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Santee Cooper's Renewable Energy Initiatives

Elizabeth Kress

Oct. 25, 2012

Building Enclosure Council – Charleston

BUTME

Buildings Use Too Much Energy:
The Solutions Symposium

Who are we?

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- Santee Cooper is the South Carolina Public Service Authority, an authority of the state government. Santee Cooper is a retail electric utility along the northern coast of South Carolina, and a supplier of electricity to a network of electric co-operatives and a number of industrial customers across the state.
- Currently net summer capacity is approx 6 GW
- State's net summer capacity is approx 24 GW

Renewable Resources
- specific to South Carolina

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- **Biomass**
- **Wind**
- **Solar**
- **Hydro**
- **Geothermal**
- **Marine**
  (Tidal/Wave/Current)

– **How much of each is available?**
– **How effective is the energy production technology?**
– **What is the cost?**
– **What are the obstacles?**

South Carolina – Available Renewables

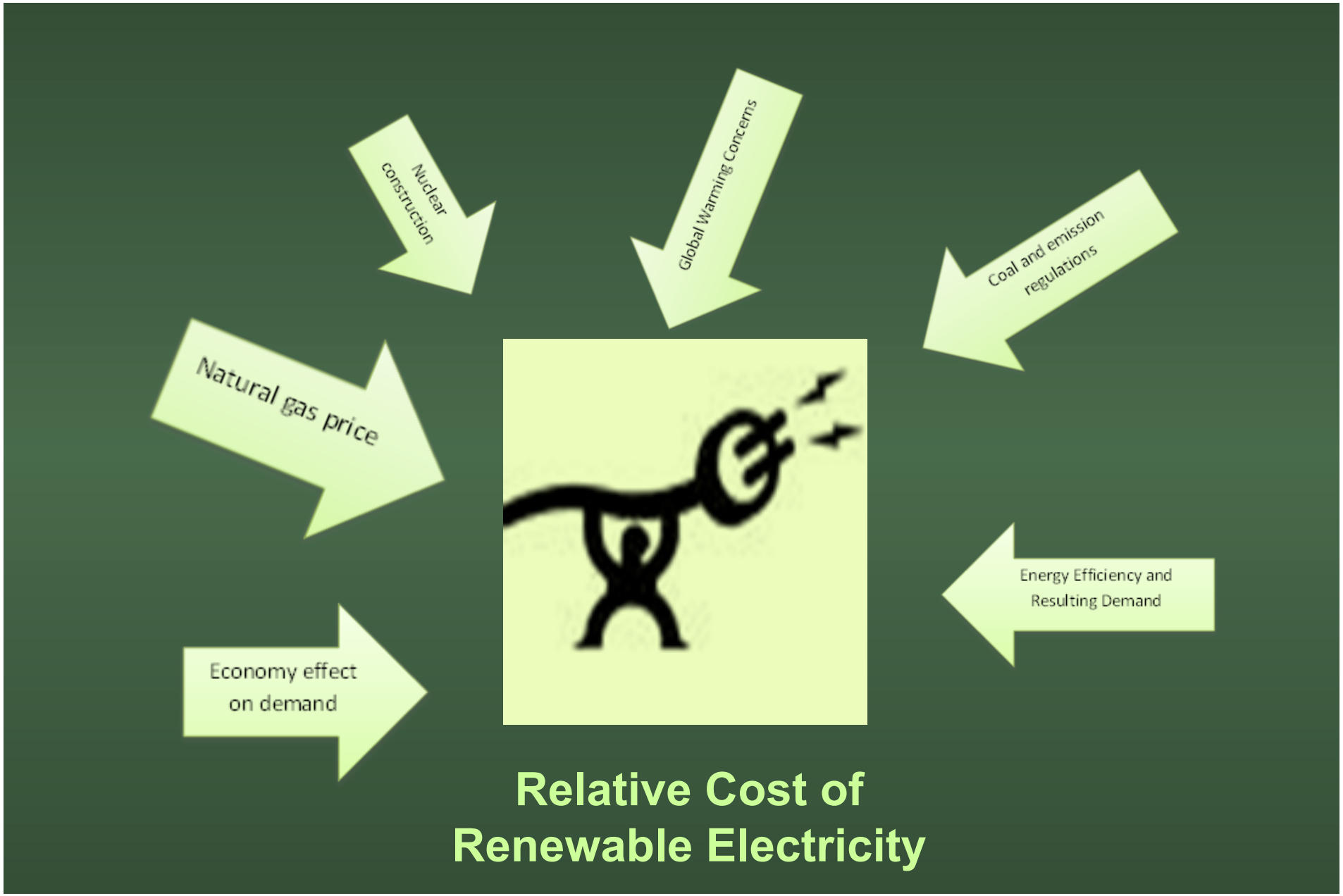
(source: Black and Veatch for SCEAC)

RESOURCE	TECHNICAL POTENTIAL CAPACITY (MW)[e]	CONSTRAINED POTENTIAL CAPACITY (MW)[e]
Wind		
Onshore	185-1,215	185
Offshore	70,000	3,300
Solar Photovoltaic	51,000	850-1,700
Hydroelectric[d]	(630 MWa) 1,260-1,575	(164 MWa) 328-410
Landfill Gas Projects	12.1-17.5	12.1-17.5
Biomass		
Woody Biomass	960	317
Agricultural Residues	370	63
Energy Crops	227-565	23-56
Anaerobic Digestion of Organic Waste	46	28

Total w/o offshore wind = 2,777 MW

Total w/ offshore wind = 6,077 MW

Total state capacity = 24,000 MW


Nuclear construction
Global Warming Concerns
Coal and emission regulations
Natural gas price
Energy Efficiency and Resulting Demand
Economy effect on demand
Relative Cost of Renewable Electricity

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Green Power Program

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Began in September 2001 with the start-up of the Horry County Landfill-Gas-to-Energy Generating Station

