

An Assessment of the Green Economy in the Upper Coastal Plain Region of North Carolina

By

Ashley E. Yingling

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PRINT NAME

ADVISOR SIGNATURE

Chapter 1: Introduction

Harnessing the green economy has been coined as the solution to our “two biggest problems” with our two biggest problems being a loss of income and opportunity for our under and middle class workers and continued environmental degradation (Jones, 2008). While in the past we have grown our economy by exploiting both our natural and human resources, the green movement is an attempt to grow the economy through industries that restore and protect our natural resources. Many economic development and environmental agencies have forecasted incredible numbers of jobs to be created in the “green” sector, typically defined as the industries involved in conserving energy and creating clean energy. While there a wide range of projections, responsible development of this sector can provide both jobs and environmental benefits to the Upper Coastal Plain (UCP) Region.

A change in policy framework, as well as increased public awareness, has created emerging markets in several green industries. Most significantly, the American Recovery and Reinvestment Act of 2009 has provided the single largest investment in clean energy thus far. Included in this bill are several procurement measures and tax credits that will spur demand for clean energy and energy efficient products. Perhaps more importantly, however, was the appropriation of \$500 million to fund workforce training programs through the Green Jobs Act. The Green Jobs Act takes steps towards more fully developing and establishing skilled and competitive green industries. Furthermore, the Green Jobs Act attempts to connect low income persons and displaced workers with jobs in this growing sector.

In the summer and fall of 2009, I gained personal experience working with the procurement side of green policies by assisting small towns apply for Energy Efficiency and Conservation Block grants. While providing this assistance to small towns in the Upper Coastal Plain Region with applying funds energy efficiency and renewable energy projects, I noticed that every town received energy efficiency audit services provided by contractors from Raleigh. These particular procurements benefitted the existing green economy in a nearby metropolitan center, rather than encouraging the development of a local green economy. While this sample of energy efficiency services does not provide a basis for drawing conclusions about the regional economy, it led me to my research question: how does the “green economy” fit in the Upper Coastal Plain regional economy?

While many optimistic reports indicate that there will be an abundance of jobs created in the green economy, my experience led me to question the magnitude of this benefit within the Upper Coastal Plain region. Numerous policy papers have indicated that a green economy cannot be built from scratch, but rather requires incremental changes based on the existing strengths of the local economy (Chapple, 2009). According to Karen Chapple of the Center for Community Innovation, cities seeking quality jobs should “look to sectors that have traditionally provided well-paying, career-track jobs with well-established job training programs” (Chapple, 2009, p.6). Thus, the purpose of this paper will be to provide economic development actors within the Upper Coastal Plain region an assessment of the existing economic strengths and the current state of the green economy in the region.

The Green Economy

Job Growth Forecasts

Many economic development and environmental agencies have forecasted incredible numbers of jobs to be created in the green sector. The U.S. Conference of Mayors project a more modest 4.2 million new jobs directly created by the renewable energy; commercial and residential retrofitting; renewable transportation fuels; and legal, engineering, research and consulting sectors over the next 30 years (Diaz, et al., 2008). This projection is based on the assumption of future aggressive local and national strategies that drive demand in these sectors. The projection includes only direct jobs created, and does not include retained jobs or jobs indirectly created by new spending of these industries (Diaz, et al., 2008). Much higher projections have been forecasted by industry groups. The Green Building Council Green Jobs Report (Booz Allen Hamilton, 2009) estimates that the green building industry alone will support an additional 5.5 million jobs by 2013. The American Solar Energy Society has projected between 16 and 37 million jobs will be created in the renewable energy and energy efficiency sectors by the year 2030 (American Solar Energy Society, 2009). Despite wide discrepancies in forecasts, green sectors have been shown to be growing faster than traditional sectors since 2000, and this can be expected to continue.

While there is general consensus that jobs are expected to grow in this sector, there has been some debate as to whether these jobs will be considered “good” jobs, with “good” meaning that they provide living wages, benefits, and opportunities for advancement. In reality, the jobs available in green sectors are wide ranging. While a report from the U.S. Senate Committee on Environment and Public Works (2009) cited low paying wind turbine manufacturing and waste remediation jobs, others have cited reasonable wages on the whole in green sectors (Clean Edge, Inc., 2009). Also controversial, has been the idea that green jobs are replacing traditional jobs.

When this is the case, the wages relative to the traditional sector jobs becomes important. In order to address this, this report includes median wages for the sectors that have been assessed.

Policy Framework

National policy has begun to dedicate funding towards this investment. The 2007 Green Jobs Act is an amendment to the Workforce Investment Act, authorizing (but not appropriating) \$125 million per year to create an Energy Efficiency and Renewable Energy Worker Training Program (Green for All, 2007). The program has special emphasis on alleviating poverty. Funds were not made available to the program until February 2009 in the American Recovery and Reinvestment Act of 2009, where \$500 million was made appropriated (Green for All, 2009). Funds will be used to develop national and state level training programs, including Pathways out of Poverty demonstration programs. In addition, the Recovery Act provided funding to the Energy Efficiency and Conservation Block Grant program; the State Energy Program; and the Weatherization Assistance Program (NC League of Municipalities, 2009). An additional source of green investment has come from federal tax credits for EnergySTAR appliance upgrades and renewable energy installations. The recent stimulus represents the largest investment in the clean energy sector thus far, and local governments and non-profits are seeking out means of remaining competitive and directing the benefits of this public spending.

The funding of these programs has not been without debate. Most policy makers agree, green jobs programs are expensive, calling for hundreds of billions of dollars to be spent on research, training, recruitment and subsidies (U.S. Senate Committee on the Environment and Public Works, 2009). The Recovery Act spending was not without controversy, and continued

funding of these programs remains uncertain., Currently under consideration is paying for these programs through a carbon emissions cap and trade program, a very controversial proposal (U.S. Senate Committee on the Environment and Public Works, 2009). While some find that these programs will cause many jobs to be lost to countries with lower production costs, others feel that major restructuring of the economy is necessary to be both sustainable and competitive.

At the state level, however, the governor has shown a strong commitment to promoting green jobs. North Carolina is listed among the top twelve states that are developing a clean energy sector in a recent Pew Center report (Pew Center, 2008). Capitalizing on this, Governor Perdue has included the green economy in her “New Economy Plan,” which outlines sectors that she plans support. Her plan for the green economy includes moving the State Energy Office to the Department of Commerce; expanding the Green Business Fund; creating a revolving loan fund for businesses, non-profits and local governments; and reinvigorate the Energy Policy Council; and provide green job training through the JobsNOW program (Office of the Governor, 2009). The majority of these recommendations are being funded through Recovery Act funding, and many have already been put in place.

At the local level, planners are urged planners to not see the pursuit of sustainability as a large scale economic restructuring, but rather as small changes implemented over time (Campbell, 1996). According to Campbell, “the only feasible path to global sustainability is likely to be a long, incremental accumulation of local and industry-specific advances” (Campbell, 1996, p. 304). In pursuit of this approach, this paper will provide an assessment of the existing industries and existing institutions.

Defining and Measuring the Green Economy

The green sector is wide ranging, but is rarely defined. Industries included range from mass transit to green building construction. Karen Chapple (2008), of the Center for Community Innovation, reviewed several studies of the green economy in a report title “Defining the Green Economy.” Most studies do not define the green economy, but include the clean energy sector at its core. While renewable energy and energy efficiency upgrades are the most commonly cited green business activities, the clean energy sector encompasses many other processes and services that reduce environmental impact (Chapple, 2008). Some economic development agencies and non-profits take a narrower focus, looking only renewable energy and energy efficient technology. The green economy is likely to look different in each region, with the certain green sectors coming into focus due to local resource advantages, policies, institutions and environmental concerns.

For the purposes of this study, both traditional North American Industrial Classification sectors and subsectors and green sectors identified by the Occupational Information Network (Dierdorff, 2009). Traditional NAICS sectors (2-digit classification) and subsectors (3-digit classification) were used in order to assess existing economic strengths and conditions. These data were retrieved entirely from the Bureau of Labor Statistics Quarterly Census of Employment and Wages, via the North Carolina Employment Security Commission. While six-digit NAICS Codes have, in fact, been identified in order to track the green economy data was largely unavailable at this level due to data suppression for confidentiality reasons. When assessing occupational strengths, O*NET occupational classifications developed for the purposes of tracking and identifying emerging occupations were used. Only those occupations that exist in the current SOC were used, as new and emerging occupational data is not yet available. Additional data used for this analysis is cited throughout.

The sectors identified by O*NET are as follows, with descriptions directly from the O*NET website (O*NET, 2009):

I. **Renewable Energy Generation:** This sector covers activities related to developing and using energy sources such as solar, wind, geothermal, and biomass. This sector also includes traditional, non-renewable sources of energy undergoing significant green technological changes (e.g., oil, coal, gas, and nuclear).

II. **Transportation:** This sector covers activities related to increasing efficiency and/or reducing environmental impact of various modes of transportation including trucking, mass transit, and freight rail.

III. **Energy Efficiency:** This sector covers activities related to increasing energy efficiency (broadly defined), making energy demand response more effective, constructing "smart grids," and other energy efficient activities

IV. **Green Construction:** This sector covers activities related to constructing new green buildings, retrofitting residential and commercial buildings, and installing other green construction technology.

V. **Energy Trading:** This sector covers financial services related to buying and selling energy as an economic commodity, as well as carbon trading projects.

VI. **Energy and Carbon Capture and Storage:** This sector covers activities related to capturing and storing energy and/or carbon emissions, as well as technologies related to power plants using the integrated gasification combined cycle (IGCC) technique.

VII. **Research, Design, and Consulting Services:** This sector encompasses "indirect jobs" to the green economy which includes activities such as energy consulting or research and other related business services.

VIII. **Environment Protection:** This sector covers activities related to environmental remediation, climate change adaptation, and ensuring or enhancing air quality.

IX. **Agriculture and Forestry:** This sector covers activities related to using natural pesticides, efficient land management or farming, and aquaculture.

X. Manufacturing: This sector covers activities related to industrial manufacturing of green technology as well as energy efficient manufacturing processes

XI. Recycling and Waste Reduction: This sector covers activities related to solid waste and wastewater management, treatment, and reduction, as well as processing recyclable materials.

XII. Governmental and Regulatory Administration: This sector covers activities by public and private organizations associated with conservation and pollution prevention, regulation enforcement, and policy analysis and advocacy.

