM plants now feature solar panels and electric vehicle charging stations. But perhaps most impressive are the company's 'zero waste' efforts and 'landfill-free' facilities, of which Flint Engine Operations, Flint Metal Center, Grand Blanc Weld Tool Center, Flint Tool and Die, as well as the Customer

[25] http://abclocal.go.com/kfsn/story?section=news/local&id=8239986

Care and After Sales, Davison Road are shining examples. Every bit of unused material at these plants is eventually reused in some way or another, avoiding the landfill. Seventy-eight manufacturing plants, representing more than half of the company's facilities worldwide, now meet this standard.

John Bradburn, Staff Project Engineer and Manager of GM's Design for the Environment Group, manages the company's waste-reduction initiatives from his home base in Grand Blanc. He grew up in Flint and says the 'zero waste' operations have been recycling about 2.5 million tons of waste each year. These efforts have made GM $2.5 billion through its sale of repurposed waste products since 2007. John has spearheaded a number of innovative waste reduction projects in the area, including collaboration with global corporations such as ***Federal Mogul***, a Southeast Michigan based company to turn cardboard waste into vehicle parts. Other projects involved processing 227 miles of oil boom used to clean up the Gulf of Mexico oil spill into vehicle parts for the Chevy Volt and transforming scrap Volt battery covers into artificial nesting box habitats for local wildlife.

GM's transformation has given a very visible boost to not just the Clean Transportation cluster, but to the area's economy as a whole. Its comeback through investment in cleaner vehicle technologies is a powerful and potent symbol of Flint's own transformation. This report has not attempted to investigate the full range of waste reduction and recycling activities in Flint, but this remains an interesting area for future work.

Building Alliances, Breaking Barriers

The faculty, researchers and students at Kettering University's ***Techworks*** believe in Flint's bright clean auto future, as well. They have taken advantage of Flint's expertise and growing involvement in the world of clean transportation, and are working on a "Green Automotive Cluster" to complement the center's other incubation work. This collaboration would connect researchers with manufacturing and trade groups to direct innovators' efforts towards cleaner automotive technologies. Director Neil Sheridan says the goal is to leverage strengths of both Kettering University and the Flint and Genesee region as a whole. He pointed out that a lot of the 'green' tech work being done today is already heavily connected to the auto industry.

TechWorks is busy making partners from Midland and Lansing to Toledo, Ohio, and even up into Canada. Work will include alternative technologies such as biogas, fuel cells, solar, and advanced materials for clean transportation purposes.

One company that incubated at TechWorks is ***Global Energy Innovations*** (GEI), which develops fuel cells for various transportation purposes. Kettering Professor Joel Berry launched the company as a way to commercialize technology he had worked on through his research at the university. GEI's patented mobile, compact fuel cells are a hydrogen-powered alternative to diesel generators on trucks, small aircraft, emergency vehicles, and boats. In August 2011, Dr. Berry met with dignitaries from the Dominican Republic to tentatively discuss building a fuel cell power plant on the island. If the deal goes through, it could create 20-50 jobs in Flint.[26] As the company secures more contracts and begins manufacturing fuel cells, its employee count could climb as high as 700—and Dr. Berry is interested in keeping those added jobs in Flint.

As we have seen, Kettering University is a key strategic lynchpin in the Genesee region's developing green economy. Its programs have spurred alliances between various entities, both public and private. There are other key alliances developing amongst large Flint-area employers that are breaking the mold and helping to create good green jobs. For an area in which most jobs have traditionally been dependent upon the fortunes of one big employer (General Motors), the ideal new economy will diversify to include a mix of companies. Fortunately, ***Magna International***'s recent work has potential to make significant progress in this direction. Magna is a sponsored research client of Kettering University, which means that the school's professors and student researchers work with them to solve engineering and science challenges related to improving their products, in this case improving electric power management in electric cars as part of Magna's eCar program.

