



Jackson County Green Energy Park

401 Grindstaff Cove Rd
Sylva, NC 28779
(828) 631-0271
www.jcegp.org

Commissioners' Update for 10/20/15

Submitted by: Timm Muth, Green Energy Park Director
Topics: Art Center Construction Plans
Solar Installation Proposals

New Art Center Construction

Architect/Engineering Work

- Design updates
 - Pottery studios and kiln area first, to utilize equipment in-hand.
 - Requires electrical/mechanical rooms, and restrooms.
 - Heating and cooling systems required.
 - Possible hybrid heating system of landfill gas and solar thermal collectors.
 - Passive ventilation features to aid in cooling.
 - Parking and access road covering needed.
 - See Attachment #1 for building layout.
- Construction contract preparation
 - Final drawings
 - Material specifications
 - Detailed Scope of Work
- Bid Offering and Negotiations
 - Advertising and collection of bids
 - Bid assessment and award
- Construction Administration
 - Monitor construction progress
 - Change orders
 - Billing
- **Cost estimate from Odell Thompson: \$35,000** (see Attachment #2).

Bid/Construction Timeline Estimates

- Schedule estimates currently in development. Will be available at CC meeting.



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Tenants

- Could begin advertising for four (4) available ceramics studio benches once construction begins.
- Overflow of applicants provides potential tenant list for Phase B – 14 rental studio spaces.
- Both SCC (Jeff Marley, Heritage Arts Program Director) and WCU (Tom Ashcraft, Master of Fine Arts Program Director) expressed interest in long-term lease or reservation of ceramics studio spaces.

Non-Profit

- 501c3 status needed for many grant and donor opportunities.
- Paperwork from earlier attempt at non-profit (5 years ago) still available for reuse.
- Non-profit board member recommendations needed.

Funding

- **USDA Rural Development grant**
- Rural Energy for America Program (REAP grant)
 - Not available to County; for small businesses and ag producers only.

Requirements

- Board authorizes Odell Thompson to begin A/E process.
- Begin monthly payments for A/E work from existing GEP contractual budget line.
- Move \$35k from GEP Enterprise Fund to contractual budget line.
- Approval for GEP Director Timm Muth to begin advertising for ceramic studio rental spaces.
- Approval to begin formation of new non-profit board.
- Begin crowd-funding efforts to raise additional capital.



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Photovoltaic Solar Systems

- Solar represents good investment in energy security.
 - Distributed generation systems (like solar installations) help stabilize local electric grid.
 - Investigating potential solar installation on landfill cap and GEP building roofs.
 - 4 developers queried for estimates: FLS, Sugar Hollow, Haynes, Sundance Power.
 - Available land too small for FLS Solar.
 - Project too big for Sugar Hollow Solar.
 - Estimates in hand from Sundance Power Systems (see Attachment #3).
 - Estimate on building system from Haynes Energy Systems in hand. Landfill system estimate available at CC meeting.
- **** County unable to take advantage of tax credits and equipment depreciation, unlike for-profit firms. Developers recommend searching for 3rd party investor.

Landfill PV system

- Ground-mounted system
 - Sell all power produced to Duke at 6.9 cents per kWh, -or-
 - Lease land to 3rd party developer for ~ \$600/acre/year for 25 years.
- **Sundance Power** – estimates **368 kW** installed (uses only flat area on top landfill).
- **Haynes Energy** – estimates **600 kW** installed (uses additional sloped areas).

