



DATA SNAPSHOTS

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EcoEnterprises in Greater Philadelphia



The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals and the public with a common vision of making a great region even greater. Shaping the way we live, work and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

The symbol in our logo is adapted from the official DVRPC seal, and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole. The diagonal line represents the Delaware River and the two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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Introduction

This Data Snapshot assesses the emergence of businesses and jobs in Greater Philadelphia that support and are driven by increased consumer and business demand for energy-efficient and environmentally-benign products and services. In DVRPC's 2006 publication *A Post-Global Economic Development Strategy*, this economic sector was dubbed eco-industries, a term derived from the "Eco-Economy" work of the Earth Policy Institute.¹ These industries include businesses and professionals that have the potential to transform challenges in energy efficiency and ecological sustainability into a competitive economic advantage, creating jobs and quality economic development for our region.

Since DVRPC's 2006 report, the definition of eco-industries has expanded to capture a wide range of sectors, including traditional manufacturing but also professional and business sectors such as design, engineering, management, environmental consulting, and advocacy. DVRPC now refers to this growing sector of businesses and professionals that promote energy efficiency and ecological sustainability as eco-enterprises. Eco-enterprises include a multitude of jobs and occupations associated with environmental improvement, energy conservation, and renewable energy.

The report begins with a discussion of the importance of this emerging sector and the recognition of varying alternative definitions. Recent research undertaken by the Pew Charitable Trusts, the National Governors' Association, the United States Conference of Mayors, and the Pennsylvania Department of Labor and Industry are summarized, followed by a discussion of analysis undertaken by DVRPC using alternative indicators for the presence of eco-enterprises in Greater Philadelphia.

The Importance of Eco-Enterprises

The transformation of the global economy to use less energy and produce less greenhouse gas emissions presents a tremendous opportunity for Greater Philadelphia. Global challenges related to natural resource depletion and global warming present local opportunities for economic growth, provided the region is prepared to compete in a future where energy efficiency and environmentally-friendly products and services are the key drivers of economic development.

Like many urban areas, Greater Philadelphia has undergone a major transition in recent decades, from a manufacturing-based economy to one dominated by knowledge-based industries. Life sciences, health and education services, professional and business services, and information technology rank among the region's top economic sectors. The region has already established itself as a center for businesses and professionals who possess the skills necessary to transform challenges in energy efficiency and ecological sustainability into a competitive economic advantage, creating jobs and quality economic development for the region.

Already home to a high concentration of cutting-edge sectors such as life sciences, chemicals, and higher education, Greater Philadelphia also boasts a burgeoning alternative and clean energy industry that is poised for significant growth in coming years. Some of the world's largest and most innovative alternative energy companies – Gamesa, Iberdola, GE Wind, SunTechnics, and HelioSphera – have a presence in

¹ Lester R. Brown, *Eco-Economy: Building an Economy for the Earth*, W. W. Norton & Co., NY: 2001.

the region. With more stringent environmental regulations and concerns, many companies now seek professionals with knowledge in environmental and energy issues, including environmental consultants, environmental engineers, green architects, environmental lawyers, educators, and technology workers.

While many of these eco-enterprise occupations are higher-paying positions requiring an advanced education and a relatively high skill set, this growing sector also includes lower-skilled jobs such as installation installers, recycling workers, “green building” construction workers, and energy-efficient transportation workers. These occupations provide employment opportunities for entry-level workers with technical training but less advanced education. The region’s challenge is to link the economy’s need for green-collar workers trained to perform jobs related to energy conservation and environmental sustainability with the need to provide a ladder out of poverty for unemployed urban residents.

To many, eco-enterprises are the vanguard of a new global economy emerging in response to the escalating costs of resource extraction and energy consumption. The restructuring of economies in response to resource depletion presents huge opportunities as shifts in production create jobs and open new areas of economic growth. Promoting eco-industries and green-collar jobs will make our region more economically competitive, generate new jobs and revenue, and create jobs for the underemployed.

Defining Eco-Enterprises

An analysis of eco-enterprises as an emerging sector requires a definition of this set of businesses and professionals. Defining the sector, however, is difficult. Research revealed several alternative definitions that include specific professions and occupations and/or are based on an array of business characteristics, services, or products. While these definitions individually capture or characterize one or more aspects of eco-enterprises, no single standard definition exists that adequately describes the sector’s full range of businesses and industries.

In response to the growing importance of this emerging sector and the current lack of a standardized definition, the U.S. Bureau of Labor Statistics (BLS) is currently working with other Department of Labor agencies and key organizations to define and produce data on green jobs. These activities will be conducted through the Quarterly Census of Employment and Wages and Occupational Employment Statistics programs. In March 2010 the BLS published a Notice in the Federal Register that provided a definition of green jobs, described in general how BLS plans to collect data on green jobs, and solicited comments on the proposed definition and on specific questions concerning the definition. The Bureau plans to begin collecting information related to the green economy in FY 2011 and publish the first national ‘green jobs’ data in FY 2012.

In the meantime, however, the current lack of a definition has resulted in the use of multiple approaches for analyzing the green economy. Table 1 summarizes a set of ten alternative definitions of eco-enterprises, with a more specific discussion of each provided in Appendix A. As a complement to these ten varying definitions, DVRPC analyzed professional memberships and certifications and the square footage of buildings constructed in alignment with standards consistent with this emerging sector to gauge the relative presence of the sector in this region. Professional and sector-wide practices support the Commission’s assumption that memberships and certifications are a reasonable proxy since economic players in any given sector (including eco-enterprises) depend upon their affiliations and certifications to qualify expertise and provide networks, contacts, and sales leads.

Table 1: Alternative Definitions of Eco-Enterprises

Basis	Description	Examples	Comments
Job/occupation – “green jobs”	Jobs/occupation classifications associated with this sector	Insulation installers; wind turbine engineers; installers of solar thermal systems.	Standard occupation codes do not disaggregate these occupations. While detailed occupational information is readily available at the metropolitan area level, it is not available at smaller geographies.
Job/occupation – “green collar” jobs	Manual labor jobs in businesses whose products and services directly improve environmental quality	Bicycle repair; green landscaping, recycling.	This clearly defined subset of a “green jobs” definition is the subject of an active, coordinated effort in several cities, including Philadelphia. Specific data on jobs meeting this definition is not yet available.
Self-identification – <i>Industry specific</i>	Industry affiliation groups	American Wind Energy Association.	Focus on particular product or area of service. Like professional certifications, such memberships may be a good indicator for the presence of this sector. In addition, the ZIP code field from certification databases provides relatively fine-grained geographic insight.
Industry sector	Industrial classifications associated with the sector	Wind power companies; bio-diesel refiners	Standard industry NAICS codes do not map clearly to these industries. In addition, while detailed industry information is readily available at the metropolitan area level, it is not available at smaller geographies.
Products and services	Products and services associated with this sector	Wind generation equipment; bicycles; pollution control equipment.	Standard NAICS product codes are not sufficiently narrow for many products. Information on location of product manufacture is not available for most products.
Professional certifications	Professionals with accreditation associated with this sector	LEED Accredited Professional; Certified HERS rater	Certified professionals represent only a small portion of this sector; however, they may be a good indicator for presence of this sector. In addition, using the ZIP code field from certification databases, relatively fine-grained geographic insight can be obtained.
Self-identification – <i>Sustainable businesses</i>	Businesses with membership in local, national and international “sustainable business” organizations	Sustainable Business Network; BALLE; Businesses for Social Responsibility; CERES; B-Corporation	Generally focus on <u>how</u> a business is run rather than <u>what</u> product or service is provided. Organizations are not widespread enough to permit valid comparison among regions; however, using member ZIP codes provides some geographic insight within the region.
Investor based	Businesses included in environmentally / sustainability-screened investment funds or indexes	Dow-Jones Sustainability Index; Calvert Group	Limited to large, publicly traded corporations. Relatively small subset of sector population. Not likely to provide insight for either the inter-regional or intra-regional presence of this sector.
Facility certification	Facilities that have been certified	ISO 14000; EPA certification programs	Facilities may be certified under ISO 14000 (environmental management standards) regardless of the product or service offered. ISO certification information is not centrally collected by ISO or ANSI. Location data not available.
Eco-industrial parks	Businesses or facilities located in an eco-industrial park	Classic example is Kalundborg, Denmark	Generally limited to manufacturing facilities. Focus is on how product is made rather than what product is. No comprehensive list of such facilities is available. The number of such parks is too low to provide basis for inter-regional or intra-regional analysis.

Source: Delaware Valley Regional Planning Commission, May 2010.

Recent Studies

Numerous reports have been released in recent months that attempt to quantify the number of green jobs by state or metropolitan area, each using different definitions and methodologies. Recent research efforts include work done by PEW Charitable Trusts, the National Governors Association (NGA), the United States Conference of Mayors, and the Pennsylvania Department of Labor and Industry.

The Clean Energy Economy: Repowering Jobs, Businesses, and Investments across America

In June 2009 Pew Charitable Trusts released a report which counted jobs, businesses, and investments in the “clean energy economy” for all 50 states. This report was a collaborative effort between the Pew Center on the States and the Pew Environment Group. Working with Collaborative Economics, Inc. (CEI), Pew characterized the clean energy economy as generating jobs, businesses, and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste, and pollution, and conserving water and natural resources.

Based on a review of multiple available data sources, the Pew study defined five categories for the clean energy economy, including clean energy, energy efficiency, environmentally-friendly production, conservation and pollution mitigation, and training and support. The premise of the Pew report is that although the specific jobs and businesses within each of these five categories will change in coming decades, the categories themselves will not – thereby creating a clear and consistent framework to allow public policy makers as well as the private sector to track investments, business creation and job growth over time.

Pew and CEI undertook a labor-intensive process using micro-level establishment data to analyze the clean energy economy, counting all businesses that produce or provide services that leverage renewable energy sources, conserve energy and natural resources, reduce pollution, or recycle waste. Data sources included data from the National Establishment Times Series (NETS) database published by Walls and Associates, information on companies that received venture capital between 1998 and 2007 related to clean energy, industry associations and green business directories, press coverage, published articles, and databases of government incentive programs for renewable energy.

Pew’s study concluded that Pennsylvania had a total of almost 39,000 clean energy jobs as of 2007, more than double the national average of 15,000. The study also found, however, that the number of clean jobs in the Commonwealth had declined by over six percent between 1998 and 2007. New Jersey was found to have 25,397 clean jobs in 2007 but like Pennsylvania had experienced a decline in these jobs, with the number of clean jobs declining by almost ten percent between 1998 and 2007. States with large and growing numbers of clean energy jobs include California, Florida, Georgia, Indiana, and Massachusetts.

The study noted that there is hope, however, for those states that have large clean energy economies but are losing jobs. Illinois, New Jersey, New York, and Pennsylvania, for example, each rank among the top ten states for total jobs across several of Pew’s five categories. Pennsylvania ranks second in clean energy jobs, third in conservation and pollution mitigation, and ninth in training and support. New Jersey

ranks seventh in conservation and pollution control. To successfully compete in the clean energy economy, both states must find ways to build on the strong foundations provided by their existing economies.

A copy of the full report is available at www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf.

Profile of the Green Economy

In 2009, the National Governors Association Center for Best Practices commissioned Collaborative Economics Inc. (CEI) to prepare a profile of each state's "green" economy. Expanding its earlier work in creating the "California Green Innovation Index", CEI provided the analysis that became the background for Pew's 2009 state-by-state count of clean energy jobs and businesses discussed earlier. CEI was then asked by NGA to provide states with some of the more detailed information contained in the California report that was not included in the analysis done for the Pew report.

CEI's state profiles analyzed the scope of green business activity from 2000 to 2007 (the latest year for which data was available) and patent activity from 1994 to 2008. The analysis sought to identify areas of comparative advantage, targets for workforce development, and opportunities for building partnerships within and across green industry segments. CEI's analysis focused on quantifying green economic "activity", defined as businesses that provide products and services that provide alternatives to carbon-based energy sources, conserve the use of energy and natural resources, reduce pollution (including greenhouse gas emissions), or repurpose waste.

Based on CEI's methodology, the air and the environment segment (including emissions monitoring and control, environmental consulting, and environmental remediation) had the most green jobs in the Commonwealth of Pennsylvania as of 2007, with approximately 9,000 jobs. In terms of competitive advantage, sectors with a higher percent of total employment than the national average are considered areas of strength. Pennsylvania holds an advantage in energy storage (which is seven times more concentrated than the national average) and water and wastewater (twice as concentrated).

The CEI profile also identifies economic segments that have become more concentrated in the state over time, noting that these may signal areas that are most promising for targeting research and development investment, commercialization, and focused workforce development. In Pennsylvania, employment concentration in agriculture more than doubled between 1995 and 2007, while the concentration in energy generation increased by 30 percent and in the air and the environment segment by more than 20 percent.

As in the Commonwealth of Pennsylvania, the green segment with the greatest employment in the State of New Jersey as of 2007 was air and the environment, with nearly 8,400 jobs. Other green segments with high employment included recycling and waste as well as water and wastewater. Based on the relative concentration of employment, New Jersey displays a competitive advantage in advanced materials (bio-plastics and new materials for energy efficiency), which are nearly twice as concentrated as the national average, as well as energy generation, green building design and materials, and research and advocacy. Segments which have become more concentrated in New Jersey since 1995 and which show promise for future growth include green building (which more than tripled) as well as research and

advocacy (which increased by nearly 45 percent). For more information on CEI's state profiles see www.nga.org/portal/site/nga/menuitem.9123e83a1f6786440ddcbbeb501010a0/.

U.S. Metro Economies: Green Jobs in U.S. Metro Areas

A 2008 report prepared by Global Insight for the United States Conference of Mayors and the Mayors Climate Protection Center quantified the number of workers employed in “green activities”, defined as any activity that generates electricity using renewable or nuclear fuels, agricultural jobs supplying corn or soy for transportation fuel, manufacturing jobs producing goods used in renewable power generation, equipment dealers and wholesalers specializing in renewable energy or energy- efficiency products, construction and installation of energy and pollution management systems, government administration of environmental programs, and any jobs in the engineering, legal, research, and consultant fields that support the green economy.