Magna is a Canadian auto industry supplier with longtime roots in Michigan. The company recently completed most of the development work on a car that will soon hit the market as the Ford Focus Electric Vehicle (EV). It is quite an anomaly for a major American automaker to

[26] Beata Mostafavi. "Fuel Cell plant in Dominican Republic could produce between 20-to-50 jobs in Flint." *Mlive.com*: August 10, 2011. <http://www.mlive.com/business/mid-michigan/index.ssf/2011/08/fuel_cell_manufacturing_plant.html>

mass-manufacture a car that was not created in-house, by its own design team. But Magna, which reordered its corporate structure to create ***Magna E-Car Systems***, was determined to jump-start the EV market. And because Magna independently developed most of the technology used in the Focus EV, it could make its way into vehicles produced by the other Big Auto companies. In other words, Magna E-Car Systems is not restricted to just working with Ford—its EV technology may well attract lucrative contracts with multiple automakers.

Genesee County's Grand Blanc Township is already seeing the benefits of this alliance as Magna expands its facilities to increase production under the Ford contract. Grand Blanc houses one of the company's Electronics facilities, which produces rear-view cameras for the Focus and other vehicles, in addition to an E-Car Systems facility. Multiple parts for the Focus, including electric motors and battery components, will be produced in the Grand Blanc plants.

Magna has worked in close collaboration with both the ***Genesee Regional Chamber of Commerce*** (GRCC) and the local ***Career Alliance*** to ensure that the company's growth is sustainable and that workers' needs are accounted for. "What we're trying to do is develop an opportunity for our displaced engineers that may have been laid off, and retrain them for working with Magna in batteries and electric tech," says Alicia Booker, Career Alliance's President and CEO.

Janice Karcher, Vice President of Economic Development at the GRCC, says it wasn't always a done deal that the new E-Car Systems facility would be located in Genesee—quite a bit of wooing was involved. The company considered locations in Ohio, Indiana, and other parts of Michigan before eventually settling in Grand Blanc. Karcher says a number of factors, including better millage rates (i.e. property tax rates), cheaper utility costs, and lower average wages made Genesee a wise economic choice as well as a convenient one for this company based in Canada. In addition, Magna's expansion into the world of EVs has been aided by a federal Department of Energy grant as well as two multi-million-dollar tax breaks from the Michigan Economic Growth Authority, which will help them create over 900 jobs over the next several years

As Magna grows its investment in EV production, it will bring many more job opportunities to the Genesee area. Given E-Car Systems' groundbreaking success with its Ford collaboration and the strong potential for other auto companies to get on board, the future looks bright for EV-friendly Genesee.

The MTA Gets On Board

The ***Flint Mass Transportation Authority*** recently installed five solar bus shelters in its coverage area. As passengers wait for buses to arrive, the photovoltaic solar panel shade structures over their heads are busy generating power for signage and lighting rather than drawing from the electrical grid. It's such a common sense and economical solution that MTA already has plans to purchase 20 more of the shelters from Detroit-area firm ***Brasco, Inc***.

The move toward solar bus shelters is just one indicator of the new cleaner direction the MTA has set for itself. The agency is also in the midst of launching a massive new project that will make Clean Transportation publicly visible like never before. At present, MTA's fleet runs entirely on diesel fuel. But thanks to millions of dollars in grant funding and the go-getters in the front office, Flint's public transit system will soon be running on clean, green alternative fuels.

The agency's signature project is an innovative new alternative fueling station, which is set to be operational starting in 2012. The 20-acre facility will provide multiple advanced fuels—hydrogen, fuel-compressed natural gas, and propane—to run MTA's fleet. All of these fuels promise less air pollution, including fewer climate-destabilizing emissions, than diesel—bringing cleaner air and more environmentally friendly transportation to the people of Flint. These advanced fuels also have the benefit of not being tied to oil prices.

This ambitious project will require constructing a station as well as purchasing and converting vehicles to accommodate the alternative fuels. MTA aims to utilize local-area firms wherever possible. "Flint has been so affected by what's happened to the automotive industry, and MTA is one of the larger employers in the area," says Ed Benning, MTA General Manager, "So we have an obligation to do everything we can to help the community while we're helping ourselves." Part of the plan is to convert between 40 and 50 transit vehicles to run on propane, which will

likely be done by a company based near Detroit. But Benning wants to discuss the possibility of siting the actual conversion process in the Flint area, which would help keep investment in the local economy.

The fueling station will eventually be opened to public use, with electric vehicle charging added to the mix. This will provide an invaluable resource for Flint-area residents and businesses hoping to convert their own vehicles over to alternative fuels. Since one of the major challenges to widespread electric vehicle adoption is the lack of charging infrastructure, MTA could succeed in revolutionizing its own fleet as well as the personal fleets of many Genesee residents.

