Georgia solar energy looks bright

11.18.2014

NREL

Rob Felt/ Georgia Institute of Technology

Tom Raftery

MAGE SOLAR
Agenda

- **Pew’s Research: Clean Economy Rising**
  - Phyllis Cuttino, *director, clean energy*, The Pew Charitable Trusts

- **Solar Power in Georgia**
  - James Marlow, *CEO*, Radiance Solar

- **Energy Efficiency in Georgia**
  - Mandy Mahoney, *executive director*, Southeastern Energy Efficiency Alliance
The Pew Clean Energy Initiative

The goal is to accelerate the clean energy economy for its national security, economic and environmental benefits.

The program promotes the adoption of key changes to U.S. energy policy in four sectors:

- Industry
- Utilities
- Transportation
- Research and Development
# Clean Economy Rising

## Project Overview

<table>
<thead>
<tr>
<th>State</th>
<th>SECTORS</th>
<th>EMERGING OPPORTUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>Solar, Biomass</td>
<td>Offshore Wind, EVs</td>
</tr>
<tr>
<td>ME</td>
<td>Wind, Biomass</td>
<td>Marine Hydrokinetic</td>
</tr>
<tr>
<td>MI</td>
<td>Wind, Biofuels</td>
<td>Cleantech Incubator</td>
</tr>
<tr>
<td>NC</td>
<td>Solar, Smart Grids</td>
<td>EVs, Biofuels</td>
</tr>
<tr>
<td>ND</td>
<td>Wind, Industrial Energy Efficiency</td>
<td>Solar, Biomass</td>
</tr>
<tr>
<td>OH</td>
<td>Wind, Solar, Industrial Energy Efficiency</td>
<td>Storage, Advanced Vehicles</td>
</tr>
<tr>
<td>PA</td>
<td>Industrial Energy Efficiency, Solar</td>
<td>Advanced Hydro</td>
</tr>
<tr>
<td>TX</td>
<td>Wind, Solar, Industrial Energy Efficiency</td>
<td>Clean Energy Manufacturing</td>
</tr>
</tbody>
</table>
Highlights of Georgia’s Clean Energy Economy

<table>
<thead>
<tr>
<th>Rank</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>3% of U.S. additions of clean energy capacity, 2013</td>
<td></td>
</tr>
<tr>
<td>10th</td>
<td>3rd nationwide in biomass electricity generated in 2013</td>
<td></td>
</tr>
<tr>
<td>13th</td>
<td>in new renewable capacity installations, 2013 (192 MW)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in private investment, 2013 ($477 million)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in energy- and environment-related jobs, 2011 (64,205)</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Navigant Research, Bureau of Labor Statistics
© 2014 The Pew Charitable Trusts
# Highlights of Georgia’s Clean Energy Economy

## National Rankings

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category and Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>in new renewable capacity installations, 2013</td>
<td>192 MW</td>
</tr>
<tr>
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<td>in private investment, 2013</td>
<td>$477 million</td>
</tr>
<tr>
<td>13th</td>
<td>in energy- and environment-related jobs, 2011</td>
<td>64,205</td>
</tr>
</tbody>
</table>

- 225% increase in solar jobs, 2012 to 2013 – largest gain of any state
- 10th nationwide in private investment, 2013 ($477 million)

Sources: Navigant Research, Bureau of Labor Statistics
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Drivers of Georgia’s Clean Energy Economy

1. Policy

- Federal and state incentives

### Key State Policies

<table>
<thead>
<tr>
<th>Policy Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable portfolio standard</td>
<td></td>
</tr>
<tr>
<td>Tax incentives</td>
<td>✔️</td>
</tr>
<tr>
<td>Green power purchasing</td>
<td></td>
</tr>
<tr>
<td>Net metering and interconnection standards</td>
<td>✔️</td>
</tr>
<tr>
<td>Bonds/loans/rebates/other financing</td>
<td>✔️</td>
</tr>
<tr>
<td>Nonutility sales of renewable electricity allowed</td>
<td></td>
</tr>
</tbody>
</table>

Source: North Carolina State University, Database of State Incentives for Renewables and Efficiency

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2. Innovative Research Institutions

- Georgia Institute of Technology: solar, smart grids, wind
- University of Georgia and Georgia Southern University: biomass and biofuels
Clean Energy Installations & Investment

- 290 MW, $666M over past 5 years
- 1.5 GW, $4.4B over next 10 years

Sources: Navigant Research, Energy Information Administration
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Solar