The report assessed the number of jobs in over 70 specific 8-digit SIC codes to estimate the number of jobs that met the above description. Based on this methodology, the study found that there were approximately 14,400 green jobs in the Philadelphia metropolitan area as of 2006, ranking seventh in the nation, as illustrated in Table 2. The report found that almost 57 percent of the 750,000 green jobs in the United States as of 2006 were engineering, legal, research, and consulting jobs related to the green economy, while the second largest number (127,000, or 17 percent) were in renewable power generation. These were then followed in order by government administration, “green” manufacturing, and agricultural and forestry.

Table 2: Green Jobs in Major Metropolitan Areas, 2006

Metropolitan Area	Green Jobs 2006	Projected New Green Jobs Through 2038
New York, New York	25,021	197,971
Washington, DC	24,287	192,165
Houston, Texas	21,250	168,136
Los Angeles, California	20,136	159,321
Boston, Massachusetts	19,799	156,660
Chicago, Illinois	16,120	127,545
Philadelphia, Pennsylvania	14,379	113,772
San Francisco, California	13,848	109,570
San Diego, California	11,663	92,285
Pittsburgh, Pennsylvania	9,628	76,174

Source: U.S. Conference of Mayors, *U.S. Metro Economies*, page 5. October 2008.

The report concludes that there is a tremendous potential for growth in green jobs due to market forces, legislation, and local initiatives. The study projects a potential 4.2 million new green jobs nationally by 2038, including 113,772 in the Philadelphia region. This expected 30 year growth rate was estimated by

considering anticipated job growth in three key areas (renewable power generation, residential and commercial retrofitting, and renewable transportation fuels). Because the vast majority of green jobs are not location-dependent, future growth in the green economy will most likely occur in cities and metropolitan areas that are already attractive for growth or that work aggressively to increase their attractiveness relative to competing regions. The projected number of new green jobs in each metro area listed in Table 2 assumes that the distribution of green jobs will remain unchanged through 2038; metropolitan areas that recognize the sector's potential and aggressively work to attract green jobs are likely to gain more, while other less responsive MSA's are likely to gain fewer. A copy of the report is available at www.usmayors.org/pressreleases/uploads/GreenJobsReport.pdf.

The Pennsylvania Green Jobs Report

The Pennsylvania Green Jobs Report, issued by the Pennsylvania Department of Labor and Industry in January 2010, defines green jobs as jobs that employ workers in producing or providing products or services that promote energy efficiency, contribute to the sustainable use of resources, prevent pollution, clean up the environment, and/or promote the reduction of harmful emissions.²

To analyze the green economy, the report identifies five green industry sectors, including energy efficiency, renewable energy, clean transportation, pollution prevention and environmental cleanup, and agriculture and resource conservation. The Center for Workforce Information and Analysis reviewed six digit North American Industry Classification System (NAICS) codes to determine if the industries classified by the code included workers who were directly involved in the efficient use and conservation of traditional fuels or alternative energy or energy-efficient technologies, limited to construction, inspection, research, regulation, distribution, supply, or manufacturing processes.³

The Standard Occupational Classification (SOC) structure was also reviewed and an occupational employment distribution was developed for each NAICS code identified as green. Using this data, the Center used IMPLAN (an economic modeling tool) to estimate the total number of green jobs statewide. It also categorized these jobs as emerging (including jobs such as energy auditors, wind power technicians, and solar panel installers), evolving (existing occupations such as construction workers who are mastering new skills, such as conservation retrofitting), or traditional (including construction laborers who happen to be working on a green building, or machinists who are manufacturing parts for wind turbines).

The report estimates that there are approximately 350,000 jobs in over 28,000 establishments across the five identified green sectors, with the largest percentage in energy efficiency, followed by pollution control and environmental cleanup. The report notes that many of the jobs in the emerging green sectors (such as clerical, sales, and administrative support) require the same skill sets as those in other non-green industries. The report also reviews Pennsylvania's investments in the emerging green economy through 2012 and estimates the projected number of jobs that are expected to result from investment in green sectors, noting that \$10 billion in public and private investment is expected to act as a catalyst for generating over 115,000 jobs.

² Pennsylvania Department of Labor and Industry, *The Pennsylvania Green Jobs Report*, page 1. January 2010.

³ Ibid, page 34.

DVRPC's Analysis

The recent studies described above generally utilized standard industry-specific employment data to approximate the number of green jobs in major metropolitan statistical areas (MSAs) across the United States. The goal of DVRPC's research is to use an alternative definition of the sector to gauge the relative geographic presence of this economic sector - first among a set of regions, and second, within Greater Philadelphia. As a complement to the studies discussed above and in the absence of an accepted standard definition of eco-enterprises, DVRPC used professional memberships in and certifications by 27 relevant professional organizations as a proxy to estimate the relative strength of the green economy. The study also considers the construction of buildings in alignment with standards consistent with this emerging sector (specifically, the square footage of buildings certified by the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program and ENERGY STAR facilities) as another indicator of the presence of the eco-enterprise sector.

Professional and sector-wide practices support the assumption that memberships and certifications are a reasonable proxy for the relative presence of green jobs. Economic players in any given sector depend upon their affiliations and certifications to qualify expertise, guarantee the manufacture of products to standard, and provide networks, contacts, and sales leads which increase exposure to consumer and business markets. This is true for the eco-enterprise sector as well.

The organizations that provide and manage these memberships and certifications maintain records for affiliated businesses, individuals, and products. These records include postal addresses with ZIP codes. The analysis used this ZIP code information for both the inter-regional and intra-regional analysis. While there are inherent limitations to this methodology, discussed below, it offers the most appropriate and complete opportunity for analysis.

Limitations to the Methodology

There are a number of limitations to DVRPC's methodology, including the following:

- ❖ Most available data from targeted sources are professional memberships and certifications. This means businesses and products are likely to be underrepresented, as are low-skilled labor participants, for whom memberships or certifications are often unnecessary.
- ❖ It is possible for businesses or professionals to obtain both a membership and certification from a single organization. Rather than attempt to eliminate such double-counting (which would be a very difficult task given the data limitations), researchers interpreted this as implying the presence of a relatively higher concentration of eco-enterprises.
- ❖ This method does not adequately account for industrial bias in the weight of certain organization's affiliates in the aggregate analysis. Some industries within the sector are under-represented while others account for up to 63 percent of eco-enterprise professionals in MSAs.
- ❖ It is not clear whether the ZIP code reported for a professional certification or membership is the individual's business or residential address. The organizations providing data estimated that approximately 80 percent are business addresses. This is not likely to be an issue for the inter-regional analysis, as most people live and work in the same metropolitan area. For the intra-regional level, however, this ambiguity may limit the validity of the results.

Data Sources

DVRPC initially identified 41 relevant organizations based on the various alternative definitions described in Table 1. Several of these organizations were subsequently excluded after more detailed research revealed that their scope or purpose was not relevant to the project. Additionally, a small number of organizations were unable to provide information. Some data sets were found to be unusable, as they did not provide ZIP code information. Of the 41 organizations originally identified, data were obtained from 27 (identified in Table 3) totaling over 145,000 individual records.⁴

Records included in the analysis are summarized in Table 3 and are organized according to the information contained within the data set and the specific purpose of the organization. The geographic scope of the data set is indicated in this table as well. The inter-regional comparison makes use of nationwide data sets only, while the intra-regional analysis is supplemented with sub-national organizations. Building and facilities data from the US EPA's ENERGY STAR program and USGBC are analyzed separately from professionals and businesses.

Data Acquisition and Management

Data offered by organizations varied according to the availability of information as well as their organizational policies.⁵ Organizations were asked to provide only the ZIP code column of their relevant databases. This met the needs of the analysis while maintaining the anonymity of individuals and businesses. A count of observations per ZIP code was produced for each organization's usable data sets. For national organizations, this provided a nationwide breakdown of the distribution of memberships and certifications. Counts for ZIP codes within any of the 13 metropolitan statistical areas (MSAs) considered in this report are aggregated into their respective MSAs.⁶ These 13 MSAs include the 11 most populated metropolitan areas in the United States as well as Baltimore, Maryland and Pittsburgh, Pennsylvania, which were included due to their proximity to Philadelphia.

Counts for ZIP codes within the DVRPC nine county region were derived from the nationwide database of ZIP code counts by organization to provide a regional breakdown of membership distributions for the intra-regional analysis. Organizations exclusive to the region or to either Pennsylvania or New Jersey were added to this new dataset. For both analyses, organizations' total counts are aggregated into sub-groups, including "professionals", "businesses", and "buildings and facilities". The organizational breakdown of each is outlined in Table 3.

⁴ Of those 145,000 records, only those located within the 13 MSAs considered in this analysis are reflected in the results.

⁵ Some organizations' by-laws prohibit the sharing of any information on membership regardless of its anonymity. Others simply do not keep detailed records. For an explanation of the data received from each organization see Appendix B.

⁶ MSA definitions are from the federal Office of Management and Budget (OMB) as of December 2006.

Table 3: Eco-Enterprise Certifications and Membership Organizations

Organizations by sub-group and type	Records	Scope	Inter-regional*	Intra-regional*
Professional organizations				
Certifications				
Academy of Board Certified Environmental Professionals (ABCEP)	464	National	P	P
Association of Energy Engineers (AEE)	1,170	National	P	P
Institute of Professional Environmental Practice (IPEP)	994	National	P	P
International Society of Arboriculture (ISA)	19,734	National	P	P
National Environmental Health Association (NEHA)	2,489	National	P	P
Society of American Foresters (SAF)	2,423	National	P	P
Solid Waste Association of North America (SWANA2)	2,974	National	P	P
U.S. Green Building Council (LEED APs)	58,583	National	P	P
Water Quality Association (WQA1)	1,636	National	P	P
Memberships				
Air & Waste Management Association (AWMA)	6,863	National	P	P
American Solar Energy Society (ASES)	10,843	National	P	P
National Association of Environmental Professionals (NAEP)	1,083	National	P	P
National Recycling Coalition (NRC)	3,628	National	P	P
Northeast Sustainable Energy Association (NESEA)	1,593	Regional	x	P
Residential Energy Services Network (RESNET)	999	National	P	P
Solid Waste Association of North America (SWANA1)	7,372	National	P	P
Water Quality Association (WQA2)	2,039	National	P	P
Business Organizations				
Certifications				
New Jersey Dept of Agriculture - Certified Organic (NJOrg)	81	State	x	B
Pennsylvania Certified Organic (PCO1)	434	State	x	B
Memberships				
Bicycle Retailers (BIC)	4,388	National	B	B
Green Roof Directory/Businesses (GRB)	74	National	B	B
Institute of Scrap Recycling Industries (ISRI1)	1,402	National	B	B
National Bio-diesel Board (NBB)	381	National	B	B
Pennsylvania Certified Organic (PCO2)	118	State		B
Smart Energy Initiative of SE PA (SEI)	130	Regional	x	B
Solar Energy Industries Association (SEIA)	115	National	B	B
Sustainable Business Network (SBN)	428	Regional	x	B
Product Organizations				
Scientific Certification Systems (SCS)	3,963	National	B	B
Buildings and Facilities				
EnergyStar Homes		National	F	x
Green Roof Directory/Projects (GRP)	697	National	F	F
Institute of Scrap Recycling Industries (ISRI2)	2,546	National	F	F
U.S. Green Building Council (LEED CBs)	5,056	National	F	F

Source: Delaware Valley Regional Planning Commission, May 2010. "P": professionals. "B": businesses. "F": buildings/facilities. "x": not available at the indicated geographic level.

Because LEED Accredited Professionals (LEED APs) weigh heavily on the count of the professionals by MSA, a separate sub-group was created excluding them in the results. In order to gauge the size of the eco-enterprises sector relative to total economic activity, eco-enterprise totals for each MSA were compared to the total MSA employment. MSA employment estimates are from the U.S. Bureau of Economic Analysis's (BEA) 2005 Regional Economic Profiles which includes part-time and full-time employees as well as sole proprietorships and partnerships in its definitions. Because many of the businesses and professionals represented in the data may be freelance consultants or sole proprietorships, this source is appropriate. The same source is used as the basis for employment data in DVRPC's 2007 publication, *Rating the Region*.⁷

For the intra-regional analysis, ZIP code sub-group totals were also normalized using employment estimates to maintain consistency. However, because the BEA does not publish ZIP code level statistics, employment estimates from the consulting group Global Insight, Inc. were used. These estimates are based on definitions established by the U.S. Census Bureau for the annual County Business Patterns series. Because this definition does not include sole proprietorships, partnerships, or seasonal employment, the normalized ZIP code estimates in the intra-regional analysis are systematically overstated.

Greater Philadelphia Compared to Other Major Metropolitan Areas

The following inter-regional analysis compares the Philadelphia region to 12 metropolitan areas in terms of three separate sub-groups: professionals, businesses, and buildings.

Professionals

Table 4 summarizes the concentration of eco-enterprise professionals in the 13 metropolitan areas and Table 5 ranks the metropolitan areas using the following three different definitions:

- ❖ All eco-enterprise professionals.
- ❖ LEED accredited professionals (APs) only: These columns are based on only LEED accredited professionals. This data is provided separately because LEED APs make up a very large percentage of eco-enterprise professionals in this methodology.
- ❖ Excluding LEED accredited professionals (APs)

As illustrated in Table 5, Philadelphia ranks at or above the median in all three of the definitions. This suggests that additional strategies may be needed to cement and build upon the region's competitive advantage in eco-enterprises. This seems especially true considering Philadelphia's performance in comparison to its closest neighbors (Baltimore, Pittsburgh, and Washington, DC) which generally rank higher than Philadelphia. Houston, Miami, New York, and Detroit are at the bottom of the eco-enterprise professional rankings. The size and diversity of the New York economy may explain its low concentration

⁷ The data referenced in *Rating the Region* has been revised by the Bureau of Economic Analysis since the publication of that report to reflect more accurate estimates.

