

Florida State Energy Roadmap



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May 20, 2015

The American Jobs Project

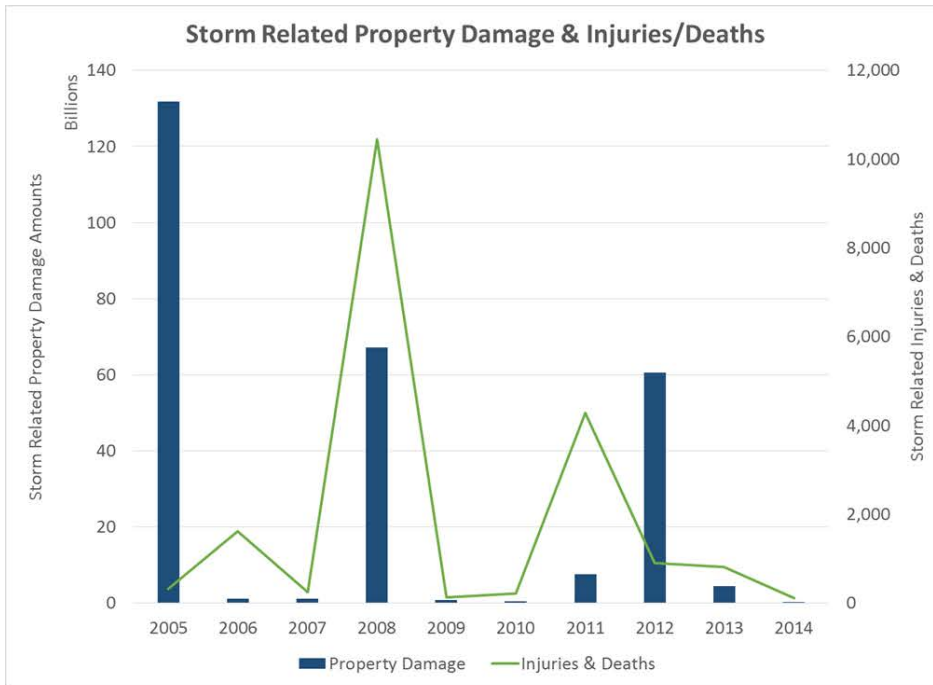
Mission: Create a research-based roadmap for state and local leaders who strive to create jobs for their constituents in one of the biggest market opportunities today for advanced energy solutions

Partners/Sponsors: Florida Energy Systems Consortium, JPB Foundation, Berkeley Energy & Climate Institute, Chambers for Innovation and Clean Energy, and more

