Alternatives Evaluation and Site Selection Study for the Proposed Hertford Renewable Energy, LLC Biomass Power Plant, Hertford County, North Carolina

Representative Photo: Decker Energy International, Inc.'s Craven County Wood Energy – North Carolina

Decker Energy International, Inc.
Winter Park, Florida

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Executive Summary

Hertford Renewable Energy, LLC ("HRE"), a wholly owned subsidiary of Decker Energy International, Inc. ("DEI"), is an independent power producer, that develops, acquires, and owns energy generating facilities that meet the energy needs of utility and industrial customers by providing reliable, low-cost power with sensitivity to the environment. Decker Energy International, Inc. is a privately held Florida corporation, headquartered in Winter Park, Florida that has developed fourteen diverse energy projects totaling nearly 1,000 MW and $700 million in total investment, including six renewable energy biomass facilities. In response to the North Carolina's Renewable Portfolio Standard which was put in place by North Carolina Session Law 2007-397 ("NC 397"), HRE is proposing to construct and operate one 50 MW biomass power plant expected to be in service in 2011.

HRE, has requested assistance from the Rural Utilities Service, an agency which administers the U.S. Department of Agriculture's Rural Development Utilities Programs (USDA Rural Development), to finance the construction of one 50 MW biomass power plant with associated offsite water and wastewater lines located in Hertford County, North Carolina. This document supports the preparation of a future Environmental Assessment pursuant to 7 CFR Part 1794, Subpart F (new electric generating facilities of less than 50 MW, nameplate rating).
The North Carolina Session Law 2007-397, regional studies, utility requests for proposals, and HRE/DEI data were used to develop and evaluate alternatives for developing new renewable power generation (see Appendices 1-10 for reference material). Additionally, information provided by the North Carolina Department of Commerce ("NCDC") was used to develop evaluation criteria for site alternatives and identification of the preferred site for the proposed 50 MW biomass plant.

Section 1 introduces HRE and the proposed action.
Section 2 provides an overview of HRE/DEI's history, and type of customers.
Section 3 addresses the purpose and need for the 50 MW biofuel plant.
Section 4 provides an overview of existing and potential capacity alternatives. Since energy conservation, load management programs, nuclear, and fossil fuel do not meet the requirements of of the Renewable Portfolio Standard they are eliminated from further consideration. Solar and geothermal power sources are not considered feasible for North Carolina and/or the technology is not sufficiently developed. Hydro power is not a feasible alternative due to the lack of elevation change in the study area. Fuel cells have not been proven to be commercially viable due to inherent technology risk and a lack of operating history. Wind turbines were not selected as the preferred alternative due to the intermittent nature of the technology and the local opposition to siting the turbines. Based on the analysis of capacity alternatives, HRE has selected the proposed 50 MW biomass power plant capable of combusting forest industry products (including

mill stream wastes such as chips and fines, and chips produced during forest harvesting) as the preferred source for new renewable generation.

Section 5 provides an overview of the site selection criteria for the proposed biomass plant within North Carolina (per Renewable Portfolio Standard requirements).

A phased approach was utilized in site selection beginning with the identification of potential siting areas, followed by the identification of possible sites and finally detailed evaluation of those sites. HRE considered 8 potential sites, selected 3 possible sites and identified a preferred site (Hertford, Hertford County) and one alternate site (Alexander, Alexander County). Additionally, the preferred site was previously selected for development of a 300MW Combined Cycle Gas Turbine power plant, the property was rezoned accordingly, however, the plant was not built.

Section 6 describes the proposed and alternative sites for the 50MW biomass plant.

Section 7 details the proposed action and facility details of the 50 MW biomass plant including the proposed site layout. Initial regulatory permitting of the project is underway. Pending the outcome of the permitting process, construction is expected to begin in June 2009. Project construction would require approximately two years to complete and commercial operation is proposed for late 2011.

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Tables and Figures

Preparer

Timothy P. Berrigan, Vice President, Decker Energy International, Inc. prepared this report. Figures, Tables, Exhibits, and Appendixes were prepared by the various parties sited in the body of the report.

The proposed project (Proposal) consists of the construction of one 50 MW biomass-fired power plant utilizing a vibrating grate stoker type boiler on approximately 93-acres on Joe Holloman Road east of the town of Millennium, in northeastern North Carolina. The proposed unit would be fueled by biomass debris from the local forest products industry (generally within a 50-mile radius of the proposed site). The proposed plant is needed to meet the requirements of North Carolina's Renewable Portfolio Standard which was put in place by North Carolina Session Law 2007-397 ("NC 397"). In keeping with NC 397, the Proposal is planned for commercial operation in 2011. The Proposal also includes the construction of on-site transmission facilities (13/115 kV step up transformer, 115 kV circuit breakers, and telemetry) and water supply/waste water discharge systems. The proposed new transmission facilities are needed to provide an outlet for the electric power that would be generated at the proposed site to an adjacent 115-kV Transmission line operated by North Carolina Power Company (a subsidiary of Dominion Corporation). The transmission structures would be supported by vertical H-frame steel pole structures that would range in height from 90 to 130 feet aboveground. The construction of the Proposal is tentatively scheduled to begin in the summer of 2009 with an estimated construction duration of 2 years allowing for a 2011 commercial operation date.
DEI has developed, owned, and operated biomass power plants during its twenty five year history. HRE is a project designed to respond to North Carolina's Renewable Portfolio Standard which was put in place by North Carolina Session Law 2007-397 ("NC 397").

Beginning in April 2007, various North Carolina utilities initiated Request for Proposal processes as a means of complying with NC 397 (among these utilities was an RUS beneficiary). DEI responded to these RFP's by evaluating renewable technologies and potential sites within North Carolina. The proposed project, HRE was identified through a site selection process that took place during the summer of 2007 The primary criteria used in site selection include, proximity to productive forest industries, appropriate land use and zoning, proximity to skilled forest products industry labor force, proximity to transmission lines. After evaluation, the Proposal exhibits the following advantages over the other technologies and sites evaluated: centrally located to one of the most productive forests in the world: "The South, particularly the coastal plain and the piedmont, contains the most intensively managed forests in the world. This one region of the United States produces more wood products that any other single nation. Timber harvesting, tree planting, and other forest investments have increased and forest inventories have expanded as harvesting and processing technologies have changed in ways that favor southern timber." Published by the U.S. Forest Service; Asheville, NC; 10/02.) , appropriate land use and zoning as the site had previously been permitted for a power plant which was not built , northeastern North Carolina has a skilled labor force with years of forest products industry training, and the site is bisected

by North Carolina Power Company's power lines which provide access to the PJM Interconnection and its corresponding wholesale power market.
HRE is in negotiations with two utilities for the purchase of the power produced by the Proposal. HRE anticipates the execution of a power purchase agreement with one of these utilities during the second quarter of 2008.