Table 4: Concentration of Eco-Enterprise Professionals by Metropolitan Area

Metropolitan Area	2005 Employment	All Eco-Enterprise Professionals		LEED APs only			Excluding LEED-APs	
		Count	Per 100,000	Count	Percent of all eco-enterprise professionals	Per 100,000	Count	Per 100,000
Atlanta, GA	2,980,035	2,985	100.17	1,679	56%	56.34	1,306	43.82
Baltimore, MD	1,644,261	1,341	81.56	662	49%	40.26	679	41.30
Boston, MA	3,054,245	3,326	108.90	2,094	63%	68.56	1,232	40.34
Chicago, IL	5,585,093	4,947	88.58	2,349	48%	42.06	2,598	46.52
Dallas, TX	3,606,686	2,416	66.99	1,146	47%	31.77	1,270	35.21
Detroit, MI	2,512,321	1,238	49.28	478	39%	19.03	760	30.25
Houston, TX	3,059,980	1,877	61.34	949	51%	31.01	928	30.33
Los Angeles, CA	7,458,956	4,855	65.09	2,423	50%	32.48	2,432	32.61
Miami, FL	3,171,133	1,720	54.24	622	36%	19.61	1,098	34.62
New York, NY	10,586,578	5,715	53.98	3,267	57%	30.86	2,448	23.12
Philadelphia, PA	3,409,568	2,643	77.52	1,158	44%	33.96	1,485	43.55
Pittsburgh, PA	1,413,658	1,139	80.57	393	35%	27.80	746	52.77
Washington, DC	3,754,710	4,804	127.95	2,585	54%	68.85	2,219	59.10

Source: Delaware Valley Regional Planning Commission, May 2010.

Table 5: Major Metropolitan Area Ranked by Concentration of Eco-Enterprise Professionals

Metropolitan Area	All Eco-enterprise Professionals	LEED APs Only	Excluding LEED APs
Washington, DC	1	1	1
Boston, MA	2	2	7
Atlanta, GA	3	3	3
Chicago, IL	4	4	4
Baltimore, MD	5	5	6
Pittsburgh, PA	6	11	2
Philadelphia, PA	7	6	5
Dallas, TX	8	8	8
Los Angeles, CA	9	7	10
Houston, TX	10	9	11
Miami, FL	11	12	9
New York, NY	12	10	13
Detroit, MI	13	13	12

Source: Delaware Valley Regional Planning Commission, May 2010.

of eco-enterprises professionals. Low concentrations in Houston and Dallas might be explained by their sprawling, low-density development patterns and concentrations in the petrochemical industry. Philadelphia ranks fifth when LEED Accredited Professionals (APs) are excluded. Most metropolitan areas with higher LEED AP concentrations than Philadelphia boast higher population growth rates (Boston, Washington, Chicago, and Atlanta), indicating a possible relationship between increased construction activity and the presence of LEED APs.

A more detailed analysis of the relative concentration of the various component organizations by MSA is included as Appendix B. The differing relative concentrations indicate some regions might maintain historical industrial mixes and human capital stocks in manufacturing, metals, water management, or energy. That artifacts of previous production patterns now appear in an analysis of eco-enterprises indicates some regions have effectively leveraged their environmental liabilities. Additionally, there is some evidence that regions may export eco-enterprise sector work.

Businesses

Table 6 summarizes the concentration of eco-enterprise businesses ranked by eco-enterprise businesses per 100,000 employees. The low number of business observations relative to total professionals in each MSA limits what can be inferred from the results. The included business data also misses important industries within the sector, such as building retrofitting and retail stores that supply sustainable materials or energy-efficient appliances. The product certifications in this sub-group might indicate a network of sustainable goods suppliers.

Table 6: Concentrations of Eco-Enterprise Businesses by MSA

Metropolitan Area	2005 Employment	Count of Eco-enterprise Businesses	Count per 100,000 Employees	Business Concentration Rank	Professional Concentration Rank
Los Angeles, CA	7,458,956	582	7.80	1	9
Pittsburgh, PA	1,413,658	79	5.59	2	6
Boston, MA	3,054,245	147	4.81	3	2
Chicago, IL	5,585,093	236	4.23	4	4
Philadelphia, PA	3,409,568	141	4.14	5	7
Atlanta, GA	2,980,035	120	4.03	6	3
Miami, FL	3,171,133	125	3.94	7	11
New York, NY	10,586,578	412	3.89	8	12
Houston, TX	3,059,980	113	3.69	9	10
Detroit, MI	2,512,321	92	3.66	10	13
Baltimore, MD	1,644,261	57	3.47	11	5
Washington, DC	3,754,710	111	2.96	12	1
Dallas, TX	3,606,686	103	2.86	13	8

Source: Delaware Valley Regional Planning Commission, May 2010. Employment data source: U.S. Bureau of Economic Analysis, Regional Economic Profiles, Table CA30, 2008.

Buildings

Another indicator for the presence of the eco-enterprise sector is the construction of buildings in alignment with standards consistent with this emerging sector. A number of standards and certification programs reflect the concerns for energy efficiency and sustainable or environmentally-benign construction practices in the construction and real estate industries. Perhaps the two best established national programs are the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program and ENERGY STAR, operated jointly by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy.⁸

Databases of current and completed building projects registered with or certified by the USGBC's LEED program were obtained from the USGBC by Phil Hopkins, Vice President, Research, Select Greater Philadelphia. Each database contained the address of each building or project (including its ZIP code), the year construction was completed, the building's gross square footage, and its level of certification.⁹ Gross square footages were aggregated for each MSA. The results for each of the metropolitan areas (including both building counts and aggregated square footages) are shown in Table 7.

Table 7: LEED Buildings Completed or Registered by MSA¹⁰

Metropolitan Area	Completed		Registered		Completed		Registered	
	Count	Rank	Count	Rank	Sq. Ft.	Rank	Sq. Ft.	Rank
Los Angeles, CA	48	1 (tie)	290	3	5,438,907	4	86,895,196	4
Chicago, IL	48	1 (tie)	209	4	11,805,795	1	87,358,931	3
Washington, DC	46	3	370	1	6,811,348	3	130,822,942	1
Boston, MA	44	4	140	5	4,681,001	5	35,123,018	6
New York, NY	40	5	362	2	6,915,903	2	128,381,087	2
Atlanta, GA	37	6	129	7	3,462,352	7	24,960,156	9
Philadelphia, PA	32	7	107	10	2,150,644	10	14,089,168	12
Pittsburgh, PA	31	8	61	12	3,121,029	8	27,582,378	8
Dallas, TX	17	9	112	9	4,261,150	6	38,584,401	5
Baltimore, MD	14	10	100	11	1,724,082	11	17,039,015	11
Houston, TX	13	11	116	8	388,052	12	21,696,502	10
Detroit, MI	10	12	28	13	2,359,659	9	4,301,213	13
Miami, FL	2	13	132	6	143,998	13	32,833,733	7

Source: Delaware Valley Regional Planning Commission, May 2010.

The EPA provided databases of individual commercial and industrial buildings and facilities which meet ENERGY STAR's energy efficiency standards, as well as the total number of "rated" homes by

⁸ Details of these programs can be found at www.usgbc.org and www.energystar.gov, respectively.

⁹ The raw data received from USGBC was dated April 8, 2008.

¹⁰ Data includes all LEED-certified buildings, regardless of certification level.

metropolitan statistical area. The database of facilities contained a list of each building by its address and square footage. The total square footage and representative number of projects for each metropolitan area are shown in Table 8 along with registered LEED building rankings. Data for ENERGY STAR-rated homes, also listed in Table 8, include only the total number of homes by metropolitan statistical area. The LEED registered buildings and ENERGY STAR facilities are ranked by total square footage while ENERGY STAR homes are ranked by the number of homes per metropolitan area.

LEED and ENERGY STAR buildings, facilities, and homes are either newly constructed or rehabilitated buildings.¹¹ A region in the midst of a building or population boom will likely have more construction activity overall. ENERGY STAR ratings can also be indicators of the quality of incentives offered by local utility companies or municipal governments. Ideally, the information in Tables 8 and 9 should therefore be normalized. The ideal normalization factor would be an indicator of overall regional building activity. Because there is no reliable, readily available indicator of overall building activity for every metropolitan area, the rankings do not control for population or employment growth or increased development activity in each metropolitan area.

Table 8: Energy-Efficient Buildings and Homes by Metropolitan Area

Metropolitan Area	LEED Registered Buildings			ENERGY STAR Facilities			ENERGY STAR Homes	
	Buildings	Sq. Ft.	Rank	Buildings	Sq. Ft.	Rank	Homes	Rank
Washington, DC	46	137,514,290	1	173	44,871,914	3	4,311	8
New York, NY	40	134,889,030	2	113	34,424,560	6	20,872	3
Chicago, IL	48	99,164,726	3	121	36,470,880	5	6,102	7
Los Angeles, CA	48	91,847,385	4	412	96,491,062	1	19,496	4
Dallas, TX	17	42,738,551	5	176	42,165,624	4	92,368	2
Boston, MA	44	39,680,610	6	125	31,436,898	7	7,721	6
Miami, FL	2	32,977,731	7	30	8,603,775	11	838	11
Pittsburgh, PA	31	30,703,407	8	49	6,189,891	12	270	13
Atlanta, GA	37	28,422,508	9	70	25,126,853	8	3,035	9
Houston, TX	13	22,084,554	10	180	67,401,712	2	126,670	1
Baltimore, MD	14	18,763,097	11	44	4,408,790	13	2,732	10
Philadelphia, PA	32	16,122,602	12	85	22,025,682	9	10,233	5
Detroit, MI	10	6,645,872	13	83	20,374,585	10	695	12

Source: Delaware Valley Regional Planning Commission, May 2010.

The rankings of ENERGY STAR facilities and homes versus the number of registered LEED buildings are similar with the exception of Houston, which ranks highly in ENERGY STAR ratings. This region also has a significantly higher concentration of Residential Energy Services Network (RESNET) professionals, the EPA's energy home raters. As it stands, the comparison roughly represents the size and growth of the

¹¹ The current LEED database contains over 5,000 projects. Less than one percent of these projects are residential; of that one percent, less than 25 percent are privately owned or occupied.

region rather than the real concentration of sustainable building. A ranking of the straight counts of eco-enterprises professionals or businesses would produce similar rankings by region.

An interesting nexus of building and professional analyses is a comparison of LEED square footages to a region’s population of LEED Accredited Professionals. This is essentially a comparison of the productivity of LEED professionals within each region, measured by the square feet of LEED registered buildings in an MSA per LEED professional in that MSA. The results are provided in Table 9, which ranks the regions according to the amount of LEED registered interior space (square footage) per LEED AP. For each of Philadelphia’s LEED APs, approximately 13,923 square feet of LEED registered buildings have been or will soon be built in the Greater Philadelphia region. Detroit ranks lowest in this analysis of LEED AP productivity and Philadelphia second lowest, compared to Pittsburgh which has the highest “per professional” rate of productivity.

There are two or more non-mutually exclusive explanations for this disparity. First, LEED APs probably do not work exclusively on LEED buildings. In Philadelphia, there may be insufficient demand for LEED projects in relation to its supply of LEED APs. Second, professionals in design and construction industries for whom LEED designations would be desirable do not work exclusively within the region of their home or office. Their projects may be based in other regions where demand is high for sustainable building.

Table 9: Square feet of LEED Registered Buildings per LEED Accredited Professional

Metropolitan Area	LEED APs	Built Square Feet	Square Feet per LEED AP	Rank
Pittsburgh, PA	393	30,703,407	78,126	1
Washington, DC	2,585	137,514,290	53,197	2
Miami, FL	622	32,977,731	53,019	3
Chicago, IL	2,349	99,164,726	42,216	4
New York, NY	3,267	134,889,030	41,288	5
Los Angeles, CA	2,423	91,847,385	37,906	6
Dallas, TX	1,146	42,738,551	37,294	7
Baltimore, MD	662	18,763,097	28,343	8
Houston, TX	949	22,084,554	23,271	9
Boston, MA	2,094	39,680,610	18,950	10
Atlanta, GA	1,679	28,422,508	16,928	11
Philadelphia, PA	1,158	16,122,602	13,923	12
Detroit, MI	478	6,645,872	13,903	13

Source: Delaware Valley Regional Planning Commission, May 2010.

Pittsburgh has one of the lowest concentrations of LEED APs of the regions included in this study but boasts a relatively significant amount of sustainable construction for a region of its size. It obviously has high demand for this work but a low supply of expertise. It seems unlikely that all the production work for its sustainable building industry occurs locally. It is more likely that this work is imported from other regions with lower ratios of supply to demand.

This relatively crude analysis does not account for many important factors in evaluating supply and demand relationships for this kind of work. It does, however, showcase eco-enterprise's products and services as commodities able to improve a region's export work.

Distribution of Eco-Enterprises within the Greater Philadelphia Region

The results of DVRPC's intra-regional analysis are illustrated in Maps 1 and 2. A regional base map (including the commuter rail system and highway network) and two maps providing the names of the region's municipalities are included in Appendix C for reference, as well as maps of population and employment change between 1990 and 2000, median household income, people working at home, and degrees of disadvantage (from DVRPC's environmental justice methodology¹²). The counts of both businesses and professional memberships and certifications by ZIP code are combined for this analysis due to the relatively low number of business observations.

DVRPC also reviewed the results with and without the inclusion of region-specific organizations, as it was thought that these may have skewed the interpreted distribution of eco-enterprise concentrations within the region. The data was also assessed with LEED APs excluded and with national organizations excluded, since it was thought that either of these might likewise skew the results. In all cases, this did not appear to be the case.

It is important to recognize that at this point the only comparisons that can be made between eco-enterprise concentrations and other demographic characteristics such as high employment or population growth, median income, the number of "degrees of disadvantage", or concentrations of people working from home are visual. Because demographic data is evaluated in this report by municipality and eco-enterprise data is available only by ZIP code, determining if the correlation of these factors is statistically valid is not possible. Based on a visual survey, however, some general observations regarding the distribution of eco-enterprises in the Greater Philadelphia region can be reasonably made.

Map 1, which illustrates the absolute number of eco-enterprise professionals and businesses by municipality, demonstrates that a large number of green professionals and businesses are found in developed suburban communities closer to the region's core. The geographic similarities between areas with high population and employment growth, concentrations of people working from home, relatively high median household income, and eco-enterprise concentrations indicate a possible correlation among these factors. Similarities between the concentrations identified in Map 1 and the maps of median household income, population change, and employment change included for reference in Appendix C suggest that lower income areas and areas of little or negative growth contain fewer eco-enterprise businesses and professionals. There also appear to be some similarities between the frequency of people working from home and eco-enterprise concentrations. This may mean many of the professionals in this sector are self-employed.