The analysis reveals that the region has a manufacturing and agricultural base, both of which can be capitalized upon in pursuing green jobs. A growing service sector also has the potential to provide research, design and consulting services related to clean technology. Also identified in the region are occupational clusters closely related to environmental protection and energy efficiency. While occupational clusters are not available for the waste reduction and recycling sector, the related waste management sectors also has significant competitive advantages in the region, with several identified recycling programs. By building on these strengths and connecting the local workforce to new jobs, the Upper Coastal Plain will benefit from the expected expansion of green businesses.

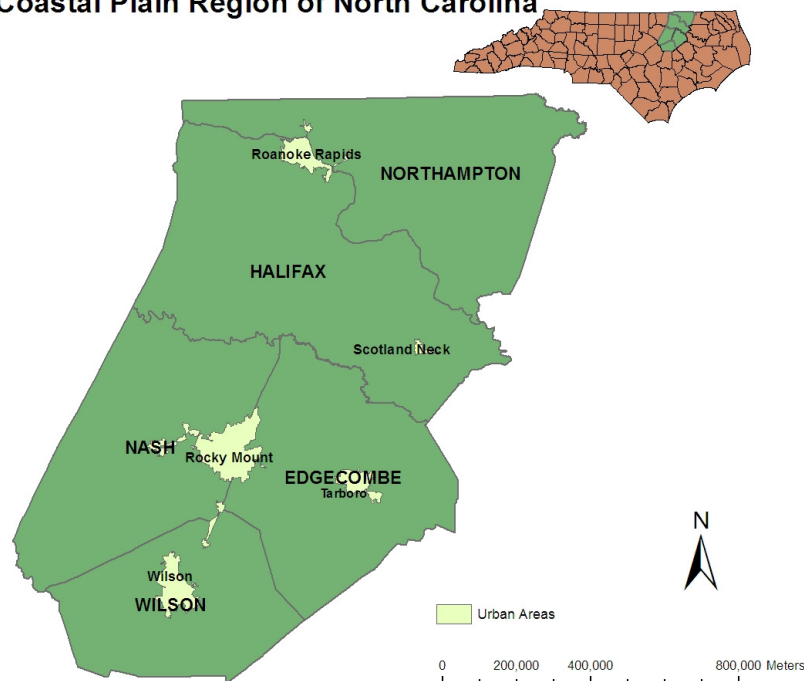
The second chapter of this report details the industrial analysis, including both traditional industries and the results from a green business search. This research provides an overview of the regional strengths, as well as a sample of the businesses that are connecting to the green economy. The third chapter provides the occupational analysis for the region, identifying green occupational clusters that are present in the region based on O*NET's identified occupations. The final chapter lists available training programs in these occupations, as well as several relevant economic development institutions. The final chapter also makes recommendations for the next steps in assessing and developing the regional green economy.

Chapter 2: Regional Industry Analysis

The Upper Coastal Plain Region of North Carolina (See Figure 1, below), has long been economically distressed with perpetually high unemployment and poverty rates. The Turning Point Workforce Development Board has cited the long-term impact of severe storms, beginning with Hurricane Floyd in the late 1990's, as well as a decline in the textile and other manufacturing industries (Turning Point Workforce Development Board, 2005). The two northernmost counties—Halifax and Northampton—are less populous and have a more agriculturally-based economy. Wilson and Nash Counties both have urban areas, and Edgecombe County is also more densely populated. This chapter provides an in-depth overview of the regional economy, and identifies the regional strengths that can make the region competitive in green sectors.

Figure 1. Map of Region.

Upper Coastal Plain Region of North Carolina



Industry Mix

The region has seen economic losses due to the recent economic downturn, the tobacco buyout of the 2000's and general economic restructuring, with only a 2.2% employment growth between 2002 and 2008 (Turning Point WDB, 2005). While manufacturing remains a regional specialization and the top employer, this sector has seen a dramatic decline in the last decade. Of note, however, are the many manufacturing subsectors that have continued to grow and perform well despite national decline. As detailed below, the region has also recently made gains in the professional and business service sectors and established some service specializations.

In order to assess the industrial mix, the regional economy was analyzed using three analyses: location quotient, simple shift share analysis, and classical shift share analysis. In addition, I conducted a preliminary assessment of green businesses through a green business search. Ten sources were consulted to find self-identified green businesses: five chambers of commerce, the North Carolina Green Business Fund, the state government Interactive Purchasing System, the North Carolina Sustainable Energy Association and The Green Building Council. The results of these analyses are detailed below.

Largest Industries

An analysis of the most recent employment data from the years 2002 and 2008 reveal manufacturing remains the dominant sector in the region, despite a near 20% decrease in manufacturing jobs (see Table 1). The growing sectors are largely service-providing sectors, including healthcare, professional services, finance and insurance and management of companies and enterprises. The fastest growing sector is identified as "Information," described by the bureau of labor statistics as businesses that produce and distribute information, or produce the

means to distribute information (for instance, internet services or publishing). This general trend reflects the national economic restructuring, with growing service sectors and declining manufacturing.

Table 1. Employment by Sector, 2008.

Industry	2002	%	2008	%	% Change 2002-2008
Manufacturing	26,066	25.8%	21,026	20.4%	-19.3%
Retail trade	14,816	14.7%	15,991	15.5%	7.9%
Health care and social assistance	7,985	7.9%	9,904	9.6%	24.0%
Accommodation and food services	8,909	8.8%	9,378	9.1%	5.3%
Wholesale trade	6,166	6.1%	7,666	7.4%	24.3%
Construction	7,922	7.8%	7,513	7.3%	-5.2%
Administrative and waste services	5,201	5.2%	5,645	5.5%	8.5%
Professional and technical services	1,282	1.3%	3,795	3.7%	196.0%
Finance and insurance	3,243	3.2%	3,045	3.0%	-6.1%
Agriculture, forestry, fishing and hunting	2,982	3.0%	2,876	2.8%	-3.6%
Other services, except public administration	2,873	2.8%	2,757	2.7%	-4.0%
Management of companies and enterprises	833	0.8%	2,037	2.0%	144.5%
Transportation and warehousing	2,148	2.1%	2,015	2.0%	-6.2%
Information	601	0.6%	1,916	1.9%	218.8%
Educational services	937	0.9%	1,191	1.2%	27.1%
Real estate and rental and leasing	931	0.9%	854	0.8%	-8.3%
Arts, entertainment, and recreation	635	0.6%	677	0.7%	6.6%
Unclassified	33	0.0%	162	0.2%	390.9%
Utilities	286	0.3%	143	0.1%	-50.0%
Mining, quarrying, and oil and gas extraction	93	0.1%	56	0.1%	-39.8%
Total, all industries	100,986	100.0%	103,214	100.0%	2.2%

Source: North Carolina Employment Security Commission (2010). *Quarterly Census of Employment and Wages*).

Assessing the more detailed subsectors provides a clearer picture as to why these larger sectors are seeing growth or decline. While there has been a sharp decline in manufacturing jobs overall, “miscellaneous” manufacturing has seen the most dramatic increase of all the subsectors with a 1,850% increase in jobs over six years. The overall decline in manufacturing jobs is due to decline in the machinery manufacturing and textile manufacturing sectors. A more detailed

assessment of these declines can be found in the location quotient and shift share analysis.

Below, the sectors and subsectors that have seen the sharpest decline or greatest growth are listed.

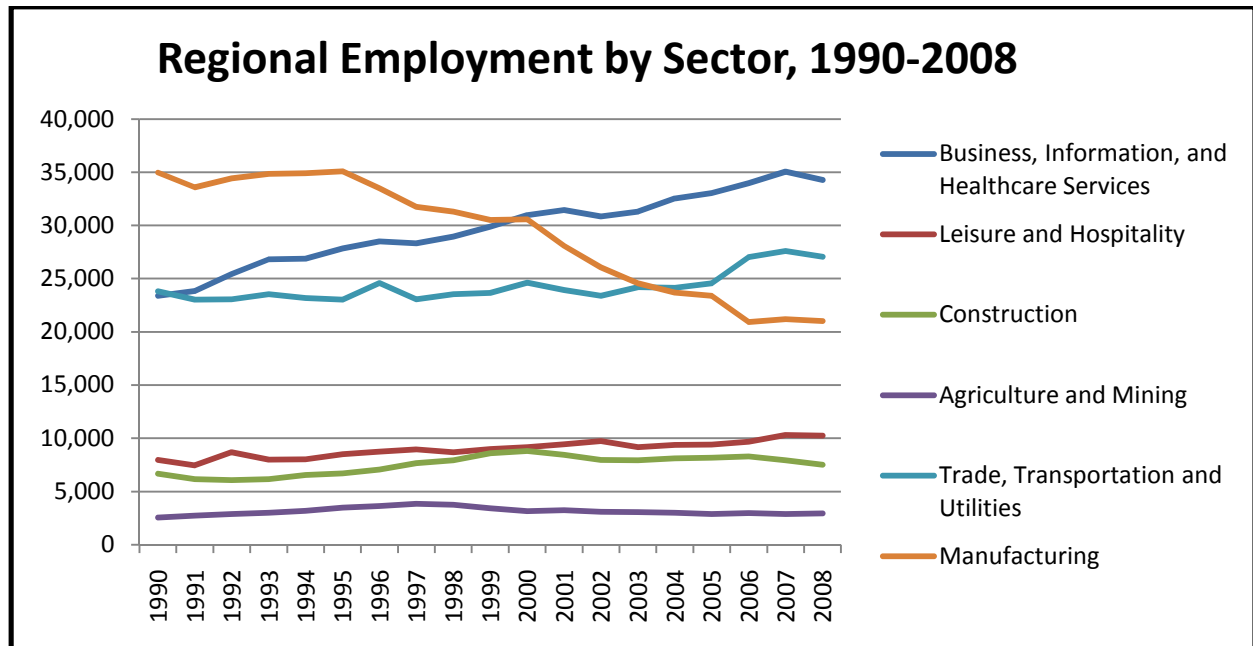
Table 2. Industries experiencing the greatest growth and decline, 2002-2008.