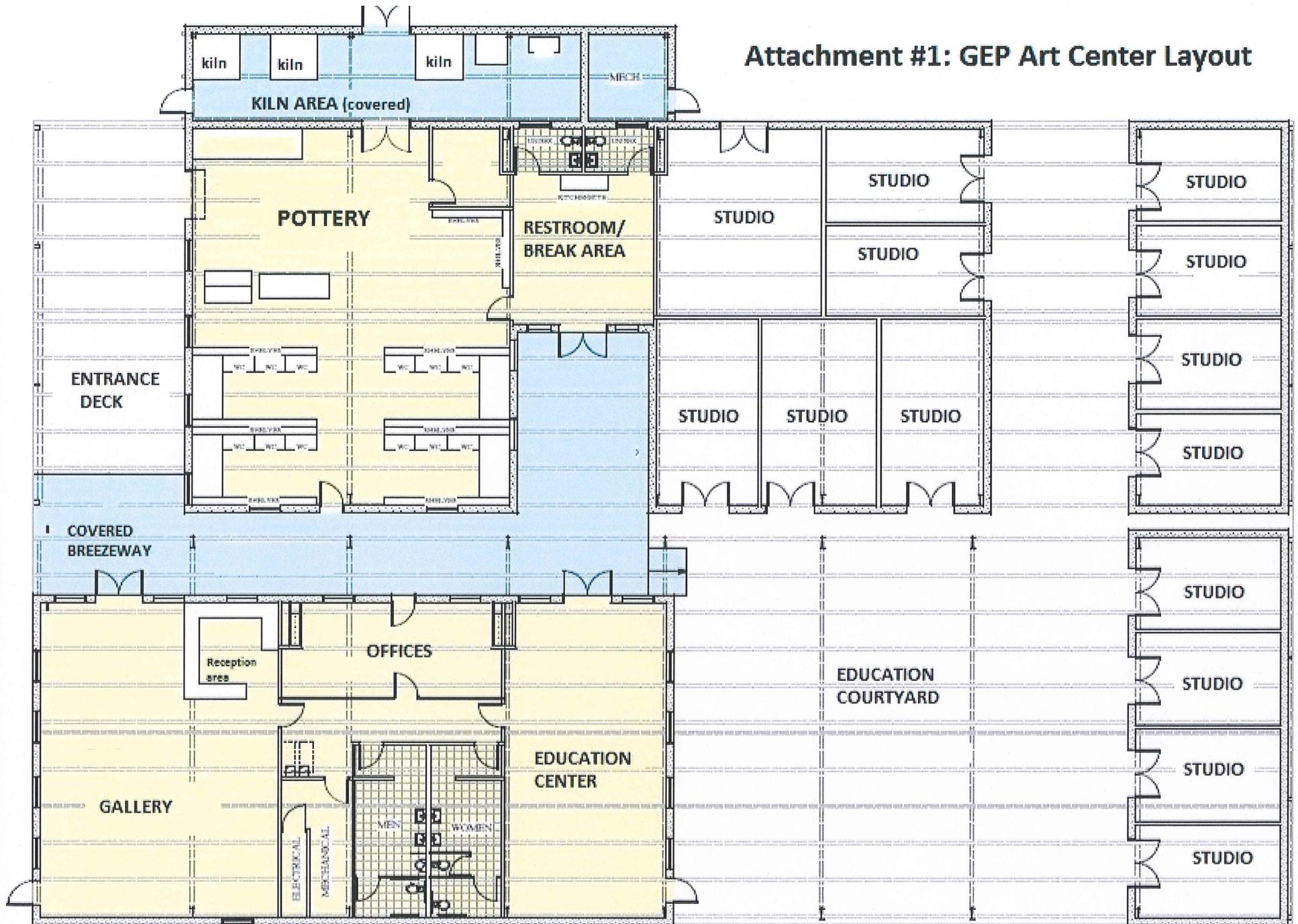
Building PV system

- Net-metered system: all power generated used to meet on-site electric demands.
- Offsets power purchase from Duke Power at 7.9 cents per kWh.
- Excess generation credited against future power purchases from utility.
- Installed on roof over Glass/Metal shops, and on high roof over concrete pad area.
- **Sundance Power** (south-facing roof only)
 - Estimated **36 kW** installed.
 - Offset ~ 40% of monthly electric use.
- **Haynes Energy** (north and south-facing roofs)
 - Estimated **60 kW** installed .
 - Offset ~ 75% of monthly electric use.

Recommendations

- Long-term investment in solar will provide security against utility price increases.
- Without use of tax credits and depreciation, there is little if any profit to be realized by County.
- Continue search for 3rd party investor to partner on project.
- Contact large glass organizations for potential partnerships and/or financial support.

Attachment #1: GEP Art Center Layout





AUGUST 6, 2015

Mr. Chuck Wooten
Jackson County Manager
401 Grindstaff Cove Road
Sylva, NC 28779

Dear Mr. Wooten,

I am excited that this project is back on as I think it is a great example of what we can do to reuse our resources (the sun, the wind, pre-existing structures as wells as byproducts of our waste). We originally prepared bid documents for an earlier version of this project in 2006. Since then, the master plan has evolved, and the architectural organization of the facility has changed completely. Timm Muth asked if we could re-cycle any of the work from the previous documents, and with the exception of some of the structural modifications to the steel frames, all of our documents must be redrawn to describe the new arrangement of spaces and scope of work. We will certainly be as efficient as possible with our work, but for all practical purposes, this is a completely new project- as far as preparing bid documents.

Chairman McMahan has indicated that he would like to see construction begin just after the first of the year. The design and documentation phases outlined below could take 2 to 3 calendar months to produce, so if we are to be ready to go out for bids by the beginning of 2016, it would be prudent to start this work in the near future.

With that in mind, I am pleased to submit this proposal for architectural and engineering services for the first phase of the new master plan for the artists' studios at the Jackson County Green Energy Park. I intend to work with the same engineers from the original 2006 project: Reece, Noland & McElrath for MEP and Owen Rothberg for structural. Our work will be divided into the following phases:

A. Design Development- Timm Muth and I have arrived at an acceptable concept design already, so we can delve into the Design Development phase of work immediately. Our A/E team will refine that concept design with input from the county and any potential artists. The product will be computer drawings (plans, sections, elevations) as well as written descriptions of materials and finishes. The goal is to get all of the major spatial and systems decisions made and "blocked-out" on paper to take us into the final drawing phase.

B. Construction Contract Documentation Phase- When we are confident that the design is "set", we will prepare the final drawings and specifications. Typically this takes the most time because calculations must be performed, and materials must be specified so the contractor and sub contractors know what our intentions are. The design team will coordinate carefully during this phase to assure that all the systems and materials work well together. We will coordinate with the county to accurately describe the scope of this phase one work, and we may identify certain items that might be bid as alternates to accept or decline depending on the costs.

C. Bid Negotiation Phase- We will work with the county as required to prepare the necessary documents for bidding. This will include, of course, advertising for bids, distributing the bid documents, preparing any clarification information requested by the approved bidders, and coordinating the opening of the bids.