¹² DVRPC's environmental justice (EJ) methodology (illustrated on the "Degrees of Disadvantage" map in Appendix D) quantifies eight indicators of disadvantage: concentrations of non-Hispanic minorities, Hispanics, the elderly, the physically disabled, car-less households, person with Limited English Proficiency, female-headed households with children, and households living in poverty. DVRPC's EJ methodology relies primarily on U.S. Census data, analyzed at the nine county regional scale (by municipality or census tract). The number of these factors that apply in a given census tract or municipality represent the "Degrees of Disadvantage." See www.dvrpc.org/GetInvolved/TitleVI/ for more information.

Several issues arise, however, when comparing demography to eco-enterprise concentrations. The eco-enterprise concentrations identified in Map 1, for example, are in areas known to be experiencing rapid population and employment growth, which may explain the presence of professionals and jobs linked to the emerging green economy.

Likewise, the consistent absence of certified professionals and businesses in disadvantaged or declining areas of the region and their disproportionate concentration in suburban areas where educational attainment and median incomes are higher may indeed be indicative of the sector's distribution, given the education requirements of many eco-enterprise jobs. However, this distribution may also simply reflect the fact that the current study relies on professional memberships and certifications as a proxy for the presence of eco-enterprises. Green jobs in the region's lower income areas are more likely lower-skilled 'green collar' jobs for which data is currently lacking. In any case, the implications of under-serving disadvantaged communities should be carefully considered in terms of both the social needs of these areas and the sector's apparent supply gap present within them.

Buildings

The intra-regional building analysis examines the dispersion of commercial buildings registered with or certified by LEED or ENERGY STAR.¹³ Map 2 illustrates the total square footage of interior space associated with these two programs. This analysis of ENERGY STAR and LEED-certified buildings includes commercial, industrial, and institutional buildings with a diverse mix of building uses, including schools, office buildings, supermarkets, fire stations, and warehouses.

The majority of this space appears to be in more densely populated urban areas. Philadelphia County contains a large amount of the region's share of "green" building space. Dense areas in Montgomery and Delaware counties and areas of rapid employment growth in Chester County also contain substantial amounts of registered square footage. Mercer County, with its sizable number of LEED APs, also boasts several ZIP codes with relatively large amounts of registered space.

Buildings qualified for registration with LEED or certification by either LEED or ENERGY STAR provide a number of financial benefits to building owners or occupants but can be substantially more expensive to build. While these buildings are often less expensive to operate, the materials and expertise that go into their construction are costly. Given the expense of constructing or refurbishing these buildings, it is not unexpected that they would be concentrated in high-rent areas or in places they can otherwise receive financial advantages. Also, given that the technology in these buildings tends to be more recent, it is likewise not surprising that LEED certified and ENERGY STAR buildings are most often located in areas of rapid growth or construction.

¹³ ENERGY STAR rated homes are not reported at the zip code level. Therefore, an analysis of their dispersion within the region is not possible.

Figure 2: ENERGY STAR and LEED Building Sq. Footage

Total Square Feet by ZIP Code

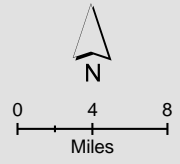
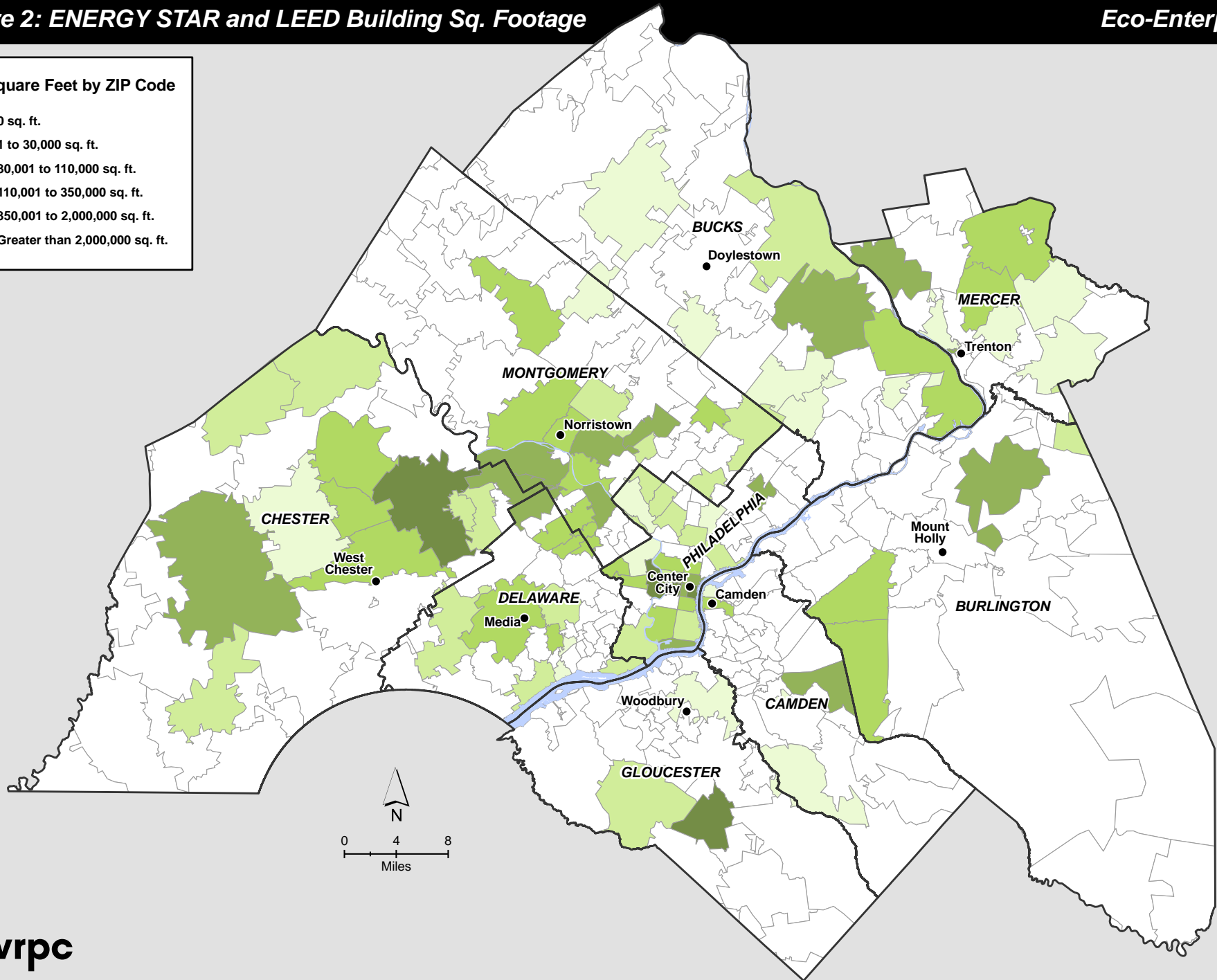
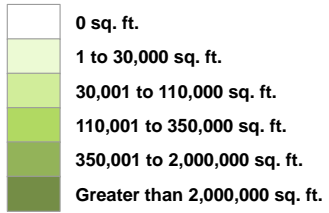
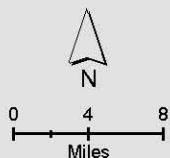
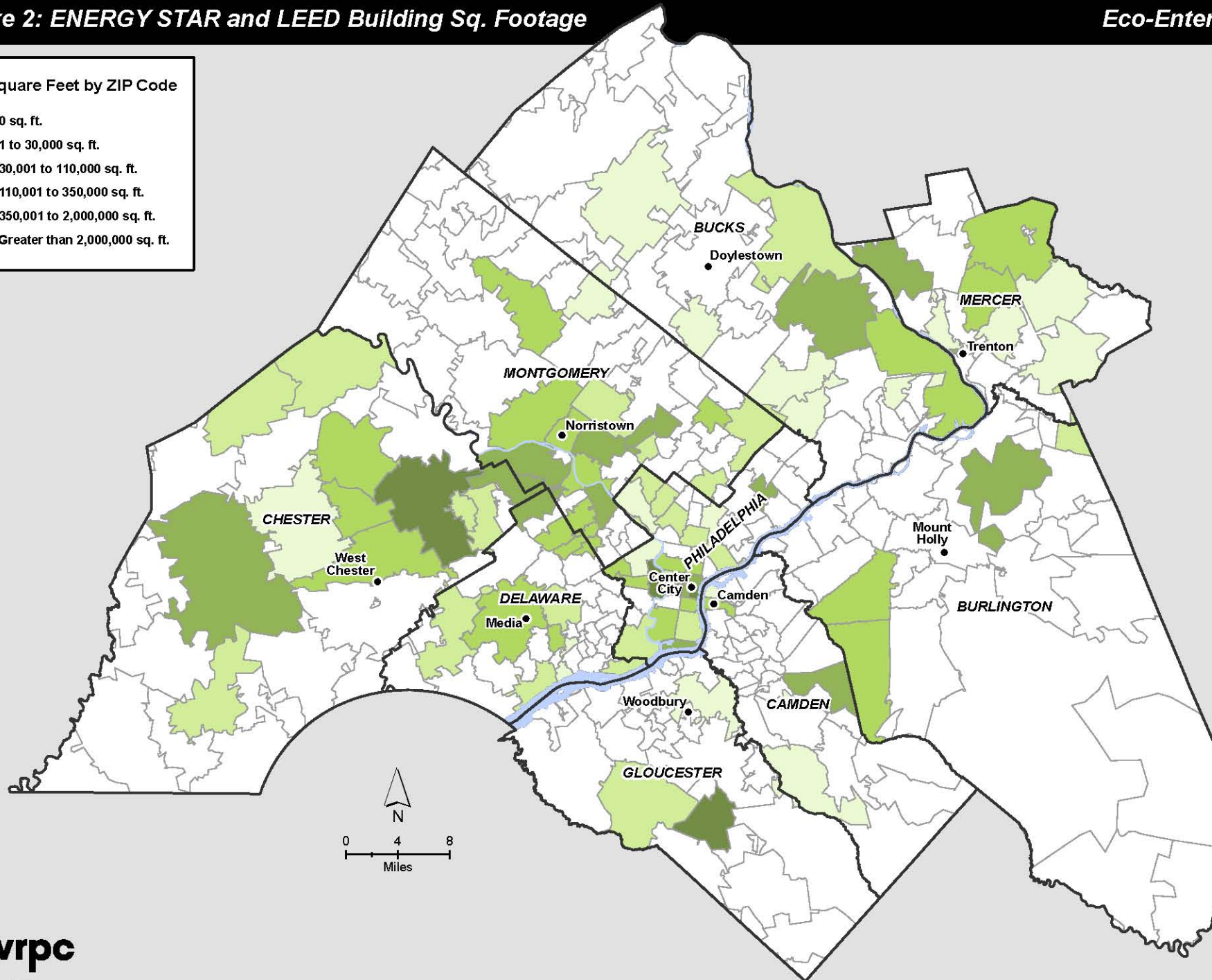
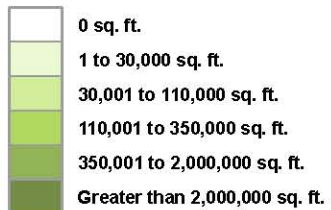


Figure 2: ENERGY STAR and LEED Building Sq. Footage

Total Square Feet by ZIP Code



Summary

This Data Snapshot provides an initial evaluation of eco-enterprises in the Greater Philadelphia region compared to other major metropolitan areas, constructing a unique and innovative dataset that effectively captures the nature of this emergent sector. Consistency between the results of the inter-regional analysis and other research efforts suggests that this methodology is a valid alternative. While the data do not enable a similarly stringent analysis when assessing concentrations of eco-enterprise jobs within the region, the inferred similarities between a variety of demographic factors and the dispersion of eco-enterprises also appear valid. Despite the preliminary nature of this analysis, it provides reliable results which say a great deal about the status of eco-enterprises in Greater Philadelphia.

Inter-regional results along with an analysis of the weight of certain organizations' presence within each metropolitan area indicate that a region's respective concentration in particular eco-enterprises may be tied to their historic industry mix. The fact that many cities have leveraged former industrial clusters into developing eco-enterprises, through both public and private initiatives, indicates that post-industrial cities have certain competitive advantages in "going green".

Results from the LEED AP productivity analysis suggest these professionals may export a great deal of their work. Quantifying the amount of eco-enterprises production and demand in each region is not as straightforward as the analysis of LEED and ENERGY STAR building activity. That analysis may capture the norms of the architecture and design field more than eco-enterprises as a whole. However, it is not unreasonable to assume regions export the work of this sector.

The study's intra-regional results indicate possible links between areas with strong economic growth and the presence of eco-enterprises. While this research is unable to provide solid statistical evidence of these links, inferred trends are fairly standard: emergent industries typically concentrate in areas of extensive economic growth. The areas of greatest employment and population growth in Greater Philadelphia are located in rapidly growing suburbs ringing the region's developed center where educational attainment and median incomes are also high.

Comparisons between areas with high degrees of disadvantage and eco-enterprise concentrations suggest that the region's older inner-city communities may lag in terms of attracting eco-enterprise jobs. The age of the building stock in these areas offer great opportunities for eco-enterprise work, including insulation and retrofitting. This analysis, however, considers only the location of businesses and professionals, not the distribution of work. Demand in these communities may be met by services offered outside of them. Also, employment barriers in these places may not easily enable adequate training for the professional occupations that this report specifically considers. Many job training initiatives are currently focused on preparing unemployed and under-employed residents in these older communities for entry level green-collar jobs, which can eventually lead to more advanced positions in the emerging eco-enterprise sector requiring higher skills sets and commanding higher wages.

These observations begin to explain the present state of eco-enterprise growth and development in Greater Philadelphia and the United States as a whole. Using counts of self-identified individuals as a proxy for economic activity adequately captures the sense of the sector. Future studies should consider

alternative “green collar jobs” definitions to appropriately measure overall employment in eco-enterprises and more equitably consider non-professional eco-enterprise concentrations.¹⁴ As the diverse eco-enterprises sector becomes more established and dominant, an improved means of analysis, including a more comprehensive data set, will likely develop. The methodology currently being developed by the U.S. Bureau of Labor Statistics should provide a standardized definition and accounting of “green jobs” that will allow policy makers to track and respond to trends in the sector.