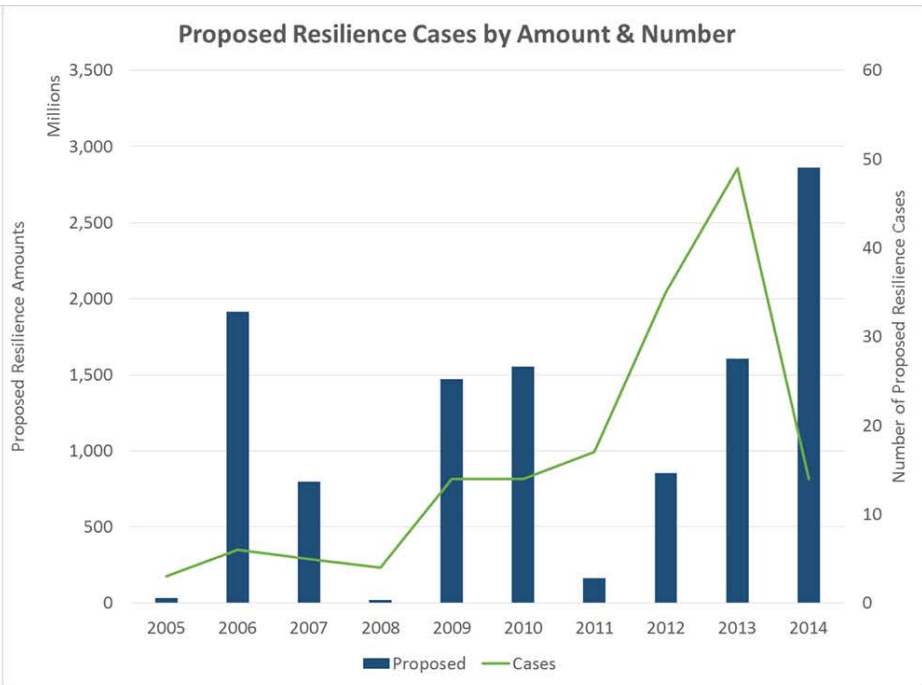
Climate Change Impacts

- Climate models project that the same summertime temperatures that ranked among the hottest 5% in 1950-1979 will occur at least 70% of the time by 2035-2064 in the U.S. (National Climate Assessment)
- The intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s (National Climate Assessment)