D. Construction Contract Administration Phase- We will monitor the progress of the work to make sure it complies with the contract documents. We will review pay requests from the contractor to confirm that the work being charged for has been completed. Should changes in the work be requested or required, we will prepare the documents necessary to solicit proposals for that change. We will then assist in the evaluation of whether that proposal is fair. Should the change represent additional work not originally part of this contract, additional services will be negotiated with the county.

E. Post Contract Evaluation- We will be available during the one-year contractor's warranty period to assist the county with warranty related issues that arise.

Fee:

We propose to perform the A/E services for the phase one work for the Artists Studios at the Jackson County Green Energy Park for a **lump sum fee of \$35,000** which will be invoiced monthly based on the percentage complete of each of the phases of work. Below is a summary of the fee per phase:

A. Design Development-	\$8,750
B. Contract Documents-	\$15,750
C. Bid/ Negotiation-	\$3,500
D. E. Contract Administration--	\$7,000
Total	\$35,000

If the scope of the work changes after our work has been started, we will need to re-evaluate the appropriateness of our fees. Should the above scope of services and associated fee structure be acceptable to you, please sign and date this letter of agreement on the line below, and forward a copy to me for my records. We are very proud to be considered again for such a progressive, successful project!

(Client signature)

(date)

Sincerely,

Mahaley Odell Thompson, AIA

c.c. Timm Muth



11 Salem Hill Road • Weaverville NC 28787 • 828.645.2080
502 Polk Street • Raleigh NC 27604 • 919.252.0016

sundancepower.com • fax: 828-645-2020

Photovoltaic System Design and Proposal for Jackson County Green Energy Park

Sundance Power Systems is pleased to present this system design and proposal to the Jackson County Green Energy Park. Sundance is a leading solar installer in the southeastern United States, with over 1300 solar systems installed since 1995. Utilizing Sundance's unique dealer network, while providing our highly skilled technical design and installation team, allows us to offer the highest quality solar panels and balance of systems equipment at very attractive pricing.

Based on the site information gathered during our visit to the facility and after conducting our energy usage analysis, we have prepared two system designs for your review:

- 1. 368 kW Ground-Mounted Solar System (For Landfill)**
- 2. 36 kW Roof-Mounted Solar System (Art Studios Building)**

The 368 kW solar system for the landfill was based on maximizing the available ground space at the top of landfill where it is most level. Since there are very minimal electrical loads being consumed at the landfill, this system is designed as a sell-all system, which means that the electricity produced by the solar system is sold back to Duke Energy. This system would be considered a solar farm. It would serve the county as a long-term revenue stream for 25 + years.

The 36 kW solar system on top of the art studios is designed to supply electricity for the art studios. This is referred to as net-metering, where the electricity produced by the solar system will be consumed by the facility, resulting in the lowering of your electric bills at the same retail rate you purchase electricity at. The system size was determined based on maximizing the available roof space. We reviewed the electric usage for the art studios building and based on the 12 months of electric bills we received from you, the facility has consumed 115,526 kWh or 9,627 kWh as a monthly average. The 36 kW net-metered solar system is designed to reduce the electric usage by 40%

We have selected Q Cell as the solar panel manufacturer for both of these systems. Q Cell was selected as the basis for design based on their proven track record and bankability. Q Cell has a 25 year linear power output guarantee. This guarantees that the output of the solar panels will degrade by no more than 82% over 25 years, which is one of the best warranties of any solar panel manufacturer. We consider Q Cell a premium product. Their manufacturing sites are located in Germany, Poland, and Malaysia.

This proposal includes a system design overview for each system which includes the estimated electrical output and associated revenue generation/ bill savings. We have also included layouts to illustrate the location of the solar panels. Please keep in mind these systems are highly scalable, where the system sizes can be easily adjusted for budgetary purposes. Our goal with this proposal was to create system designs that produce, sell and use solar electricity in the most cost effective way possible for your facility. Thanks for the opportunity to provide you with this design and proposal. Please let us know if you have any questions.

Sincerely,

Evan Becka
Director of Business Development
Sundance Power Systems, Inc.

System Design Overview - 368 kW (Landfill)

SUNDANCE POWER SYSTEMS
11 SALEM HILL RD | WEAVERVILLE, NC 28787
828.645.2080 | FAX 828.645.2020
WWW.SUNDANCEPOWER.COM



Prepared for: Jackson County Green Energy Park
System Location: Green Energy Park Rd. Dillsboro, NC
System Type: 368 kW Sell-All Ground-Mounted System

9.17.2015

System Layout - The images below represent the approximate location of the solar panels.

Bird's Eye View



Southwest View



System Design Overview - 368 kW (Landfill)

Racking/Layout

During our solar site analysis, we determined that the most level areas of the landfill were ideal for ground-mounted solar arrays. The most level areas were the top of the landfill, which works to the benefit of the solar array since this area receives the most sunlight. The 368kW system consists of 1,170 Q Cell 315 watt solar panels for a total of 368,550 watts or 368 kW.