As a renewable energy power facility the Proposal would help North Carolina diversify its fuel supply, increase its energy independence, and enhance bulk power reliability in the region. The Proposal would utilize local fuel sources and thereby provide an economic stimulus for the local economy.

Section 1: Introduction

1.1 General

As an independent power business, DEI develops, acquires, and owns energy generating facilities that meet the energy needs of utility and industrial customers by providing reliable, low-cost power with sensitivity to the environment. Decker Energy International, Inc. is a privately held Florida corporation, headquartered in Winter Park, Florida.

This document is prepared in response to North Carolina's Renewable Portfolio Standard which was put in place by North Carolina Session Law 2007-397 ("NC 397") to require the development of renewable energy production. Beginning in April 2007, various North Carolina utilities initiated Request for Proposal processes as a means of complying with NC 397 (among these utilities was an RUS beneficiary). DEI responded to these RFP's by evaluating renewable technologies and potential sites within North Carolina and is subsequently proposing the construction and operation of two new 278 MW generating units each consisting of one one 50 MW biomass-fired power plant on approximately 93-acres on Joe Holloman Road east of the town of Millennium, in northeastern North Carolina. The proposed unit would be fueled by biomass debris from the local forest products industry (generally within a 50-mile radius of the proposed site). The Proposal also includes the construction of on-site transmission facilities (13/115 kV step up transformer, 115 kV circuit breakers, and metering) and water supply/waste water discharge systems. The proposed new transmission facilities are needed to provide an outlet for the electric power that would be generated at the proposed site to an adjacent 115-kV Transmission line operated by North Carolina Power Company (a subsidiary of Dominion Corporation). The transmission structures would be supported by vertical H-frame steel pole structures that would range in height from 90 to 130 feet aboveground. The construction of the Proposal is tentatively scheduled to begin in the summer of 2009 with an estimated construction duration of 2 years allowing for a 2011 commercial operation date.

The Proposal intends to utilize grey water from the Town of Ahoskie at a maximum rate of one million gallons per day for approximately three hundred and forty four days per year. The proposed biomass plant would be located on the site of the originally proposed 300MW Combined Cycle Gas Turbine plant. At this time, interconnection of the proposed plant to North Carolina Power Company is not anticipated to require new off-site transmission lines, however, transmission studies are currently being prepared and any facilities required would need to be considered in accordant with RUS Environmental Policies and Procedures (7 CFR 1794).

This document was prepared in support of HRE's request to RUS for financial assistance for the proposed biomass plant pursuant to 7 CFR Part 1794, Subpart F (new electric generating facilities of less than 50 MW, nameplate rating).

Section 2: Profile of Applicant

2.1 History

Founded in 1982, Decker Energy International (DEI) has developed or acquired fourteen diverse energy projects totaling nearly 1,000 MW and $700 million in total investment, including six renewable energy biomass facilities. With a current total installed wood fired capacity of 88 MW, prior involvement with other biomass projects in excess of 200 MW more, and a current development of a nominal 40 MW project, DEI is one of the most experienced generators of energy from wood residue in North America. As an independent power business, DEI develops, acquires, and owns energy generating facilities that meet the energy needs of utility and industrial customers by providing reliable, low-cost power with sensitivity to the environment.

2.2 Projects

Craven County Wood Energy, LP

CCWE is located in New Bern, North Carolina. CCWE is a virtual twin to HRE as conceived. CCWE uses a traveling grate stoker to combust biomass. The steam from this boiler is used to turn an approximately 48MW (net to grid) steam turbine/generator set. With a nominal net output of approximately 48MW, CCWE is the largest biomass power plant in the southeastern United States. The plant has been in service since 1991 and over its history has had availability in excess of 95%. The plant currently sells its output to a power marketer in the PJM Interconnection.

Grayling Generating Station

Grayling Generating Station is located in Grayling, Michigan. The plant has a 37 MW capacity that is sold to Consumers Energy. The station began commercial operation in 1992 and is fueled by a combination of waste wood and tire-derived fuel. Grayling has received both the Clean Corporate Citizen award from the Michigan Department of Environmental Quality and the Powerplant Award from Power Magazine.

Plainfield Renewable Energy

"PRE" is a 37.5 MW advanced technology biomass project located in Plainfield, Connecticut, which is scheduled to begin construction in 2008. The project qualifies as a Connecticut Class I renewable resource, an extremely stringent designation to receive. PRE will be fired with urban wood waste and is scheduled to begin commercial operation in 2010.

Divested Projects

DEI developed or participated in many other power projects during its history which it has since divested of. The other biomass projects on DEI's resume include:

- Cadillac Renewable Energy (MI) 38 MW
- Ridge Generating Station (FL) 40 MW
- Ryegate Wood Energy (VT) 20 MW
- Genesee Power Station (MI) 35 MW
- United Cogen Fuels (NC) 25 MW

2.3 Customer Base

Through its history DEI has participated in the wholesale (sales for resale, as opposed to directly to retail load) power market exclusively. DEI's customers have traditionally been utilities with load serving obligations that purchased our power for resale to their ratepayers. DEI currently sells power to Consumers Energy, DTE Energy Trading, Inc., and Constellation Commodities Group. We have had many other utility customers through the years including Florida Progress Corporation, and Progress Energy Carolinas. DEI is in negotiations with many Cooperatives and Investor Owned Utilities for power sales.

Section 3: Purpose and Need for the Proposal

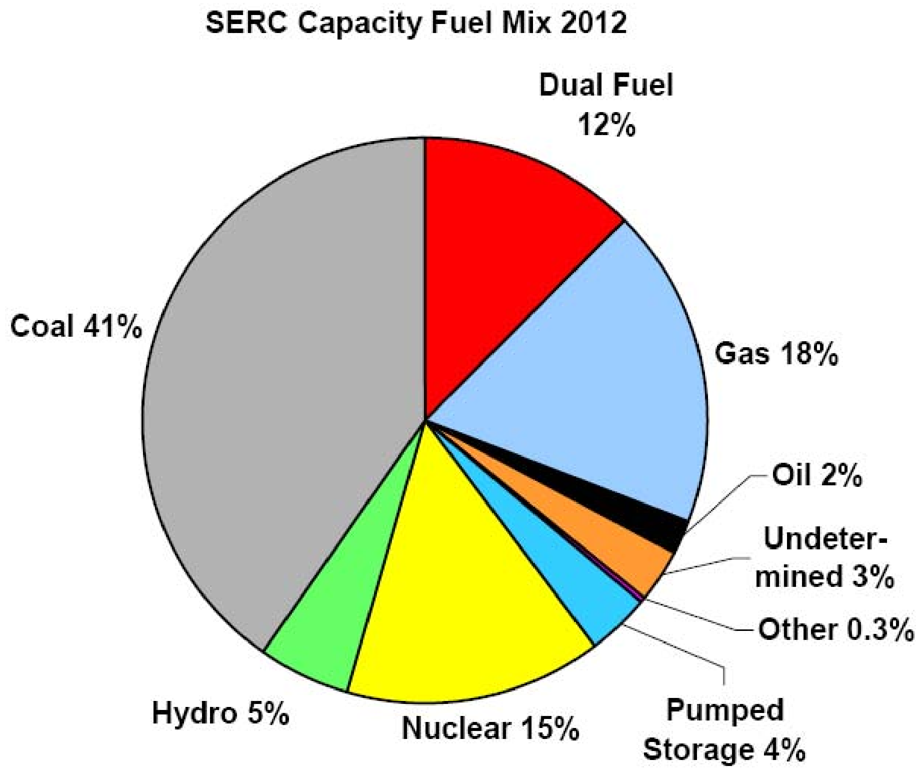
The purpose and need for the Proposal was created by the North Carolina Session Law 2007-397 (Law 397) which requires the implementation of a Renewable Energy and Energy Efficiency Portfolio Standard (REPS). A summary of Law 397 is provided in Section 3.1 and provided in its entirety in Appendix 3. During 2007, utilities in North Carolina issued RFP's requesting thousands of MW's of renewable capacity and millions of MWH's of renewable energy. .