Fastest Growing Industries	Fastest Declining Industries
Sectors: ▪ Information ▪ Professional and technical services ▪ Management of companies ▪ Educational services ▪ Wholesale trade Subsectors: ▪ Miscellaneous manufacturing ▪ Waste Management and Remediation ▪ Securities, commodity contracts, investments ▪ Professional and technical services ▪ Telecommunications	Sectors: ▪ Utilities ▪ Mining ▪ Manufacturing ▪ Real estate rental and leasing ▪ Transportation and warehousing Subsectors: ▪ Machinery manufacturing ▪ Textile product mills ▪ Printing and related activities ▪ Rental and leasing services ▪ Sporting goods, hobby and book stores ▪ Finance and Insurance

Also important in understanding the regional economy is a more long-term assessment of industry trends. Examining previous years is particularly important given the recent economic downturn, which resulted in massive layoffs in 2008. As illustrated in Figure 2, below, the manufacturing sector began seeing a dramatic decline in the mid-90's, though has most recently seemed to have leveled off. While we cannot conjecture future performance of this sector based on this data alone, based on subsector data it seems clear parts of this sector are faring well in this region and will remain an important part of the economy despite a decades' long decline in the larger manufacturing sector. Also of note from this data is the recent (2006-2008) decline in the construction and trade (namely, retail) industries. These declines are likely due to the recent economic crisis, which has seen negatively impacted all industries, but especially these as evidenced by similar trends in national employment data. The use of another recession year as a

comparison (2002) will control for some of these recent changes, but this recession has seen much higher unemployment rates and this will likely be reflected in this analysis.

Figure 2. Regional Employment by Sector.



Source: North Carolina Employment Security Commission. (2010). *Quarterly Census of Employment and Wages*.

Industrial Specialization: Location Quotients

Location quotients provide a means of measuring the concentration of employment in a given sector, providing the ratio between local percentage of employees working in a sector and that of a reference area. A ratio greater than one indicates that the study region has a higher concentration of employment in that sector compared to national employment. Generally, this is interpreted to mean that those industries make up the regional export base (McLean and Voyek, 1992). In this case, the both the United States and North Carolina were used as a reference regions.

The location quotients for two-digit NAICS codes (sectors) indicate that the region has a higher concentration of agriculture, manufacturing, construction, retail and wholesale trade employees than both the United States and North Carolina (see Table 3). A more detailed analysis of three-digit NAICS codes (subsectors) reveals twenty-five subsectors that the region has a location quotient greater than one (see Table 4). These industries are wide ranging, including eight manufacturing subsectors, crop production, and multiple wholesale and retail categories.

Changes in location quotients between 2002 and 2008 indicate that the regional specializations are changing. Notably, the textile industry has seen in a 58% employment decrease, and a reduced concentration in employment. Also evident is the drastic decline in tobacco production, the region's most significant specialization, as tobacco and beverage product manufacturing has seen a 37% decrease in employment. The shift to service industries is evident in the increased specialization in the "Management of Companies and Enterprises," sector, indicating a shift from the long-standing manufacturing sectors to the more service-oriented sectors.

Overall, the majority of subsectors that have seen increased employment concentration have also seen increased overall employment. The exceptions to this are wood product manufacturing, gasoline stations, and motor vehicle and parts dealers. These subsectors have seen employment decline, but either due to labor force decline or decreased national employment in this sector, the location quotient has increased. The eight sectors that have seen a decline in specialization have also seen a decline in employment levels.

Table 3. Location Quotients: Two-Digit NAICS Codes

Indicates an LQ Greater than 1	2002	2008		
Reference Region:	United States	North Carolina	United States	North Carolina
Agriculture, forestry, fishing and hunting	2.74	2.94	2.71	3.22
Manufacturing	1.83	1.26	1.72	1.33
Wholesale trade	1.17	1.18	1.41	1.38
Management of companies and enterprises	0.52	0.41	1.18	0.88
Construction	1.27	1.12	1.15	1.03
Retail trade	1.05	1.05	1.14	1.12
Accommodation and food services	0.93	0.96	0.90	0.88
Unclassified	0.17	0.55	0.85	0.42
Administrative and waste services	0.73	0.78	0.77	0.77
Information	0.68	0.84	0.74	0.91
Health care and social assistance	0.64	0.70	0.70	0.71
Other services, except public administration	0.73	0.91	0.68	0.87
Finance and insurance	0.61	0.74	0.57	0.65
Educational services	0.51	0.65	0.55	0.66
Professional and technical services	0.21	0.27	0.53	0.65
Transportation and warehousing	0.16	0.17	0.49	0.56
Real estate and rental and leasing	0.49	0.61	0.44	0.53
Arts, entertainment, and recreation	0.38	0.43	0.38	0.42
Utilities	0.52	0.62	0.28	0.37
Mining, quarrying, and oil and gas extraction	0.20	0.69	0.00	0.00

Table 4. Location Quotients: Three-Digit NAICS Codes, 2008.

	Indicates increased LQ between 2002 and 2008		Percent Change in Regional Employment 2002-2008
	Indicates Decreased Employment between 2002 and 2008		
Industry	LQ 2002	LQ 2008	
Beverage and tobacco product manufacturing	8.65	5.93	-36.7%
Plastics and rubber products manufacturing	2.79	4.93	46.4%
Crop production	3.59	3.97	4.0%
Wood product manufacturing	1.84	2.26	-2.3%
Electrical equipment and appliance mfg.	0.73	2.08	138.6%
Textile mills	2.42	1.99	-58.5%
Heavy and civil engineering construction	1.54	1.96	28.7%
Chemical manufacturing	1.35	1.93	27.4%
Merchant wholesalers, nondurable goods	2.03	1.77	-13.3%
Gasoline stations	1.75	1.77	-7.7%
Animal production	2.82	1.76	-33.2%
Merchant wholesalers, durable goods	0.67	1.55	130.0%
Goods-Producing	1.67	1.54	-15.0%
General merchandise stores	1.11	1.35	27.3%
Furniture and related product manufacturing	1.40	1.25	-31.2%
Food manufacturing	0.93	1.22	22.5%
Fabricated metal product manufacturing	1.28	1.21	-8.5%
Apparel manufacturing	0.47	1.19	42.4%
Management of companies and enterprises	0.52	1.18	144.5%
Nonmetallic mineral product manufacturing	0.95	1.17	7.4%
Truck transportation	1.07	1.17	10.7%
Specialty trade contractors	1.07	1.12	9.3%
Motor vehicle and parts dealers	1.07	1.10	-3.1%

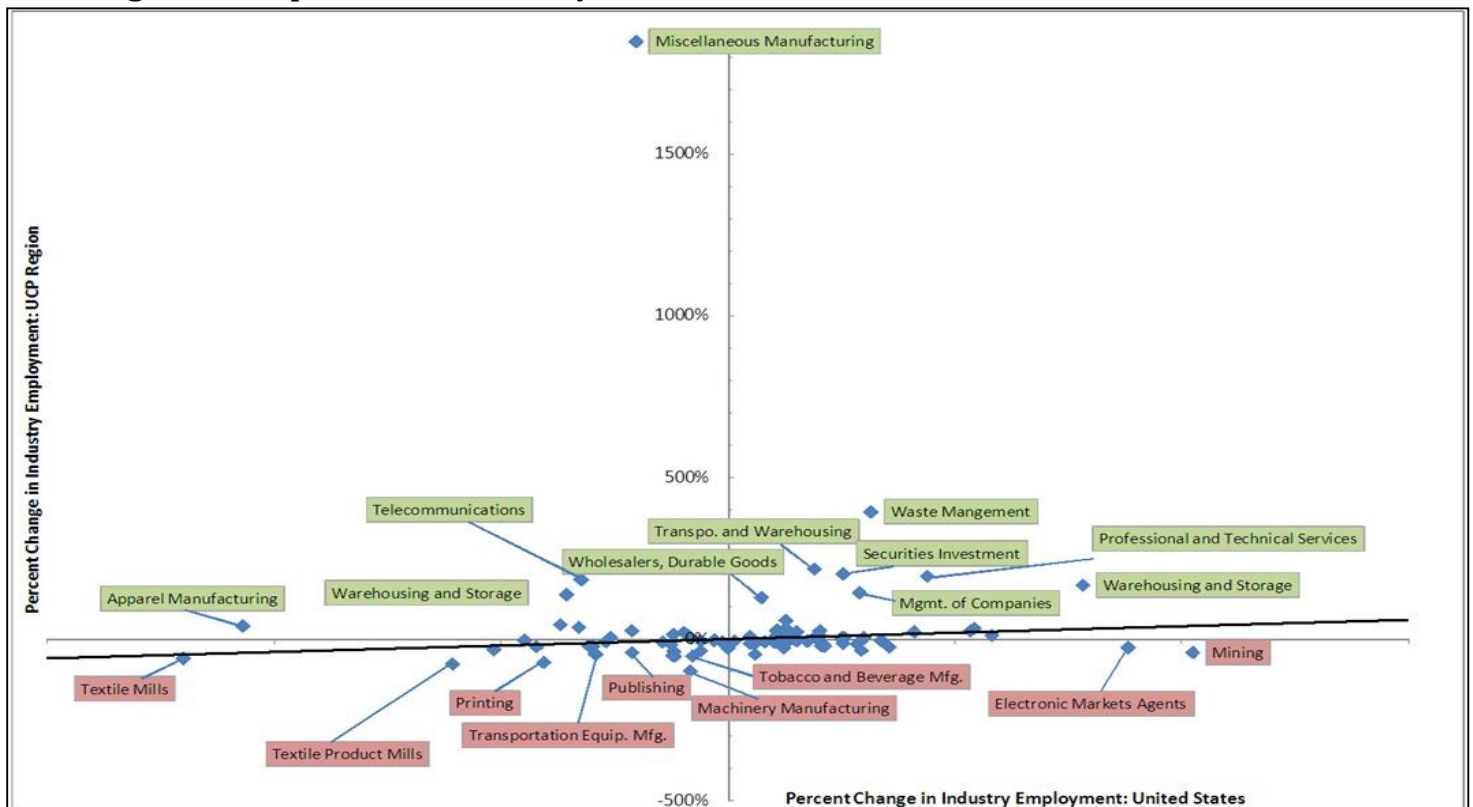
Competitive Advantages: Shift-Share Analysis

A simple shift share analysis reveals the industries in which the region has some regional advantage. The shift-share graph, below, plots the regional rate of growth against the national rate of growth. The industry points that above the black line are those that are growing in the region at a higher rate than the industry employment is growing nationally, or the industry is growing within the region while it is declining nationally. The industries with that are outpacing the US growth the most are labeled, as are those that growing much slower or declining much

faster than national rates. Based on this analysis, the industry sectors can be categorized in to four groups (McLean and Voytek, 1992):

1. **Strong Performers:** Industries that have had outpaced the positive national growth.
2. **Lagging Performers:** Industries that have grown, but not as fast as the national growth.
3. **Constrained Performers:** Industries that have either grown while the national employment in the industry has declined, or have declined less quickly than national employment in the industry.
4. **Poor Performers:** Industries that have had employment decline more quickly than national employment.