Since the landfill lining cannot be penetrated, we use what is called a ballasted ground-mounted racking system for supporting the solar panels at landfill and brown field sites. This rack utilizes a concrete ballast at the bottom of the racking system to keep the solar array anchored to the ground. The rack will be tilted at 25 degrees and oriented 180 degrees due south to maximize production. We can provide the racking specifications to the DENR representative assigned to your landfill to get confirmation that the dead loading of the racking system will be compatible with the landfill. The final location of the racking needs to be confirmed by the DENR rep in order for the system to be considered a complete design. The racking system is designed for 90 mph wind speeds and 20 pounds per square foot snow loading, which is required for Dillsboro, NC.

Inverters

We have specified to use Solectria PVI Inverters for this project to convert DC voltage to AC voltage. These are commercial grade 480 volt inverters that will be attached to the back of the racking system. The AC circuits will then be combined into a load center where the output will run to a new pad-mounted transformer dedicated to the solar system. The solar system will be metered at the transformer. The final location of the pad-mounted transformer is to be determined with owner but there is plenty of room for locating this.

Monitoring System

The solar system is equipped with a web-based monitoring system that allows you to see the real-time and historical production of the solar system at any computer that has internet access. The customer can use the monitoring program to track the performance of their system as well as share it to the general public for educational purposes. The monitoring systems also can display the greenhouse gas savings associated with the clean energy project. It can display metrics like tons of CO2 offset and more tangible metrics such as the number of homes this system can provide electricity for, or gallons of gas saved by the solar system. An image of what the monitoring platforms look like is below.



System Design Overview - 36 kW (Art Studios)

SUNDANCE POWER SYSTEMS
11 SALEM HILL RD | WEAVERVILLE, NC 28787
828.645.2080 | FAX 828.645.2020
WWW.SUNDANCEPOWER.COM



Prepared for: Jackson County Green Energy Park
System Location: Green Energy Park Rd. Dillsboro, NC
System Type: 36 kW Net-Metered Roof-Mounted System
9.17.2015

System Layout - The images below represent the location of the solar panels.

Bird's Eye View



Southeast View



System Design Overview - 36 kW (Art Studios)

Racking/Layout

To maximize the available south facing roof space, we designed the layout to be a flush-mounted system, where the solar panels are installed at the same pitch of the roof. The solar panels are oriented with building which faces 172 degrees (almost due south). We have laid the solar panels out to fill up the south facing roof on the tallest roof section but allowed enough clearance for safely walking around the solar panels. The lower roof is almost entirely filled up with the exception of a small portion of it that is left uncovered due to shading from the taller roof.

There are a total of 138 Q Cell 265 watt solar panels for a total of 36,570 watts or 36.57kW. The rails supporting the solar panels will be attached to the roof every 5' running North to South in order to hit the Z-purlins, which are the structural members supporting the roof. The racking system is rated for 90 mph wind speeds and 20 pounds per square foot snow loading, which is required for Dillsboro, NC.

Inverters

We have specified to use a Solectria PVI Inverter for this system to convert DC voltage to AC voltage. This inverter will be located on the southwest corner of the building close to the existing meters. A utility required disconnect will be located next to the inverter. The output of the inverter will finally connect to the load-side of the meter, tying into the facility making it a net-metered system.

Monitoring System - (same as landfill)

The solar system is equipped with a web-based monitoring system that allows you to see the real-time and historical production of the solar system at any computer that has internet access. The customer can use the monitoring program to track the performance of their system as well as share it to the general public for educational purposes. The monitoring systems also can display the greenhouse gas savings associated with the clean energy project. It can display metrics like tons of CO2 offset and more tangible metrics such as the number of homes this system can provide electricity for, or gallons of gas saved by the solar system. An image of what the monitoring platforms look like is below.



Electrical Production and Pricing

SUNDANCE POWER SYSTEMS
11 SALEM HILL RD | WEAVERVILLE, NC 28787
828.645.2080 | FAX 828.645.2020
WWW.SUNDANCEPOWER.COM



Prepared for: Jackson County Green Energy Park
System Location: Green Energy Park Rd. Dillsboro, NC
System Type: 368 kW Sell-All & 36kW Net-Meter

9.17.2015

368 kW Sell-All System (Landfill)

- Budgetary Estimate- \$821,866*
- (1,170) Q Cell 315 watt solar panels
- 1st Year Annual Electrical Production – 537,345 kWh**
- 25 Year Electrical Production – 12,808,157 kWh
- 1st Year Revenue Generation from Sale of Electricity – 37,076***
- 25 Year Revenue Generation from Sale of Electricity -\$1,314,687

* This is not a final quote but a close approximate estimate. The final system cost can be determined after the DENR rep has approved the final location of the solar array in the landfill and all conduit pathways in the landfill have been approved by him/her as well. There will likely be a fee from Duke Energy to supply a new service, which will be incurred by the customer. This fee can be determined once the interconnection study is complete.

** This estimated production is based on our production calculator Helioscope. It is based on your location, roof orientation, tilt, and overall system design. The detailed production report is available upon request.

***The estimate revenue generation is based on Duke Energy's PP-N rate schedule, Option B, which averages to 6.9 cents per kWh. The 25 year revenue generation is based on 3% annual escalation for electricity.

