



CLEAN ENERGY: OPPORTUNITIES FOR WESTERN NORTH CAROLINA

**A Snapshot of Existing Businesses and
Supportive Infrastructure**

**Prepared by Land-of-Sky Waste Reduction Partners
as part of a
North Carolina Rural Economic Development Center
Research and Demonstration Grant titled
*Rural Prosperity through Energy Entrepreneurship***

Funding provided by:



Clean Energy: Opportunities for WNC

A Snapshot of Existing Businesses and Supportive Infrastructure

Abstract:

Clean energy businesses, including renewable energy manufacturers and those working in the energy efficiency fields, are increasingly playing a larger role in North Carolina's economy. "The diversification and security of energy supplies, increased efficiency of our energy use, and mounting concerns over the environmental impact of energy-related emissions are issues of undisputed importance in the modern economy, and may well be the guidepost to a fundamental economic transition."¹ Land-of-Sky Regional Council (LOSRC) is examining how the clean energy sector can be an economic development opportunity for the Western North Carolina region while promoting many of the region's values of environmental sustainability and local resilience. In this report, LOSRC seeks to capture the beginnings of an inventory of clean energy and energy efficiency-related manufacturers and businesses in the 23-county WNC region. Included in this preliminary review of the WNC clean energy landscape are some of the market trends, investment trends and the regulatory drivers as well as the resulting direction these forces suggest for energy market transition and innovation. The report also covers the region's supportive infrastructure network, which now promotes or could promote the development of the green energy technology sector. LOSRC is working to develop a regional framework for a clean energy planning initiative with a strong business development component to support entrepreneurial growth in the region.

North Carolina Energy Landscape

Driven by rapidly increasing energy prices, climate change concerns and national security issues associated with our dependence on petroleum supplies controlled by countries that view the United States as other than a strong ally, there appears to be a move toward rationalization of domestic energy requirements in an increasingly volatile energy price environment. Securing sustainable energy in an environmentally acceptable manner is now viewed as a national priority although there are political and ideological differences in the approaches necessary to get there.

For the past several years, the nation has experienced rapid increases in energy and fuel costs. The National Association of Manufacturers, in their 2006 Labor Day Report titled “Energy Cost: Shrinking the Pie of America’s Workers,” identified energy costs as a key issue for manufacturers. “Surging energy prices have propelled inflation at a faster pace than workers’ take-home pay and have resulted in declines in real wages for working Americans.”²

North Carolina imports all of its energy supply, except for a small amount of wood, hydro and solar energy. Diagram 1, Energy Flows in North Carolina, shows that North Carolina imported \$15 billion of fuels and energy in 2007.³ This leaves the region vulnerable to supply disruptions, such as with Hurricane Katrina, and significant price volatility.

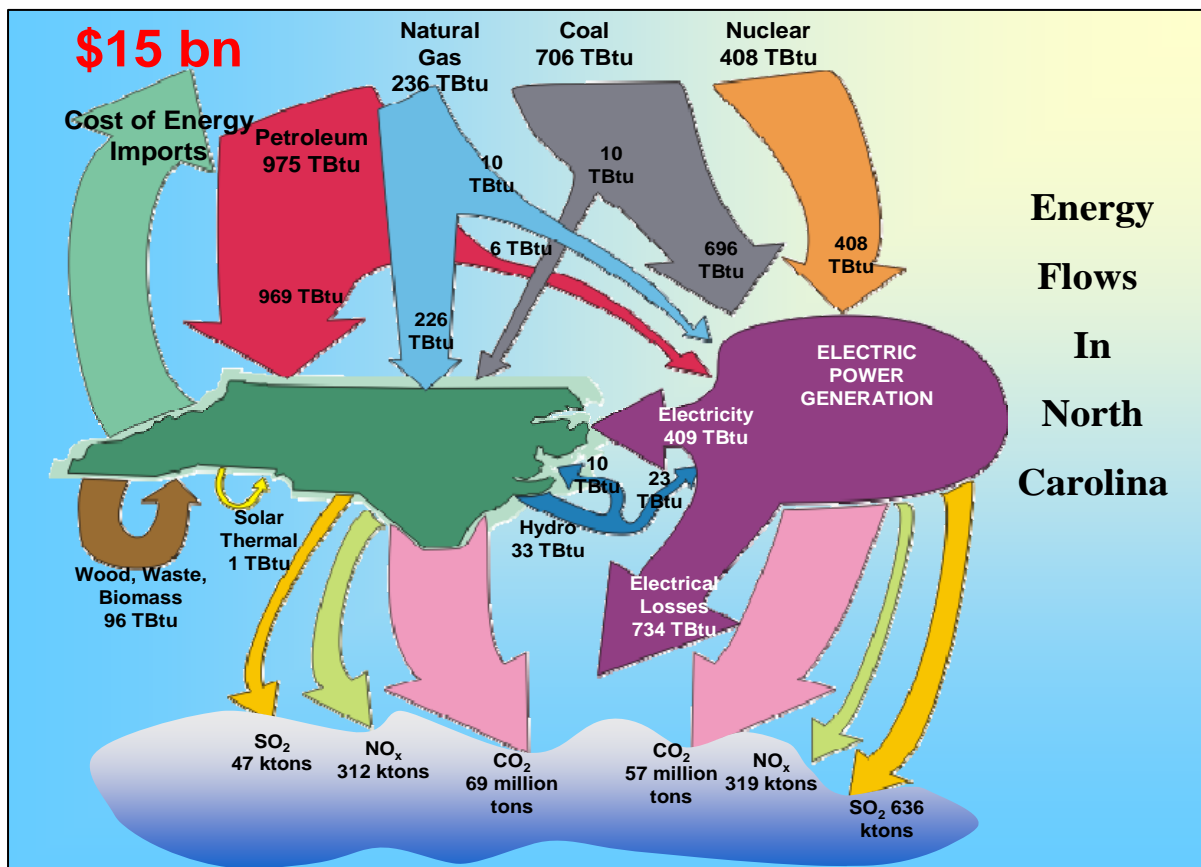


Diagram 1: Energy Flows in North Carolina, Source: SEO, NCDOA

The Appalachian Regional Commission (ARC), a 13-state regional economic development agency that serves western North Carolina, published *ENERGIZING APPALACHIA: A Regional Blueprint for Economic and Energy Development* in October 2006 to address its energy goal which is to "...develop the Appalachian Region's energy potential to increase the supply of locally produced, clean, affordable energy, and to create and retain jobs."⁴ These energy goals reflect the community values of western North Carolina.