Figure 3. Simple Shift Share Analysis.



Individual industry performance can be found in the tables below, along with the competitive shift analysis. The competitive shift is a result of classic shift share analysis, which provides the portion of employment changes that are due to regional competitiveness, as opposed to national employment trends. The first table details the classic competitiveness of industries in which the region has a specialization (location quotient of greater than 1.1). The second table details the employment data and competitive shift of the remaining industries in the region. Of important note are the strong performers, both of the industry specializations and other industries. Among the industry specializations, twelve of the twenty-seven industries are strong performers, eleven of which are service industries. These figures indicate that the region has a growing advantage and in service industries, which includes a wide range of industries such as management of companies as well as truck transportation services. The remaining strong performing industry specialization, is heavy and civil engineering construction. This is of important note, because it closely relates to the green construction industry that has been identified by O*NET.

While there are twelve manufacturing industries in which the region specializes, these are all either constrained or poor performers. The constrained performers are some of the fastest growing industries in the region; however, nationally these industries are in decline. Thus, overall performance may be limited by national or international demand. It may also indicate that while the sectors are declining at the national level, the region has seen growth due to local advantages.

Among the industries that are not regional specializations (location quotient below 1.1), fourteen industries are strong performers in the region. The recent performance indicates that these industries may be potential have potential to provide for the regional demand of these

industries. Having location quotients at or below 1.1 indicates that the region may be importing these services, and the growth in these sectors may replace the current imports. As with the region's specializations, these are largely service industries. Of important note, the waste remediation services has grown over 395%, largely attributable to the regional competitive advantages. This particular industry has begun to play an important role in the green economy, and the region may be positioned to take advantage of this growth.

Table 5. Shift-Share Analysis, Industry Specializations.

Industry	2008 LQ	2008 Employment	% Change, 2002- 2008	Competitive Shift, %	Competitive Shift, Jobs
<u>Strong Performers</u>					
237 Heavy and civil engineering construction	1.96	1338	28.7%	24.4%	327
423 Merchant wholesalers, durable goods	1.55	1874	130.0%	127.1%	2,381
42 Wholesale trade	1.41	6166	24.3%	18.3%	1,129
452 General merchandise stores	1.35	2940	27.3%	19.2%	566
621 Ambulatory health care services	1.30	6692	34.3%	12.6%	630
551 Management of companies and enterprises	1.18	833	144.5%	133.0%	1,108
484 Truck transportation	1.17	1334	10.7%	6.5%	86
44-45 Retail trade	1.14	14816	7.9%	6.0%	889
238 Specialty trade contractors	1.12	4212	9.3%	1.6%	68
<u>Constrained Performers</u>					
326 Plastics and rubber products manufacturing	4.93	3232	46.4%	61.2%	1,351
111 Crop production	3.97	1955	4.5%	7.8%	146
321 Wood product manufacturing	2.26	928	-2.3%	15.6%	149
335 Electrical equipment and appliance mfg.	2.08	804	138.6%	152.8%	515
325 Chemical manufacturing	1.93	1528	27.4%	36.0%	431
311 Food manufacturing	1.22	1637	22.5%	26.5%	353
315 Apparel manufacturing	1.19	225	42.4%	85.2%	135
327 Nonmetallic mineral product manufacturing	1.17	496	7.4%	17.8%	82
<u>Poor Performers</u>					
312 Beverage and tobacco product manufacturing	8.65	1068	-36.7%	-31.8%	(537)
313 Textile mills	2.42	273	-58.5%	-10.5%	(69)
31-33 Manufacturing	1.83	21026	-19.3%	-7.4%	(1,924)
447 Gasoline stations	1.75	1358	-7.7%	-1.9%	(28)
101 Goods-Producing	1.67	31513	-15.0%	-9.9%	(3,677)
333 Machinery manufacturing	1.66	53	-97.2%	-93.8%	(1,774)
337 Furniture and related product manufacturing	1.40	544	-31.2%	-10.5%	(83)
332 Fabricated metal product manufacturing	1.28	1690	-8.5%	-7.9%	(147)
445 Food and beverage stores	1.14	2241	-26.9%	-26.9%	(824)

Table 6. Shift-Share Analysis: Other Industries.

Industry	2008 LQ	2008 Employment	% Change, 2002-2008	Competitive Shift, %	Competitive Shift, Jobs
Strong Performers					
562 Waste management and remediation services	0.92	302	395.1%	382.5%	233
443 Electronics and appliance stores	0.80	404	23.2%	18.3%	60
56 Administrative and waste services	0.77	5645	8.5%	3.2%	164
236 Construction of buildings	0.76	1148	18.5%	13.1%	127
62 Health care and social assistance	0.70	9904	24.0%	7.6%	611
561 Administrative and support services	0.67	4647	59.5%	54.5%	1,586
493 Warehousing and storage	0.62	378	168.1%	136.8%	193
61 Educational services	0.55	1191	27.1%	5.8%	54
54 Professional and technical services	0.53	3795	196.0%	178.5%	2,289
541 Professional and Technical Services	0.53	3795	196.0%	178.5%	2,289
813 Membership associations and organizations	0.50	618	34.9%	29.9%	137
48-49 Transportation and warehousing	0.49	1916	218.8%	211.2%	1,269
523 Securities, commodity contracts, investments	0.41	321	202.8%	192.7%	204
Lagging Performers					
444 Building material and garden supply stores	0.91	1037	3.0%	-2.8%	(28)
72 Accommodation and food services	0.90	9378	5.3%	-6.7%	(596)
71 Arts, entertainment, and recreation	0.38	677	6.6%	-3.4%	(22)
713 Amusements, gambling, and recreation	0.29	373	7.8%	-2.4%	(8)
624 Social assistance	0.00	999	13.1%	-10.1%	(89)
Constrained Performers					
113 Forestry and logging	1.00	55	37.5%	50.7%	20
517 Telecommunications	0.89	832	185.9%	198.9%	579
51 Information	0.74	2015	-6.2%	4.6%	99
339 Miscellaneous manufacturing	0.27	156	1850.0%	1858.1%	149
515 Broadcasting, except Internet	0.25	73	15.9%	20.7%	13
Poor Performers					
441 Motor vehicle and parts dealers	1.07	1830	-3.1%	-0.6%	(11)
442 Furniture and home furnishings stores	1.04	344	-35.0%	-32.5%	(172)
314 Textile product mills	0.96	43	-75.4%	-51.1%	(89)
453 Miscellaneous store retailers	0.86	623	-19.7%	-7.4%	(57)
811 Repair and maintenance	0.84	952	-2.2%	-0.9%	(9)
454 Nonstore retailers	0.84	335	-2.9%	-1.6%	(6)
323 Printing and related support activities	0.74	141	-71.2%	-54.9%	(268)
334 Computer and electronic product manufacturing	0.68	749	-22.3%	-5.4%	(52)
451 Sporting goods, hobby, book and music stores	0.57	175	-50.8%	-47.6%	(170)
532 Rental and leasing services	0.55	159	-51.7%	-46.9%	(154)
22 Utilities	0.52	143	-50.0%	-45.1%	(129)
221 Utilities	0.52	143	-50.0%	-45.1%	(129)
511 Publishing industries, except Internet	0.25	135	-39.7%	-31.2%	(70)
336 Transportation equipment manufacturing	0.07	63	-44.7%	-33.0%	(38)

The industry and shift-share analysis shows industries that the region has the greatest competitive advantage. Having an understanding of the region's strengths in traditional sectors provides insights into the regional advantages that can build and attract green sectors. Based on this analysis, the regional strengths can be summarized as follows:

- **Wholesale and Retail Trades** are among the top performers in the region. Combined with the high performing truck transportation industry, the region has specialized in the delivery and sale of goods, possibly due to the I-95 corridor that passes through the region and connects major population centers. This specialization has implications on the potential for potential biofuel demand. Furthermore, those in retail occupations have fairly low paying jobs and typically low education levels (North Carolina Employment Security Commission, 2010a). Thus, the introduction of green jobs and green training programs may provide opportunities for the retail workforce.
- **Manufacturing Sectors** are still very important to the region. Despite national and overall regional decline, several manufacturing sectors are performing well in the region. While these sectors are not specifically “green,” the Center for Globalization Governance and Competitiveness at Duke University has linked five advanced “green” technologies to both traditional and new manufacturing sectors in North Carolina (Turning Point Workforce Development Board, 2005). The following regionally competitive manufacturing sectors have been linked to new green technologies through value chain analysis (Center for Globalization Governance and Competitiveness, 2009; United States Census Bureau, 2007):
 - Plastics and rubber products manufacturing
 - Wood product manufacturing

- Electrical equipment and appliance manufacturing
- Chemical manufacturing
- Nonmetallic mineral product manufacturing

Additionally, machinery and fabricated metal product manufacturing products were also identified in the green technology value chains, though these sectors are declining in both the region and the nation. They are, however, regional specializations and the demand for these technologies increase employment in machinery and fabricated metal product manufacturing.

- **The region's traditional manufacturing specializations**, such as food and beverage manufacturing, textile mills, and furniture manufacturing are performing poorly in the region. As some of the largest specializations and industries in the region, these sectors have been the strongest contributors to the overall decline in manufacturing. The result is a displaced manufacturing workforce. While upgrading the skills of these workers may be required, the growing manufacturing sectors identified above may provide opportunities for these workers.
- **Business and Technical Service Sectors** are performing well in the region. The management of companies and enterprises sector, already a specialization in the region, has seen a 144.5% increase in employment between 2002 and 2008 (an average annual growth rate of 24.08%). While not a regional specialization, professional and technical services have also seen high growth. Professional and technical services includes engineering, financial, and technology services all of which related to the clean technology sectors identified by both the Center for Globalization Governance and Competitiveness and O*NET. Professional and technical services are not a regional

specialization, but utilization of local services as required by green industries can add to a growing, high performing industry in the region.

- **Construction and related services** are becoming increasingly important in the region.

Of important note, the heavy and civil engineering construction is a strong regional specialization, and has grown at a rate faster than the national average. The specialty trade contractor sector is also a regional specialization that has seen faster than national growth, and is the sector that includes many of the industries related to green building (Dierdorff et al., 2009). While construction of buildings is not a regional specialization, the faster than national growth indicates that this sector may be poised to meet new green construction demands.

- **Waste Management and Remediation**, while not a regional specialization, has seen a sharp increase of 395% between 2002 and 2008 (an average annual growth rate of 65.8%). This sector is closely related to two O*NET identified sectors—recycling and waste reduction, and environmental protection (Dierdorff et al., 2009).