Georgia Solar
National rankings and statistics, 2013

<table>
<thead>
<tr>
<th>Rank</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>in new capacity (91 MW)</td>
</tr>
<tr>
<td>7th</td>
<td>in private investment ($326.2 million)</td>
</tr>
<tr>
<td>15th</td>
<td>in total capacity (129 MW)</td>
</tr>
<tr>
<td>16th</td>
<td>in jobs (2,600)</td>
</tr>
<tr>
<td>21st</td>
<td>in homes powered by solar (3,255)</td>
</tr>
</tbody>
</table>

- Georgia Power’s Advanced Solar Initiative
- U.S. Army & Georgia Power’s 3x30 Project

Sources: Navigant Research, Solar Energy Industries Association, and Solar Foundation

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Biomass

- 3rd nationwide in biomass electricity generation, 2013
- $150 million in private investment, 2013

New Clean Energy Capacity Installed in 2013 (MW)
Biomass and solar accounted for all new projects

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>100.5</td>
</tr>
<tr>
<td>Solar</td>
<td>91</td>
</tr>
</tbody>
</table>

Source: Navigant Research
© 2014 The Pew Charitable Trusts
Emerging Opportunities

- **Energy efficiency:**
  - Currently 1.2 GW of combined heat and power
  - Further opportunities to reduce costs in manufacturing sector and avoid power outages

- **Electric vehicles**
  - Zero Emissions Vehicle tax credit: 20%, or up $5,000
  - 1st in nation for electric vehicle sales

- **Offshore wind**
Summary

- One of fastest-growing solar economies in nation
- One of largest biomass economies in nation
- Policy and innovation are drivers

Photovoltaic project built by Inman Solar.
Radiance Solar is a leading Engineering Procurement Construction ("EPC") contractor specializing in the Design, engineering, installation and Operations and Maintenance of solar energy systems.
Our Mission is to bring reliable solar energy within the reach of every electricity user through a relentless commitment to efficient design, aggressive procurement, and innovative construction techniques.
Proven Leadership

155+ completed projects

45+ utilities interconnections

Awarded $2.8 million grant from DOE (with Suniva and GA Tech) to develop new balance of systems products.

Key partnerships with recognized industry leaders

Expertise across all aspects of evolving solar industry

Multiple repeat customers
Our Partners

SUNPOWER

Suniva

SMA

SCHÜCO

MAGE SOLAR

radiance solar
Customers
Ferocious Price Drops

Solar Industry Growth has Produced Steadily Falling Prices

Module Pricing Trends 1985-2011


Due to Silicon Shortage
Camilla Solar Plant
South Georgia’s First Utility Scale Solar Project • Camilla, GA

20 MW FACILITY

• Design, engineering and DC construction provided by Radiance Solar

- 68,542 Trina Solar Modules
- 314 SMA Tri-power Inverters
- 260 Shoals Technology Combiner Boxes
- 286,436 Helical Piles, manufactured and installed by Cantsink Atlanta
- 26.5 MWh annual production
- Feeds into Georgia Power’s grid at 12 KV
- Project developed by Origis Energy and awarded through the Georgia Power’s Advanced Solar Initiative
Woodland Solar Power Plant
1 Mw Solar Power Plant • Woodland, GA

1 MW FACILITY

- Design, engineering and DC construction provided by Radiance Solar
- 3,542 Renesola Solar Modules
- 24 SolarMax Inverters
- Shoals Technology Combiner Boxes
- Helical Piles, installed by Cantsink Manufacturing
- 1.325 MWh Annual Production
- Developed by Hecate Energy for Georgia Power Advanced Solar Initiative
Rocky Creek Solar Farm
One of Georgia’s First Solar Power Plants • Upson County, GA

1 MW FACILITY

- Design, engineering and DC construction by Radiance Solar
- 3,542 Talesun 285 W Modules
- 161 22-Panel Arrays on Solar Flexrack Mounting
- 483 Cantsink Helical Piles
- 2 Satcon 500 480V Inverters
- 13 Shoals Technology Combiner Boxes
- 1.325 MWh Annual Production
- Feeds into Georgia Power transformer and distributed via their grid at 12kV
- Project developed by:
Shaw Industries
Carpet Manufacturing Facility • Cartersville, GA

1 MW PV SYSTEM

- One of the largest commercial/manufacturing solar projects in the Southeast.
- Roof mounted system: Arrays installed on a one degree standing seam roof at a five degree tilt.
- 3,700, 270 watt Solar World Panels (US Made)
- SMA TriPower, Three-Phase Inverters
- Annual power production of 1.4 million kWh
- Participating in Georgia Power’s Advanced Solar Initiative.
500 kW PV SYSTEM

- Designed, engineering and procurement services provided by Radiance Solar.
- 1,672 Suniva 295 watt modules.
- Advanced Energy Inverter with Shoals Technologies Combiner Boxes.
- Part of the Anheuser-Busch “Our World Responsibility Program.