In the 2005 NC State Energy Plan, the State Energy Office recognized the importance that energy-related enterprises could have for the state's economy. The plan states that in partnership with the NC Dept of Commerce, the State Energy Office should encourage and support economic development of energy-related enterprises whose products are intended to increase energy efficiency or use renewable resources.⁵

The Energy Center at Appalachian State University reports that there were over 100 green energy manufacturers in NC in 2008 as compared to just 28 in 2005.⁶ Some of this increase is the result of companies entering energy-related markets, but it also includes companies with increased visibility that were serving the energy sector.

Western North Carolina Clean Energy Landscape

In 2007, LOSRC estimated that the cost of energy imports for western North Carolina was \$1.97 billion per year. Air quality impacts from traditional fossil fuel sources continue to be an issue. The vulnerability and price stability of our energy supply to geo-political issues, severe weather events, and market pressure is a continuing risk to the stability of the WNC region. Using the strengths and assets of the region that include undeveloped, clean, indigenous energy sources, as well as a set of values that focus upon sustainability and conservation, western North Carolina has already begun to address these issues. The WNC region possesses significant natural assets in biomass, sun and wind resources, already in use and receiving closer investigation. A groundwork is in place in the green energy technologies marketplace including solar, biofuels, biogas, fuel cell, and energy efficiency sectors. The use of alternative fuels and clean energy business development, as well as the implementation of public policies to encourage and support this business sector, represents a considerable economic development opportunity.

The Asheville Area Chamber of Commerce 2007 member survey showed that 28.6% of respondents ranked energy costs as having the second highest impact on net income. Health care costs ranked highest at 37.5% and salaries ranked third at 21.4%. Energy costs and alternative fuels were ranked as the highest legislative priority for the Federal Government (67.2%) with Air Quality (42.6%) and Tax Credits for employer health coverage (42.6%) tying for the second highest legislative priority. Energy and air quality remain key issues for local businesses.⁷

AdvantageWest identified "Environment-Related enterprises" as one of ten key business recruitment sectors with a recommended strategy for implementing a cluster analysis that would include: 1) catalogue the key components of the cluster, 2) articulate an achievable vision of what the cluster can become over the next 10-20 years, and 3) identify specific opportunities for

growing the cluster and realizing greater synergies. AdvantageWest recently held an economic development recruitment event focusing on the region’s clean energy and green building sectors.⁸

Clean energy businesses, including renewable energy manufacturers and those working in the energy efficiency fields, increasingly are playing a larger role in North Carolina’s economy. “The diversification and security of energy supplies, increased efficiency of our energy use, and mounting concerns over the impact of energy-related emissions are issues of undisputed importance in the modern economy, and may well be the guide post to a fundamental economic transition.”⁹ Land-of-Sky Regional Council is examining how the clean energy sector can be an economic development opportunity for the WNC region while promoting many of the region’s values of environmental sustainability and local resilience. Included in this analysis of the sustainable energy landscape are the market trends, investment trends and the regulatory drivers as well as the resulting direction these forces suggest for energy market transition and innovation.

Clean Energy Market & Investment Trends

Over the past five years, clean energy technology growth has been in excess of 20% per year.¹⁰ One example of investment trends in the clean energy sector is the significant increase in venture capital in this sector shown in Chart 1. Clean energy technology investment rose from 0.8 percent in 1999 to 9.6 percent in 2006 - reported as % of venture capital investment in the U.S. In dollars, clean energy technology investment increased from 490 million to 2.7 billion over the same timeframe.¹¹ The projected growth in clean energy technologies from 2006 to 2016 from \$55.4 billion to \$226.5 billion is shown in Chart 2. These trends suggest that it may be possible to attract investors for energy business expansion in the region.

Chart 1

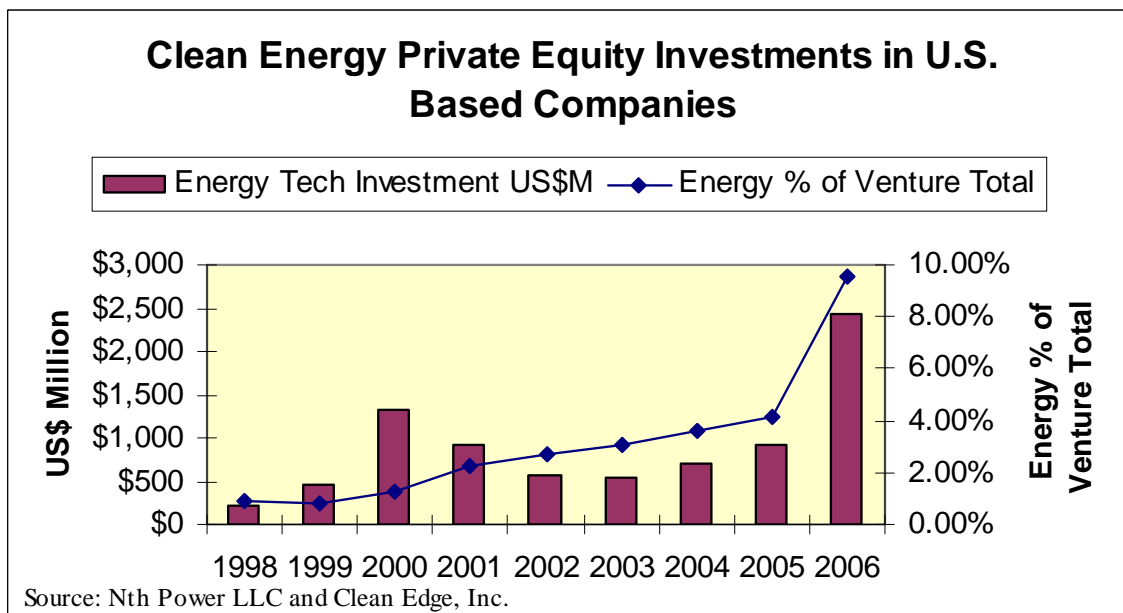
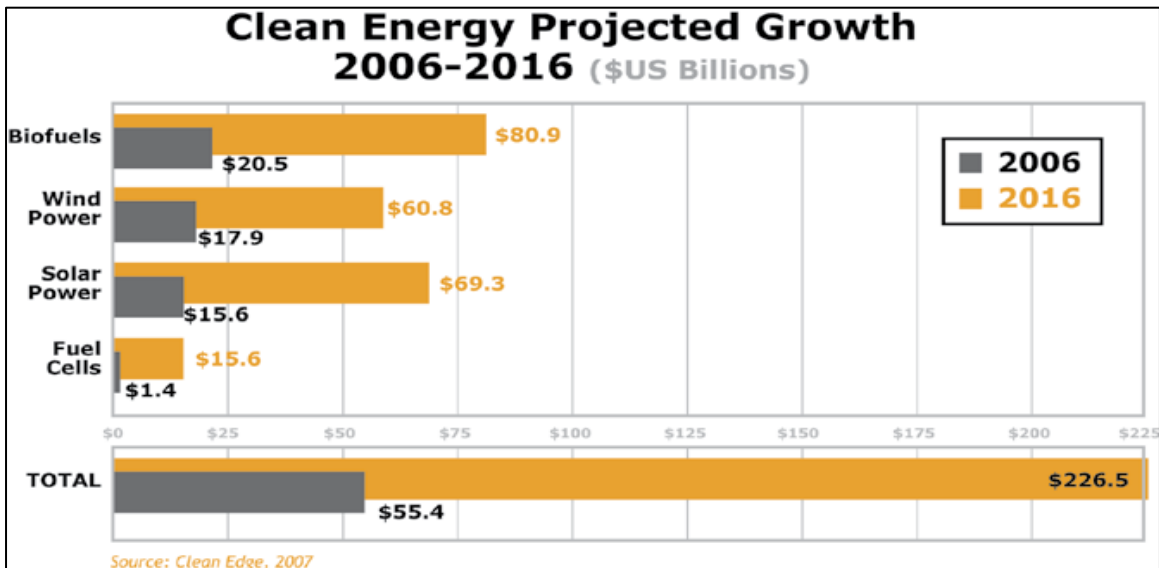