There is also a strong education component built into the fueling station project. MTA is in close contact with Kettering University, Baker College of Flint, and UM-Flint to create research initiatives around the construction process and daily operations at the station. Further down the line, a classroom will be installed within the fueling facility, allowing even closer access to the operation. In fact, MTA's unique relationship with local universities helped persuade the Federal Transit Authority to give Flint funds for the project in the first place. The hope is that research from this collaboration will inspire and guide similar efforts across the nation.

The project's biggest financial proponent so far has been the federal government through various Federal Transit Authority (FTA) grants, including the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, as well as American Recovery and Reinvestment Act (ARRA) funds. Terry Jurrens, MTA's Grants & Planning Manager, says that approximately 80% of funds have come from federal sources, with the remaining 20% provided by the state. Benning is intent on fueling further expansions by drawing in private sector investments, as well. He wants to craft public/private partnerships to facilitate operations and maintenance at the station, thereby increasing the project's long-term economic viability. Such local investment could translate into even more green jobs. MTA also has plans to install a solar array to power the fueling station and electric vehicle charge points, but doing so will only be possible with a private-company investor and facilitator on board, presumably in a profit-sharing position. Multiple private parties have already expressed interest in making this happen, says Benning.

A public-private-academic collaboration aimed at making Flint a national leader in clean transit? Sounds like a winning combination indeed.

8. Synthesis of Findings

Our evaluations of the cleaner electricity and cleaner transportation clusters in the Flint and Genesee region illustrate the dynamic interactions and linkages that lead to innovation and job growth. These findings are backed by the results of recent research, which has shown that when businesses performing similar tasks in the clean economy are clustered within close proximity to one another, they grow significantly faster than non-clustered establishments. In fact, from 2003 to 2010, clustered establishments in the clean economy grew at an annual rate that was 1.4 percentage points faster than non-clustered establishments.[27] This supports our overall finding that clean economic development in Flint could be greatly accelerated through a focused, carefully constructed drive to build regional supply chains and nurture nascent industry clusters. Clusters enable learning to be more cooperative, and clustered firms enjoy the increasing returns that result from information sharing and other positive spillovers.

As our preliminary research illustrates, Genesee's emerging clean economy is transitioning away from exclusive reliance on GM. Today, the region hosts thriving small businesses and expanding multinational corporations alike. Companies with decades of history in the region are finding new roots in the clean economy, while the brightest minds from Flint's top-flight universities are simultaneously sowing new seeds for clean business development. The newfound successes of these establishments are proof that the city should not focus on luring jobs away from other places—organic, indigenous economic development is a better bet. After all, 95% of job growth comes from the expansion of existing businesses or the birth of new establishments.[28] Consequently, the idea of clusters as an organizing concept for economic development has become a key planning tool at both the state and federal levels.[29]

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[27] Mark Muro et al., 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" The Brookings Institution (July), p. 4.
[28] Jed Kolko, 2010, "Business Relocation and Homegrown Jobs," Public Policy Institute of California (September).
[29] Mark Muro and Bruce Katz, 2010. "The New Cluster Moment: How Regional Innovation Clusters Can Foster the Next Economy," Brookings Institute (September).

But to think of Flint's developing clean economy just as a *cluster* of activities does not fully describe the key feature that makes the cluster powerful: interconnectedness. What makes the cluster work is a *web* of interconnected businesses and projects, upheld by a solid foundation of local institutions for workforce and business development, and facilitated by the close proximity afforded by density. One might posit that modern information technology has made location increasingly irrelevant, but there is substantial evidence to the contrary. Even at Google, physical proximity outweighs electronic connectedness, according to a study of information flows at the firm: "Even at an Internet company, information travels fastest on the ground."[30]

The Genesee web includes a mix of companies, academic institutions and research centers, government agencies, and nonprofits such as the ***Genesee County Chamber of Commerce*** and the ***E3 Innovation Network***. In implementing its goals, the City will be able to leverage this base of support to ensure that the region's transition to a clean economy is a smooth one.