Landfill Gas is a Type of Biomass Generation

LMOP AWARD WINNER

Green Power

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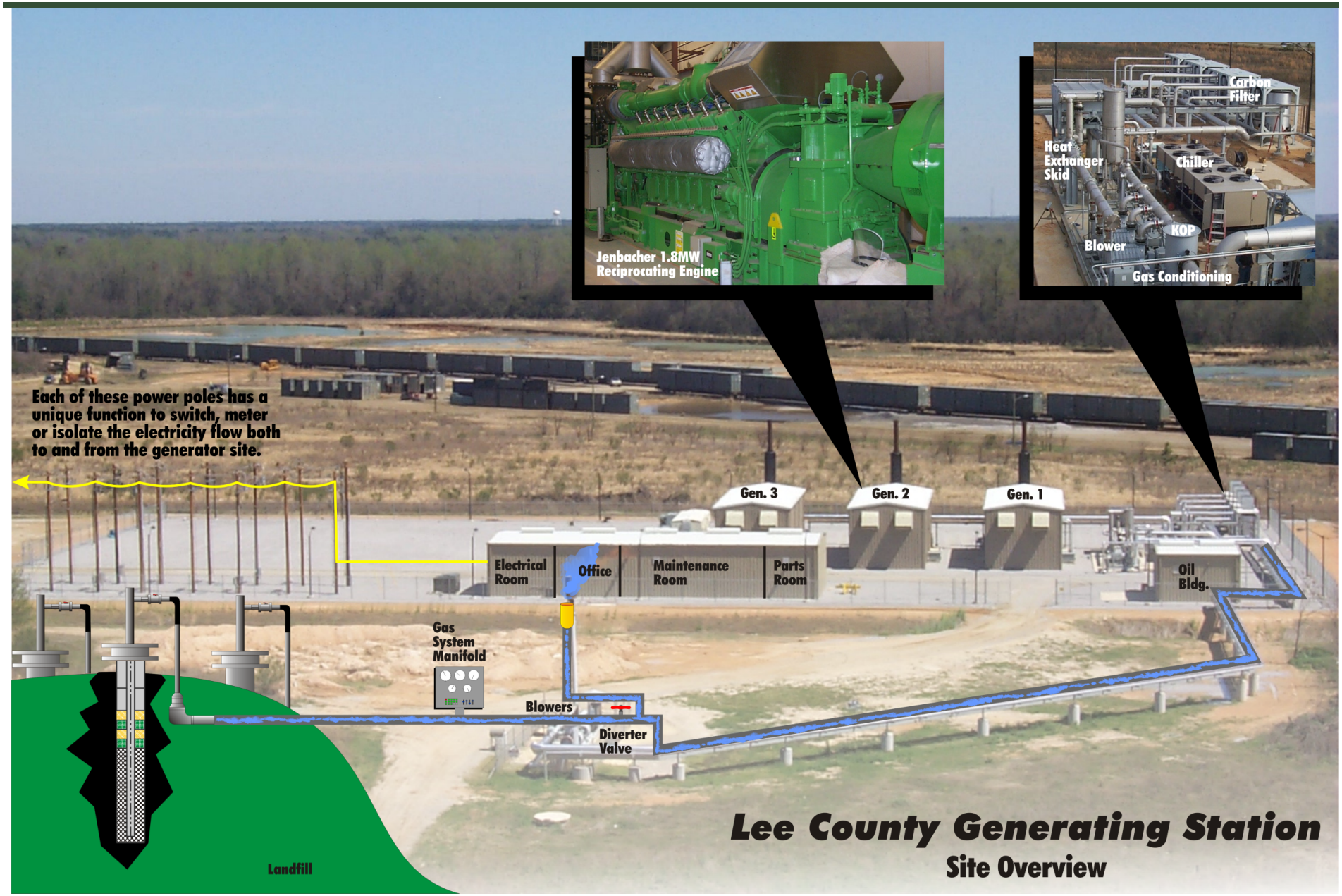
100% of the revenue collected from Green Power sales goes into a fund that is reinvested in future development of renewable energy resources.


Jenbacher 1.8MW
Reciprocating Engine
Carbon
Filter
Heat
Exchanger
Skid
Chiller
KOP
Blower
Gas Conditioning
Each of these power poles has a unique function to switch, meter or isolate the electricity flow both to and from the generator site.
Gen. 3
Gen. 2
Gen. 1
Electrical Room
Office
Maintenance Room
Parts Room
Oil Bldg.
Gas System Manifold
Blowers
Diverter Valve
Landfill
Lee County Generating Station
Site Overview

Landfill Gas

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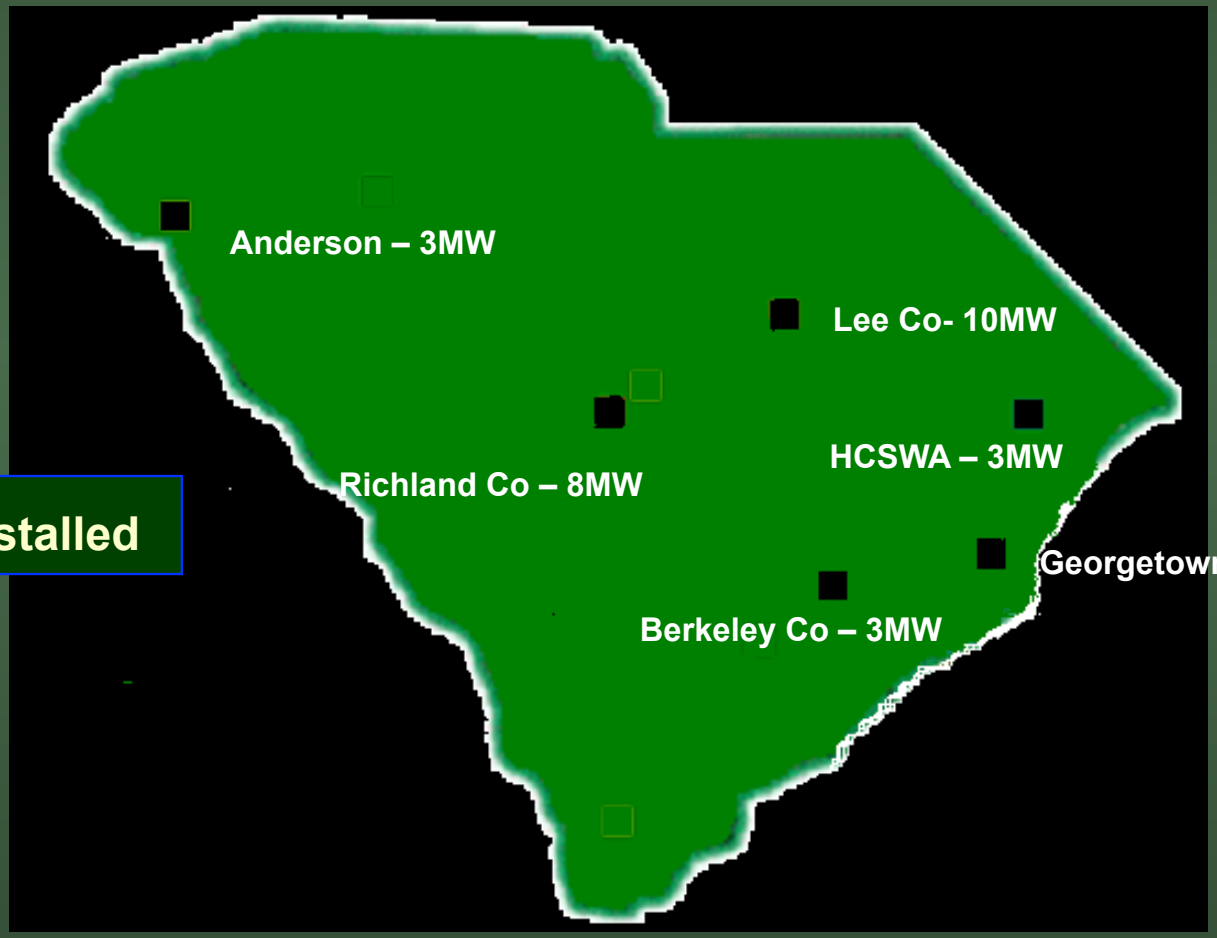