- **Agricultural sectors** are constrained performers. Crop production, a strong specialization of the region, has seen modest employment growth between 2002 and 2008 (4.5%), though nationally there has been a decline in employment. Forestry and logging has seen higher growth rates regionally (37.5%), though nationally this industry has been in decline. These sectors include the O*NET identified agriculture and forestry sector, and regional performance is indicative of a regional competitive advantage.

Identified Green Businesses

While six-digit NAICS codes have been identified for what are considered green sectors, data at this level of detail is largely unavailable for this region due to data suppression. In order to gather information regarding existing green businesses, a business directory search was conducted. Additional analysis has been completed using occupational data, using the occupation codes provided by O*NET for each sector.

The green business search was conducted using a method established by the State of Washington Employment Security Department (2008). For this report, an internet search was conducted using ten sources: five chambers of commerce directories, the North Carolina Green Business Fund, the statewide purchasing system, the North Carolina Recycling Markets Directory, North Carolina Sustainable Energy Association, and the Green Building Council. For businesses where it was uncertain as to their product or service, their websites were cross referenced to see if there was any mention of energy efficiency, environmentally-friendly practices, an environmentally-oriented organization or other green products or services. Builders and architects were cross referenced with the U.S. Green Building Council.

Many businesses do not have websites or don't take part in these organizations. This method of research will not provide an accurate count of green businesses in the region, but rather a picture of the types of firms that have identified themselves as "green" and are engaging with state and regional institutions.

Fifty-four businesses were identified through this search, representing eight of the 12 sectors identified by O*NET. Each of the five counties have green businesses, with Nash County having the largest number. The green construction industry was the most prominent, with nineteen companies found. This sample is highly skewed towards certain business types, especially since the Green Building Council and the NC Recycling Markets Directory were

consulted. There was no similar organization for manufacturers or those working in energy efficiency.

Table 7. Business Search Results.

Sector	Establishments
Energy Efficiency	6
Environment Protection	9
Green Construction	19
Manufacturing	4
Recycling and Waste Reduction	9
Renewable Energy Generation	1
Research, Design, and Consulting Services	2
Transportation	4
TOTAL	54

The identified establishments reflect the overall industry advantages in the region. In the regional economic analysis, construction, manufacturing, and waste remediation were all identified as important in terms of regional growth and specialization. The green construction industry, while likely over-represented due to the sources consulted, reveals that the construction and related sectors have begun to identify with the green movement and adopt efficiency standards. The representation of manufacturing firms indicates that the manufacturing sector in the region, much of which can be considered part of the green technology value chain, has begun to identify as green sectors. Recycling, waste reduction and environmental protection sectors are also well-represented. These firms are included in the waste management and remediation sector, a sector with a 395% employment increase between 2002 and 2008, well above the national average. Also of importance was the lack of agricultural and forestry establishments found in the region. While important to the regional economy, these sectors have not actively identified with the green movement.

Conclusions

The Upper Coastal Plain regional economy has many strengths that will make the region attractive to potential green businesses. First, the region has a history of both manufacturing and agriculture. The manufacturing industry has largely been in decline, but a detailed analysis of location quotients and a shift-share analysis reveal that many subsectors in manufacturing have been fairing well in the region. Those that have been growing in the region are the more advanced manufacturing sectors: plastics and rubber, electrical appliances, chemical and non-metallic mineral products. As identified by the Center for Globalization Governance and Competitiveness, these manufacturing sectors will play a very important role in the overall green economy supply chain. The agriculture sector remains important to the region, with the highest location quotients and fairly steady employment. The agriculture sector has also been identified as an important green sector, playing a part in biofuels and the local food movement (Dierdorff et al., 2009). Having existing labor pools and the appropriate resources within these fields can be a significant advantage for the region as they pursue green economic development strategies.

Another industry strength is the strong construction industry, though employment in this sector has declined in the last year. This industry is unique in that it cannot be easily outsourced, and therefore the employees must keep up to date with green construction techniques. The construction industry produces highly skilled laborers, and there is a great potential for these workers to learn additional skills or to utilize their skills for the growing weatherization and green construction sectors. Complementary to general construction, the region boasts a strong performing heavy and civil engineering and specialty trade contractors sectors. It is unknown whether green construction can provide the number of jobs in construction that have been lost due to the housing and credit crises; however, the skills of these individuals can provide utilized

throughout green sectors. Given the recent high rates of unemployment throughout this sector, it is unlikely that the construction industry of the Upper Coastal Plain region will be a unique attractor of green construction. However, as explored in the next section, the occupational concentration within the industry may be able to provide local green services.

The growing professional services sectors will also be a potential strength when growing the green sectors throughout the region. Management, professional and technical services are needed throughout the green sectors. Identified as a hub to the Research Triangle, Nash County has the highest professional services and business management employees. Discussed in the next chapter, the region also has an occupational advantage with skilled research and design professionals.

Chapter 3: Regional Workforce and Occupational Analysis

This chapter presents an analysis of the local workforce and occupational data. The first section provides an overview of the labor force, including the fastest growing and declining occupations, as well as education levels labor force participation rates. The remaining section utilizes green occupations identified through O*NET to find areas of occupational specialization.

Labor Force Overview

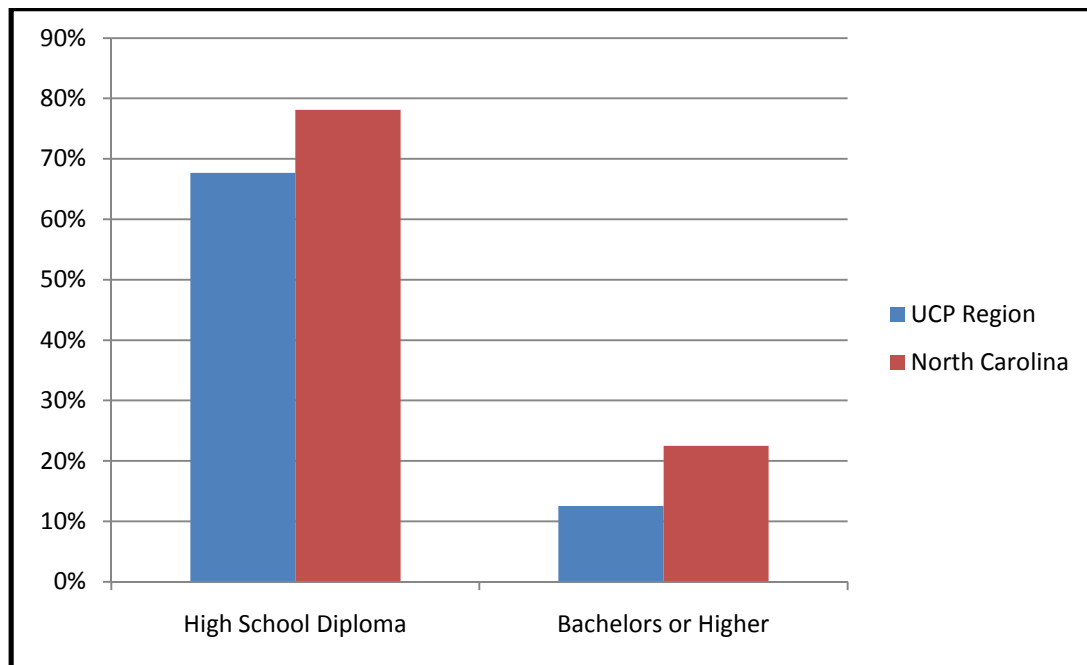
The following analysis provides a basic overview of the regional labor force, including labor force growth and participation, unemployment and education levels. Also provided is an assessment of the fastest growing occupations in the region, as completed by the North Carolina Employment Security Commission, and a similar assessment of the fastest declining occupations.

Education Levels

Existing education levels has been cited as a major concern of the regional workforce development board. High school completion rates are consistently below 60%, with the exception of Nash County, which has completion rates up to 66% (Turning Point Workforce Development Board, 2005). Following the statewide trend, these rates have been in decline since 1990. When compared with the state average of 22.5%, the region also has a much lower percentage with bachelor's degrees, at only 12.5% (see figure 4, below). While it is well beyond the scope of this report to theorize the reason behind declining educational attainment, the regional workforce strategy report states, "training and educational programs are of little value if

the worker sees neither importance nor urgency in acquiring new skills,” (Turning Point Workforce Development Board, 2007).

Figure 4. Education levels on the region and North Carolina.



Source: U.S. Census Bureau, 2000.

Green jobs require people of all skill levels—vocational, two-year and four-year degrees (White, et al., 2009). As discussed in the below, there exist many workers employed in occupations in the O*NET identified sectors. However, low graduation rates and a limited pool of high school and college educated workers is troubling. Providing training opportunities will be necessary to have a competitive green workforce.

Population and Labor Force Participation

The region has seen a slowed population growth rate, down to 0.3% annually from the previous 0.7% seen in the 1990s (US Census Bureau, 2007). The labor force participation rate has also declined; yet, unemployment has risen. The median income has declined as begun to fall below the state average, staying around \$38,950 (Turning Point WDB, 2008). While wages may be competitive in the region, the region has historically had higher unemployment and lower wages than the state, indicating that wages alone have not historically made the region competitive (Turning Point WDB, 2008). The most recent unemployment figures from December 2009 indicate that 18,393 people are looking for jobs in the region, with an unemployment rate of 12.9% (NC Employment Security Commission, 2010).

Fastest Growing Occupations

The following tables present the fastest growing occupations based on the North Carolina Employment Security Commission, as presented by the Turning Point Workforce Development Board, provided in this document for convenience. These occupations, divided by required degrees, indicates that the occupations requiring a bachelor's degree are growing at a faster rate and have higher pay. Vocational jobs have much lower paying salaries and fewer vacancies. As indicated by the lower than average education rates above, there may not be enough credentialed workers to fill the fastest growing occupations requiring higher degrees. As outlined in the Turning Point Workforce Development Board's *State of the Workforce*, employers are seeing skills shortages, as well as basic skills gaps. The main shortages, as reflected in the high number of vacancies, are in healthcare and the skilled trades (Turning Point Workforce Development Board, 2005).

Declining Occupations

Also of importance are the fastest declining occupations. The following table, as reported by the Employment Security Commission, provides the top fifteen declining occupations. These occupations represent the areas where there are more likely to be displaced workers, and identification of transferrable skills to new, growing industries can allow these workers to be better connected to the local economy. The most significant losses are estimated to be in the agriculture related positions (farmers and ranchers), a sector that has been identified by ONET as a potential green sector.

Table 8. Fastest declining occupations in Upper Coastal Plain Region.