Chart 2



Regulatory and Environmental Drivers

A major regulatory driver for sustainable energy in North Carolina is the state Renewable Energy Portfolio Standard (REPS), Senate Bill 3, which was passed in 2007. The electric utilities, suppliers of generating systems, major users of electricity, and those concerned with the environment negotiated and secured passage of a North Carolina law to provide incentives and mandates for electric utilities to use both energy efficiency and electricity generated from renewable sources to meet the demand for electricity. The REPS in North Carolina requires the utilities to satisfy 12.5 percent of their customers’ power needs with renewables or energy efficiency by 2021. This new law is expected to increase interest in residential, commercial, institutional and industrial energy efficiency and should create many opportunities for sustainable energy related companies in the region.

Recent public opposition to Progress Energy’s proposed oil-fired peaking plant in Buncombe County and Duke Energy’s coal-fired plant expansion at its Cliffside facility in Rutherford County speaks to keen public concern about global climate change and other air emission concerns such as ground level ozone, acid rain, and mountain visibility impacts. The NC Division of Air Quality permit approval for Duke Energy’s Cliffside expansion was the first permit ever issued in NC to include greenhouse gas mitigation stipulations.¹² National consideration of carbon dioxide regulations, carbon taxes, national renewable energy standards, and other carbon reduction strategies all drive further clean energy investment and expansion.

Sustainable Energy Related – Business & Industry

WNC Clean Energy Related Manufacturing

In 2006, an ad hoc group of industry professionals from the Waste Reduction Partners program, the State Energy Office of NC Department of Administration, and LOSRC staff conducted a preliminary survey of businesses and industries that were working in the renewable energy and energy efficiency fields. The survey was conducted for the western NC 23-county region using business directories compiled by AdvantageWest, Asheville Area Chamber of Commerce, WNC Green Building Directory, Sustainable Now databases, and firsthand knowledge.

The WNC region has a number of companies which manufacture forward looking energy efficiency products or supply the energy consuming marketplace with key components related to energy efficient products. With respect to renewable energy product manufacturers, WNC region has a fuel cell components manufacturer and biodiesel manufacturer. A summary of manufacturers identified which can play a potential role in the emerging renewable energy sector and evolving energy efficiency field is shown in Table 1. A list of selected regional manufacturers is shown in Table 2. Based on preliminary reviews, the region could play an important role in component manufacturing for a number of renewable energy technologies. The region boasts a strong manufacturing base in electrical components, industrial machinery, metal fabrication, plastics, measurement / analysis / control instruments, batteries, textiles and minerals - all with the potential to play a major supply chain role in clean energy enterprises. In the Asheville metro area, there are nearly 400 manufacturers, employing more than 23,000 people.¹³ Many of the manufacturers identified below make products incorporating energy efficient technologies or are a component manufacturer for the same. They are stable employers and can benefit from the emphasis on green energy technologies.

Table 1: WNC Business & Industries Related to Energy Efficiency and the Green Energy Technologies

30 Manufacturers -26 component manufacturers -4 system integrators
240 Businesses -Green Builders & Contractors -Design Professionals -Green/Energy Product Suppliers & Distributors -Other transportation and alt-fuels related

Waste Reduction Partners' Energy Cluster Analysis identified and categorized over 270 energy-related companies in a 23-county region in western North Carolina.

SELEE Corporation, Hendersonville, NC

Selee and its family partner, Porvair Advanced Materials, manufacture plates used in fuel cell production. They supply components for use in sustainable energy related applications.

“Since 2001, Porvair has been developing proprietary bi-polar plates in conjunction with the U.S. Department of Energy. A fully molded, carbon – graphite Bipolar Plate is now available for use in PEM fuel cells. This plate has all of the superior properties found in machined graphite plates, but with the cost structure of resin composite molded products. The plate is lightweight, which can provide full stack weight savings of up to 36 lbs., and is all carbon, which eliminates the chance for contamination, and improves durability.”¹⁴

Mark Morse, President of SELEE Corporation, located its molten metal filtration facility in Hendersonville, NC because space was readily available. The Greater Hendersonville Chamber of Commerce and AdvantageWest have helped Selee as it expanded its operations.