“Integrating solar would make a big contribution to our environmental goals and would bring additional long-term benefits to the bottom line,”

Al Greenwood, Facility Engineer, Anheuser-Busch.
Contracted by Strata Solar and Gehrlicher Solar to oversee and install electrical, including AC/DC, inverter, monitoring and interconnection to GA Power.

- 4,312 Yingli 240 W Modules
- 500 and 333 Advanced Energy Solar Inverter
- Solar Magic Revenue Grade Monitoring system and weather station
The City of Ashburn
Largest Municipal Installation in the State • Turner County, GA

- Design, engineering and DC construction provided by Radiance Solar
- 227 kW with three ground mounted systems
- 73 kW Roof mounted System
- Suniva Modules
- Solectria Inverters
- Renusol Roof Racking System
- 413,700 kWh annually
- Powers municipal water pump stations and buildings
- Interconnected to Georgia Power.
Providence Hill Farm
Poultry Growing Operation • Jasper, GA

100 kW FACILITY

• Radiance Solar delivered turnkey installation for the roof mounted system.
• Will supply nearly all of the poultry farm’s electricity needs.
• 333 Suniva Modules
• 8 SMA Transformerless Inverters
• Will generate 135,000 kWh of power annually.
• Interconnected to Amicalola EMC, and is the largest solar power system in the utility’s service area.
GA Tech Clough Student Center
$90 Million Sustainable Facility • Atlanta, GA

86 kW PV SYSTEM
30 COLLECTOR TH. SYSTEM

- Design, engineering, and construction provided by Radiance Solar
- 358 Suniva 240 W modules on proprietary mounting system
- 14 SMA Sunny boy 6,000 W Inverters
- 30 AET solar hot water collectors with 3,500 gallon storage tanks
- LEED certified building, used as educational tool for students

GT
Persimmon Creek Vineyard
Winery Operation • Clayton, Georgia

- 30 Sunpower 335 watt panels
- Power One 8,000 watt inverter
- Roof mounted system
- 11,600 kWh/year Produced
- Interconnected to Habersham EMC power grid

8 kW PV System
Commercial Construction Trends in the Southeast

Mandy Mahoney, President
Southeast Energy Efficiency Alliance
SEEA FOCUSES ON THE SOUTHEAST

Eleven-state footprint

Non-profit, non-partisan

Regional Energy Efficiency Organization
SEEA’S APPROACH: TAILORING TO THE NEEDS OF THE REGION

- Actively listening
- Surveying the landscape
- Identifying relevant resources
- Empowering stakeholders
Commercial State Energy Code Status
AS OF MAY 1, 2014

BCAP Dedicated to the adoption, implementation, and advancement of building energy codes

NOTE: These maps reflect only mandatory statewide codes currently in effect.
ASSUMPTION:
STRONGER CODE BAD FOR BUSINESS

- Increased cost of construction
- Decrease in local construction activity
- Negative impact on jobs and local economies
THE QUESTION:
Do commercial energy codes suppress local construction activity?
COMMERCIAL CONSTRUCTION TRENDS

- Data for 11 states from 2005 through 2013
  - Number of “pulled permits” or construction starts
  - Construction project expenditures
- Analyzed data based on state, county, building type
- Benchmarked against each state’s energy code
COMMERCIAL PERMITS IN THE SOUTHEAST
2005-2013
PERMITTING LEVELS FOR NEW CONSTRUCTION VS. RENOVATION

![Graph showing permit levels for new construction and renovation from 2005 to 2013. The graph includes two lines: one for new construction and one for renovation. The x-axis represents the years 2005 to 2013, and the y-axis represents permit levels from 0 to 14,000.]
AVERAGE CONSTRUCTION EXPENDITURES PER PROJECT IN SOUTHEAST

![Graph showing average construction expenditures per project from 2005 to 2013. The expenditures peak in 2007 at $7.47 million and then decline to $4.32 million by 2013.](image-url)
HIGH LEVEL CONCLUSIONS

- Commercial permit numbers are **on the rise** in the Southeast
- Renovation activity has **grown**, new construction has **declined**
- Construction expenditures have **decreased**
- No evidence that energy codes suppress construction starts
NEXT STEPS

• Visit SEEAlliance.org for the full paper and in depth state by state information
THANK YOU!

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www.pewtrusts.org/cleanenergy

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