36 kW Net-Metered System (Art Studios)

- System Price- \$112,308*
- (138) Q Cell 265 watt solar panels
- 1st Year Electrical Production – 45,910 kWh**
- 25 Year Electrical Production – 1,094,311 kWh
- 1st Year Electric Bill Savings – 3,626***
- 25 Year Revenue Generation from Sale of Electricity - \$132,201
- % of Facility's Usage Supplied by Solar - 39%

* If customer decides to install the landfill system as well, the price on this rooftop system will go down due to economies of scale.

** This estimated production is based on our production calculator Helioscope. It is based on your location, roof orientation, tilt, and overall system design. The detailed production report is available upon request.

***The estimate revenue generation is based on the Duke Energy rate schedule SGS, which you are on. The rate you pay per kWh varies in tiers on this particular rate schedule but based on your usage, you average 7.9 cents/kWh, which is what your electric bill savings is based on. The 25 year savings is based on 3% annual escalation for electricity.

Scope of Work / Customer Due Diligence

SUNDANCE POWER SYSTEMS
11 SALEM HILL RD | WEAVERVILLE, NC 28787
828.645.2080 | FAX 828.645.2020
WWW.SUNDANCEPOWER.COM



Prepared for: Jackson County Green Energy Park
System Location: Green Energy Park Rd. Dillsboro, NC
System Type: 368 kW Sell-All & 36kW Net-Meter

9.17.2015

Scope of Work Includes - We are fully licensed and insured NC Unlimited General Contractor that holds Electrical, Plumbing, and Mechanical licenses in house. We will pull all permits and be responsible for scheduling inspections with Jackson County. We will submit all interconnection requests with Duke Energy and coordinate to interconnect the solar system with the grid. We will supply and install a turnkey solar system(s), which includes all solar panels, racking systems and associated hardware, inverters, all DC and AC conduit, wire, and pad mounted-transformer. Roof penetrations will be sealed. We will provide all required stamped structural and electrical engineering for the project. System construction in landfill will be approved by DENR prior to starting. System commissioning at the end of project will be conducted with Duke Energy and system review will be conducted with owner or Maintenance staff. Training on how to use the web-based monitoring will be conducted with the owner. System includes 1 year workmanship warranty. Sales taxes are included with pricing. Pricing is valid for 90 days.

Scope of Work Excludes - The costs for bringing a new electrical service to the solar system at the landfill will be incurred by the customer. The exact cost for this is currently unknown but will be known upon completion of interconnection request.

Customer Due Diligence - All solar systems require an interconnection request be sent to Duke Energy to approve the installation of the solar system and the connection to the grid. To determine what your potential costs may be to run a new service to the solar farm at the landfill, we would recommend we submit the interconnection request to Duke. This will be required to install the system and if you want to be sure what the costs for the new service would be, submitting an interconnection request is the best way. Duke requires an electrical schematic for the proposed solar system stamped by an NC licensed electrical engineer. Duke charges \$500 for the interconnection request and the engineering is usually around \$1700-\$2200 for a system of this size. Sundance would provide this service.

The only concern with the system solar system at the Art Studios is the structure is built for minimal loading. Even though solar systems are extremely light, weighing around 3lbs/sf., this particular roof has limited dead loading capabilities. We would recommend getting the structural engineering done prior to committing to the project to ensure the roof can hold the additional weight. The approximate costs for structural engineering for a building like this are \$1500-\$2500. Sundance would provide this service.



Commercial Client List — references available upon request

Commercial Businesses

Asheville Alternative Energy, LLC (2)
AppalCart Transportation Authority
Big Toe Farm, LLC
Bio-Wheels RTS
Black Mountain Books
Deep River Alpacas (2)
Deltec Homes
Eastern Band of Cherokee Indians
Echoview Farm
Elan Architect
Flat Creek Land & Building, Inc.
G&W Equipment, Inc. (2)
Gerry Wood Automotive Group (3)
Highland Craftsman (2)
Ken Gaylord Architects (2)

Mangum Pottery
Mills River, LLC
Organic Mechanic
Precision Restoration Services
Rite Media
Samsel Architects (2)
Service Logistics
Slick Rock County Emporium (2)
Swannanoa 4-H
Swiss Diesel, Inc (2)
Target, Inc.
Victory Junction Gang Camp
VIP Coin Laundry
Wallace and Graham, P.A
White Owl Woods Farm, LLC

Hospitality / Tourism

Aloft Hotel
Altamont Theatre
Annie's Bakery
Blue Heron Rafting
Bouchon Restaurant
Corner Kitchen Restaurant
French Broad Chocolate Lounge
Green Sage South Restaurant
Highland Lake Inn
Homegrown Restaurant

Laughing Seed Restaurant
Mellow Mushroom Restaurant
Neo Cantina Restaurant
New Belgium Brewing (2)
Pisgah Inn (2)
Posana Restaurant
Rosetta's Kitchen
Sierra Nevada Brewing Company
Spinning Spider Creamery
Wehrloom Honey (2)

Schools / Institutions

Allegheny High
Appalachian State University (3)
Asheville High
Asheville Middle
Avery High
Brevard College
Brush Creek Elementary
Catawba College (13)
Clemson University
Duke University (2)
Grandfather Mtn. Stewardship Fnd. (2)
Hillandale Elementary
Hot Springs Elementary
Isaac Dickson Elementary