As we have seen, Flint's institutes of higher education—and in particular ***Kettering University***—have been crucial to the growth of the regional network, spurring alliances between public and private entities alike. Local universities have also taken the lead in providing training for clean tech and clean transportation projects and businesses. In addition to Kettering's extensive and expanding course selection in hybrid and battery technologies, fuel cells, and alternative energy technologies, other local institutions are developing programs to train or retrain Genesee's workers for various 'green' jobs tasks. For example, ***Mott Community College*** now offers a "Sustainable Construction Certificate" to prepare workers for jobs in the world of green buildings.

Workforce development organizations such as ***Career Alliance*** are also incorporating clean economy goals into their everyday operations. CEO and President Alicia Booker says her organization's "employer-driven" approach—which seeks to only train workers for the needs that businesses express desire for—has led to a number of training initiatives for green-related skills. Through connections to regional businesses, workforce development programs produce the skills that are really needed. To supply workers for the planned expansion at ***Magna E-Car Systems*** in late 2011, Booker and her team are working directly with the company to make sure

[30] Noam Cohen, 2008. "Google's lunchtime betting game." *New York Times* (January 7).

local candidates for the new jobs are up to snuff: "What we're trying to do is develop an opportunity for our displaced engineers that may have been laid off, and retrain them for working with Magna in batteries and electric tech," she says. The ARRA funding for weatherization projects in Flint spurred the creation of similar Certificate-Level training programs in construction and weatherization, which were developed in collaboration with local community agencies.

Career Alliance is also in heavy contact with ***The Genesee Regional Chamber of Commerce*** (The GRCC), which has played a crucial role in building the web of connections around the clean economy. According to Booker, the two organizations hope to develop a Regional Skills Alliance around energy, which would convene stakeholders to address issues in workforce development, then implement programs to address concerns and needs. The State has expressed interest in such a collaboration, which could provide important infrastructure for local investments in alternative energy projects.

It should not go without mention that The GRCC is in many ways responsible for the current clean economy picture in Genesee. Most of the larger companies in the clusters narrative above benefitted greatly from the help of The GRCC, which helped them secure tax breaks and other incentives. As evidenced by its key role in crafting the ***E3 Innovation Network***, the breadth of The Chamber's synergistic capabilities cannot be overstated. It understands the value in directly appealing to 'green' projects, and its staff is eager to take the reins in supporting clean economy efforts.

The GRCC works with businesses of multiple sizes like Magna and ***Creative Foam***, although smaller companies also have an important ally in the ***Michigan Small Business and Technology Development Center***, which has an office in Flint on the Kettering campus. The MI-SBTDC is a partner program of the U.S. Small Business Administration and receives funding from the ***Michigan Economic Development Corporation*** as well as some private investors.

Marsha Lyttle, Director of the Center's Genesee-Lapeer chapter, says the MI-SBTDC provides a variety of business counseling, training, and planning services. "It doesn't matter what kind of business walks in my door," she says, "we can bring needed expertise to bear in all areas of business development." Although most states have Small Business Development Centers,

Michigan's is somewhat unique in its capacity to offer Technology-based commercialization assistance, which could prove especially useful to clean tech start-ups. A center focusing on small business development is necessary because of the increasing importance of small firms in the overall employment market. For example, in 2010, two-thirds of Michigan's manufacturing jobs were located in facilities that employed fewer than 250 workers. Just a decade earlier, only about half of the state's manufacturing jobs were in these small firms.[31] Given this trend, The MI-SBTDC's well-suited services are an important complement to The GRCC indeed.

In sum, the dedicated business and workforce development resources already active in Genesee County will continue to be tremendous assets into the future. Their direct contact with local businesses and job applicants, coupled with a recognition that the region's clean economy is poised to take the stage in a big way, make them uniquely capable of facilitating the local alliances, partnerships, and interconnections needed to build the region's clean economy future.

9. Preliminary Recommendations

***Engage in active supply chain construction*.** Efforts should be made to actively foster supply chain linkages. One promising approach involves the establishment of formal collaborative groupings of separate companies, which serve as a form of vertical integration. These groups can bring together diverse expertise in a more compelling package—the whole becomes greater than the parts. As a result, the collaborative group can be more effective in bidding for contracts and capturing market share.