While this purpose and need assessment is specifically focused on renewable resources in response to NC 397, we have also attached as Appendix 2 the National Electric Reliability Council's long term assessment.

While the primary need for the Proposal as well as the scope of the Proposal is due to NC 397, the project will be an important contributor to bulk power reliability in VACAR (VACAR is the sub region responsible for electric reliability in Virginia, North and South Carolina). The capacity margin range (the measure of available generation to total load) of 13.1% to 11.7% over the assessment period (ten years beginning in 2007) is the lowest of the SERC (Southeastern Reliability Council) sub regions and is lower than the 14% to 15% capacity margin typically targeted by reliability planners (thus demonstrating the need for incremental capacity over the assessment period).

In Figure 3-1 below, as reported by NERC on page 194, the capacity fuel mix projected for SERC in 2012 is shown:

Figure 3-1



As shown in this figure, SERC does not include wind, solar, or biomass power generation in the capacity fuel mix for projections for 2012. The Proposal would provide fuel diversification for North Carolina (and thus for VACAR, SERC, and NERC).

3.1 North Carolina Session Law 397 -2007

NC 397 was approved by the North Carolina's congress on August 20th, 2007 and was signed into law later that year (see Appendix 3). In April 2008, the North Carolina Public Service Commission issued the compliance rules (Appendix 4, and Appendix 5) which utilities must follow to comply with NC 397.

Summarizing both the Law and the Compliance Order, electric utilities (any electrical load serving entity) must meet the following Renewable Portfolio Requirements:

- 3% by 2012*
- 6% by 2014*
- 10% by 2017*

* Percentage are of total energy supplied to each utilities load each year.

As a result of NC 397, utilities in North Carolina embarked on procurement processes during 2007 as their first step in complying with the Law.

3.2 Duke Energy Carolina's RFP for Renewable Supply

On April 23rd, 2007 Duke Energy Carolina's ("DEC") released its RFP for Renewable Energy Resources (Appendix 6). As stated in the RFP, DEC sought renewable resources from independent sources to assist it with complying with NC 397. Quoting from that RFP document:

<u>1.0 Purpose of Request for Proposals</u>

Duke Energy Carolinas, LLC (Duke), is seeking Proposals for a supply portfolio of energy and capacity generated from new (placed in service on or after Jan. 1, 2007) renewable or existing NC Green Power sources including:

- Wind
- Solar
- Biomass,
- Hydro – as certified by the Low Impact Hydro Institute
- Incremental Improvements in Large Scale Hydro,
- Landfill Methane
- Biogas Digesters
- Biomass Co-firing of All Woody Waste including mill residue, but excluding painted or treated lumber.
- Hydrogen derived from a renewable energy resource
- Geothermal
- Ocean current or wave energy resource

Duke is seeking up to 2100 MW of capacity by 2012 to meet its generation requirements and energy to meet expected Renewable Portfolio Standard (RPS) obligations from both State or Federal regulations. Duke reserves the right to revise this RFP to align with developing RPS requirements (for example, the proposed NC Renewable Energy and Energy Efficiency Portfolio Standard currently in working committee).

General characteristics applicable to any proposed resources:

- The supply resource can be intermittent in nature; however, firm or dispatchable supply may be assigned a capacity value in the review process.
- Resources must be capable of being delivered to the Duke Carolinas transmission or distribution system and suitable for use as a network resource for Duke, with preference given to (but not limited to) those assets within North Carolina and South Carolina.
- Resources must be operational and delivering power by January 1, 2012.

3.3 Progress Energy Carolina's RFP for Renewable Supply

On November 2nd, 2007 Progress Energy Carolinas released its Request For Proposal for Renewable Energy Resources (please see Appendix 7 for the complete RFP). PEC's press release addresses the purpose and need of the renewable resources being sought:

"Progress Energy Carolinas seeks renewable energy proposals

Company looks to the market for power supply to meet future requirements

RALEIGH – (November 2, 2007)"… –"Progress Energy Carolinas today issued a request for proposals on renewable energy sources that have the potential to be included in the company's portfolio of energy resources used to meet the needs of 1.4 million homes and businesses. The company's Carolinas service area is growing by 25,000 to 30,000 new households and businesses every year."…

“Progress Energy Carolinas is seeking proposals for energy and capacity from renewable resources placed in service Jan. 1, 2007, or later (to ensure compliance with state law). The company expects to purchase up to 1 million megawatt-hours of renewable energy when the initial phase of the state renewable standard takes effect in 2012. Specifically, the company is requesting bids for capacity and energy from solar photovoltaic (PV) or solar thermal projects of greater than 50 kilowatts and from non-solar generators of more than 5 megawatts. The latter category includes such technologies as wind, hydropower, geothermal, ocean current/wave energy, biomass (agricultural waste, spent pulping liquors, energy crops, etc.), landfill methane or hydrogen derived from a renewable resource. Reflecting specific provisions of the state’s energy law, priority will be given to proposals involving solar resources that will be in service by Jan. 1, 2010, and to projects fueled by swine or poultry litter.

