

GREEN JOBS IN NORTH CAROLINA

2008 ASSESSMENT



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June 2008

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EXECUTIVE SUMMARY

- In 2008 North Carolina has an estimated 63,000 green jobs, including those found in enviro-sectors as well as greener jobs in other parts of the economy.
- In 1996 a report estimated that North Carolina had 43,000 jobs in 3,400 environmental businesses in twenty sectors
- Steady and predictable job growth is estimated to be strongest in renewable energy, sustainable farming and natural health products.
- Sustainable forestry, recycling and sustainable tourism/crafts should see moderate job growth, and higher levels if public policy and consumer demand can spur business development and innovation.
- Recycling employs a surprising 14,000 workers.
- The largest environmental sector in 1996 and in 2008 is the often overlooked environmental technology field, including environmental services and equipment. It provides an estimated 25,000 jobs.
- Job quality and wages for green jobs are mixed. While some jobs are pleasant, well-paid and desirable, others offer challenging working conditions and/or low pay (e.g., some recycling sorting facilities and hazardous waste operations.)
- Greening existing industries, such as N.C.'s large manufacturing and tourism economies, could easily create more green jobs than development of smaller niche green industries. How to define and measure our green jobs remains a challenge.
- For the most part, North Carolina has strong government and non-profit resources to spur the development of green jobs and greener industries.
- Growing North Carolina's green economy and jobs requires attention to a number of factors: R&D, entrepreneurship, availability of capital, worker training, raw material supply, regulations and consumer demand . Trouble in any of these aspects can stunt growth. For N.C.'s "grade" on each of these areas, see Part III.

The green economy in North Carolina is growing by leaps and bounds -- and with it job opportunities. While the most cutting-edge green activity is centered in Asheville, Boone and the Triangle, sustainable jobs are found statewide. Moreover, many businesses and organizations not traditionally considered green are “greening up.”

Green sector jobs range from renewable energy and sustainable farming to the old standbys of recycling, hazardous waste management and wastewater treatment. Sectors that are “greening up” include N.C.’s vast manufacturing sector with over 500,000 jobs and tourism. Restaurants and hotels employ over 300,000 workers. The challenges are identifying and encouraging both environmentally-related green jobs as well as conventional jobs that are now greener. North Carolina needs to boost the solar panel installer and organic farmer, as well as the furniture maker using less toxic stains and the innkeeper using local food.

I. An Earlier Snapshot of N.C.’s Green Jobs

The last comprehensive report on the state’s environmental business sector was done in 1996. The “North Carolina Environmental Business Study” was prepared for Self-Help and the N.C. Environmental Technologies Consortium by David Kirkpatrick and Kathryn Gavaghan. The oft-cited report found that “Environmental enterprises employ about 43,000 North Carolinians, including 17,000 in environmental service firms, 6,000 in environmental equipment companies, 13,500 in water, recycling, and environmental energy businesses, and 6,500 in companies offering sustainable products and services.”

The report estimated that the segment had annual sales of \$4.2 billion. This was a higher figure than would be expected from national averages and pointed to a higher than average interest in greening in N.C. Recycling and environmental engineering/consulting were the two largest sectors, in revenue and in the number of employees and firms. Recycling showed 9,000 workers and environmental consulting/engineering accounted for 7,400.

(A summary of information from the 1996 report is included on the following page. The complete study is found at www.p2pays.org/ref/26/25072.pdf)

The authors researched twenty distinct green sectors, finding obscure parts of the green economy, including areas that a layperson would likely overlook. For example, the study found 99 companies and 2,020 jobs in “air pollution control equipment.”

That said, the report was unable to fully capture the extent of the green economy, due to the fact that dozens of green businesses and hundreds of green jobs are hidden within different sectors of the economy. For example, a green apparel manufacturer like T.S. Designs in Burlington does not fit into the categories of the study. North Carolina boasts over 500,000 manufacturing jobs and some of these are bona fide green jobs. Likewise, the study reports that only 1,000 of the state’s 450,000 retail employees could be classified as green workers. For eco-tourism, the study has only 1,600 workers out of 315,000 restaurant and hotel employees.