Conclusion and Next Steps

Building Greater Philadelphia’s capacity for competitive advantage in the rapidly expanding eco-enterprise sector is critical to the region’s economic future. Energy dependence and increasing commodity prices threaten our economic stability. As one of the nation’s largest post-industrial regions, Greater Philadelphia must address issues related to its former economy which are now economic and ecological liabilities. The ecologically-sustainable manufacturing and harvesting of products and commodities such as food and energy addresses the increasingly expensive externalities of current production patterns within and outside of the region. Eco-enterprises can offer new economic life and purpose to the infrastructure and facilities of the region’s once vast production economy, providing economic growth and new employment born out of the economic restructuring of previous decades.

This study demonstrates that the region contains a large and diverse set of eco-enterprises but lacks competitiveness with some of its peer regions. As political and economic factors begin to move the nation as a whole towards a more ecologically sustainable economy, Greater Philadelphia must be better prepared to meet its own needs and the needs of neighboring regions. Anticipation of these shifts will not only put the region in a better position to deal with change when it occurs but also ensures its economic benefit. Greater Philadelphia is already becoming increasingly competitive in attracting eco-enterprises, thanks in part to ongoing regional incentives and initiatives.

The concentration of eco-enterprises in the most rapidly growing areas of the region and apparent lack of eco-enterprise employment opportunities in the region’s older developed areas, however, is challenging. As the sector grows within the region, employment opportunities and eco-enterprise workforce training efforts should extend into areas of growth and decline alike, providing economic advantages equitably. While many jobs associated with the eco-enterprises require a highly skilled and specialized work force, others do not. Numerous planning initiatives and job training programs within the region are working to address this disparity and create pathways out of poverty, to begin to move disadvantaged areas toward fuller employment through eco-enterprise work.

Future research should continue to consider the size and nature of this sector within the region and evaluate the current demand for its products and services. An understanding of how large the market for eco-enterprises is and how much of that market is unmet would provide a good indication of the spatial mismatch of supply and demand and possibly the impetus to inspire growth. Additional information is also needed regarding logistical and financial difficulties of businesses and professionals in these industries and how policy and initiatives could better address these.

¹⁴ The Sustainable Business Network (SBN) of Greater Philadelphia is currently conducting such a study. See Job/Occupation—“Green Collar Jobs” in Appendix A.

Growth of the nation's service industries and its feverish production of technological innovation have buoyed the continued growth of the regional economy despite the decline of the manufacturing industry. The Greater Philadelphia region has already become a hub for alternative energy, with the world's three largest wind energy companies – Gamesa, Iberdola, and GE Wind – as well as two of the world's largest solar energy systems companies – HelioSphera and SunTechnics (a subsidiary of Conergy) – all having a presence in the area. Eco-enterprise businesses and professionals lie on the next horizon of Greater Philadelphia's economic expansion and continued prosperity as we continue to grapple with the impacts of an increasingly global economy.

Appendix A: Alternative Definitions of Eco-Enterprises



ALTERNATIVE DEFINITIONS OF ECO-ENTERPRISES

Job/Occupation—“Green Jobs”

Description: This definition comprises jobs and occupations associated with environmental improvement, energy conservation, and renewable energy. These are termed “green jobs” by some observers.¹⁵ These workers bring expertise and knowledge of environmentally-conscious techniques in design, policy, conservation, and sustainability into the economy. With more stringent environmental regulations and energy concerns, many companies now seek professionals with knowledge of environmental and energy issues. These workers encompass professions such as environmental consultants, environmental or biological engineers, green architects, environmental lawyers, educators, and technology workers. This category of jobs also includes low-skill jobs such as insulation installers and recycling workers, which many believe may provide employment opportunities for low-skilled workers in the urban core.

Reason for inclusion: For a region to be competitive in emerging “green” industries, it needs to have a workforce that can fill the jobs. In addition, if it can be shown that these industries can provide jobs for difficult to employ populations, it will help broaden the political base supporting these industries.

Shortcomings for this report: “Green jobs” do not have a clear correspondence with standard occupation codes, making this definition difficult to analyze.

Availability of information: Data on employment by Standard Occupational Classification (SOC) and Standard Industrial Code (SIC) are readily available. However, as noted, there is no clear correspondence between these codes and “green jobs” – the occupation categories are generally much broader and encompass occupations that should not be included. In addition, available occupation data is very limited at or below the county level.

Job/Occupation—“Green Collar Jobs”

Description: The term “green collar jobs” describes jobs in this sector and has been used synonymously with the term “green jobs”, defined above. It has also been used in a number of more focused ways to define a subset of “green jobs”. The two most widely used definitions are:

- ❖ The Apollo Alliance and Green For All defines “green collar jobs” as “well-paid, career track jobs that contribute directly to preserving or enhancing environmental quality.”¹⁶
- ❖ Raquel Pinderhughes, Ph.D., in a publication for the City of Berkeley, California, defines “green collar jobs” as “blue collar jobs in green businesses – that is, manual labor jobs in businesses

¹⁵ See the following definition of “green collar jobs”, a well defined subset of this definition.

¹⁶ The Apollo Alliance and Green for All, *Green Collar Jobs in America's Cities: Building Pathways out of Poverty and Careers in the Clean Energy Economy*, March 2008. Available on-line at www.americanprogress.org/issues/2008/03/green_collar_jobs.html.

whose products and services directly improve environmental quality.” Dr. Pinderhughes defines twenty-two specific economic sectors that together comprise “green collar jobs.”¹⁷

These definitions share the idea that a subset of jobs created by this sector are ideal for providing pathways out of poverty for low-skilled workers in the urban core.

Reason for inclusion: While this definition is a subset of the “green jobs” definition, it is emphasized separately in part because its focus on creating jobs in those areas most needing employment may be particularly relevant to the Greater Philadelphia region. Additionally, there is an active project taking place in the City of Philadelphia, spearheaded by the Sustainable Business Network (SBN), pursuing “green collar jobs” as defined by Dr. Pinderhughes.¹⁸ This project has the attention of Philadelphia City Council and the Office of the Mayor. Furthermore, if it can be demonstrated that these industries can provide jobs for populations with barriers to employment, it will help broaden the political base supporting these industries.

Shortcomings for this project: Green collar jobs do not have a clear correspondence with standard occupation codes, making this definition difficult to analyze.

Availability of information: Data on employment by Standard Occupation Code is readily available. However, as noted, there is no clear correspondence between these codes and green collar jobs – the occupation categories are generally much broader than the green collar jobs. DVRPC is not aware of other helpful sources of occupation information.

Self-identification—Industry Specific

Description: This definition includes members in national and international affiliations of businesses that identify themselves with this sector. This includes members of organizations of businesses in the environmental, clean energy, or energy efficiency/conservation sectors, or similar organizations.

Reason for inclusion: Companies that join these organizations have identified themselves with this sector.

Shortcomings for this project: Some businesses may choose not to join industry affiliation organizations. Some aspects of this emerging industry sector may not have well-established business organizations. A business that has more than one facility is likely to have its membership recorded only at its headquarters location.

Availability of information: These organizations maintain membership lists and were readily willing to share information on member locations for research purposes.

¹⁷ Pinderhughes, Raquel Rivera, PhD. *Green Collar Jobs: An Analysis of the Capacity of Green Business to Provide High Quality Jobs for Men and Women with Barriers to Employment*. Available online at www.ellabakercenter.org/page.php?pageid=26&contentid=350.

¹⁸ Note that it was anticipated that the SBN project noted above would include an extensive survey of all “green collar jobs” in the City of Philadelphia beginning in the late 2008.

Industry Sector

Description: In many cases, a regional analysis of an important economic cluster is carried out based on what business sectors are defined as part of that cluster. For this analysis, the industry cluster may be defined as those sectors that produce environmentally sensitive products or services. For instance, CleanTechNetwork.com includes the following industries:¹⁹

- ❖ Energy generation: wind, solar, hydro/marine, bio-fuels, geothermal, others
- ❖ Energy storage: fuel cells, advanced batteries, hybrid systems
- ❖ Energy infrastructure: management, transmission
- ❖ Energy efficiency: lighting, buildings, glass, others
- ❖ Transportation: vehicles, logistics, structures, and fuels
- ❖ Water & wastewater: water treatment, water conservation, wastewater treatment
- ❖ Air & environment: cleanup/safety, emissions control, monitoring/compliance, trading & offsets
- ❖ Materials: nano, bio, chemical, others
- ❖ Manufacturing/industrial: advanced packaging, monitoring & control, smart production
- ❖ Agriculture: natural pesticides, land management, aquaculture
- ❖ Recycling & waste: recycling, waste treatment

Reason for inclusion: Industries such as those listed above are plausible candidates for inclusion in an “eco-industries” cluster analysis.

Shortcomings for this project: As the CleanTechNetwork web site notes, “Determining what is cleantech isn't always easy.”²⁰ There is no clear correspondence between these industry sectors and standard industry classification systems, such as the NAICS. In addition, while detailed industry information is readily available at the metropolitan area level, it is not available at smaller geographies.

Availability of information: Information is available through the NAICS codes and other national and regional economic development data sources. However, as noted, this information is not available at the sub-regional level.

Products and Services

Description: This definition would be based on the types of products and services deemed environmentally benign, eco-friendly, or energy efficient. An analysis of eco-industries was commissioned by the European Union for its member states²¹, and a definition by product type was used during the analysis of eco-industries exports. Harmonized System codes (a set of internationally agreed codes used by customs officials to describe goods for purposes of international trade) were used to classify the products.

Reason for inclusion: In theory, it should be relatively simple to decide what type of specific products or product categories are or are not energy efficient and/or environmentally friendly. There are a variety of

¹⁹ From www.cleantech.com/about/CleantechDefinition.cfm.

²⁰ Ibid.

²¹ Ecotec Research and Consulting, Ltd. *Analysis of the EU Eco-Industries, Their Employment and Export Potential*. A final report to DG Environment, Birmingham. 2002.

product certifications that could be used, such as Energy Star certification for energy efficient appliances, which could be useful in forming a list of appropriate products.

Shortcomings for this project: The biggest problem with this method is the difficulty in finding a system or way to connect the finished products to their manufacturing location. Without such a system, a regional analysis would not be feasible. In addition, creating a comprehensive product list would be a daunting task, unless the product list used for the EU study was used.

Availability of information: Information on products themselves can be found, but tracing them to their manufacturing point is not feasible within the scope of this project.

Professional Certifications

Description: There are a wide range of professional certifications that indicate competency in key areas of this sector. These include LEED AP, certified HERS raters, and certified arborists.

Reason for inclusion: The presence of certified professionals is a clear indicator of the presence of business activity in this industry sector. Measuring their presence relative to other regions may serve to indicate the region's relative strength. ZIP code data of certified professionals provides a relatively fine-grain analysis, allowing both inter-regional and intra-regional comparisons.

Shortcomings for this project: Certified professionals comprise only a small portion of workers in these industries. In addition, the presence of a certified professional at a business may not indicate that the business should be included in this sector.

Availability of information: DVRPC was able to obtain ZIP code data for certified professionals from close to twenty national certifying bodies.

Self-identification—Sustainable Businesses

Description: This definition includes businesses with membership in local, national, and international “sustainable business” organizations. These organizations generally focus on how a business is run rather than what product or service is provided. Examples of such organizations include: Sustainable Business Network of Greater Philadelphia (SBN Philly); Business Alliance for Local Living Economies (BALLE); Businesses for Social Responsibility (BSR); Coalition for Environmentally Responsible Economies (CERES); and B-Corporation.

Reason for inclusion: Companies that join these organizations have identified themselves with this sector.

Shortcomings for this project: Not all businesses that fall within the membership of a sustainable business organization are in the eco-enterprises sector. In addition, the membership of some large national organizations, such as BSR and CERES, are made up largely of national or international businesses whose geographic presence is difficult to establish on a facility-by-facility basis. More local organizations, such as SBN Philly and other members of the BALLE network, have membership bases that are very different from each other, and in turn, are difficult to compare inter-regionally.

Availability of information: These organizations maintain membership lists and share this information for research purposes.

Investor Based

Description: This definition would comprise those firms that are included in screened green/sustainable investment funds. One example is the Dow Jones Sustainability Indices, which track the financial performance of leading sustainability-driven companies. Another example, the Calvert Group, has long offered environmentally responsible investment opportunities. A large component of their inclusion criteria is environmental performance. Companies from these and other funds would be included under this definition. In addition, this definition might include venture capital funds that focus on investing in this sector.

Reason for inclusion: The companies included have been deemed “sustainable,” “green,” or “eco-friendly” by researchers from the funds. An analysis of the presence of these larger companies in Greater Philadelphia may be of use. Data and other information on these companies are easily accessible for any analysis we may choose to complete.

Shortcomings for this project: Unfortunately, these funds are highly selective and a large number of firms are left out. For example, the Dow Jones Sustainability Index contains only 100 companies in the U.S., most of which are large multi-national corporations. Information on the location of facilities, rather than headquarters, is difficult to come by.

Availability of information: Information on both Calvert and DJSI is readily available on their respective websites. Information on venture capital investments is not readily available at the sub-regional level.

Facility Certification (ISO 14000)

Description: This definition would include facilities certified to be environmentally benign or energy efficient. ISO 14000 certification is the most appropriate certification to use for this definition. ISO 14000 is an environmental management certification, the guidelines for which were developed by the International Organization for Standardization. The standards allow companies and organizations to minimize any negative affect their operations may have on the environment. Compliance with environmental laws and regulations are included. The American National Standards Institute oversees the certification of all ISO standards in the U.S.

Reason for inclusion: Companies that are certified as operating in compliance with the ISO 14000 environmental management systems (EMS) have developed management systems that minimize their impact on the environment. The ISO 14000 standards and the others within the classification are internationally accepted for assessing EMSs. Specific requirements for establishing an environmental policy, determining the environmental impacts of the production of goods and services, planning environmental objectives and measurable targets, and implementing programs are all included.

Shortcomings for this project: ISO 14000 standards do not apply to an entire organization. Instead, individual facilities are assessed and certified. In addition, ISO 14000 certification is not related to the product or services being produced, but rather to the facility producing the product.