3.4 North Carolina Muncipal Power Authority Renewable RFP

On November 20th, 2007 NCMPA released its Request For Proposal for Renewable Energy Resources (please see Appendix 8 for the complete RFP). As stated in its RFP:“NCMPA1 is issuing this Request for Proposals (RFP) for renewable energy resources to serve a portion of its member cities' future load and energy requirements. NCMPA1 is seeking energy from renewable energy resources beginning on or after January 1, 2012 generated from any renewable energy facility that meets the requirements of North Carolina Session Law 2007-397 (“Senate Bill 3”). Solar resource proposals will be accepted with start dates on or after January 1, 2010. Resources that qualify as meeting the requirements include, but are not limited to:

- Solar (Electric or Thermal)
- Landfill Methane
- Hydro less than or equal to 10 MW in size
- Wind
- Biomass
- Renewable Energy Credits (“RECs”)

The North Carolina Utilities Commission (“NCUC”) is in the process of completing the specific rules and procedures to implement Senate Bill 3. It is expected that the rules and procedures developed by the NCUC will impact the evaluation of proposals.

NCMPA1 will favor proposals that use resources physically located within Duke's control area and within the state of North Carolina. Proposals that use resources physically located outside Duke's control area or outside the state of North Carolina will also be considered; however, the number of RECs allowed from out-of-state resources is limited by Senate Bill 3."

3.5 North Carolina Electric Membership Cooperative RFP

NCEMC released its RFP for renewable energy on October 5th, 2007. NCEMC's stated intention in the RFP was to procure "…up to 200MW of renewable energy resources in order to meet the Renewable energy and Energy Efficiency Portfolio Standards as set forth by Senate Bill 3." The entire RFP is provided as Appendix 9, we highlight the purpose and needs of NCEMC's RFP as being:

"North Carolina Electric Membership Corporation (NCEMC) is issuing this Request for Proposals (RFP) for renewable energy resources to serve a portion of its members' future load and energy requirements beginning January 1, 2012. NCEMC desires to build a supply portfolio of energy and capacity generated from new (placed in service on or after Jan. 1, 2007) renewable or existing NC Green Power sources that qualify as meeting the requirements of NC Session Law 2007-397 ("Senate Bill 3") including, but not limited to:

- Solar (Electric or Thermal)
- Wind
- Hydro
- Biomass

This list is not intended to be all encompassing; any other product that is capable of meeting the standards and associated rules as set forth by the North Carolina Utilities Commission ("NCUC"), as well as the requirements of Section 3 of this RFP document will be considered.

NCEMC is seeking up to 200 MW of renewable energy resources in order to meet the Renewable Energy and Energy Efficiency Portfolio Standards (REPS) as set forth by Senate Bill 3. The NCUC has initiated a rulemaking to establish more specific rules and procedures in accordance with Senate Bill 3. Those rules, procedures and criteria will ultimately impact the evaluation of proposals. NCEMC strongly prefers proposals for renewable energy resources that locate the source(s) of capacity within the existing control areas of Progress Energy Carolinas, Inc. (PEC), Duke Energy Corporation (Duke), or Dominion Virginia Power (VEPCO). Bids for resources outside of the state of North Carolina will be considered, however only a limited number of Renewable Energy Certificates (RECs) are allowed from these out-of-state sources in the current legislation. NCEMC is seeking proposals for resources and RECs that provide the greatest value to NCEMC and its members while meeting the eligibility requirements of Senate Bill 3 and the rules promulgated by the NCUC. NCEMC expects that this RFP will be met by a variety of suppliers with varying terms. Independent power producers, qualifying cogeneration facilities, small power production facilities, power marketers, electric utilities or any other entities able to provide all or a portion of the stated needs are encouraged to respond."

Section 4: Capacity Alternatives

4.1 North Carolina Renewable Energy Assessment

During calendar year 2006, an analysis (LaCapra study) of North Carolina's renewable energy capabilities was performed for the North Carolina Utilities Commission by LaCapra Associates (see Attachment 10). Table ES-1: New Renewable Resources Potential and a summary of the findings from the report are provided below. Please note the final bullet below, which states the significance biomass will play in meeting a Renewable Portfolio Standard (RPS) in North Carolina, approximately one-third.

Table ES-1: New Renewable Resources Potential

Resources	Technical Potential (MW)	Practical Potential (MW)	Practical Energy Potential (GWh)*
Landfill Gas	240	150	1,000
Biomass (Wood and Ag. Crops Waste)	2,270	1,100	8,700
*Co-Firing***	*1,875*	*384*	*2,500*
Poultry Litter	175	105	800
Hog Waste	116	93	600
Wind (on-shore)***	9,600	1,500	3,900
Wind (off-shore)	N/A	N/A	N/A
Hydro****	508	425	1,700
Solar PV	N/A	N/A	N/A
Total In-State Potential	12,909	3,373	16,700

**Energy estimate rounded to nearest hundred GWh. **Co-firing is a subset of the Biomass assessment.*
**** Includes wind development in the western mountains. **** Includes hydroelectric generation larger than 10 MW.*

The State currently has more than 1,400 megawatts (MW) of utility-owned hydroelectric (hydro) capacity and more than 600 MW of nonutility-owned renewable generation capacity. **Combined, the approximate 2,000 MW of renewable generation capacity can meet about 4%-5% of the State's current total energy needs.**

Beyond the existing base of renewable generation, North Carolina has a diverse mix of untapped renewable energy resources that can be developed to meet an RPS. Though there may be upwards of 13,000 MW of renewable energy potential in the State, **we estimate that about 3,400 MW can be practically developed.** This estimate includes both eastern and western on-shore wind, but does not include any off-shore wind potential. In theory, the potential for off-shore wind can be much larger than that of on-shore wind, but it is difficult to provide a useful off-shore estimate given that no such projects have been permitted and installed in the U.S. thus far. Similarly, the solar photovoltaic (PV) potential in the State was also not estimated because it is not limited by technical or practical considerations but rather by current levels of installed costs.

Biomass (wood and agricultural waste) would likely be the largest energy contributor to an RPS. Biomass fuel can be co-fired in existing coal plants or can fuel new dedicated plants.[8] Additionally, North Carolina's farming sector (through poultry litter and hog waste) may be able to contribute close to 200 MW of generating capacity to the State.

Further findings of the LaCapra study are stated in the table below. Referring to the 'Practical Potential' column in Table ES-1 below, the LaCapra study concluded that approximately one third of the commercially viable renewable capacity in North Carolina would come from biomass resources.

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Total In-State Potential	12,909	3,373	16,700

**Energy estimate rounded to nearest hundred GWh. **Co-firing is a subset of the Biomass assessment.*
**** Includes wind development in the western mountains. **** Includes hydroelectric generation larger than 10 MW.*

4.1 Hertford Renewable Energy, LLC Is Sustainable Biomass Capacity

Biomass projects located in the Southeastern United States will primarily consume fuel chips that are from residues of the forest products industry in the region. These fuel chips will typically be delivered to the biomass power plant with a moisture content in the range of 40% to 50%. It is the expectation that HRE will require 1.5 tons of biomass to produce 1 MWH of electrical energy (this is our experience at CCWE). With a production capacity of 50MW, and an expected annual run time of 8,000 hours per year, the plant will consume approximately 600,000 tons per year of biomass fuel.