Deltec Homes, Asheville, NC

Deltec Homes is an eco-friendly modular home manufacturing company that specializes in green energy efficient circular homes. Deltec has one of the largest photovoltaic (PV) arrays at a manufacturing facility in North Carolina. Deltec, working with a local PV installer, Sundance Power Systems, installed 273 photovoltaic panels at its 100,000 square-foot facility in West Asheville. The system generates up to 55 kilowatts, according to Deltec Homes Green Building Coordinator **Steve Linton**. ‘That is about one-third of the energy that we need to make the homes,’ Linton explains. But the company is committed to using 100 percent clean energy in its manufacturing process, he adds, so they will purchase the additional two-thirds from the statewide NC Green Power program. Deltec ships its homes all over the country and occasionally throughout the world, says **Joe Schlenk**, Director of Sales and Marketing . The round design, he adds, makes them stand out as more energy-efficient and hurricane-resistant than conventional homes. “We have always considered ourselves a very eco-friendly home manufacturer,” says Schlenk. “We don’t just want to get on the green bandwagon. We want to walk the walk.”¹⁵

Deltec Home’s April, 2007 newsletter described their Platinum level certified LEED project: “Deltec Homes’ recent participation in ABC’s Extreme Makeover: Home Edition television program gave our Green Building Department a unique opportunity to promote the highest levels of sustainable construction. This project is one of only 25 homes in the United States that have been certified to the Platinum level under the LEED for Homes rating system, and represents a unique collaboration between Deltec Homes, The EcoBuilders, Extreme Makeover’s design producers, and the US Green Building Council.”¹⁶

Table 2: Sustainable Energy-Related Manufacturers

Selected examples

Organization	Products
Unimin Corp Spruce Pine, NC	High quality quartz, supplying semiconductor industry
Trigen Bio-Power Spruce Pine/Forest City, NC	Steam generated by wood-fired boilers
Edco Products Boone, NC	Dehumidification Units, HVAC Balance dampers
Aegis Power Systems Murphy, NC	Power systems
KCH Engineering System Forest City, NC	Ventilation and emission control devices
Jackson Paper Sylva, NC	Recycled corrugate paper medium, wood-fired boiler energy source
Porvair Hendersonville, NC	Fuel cell component manufacturers
Deltec Homes Asheville, NC	Modular Green Home Manufacturer
Energy Mgmt. Insulation Columbus, NC	Industrial Insulation manufacturer
GE Lighting System Hendersonville, NC	Commercial lighting products
Blue Ridge Biofuels Asheville, NC	Biodiesel Manufacturing
Eaton Electrical Arden, NC	Electric transformers and generators, switchgear and controls
Loron Cook Company Asheville, NC	Ventilation Equipments
BorgWarner Thermal System Fletcher, NC	Automotive: Viscous fan drives and fans
Ohio Electric Motors Barnardsville, NC	Electric Motors
Farnam Custom Products Arden, NC	Electric Heaters
P.E. Valve Company Asheville, NC	Refrigeration & Heat Pump Values
Dampp-Chaser Electronics Hendersonville, NC	Specialty Climate Control Equipment
Peerless Electric Hot Springs, NC	Fan and Blower Parts
PGC, Inc. Asheville, NC	Temperature and humidity control systems
SAFT America, Inc. Valdese, NC	Batteries, Lithium & Nickel

Sustainable Energy Related Businesses

Bolstered in part by a strong and growing green building market demand in WNC, there exist many clean energy businesses throughout the region. These businesses include distributors, designers, installers and service providers in technology sectors such as solar-thermal, photovoltaic, biofuels, biomass, wind, alternative fuels, and a broad range of energy efficiency technologies. Many of the energy efficiency related businesses work in fields related to heating, cooling and ventilation design and installation, consumer products, and advanced building systems which conserve energy. A list of selected regional businesses is shown in Table 3.

Clean and Sustainable Energy companies have located in WNC for various reasons, but a look at several specific companies may provide insight into areas that would benefit from targeted business development efforts.

Table 3: Sustainable Energy-Related Businesses	
Selected examples	
Organization	Location
Appalachian Energy	Fletcher
KCH Engineering Systems	Forest City
Advanced Thermal Solutions	Hendersonville
Appropriate Building Solutions	Asheville
Biltmore Farms	Asheville
Grease Lightning	Swannanoa
Home Energy Partners	Asheville
The Ecobuilders	Asheville
FLS Energy	Black Mountain
Thermacraft	Horseshoe
Sundance Power Systems	Mars Hill/ Asheville
Blue Ridge Energy Systems	Fletcher
Solar Dynamics	Asheville
Electric Solutions	Woodfin
Solatube	Asheville
Green Built Environments	Asheville
High Tech Construction Products	Penrose
GLC Services, Inc.	Canton
Bullman Heating and Air	Asheville
Innova Homes	Asheville
Trans-Eco	Fletcher

FLS Energy, Black Mountain, N.C.

FLS Energy <<http://www.flsenergy.com/>> is a solar energy design and installation firm, with a mission to establish solar and efficiency as mainstream technologies through the planning, design and installation of quality, clean energy systems for both businesses and homeowners in the region. Their work includes some of the largest solar hot water and photovoltaic projects in the nation, and they are located in Western North Carolina.”

Michael Shore, president of FLS Energy, explained that western North Carolina has been an ideal region in which to launch a clean energy company. The incentives and mandates provided in North Carolina’s Senate Bill 3 for electric utilities to use electricity from renewable sources have drastically improved the climate for distributed generation. The state law is also leading Duke Energy and Progress Energy to develop programs to promote both solar PV and thermal applications to meet the demand for electricity. He credited the Asheville area with “...being a forward looking place for clean energy enterprises” that includes a client base receptive to innovative approaches for securing clean and sustainable energy. Mr. Shore was one of four recipients of the 2008 Sustainable Energy Leadership Awards given recently by the Energy Office of the state Department of Administration. <LOSRC interview: 6/13/08>



High Tech Panels on a Low Tech Farmhouse: An FLS Energy solar installation at Thatchmore Farms.

“Tax credits covered half of the cost and the electric savings will cover the rest in a few years. It helps a little with climate change and provides a better return on our investment than the bank.” Tom Elmore, Thatchmore Farms, Asheville.

Snapshot of Clean Energy Support Infrastructure in WNC

The WNC community contains hundreds of organizations which directly or indirectly support the green energy technology market place. A LOSRC ad hoc team conducted a preliminary survey to define the support infrastructure for renewables and energy efficiency related businesses, using the economic development categories similar to those used by the Asheville-Buncombe HUB. The infrastructure categories included (1) Physical, (2) Business Development/Education, (3) Workforce Development, (4) Social/Non-governmental organizations, and (5) Leadership Examples/Early Adopters.

The premise of this effort was to show that sustainable energy technology businesses could be promoted as an economic development activity while addressing the region’s energy security, stability, cost control and cost competitiveness.

Duke Energy

In response to the incentives and mandates of Senate Bill 3, Duke Energy Carolinas announced on June 9, 2008, that it is proposing a \$100 million plan to install electricity generating solar panels at up to 850 North Carolina sites including homes, schools, stores and factories.¹⁷

On June 6, 2008 the company filed an application with the North Carolina Utilities Commission asking for approval to implement this solar distributed generation program. Distributed generation is energy created close to where it is used, rather than being produced in large power plants and transported to customers over power lines. “We believe an initiative of this scope and scale will help us meet the requirement of North Carolina’s new Renewable and Energy Efficiency Portfolio Standard (REPS),” said Keith Trent, group executive and chief strategy, policy and regulatory officer. “This program also will enable us to evaluate the role of distributed generation on our system, and gain experience in owning and operating renewable energy resources.”