Availability of information: A master list of certified facilities does not exist. In addition, many large companies self-certify their facilities, making it extremely difficult to get information on the location of ISO 14000 certified facilities.

Eco-Industrial Parks

Description: Eco-industrial parks are communities of businesses and organizations located on a common property. These entities work together in many facets of their coexistence. Many eco-industrial parks have systems in place whereby the byproducts or waste material of one company's manufacturing process (e.g., waste heat) is used by another company for the manufacturing of a different product or service.

Perhaps the most cited case study is in Kalundborg, Denmark, where a power plant, oil refinery, pharmaceutical manufacturer, plasterboard factory, and the city water and heating supply system form the core of the industrial park. The plasterboard factory uses excess gas from the refinery as a low-cost fuel source; steam from the power plant is used by the refinery for process heat, by the pharmaceutical company for sterilization, and to heat homes in the city, replacing thousands of oil furnaces. The salt water used for cooling in the power plant is used to warm ponds in a fish farm nearby and waste sulfur from the refinery is used in a nearby sulfuric acid production facility.

Reason for inclusion: Eco-industrial parks are models for how to minimize waste and to identify and take maximum advantage of traditionally ignored synergies among dissimilar industrial processes. Eco-industrial parks can significantly reduce the energy use and environmental impact of a set of businesses in comparison to individual businesses efforts.

Shortcomings for this project: While eco-industrial parks have grown in popularity in recent years, they remain relatively scarce. Obviously not all eco-enterprise organizations are located at eco-industrial parks and not all organizations located at eco-industrial parks would fit in DVRPC's definition of eco-enterprises.

Availability of information: This topic is fairly prevalent in journals and other publications, as well as on websites. Several sites have begun to catalogue eco-industrial parks that have been established across the United States. However, the data is not extensive enough to permit either inter-regional or intra-regional comparisons.

Appendix B: Comparisons of Eco-Enterprise
Concentrations by Metropolitan Statistical Area



COMPARISONS OF ECO-ENTERPRISE CONCENTRATIONS BY METROPOLITAN AREA

This appendix provides a more detailed statistical comparison of eco-enterprise concentrations. Table 10 presents the concentration of memberships or certifications for each of the component national organizations in each metropolitan statistical area (MSA). For each organization, the average concentration for the 13 MSAs was calculated as well as the standard deviation of the concentration. Numbers in **bold** are significant at the 90% confidence interval. Aggregating individuals and businesses in terms of either professional or trade affiliations serves as a reasonable proxy for gauging eco-industries activity. However, the process of aggregation inherently conceals the fact that the organizations contributing data to this study are unequal in the size of their membership base and relevance within their respective eco-industries sectors.

Table 1: Concentrations of Component Organizations by MSA (per 100,000 Employees)

Org.	ATL	BAL	BOS	CHI	DAL	DET	HOU	LA	MIA	NY	PHI	PIT	WDC
ABCEP	0.37	0.43	0.29	0.13	0.14	0.20	0.98	0.08	0.79	0.23	0.18	0.21	0.69
AWMA	3.99	3.16	5.01	4.10	3.60	3.62	6.83	3.14	0.85	2.07	5.07	18.82	4.05
ASES	3.83	5.41	9.46	4.91	3.41	3.30	3.27	4.89	3.97	5.49	6.16	3.61	14.73
AEE	6.91	6.69	9.63	5.57	11.17	8.80	6.83	4.85	5.52	4.64	8.24	9.20	12.41
BIC	1.34	1.89	2.65	2.58	0.94	2.39	1.37	2.23	2.27	2.46	2.40	2.48	1.84
GRB	0.13	0.36	0.10	0.11	0.03	0.04	0.03	0.01	0.00	0.06	0.06	0.00	0.11
IPEP	0.60	0.61	0.75	0.48	0.42	0.28	0.95	0.54	0.47	0.39	0.82	3.68	0.69
ISRI1	0.60	0.85	0.85	1.11	0.61	0.80	1.24	0.90	0.63	0.95	0.88	2.48	0.29
ISRI2	1.41	1.34	1.01	2.06	1.19	1.43	1.93	1.64	0.95	1.32	1.44	3.68	0.51
ISA	10.50	9.43	6.94	20.16	5.38	8.92	3.30	9.83	13.43	5.71	11.76	8.42	12.89
NAEP	0.57	1.52	0.69	0.23	0.50	0.12	1.27	0.34	2.18	0.18	0.35	0.21	1.52
NBB	0.07	0.06	0.13	0.11	0.11	0.12	0.78	0.13	0.00	0.10	0.09	0.28	0.19
NEHA	1.38	1.82	1.87	1.47	1.03	1.63	0.16	0.16	0.50	0.21	0.44	1.70	2.32
NRC	6.68	0.49	0.39	2.22	2.27	0.36	1.41	0.54	0.28	0.58	2.82	2.83	2.00
RESNET	0.50	0.43	0.29	0.29	1.08	0.48	0.85	0.21	0.28	0.27	0.41	0.42	0.83
SCS	1.88	0.30	0.92	0.30	1.14	0.28	0.26	4.45	0.98	0.26	0.59	0.35	0.32
SAF	0.70	0.43	0.23	0.14	0.19	0.00	0.39	0.00	0.09	0.18	0.38	0.78	0.72
SEIA	0.00	0.00	0.16	0.02	0.03	0.04	0.00	0.08	0.06	0.06	0.12	0.00	0.21
SWANA1	6.07	5.66	2.82	2.02	4.41	0.84	2.65	4.37	2.96	2.13	2.58	1.63	4.21
SWANA2	0.60	2.74	0.62	0.59	0.69	0.04	0.07	1.51	1.10	0.26	0.85	0.21	1.25
LEEDAPs	56.34	40.26	68.56	42.06	31.77	19.03	31.01	32.48	19.61	30.86	33.96	27.80	68.85
WQA1	0.47	1.40	0.29	2.13	0.25	0.92	0.36	0.68	0.60	0.29	1.97	0.21	0.13
WQA2	0.64	1.09	0.85	2.08	0.67	0.76	1.01	1.46	1.58	0.50	1.53	0.85	0.67

Source: Delaware Valley Regional Planning Commission, May 2010. **BOLD** = significant at .90 confidence. Agencies and organizations represented by the acronyms in this table are defined in Table 11.

The MSAs where concentrations are more than 1.645 standard deviations from the mean are noted as having a significantly higher or lower than average concentration of professionals or businesses from that organization. Eleven of the thirteen metropolitan areas contain at least one such statistically significant concentration, and some contain more than one. Table 10 is interpreted below for each of the MSAs.

- ☞ Atlanta, Georgia: Contains significant concentrations of members of the National Recycling Coalition and Solid Waste Association of North America. The mix of these concentrations suggests a concentration in waste management and recycling.
- ☞ Baltimore, Maryland: Concentrated in professionals certified by the Solid Waste Association of North America and businesses specializing in building green roofs.
- ☞ Boston, Massachusetts: Contains significant concentration of LEED Accredited Professionals.
- ☞ Chicago, Illinois: Contains the highest and most significant concentration of both members of and professionals certified by the Water Quality Association. It also contains the greatest concentration of individuals certified by the International Society of Arboriculture.
- ☞ Dallas, Texas: Contains significant shares of professionals certified by the Residential Energy Services Network and bike shops.
- ☞ Detroit Michigan: No significant concentrations.
- ☞ Houston, Texas: Significant concentrations of American Board Certified Environmental Professionals and business organizations belonging to the National Bio-diesel Board.
- ☞ Los Angeles, California: Produces a significant number of products certified by Scientific Certification Systems.
- ☞ Miami, Florida: Contains a high concentration of the National Association of Environmental Professionals.
- ☞ New York, New York: No significant concentrations.
- ☞ Philadelphia, Pennsylvania: The most notable concentration of professionals or businesses in Philadelphia is its concentration of professionals certified by the Water Quality Association.
- ☞ Pittsburgh, Pennsylvania: Of the 13 regions compared in the study, Pittsburgh is the leader in waste management, boasting significant concentrations of members of the Air and Waste Management Association and the Institute of Scrap Recycling Industries. Pittsburgh also contains significant concentrations of members of the Institute of Professional Environmental Practice and Society of American Foresters.
- ☞ Washington, District of Columbia: Contains a significant concentration of individuals or businesses in the American Solar Energy Society, the Association of Environmental Engineers, the Solar Energy Industries Association, and LEED Accredited Professionals.

Table 12 provides data on the number and concentration of eco-enterprise businesses and professionals within the Greater Philadelphia region.

Table 11: Acronyms

Acronym	Organization
ABCEP	Academy of Board Certified Environmental Professionals
AEE	Association of Energy Engineers
ASES	American Solar Energy Society
AWMA	Air & Waste Management Association
BIC	Bicycle Retailers
GRB	Green Roof Directory/Businesses
GRP	Green Roof Directory/Projects
IPEP	Institute of Professional Environmental Practice
ISA	International Society of Arboriculture
ISRI1	Institute of Scrap Recycling Industries
ISRI2	Institute of Scrap Recycling Industries
LEED APs	U.S. Green Building Council LEED accredited professionals
LEED CBs	U.S. Green Building Council (LEED certified buildings)
NAEP	National Association of Environmental Professionals
NBB	National Bio-diesel Board
NEHA	National Environmental Health Association
NESEA	Northeast Sustainable Energy Association
NJOrg	New Jersey Dept of Agriculture - Certified Organic
NRC	National Recycling Coalition
PCO1	Pennsylvania Certified Organic
PCO2	Pennsylvania Certified Organic
RESNET	Residential Energy Services Network
SAF	Society of American Foresters
SBN	Sustainable Business Network
SCS	Scientific Certification Systems
SEI	Smart Energy Initiative of SE PA
SEIA	Solar Energy Industries Association
SWANA1	Solid Waste Association of North America
SWANA2	Solid Waste Association of North America
WQA1	Water Quality Association
WQA2	Water Quality Association

Source: Delaware Valley Regional Planning Commission, May 2010.

Table 12: Count and Concentrations of Component Organizations within Greater Philadelphia

Organization	Count	Concentration (per 100,000 employees)
Academy of Board Certified Environmental Professionals	6	0.176
Air & Waste Management Association	173	5.074
American Solar Energy Society	210	6.159
Association of Energy Engineers	281	8.242
Bicycle Retailers	82	2.405
Green Roof Directory Businesses	2	0.059
Institute of Professional Environmental Practice	28	0.821
Institute of Scrap Recycling Industries	30	0.880
Institute of Scrap Recycling Industries (yards)	49	1.437
International Society of Arboriculture	401	11.761
National Association of Environmental Professionals	12	0.352
National Biodiesel Board	3	0.088
National Environmental Health Association	15	0.440
National Recycling Coalition	96	2.816
Residential Energy Services Network	14	0.411
Scientific Certification Systems	20	0.587
Society of American Foresters	13	0.381
Solar Energy Industries Association	4	0.117
Solid Waste Association of North America	88	2.581
Solid Waste Association of North America (Certified)	29	0.851
U.S. Green Building Council	1,158	33.963
Water Quality Association (Certified)	67	1.965
Water Quality Association	52	1.525

Source: Delaware Valley Regional Planning Commission, May 2010.

Appendix C: Reference Maps



Reference Maps

This appendix contains maps that can be referenced when assessing the intra-regional comparison of eco-enterprise locations within the Greater Philadelphia region. These maps include:

- ❖ Map C-1: Greater Philadelphia Region
- ❖ Map C-2: New Jersey Municipalities
- ❖ Map C-3: Pennsylvania Municipalities
- ❖ Map C-4: Population Change, 1990–2000
- ❖ Map C-5: Employment Change, 1990–2000
- ❖ Map C-6: People Working at Home, 2000
- ❖ Map C-7: Median Household Income, 1999
- ❖ Map C-8: Degrees of Disadvantage