A successful initiative encouraging companies to cooperate has been the State of Michigan's ***Tool & Die Renaissance Recovery Zones***, through which local businesses receive tax incentives if they agree to collaborate to gain larger contracts. An offspring of this original concept of collaboration is ***Adaptive Manufacturing Solutions***, a cluster of small and medium suppliers with complimentary capabilities in Michigan that "offers a single point of contact to meet a customer's technical, tooling, manufacturing and quality needs."[1] Laurie Moncrieff, President of ***Schmald Tool & Die, Inc***., is the originator of the collaborative and was granted the initial funding through a WIRED (Workforce Innovation in Regional Economic Development) grant

[31] Dan Luria, 2011 "Michigan Manufacturing: Still a Strong Contender," ManufactLINE, Michigan Manufacturing Technology Center (Winter).

and the Great Lakes Trade Adjustment Assistance Center in 2007. In the realm of clean transportation, AMS is working with Icecat, a company that manufactures battery powered ice resurfacing machines just outside of Flint, to source components in Michigan as well as incorporate Michigan manufactured lithium ion battery technology in the unit.

In addition to this type of formal collaboration, it would also be beneficial to simply help make specific market linkages—i.e. help demand find supply. Dan Luria, Research Director at the ***Michigan Manufacturing Technology Center***, describes a job creation strategy that starts with the establishment of an 'anchor' Original Equipment Manufacturer. The next step involves finding local talent that can fill out the tiers of the production chain. Having a designated entity—like a Manufacturing Extension Partnership or Chamber of Commerce—serve as a connector among suppliers can help accelerate growth, boost efficiency and keep investments local. But efforts must go further. Active supply chain construction could occur as a function of local government or could be achieved with support from nonprofits, as discussed under the next section ("Further Work").

Promote cluster growth by encouraging linkages. Another important policy area involves actions that are not company-specific but rather create the conditions under which these connections can be made. Tasks to accomplish this could go in multiple directions, and creative approaches will be needed to engage and sustain stakeholder interest. To begin with, much deeper knowledge of the regional clean economy will help bring all potential collaborators to the table, under the circumstances most conducive to making connections. The overall idea is to build out the clean economy clusters by creating a culture of networking and collaboration akin to the work already being initiated by Howard Croft at ***Mid-Michigan Solar***.

Actions could include organizing regular networking events, information sessions, and case study testimonials from guest speakers to demonstrate the potential for this sort of work. ***The E3 Innovation Network*** and ***The Genesee Regional Chamber of Commerce*** would be natural organizers, or another city entity could assist in carrying out these actions. A specific focus on clean economy actors and related industries would be justified given the newness of this area of economic development, as well as its potential to expand in Genesee given the proper assistance.

Facilitate Access to State and Federal support. Small businesses in emerging industries often do not have the time or capacity to keep informed and take full advantage of available funding opportunities. Assistance in this regard would help ensure that Flint's businesses are able to remain competitive with businesses around Michigan and the U.S. in vying for funds. Though business development agencies in the area already provide a broad suite of similar services, a resource tailored specifically to identifying opportunities for clean economy businesses could prove invaluable.

10. Further Work

A next phase of the Flint Clean Economy Project will involve work to implement the preliminary policy recommendations. Efforts to develop new successful collaborative groups would be one priority, as would be the development of other generalized support for cluster job growth. Some specific activities could involve developing a comprehensive database, as well as engaging businesses and other stakeholders through various types of outreach including informational sessions, roundtable discussions and networking events. Further research and policy analysis is needed to refine and expand recommendations, including extension to a topic area not covered here: issues pertaining to land use, vacant homes, recycling, and brownfield policy.

Comprehensive clean economy analysis*:* One major thrust of the work will be a quantitative assessment of cleaner energy manufacturing activities in the Flint and Genesee County region. This quantitative analysis will provide the information needed for publishing a Directory of Cleaner Economy Establishments and Affiliations. Steve Montle, Flint's green city coordinator, believes such a directory would greatly facilitate new connections and business opportunities.

This activity will both broadly help the cleaner economy clusters growth in the Flint area and will also provide the insights needed to try to execute strategic supply chain construction. A new Brookings Institution report emphasizes the importance of this type of information gathering: "[Regions need to] Improve the information base about local industry clusters... Too little is as yet known about these industries at the crucial regional level, and that has impeded good strategymaking."[32] Insights into the contours of the regional economy – size, growth areas,

[32] Mark Muro et al., 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" The Brookings Institution (July), p. 43.

market opportunities and challenges – will greatly assist in refining policy recommendations. Policy analysis would review city and county procurement practices in an effort to see if these are fully taking advantage of local suppliers.