Another issue is that the report makes the assumption that firms within environmental sectors are necessarily green, when some may not be. Solid waste management is an example. Companies that operate landfills are in the environmental business, but may have policies that are not particularly green. It is safe to say that a perfect definition of green jobs will never be found.

The report found that green ventures were growing at a steady rate. Companies with historical data were experiencing a ten percent growth rate per year over three to five years. If the 43,000 total green jobs found in the study grew at a five percent rate, we would find today 81,000 jobs. A 10% growth rate would yield 150,000 green jobs. If an entire sector like manufacturing could be encouraged to substantially “green up,” then we would be looking at millions of green jobs.

In the 1996 study, only 15% of the state’s green jobs were found in the sustainable products area. This is the area which contains many of the most visible green businesses: alternative transportation, ecotourism, sustainable forestry/farming, green building, green retail and environmental education and non-profits. If this figure still holds true today (and it probably does), then policymakers need to work to also assist less visible green sectors and their less visible companies and jobs. Energy and local food are getting the most attention today, while “techie” sectors like “water equipment and chemicals” fly under the radar screen.

Table1: North Carolina’s Environmental Sectors, 1995

	Businesses	Revenue (mil)	Workers
ENVIRO. SERVICES			
(includes enviro testing, wastewater treatment, solid waste management, haz waste management, remediation services & enviro consulting/engin.)			
TOTAL	1,291	\$1,625	16,740
ENVIRO. EQUIPMENT			
(includes instrument manufacturing, water equipment and chemicals, air pollution control equipment, waste mgt. equipment & process / prevention technology)			
TOTAL	440	\$685	6,360
ENVIRO RESOURCES			
Water supply	234	77	1,590
Recycling	586	945	8,970
Environmental energy	215	349	2,800
TOTAL	1,035	\$1,371	13,360
SUSTAINABLE PRODUCTS			
Alternative transportation	n/a	104	870
Ecotourism	n/a	199	1,660
Sustainable forestry, farms and aquaculture	157	46	610
Green building	168	41	640
Green retail	77	73	1,080
Environmental education and non-profits	239	66	1,610
TOTAL	641	\$529	6,470
GRAND TOTAL	3,407	\$4,217	42,930

Source: “NC Environmental Business Study,” Kirkpatrick and Gavaghan, 1996, page 11.

II. North Carolina's Green Economy and Jobs in 2008

Since the 1996 report, N.C.'s green economy has grown substantially. This is not news to anyone. However, information documenting this growth has been anecdotal at best. Standard government economic data is of limited use, because, as said earlier, much of the green economy is embedded in other larger sectors. For example, green builders are hidden within overall builders and green hotels are lost in overall hotel and lodging. Recycling is aggregated with waste services. What follows is a sector by sector assessment, using government data where available, but relying primarily on the author's qualitative knowledge.

In this report, for convenience, green sectors are placed in one of two categories: natural resource-based or environmental technology. The first category includes sustainable farming, natural health, aquaculture, sustainable forestry and wood products, ecotourism and crafts. Environmental technology includes renewable energy and energy efficiency, recycling and waste reduction, and other environmental technologies. Three sectors (transportation, green retail, and enviro-education / non-profits) are discussed only in relation to the table in Section C.

A. Natural resource-based businesses and projects

Sustainable agriculture

2008 employment estimate: 3,000
Prospects for growth: High

North Carolina is home to a thriving sustainable agriculture movement, with "local" now an equal or stronger driver than organic. In N.C. there are over 100 organic farms, a growing number of successful farmers markets, numerous CSAs (subscription farms), regular events and workshops, support non-profits and educational institutions, and locally-focused restaurants. The strongest hubs are in and around Pittsboro, Carrboro and Chapel Hill, and in the Asheville area.

Sustainable farms generate many entry-level jobs for those who want to learn about farming and participate in the local/organic food movement. Many farms take on seasonal workers and interns. Workers are taught techniques as they do the manual labor of a farm. Farm interns may go on to start their own farms. Farm incubator projects are in development.