28 MW installed

Biomass – Landfill Gas

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Horry:	3 MW	(2001, 2003)
Lee:	10 MW	(2005, 2009)
Richland:	8 MW	(2006, 2010)
Anderson:	3 MW	(2008)
Georgetown:	1 MW	(2010)
Berkeley:	3 MW	(2011)
Total	28 MW	

Georgetown County Landfill Gas Site

Renewables

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- 151 MW's in current and contracted capacity
- Not all is Green Power, because the contracted woody biomass PPA's are not certified to CRS for sale.

Woody Biomass – PPA's

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- Domtar – 38 MW cogen wood-fueled project that was carefully negotiated among Domtar, MEC and Santee Cooper
- Southeast Renewable Energy – (2) 17.8 MW wood-fueled plants in Dorchester and Allendale Counties
- Northstar – 21 MW wood-fueled project in Horry County

Biomass – Woody Biomass

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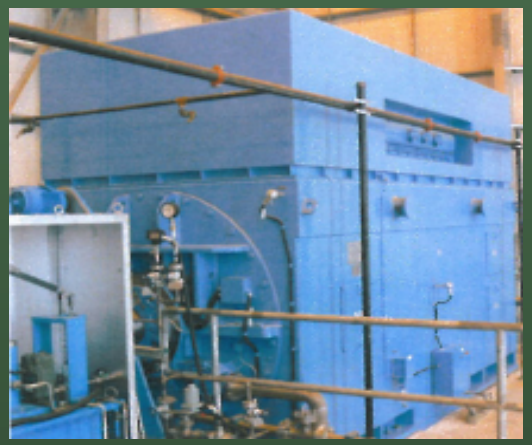
Domtar

It all begins with paper.®

- 38 MW
- Began generating power Sept. 17, 2010
- Operating >80% capacity factor



Biomass – Woody Biomass

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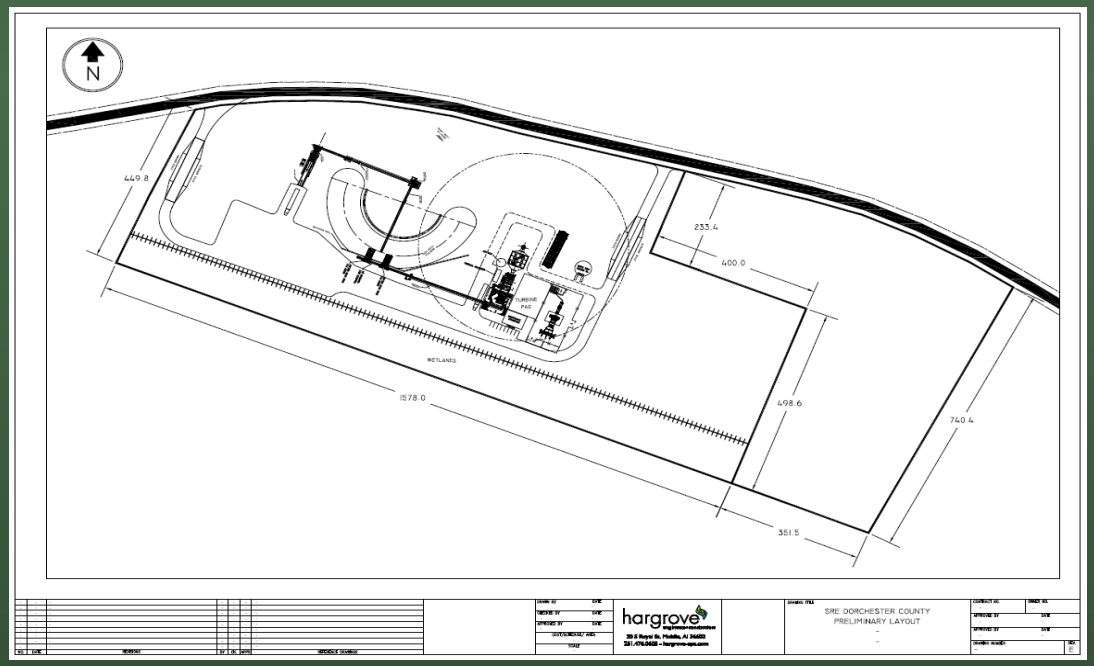
- Allendale Biomass, LLC
- Dorchester Biomass, LLC
- 17.8 MW each
- Scheduled on-line in Nov 2013



Biomass – Digester/Biogas

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4 Anaerobic Digester/Biogas PPAs

1. Waste2Energy
   Columbia area, Food and produce waste collection,1.6 MW
2. Bioenergy Technologies
   Berkeley County, Grease and sludge,1.6 MW
3. Burrows Hall
   Williamsburg Co, Hog waste,180 kW
4. Green Energy Solutions
   chicken manure, State-wide, 50 sites, 510 kW ea