Assess workforce programs: Conduct an assessment of Genesee's workforce development programs and plans. Gaps and challenges for specific green jobs training needs should be identified and addressed. Analysis should focus on how best to align workforce training needs with the current and future demands of the clean economy, as well as how to satisfy those needs in the most cost-effective and efficient way. The current and expected future supply of jobs is one crucial element. The assessment should also include a review of the regional population. Looking at what programs are available is not enough. The existing skills of the residents also need to be assessed. Notice that this is another opportunity to help grow linkages—among workers, educations, and businesses in this case.

Assess city/county policies, activities, and resources through a cleaner economy lens: As we have detailed above, Genesee already hosts myriad development and training programs with great potential to spur the growth of Flint's clean economy. With our assistance, the city and county should assess the opportunities and potential obstacles presented by policies and/or structures at their own programs and agencies, taking into account the uniqueness of the clean economy challenge. Garnering a better picture of these potential challenges and obstacles will be made easier through greater information-sharing and data collection on issues relevant to regional clean economy development.

In addition, the city and county should complete a broader analysis of current policies with an eye toward the ways in which they may impact the proliferation of clean electricity and clean transportation businesses in the area. Particular areas of interest might include land-use regulations, electricity arrangements and purchasing agreements. The idea would be to create a solid policy framework that encourages rather than discourages the development, production, and deployment of cleaner technologies and products.

Facilitate access to state and federal support*:* To complement efforts of The GRCC, MI-SBTDC and local agencies, we will gather up-to-date information on funding opportunities from federal, state, and other programs for which local green businesses qualify. These fast-changing

offerings are not always easy to track, especially for start-ups or small- and medium-sized businesses. If promising federal or state grant opportunities are available, assistance completing the application paperwork could also be provided. This would include support for green workforce development. We could also help establish a collaborative arrangement between an educational institution and private sector actors as is sometimes required.

***Land use policy recommendations**:* There is much work to be done in the area of land use policy, which we have not touched upon in this Policy Brief. Due to the large number of vacant homes in Flint, many structures have been demolished and more remain to be taken down. There are public safety and neighborhood quality-of-life reasons for such actions, but they also create waste streams that feed into the recycling sector. Increasing availability of accessible urban green space could also be used to promote urban farming. Another area of intersection between land use policy and clean economic development involves land redevelopment for brownfields or empty facilities, which could house new factories and businesses. Flint has one of the biggest contiguous industrial sites of any city in the country. Land use policy recommendations that further cleaner economy objectives are a complex but promising area for further work.

10. Conclusion

The Flint Clean Economy Project aims to create new clean technology and green jobs in the City of Flint and in Genesee County, Michigan. We aim to prove the proposition that clean reindustrialization can simultaneously create good jobs, reduce poverty, and contribute to a cleaner environment. The sole objective of our policy recommendations will be to grow good jobs in the clean economy industries that are blossoming today and will dominate the tomorrow's economy. The measure of success will be how many new, high-quality jobs are created.

There are also tantalizing signs that manufacturing jobs may be poised for resurgence, in part due to clean energy development. The latest data from California show green jobs in manufacturing grew 10% from 2008 - 2009, and in 2009 manufacturing jobs made up 24% of all green jobs in California.[33] Further, manufacturing jobs have been growing steadily nationwide. In July of

[33] See page 11 of Next 10. 2011. *Many Shades of Green*.

2011, 24,000 manufacturing jobs were added. The sector has expanded by 289,000 jobs since December of 2009.[34]

There are also hopeful signs in the quantitative results presented here, which suggest green jobs are growing faster than other types of jobs. While caveats apply, there are intuitively appealing reasons to expect that such results might stand up when a more complete picture of inner city green jobs is developed nationwide. Green jobs tend to be local because many involve work transforming and upgrading the immediate built and natural environment – work such as energy upgrades with energy-saving technology, renewable energy technology, transit, and green space development and maintenance.

Cities are crucial drivers of regional growth. Simultaneous progress on urban economic and environmental challenges would help to fully unleash cities' potential as engines of innovation while driving urban and regional growth. What could be more compelling than a vision that delivers both broadly-shared prosperity and progress on ending poverty and ensures a healthy environment for those living in inner city communities?