Climate Change Impacts



Source: Analysis of NOAA Data 2005-2014Q2

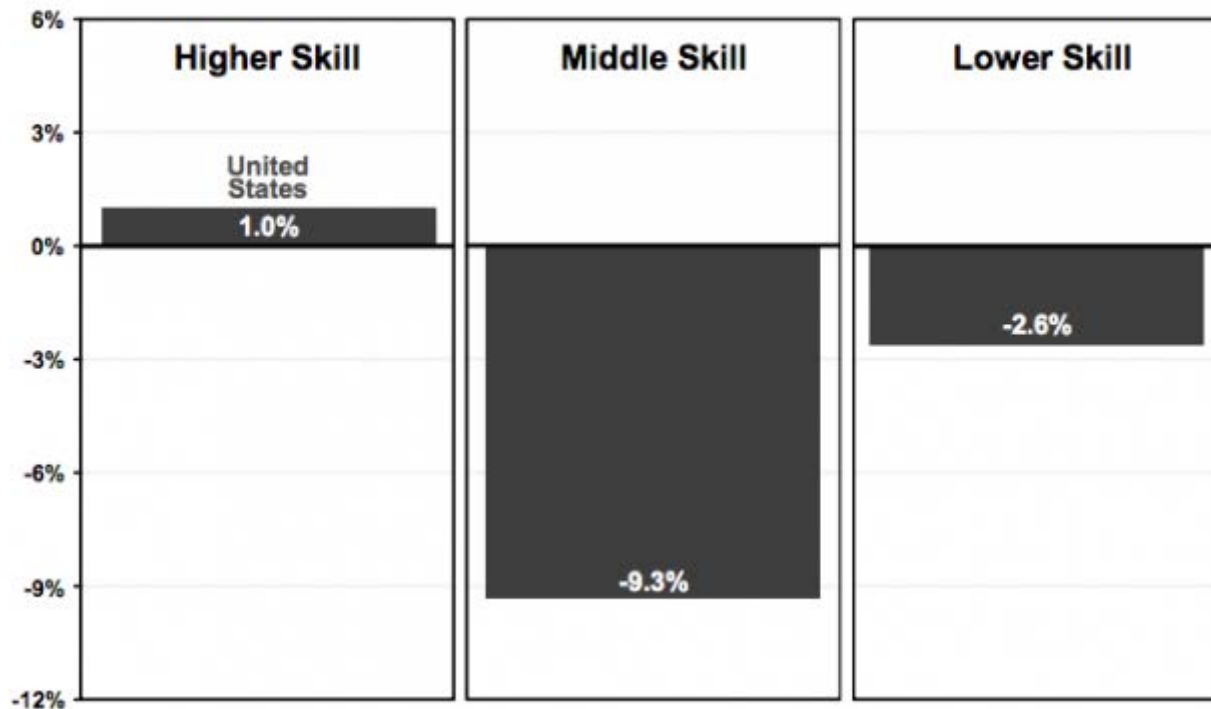


Source: Analysis of EEI Data 2005-2014Q2

Loss of Middle Class Jobs

Job Change During the Great Recession

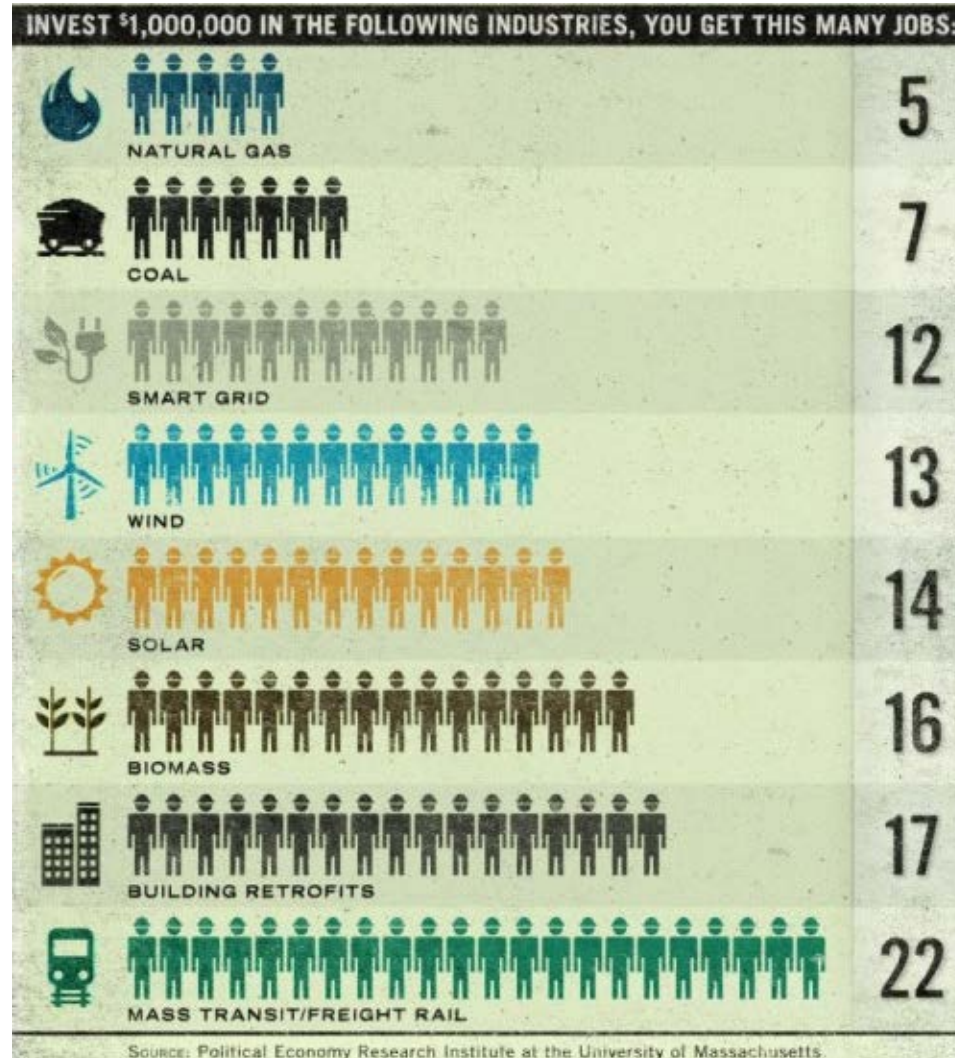
Percent Change, United States, 2007 to 2010



Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics.