Important support organizations include the Carolina Farm Stewardship Association (CFSA) based in Pittsboro. With 800 members, a major annual conference and a long history, this is one of the strongest sustainable ag non-profits. The Rural Advancement Center International, also in Pittsboro, is another important group and recently completed a report on financing small eco-friendly farms.

In Western N.C., the Appalachian Sustainable Agriculture Project (ASAP) supports sustainable farming. ASAP has a newly developed *Appalachian Grown*TM logo; its *Local Food Guide* is very popular. A separate group puts on the "Organic Growers School" each year near Asheville; it is a popular one-day event with hundreds in attendance. Another resource is the farm program at Warren Wilson College east of Asheville.

The universities and their extension services are increasingly interested in organic methods and offer training and internships. The Center for Environmental Farming Systems (CEFS) is an excellent outfit in Goldsboro, east of the Triangle. Extension agent support for sustainable farming is growing, with strong support in Chatham, Watauga and Orange Counties, and other parts of the state as well.

On the distribution side, market leaders include Whole Foods, Earthfare, Greenlife Grocery, Weaver Street Market and the new Chatham Marketplace in Pittsboro. Another market is in development in Burlington. All of these companies have committed to buying more local food items and need workers with a commitment to healthy food. An important wholesale link between retailers and organic farmers is ECO or Eastern Carolina Organics. Despite its name, ECO serves the entire state of N.C. Major grocery store chains will eventually play a role here, but the supply of local food is too small to supply them much at the present.

Employment demand in this sector will see strong growth in N.C. as new markets open up in places like Charlotte metro. Demand routinely exceeds supply both for organic and local products. Farmers markets are moving an increasing amount of non-produce items (crafts, baked goods, processed foods, plants, flowers) as the markets grow in number and scale.

Pasture-raised livestock, as an alternative to CAFOs (confined animal feeding operations), is growing dramatically on the demand and supply side, and represents an employment opportunity. CFSA, the Livestock Breeds Conservancy (also Pittsboro) and N.C. Choices are all active in promoting pastured livestock.

For those who love the outdoors, plants and animals, and are not afraid of hard work, sustainable farming is a promising green job sector.

Natural health products

2008 employment estimate: 500
Prospects for growth: High

Linked to the organic movement, N.C. is becoming a center of natural health products due to two factors: the presence of biodiverse forest and farmland and a fit with the many LOHAS residents. [LOHAS = Lifestyles of Health and Sustainability] Increasing concern for example about toxins in beauty aids and interest in alternative medicine will spur this industry forward.

One example is Gaia Herbs, located on 200 organic acres in Brevard; it grows 50 herbs and sells to 3,000 outlets. Gaia works with twelve outside growers, employs 110 and operates a 36,000 SF warehouse. The N.C. Natural Products Association is a new trade association based in Asheville, with backing from players in the industry including Gaia Herbs. Their 2006 conference was called "Cultivating the New Wellness-Driven Economy in N.C."

There is no definitive survey of the size of this sector, but an estimate is at least 100 small businesses. Employment includes growing the plants and herbs, processing the plants into medicinals and health products, and marketing and distribution.

Aquaculture

2008 employment estimate: 1,000

Prospects for growth: Medium

Aquaculture is an industry that, when done properly, can be environmentally-sound and take pressure off of wild stocks. Local fish production can also reduce GHG emissions from transportation.

State government in N.C. has devoted ample resources to developing the industry. There is a tradition of small scale operations, unlike N.C.'s rival, Idaho, with its larger operations. Activity has been centered in the eastern part of the state.

250 individuals hold licenses for raising fish in tanks and ponds, and 300 hold licenses for shellfish production on the ocean bottom. There are also sixteen hatcheries and thirty fee fishing operations. Four processors operate in the state (\$10M sales). Overall, the N.C. aquaculture industry, including all fish species, crayfish, oysters and fish meal has seen recent growth and totals \$60M in sales.

Debra Sloan in Macon County is the aquaculture business advisor with state government. A statewide aquaculture conference has been held every year for the last 18 years. Aquaculture jobs require a mix of skill levels, from entry-level production and processing to higher-level biologists.