[34] http://www.bls.gov/news.release/empsit.nr0.htm

Appendix 1: Detailed Definition of Solid Green Approach to Measurement

As explained in the body of this document, to enable some assessment of inner city green job growth before the BLS has released its data, we developed our "solid green" definition. This approach selects a subset of sectors chosen because the employment is expected to be entirely green or nearly so. Table 2, below, enumerates the specific sectors by NAICS codes. We welcome feedback on the judgment we used in selecting these sectors for inclusion.

Table 2: Solid Green Industries

NAICS	DESCRIPTION
113210	Forest nursery and gathering forest products
221111	Hydroelectric power generation
221113	Nuclear electric power generation
221119	Other electric power generation
221320	Sewage treatment facilities
325193	Ethyl alcohol manufacturing
325311	Nitrogenous fertilizer manufacturing
326212	Tire retreading
333411	Air purification equipment mfg
334512	Automatic environmental control mfg
335911	Storage battery manufacturing
336510	Railroad rolling stock manufacturing
423930	Recyclable material merchant wholesalers
483114	Coastal and Great Lakes passenger transport.
485112	Commuter rail systems
485113	Bus and other motor vehicle transit systems
485119	Other urban transit systems
485210	Interurban and rural bus transportation
541620	Environmental consulting services
562112	Hazardous waste collection
562211	Hazardous waste treatment and disposal
562910	Remediation services
562920	Materials recovery facilities
562991	Septic tank and related services
712190	Nature parks and other similar institutions
813312	Environment and conservation orgs
924110	Air, water, and waste program administration
924120	Administration of conservation programs

Appendix 2: Different Approaches to Defining a Green Job

In this section, we survey the definitional landscape. We start with the first significant effort to count green jobs on an economy-wide basis, a study by Collaborative Economics out of California. Next we discuss work at the Department of Labor's Bureau of Labor Statistics which attempts to broaden the definition. Lastly, we discuss critiques that have been made of this larger effort which indicate that even use of the broadened definition fails to count some jobs that should be described as green. Thus, we conclude that broader definitions do, in fact, provide the most accurate picture of the economic implications of environmental policies.

Collaborative Economics Approach – narrow focus

Some of the earliest work on green job definition and measurement has been done by Collaborative Economics, a Palo Alto economic consultancy, in research done for the Pew Charitable Trusts and the California non-profit Next 10. This approach has been very selective about which green jobs are included in the definition. The use of a narrow definition was mainly dictated by what jobs could be counted based on currently available data. In particular, Collaborative Economics has worked with the National Establishment Time Series, a proprietary database from the firm Dun & Bradstreet.

Collaborative Economics thus focuses on the "core green economy," goods or services that do one of three things: (1) provide low carbon advanced energy, (2) conserve energy or other natural resources, or (3) reduce pollution and repurpose waste. This definition of the core green economy involves "what is produced or provided."[35] Put differently, the core green economy covers the production of a narrow set of green products and services.

Yet, as Collaborative Economics recognizes, this approach does not account for a wide swath of green activity, or what is termed the "adaptive green economy." The adaptive green economy expands beyond the core economy ("what is produced") to consider also, "how things are produced or operated." Within many businesses that fall outside of the core green economy, jobs are emerging due to sustainability efforts. As explained in Pew's report, "[W]e focus exclusively on producers and suppliers in the clean energy economy. We do not count jobs that use these products and services – for example, jobs within utilities responsible for purchasing energy

[35] Next 10. 2011. *Many Shades of Green: Regional Distribution and Trends in California's Green Economy*, page 5.

monitoring equipment or the mass transit operations that buy hybrid buses—because data limitations prevented the disaggregation of specific jobs within these types of companies." [36]

These jobs are green jobs but are outside of the core green economy. For example, above we discussed efforts at GM plants to generate less waste. Numerous GM Flint Plants have actually achieved "zero waste status" meaning it landfills no solid waste from their daily operations. However, because the plant produces conventional trucks, the jobs associated with waste reduction at this plant are not within the core green economy.

Finally, we observe that the National Establishment Time Series data only cover private employers. So, even though the core green economy would include jobs like a government environmental compliance official, these are excluded from this narrow definition.