HRE is sited in one of the most productive forests in the world. HRE's wood studies demonstrate that over 13MM tons of fuel is available annually in the fifty mile radius around the project. A breakdown of the fuel types and expected delivered costs in Table 4-1 is:

Table 4-1

HRE Wood Basket	Tons per year	Price $/ton Woods	Price $/ton Processing	Price $/ton FOB Plant
Mill stream				
Inventory	1,428,527.89			17
Forest residuals				
Inventory	2,838,249.95	2	15.30365893	17.30365893

The average acre of Southeastern forestland produces 10 tons of biomass each year (Source: Timber Market Profiles & Rankings: US South). Accordingly, to sustainably fuel HRE, approximately 60,000 acres of forestland would be required (said acres would grow 600,000 tons of biomass each year). The forest lands in Eastern North Carolina total 11.44 million acres. By making the rough assumption that 1/6 of eastern North Carolina is within fifty miles of HRE, the forest available to fuel the plant totals almost 2 million acres, which implies over 33 times the forest required is available to fuel HRE sustainably.

4.2 Other Renewable Energy Sources
4.2.1 General
Renewable energy includes any source that is regenerative or virtually inexhaustible. The Energy Information Administration (EIA) classifies wind, solar, geothermal, hydropower, and biomass as renewable energy sources. According to the EIA Renewable Energy Annual (2000), renewable energy consumption increased 3 percent between 1998 and 1999 to more than 7 quadrillion Btu, accounting for almost 8 percent of total U. S. energy consumption. This 8 percent renewable is broken down as 1 percent solar, 5 percent geothermal, 44 percent biomass, 1 percent wind, and 49 percent hydroelectric. U.S. renewable electricity generation rose 1 percent between 1998 and 1999. This reflects a decline in hydroelectric generation balanced against growth in electricity generated from other renewable sources. Biomass had the largest absolute increase in generation, but wind power expanded 50 percent in 1 year, while geothermal increased 14 percent. The five leading states for renewable generation in 1999 were Washington, California, Oregon, New York, and Idaho. As in the past, the majority of renewable generation recorded in North Carolina was from a combination of conventional hydroelectric sources and biomass sources.

4.2.2 Hydroelectric Power
Hydroelectric power has a relatively high capital cost but has no fuel-related costs. During operation these facilities have minimal environmental impacts. They create little or no emissions and can be designed to minimize their effects on fish and wildlife. However, the impoundments often associated with hydroelectric projects can impact large land areas and associated ecosystems. Hydro plants are classified as storage, run-of-river, or diversion projects. In Northeastern North Carolina hydro power is not a practicable capacity alternative due to the lack of available elevation changes on the Coastal Plain.

4.2.3 Wind Power Production

Wind turbines are most efficient at supplying centralized electric power. Electricity from wind farms, large clusters of interconnected wind turbines, is fed into the local distribution grid and sold to local utility companies. The levelized cost of wind energy, which is the cost of capital and operating and maintenance expenses associated with the plant over its lifetime, divided by the estimated output in kWh over the lifetime of the plant ranges from $0.03—$0.06/kWh (2001, not including the federal Production Credit Tax). According to the LaCapra study (Appendix 10), areas that are potentially suitable for wind energy applications are the mountain ridges in extreme western North Carolina and on North Carolina's outer banks. The intermittent nature of the wind resource, the 'ridge laws' in Western North Carolina, and the expected local opposition to siting wind turbines on the Outer Banks, prevent wind turbines from being selected as the preferred capacity alternative.

4.2.4 Solar Power

Solar energy systems use either solar cells or some form of solar collector to generate electricity and heat homes. Solar power has potential as a pollution free source of electricity. On small-scale projects it is an effective supplement to centralized generation. However, there are economic and environmental considerations that, at present, prevent it from being an alternative to large fossil fuel plants. Economically it has a high installation and maintenance costs. Environmentally, centralized solar projects would require huge investments in land and transmission resources. Due to these fundamental challenges, solar power is not selected as the preferred capacity alternative

4.2.5 Fuel Cells

Fuel cells rely on a fairly simple chemical reaction to generate energy.
According to the Center for Renewable Energy and Sustainable Technology, fuel cells are attractive as energy generators because:

• They are cleaner and non-combustive. Fuel cells emit no particulate matter and almost no NO_x and SO_2. While fuel cells still have some substantive CO_2 emissions, they are only 45 percent of coal generation and 47 percent the amount emitted from the production of energy using fossil fuels.

• They have high efficiencies when compared to combustion driven generators. Fuel cells alone are about 50-65 percent efficient, and with cogeneration technologies, their efficiency can be boosted as high as 90 percent.

• They are extremely reliable. A fuel cell within an integrated power system can deliver 99.0 percent reliability.

Research shows that the price of fuel cells is variable. Depending on the technology and application, the cost of a fuel cell can vary from $50/kW—$10,000/kW (2000). These costs reflect the threshold of commercial viability for each application. On average, the current fuel cell commercial cost is $4,000—$5,000/kW. Fuel cell projects involve technology risk (the technology has not been deployed enough for it to be financed), and lack known financial (cost) aspects, which make them unattractive for an inexpensive power market such as North Carolina. More simply stated, it is not even possible to finance a 'technology risky' fuel cell project in the southeast United States because their costs are high and available revenue is extremely low.

Section 5: Siting Alternatives

5.1 Scope of Siting Study

DEI is proposing to build one 50 MW biomass unit on a 93-acre site in Hertford County, North Carolina. The unit is proposed to begin commercial operation in 2011. The unit will be fueled by biomass debris from the local forest products industry. This analysis addresses the siting of the proposed 50 MW biomass unit.

5.2 Phase 1 Identification of Potential Siting Area

DEI engaged the assistance of the North Carolina Department of Commerce ("NCDC") to assist it with identifying potential sites for biomass projects in the State. DEI's siting area was the entire state of North Carolina.