Sustainable forestry / wood products

2008 employment estimate: 2,500

Prospects for growth: Medium

Wood products, the manufacturing sector, is a \$19 billion industry in N.C. Currently, it is very slowly becoming a greener industry and thus a source of more green jobs. Due to its size, even a small shift can have a significant impact.

Wood products overall has over 100,000 workers and over 3,000 businesses. It includes furniture (79,000), pulp/paper (19,000) and lumber (30,000). These facilities are spread evenly across the state. This activity is spurred by the fact that N.C. has 17 million acres of forestland. Statewide, 40% of that forestland is owned by individuals and 27% by farmers. Only 11% is publicly-owned.

Western NC's forests are valuable hardwoods; pines predominate in the east. Statewide, many acres are being clearcut for development, producing low grade logs. But strong counter-trends have been set into motion. Certification programs and watershed conservation organizations grow stronger each day. Habitat restoration and the control of invasive species on our wild lands could be a source of job growth in the future. Reforestation as a way to combat climate change is another source of jobs. Two thousand Christmas tree growers operate in the state and only a handful are organic.

The \$8 billion furniture industry has suffered job losses (10,000 in the early 90s and another 10,000+ in the last few years), but still boosts thousands of good jobs. Only a tiny portion of the

industry can be seen as truly green, but trends are in the right direction. The Sustainable Furniture Council, a national group located in Chapel Hill, has 200 members and is appropriately riding the US Green Building Council's LEED certification wave.

Pressure continues to mount on the paper and pulp industry to become greener and that has had an effect on green jobs in N.C. The Environmental Paper Alliance, a national group based in Asheville, released a comprehensive report in 2007 (See www.environmentalpaper.org.)

Small "Mom and Pop" sawmills have all but disappeared and are ripe for a revival a la the small farm movement. This could be a source of a small number of greener wood-related jobs. LEED encourages local wood sourcing; there is a shortage of locally-milled wood for LEED projects.

The N.C. Division of Forest Resources maintains a list of 225 consulting foresters, some of whom are decidedly green in orientation. NCSU has an established forestry school which is slowly becoming a source of greener forestry. The N.C. Forestry Association (NCFA) is the oldest mainstream forestry group in the state and has 3,200 members, including loggers, foresters, and manufacturers. It is slowly moving in a greener direction.

The greener side of the forestry movement is represented by several non-profit groups. The Southern Forestry Foundation (SFF) is a non-profit that seeks to encourage sustainable harvests of private land. It sponsors logger training courses in an attempt to raise the logging standards and green up the logging profession. Many of N.C.'s 4,000 loggers have lost the skill to do select cuts and low-impact logging.

Other groups include Appalachian Voices in Boone, which conduct landowner education and advocacy. The Southern Forest Network is working to expand market opportunities for certified wood. Such groups are working to increase both the supply and demand for sustainable wood products and forestry, and create green jobs.

Sustainable Tourism and Crafts

2008 employment estimate: 7,500
Prospects for growth: Medium

Consumer demand for nature-based tourism activities and greener operators is on the rise. Nationally, it is thought that about 5% of all tourism qualifies as "eco-tourism." A large part of N.C.'s \$3 billion tourism economy is dependent on protecting the natural environment and scenery. Less prominent is a move for tourism businesses to become greener in their operations. N.C. needs much better organizational capacity to both grow its ecotourism sector and green its operators. Overall, tourism employs 190,000 directly.

According to a 2002 federal report, whether a trip is eco-friendly is largely determined by the impact of lodging. Green lodging is growing in N.C., but is still a tiny segment. The Green Hotel program from N.C. DENR has been disappointed with the lack of interest in greener hotels. After contacting hundreds of businesses, only a handful expressed interest in the program. Solar hot water is a market opportunity, since hotels and motels use large amounts of water. Many Mom and Pop motels are facing the need for facility upgrades and could be open to "greening up" as energy costs rise.

The N.C Tourism Office could help create more green jobs in the tourism industry in N.C. The laudable Heritage Tourism Program is their main program of sustainable tourism, but there is more that they could be doing.