The Bureau of Labor Statistics – a broader definition

The Department of Labor's Bureau of Labor Statistics (BLS) is working to provide a more comprehensive measure of green jobs. As described by the BLS, they are setting out to measure green jobs that fall into one of two categories, either:[37]

- One is an *output* approach to identifying green jobs. These are jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources.
- The second is a *process* approach to identifying green jobs. These are jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.

Essentially, point A – the output approach – corresponds to the core green economy and point B – the process approach – corresponds to the adaptive green economy using the Collaborative Economics terminology. Thus, the BLS is attempting to provide a broader measure that covers both the core and adaptive green economies.

Output-based jobs are classified into five broad categories: energy from renewable sources jobs; energy efficiency; pollution reduction and removal, greenhouse gas reduction, and recycling and

[36] Pew Charitable Trusts. 2009. *The Clean Energy Economy: Repowering Jobs, Businesses, and Investments Across America*, page 10.
[37] http://www.bls.gov/green/green_definition.pdf

reuse; natural resource conservation; and environmental compliance. The BLS describes process approach jobs as those involving: research, development, maintenance, or use of technologies and practices to lessen the environmental impact of their establishment, or training the establishment's workers or contractors in these technologies and practices.

The BLS identified 333 detailed industries where green products and services will be produced as a first step to counting jobs that would fall under the "output-based" approach.[38] However, these 333 sectors include many jobs that are not actually green. Broad sectors like automobile manufacturing are included. The BLS is currently engaged in the process of distinguishing green jobs within these broad sectors. So, for example, in the case of automobile manufacturing, the BLS is working to distinguish advanced electric vehicle production (e.g. the Chevy Volt) from conventional vehicle production.

The BLS is surveying a representative sample of employers from across the entire economy to count process green jobs (adaptive green economy under Collaborative Economics terminology). Using this data, the BLS will use statistical techniques to scale up the results from the survey sampled.

The results of the BLS's work measuring green jobs will be released in the spring of 2012.

The Case for an Even Broader Definition

Though the BLS is moving to implement a broader definition of green jobs, their approach still fails to capture some jobs that should be properly recognized as a reflection of growth in the clean economy. The BlueGreen Alliance believes that a broader definition is needed, a view that is shared by the AFL-CIO and the United Steelworkers (USW).

The BGA comments to the BLS provide some examples of green jobs that would be missed by the planned =approach: for example, in the area of environmental health.[39] BGA also points out

[38] The BLS draws its data from the North American Industry Classification System (NAICS), a system of classifications which replaced the SIC system in 1997. The NAICS system classifies businesses on how something is produced and not simply what is produced. The increased level of detail with NAICS is designed to be easier to develop classifications for new and emerging industries.

[39] Their comment letter to BLS explains: "BLS proposes a broad definition of green jobs as those "involved in economic activities that help protect or restore the environment or conserve natural resources." This definition and the resulting categorization do not sufficiently recognize the connection between the health of the environment and the people who are part of that environment. The human health problems of asthma, cancer and other chronic

inconsistencies in BLS' classification of the transportation realm – low-carbon movement of people is covered, but low-carbon movement of goods is excluded.

The USW points out that the BLS definition would fail to capture job creation along some links on the value chain. It believes that jobs needed to produce the steel used in wind turbine production should also be counted, commenting: "The BLS appears to have adopted an approach in some sectors, including the metals sector to limit the scope of green jobs designations to 'identifiable, specialized inputs for renewable energy.' USW believes this limitation should be abandoned. After all every step in the value chain of a given product is necessary in order for it to be in the end available for use in green projects, and every such step should be recognized."

We conclude by observing that the broadest possible definition of green job growth would capture an even broader class of jobs, jobs that fall outside of both the core and adaptive green economies. These are jobs in the traditional economy that can be traced back to environmental policies. For example, policies that speed the adoption of energy-saving technologies in turn lead to greater disposable income. These energy savings can then be used for other productive, job-producing, purchases or investments. This re-spending and reinvestment also creates jobs that can be traced back and credited to energy and environmental policies.

diseases are directly related to the production and use of toxic chemicals. Therefore, we think it is necessary to add Environmental Health as another category of green economic activity, and greater attention should be paid to related jobs in the proposed green industries list."