If the program is approved by regulators, Duke Energy Carolinas would spend two years installing approximately 20 megawatts of distributed solar generation on rooftops of customer businesses and homes or on ground sites within the company’s North Carolina service area. Duke Energy Carolinas customers could benefit from more than 16 megawatts of power, enough energy to serve more than 2,600 homes.

“The company plans to recover its \$100 million investment through North Carolina’s new REPS cost recovery mechanism. The company estimates that, over its life, the program will increase the average customer’s bill by no more than 25 cents a month. The average customer uses about 1000 kilowatt-hours of electricity each month.

“As a corporation, Duke Energy is also pursuing other alternative energy projects. In April 2008, a wind farm in Indiana began supplying 100 megawatts of power to Duke Energy Indiana customers. In addition, Duke Energy Generation Services has more than 3,000 megawatts of wind projects under development in eight different states.¹⁸

Sustainable Energy – Physical Infrastructure

Table 4 notes examples of the physical infrastructure in our region that supply or utilize clean/renewable and alternative energy sources. The list of examples continues to grow. Examples range from: biodiesel distribution and production, publicly accessible and private sector compressed natural gas (CNG) fueling stations, landfill gas development, hydropower - as well as leading implementation of environmental control systems on coal fired power plants such as Progress Energy’s Asheville site. Many of these examples represent a “first in North Carolina,” demonstrating the region’s commitment to innovation.

Federal alternative fuel requirements for public organizations, NC legislative requirements for energy efficiency and fuel conservation, and the state Renewable and Energy Efficiency Portfolio Standard (REPS), are all affecting the planning efforts of these companies as they prepare to meet the current and future demand for electricity and fuel across the state.

Table 4: Physical Infrastructure Examples Supporting clean energy businesses	
Organization	Example
Blue Ridge Biofuels	NC’s First Retail Bio-diesel Pumps
Enerdyne Power Systems	First NC Green Power Investment from Buncombe Landfill Gas
City of Asheville	Publicly Accessible CNG pumps
Progress Energy – Asheville Plant	NC’s First “Clean Smokestacks Act” Scrubber installed
Appalachian Energy	Hydropower Management - Marshall
EnergyXchange	Landfill Gas Craft & Green Houses - Burnsville
Henderson County Landfill	Landfill Gas supplying industry
Jackson County Landfill	Green Energy Park

Progress Energy – WNC Region

Recognizing that electricity peak demand in WNC will present a challenge to its ability to meet that demand, Progress Energy is taking aggressive action to meet future demand by employing a number of demand side management approaches (DSM). Progress proposes two programs which are components of the company’s “...strategy to double its energy efficiency portfolio to 2,000 megawatts (MW) and delay the need to build power plants.”¹⁹

A number of DSM program have been filed for approval with the NC Public Utility Commission, New DSM programs include 1) a New Construction and Retrofit incentive program for energy efficiency and load shifting programs for Commercial/Industrial and Governmental customers, 2) an “Energy Wise Program” for volunteer residential clients to remotely adjust strip heating, electric hot water, and A/C Units during peak energy demands, 3) Residential Home Advantage, to incentivize Energy Star standard or higher in new residential construction projects, and 4) a Distribution System Demand Response program which employs ‘smart grid’ technology to control demand. The Distribution Demand Response program represents an investment of about \$260 million over five years. In a letter to their customers on May 30, 2008, Progress Energy Carolinas (PEC) indicated that the company “is committed to a long-term, balanced solution to meeting our growing energy needs – a solution that includes three main components: (1) increased energy efficiency, (2) renewable energy resources, and (3) upgrading of existing power plants and investments in new plants when needed.”

Sustainable Energy – Business Development Support

Business Development Support can come in many forms. It is not just assistance in identifying and securing new clients, but it is also the development of the company so that it is capable of serving its existing clients while it expands its operations. Western North Carolina has several organizations that provide assistance to existing companies and to those considering establishing operations in the region. In addition to the region’s strong economic development community that includes AdvantageWest, county governments, chambers of commerce and the state’s Department of Commerce staff, examples of business support organizations that have a specific connection to energy-related enterprises are shown in Table 5. The region’s strong connection

The WNC Technology Commercialization Center (TCC) at Asheville-Buncombe Technical Community College (A-B Tech)

The TCC (www.abtech.edu/sbc/tcc) is an example of a program that provides not only business development support, but also is a major element of workforce development support. “Established in 2006 on A-B Tech’s Enka campus as a partnership between A-B Tech and Technology 2020, TCC has been made possible, in part, by a grant of \$200,000 from Buncombe County that the Asheville Hub helped to secure. AdvantageWest has also contributed operational funds. In terms of development, during the past 15 months, TCC has assisted more than 50 companies toward sustainability — retaining or creating 89 jobs in the process. TCC is located within A-B Tech’s Small Business Incubator, which provides an environment to help all types of companies grow. “Technology 2020 (www.tech2020.org) is connected with the Oak Ridge National Laboratory (ORNL) and demonstrates ORNL’s commitment to support economic development in a region that extends from western North Carolina to eastern Kentucky.

Waste Reduction Partners (WRP) at LOSRC

Since 2000, the WRP team of retired professionals has helped western North Carolina manufacturers, businesses, and public institutions save more than \$20.5 million in utility costs. This unique team of volunteer engineers and scientists has provided over 98,000 hours of “pro bono” technical expertise in the western and southern piedmont regions of North Carolina. WRP has helped 710 organizations achieve efficiency improvements and waste reduction strategies which cut energy use by 64,000 megawatt hours of electricity, conserved 220,000 million gallons of water, and diverted 150,500 tons of waste from landfills. The WRP program proudly serves the 37 western-most counties and is expanding its service coverage to statewide in 2008.