Biomass – Digester/Biogas

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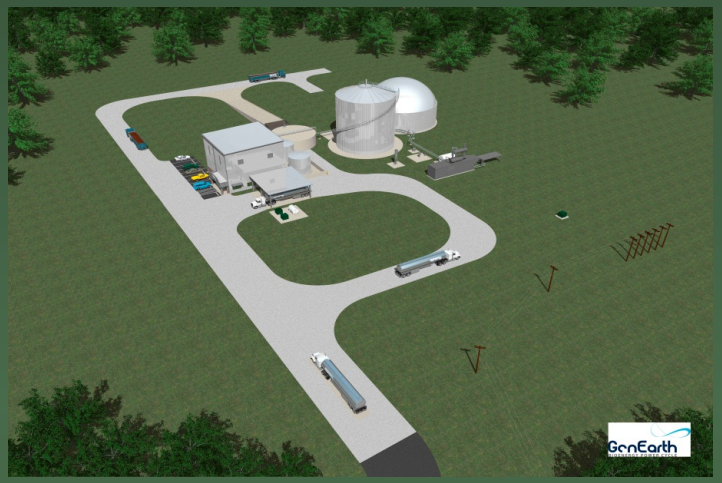
Bio Energy Technologies

- 1.6 MW generator



Biomass – Digester/Biogas

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Environmental Fabrics, Inc.
10,000 head hog farm
Earthen Insulated Covered Lagoon
Anaerobic Digester

180 kW Capacity

Biomass – Digester/Biogas

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- Green Energy Solutions
  - Up to 50 Farms across the state
  - 25 MW

Santee Cooper Solar Schools Program

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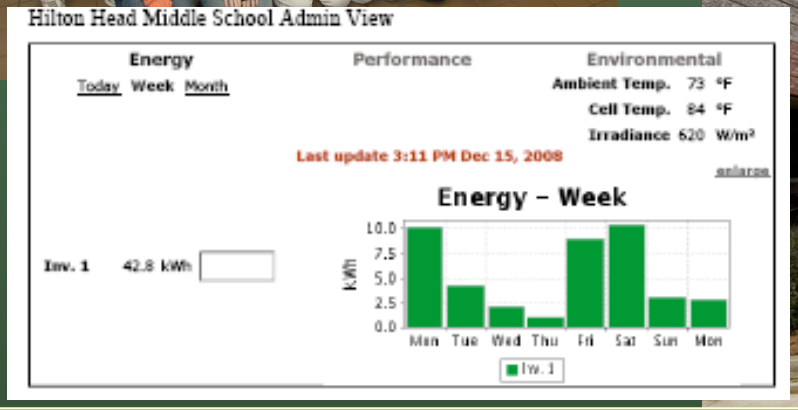

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Bennettsville
Mauldin
Springfield
Diamond Hill
Aynor
Hillcrest
Sangaree
Carver's Bay
New Ellenton
Hilton Head
Hopkins
Chapin
Leslie M. Stover
Chesterfield-Ruby
Carver-Edisto
Ruffin
Savannah Grove
Tamassee-Salem

Solar

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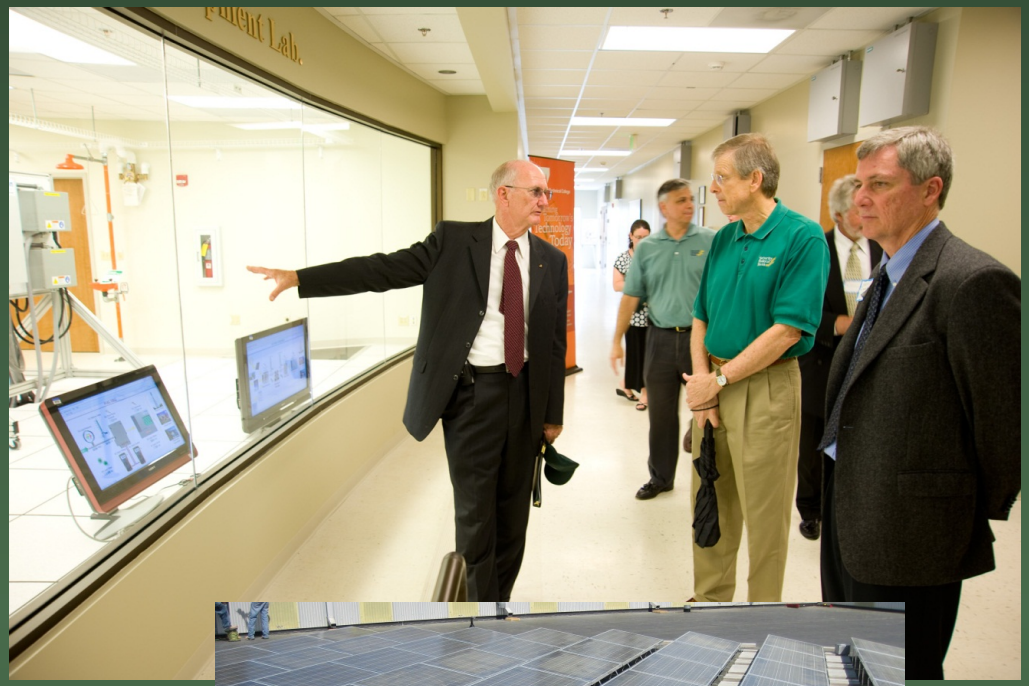
Solar Pavilions at Coastal Carolina University

Solar Canopies at Technical College of the Lowcountry – New River Campus - Bluffton SC



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Solar to Hydrogen Demonstration

at the

Center for Hydrogen Research

Dedicated on May 15, 2009

Education, Training and Development Lab

which demonstrates

- Storage of solar power in hydrogen
- Hydrogen as a means to transport energy
- Clean cycle for transportation to replace oil and gas

Grand Strand Solar Project

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- 311 kW
- 1,325 modules
- 4 Inverters
- Grid connected
- Dedicated April 18, 2011
- Partial funding from a SEP-ARRA Grant

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Solar Homes Initiative 2008
Living Green
With Renewable Energy