Eco-tourism activities include fishing, hiking, birding, bicycle touring, camping and non-motorized boating, including river rafting. Jobs in these sectors are great for outdoors lovers and those who like adventure. An example of a promising project is that recently NC State joined with the N.C. Birding Trail Initiative to provide statewide "birder-friendly business training" to business and community leaders. There is no estimate of the number of jobs in this sector, but it is likely to be a few hundred at best.

NC has a long tradition of summer camps for children and adults. Camps preserve open space and teach an appreciation for nature. There are over one hundred summer camps in North Carolina, employing thousands seasonally. Camps and retreat centers can be greener with energy upgrades (solar hot water) and other improvements. Many are taking on more staff as they extend their seasons beyond the summertime.

Farm tourism, where tourists learn about the workings of a real farm, is another eco-tourism segment. A recent study identified almost 400 agritourism enterprises in N.C. State government is providing assistance to this sector. A publication from ASAP is worthy of study: "Opportunities for Expanding Food and Farm Tourism in WNC." (www.asapconnections.org)

N.C. is home to several thousand working craftspeople. A recent study found that nationally a typical crafter earned over \$75,000/year and half of that income came from crafting. Direct sales (home or craft fair) accounted for over half of their income. Most worked from home and only 16% had employees. Craft support organizations like Handmade in America are strong in N.C.

B. Environmental technology

The "techie" side of the green economy is alive and well in North Carolina. Sustainable energy is a sector that is on fire in North Carolina and recycling remains an important green industry for the state. The rest of the environmental technology sector has seen growth as environmental protection efforts, many below the public radar screen, have progressed over the last ten years.

Sustainable Energy and Green Building

2008 employment estimate: 5,000
Prospects for growth: High

North Carolina has been a leader in sustainable energy for many years. The state had built up a sizeable institutional capacity prior to the explosion of interest in energy the past two years. Credit goes to advocates at the N.C. Renewable Energy Association, N.C. Solar Center and Advanced Energy. Due to strong leadership, N.C. has long had among the most generous state tax credits for home and commercial projects in the nation.

There are now many small-scale energy entrepreneurs, including solar, wind and micro-hydro installers, a solar cell producer, active and passive solar builders, energy efficiency and daylighting consultants, and several weatherization and energy auditing firms. The Solar Center maintains a database of 400 N.C.-based energy professionals, companies and sympathetic

architects and builders. With better access to capital, these small businesses could grow faster and experiment with models like that of the energy service companies. As the 1996 study noted, there are also insulation manufacturers that have been operating in N.C. for years. All of the activity in this sector is not new or high-tech.

Each year the Southeastern Energy and Environment Expo is held in Asheville in August, showcasing this sector. (See www.seeexpo.com.) In 2007, dozens of energy and green building firms were on hand for the expo, many of them from N.C.

The State Energy Office released an energy jobs report in Winter 2008 which identified 100 green energy manufacturers in the state. Roughly estimated this would represent a few thousand jobs. The LED lighting company CREE alone has over 1,000 workers in N.C. If N.C. manufacturers *and their N.C. suppliers* were to capture their market share during the expected expansion of solar and wind, the job impact, says the report, could be as much as 11,000 new manufacturing jobs for the state. Currently, however, such manufacturing is growing faster overseas (in places like Germany with high demand) than in the U.S. Other states like California are also moving well out in front.

Overall, wind and solar power are poised for strong growth. Solar Today has said: "... growth in sales is expected to continue at over 30 percent for the next five years ..., making solar the fastest-growing industry of significant size in the world." In 2007, according to the Solar Energy Industries Association, solar added 6,000 new jobs nationwide and expects 60% job growth in 2008. However, if federal tax credits lapse, 40,000 jobs nationwide could disappear overnight. Wind power accounts for several thousand jobs nationwide and new plants are opening up on a regular basis.

Although less exotic, solar hot water is seen as a particularly prime market. Large hot water users like hotels/motels, fitness clubs, summer camps, laundromats and some restaurants and manufacturers could see significant savings from solar hot water. Single family homes are also candidates. Producing electricity with solar hot water is advancing as an option.