5.3 Phase 2 – Identification of Candidates Sites

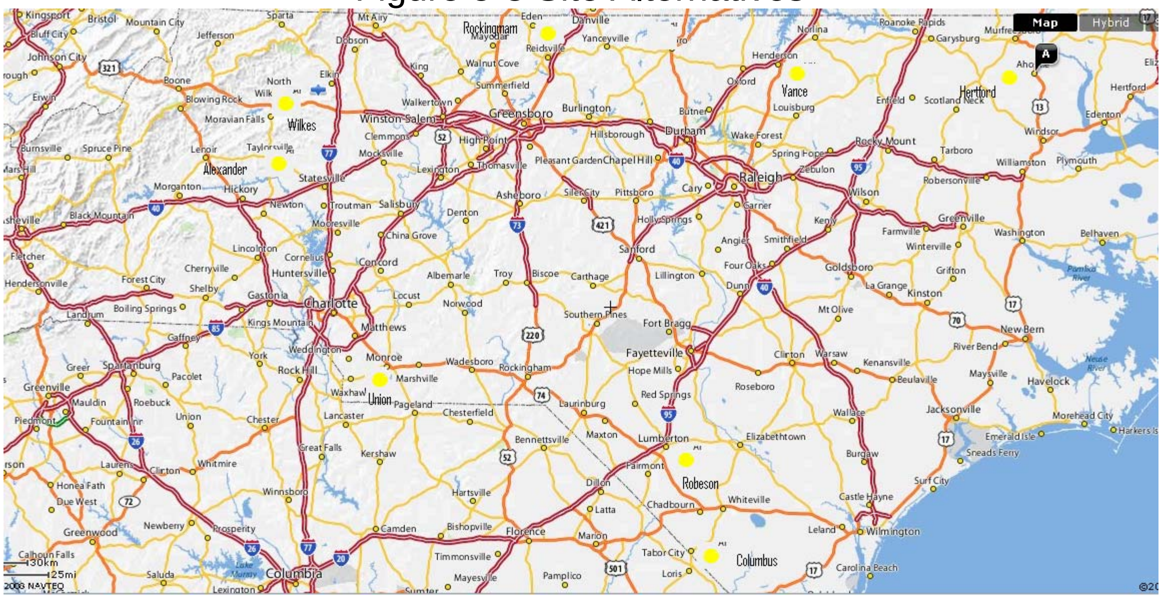
DEI provided the following criteria to NCDC:

- Lot size in the 50 to 100 acre range
- Lot already zoned industrial
- Site central to large forest products industry
- Transmission lines of 100kV or larger available in close proximity
- Raw water available in the volume of approximately one million gallons per day
- Surface water discharge or discharge to municipal water system available
- Minimal residences within one mile radius of the site
- Landowner willingness to option property to DEI
- At least 100 miles from Class I areas
- Preference for Phase I environmental assessment to have already been completed

NCDC identified the following industrial sites for DEI to screen and DEI's initial assessments are noted (please refer to Figure 5-3):

- Rockingham – Site too expensive, connected to Duke Energy Carolinas system
- Columbus – Appropriately remote site, lack of available raw water and discharge
- Robeson – Interconnected to Progress Energy Carolinas which was lowest priority utility in our screening, commercial terms for site acquisition were not reasonable
- Hertford – Extremely robust wood basket, connected to preferred utility North Carolina Power
- Vance – Interconnected to Duke Energy Carolinas, good road infrastructure, proximity of neighbors was primary shortfall of site
- Wilkes – Wood basket already stressed by competing project, too many neighbors
- Alexander – Site appropriately remote, good wood basket, connected to Duke Energy Carolinas
- Union – Non-attainment area and too many neighbors

Figure 5-3 Site Alternatives



5.4 Site Screening

Please refer to Appendix 11 for the compilation of DEI's site screening efforts. After consideration of all eight sites, three were selected for further analysis (see Appendix 11 for detailed site analysis information). HRE/DEI has initiated negotiations on the following three sites:

- Hertford: Advantages include: access to most valuable power market through interconnection with North Carolina Power Company, the most robust fuel supply of any of the North Carolina sites, beneficial reuse of Ahoskie's grey water (cost and environmental).
- Alexander: Advantages include: access to second most valuable power market (Duke Energy Carolina),river access, Disadvantages include : extreme remoteness of site (increased costs and impacts from long fuel and transportation routes).
- Columbus: Disadvantages include: access to the least valuable of the North Carolina interconnects (as perceived by DEI and customers), lack of available water and means of disposing of wastewater.

Section 6: Site Description

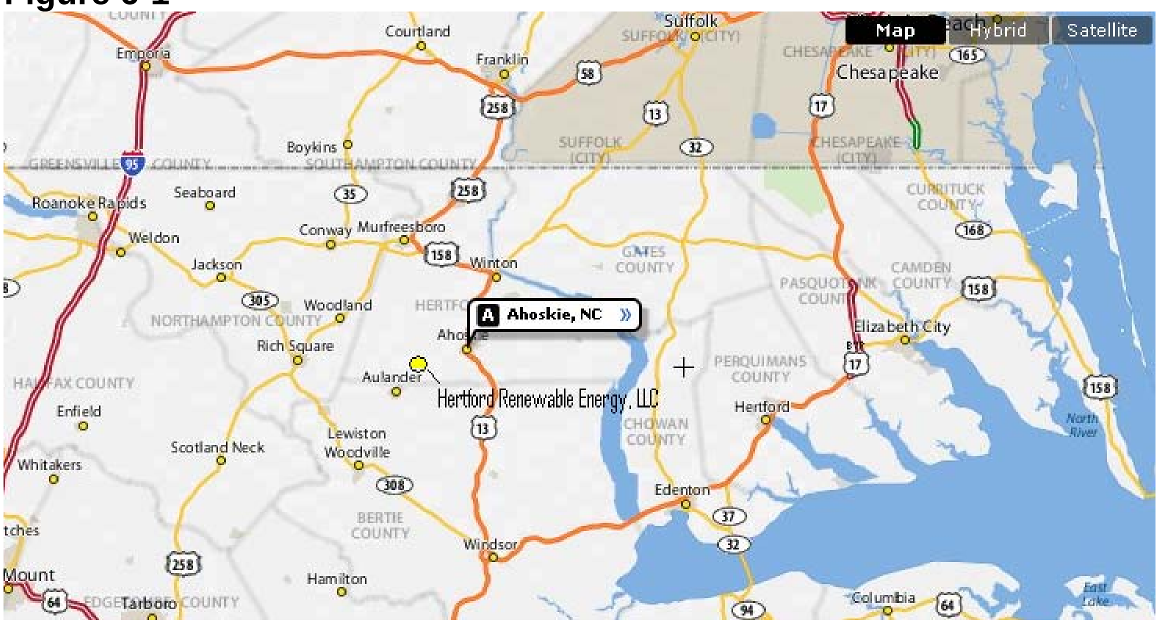
6.1 Site Alternatives

After analysis of the three sites, Hertford was selected by HRE as the preferred site (herein after referred as the "proposed" site) for one 50MW biomass plant in North Carolina.

6.1.1 Applicant's Proposed Site

The proposed site for Hertford Renewable Energy, LLC is located in Hertford County, North Carolina, approximately four miles west of the Town of Ahoskie, at the Northeast corner of the intersection of Joe Holloman Road and Brick Mill Road. Figure 6-1 presents a general location map of the HRE site. The site is zoned industrial and has previously been permitted for a 300MW Combined Cycle Gas Turbine plant. There are no residences within one mile of the site. The 93 acre site provides ample buffer for the project, as the plants total foot print will be closer to 30 acres. While the site is zoned for industrial use, it is centrally located to predominately agricultural use land (most of which is planted in timber).