SOLAR SYSTEMS

NAME	KW	LOC.	SQ FT	GEO.	THERMAL	HEAT REC.
CROMARTIE	4.48	GRD RACK	4439		3	
DAVIS	4.16	ROOF RACK	3851			
DERR	2.0	ROOF	1890		1	
HOUGHTON (B)	3.3	ROOF	2300	2		
KAMPEN	3.2	ROOF	2857			
LAWARE	3.6	ROOF	2200		1	
LONG	4.16	ROOF	3552		1	
MacKINNON (B)	2.0	ROOF	2037		1	1
MILLER	4.16	ROOF	2448		1	
MIMMS	4.16	GRD RACK	3800	2		
TOTAL kW	35.36					

santee cooper green

Solar Homes Initiative 2008
Living Green With Renewable Energy

3.6 kW Flush Mounted Roof
David Laware – Shady Oak Ln., Surfside Beach

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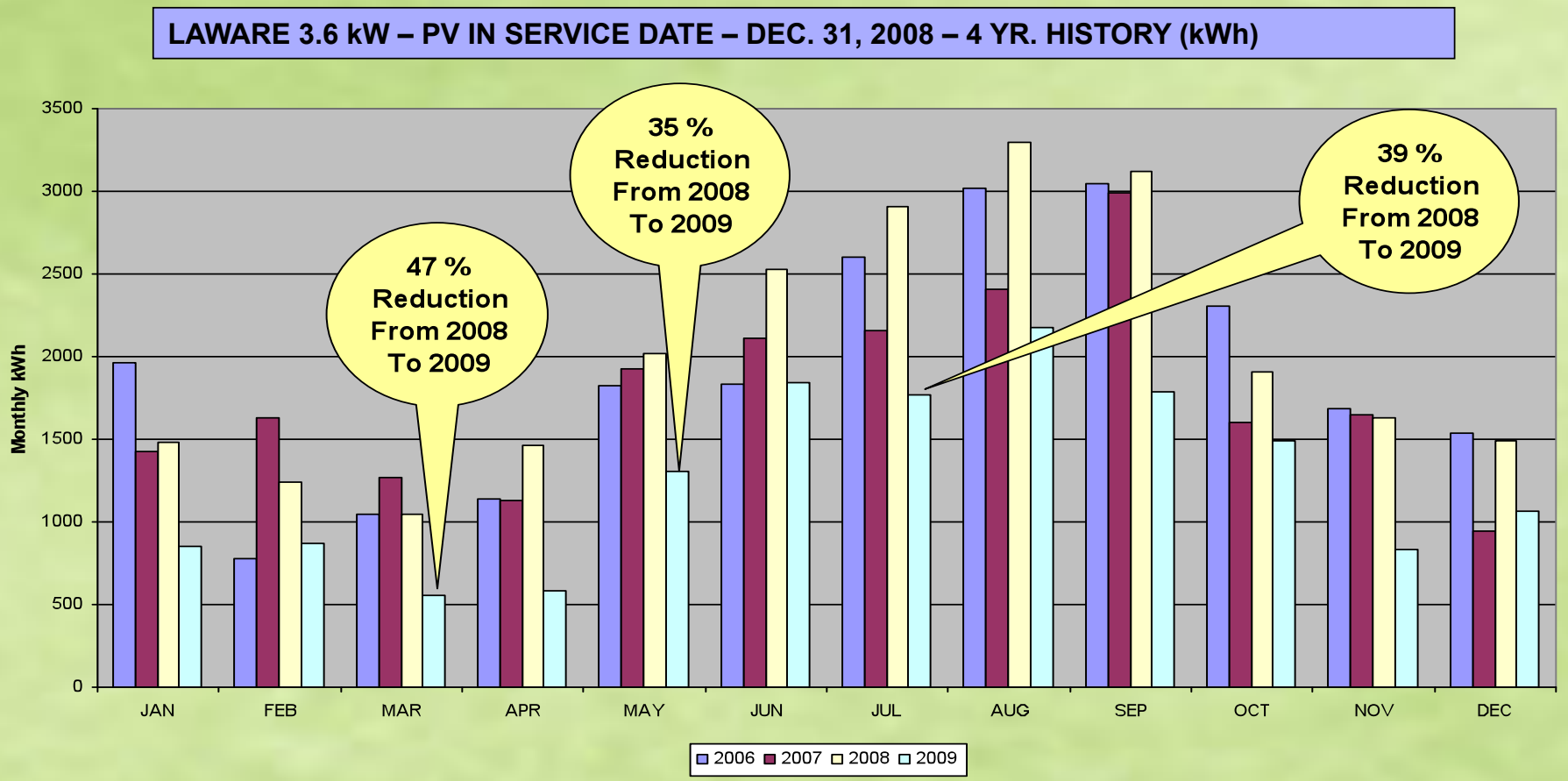
Solar Homes Initiative 2008
Living Green
With Renewable Energy



Why Consider Offshore Wind?

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- Santee Cooper:
  - renewable energy leader
- Limited renewable resources
- Conditions support research
  - Shallow coast
  - Class 6 winds close to shore
  - Good ports
  - Robust transmission near coast

Why Consider Offshore Wind?

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- Great Partners
  - Ocean and Coastal Consultants (div of COWI)
  - Savannah River National Labs
  - Clemson University (esp CURI DTTF)
  - Coastal Carolina University
  - South Carolina Energy Office
  - Dozens of individual OSW supporters within many SC organizations

SRNL
SAVANNAH RIVER NATIONAL LABORATORY
Operated by Savannah River Nuclear Solutions, LLC
We Put Science To Work