Occupation	Decline in Openings	Percent Change, 2006-2016
Farmers and Ranchers	-640	-44.52
Farmworkers & Laborers, Crop, Nursery & Greenhouse	-210	-25.96
Farm, Ranch, and Other Agricultural Managers	-80	-40.28
Telecommunications Equipment Installers and Repair	-80	-33.8
Sewing Machine Operators	-80	-31.25
Packers and Packagers, Hand	-70	-7.03
Order Clerks	-60	-30.37
Stock Clerks and Order Fillers	-50	-3.33
Computer Programmers	-50	-12.57
Driver/Sales Workers	-50	-6.67
Textile Knitting and Weaving Machine Setters, Oper	-50	-33.54
Industrial Truck and Tractor Operators	-40	-3.56
File Clerks	-40	-41.05
Computer Operators	-30	-31.25
Farmworkers, Farm and Ranch Animals	-30	-25.26
Textile Winding, Twisting, and Drawing Out Machine	-30	-25.37

Figure 5: Fastest Growing Occupations in the Upper Coastal Plain Region.

Turning Point WDB Area Occupational Projections 2006-2016

Bachelor's Degree Growing Occupations ¹	Annual Openings ²	Associates Degree Growing Occupations ¹	Annual Openings ²	Vocational Training Growing Occupations ¹	Annual Openings ²
Elementary School Teachers, Except Special Education \$39,565	394	Registered Nurses \$52,245	921	Preschool Teachers, Except Special Education \$18,074	241
Accountants & Auditors \$50,232	282	Computer Support Specialists \$36,586	179	Automotive Service Technicians & Mechanics \$30,413	218
Business Operations Specialists, All Other \$48,342	261	Dental Hygienists \$65,559	91	Nursing Aides, Orderlies & Attendants \$19,235	196
Computer Systems Analysts \$64,811	241	Medical Records & Health Information Technicians \$23,519	74	Licensed Practical & Licensed Vocational Nurses \$38,791	180
Secondary School Teachers, Except Special & Vocational Education \$39,726	228	Paralegals & Legal Assistants \$33,277	67	Welders, Cutters, Solderers & Brazers \$30,792	113
Middle School Teachers, Except Special & Vocational Education \$38,169	205	Radiologic Technologists & Technicians \$46,335	61	Bus & Truck Mechanics & Diesel Engine Specialists \$31,192	90
Computer Software Engineers, Applications \$76,168	188	Life, Physical & Social Science Technicians, All Other \$31,386	47	Emergency Medical Technicians & Paramedics \$24,845	72
Construction Managers \$70,454	161	Medical & Clinical Laboratory Technicians \$32,265	45	Library Technicians \$26,752	59
Computer Software Engineers, Systems Software \$72,838	150	Civil Engineering Technicians \$41,210	39	Fitness Trainers & Aerobics Instructors \$29,352	57
Industrial Engineers \$60,033	128	Veterinary Technologists & Technicians \$28,223	37	Aircraft Mechanics & Service Technicians \$27,896	53
Teachers & Instructors, All Other \$19,951	119	Industrial Engineering Technicians *\$48,431	35	Surgical Technologists \$32,666	48
Network Systems & Data Communications Analysts \$69,344	110	Respiratory Therapists \$48,647	34	Electrical & Electronics Repairers, Commercial & Industrial Equipment \$39,481	42
Child, Family & School Social Workers \$36,198	109	Legal Secretaries \$33,931	33	Computer, Automated Teller & Office Machine Repairers \$30,273	40
Special Education Teachers, Preschool, Kindergarten & Elementary School \$34,477	95	Electrical & Electronic Engineering Technicians \$41,891	31	Real Estate Sales Agents \$45,614	39

Sources: 1-Occupational Employment and Wages (OES) program survey. NOTE: Wages provided represent the median annual wage, which is the midpoint between the highest paid 50% and the lowest paid 50% of workers in that occupation.
2-LMI Projections, Plug Date 2006-2016 job growth and replacement (total openings) for occupational and industrial employment.

*Only statewide annual wage available.

Green Occupation Analysis

Cross-industry occupational Data from the Occupational Employment Statistics database was evaluated for each of the “increased demand” and “enhanced skill” occupations provided by O*NET. Fifty-four occupations were analyzed, though several did not have data available for this region. Occupations from seven sectors were found to exist in this region, for a total of twenty-eight occupations, with six occupations crossing sectors (See Table 9). Figure 5, below provides the simple shift-share graph of occupations, by sector. This figure illustrates the occupations with the greatest regional competitive advantage, those that are growing faster in the region than in the United States. Occupations that have this advantage in the region appear above the black line. Table 9 identifies the specific occupations which have a higher rate of growth in the region. All sectors have occupations with regional advantages, as well as occupations that are declining. Of the sectors analyzed here, research and design has the highest percentage of occupations with a growth rate above the national average, followed by green construction. Perhaps more interestingly, however, are the occupations that lagging behind national growth or declining more quickly. These occupations may represent gaps in the field that will require training and recruitment. Of the identified sectors in the region, green construction has the most occupations without a competitive advantage. While this analysis is useful for examining specific occupations, the occupational clusters must be examined a whole in order to identify industry strengths.

Figure 6. Simple Share Analysis of Green Occupations in the Upper Coastal Plain Region.

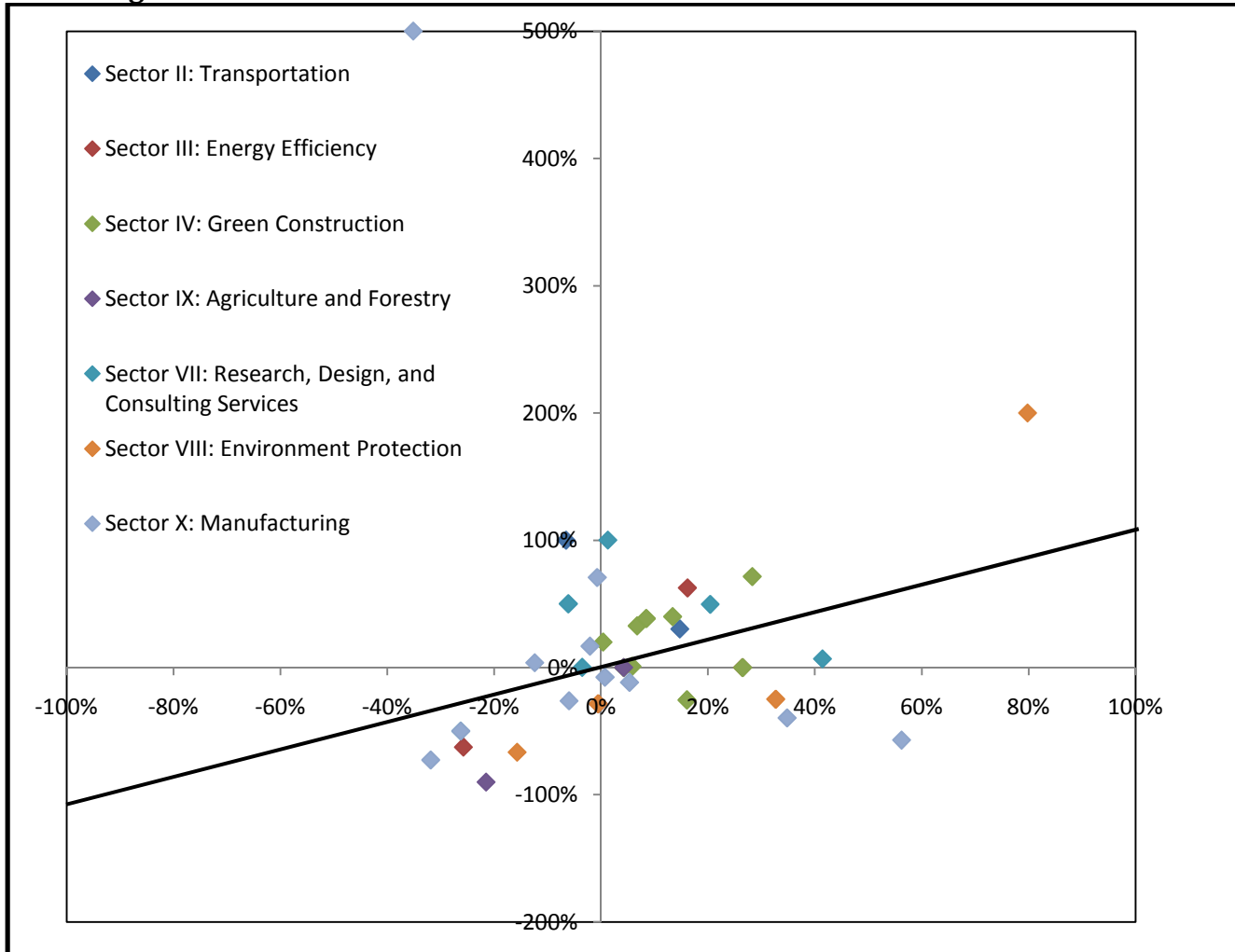


Table 9: Green Occupation Identified in the Upper Coastal Plain Region, By Sector

Sector	Occupations
Transportation	Dispatchers
	Industrial Machinery Mechanics
	Bus Drivers, Transit and Intercity
Environmental Protection	Environmental Scientists and Specialists
	Forest and Conservation Technicians
	First-line supervisors/Managing of Logging Workers
Research, Design and Consulting Services	Industrial Engineers
	Electrical and Electronics Repairers
	Industrial Safety and Health Engineers
	Forest and Conservation Technicians
	Customer Service Representatives
Green Construction	Helpers—Installation, Maintenance and Repair
	Electricians
	Structural Metal Fabricators and Fitters
	Cement Masons and Concrete Finishers
	Laborers and Freight, Stock, and Material Movers
	Operating Engineers and Other Construction Equipment Operators
	Industrial Engineers
	Electrical and Electronics Repairers
	Chemical Engineers
	Industrial Safety and Health Engineers
	Chemists
	Environmental Scientists and Specialists
	Forest and Conservation Technicians
	First-Line Supervisors/Managers of Logging
	Solderers and Brazers
	Welders, Cutters, and Welder Fitters
Manufacturing	Production, Planning, and Expediting Clerks
	Industrial Safety and Health Engineers
	Millwrights
	Electrical and Electronics Repairers, Commercial and Industrial Equipment
	Chemists
	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers
	Structural Metal Fabricators and Fitters
	Mixing and Blending Machine Setters, Operators, and Tenders
	Industrial Machinery Mechanics
	Laborers and Freight, Stock, and Material Movers, Hand
	Team Assemblers
	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic
	Cutting, Punching, and Press Machine Setters, Operators, and Tenders
	Chemical Technicians
Energy Efficiency	First-Line Supervisors/Managers of Production and Operating Workers
	Solderers and Brazers
	Welders, Cutters, and Welder Fitters
Agriculture and Forestry	Stationary Engineers and Boiler Operators
	Electrical Power-Line Installers and Repairers
	Purchasing Agents and Buyers, Farm Products
	First-line Supervisors/Managers of Agricultural Workers

Forest and Conservation Technicians

Source: North Carolina Employment Securing Commission (2010).