Madison Middle
Madison High
Mills River Elementary
Morris Grove Elementary
NC Botanical Garden
NC Museum of Natural Sciences
North Wilkes Middle
Penland School of Crafts
Smoky Mountain High
University of North Carolina Asheville
Watauga High
Warren Wilson College
Western Carolina University (HBRS)

Medical / Health

All States Medical Supply
Asheville Eye Associates
Buffalo Valley Residential Rehabilitation
Charlotte St. Animal Hospital
GlaxoSmithKline (2)

Morton Family Dentistry
RHA Health Services, Inc. (3)
SC Veterinary Surgical Center
Smoky Mountain Foot & Ankle Clinic (2)

Religious / Spiritual / Community Organizations

Bread of Life Community Kitchen – Brevard, NC (2)
Church of the Holy Family – Mills River, NC
Elon Community Church – Elon, NC
First Christian Church – Black Mountain, NC

First Congregational United Church of Christ – Asheville, NC
First United Methodist Church – Franklin, NC
Hospitality House Community Shelter – Boone, NC
Prama Institute – Marshall, NC

Municipal / Government

City of Asheville – Fire Departments (2)
City of Durham – Durham Transit Authority (9)
City of Raleigh – Fire Departments (4)
City of Raleigh – Solid Waste Facility (2)
Greene County TN – Jail
Madison County NC – Board of Education
Mars Hill Library
MCAS Cherry Point

MCB Camp Lejeune
North Carolina National Guard
North Carolina State Parks
Rutherford County NC – Jail
Town of Black Mountain
Town of Carrboro
Town of Chapel Hill – Fire Department



Capabilities Statement

COMPANY DATA

Sundance Power Systems, Inc.

Established 1995

Owners: Dave & Sierra Hollister

Dir. of Business Development: Evan Becka

Field Operations Manager: Cody Kelly

Fed ID # 56-1923768

D & B # 96-248-1545

MAIN OFFICE

11 Salem Hill Road

Weaverville, NC 28787

828.645.2080

ebecka@sundancepower.com

BRANCH OFFICES

Raleigh, NC 919.252.0016

NAICS PRIMARY

221114 Electric power generation, solar

221114 Solar farms

237130 Solar power structure construction

237130 Alternative energy structure construction

238160 Solar reflecting coating, roof, application

238220 Solar heating equipment installation

335121 Solar lighting fixtures, residential, electric, manufacturing

335122 Solar lighting fixtures, electric, manufacturing

423690 Solar cells merchant wholesalers

423720 Solar heating panels and equipment merchant wholesalers

222115 Wind electric power generation

LICENSURE

Sundance holds an unlimited General Contractor's License as well as Electrical, Mechanical H-1 and Plumbing licenses. These licenses are all held by Sundance personnel. All of our installations comply with local, state, and federal codes.

General Contractor's License NC# 67075-
Unlimited

Electrical Contractor's License NC# L-14397

Mechanical H-1 License NC#21584

Plumbing License NC# 21584

DIFFERENTIATORS

- HUB Certified Woman-Owned Small Business
- Living Wage Certified
- NABCEP certified workers in installation, design and management
- AAA rating Better Business Bureau
- Diverse system and integration expertise in Grid-tie, Off-Grid, Wind Power, Hydroelectric and Radiant Floor and Solar Thermal Heating Systems.
- Family-owned, local NC business for Southeast region project installations
- Full-Time Maintenance Division
- Customized design process
- High quality, warranty products, as well as Buy-American-Agreement Compliant US Made products
- Relationship-based business practices
- Practice a Triple Bottom Line business strategy
- Committed to our community by employing full-time Outreach Coordinator
- We are committed to sustainability and the environment by operating as a carbon-neutral workplace.



REFERENCES

"Sundance Power quickly showed us that their **experience, knowledge and infrastructure could be counted upon**. They brought a unique blend of **intellectual property and product deliverability** that made us feel comfortable awarding the purchase and installation of our 55 kW solar system project to them. I'm glad we did. The system was **installed on time and on budget and the production has been all they promised and a little more. Their service after the sale has been impeccable**. I would highly recommend Sundance for your solar needs."

~Steve Linton, LEED AP

President/CEO Deltec Homes



Capabilities Statement

COMPANY QUALIFICATIONS

Sundance is a leading solar installer in the Southeastern United States.

- Over 1,000 renewable energy systems installed since 1995 for residential, commercial, institutional and municipal applications.

Our extensive experience allows us to bring significant skill and expertise to all aspects of project development.

- The Sundance five-step design process ensures we create long-term renewable energy strategies and projects that truly represent the goals of our clients.

We have established strong relationships with the NC Utilities Commission, NC Green Power, as well as Duke Energy, Progress Energy, Santee Cooper and many utility cooperatives throughout the Southeast. Sundance Power's Dave Hollister negotiated the first net-metering agreement in NC in 1997.

- We manage all of our design and installation work in-house and maintain one of the most experienced installation teams in the Southeast.
- Members of our design team, installation crews and field management hold NABCEP certifications in photovoltaics and solar thermal. We are OSHA Complaint and members of our installation team have received OSHA Certified Construction Industry Outreach Safety Training.