Wind Turbine Demo

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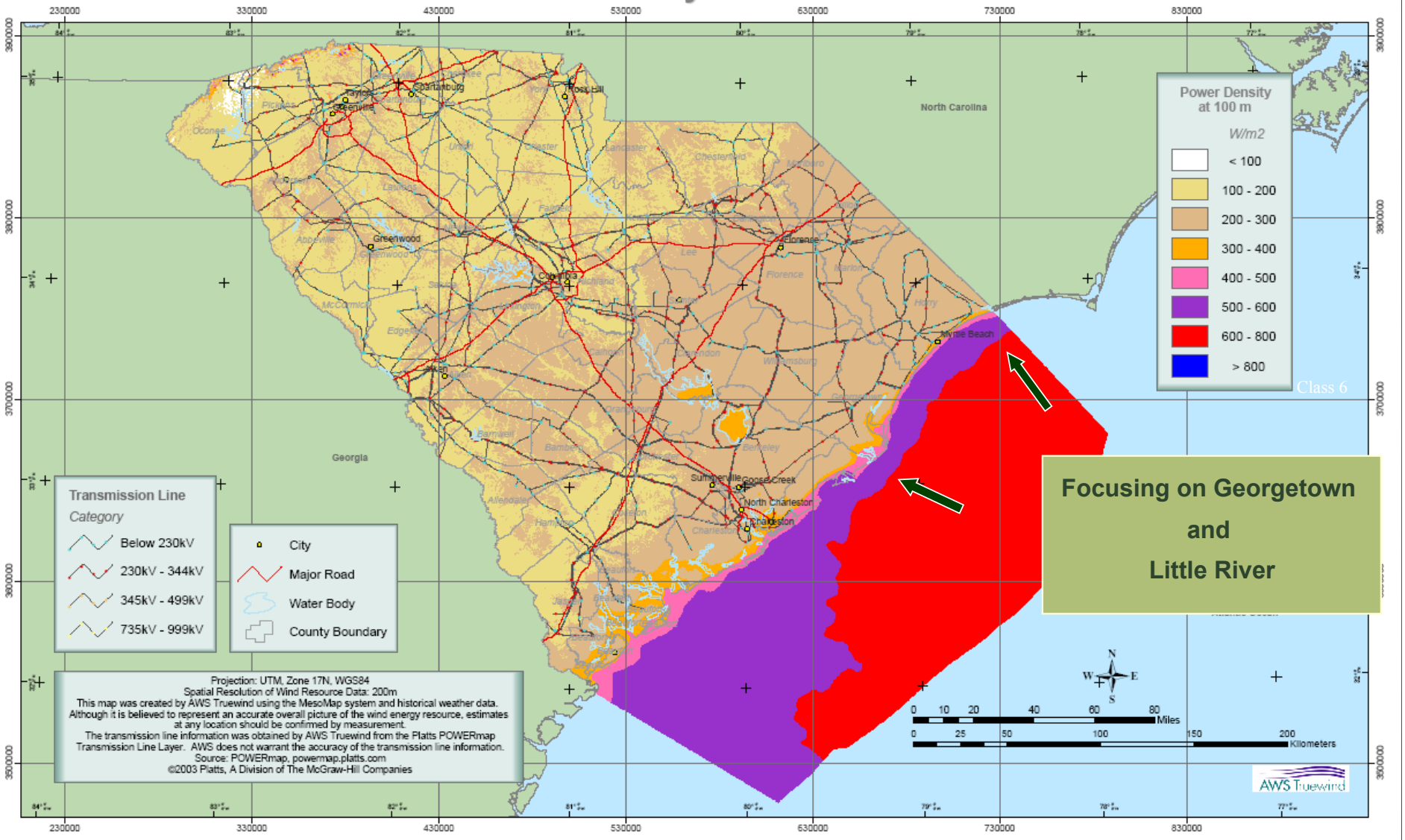
- NMB, Oceanfront park
- 2.4kW rated capacity
- A small scale example of an offshore wind turbine (HAWT)
- Developing curriculum for high school students

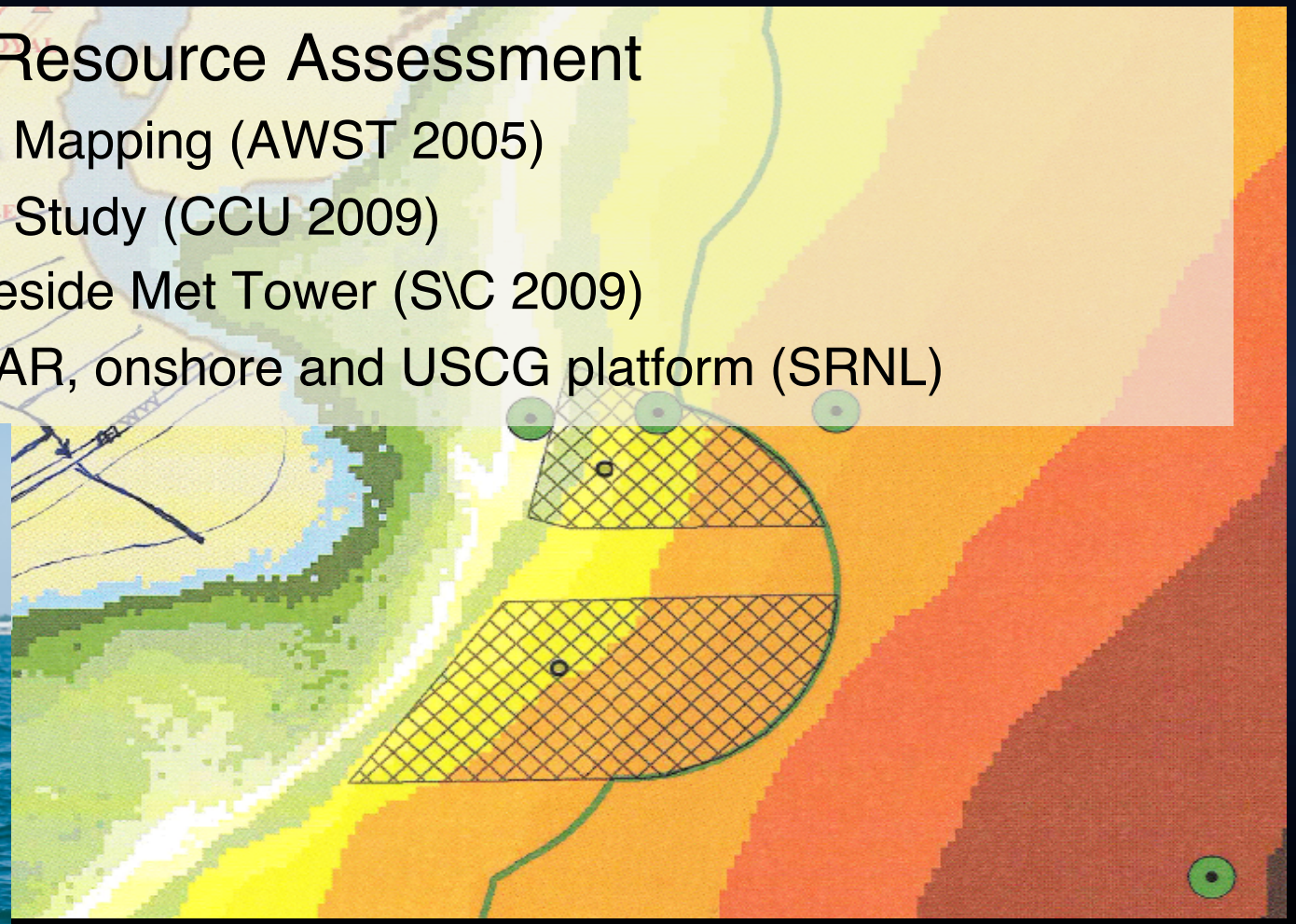
Mean Annual Wind Power Density of South Carolina at 100 Meters