Figure C-1: Greater Philadelphia Region

Eco-Enterprises

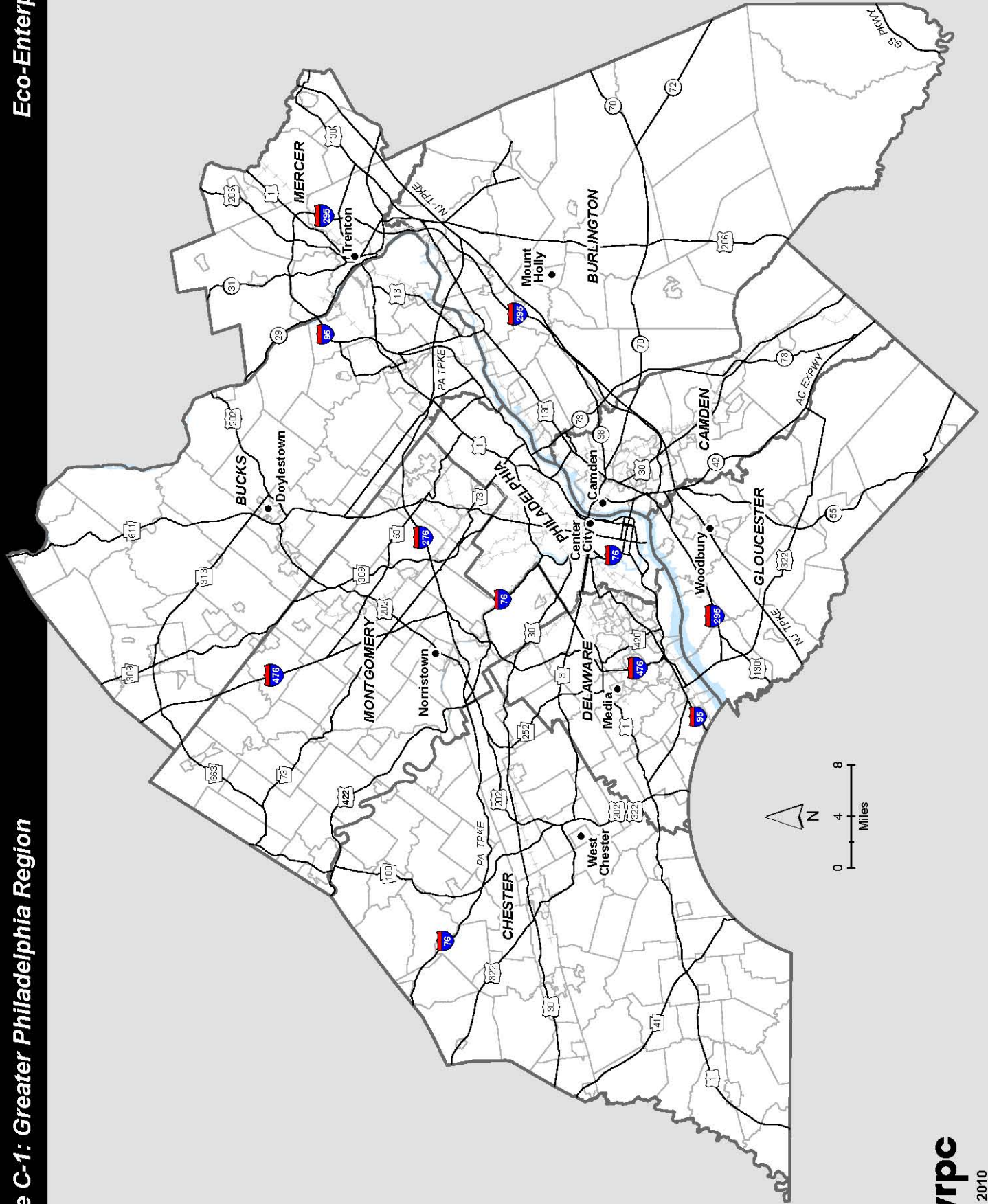


Figure C-2: New Jersey Municipalities

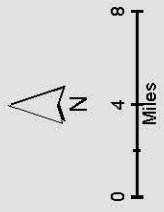
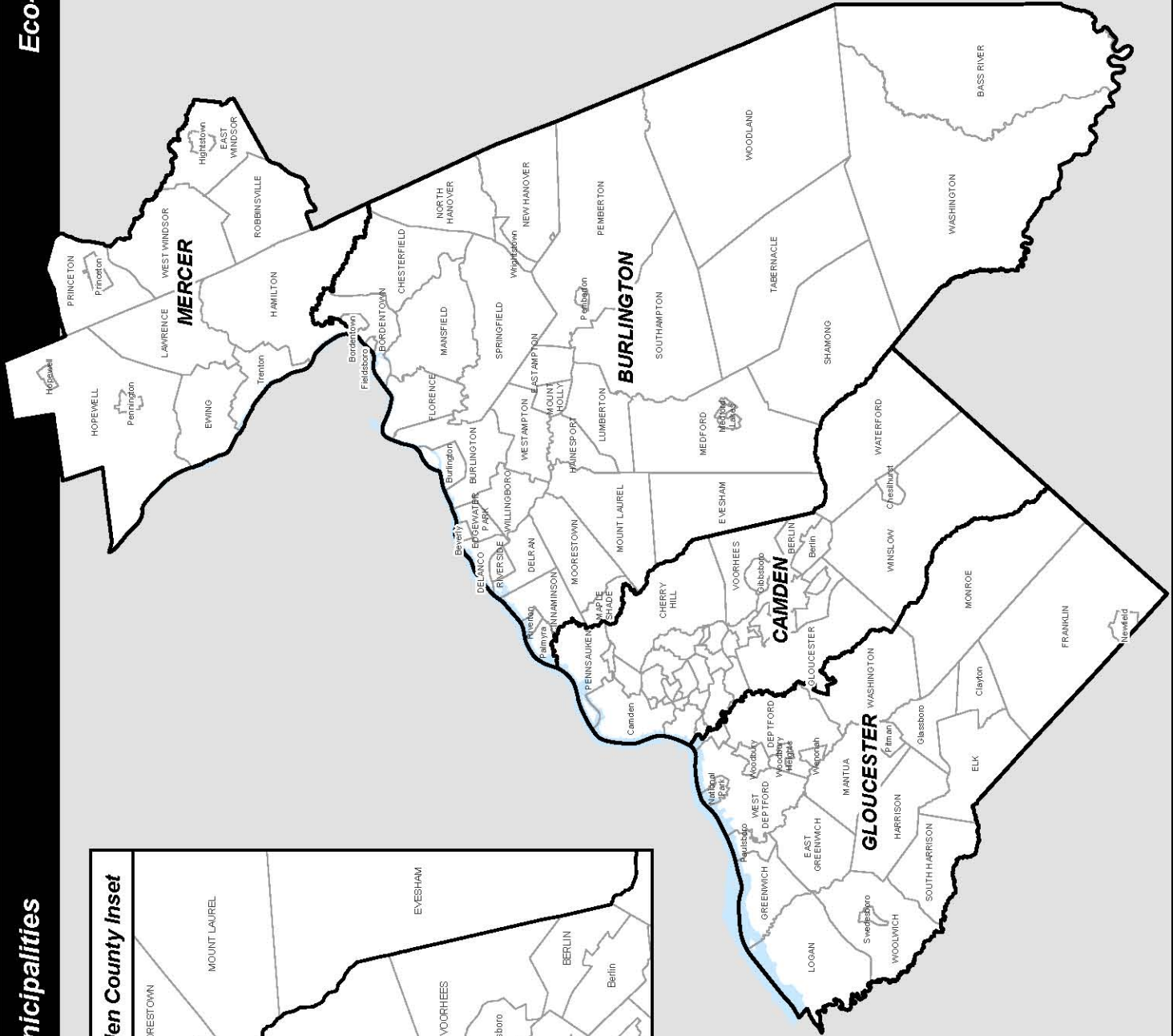
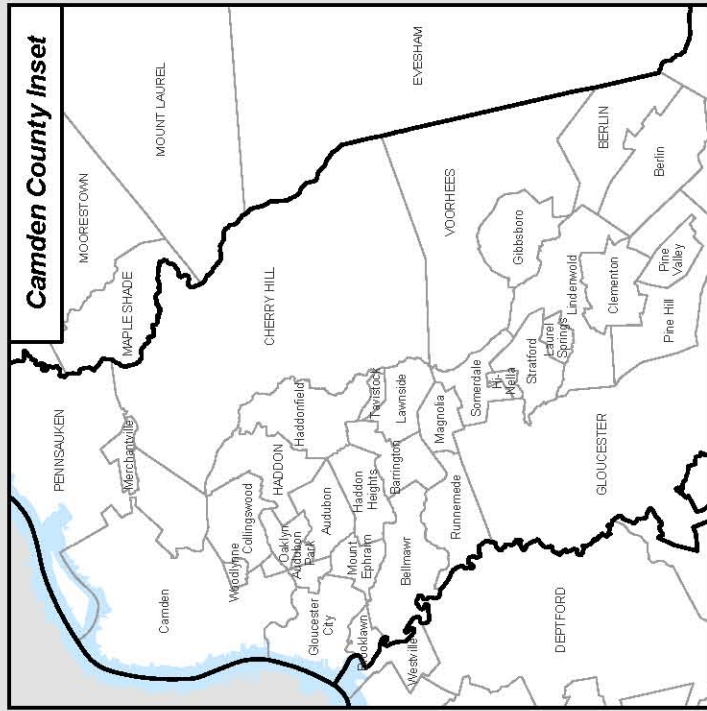
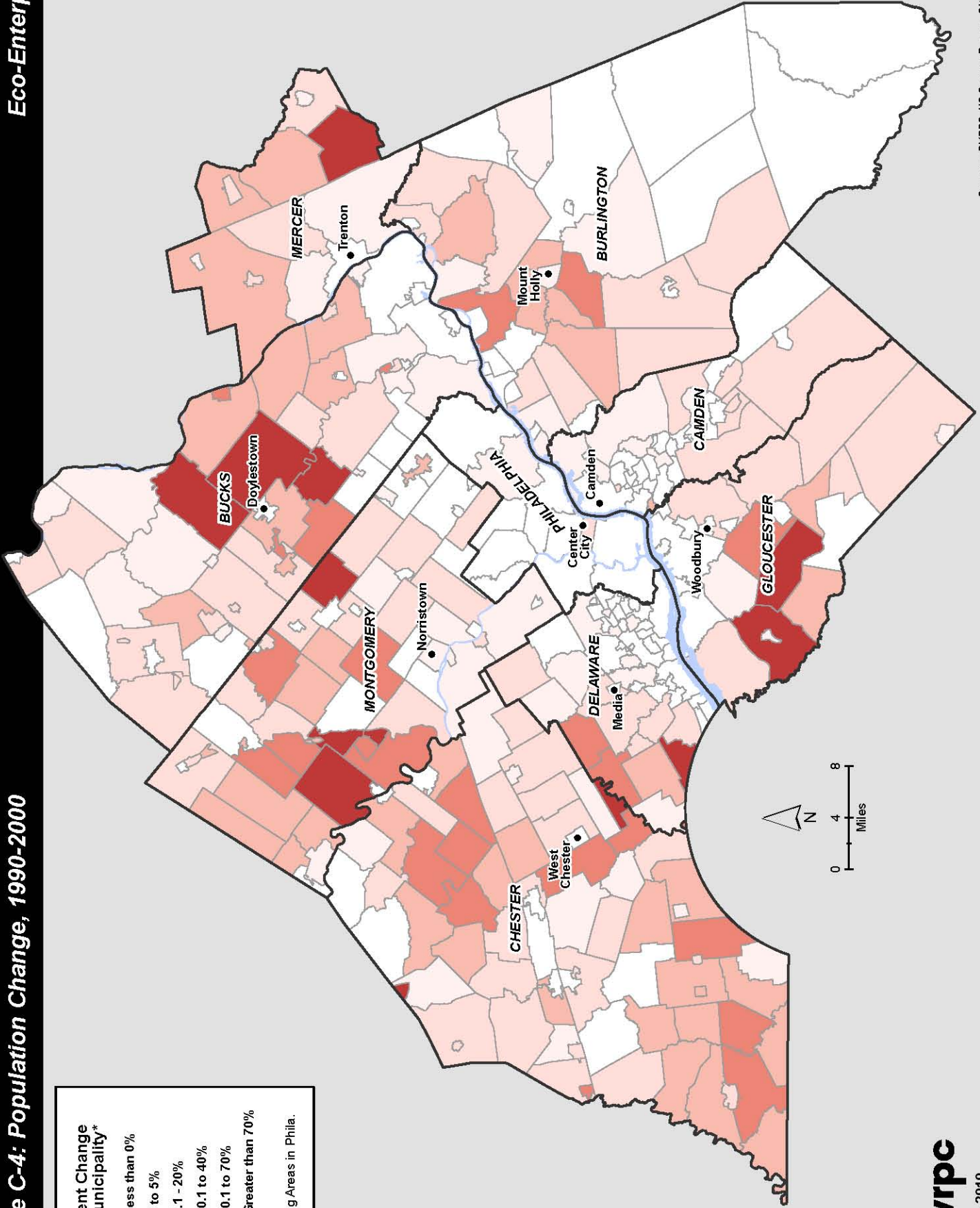
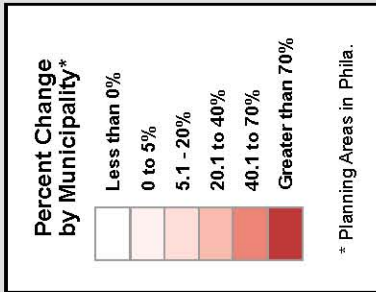