INSTITUTIONAL



Appalachian State
Solar Thermal System

COMMERCIAL



Wallace & Graham PA

MUNICIPAL



City of Raleigh
Solid Waste Facility

DEVELOPMENT



Sustainable urban
communities

SOME OF OUR VALUED CLIENTS

Schools / Institutions: Allegheny High, Appalachian State Uni., Asheville High, Avery High, Brush Creek Ele., Chapel Hill Ele., Clemson Uni., Duke Uni., Hillandale Ele., Hot Springs Ele., Madison Middle & High Schools, Mills River Ele., N. Wilkes Middle, Penland School of Crafts, UNC – Chapel Hill, Watauga High, Warren Wilson College, Wind for Schools Project (4),

Municipal / Government: Eastern Band of Cherokee Indians, City of Asheville, City of Raleigh and Town of Chapel Hill, Greene Co., Flat Rock National Guard Readiness Center, Rutherford Co., Town of Mars Hill, Madison County Board of Education, Town of Black Mountain, MCB Camp Lejeune

Commercial: Aloft Hotel, Johnson Controls, Glaxo–Smith Kline, Deltec Manufacturing, Appalcart Transit, Altamont Theatre, Asheville Independent Restaurants (Homegrown, Luella's, Neo Cantina, Posana, Rosetta's, The Chocolate Lounge, The Green Sage), Bright Fields Charging Station, Charlotte Street Animal Hospital, First Congregational United Church of Christ,

Sundance Power Systems

Sierra Nevada Brewing Co., North Carolina



Courtesy Sundance Power Systems

Overview

DESIGNER: Drew Cates, design and estimate coordinator, Sundance Power Systems, sundancepower.com

PROJECT MANAGER: Grayson Newell, director of field development, Sundance Power Systems

ENGINEER: Dale Reynolds, PE, senior electrical engineer, McKim & Creed, mckimcreed.com

DATE COMMISSIONED:
January 19, 2014

INSTALLATION TIME FRAME: 120 days

LOCATION: Mills River, NC, 35.4°N

SOLAR RESOURCE: 4.3 kWh/m²/day

ASHRAE DESIGN TEMPERATURES:
88°F 0.2% avg. high, 5°F extreme min.

ARRAY CAPACITY: 710 kWdc

ANNUAL AC PRODUCTION: 903 MWh

Sierra Nevada Brewing Company is well known for its commitment to preserving the environment and its sustainability initiatives for manufacturing its ales and lagers. Its Chico, California, brewery is home to one of the largest privately owned PV arrays in the country. When it made the decision to expand to a new East Coast location in Mills River, North Carolina, Sierra Nevada intended to make the new facility as sustainable as possible, with features including a solar component to offset a substantial portion of the site's electrical usage.

North Carolina has a 1 MWac cap per customer on net-metered systems. This limitation dictated the size of the systems designed for the brewery. With two planned 200 kW turbine generators, fueled with methane produced from spent grains and wastewater treatment on-site,

the total solar inverter capacity had a calculated target of 600 kWac.

The system included nine parking lot canopies with a total capacity of 60 kWdc, custom designed to create shaded parking during the day and provide lighting at night from fixtures integrated on the underside of the canopies. Wire management within the canopy structures posed an installation challenge. Due to aesthetic requirements, the design concealed all of the dc source circuits and ac lighting circuits within the canopies' structural members, which required fabrication of the structures with internal wiring partitions to keep the ac and dc wires separated throughout. Additionally, aesthetic elements of the canopy design resulted in minimal array shading during certain times of the day. However, the canopies represent a small portion of the total array capacity



Courtesy Sierra Nevada Brewing Company (2)

on-site and create a striking effect for the brewery's visitors.

The Sundance Power Systems team installed the 650 kWdc rooftop array over nearly two acres of the packing warehouse's roof. The precast concrete roof provided an ideal surface for laying out Daetwyler's Eco-Top Rooftop Mounting Structures. Sundance selected the Eco-Top product in part because Daetwyler

manufactures it in North Carolina, so it qualifies for local materials credit in LEED certification, an option that Sierra Nevada will be pursuing.

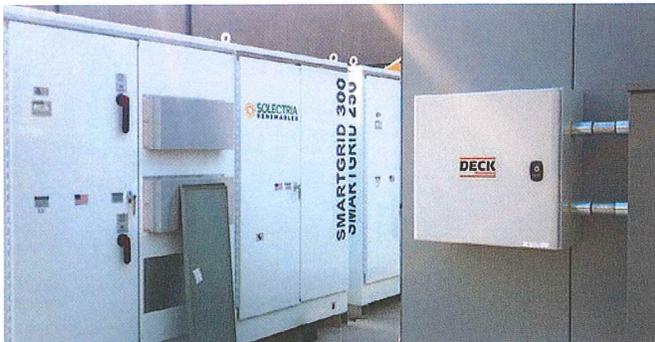
The canopy and rooftop systems interconnect at separate locations on-site. The rooftop system's 250 kW and 300 kW Solectria inverters are located on the opposite side of the cold storage warehouse from the canopy arrays. The rooftop system's point of delivery is located at

the 480 Vac switchgear on the load side of the MV transformer that feeds the warehouse section of Sierra Nevada's site grid. The canopy array's 50 kW inverter interconnects at a 480 Vac subpanel located adjacent to the keg line.