Proposed Site Location
Figure 6-1



6.1.2 Alternative Sites

While DEI does control Alexander as an alternate site in North Carolina, the site does not meet the criteria of the wholesale customers HRE is negotiating Power Purchase Agreements with because it delivers power into Duke Energy Carolinas system, not North Carolina Power Company's system (as is preferred by our customers).

Section 7: Project Description

7.0 Introduction

The proposed project consists of one 50 MW biomass fired unit. The biomass unit is considered a renewable energy resource and will meet the EPA's criteria for Best Available Control Technology.

7.1 Facility Equipment and Layout

Please refer to Exhibit 7-1 for the conceptual site layout of the project. The project will be comprised of:

- A fuel receiving yard
- Fuel handling equipment
- A vibrating grate stoker boiler
- Pollution control equipment including an electrostatic precipitator and Selective Noncatalytic Reduction
- A steam turbine with condenser
- Cooling towers
- An electric generator
- A step up transformer and various interconnect equipment
- Water supply and waste water discharge systems to be provided by the Town of Ahoskie

7.2 Emission Controls

HRE will trigger Prevention of Significant Deterioration permitting requirements. Biomass fired units are inherently the cleanest solid fuel sources of power due to the organic nature of the fuel (refer to Figure 7-2 below).

Figure 7-2: Comparison of Global Warming Potential – All Cases

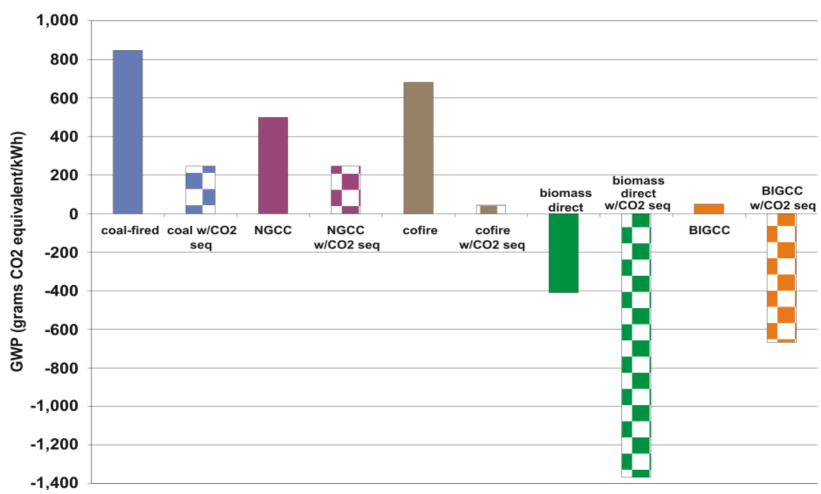
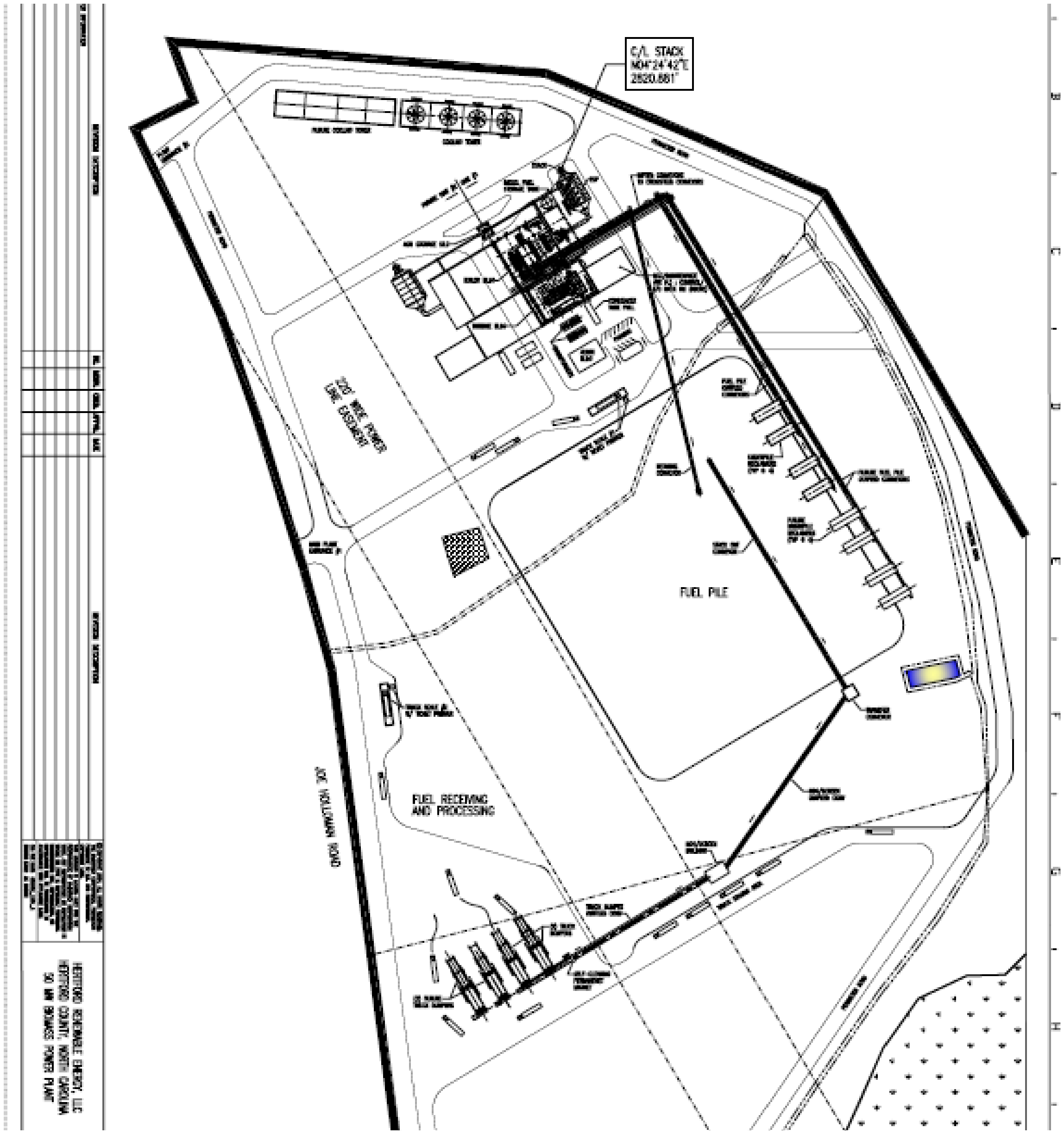


Figure 1: January 2004 • NREL/TP-510-32575, Biomass Power and Conventional Fossil Systems with and without CO2 Sequestration – Comparing the Energy Balance, Greenhouse Gas Emissions and Economics

Exhibit 7-1



C/L STACK
N04°24'42"E
2820.881'
230 KV POWER
LINE EASEMENT
FUEL PILE
FUEL RECEIVING
AND PROCESSING
JOE HOLLOMAN ROAD

The emissions characteristics of the project will be in the following ranges:

.075 < Nox lbs/mmbtu < .15 (depending on boiler type)
.05 < CO lbs/mmbtu < .15 also depending on boiler type
VOC's, SOx, and PM's will not exceed minimal EPA criteria pollutant levels

Because CO emissions will exceed 250 tons per year, a PSD permit will be required for HRE. The PSD process will take approximately twelve months to complete.