BACKGROUND WORK

SEAWIND
Research
Project

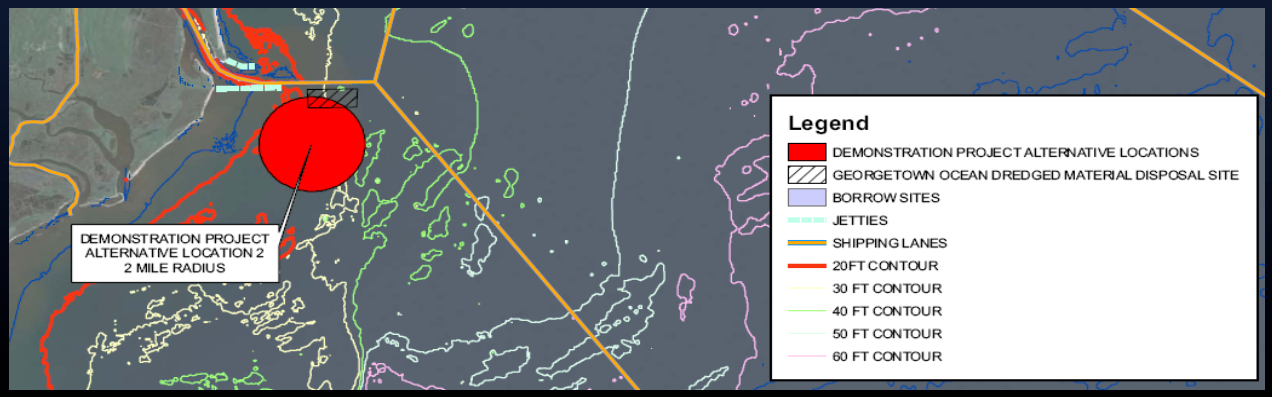
- Wind Resource Assessment
  - Wind Mapping (AWST 2005)
  - Buoy Study (CCU 2009)
  - Shoreside Met Tower (S\C 2009)
  - SODAR, onshore and USCG platform (SRNL)



BACKGROUND WORK

SEAWIND Research Project

- Siting Work
  - Wind Farm Feasibility Committee (SC Energy Office)
  - Transmission / Grid Integration Study (SC Energy Office)
  - Preliminary Siting (SC Energy Office)
  - Photo Simulations (Clemson)



BACKGROUND WORK

SEAWIND Research Project

- Regulatory Task Force
  - Made up of State and Federal Agencies, Stakeholders, Interested Parties
  - Convened in 2009
  - ID Regulatory Process (State Waters)
  - Leasing Framework Recommendation
  - Coastal Geospatial Mapping (SCDNR)
  - Demonstration Project presented to RTF in May and July 2011 and January 2012.

BACKGROUND WORK

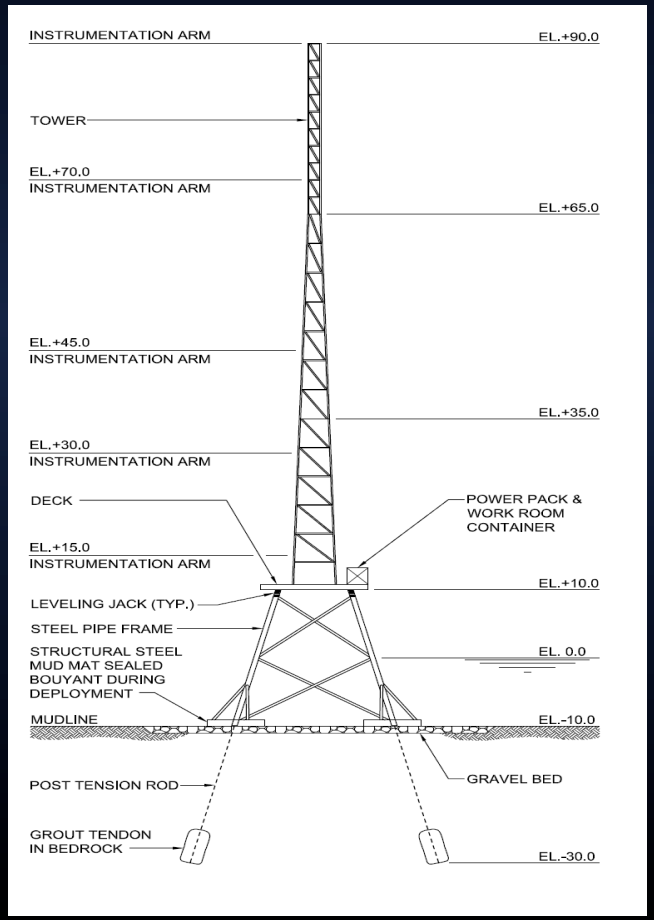
SEAWIND Research Project

- Offshore Meteorological Station
  - Conceptual Design
  - Siting Validation
  - Site Investigation
    - Geophysical Surveys
    - Geotechnical Surveys
  - Design Protocol
  - Preliminary Design
  - Regulatory Permit Preparation

METEOROLOGICAL STATION CONCEPTUAL DESIGN

SEAWIND Research Project

- Monitoring Program Alternatives
  - Short Vs. Tall Tower
  - Remote Sensing Equipment
- Foundation Alternatives
  - Gravity, Jacket, Monopile, Suction, Driven Pile,
- Tower Type Alternatives
  - Monopole Vs. Lattice