Biodiesel companies are present around the state and are generally prospering. Their growth is somewhat limited by the availability of cheap feedstocks like restaurant grease. The future of liquid biofuels overall is uncertain due to the boom and bust of corn ethanol. Job growth in the industry cannot be easily predicted, but the State is supporting the industry in its efforts to use feedstock like switchgrass.

Green builders, producing green housing, subdivisions, and commercial development, are a growing force in North Carolina. A few builders in places like Chatham County, Carrboro and Asheville are spec-building to a high level of green, including active and passive solar, super high efficiency plumbing, low VOC paints and recycled content. But mass market builders are also introducing some green elements such as better insulation, eco-friendly windows and doors, drought-tolerant landscaping and rain barrels.

Recycling and resource recovery

2008 employment estimate: 14,000

Prospects for growth: Medium

North Carolina has a strong recycling industry, based on its manufacturing heritage, widespread curbside programs in urban areas and strong support from government. It was recently estimated by N.C. DENR that there are 14,000 recycling jobs in the state. This is an additional 5,000 jobs over the 1996 estimate. The recycling industry is assisted by a non-regulatory Recycling Business Assistance Center (RBAC) which hands out upwards of \$600,000 per year in grants to businesses and non-profits.

North Carolina has relatively low tipping fees and does not have a bottle bill (also called beverage container deposit legislation) as is found in eleven other states. The result has been more landfilling and less recycled raw materials than many would prefer. The legislature recently enacted a \$2.00 per ton landfill surcharge fee, which could become a prime source of funding for recycling projects. The main trade association, the Carolina Recycling Association, is based in Pittsboro and puts on a training and policy conference each year.

The industry is a mix of large national firms and Mom and Pop establishments. Opportunities exist for smaller operations, such as small curbside routes, scrap metal yards, paper recycling for commercial accounts and pallet recycling. Other niche areas include removing mercury switches from autos, industrial scale composting, electronics and construction debris recycling.

Manufacturing from recycled products is another aspect of the industry and is essential to closing the loop. An example of this was a business in Charlotte that manufactured 2X4s from construction waste. There are companies making furniture from pallets and plastic lumber from plastic bottles. In the east, there is a business making pavers from recycled glass.

Environmental Services and Equipment, and Water Supply

2008 employment estimate: 25,000

Prospects for growth: Low

Most environmental technology companies are based either in Charlotte or the Triangle area. Some are based in Asheville and rural parts of the state. Regulatory enhancements have provided a steady stream of work for many of these firms. There is no evidence that the sector has grown to a large degree in the state. Based on the 1996 figures, the number of firms may have actually shrunk, due to mergers and consolidations. Overall employment is likely to be flat or slightly up due to the offsetting factors of some weaker environmental policies coming from Washington along with a steady tightening of some air, water and waste rules by state and federal officials. An important source of dynamism in the sector is the presence of the U.S. EPA facility at Research Triangle Park, with several thousand employees and the headquarters of the Air Quality Division.

A comprehensive list of these firms (750 businesses) was developed about two years ago by Self-Help and provided to N.C. DENR. There is no over-arching trade association and state government support for the sector is not strong. Companies tend to be run by lone wolves,

inventors or engineers and many network through national professional associations, if at all. Local business and engineering schools are possible points of contact.

Hazardous waste management is an area poised for growth, as more and more jurisdictions face pressure to provide household hazardous waste services to residents. This growth has yet to occur in a significant way.

Brownfields remediation (cleaning up old toxic industrial and commercial sites) is a strong sub-area. Some of this work, often large in scale and scope, is done by major companies like Cherokee Partners in Raleigh. Other projects are more modest in scale and are handled by small firms. Land of Sky Regional Government in Asheville has a brownfields program that can be a model for job creation in this field. Their grant and technical assistance program has about a dozen projects underway in and around Asheville.