Table 5: Business Development/Education, Research, and Extension
 Supporting energy business sectors

Organization	Example
AB-Tech / Oak Ridge National Lab Partnership	WNC Center for Technology Commercialization
UNCA	NEMAC – Environmental Data
NOAA	National Climatic Data Center
USFS	Southern Research Station
NCSU	Minerals Research Lab (Asheville)
Haywood Hi-Tech Center	Business Training Center
ASU	Energy Center and Wind Center
State Energy Office	WNC Office
WNC Green Building Council / Asheville Homebuilders	NC HealthyBuilt Homes
Land-of-Sky Regional Council (LOSRC)	Waste Reduction Partners
NCSU	Mountain Horticultural/ Crops Research Extension Center
NC Solar Center	Nationally Recognized Sustainable Energy Resource
WCU	Center for Applied Engineering Technology
Sustainable Now	Sustainable Business Directory & Marketing

Sustainable Energy – Workforce Development

Business development is dependent upon workforce development to enable growth and expansion of operations in the sustainable energy industry. Community colleges, state universities and private colleges play an important role in developing a workforce with experience and skills to support the sustainable energy industry.

ASU Energy Center

Since its establishment in 2001, The Energy Center at ASU has become a regional asset for workforce development and for providing public awareness and education. The Energy Center has led the development of the State Energy Plan, and publishes “North Carolina’s Economic Developer’s Guide to renewable Energy Industries.” (<http://www.energy.appstate.edu/>)

The Center, working through faculty, staff and students, has programs in the areas of energy efficiency, renewable energy technology, biofuels, policy analysis, forecasting, and economic development. ASU has long been a home for renewable energy, sustainable development and an environmentally aware campus community. ASU is home to one of the nation’s first degree programs in renewable energy technology, and remains one of a handful of schools in the world that offers a Masters-level degree in renewable energy technology.

Table 6: Workforce Development
Supporting energy business sectors

Organization	Example
Appalachian State Univeresity (ASU)	Building Science Programs - Renewables
AB-Tech	- Alternative Fuel Training - Building Operator Cert for Energy Savings - Green Building Tech - Small Business Incubator
Warren Wilson College	Environmental Leadership Center
Blue Ridge Community College and AB-Tech	Strong Mfg Skill Training Programs
UNC-A	Environmental Studies
WCU	Engineering Programs
Haywood High Tech Center	Business Training Center

AB-Tech Small Business Incubator

Recognizing A-B Tech’s role in education for “green energy,” U.S. Rep. Heath Shuler announced “a \$354,240 appropriation... to create a Western North Carolina Clean Energy Business Incubator at A-B Tech’s Enka Campus.” A-B Tech’s existing Small Business Incubator, produced 50 jobs and \$4 million in revenue in 2007.²⁰

AB-Tech Continuing Education

A new course was recently offered by A-B Tech called the “Building Operator Certification Program,” sponsored by the NC State Energy Office, The course’s 8-day classes over several months provide training for building maintenance staff and technicians about energy efficiency building operations from lighting to indoor air quality. This course was the first of its kind in the Southeast, offering front-line staff a training program which holistically addresses energy efficiency in the context of all facilities and building management responsibilities.

Sustainable Energy – Social Infrastructure

Environmental awareness may be higher in western North Carolina than anywhere in the state. An extensive network of non-profits, trade associations, and institutions outreach to the community on a number of environmental sustainability issues related to energy. These organizations (Table 7) help generate public awareness and market demand for green products, homes, developments, and community design and operation standards.

WNC Green Building Council (WNCGBC)

The WNCGBC is a non-profit organization whose mission is to promote environmentally sustainable and health conscious building practices through community education. In collaboration with *Mountain Xpress*, the WNCGBC publishes the WNC Green Building Directory²¹, which includes firms targeting renewable energy. The WNCGBC hosts several green building educational forums and training events each year and also administers the NC HealthyBuilt Home certification program for the region, with 152 homes certified in the region, and 722 NC HealthyBuilt homes in progress.

American Green TV

Americangreen.tv is an Asheville-based progressive filmmaking and media advertising agency which focuses on communicating the client’s “green” messages to the world. Recently commissioned by AdvantageWest, Americangreen.tv developed a video titled, “Advantage Green” which highlights regional assets that have led to green enterprise business development in western North Carolina. By showing how Sundance Power Systems, Deltec Homes, Livingstone Construction, and FLS Energy, as well as the North Carolina communities of Black Mountain, Hendersonville, and Asheville are leading the way in adopting clean energy concepts, other existing businesses and companies considering establishing operations in the region will be encouraged to adopt these concepts.²²

Table 7: Social Infrastructure Examples Supporting energy business sectors	
Organization	Example
Clean Air Community Trust	Youth Leadership in Energy Efficiency Project
WNC Green Building Council	NC’s Strongest regional Green Building Council
Environmental and Conservation Organization	Organizers of Clean Air Car Fair and many other sustainability efforts
Clean Cities of Greater Asheville	Network of stakeholder growing the use of alt fuels
WNC Alliance	www.wnca.org
Warren Wilson College	Environmental Leadership Center
Regional Clean Air Campaign – LOSRC	Promoting aware of clean air and visibility issues, ozone forecasting
Pisgah Forest Institute	www.pisgahforestinstitute.org
American Green TV	www.americangreen.tv
Earthaven	www.earthaven.org
Southern Alliance for Clean Energy	www.cleanenergy.org
Longbranch Environmental Center	www.longbrancheec.org
NC Solar Center	One of the nation’s best solar technologies outreach, research and education centers
NC Sustainable Energy Associations	www.ncsustainableenergy.org
Sustainability Alliance of the Mountains (SAM)	www.sustainability-mountains.org
Sustainable Energy Council of Western North Carolina	www.sec-wnc.org
Southern Energy & Environment (SEE) Expo	WNC large clean energy and environmental expo
Sustainable Now	Sustainable business directory
Community Energy Advisory Council	Communication forum

Next Page

Sustainable Now

Ian Booth is the founder of the non-profit [Sustainable Now](#), which has compiled a list of registered Green Businesses with links to the companies located in 23 WNC counties. Ian is also the producer and host of the Green Radio Bistro. The show features co-hosts [Ned Doyle](#), founder of the Southern Energy and Environment Expo (SEE Expo), and UNCA professor Dr. Dee Eggers' interviewing regional innovators from the business, government, non-profit and grassroots communities about all facets of sustainable living including clean energy, alternative transportation, green building and much more. The Sustainable Now web site suggests that "The overarching objective of Ian's work is to ensure a sustainable future in the mountain region by establishing western North Carolina as the "Sustainability Capital."²³

Community Energy Advisory Council

Progress Energy created an advisory organization, the Community Energy Advisory Council (CEAC), to be a "...a forum for open and active communication between Progress Energy Carolinas (PEC) and community leaders, customers and other key stakeholders in Progress Energy's Western North Carolina service territory. The CEAC has been created to facilitate two-way communication, understanding, and advice on the development of long-term strategies to meet the growing energy demands of the region and to promote community understanding of, and support for, a balanced approach to meeting those demands. PEC is promoting action by organizations within the region for demand side management and renewable energy generation through CEAC."²⁴

Sustainable Energy – Leadership / Early Adopters

Early adopters (Table 8) are essential for the commercialization of new products. Fortunately, there are many that see the benefits of a new product and, for various reasons, determine that it is important that they risk adoption of the new technology while others await the availability of the product or service after it has been proven. For those that purchased High Definition DVD players that used a format other than Blu-ray Disc™, the risk of adopting early is clear. In the case of those adopting clean and sustainable energy products, some see their leadership as a part of their corporate mission. Deltec Homes, highlighted previously, installed their Solar PV system even though the payback period was about nine years, taking into account the state and federal tax credits. This investment was aligned with their image of being an eco-friendly home manufacturer. Local and county government agencies often see the necessity of leading with the early adoption of sustainable efficiency as a means to securing long-term acceptance by companies in the region.