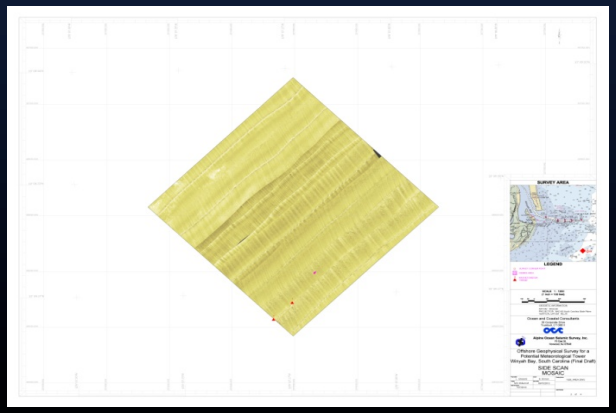
METEOROLOGICAL STATION SITE INVESTIGATION

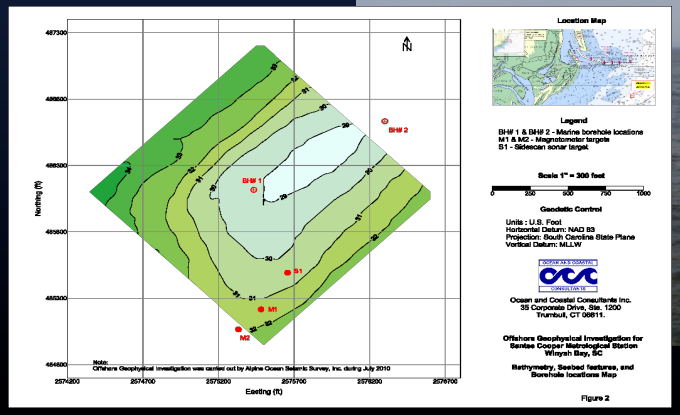
SEAWIND Research Project

Geophysical Surveys

- Hydrographic
- Side Scan
- Magnetometer
- Subbottom Profile

Geotechnical Surveys





METEOROLOGICAL STATION DESIGN PROTOCOL

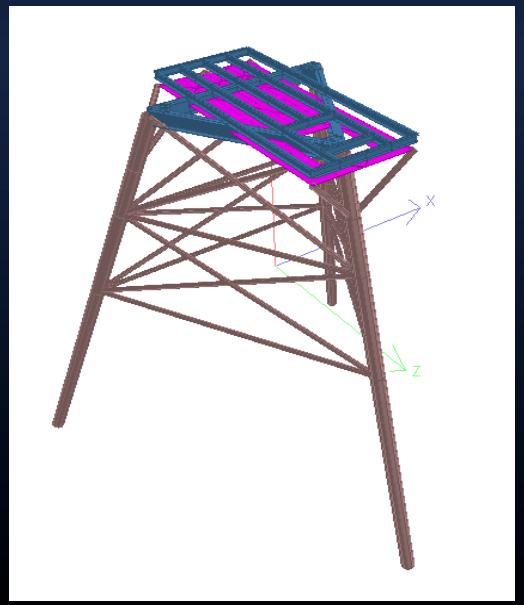
SEAWIND Research Project

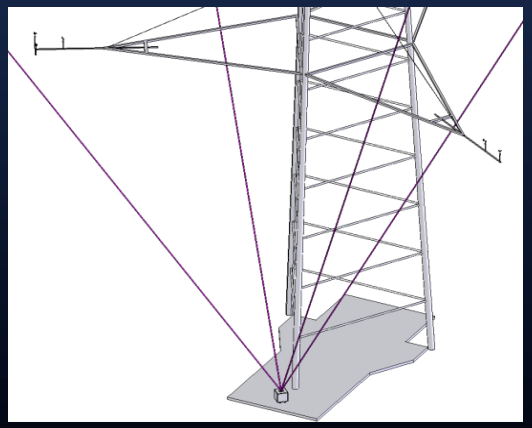
- Design Principles / Certification
- Site Conditions / Environmental Loads
- Operational Criteria
  - Multipurpose Research Platform
- Constructability
- Decommissioning

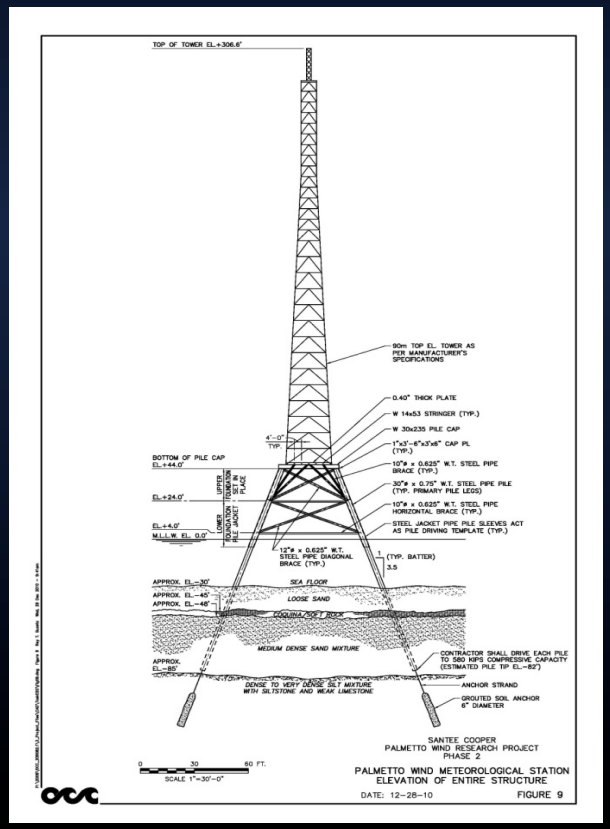
METEOROLOGICAL STATION PRELIMINARY DESIGN

SEAWIND Research Project

- Structural Design and Layout
- 3-D Structural Modeling







METEOROLOGICAL STATION REGULATORY STATUS

SEAWIND
Research
Project

- Pre-Application Discussions
- Presented to RTF
- Applications are Ready for Submittal to Regulatory Agencies

Demonstration Project Purpose

SEAWIND Research Project

The purpose of the demonstration scale offshore wind farm conceptual design (up to 20 wind driven generators) is to provide an actual circumstance to evaluate the environmental impacts, wind conditions, constructability, grid integration aspects, and socioeconomics of an offshore wind energy generating facility in South Carolina. The understanding gained from the demonstration farm as currently conceptualized will be widely applicable, especially in the South Atlantic Bight. No decision or plan to construct has been made regarding this design because more detailed cost and feasibility information is required.

PROJECT EXPECTATIONS

SEAWIND
Research
Project

- Not a utility scale alternative
- Large scale onshore wind not viable
- South Atlantic Bight – significant wind resource
- Initial wind studies indicated Northern SC has better wind resource
- State waters
- Answer questions about offshore wind

South Carolina
OSW Path Forward

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- Have a great location in state waters with over $1.5 million invested in design and uncountable man-hours of vetting
- State overall has been supportive, with no opponents to date
- Overall, Santee Cooper has been very supportive of the efforts
- Looking for the right timing and partners
- Will keep working at this until it is not relevant.

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Green Power

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Please purchase Green Power from Santee Cooper or the electrical cooperatives.

Every dollar goes directly to new renewable generation.

$3 for a 100 kWh block each month, added to your electric bill

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Santee Cooper's Renewable Energy Initiatives

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