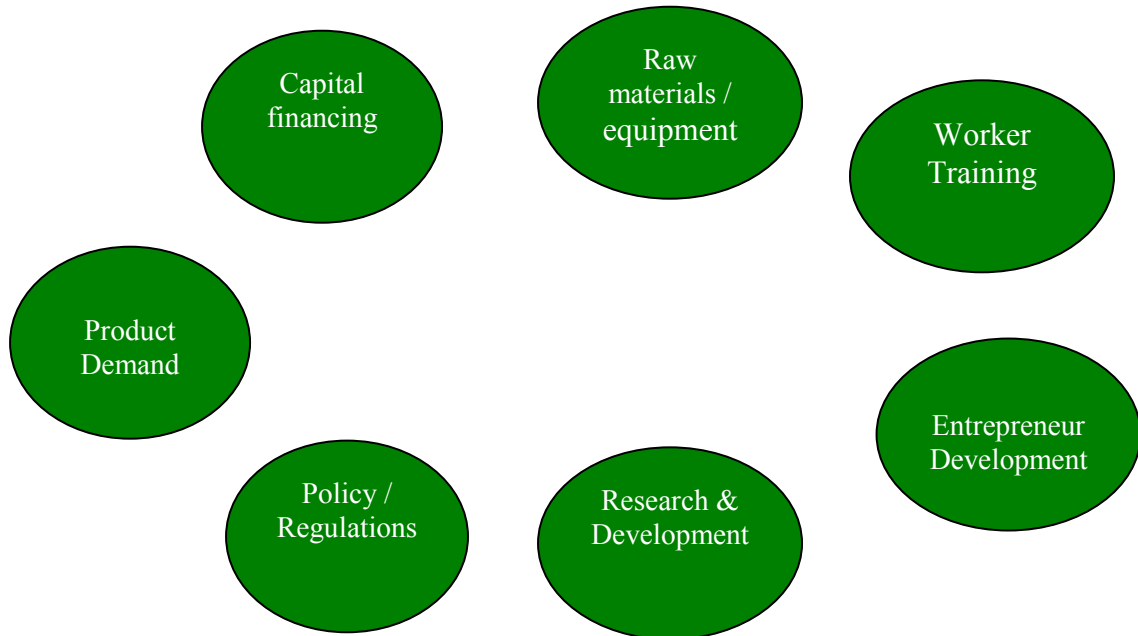
C. N.C. Green Jobs Summary Table

	1996 Job Estimates	2008 Job Estimates	Future Growth
Natural resource based businesses and projects			
Sustainable agriculture	610	3,000	High
Natural health products	na	500	High
Aquaculture	na	1,000	Medium
Sustainable forestry / wood products	na	2,500	Medium
Sustainable tourism and crafts	1,660	7,500	Medium
Environmental Technology			
Sustainable energy and green building	3,440	5,000	High
Recycling and resource recovery	8,970	14,000	Medium
Environmental services and equipment, water supply	24,690	25,000	Low
Other¹			
Alternative transportation	870	1,000	High
Green retail	1,080	1,200	Low
Environmental education and non-profits	1,610	2,000	Medium
Totals	42,930	62,700	

¹ Analyzing these sectors in depth was beyond the scope of this report. Alternative transportation has just recently been boosted by higher fuel costs and shows high future job growth related to public transit and bicycling. Green retail is stagnant. Environmental education and non-profits have seen steady, but modest growth, and this should continue.

III. Growing Jobs in N.C.'s Green Sectors

Spurring the green economy forward requires a multi-faceted effort. A variety of factors influence the progress; serious deficiencies in any of these can spell trouble. Seven key components are shown below:



Consider a plastic lumber manufacturer. To create jobs in this area, attractive and affordable products must be developed. This can require several iterations of a test product. An entrepreneur needs to take promising products and build a company around them. Investors and lenders have to bring capital to the enterprise. Consumers must be convinced to purchase plastic lumber, for example, for a deck. Once demand begins, the company will need equipment and raw materials to do their work. Since recycled plastic has been in short supply, citizens will have to be encouraged to recycle more. Government policies will be needed to encourage more recycling, set building code standards for the lumber and regulate its use in construction. Finally, workers will need to be found and trained to do the manufacturing.

In the plastic lumber example, raw material supply is probably the greatest hurdle to expansion. Other sectors face different types of barriers. With sustainable forestry, a key problem is the lack of consumer demand for sustainably-made wood products such as furniture. In organic farming and renewable energy, a host of issues are holding expansion back, including product development, worker training, capital and entrepreneurial development.