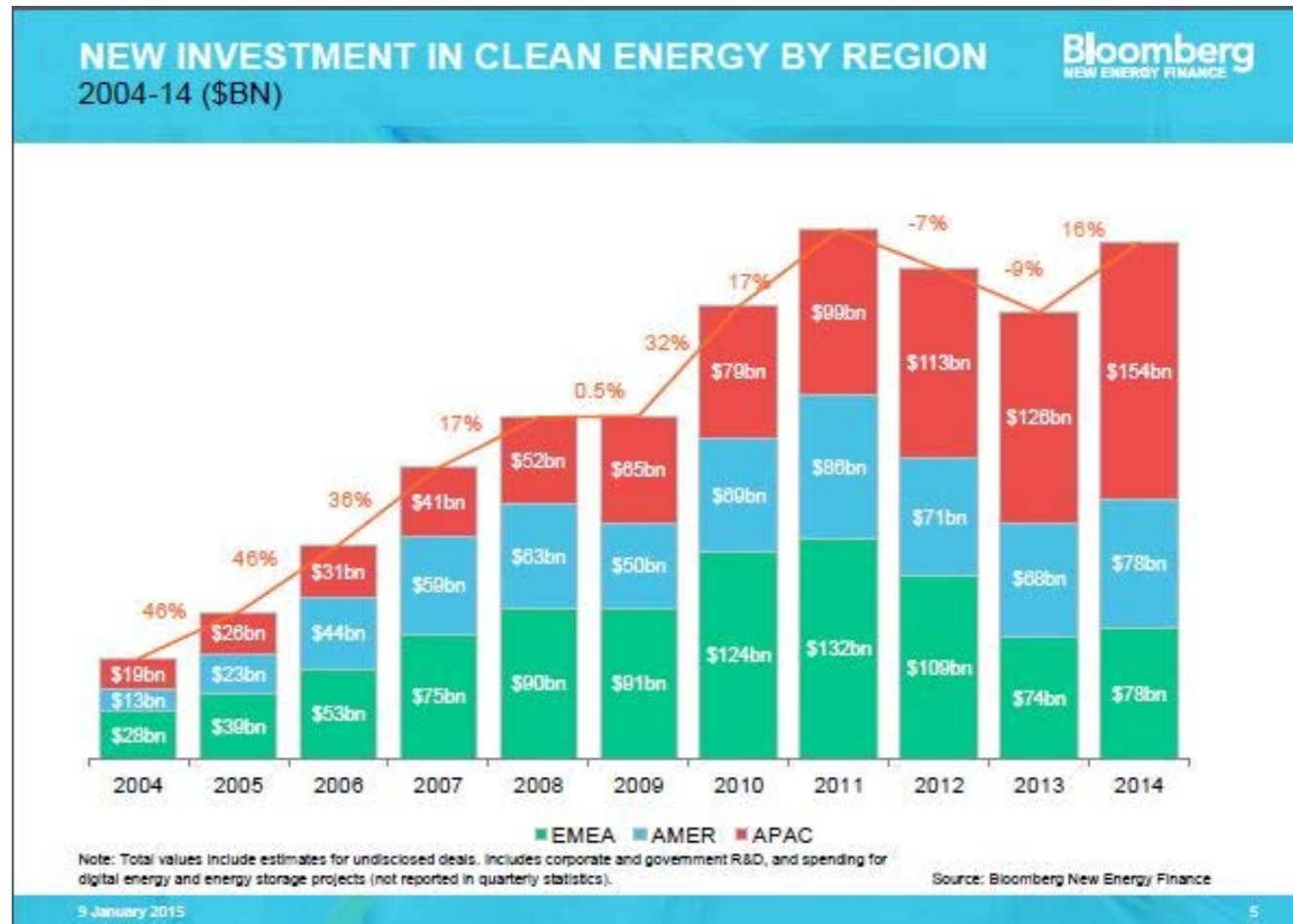
Source: Federal Reserve Bank of New York