North Carolina Arboretum

The NC Arboretum was the state's first High Performance Building completed, with many renewable features including solar-thermal hot water and a green roof. The energy utility bills were \$286 per month for the first six months (\$0.26 per square foot for this 10,400 square foot building).

City of Asheville

In 2005, Asheville City Council exhibited leadership as an early adopter with its endorsement of the US Mayor's Climate Protection Agreement. The City of Asheville installed WNC's first publicly accessible Compressed Natural Gas (CNG) fueling station. Asheville "Green Vehicles Campaign" resulted in the purchase of hybrid vehicles, the expansion of its alternative fuel vehicle program including the use of biodiesel and ethanol, new alternative fuel vehicles, including a CNG-powered refuse truck, and more purchases of electric GEM vehicles. In 2006 the City created the Sustainability Advisory Committee on Energy and the Environment (SACEE) which led to the City's commitment to construct new facilities to LEED standards, energy use reduction goals, and the hiring of a City Sustainable Energy Coordinator. The SACEE will focus on the City of Asheville, as an organization, being a model for the community regarding energy reduction and clean air initiatives.²⁵

Table 8: Leadership/Early Adopters Examples End-users employing green energy technologies	
Organization	Example
NC Arboretum	First State High Performance Building
Mountain Housing Opportunities	First NC HealthyBuilt Affordable Housing Development
MSD of Buncombe Co.	Biodiesel Fleets / ISO14001 registration
Buncombe County	Biodiesel Fleets Energy Efficiency Bio-reactor Landfill
Hart Distributing	CNG Fleets (commercial)
Town of Black Mountain	Energy Efficiency Policy and Incentives
Henderson County	Energy Policy Initiative
NC HealthyBuilt Homes	First Community Based program in NC. 152 home certified
City of Asheville	Major's Climate & LEED Commitment, electric / CNG fleet
Buncombe & Other County Schools	Diesel bus emission systems retrofits
Milliken	ISO 14001 Certified Manufacturer
Eaton Cutler-Hammer	ISO 14001 Certified Manufacturer
Borg Warner	ISO 14001 Certified Manufacturer
Volvo	ISO 14001 Certified Manufacturer
Warren Wilson College	Eco Dorm, LEED Buildings, Sustainability Initiatives

Efforts to Support the Clean Energy Sector in WNC

Land-of-Sky Regional Council (LOSRC) believes that clean and sustainable energy opportunities “creates more jobs, represents a continuing source of jobs with sustainable, long-term growth potential, and is more resilient and secure” than in other sectors. “The people of our region hold a set of values that make this an ideal place for recruitment and entrepreneurial development based upon sustainable energy. The number and range of businesses in energy-related manufacturing and services, plus the public policy leadership, number of early adopters of new technology and other factors all point to these values,” states LOSRC Executive Director Joe McKinney.

LOSRC has initiated a \$400,000 two-year planning and business development project, supported by an Economic Innovation Grant from the North Carolina Rural Economic Development Center. This project proposes to use business development as a vehicle to implement a clean energy future for our region. Goals of the project include:

1. Pursue economic development approaches that support small and mid-sized energy businesses that are more likely to invest in -- and be invested in -- our community;
2. Use a balanced approach to recruiting energy businesses by supporting regional entrepreneurs and selectively inviting outside companies to join growing clusters of energy-related companies within the region;
3. Move toward using more regional energy resources in the future, principally energy efficiency and renewables like wind, solar, low impact hydro, and woody biomass;
4. Assemble an integrated infrastructure that supports clean energy and alternative fuels businesses of all types -- design, fabrication, installation, retrofit, and maintenance – with support services such as workforce development, business incubation, capital access and public education;
5. Establish an economic development and recruiting policy focused upon local energy resources, local companies, entrepreneurship, diverse sources of energy production, and engaging the public in providing a market for regional energy-oriented entrepreneurs;
6. Articulate a value system based on sustainability and resilience in our regional economy as a basis for building public support, regional entrepreneurship and place-based recruitment.

Rather than an energy plan, LOSRC staff has designed a dynamic framework for energy planning and implementation. In the overall planning part of the framework, the design covers all the bases in terms of identifying, involving, and getting ownership of all the energy interests in the region. Such a framework provides a vehicle with which we can evaluate emerging opportunities and challenges as they arise. With a stakeholder network established, the group can move quickly and nimbly to develop shorter term action plans and seek funding for special projects.

Regional Organizations Promoting Energy Economic Development

Through the efforts of the Asheville Hub Alliance, AdvantageWest and Land-of-Sky Regional Council, cooperation and coordination will create jobs with sustainable long-term growth potential.

Advantage West

“AdvantageWest Economic Development Group is western North Carolina's regional economic development commission. [AdvantageWest's Vision Plan](#) is focused on growing the Western North Carolina economy around ten clusters of innovation for which strong university and commercial capabilities and assets are already in place in the region. Clusters are concentrations of companies or industries which are connected by the markets they serve, the products they make, suppliers, trade associations, educational institutions and more.²⁶ In 2007 and 2008 the Environment-related Cluster of Innovation, including, Green Building and Alternative/renewable energy, was the organization's focus. AdvantageWest made energy the focus of their annual recruitment event in the fall of 2007, showing their belief in the potential for job creation and regional prosperity related to energy products and services.