7.3 Transmission Requirements

It is anticipated that HRE will be interconnected to North Carolina Power Company's existing 115 kV transmission lines on our site and that no additional transmission will be required. A feasibility study has been initiated with the PJM Interconnection (PJM), PJM is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. The study is scheduled to be completed by the end of July 2008. After completing the feasibility study a system impact study and interconnection agreement will be performed by PJM. Any required upgrades would be assessed in accordance with RUS Environmental Policies and Procedures (7 CFR 1794).

7.4 Fuel Use and Waste Disposal

All of the biomass fuel for HRE is expected to come from within fifty miles of the plant. The project will purchase fuel in order of cost (from lowest to highest…) until its fuel supply is met. HRE will keep thirty to forty five days of fuel inventory on site. The fuel pile will have sprinkler systems in place for fire suppression due to biomass tendency to combust if left piled and unmanaged for extended periods of time. All dust and airborne particulates from the project will remain on the site and comply with local ordinances.

It is expected that a significant amount of HRE's fuel will come from saw mills and pulp and paper mills in the area, and these biomass fuels are typically the lowest cost available. North Carolina's forest products database suggests there is 1.3 million tons per year of wood waste created by the mills in the area as compared to HRE's expected annual fuel requirement of 600,000 tons per year.

The next lowest price fuel source for the project is waste wood collected from land clearing and forest harvest activities. Timber Market Profiles & Rankings of the South US suggests that over 2 million tons per year of this type of debris is available within a fifty mile radius of the plant.

HRE will produce two solid waste streams: fly ash and bottom ash. Fly ash is air born soot captured by the electrostatic precipitator. Fly ash is beneficially reused as a soil amendment by the forest community in North Carolina and there will be no cost associated with its disposal. Bottom ash (primarily sand with some ash in it) has been designated as a road bed material approved by the North Carolina Department of Transportation (this is the case for Craven County Wood Energy's bottom ash and as a result we expect the same outcome for HRE).

7.5 Water Supply and Wastewater Disposal

One advantage of the proposed site is the availability of the Town of Ahoskie's grey water as the cooling water for HRE's thermal cycle. DEI has successfully used effluent as a supply for coolant water at the Grayling, MI plant.

The Town of Ahoskie is under a Compliance Order from the State of North Carolina to construct a new waste water treatment facility and to beneficially reuse a portion of its discharge. Ahoskie has been designing and planning to construct an 18 mile pipeline to Nucor Steel in order to achieve the beneficial reuse requirement. DEI understands that Ahoskie is working with RUS on financing for this project.

Ahoskie Town Council voted in a closed session on February 25, 2008 to negotiate with HRE to provide Ahoskie's effluent for HRE's cooling requirements. HRE is approximately four miles southwest of Ahoskie, and both a 12" supply and 12" return line would need to be constructed. As compared to the Nucor Steel line, this project would save the Town of Ahoskie approximately $3MM. Remaining issues to be resolved involve water quality specifications, water balances at HRE, and contractual negotiations between Ahoskie and HRE.

At this time it is also expected that HRE would return its waste water to Ahoskie for treatment.

7.6 Operating Characteristics

HRE is evaluating two different boiler technologies. Either one of these technologies can meet the EPA's standard of best available control technology. HRE's evaluation is primarily focused on ease of installation, operation, and overall feasibility.

HRE will deploy a vibrating grate stoker as its combustion technology. This technology is consistent with the technology at our Craven County Wood Energy Plant (but has been modernized from the traveling grate stoker at Craven). As the name suggests, biomass is placed onto a large grate which is being vibrated. The combustion takes place on this grate. As biomass is reduced to ash the vibration moves the ash across the grate where it is captured and disposed. An atmosphere containing ammonia is maintained to allow the exhaust gases coming off of the bed (which contain nitrous oxides) to react with the ammonia and remove the nitrous oxides from the exhaust gases. The exhaust then passes over an electrostatic precipitator which collects particulate matter on electrically charge plates.

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7.7 Noise

HRE will comply with Hertford County's noise ordinance. That ordinance requires 75 dB or less at the property line.

7.8 Transportation

The project site is located near North Carolina Highway 11. This highway is a major route for logging trucks taking the forest harvest from the woods to industries. HRE is coordinating its plans with the North Carolina Department of Transportation. At this time it is expected that the surfaces of Joe Holloman Road and Brick Mill Road leading up to the plant site will need to be reconstructed to accommodate the approximately twenty five ton load trucks which will be bringing fuel to the site. The truck traffic coming to the site will vary between eighty five and two hundred tucks per day depending on fuel availability and market conditions.

7.9 Project Schedule

Initial regulatory permitting for the project is underway. If permits can be obtained, project construction is expected to begin in May of 2009. Approvals and/or permits for the project include air quality, North Carolina PSC, and building permits. Construction would require approximately two years, with performance testing for the unit expected in early-2011. A preliminary project schedule is shown in Appendix 13. Delays in permitting could have a significant effect on the anticipated completion date.

7.10 Project Cost

The unit at the site would cost approximately $148 million under the present construction schedule. Cost comparisons were determined by using an RFP process carried out by an independent contractor on behalf of DEI.

7.11 Employment

During the construction phase, HRE would provide up to 200 construction jobs at an average annual salary of $60,000. The number of employees on-site would fluctuate with the construction schedule. The operating power station would require approximately 25 full-time employees. These jobs would vary from moderately skilled operations staff to highly trained laboratory, electrical, and instrument technician positions. The HRE site would be manned 24 hours a day, 365 days a year.

Appendix

Appendix 1 NREL Study
Appendix 2 NERC 2007 Long Term Assessment
Appendix 3 NC Law 397 -2007
Appendix 4 NC PSC Compliance Order
Appendix 5 NC PSC Compliance Order Ammend.
Appendix 6 DEC RFP
Appendix 7 PEC RFP
Appendix 8 NCMPA RFP
Appendix 9 NECMC RFP
Appendix 10 LaCapra Study
Appendix 11 NC Site Screening
Appendix 12 HRE Site Layout
Appendix 14 HRE Preliminary Project Schedule