Clean Energy Jobs Opportunity



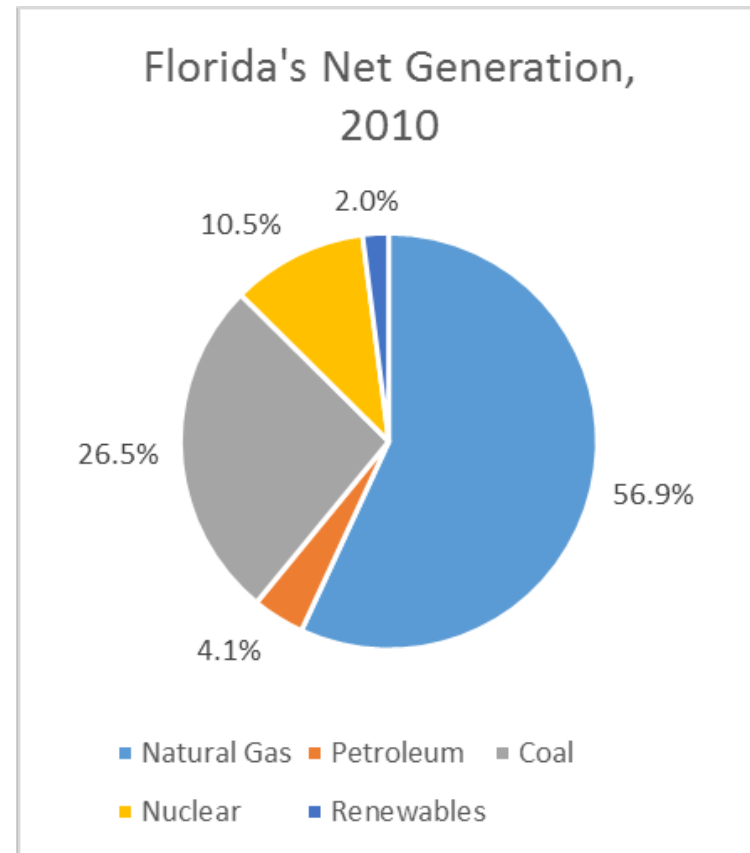
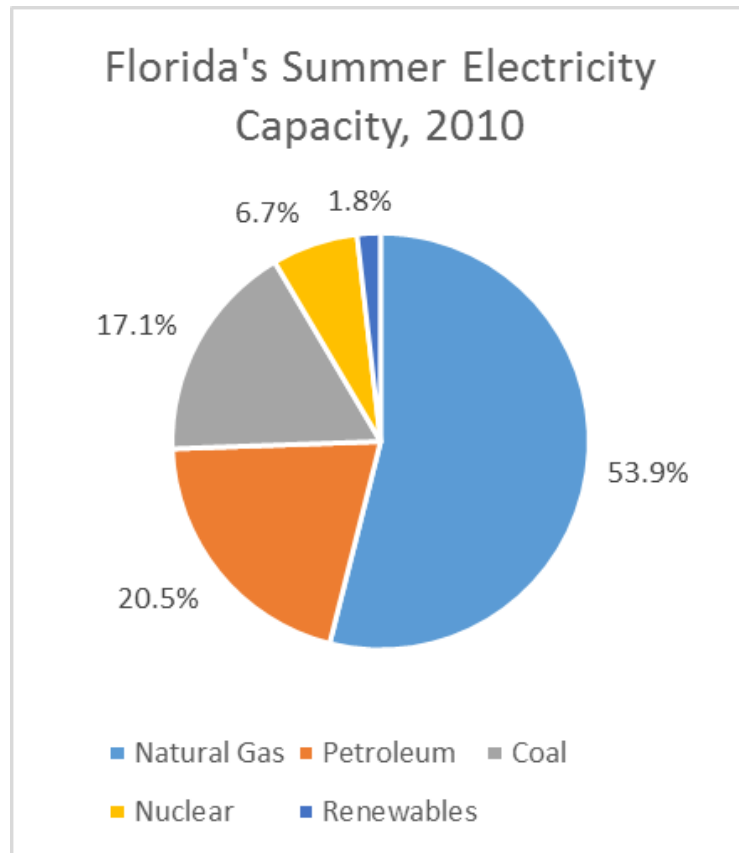
Source: UMass Political Economy Research Institute