Figure C-4: Population Change, 1990-2000



Sources: DVRPC, US Census Bureau, City of Philadelphia

Figure C-5: Employment Change, 1990-2000

Eco-Enterprises

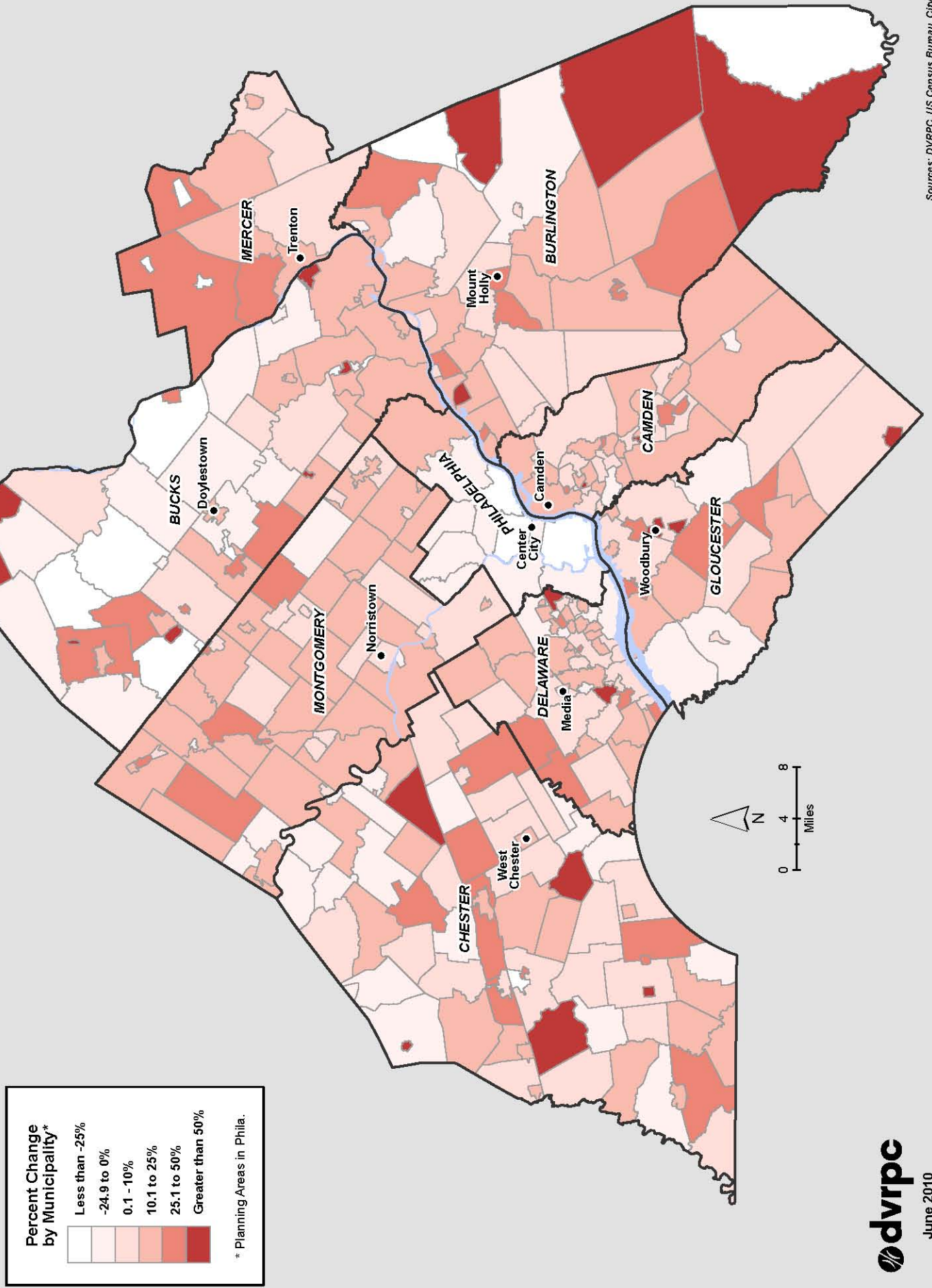


Figure C-6: People Working at Home, 2000

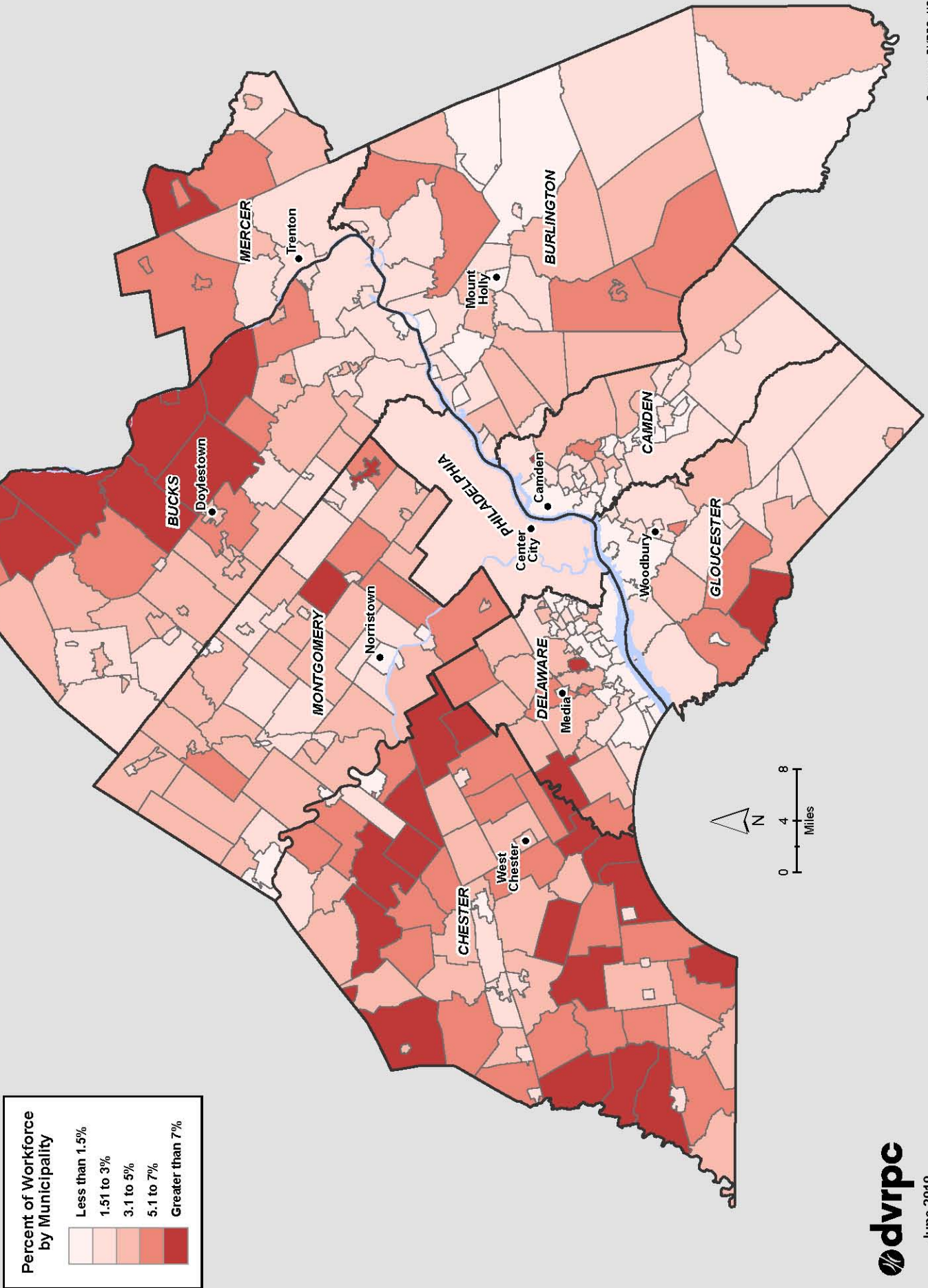


Figure C-7: Median Household Income, 1999

Eco-Enterprises

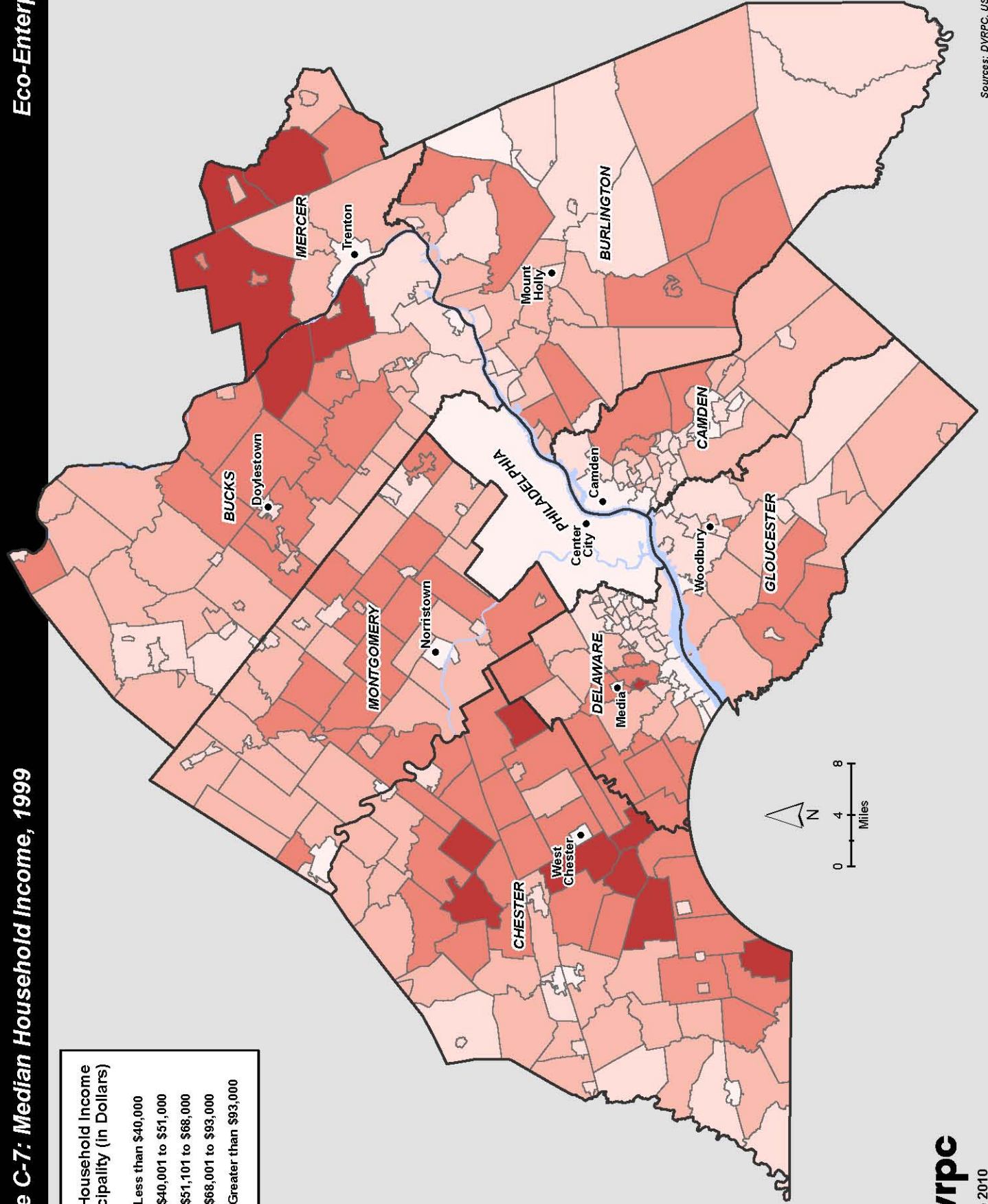
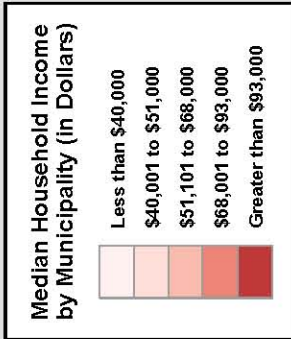
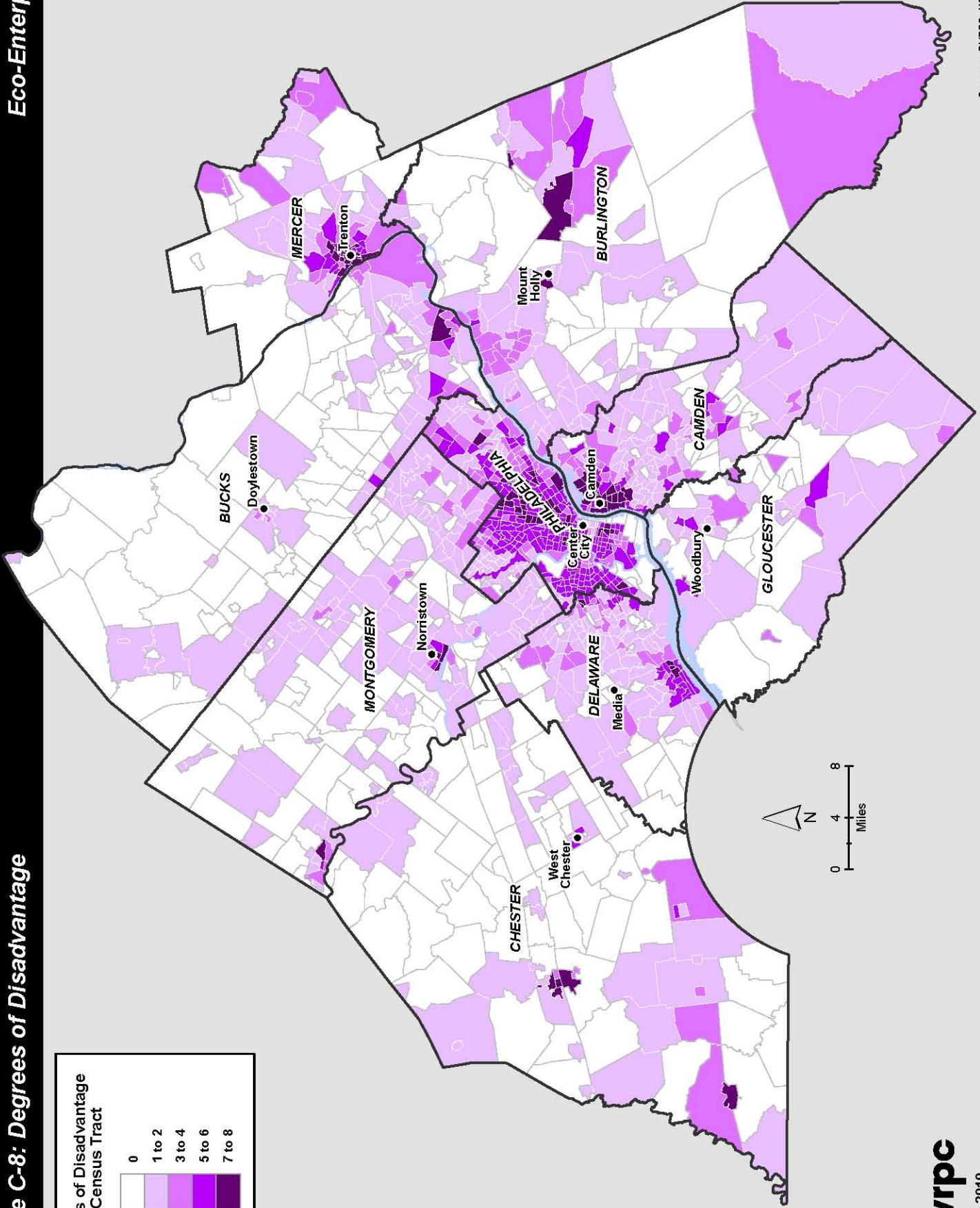
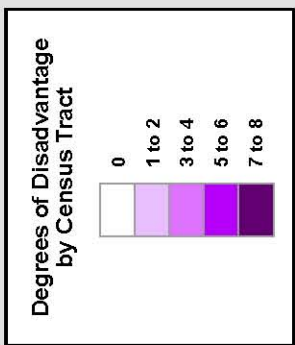


Figure C-8: Degrees of Disadvantage



Sources: DVRPC, US Census Bureau

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Geographic Area Covered: DVRPC's nine-county region, including Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey)

Key Words: Eco-enterprises, eco-industries, green economy, green jobs

Abstract: This project assesses the emergence of businesses and jobs in Greater Philadelphia that support and are driven by increased consumer and business demand for energy-efficient and environmentally-benign products and services. This economic sector, dubbed "eco-industries" in DVRPC's 2006 publication *A Post-Global Economic Development Strategy* and now referred to as "eco-enterprises", includes businesses and professionals that have the potential to transform challenges in energy efficiency and ecological sustainability into a competitive economic advantage.

The report begins with a discussion of the importance of this emerging sector to the region's economy. Recent research undertaken by the Pew Charitable Trusts, the National Governors' Association, the United States Conference of Mayors, and the Pennsylvania Department of Labor and Industry are summarized, followed by a discussion of an analysis undertaken by DVRPC using professional memberships and certifications as well as the presence of ENERGY STAR and LEED certified buildings as alternative indicators for the presence of eco-enterprises in Greater Philadelphia and a comparison to peer regions.

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