So how do we proceed to grow the green economy? Let's give North Carolina a grade on each of these areas and point to areas of improvement. Coordination and better resources at the state level can help to move us to an "A" on all fronts.

Product Demand: **B**

Green consumers in the mountains and in the Triangle are demanding organic and local food, green buildings and renewable energy. There is the opportunity to move this beyond the “Whole Foods crowd” to a more mainstream audience. Also, consumer demand in most other parts of the state is just beginning. Local governments could be doing much more to generate demand through procurement and environmental infrastructure upgrades.

Capital Financing: **A-**

North Carolina is blessed with some of the strongest green financing resources in the nation. Specialty loan funds have been established by state government, the Rural Center, Self-Help and The Conservation Fund. SJF Ventures, a leading green venture capital firm, is located in Durham. A new state government green business fund is in the works and could be a national model. On the down side, the State Energy Office loan fund remains inoperable and farm financing need improvement.

Raw materials/equipment: **C**

Supply of raw materials is a major problem for some parts of N.C.’s green economy. Without a bottle bill, for example, recycled plastic is in constant short supply here (and nationally.) Processors wanting to use organic raw ingredients face a limited supply. Organic cotton and grains can be hard to come by. Green builders face a severe shortage of local certified wood for building and furniture projects. It can be difficult to find machinery of the right scale; green businesses often are smaller than their brown competitors or need equipment with a lighter footprint. For example, specialized equipment for sustainable forestry may have to be imported from Europe. In some fields, smaller scale equipment that is available may be made for hobbyists or home-use and not be durable enough for commercial use.

Worker training: **B**

There is a surprisingly wide range of training for green jobs, especially in the mountains and Triangle. Trainings are offered regularly by the community colleges, UNC System and a host of non-profits. North Carolina State University in particular has offered many courses on renewable energy and green building. Central Carolina Community College in Pittsboro offers an outstanding farming program. Such trainings not only assist existing N.C. residents, but also attract green-minded students from other places. Programs need to expand and serve more of the state. Opportunities should be statewide and green curricula should penetrate all our educational institutions.

Entrepreneurial Development: **B**

A more comprehensive approach to green entrepreneurs would benefit the state. There are a wealth of resources, including the excellent (but not green) SBTDC. Clubs and associations like the NC Sustainable Energy Association, Carolina Farm Stewardship Association, N.C. Sustainable Business Council and NetImpact chapters provide networking and some training. Perhaps the most valuable assets are the business schools at UNC and Duke which attract green entrepreneurs to North Carolina and bring national green business leaders to the state. Youth entrepreneurship with a green focus is in its early stages and needs to grow in a more intentional

manner. N.C. Real Enterprises, a youth business program found in many high schools and technical colleges across the state, is a logical partner.

Research and Development B-

North Carolina has not invested sufficiently in the research needed to create a truly vibrant green economy. Research is happening at the public universities, most notably on agriculture. The Center for Environmental Farming Systems in Goldsboro is a standout. Product development is taking place inside the walls of the some of the larger green businesses, but much of it is coming from lone wolf inventors and garage entrepreneurs with shoestring budgets. Some research grants are available such as business grants from DENR for recycling and farming grants from SARE. Overall, these efforts could be substantially beefed up.

Policy and Regulations B+

While North Carolina has a ways to go before it can claim a world-class regulatory environment, one that encourages green behavior and sets standards for green products and practices, it has made notable progress in the last decade. For example, a law was passed to prohibit broad bans on solar panels in subdivisions. A strong renewable portfolio standard was adopted by the Utilities Commission and LEED standards are being embraced by some local governments. Local and state governments are getting more serious about water quality and supply issues, spurred by the drought and federal mandates. Recycling is making very slow but steady progress in the policy arena. More still needs to be done to level the playing field in some sectors, so that green businesses are not undercut by less green competitors. Policies need to be enacted so that businesses don't find that their products are illegal or discouraged (e.g., wind turbines, raw milk, green roofs, commercial composters and biological sewage treatment via wetlands.)