"Delays challenged this installation, including product availability issues, record rainfall for the season and working with custom canopy structures. However, Sierra

Nevada's familiarity with PV from past installations and its commitment to quality craftsmanship throughout this project were hugely instrumental in the success of the design and installation."

—Drew Cates,
Sundance Power
Systems



Courtesy Sundance Power Systems

Equipment Specifications

MODULES, ROOFTOP: 2,030 Kyocera KD320GX, 320 W STC, +5%/-0%, 7.99 Imp, 40.1 Vmp, 8.6 Isc, 49.5 Voc

MODULES, CANOPIES: 198 Suniva OPT305-72-4-100, 305 W STC, +5/-0 W, 8.45 Imp, 36.1 Vmp, 9 Isc, 45.6 Voc

INVERTERS: 3-phase 277/480 Vac service, one Solectria PVI 50KW (50 kW, 600 Vdc maximum input, 300–500 Vdc MPPT range), one Solectria SGI 250 (250 kW, 600 Vdc maximum input, 300–500 Vdc MPPT range), one Solectria SGI 300 (300 kW, 600 Vdc maximum input, 300–500 Vdc MPPT range)

ARRAY, ROOFTOP: 10 modules per source circuit (3,200 W, 7.99 Imp, 401 Vmp, 8.6 Isc, 495 Voc), 16–24 source circuits per combiner, 4–6 combiners per inverter, 649.6 kW array total

ARRAY, CANOPIES: 11 modules per source circuit (3,355 W, 8.45 Imp, 397.1 Vmp, 9 Isc, 501.6 Voc), 18 source circuits total (60.39 kW, 152.1 Imp, 397.1 Vmp, 162 Isc, 501.6 Voc), 60.4 kW array total

ARRAY INSTALLATION, ROOFTOP: Ballasted low-slope roof mount, membrane roofing, Daetwyler CE Eco-Top Gen2 Rooftop Mounting Structures, 141° azimuth, 10° tilt

ARRAY INSTALLATION, CANOPIES: Custom-fabricated canopy structures, 141° azimuth, 20° tilt

SOURCE-CIRCUIT COMBINERS: 11 SolarBOS Disconnect Combiners, 15 A fuses

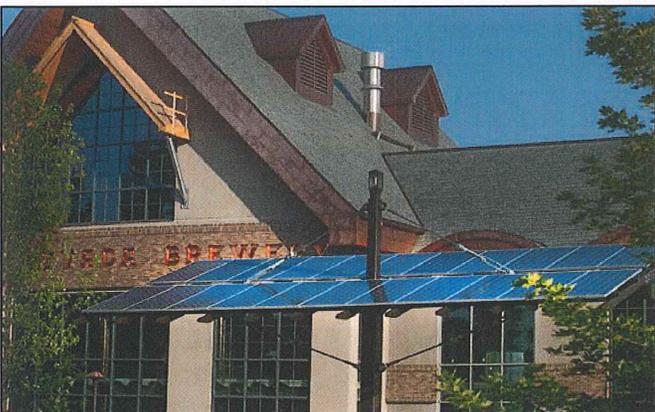
SYSTEM MONITORING: String-level DECK monitoring with weather station



Project Profile

Sierra Nevada's new state-of the-art brewery in Mills River, NC demonstrates leading edge sustainability measures, including on- site solar electric generation. With a combined capacity of 712 kilowatts DC, two separate photovoltaic systems will produce a significant amount of the power used in their operations.

The rooftop array covers nearly two acres on the facility's packing and warehouse, while nine parking lot canopies are strikingly visible to the public. They provide shading, and reduce the heat island effect, enhancing the experience for visitors.



Specifications

Rooftop Array

System Size	650 kW DC
Estimated Annual Production	852,857 kWh
PV Modules	(2,030) Kyocera 320 watt modules
Racking	Daetwyler Eco-Top Mounting System
Inverters	Solectria (1) 250 kW, (1) 300 kW
Monitoring	Deck (string level)
CO2 offset equivalent	588 metric tons

Parking Lot Canopies

System Size	60 kW DC
Estimated Annual Production	50,053 kWh
PV Modules	(198) Suniva 305 watt modules
Racking	Custom design
Inverter	Solectria (1) 50 kW
Monitoring	Deck (zone level)
CO2 offset equivalent	43.5 metric tons



Customer Profile

Founded in 1980, Sierra Nevada Brewing Co. is one of America's premier craft breweries, highly regarded for using only whole-cone hops and the finest quality ingredients. The pioneering spirit that launched Sierra Nevada spans more than three decades, with innovation emerging from both the brewhouse and sustainability initiatives.

Learn more at www.sierranevada.com.

About Sundance Power Systems

Sundance Power Systems was established in 1995 and has built a solid reputation for being a trusted partner for solar projects throughout the region. Our team brings significant skill and expertise to all aspects of the project development.

Learn more at www.sundancepower.com

"Integrating renewable energy into our Mills River facility was an important part of our project design. Mirroring our Chico, California brewery's diverse approach to renewable energy, we decided to couple biogas powered microturbines with photovoltaic technology in North Carolina. Sundance Power Systems designed and installed our 710 kW solar system, which covers a warehouse roof and features canopies in our parking lot. We are looking forward to enjoying many years of renewable energy from the system."

- Cheri Chastain, Sustainability Manager, Sierra Nevada Brewing Co.