Asheville Hub Alliance

“The Asheville Hub (www.ashevillehub.org) is a community leadership organization that serves as a catalyst to spur collaboration and the incubation of community, cultural, and economic development strategies that will leverage Asheville's and Buncombe County's strengths in sustainability, technology, creativity, rejuvenation, land/agriculture, manufacturing and enterprise.” Steve Cochran of Sustainability Strategies LLC and several other Asheville Hub Alliance board members have been working to include clean energy as one of their focus clusters. The Hub announced the formation of the Sustainability Cluster “...that will focus on developing Buncombe County's green economy and making the Asheville area a model city for environmental sustainability. The Asheville Hub is encouraging all area organizations with sustainability-oriented missions to become part of the cluster so they can accomplish even more through collaboration.” The HUB has formed a special task force that is charged with the responsibility of broadening the base of involvement of existing organizations in the sustainability domain. “The Sustainability Cluster is the first cluster not to have been part of the Asheville Hub's original vision.”

“Sustainability and greening are central to the New Economy,” said David G. Brown, Executive Director of the Asheville Hub. “Ashevillians have the will and the skill to pull off a ‘two-fer’ – we can help the planet and add quality jobs. The strength of this Cluster will come, in part, from the Asheville region's demonstrated ability to engage in robust community dialogue that integrates sound thinking with values and actions. We must combine long-term productivity with attention to the richness, diversity and limits of nature in Western North Carolina.”

http://www.ashevillehub.com/images/stories/sustainability_cluster_approved_-_news_release.doc

Conclusions

Based upon the preliminary surveys of the LOSRC ad hoc energy team's analysis of the sustainable energy business clusters, several findings can be made:

- The WNC region has very supportive business development infrastructure for sustainable energy and fuels enterprises;
- The WNC region has been first in the state in a number of private and public sustainable energy developments in biodiesel production, Green Power investment, NC HealthyBuilt Homes programs, Clean Smokestack Act emission controls, alternative fuels businesses, and many others;
- While there are relatively few renewable energy products manufacturers, the WNC region does have key supply chain component manufacturers across the electrical, machinery, metal fabrications/forming, plastic products, and mineral sectors;
- The WNC region already has a strong network of renewable energy designers, distributors, installers and service providers.

The presence of this business service sector is highly desirable for growing business clusters and recruiting other sustainable energy product manufacturers to the WNC region. The proximity to end-users is a key ingredient to any sustainable energy recruitment efforts as it provides a closed feedback loop for new product development.

One clear next step of the business inventory project would be to perform a more detailed supply chain analysis for top renewable energy technologies, including wind turbines, geothermal heating systems, biomass energy production, solar thermal photovoltaic systems and potentially others. Studies exist which document the clean energy supply chain manufacturers at various levels of detail by industrial classification codes (NAICS). Example studies can be found on the 'Renewable Energy Potential' for the states of Pennsylvania, Wisconsin and Ohio produced by the Apollo Alliance (http://www.apolloalliance.org/downloads/REPP_PA.pdf). The presences of clean energy-related component and sub-component manufacturers in our regions could attract other clean energy sector business to fill gaps or even attract system integrators for the various end products and sub-assembly levels. Other job creations and economic investment potential also could be addressed in this future study.

With the vibrancy of fine [universities and community and private colleges](#) and many regional assets, Western North Carolina's healthy growth rate will continue, particularly in the area's clean energy innovation cluster.

AdvantageWest describes the recognition of the region as an excellent location for developing new businesses: "Asheville and other cities in the region have garnered recognition as best places for entrepreneurship and innovation (from the Small Business Administration), hot places for manufacturing expansions and relocations (*Expansion Management* magazine), best high-tech output growth (*Forbes* and Milken Institute), best places for business and careers (*Forbes*), and to best places to live and work (from sources too numerous to mention).²⁷

Research and Development Grant Final Report
Appendix H
Recruitment & Business Development Track

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- ² The NAM Labor Day Report, National Association of Manufacture, September 2006, <http://www.nam.org/>
- ³ Green Business Venture Forum, State Energy Office, NC Department of Administration, June 2007
- ⁴ *ENERGIZING APPALACHIA: A Regional Blueprint for Economic and Energy Development*, October 2006, Appalachian Regional Commission (ARC)
- ⁵ State Energy Plan, 2005 Revision, State Energy Office, NC Dept of Administration
- ⁶ *North Carolina Economic Developer's Guide to the Renewable Energy Industries, Volume 2, winter 2008, Appalachian State University Energy Center.*
- ⁷ 2007 Membership Survey, Asheville Area Chamber of Commerce, <http://www.ashevillechamber.org/>
- ⁸ Five-Year Vision Plan for the Economy of the Advantage West Region: 2004-2009 Advantage West, <http://www.advantagewest.com/>
- ⁹ *North Carolina Economic Developer's Guide to the Renewable Energy Industries, Volume 2, winter 2008, Appalachian State University Energy Center*
- ¹⁰ Ibid.
- ¹¹ Joel Makeover, Clean Energy Trends 2007, March 2007, Clean Edge.
- ¹² Revised Air Permit Approved for Duke Power Plant, NCDENR Press release, January 29, 2008, http://www.ncair.org/news/pr/2008/cliffside_01292008.shtml
- ¹³ Advance Manufacturing is Part of Buncombe County's New Economy, Asheville Hub, June 2008, http://www.ashevillechamber.org/economicdevelopment/PDFs/advanced_manufacturing_cluster_fact_sheet.pdf
- ¹⁴ <http://www.porvairadvancedmaterials.com/bipolar.htm>
- ¹⁵ *Mountain Express article*, Vol. 14 / Iss. 21 on 12/19/2007
- ¹⁶ Deltec Homes, Green Building, newsletter, <http://www.deltechomes.com/ecofriendly.php>
- ¹⁷ Press Release June 9, 2008, Duke Energy, <http://www.duke-energy.com/news/releases/2008060901.asp>
- ¹⁸ <http://www.duke-energy.com/news/releases/2008060901.asp>
- ¹⁹ Progress Energy Press Release, April 29, 2008, <http://www.progress-energy.com/aboutus/news/article.asp?id=18462>)
- ²⁰ http://www.abtech.edu/cr/techtalk/ttarchives/2008tt05/readarticle.asp?articles/01_clean_energy_incubator.htm
- ²¹ 2008 WNC Green Building Directory; <http://www.wncgreenbuilding.com/>
- ²² Advantage Green video, Americangreen.tv. 2007, www.americangreen.tv/
- ²³ Sustainable Now, Ian Booth, <http://www.sustainablenow.us/ais/>
- ²⁴ <http://www.progress-energy.com/aboutenergy/wnc.asp>
- ²⁵ CACEE, City of Asheville, http://www.ashevilenc.gov/government/mayor_city_council/city_council/default.aspx?id=4576
- ²⁶ Advantage West http://www.advantagewest.com/content.cfm/content_id/221/section/regional
- ²⁷ Ibid.