Also assessed were the location quotients, mean annual wages, and rate of growth for each of the above sectors. Summarized below, the data shows that research, design and consulting services has both the highest historic rate of growth and wages. However, it also includes the most positions requiring a four-year degree. Occupations within the manufacturing and energy efficiency sector provide near-median income with more associates degree positions. The 2002-2008 data does not show robust growth in these sectors. However, the recent weatherization initiatives (see Chapter 4) may spark increases in the energy efficiency sector. The manufacturing sector reflects the overall job losses in manufacturing as discovered in the full economic analysis of the region.

Table 10. Green Occupational Data, by Sector.

	Employees in Related Occupations, 2008	% Change, 2002-2008	Average Wage	Location Quotient
Transportation	1490	-18.8%	\$22,836	1.48
Environment Protection	130	7.7%	\$37,661	1.65
Research, Design, and Consulting Services	330	27.3%	\$56,601	1.02
Green Construction	4450	-5.6%	\$29,003	1.26
Manufacturing	9540	1.8%	\$38,008	1.50
Energy Efficiency	160	0.0%	\$36,082	1.01
Agriculture and Forestry	170	-64.7%	\$47,634	1.66

Utilizing the highly concentrated occupations, identified by the location quotients, each green sector was categorized by the rate of growth in these clusters and earnings, as compared to the region's median income (\$35,970). The sectors are identified as growing, stable (average increase in employment between -5% and 5%), or in decline. Additionally, the sectors are divided by income: high, medium (within 15% of the median) and low. While this chart is not

meant to provide a decision mechanism for targeting green sectors, it does provide a visualization as to where these sectors currently stand.

Growing sectors indicate areas of high opportunity and competitive advantage. Declining industries may indicate a source of unemployed workers, which may also direct recruiting and marketing efforts. Income provides a measure of desirability, but also of required skill level. While research, design and consulting services is the only sector that is both growing and provides high income, the high income levels are due to the high educational requirements. Generally speaking, research, design and consulting jobs are not “green collar” jobs for the blue collar workforce, but rather green jobs for the traditional white collar workforce. Yet, research, design and consulting services may focus on industries that will create more moderate-income jobs, such as manufacturing and environmental protection. Having strong research firms can lead to innovation and efficiencies that make the region more attractive to green firms that provide “green collar” jobs. The sectors with stable and growing employment under the medium income category (environmental protection, manufacturing, and energy efficiency) will provide more employment opportunities for those without bachelor’s degrees.

Table 11. Established Occupational Clusters.

	High Income	Medium Income	Low Income
Growing	Research, Design and Consulting Services	Environmental Protection	
Stable		Manufacturing Energy Efficiency	
Declining	Agriculture and Forestry		Transportation Green Construction

Limitations

Due to data restrictions, this analysis has several limitations. This analysis used the most detailed occupational data available, which resulted in unavailable future projections.

Therefore, this analysis is based on the past performance of these occupations within the region rather than the projected future performance. Economic structural changes and public policy will likely have a great impact on these sectors, and therefore we should not draw too many conclusions from this analysis. This analysis is of use, however, in illustrating which sectors utilize skills most similar to the current make up of the Upper Coastal Plain's regional workforce.

Summary and Conclusions

An occupational assessment of the region has suggested both opportunities for growing green sectors, as well as challenges for the region. The following sectors provide the main areas of opportunity for the region.

- **Agriculture:** While employment in the occupations identified in the green agriculture sector is in decline, the regional industry analysis suggests that the traditional agriculture sector remains fairly stable. Therefore, the occupations identified by O*NET in the region may need additional education to compete with in emerging green markets and to provide green services to the existing agriculture industry.
- **Manufacturing:** While the manufacturing sector will likely not return to previous employment numbers, the existing labor force has maintained fairly stable employment in the occupations related to green manufacturing. Furthermore, the manufacturing trades that have seen employment growth in recent years are connected many green technology value chains (Center

for Globalization Governance, 2009). The wages in this sector will be very near the median income for the region.

- **Environmental Protection:** Environmental protection occupations are growing at a rate faster than the United States at 7.7% between 2002 and 2006. The Upper Coastal Plain region has nine superfund sites, 35 inactive hazardous sites and 469 sites with underground storage tanks (NC Division of Waste Management). The UCPCOG has spearheaded a brownfields assessment coalition to fund the assessment of and encourage the redevelopment of these hazardous sites, and federal cleanup initiatives through the Environmental Protection Agency provide incentives to develop these sites. Encouraging this redevelopment can provide both moderately paying jobs in this sector and support general redevelopment.
- **Research, Design, and Consulting:** The occupations identified in this sector are the fastest growing of these sectors, and also provide the highest wages. As discussed in the next section, these jobs are not “green collar” jobs, with most requiring Bachelor’s degrees. However, recruiting and retaining research, design and consulting firms can support firm innovation and enhance emerging clusters if they are closely related to the region’s sectoral strengths.
- **Energy Efficiency:** Employment in energy efficiency related sectors is stable and provides near median wages. While the region does not have an especially great competitive advantage in these occupations, the current federal and state administrations have begun to encourage and subsidize

weatherization and energy efficiency projects. Connecting these businesses and workers can create local energy efficiency services to meet these new demands.

- **Waste Remediation:** Due to the lack occupational code availability, waste remediation was not included in the occupational analysis. Yet, this sector should be included in the potentially high performing green sectors in the region. However, based on the industrial analysis, as well as the identified recycling businesses in the region, waste remediation should be considered a green industry worth targeting in the region.

Also of note, green construction is a declining occupational cluster with low wages in the region. Given the direct correlation between construction employment and real estate development, there is little to be done to encourage construction outside of general economic development practices. The construction industry is well connected to the green movement, with 19 green construction firms identified in the region. Further connecting these workers with both educational and business opportunities in green construction may slow the recent downturn in these occupations.

The region has significant barriers to taking full advantage of the growing green economy and available public funding, however. The main barrier lies with the skills gap, declining high school completion rates, and low number of individuals with college degrees. As put forth by Van Jones in his book *Green for All* the growth of green sectors can and should provide opportunities to the socially disadvantaged. Given the low median income, and the high, persistent poverty rates in the region, this should be a top priority. The green economy can

provide the opportunities for skilled workers that are diminishing in the manufacturing, construction and agriculture sectors. The qualitative research that has been done in the region regarding the increasing skills gap remains troubling. Like any employer, green employees will need basic skills and the ability to upgrade their skills as technology and innovation demands.

Chapter 4: Connecting Workers to the Green Economy

In identifying strategies to pursue green jobs, it is necessary to both identify goals and find the appropriate strategies based on the available resources. The goals stated in the Turning Point Workforce Development Board's strategic plan states that their vision is,

The counties of the northern I-95 corridor will have a highly skilled workforce that can help local firms compete in a technologically advanced global marketplace. The region's workforce will have wages above the state average and educational attainment levels above the state average.

Based on the desire to provide high quality and high paying jobs, the WDB seeks to go beyond simple job creation to pursue true economic development. Identifying and building on existing training programs and economic development institutions can lead to improved education levels and the skilled, well-paid workforce within the green sector. Karen Chapple of the Center for Community Innovation suggests that strategies should be endogenous and based on existing programs and training availability. This chapter identifies the relevant programs, with special emphasis on training available at the community colleges relevant to the occupations identified in the previous chapter.

Local Training Availability

Table 12, below lists all the occupations identified in the region related to green sectors as well as the available sectors. This list was generated via the "North Carolina Consumer Guide," which provides full listings of all publicly funding training programs. Many four year degrees were omitted from this search due to the fact that only one four year college (Barton

College) exists, with few relevant programs. Occupations that require four year degrees will need to recruit from nearby state schools—including those in the Raleigh-Durham-Chapel Hill area as well as Eastern Carolina University. Some occupations do not have any local training opportunities (highlighted in red). Construction and the research, design and consulting sectors have the most training gaps. Research, design and consulting positions gene

Table 12. List of Community College Training Programs.

Occupation	Training Programs	Degree or Certificate	Location(s)
Refrigeration Mechanics and Installers	Air Conditioning, Heat and Refrigeration	Certificate	Roanoke-Chowan; Wilson
Forest and Conservation Technicians	Associate in Science	Associate	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Chemical Technicians	Associate in Science; Bachelors Degree	Associate	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Production, Planning, and Expediting Clerks	Basic Computer Skills	Certificate	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Operating Engineers and Other Construction Equipment Operators	Construction Equipment Handler	Associate or Certification	Not available in region
Cement Masons and Concrete Finishers	Construction Equipment Handler, or Apprenticeship	Certificate	Not available in region
Electricians	Electrical/Electronics Technology	Associate or Certification	Edgecombe
Electrical Power-Line Installers and Repairers	Electrical/Electronics Technology; Electronics Engineering	Associate or Certification	Edgecombe; Halifax; Wilson
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Electrical/Electronics Technology; Electronics Engineering	Associate or Certification	Edgecombe; Halifax; Wilson

First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	Facilities Maintenance Worker	Associate or Certification	Edgecombe
Industrial Machinery Mechanics	Industrial Maintenance Technician	Diploma	Halifax,
Millwrights	Industrial Maintenance Technician	Diploma	Halifax
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	Machining Technology	Associate	
First-Line Supervisors/Managers of Production and Operating Workers	Manufacturing Technology	Associate	Edgecombe
Mixing and Blending Machine Setters, Operators, and Tenders	Manufacturing Technology	Associate	Edgecombe
Team Assemblers	Manufacturing Technology	Associate	Edgecombe
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	Manufacturing Technology; Heavy Equipment Operator; Industrial Machinery Technician	Associate	Edgecombe
Electrical and Electronic Equipment Assemblers	Manufacturing Technology; Machining Technology	Associate	
Dispatchers, Except Police, Fire, and Ambulance	Office Technology	Associate or Diploma	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Customer Service Representatives	Office Technology	Associate or Certification	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Stationary Engineers and Boiler Operators	On the Job		
Helpers--Installation, Maintenance, and Repair Workers	On the Job		

First-Line Supervisors/Managers of Agricultural Crop and Horticultural Workers	On the Job		
First-Line Supervisors/Managers of Logging Workers	On the Job		
Laborers and Freight, Stock, and Material Movers, Hand	On the Job		
Bus Drivers, Transit and Intercity	On the job training		
Industrial Truck and Tractor Operators	On the Job; or Apprenticeship		
Structural Iron and Steel Workers	On the job training; Welding Technology	Certificate or Diploma	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Agricultural Inspectors	On the job; Associate of Science	Associate	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Structural Metal Fabricators and Fitters	On the job; Manufacturing Technology; Welding Technology	Certificate, Diploma or Associate	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Welders, Cutters, and Welder Fitters	Welding Technology	Certificate or Diploma	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Solderers and Brazers	Welding Technology	Certificate or Diploma	Wilson; Roanoke-Chowan; Nash; Halifax; Edgecombe
Farm and Home Management Advisors	Bachelor's Degree or Higher		
Purchasing Agents and Buyers, Farm Products	Bachelor's Degree Required		
Chemical Engineers	Bachelor's Degree Required		
Occupational Health and Safety Specialists	Bachelor's Degree Required		

Industrial Engineers	Bachelor's Degree Required		
Chemists	Bachelor's Degree Required		
Computer Software Engineers, Systems Software	Bachelor's Degree Required		
Industrial Safety and Health Engineers	Bachelor's Degree Required		
Environmental Scientists and Specialists, Including Health	Bachelor's Degree Required		

Source: North Carolina Employment Security Commission (2010); Occupational Information Network (2010).

Table 13. Summary of Training Availability, By Sector.

Sector	Bachelor's Degree Required	Training Available	Training Unavailable	On the Job Training
Transportation	0	2	0	1
Energy Efficiency	0	1	0	1
Green Construction	0	6	2	4
Agriculture and Forestry	1	2	0	1
Research, Design and Consulting	6	2	0	0
Environmental Protection	2	1	0	1
Manufacturing	0	13	0	1

Source: North Carolina Employment Security Commission (2010); Occupational Information Network (2010).

As illustrated above, the majority of occupations have some sort of training available through the community college. The majority of occupations in the research, design and consulting sector require a bachelor's degree. The green construction sector has the most occupations that have on the job training, and it is the only sector that has occupational training

gaps. The manufacturing sector has the largest number of occupations with available training programs, likely due to the historical importance of the manufacturing sector in the region.

In addition to these training programs, the following provides an overview of existing federal state and regional programs and institutions. At the federal and state levels, programs specifically directed at green sectors were included. At the regional level, important economic development actors that may influence the development of a regional green economy were identified.

Table 14. Federal Policies and Programs

Policy/Program	Type	Description
Green Jobs Act	Workforce Development	\$500 million for green job pilot programs, including Pathways out of Poverty
Energy Efficiency and Conservation Block Grants	Greening of city, business capacity	Provides grants to cities for energy efficiency programs.
HUD Weatherization Assistance	Residential energy efficiency	Assists low income residents in weatherizing homes
EnergySTAR Tax Credits	Tax credits	Encourage the purchase of energy efficient appliances and building materials
U.S. Green Building Council	Green certification	Provides certification to builders who build energy efficient buildings.
USDA Rural Energy for America Program	Clean energy grants	Rural renewable energy programs funded

Table 15. State Policies and Programs

Policy/Program	Type	Description
State Energy Program	Comprehensive	Includes grants for new technology, training, technical assistance, and energy efficiency
Weatherization Training Program	Workforce Development	Short training for unemployed individuals to complete weatherization
Local Loan Program	Financing	Provides low interest loans for energy efficiency projects
Green Business Fund	Financing/Grant	Provides grants to green start ups
Department of Commerce	Business recruitment	Markets the state to expanding firms; completes market analysis. Will work to create individualized training programs.

Table 16. Existing Regional Institutions and Programs

Policy/Program	Type	Description
Economic Development Corporations	Business recruitment and retention	Three economic development corporations in the region work to market, including industrial parks
Housing Authorities	Greening of the city	Oversee low income weatherization assistance
Turning Point Workforce Development Board	Networking, workforce analysis	Complete workforce studies and coordinated with community college and JobLink
JobLink	Workforce Intermediary	Connects workers to vacant jobs.
NC Gateway Technology Center	Training	Provides basic skills, computer and technology training
UCP Small Business Incubator	Business capacity building	Provide reduced-rent space, networking opportunities
Community Colleges	Training	Three community colleges provide training, including construction, manufacturing

Institutional Assessment

The region has numerous institutions that guide current economic development, but lacking from this list is a leader in the green economy. While there are numerous sustainable business organizations around the state, this feature is noticeably absent to this region. The presence of such an organization could promote the ‘greening’ of prominent sectors, including environmental protection, agriculture, and construction. In the western region of North Carolina, the Clean Air Community Trust has led the way in both promoting clean energy sectors and in training disadvantaged workers to take jobs in the clean energy sector (Clean Air Community Trust, 2009). This leadership does not require a new organization, but rather the gathering of existing organizations and regional actors under the leadership of one. Cooperation and persistent leadership will be necessary to have an efficient, effective pursuit of green jobs.

Also important to assess is the training opportunities for the region. While there are several opportunities available, it is clear that not many are taking advantage of these opportunities. The high school graduation rate of 66% indicates that 36% of the entering workforce is ultimately ineligible for these training programs. All O*NET descriptions indicate that a high school diploma is required for these positions, with the exception of a couple construction jobs. Therefore, over 1 in 3 people in the workforce are ineligible for nearly all of these positions. The qualitative analysis completed by the Workforce Development Board echoes this sentiment, with most employers citing the need for basic and remedial skills among their employees. While remedial education and GED programs are widely available in the region, few are partaking. Thus, missing from the institutional actors is a program to encourage these forms of education. While having higher paying jobs in the region may incentivize individuals to receive this training, having a dearth of basic work skills may hinder the growth and recruitment of green businesses. The workforce development institutions should work towards connecting the impoverished to training programs, and eventually to green jobs. This should be done in conjunction with recruitment, development and retention efforts in order to maximize benefits to disadvantaged workers and the regional economy as a whole. As green firms begin to locate in the region, firm specific job training programs, funded through the Department of Commerce, can provide employers with the specific skills required for these jobs.

Finally, the region is fragmented with respect to economic development. The northern two counties (Halifax and Northampton) much more rural, while Rocky Mount is tied to the Research Triangle Region. The region is covered by three different Economic Development Partnerships (NC Department of Commerce, 2010) and three different USDA Rural Development offices (USDA, 2010). The division of this region along the different economic

development networks makes it difficult for economic development coordination to happen. The relatively low population and cross commuting patterns are indicative of the dependence on nearby population centers in Raleigh and Greenville (Turning Point Workforce Development Board, 2005). Working with these regions can ensure compatible economic development. The Research Triangle Regional Partnership suggests that Nash County act as one of many small research hubs, a plan that will likely encourage the expansion of the research and consulting industries (Kenan Institute for Private Enterprise, 2006). In contrast, the Eastern Economic Development Partnership proposes an advanced manufacturing cluster near Wilson (Eastern Economic Development Partnership, 2006). While these clusters may likely be compatible with in the region, and with the existing strong industry sectors, coordination can ensure that region maximizes the potential for these sought-after clusters.

Recommendations

The purpose of this study was to identify the region's strengths in the green economy, as well as the main challenges. In assessing traditional industries, occupational patterns and green businesses, several green sectors emerged as potential targets for regional economic development. In some green sectors, the region has true competitive advantages and these should be capitalized on through future economic development planning and recruitment efforts. In particular, manufacturing has very strong potential due to the displaced labor force, strong performing sectors, and available training. The research, design and consulting sector has the potential to compliment the emerging green technology manufacturing sectors, as well as contribute to the greening of the agriculture and construction sector. The agriculture and construction sectors, while not particularly fast growing, have the potential to gain competitive

advantages through the “greening” of these sectors. As described by Chapple (2009), green construction and sustainable agriculture practices are creating more value added and meeting new consumer demands begin to favor more environmentally sustainable practices.

Table 16. Green sectors with regional competitive advantages.

Green Sectors with Regional Competitive Advantages	Sectors that have the potential to “go green”
• Manufacturing • Research, Design and Consulting • Waste Reduction and Recycling • Environmental Protection • Energy Efficiency	• Agriculture • Construction

Identifying these sectors was just the first step to building a green economy. Going forward, the region will need leadership, initiative and good strategies. As discussed in the institutional analysis, the region is lacking a leader in environmental practices and the green economy. Developing a task force to include many institutions and varied strategies can create the incremental changes required to take full advantage of the available funding and job creation. The region has several business parks and economic development marketing agencies; rather than competing for green businesses, strategies focusing on the local advantages should be examined. The firms should seek out trade groups in order to establish sectoral initiatives based on industry needs. Additionally, these strategies should take the disadvantaged workers into account. Training, outreach and other workforce development strategies should be in place both the enhance general works skills and to create career ladder programs to incentivize higher education.

Close partnerships with industrial leaders can lead to thoughtful workforce development, as well as careful recruitment in the identified green sectors. The regional workforce struggles

due to low educational attainment levels, and therefore recruitment of research firms will not provide the needed relief to the unemployed residents of the region. However, connecting research firms to green manufacturing, recycling or agriculture firms can embed the research firms in to the regional economy.

Promoting networking among these green businesses can create greater ties between these firms, and allow for firms to collectively address labor force and other issues. Missing from the listed institutions is a “green” or “sustainable” business association. While some firms are identifying as green, they are not identifying with the green economy specific to the region. While these institutions do not necessarily lead to clustering or innovation, these benefits are possible. These associations often act as the lead organization for green initiatives, encouraging ventures and establishing green job training programs (Jones, 2008).

Further research is needed to fully understand the green economy in this region, particularly the manufacturing and research, design and consulting sectors. A more nuanced assessment of the research sector can identify where innovation is happening in the region, and if it will even be related to the green economy. Additionally, the further assessment of the manufacturing sector can identify major employers and whether they are connected to green technologies. As partnerships form and initiatives begin, deeper sectoral research can identify the sectors where innovation is occurring. Further analysis of training enrollment figures can also provide a greater assessment of the existing workforce and the capacity of these training programs.

While the Upper Coastal Plain Region is economically disadvantaged, proactively planning for the future and building on existing strengths can create the advantages the region needs to take full advantage of the green economy.

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