Clean Energy Jobs Opportunity



Florida Energy Profile

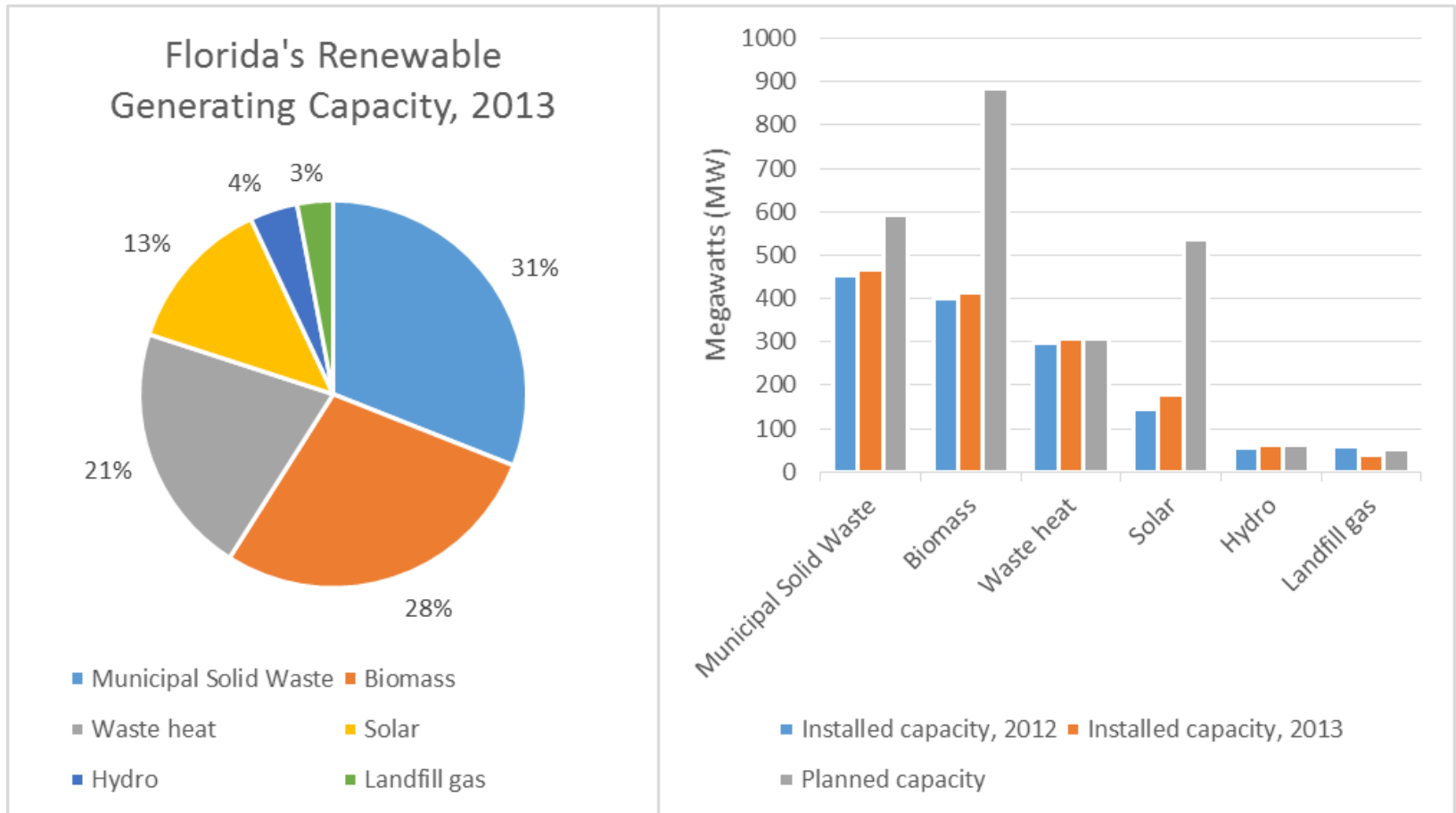
Figure 1: Florida Electricity Capacity & Generation by Fuel Source



Source: Energy Information Administration.

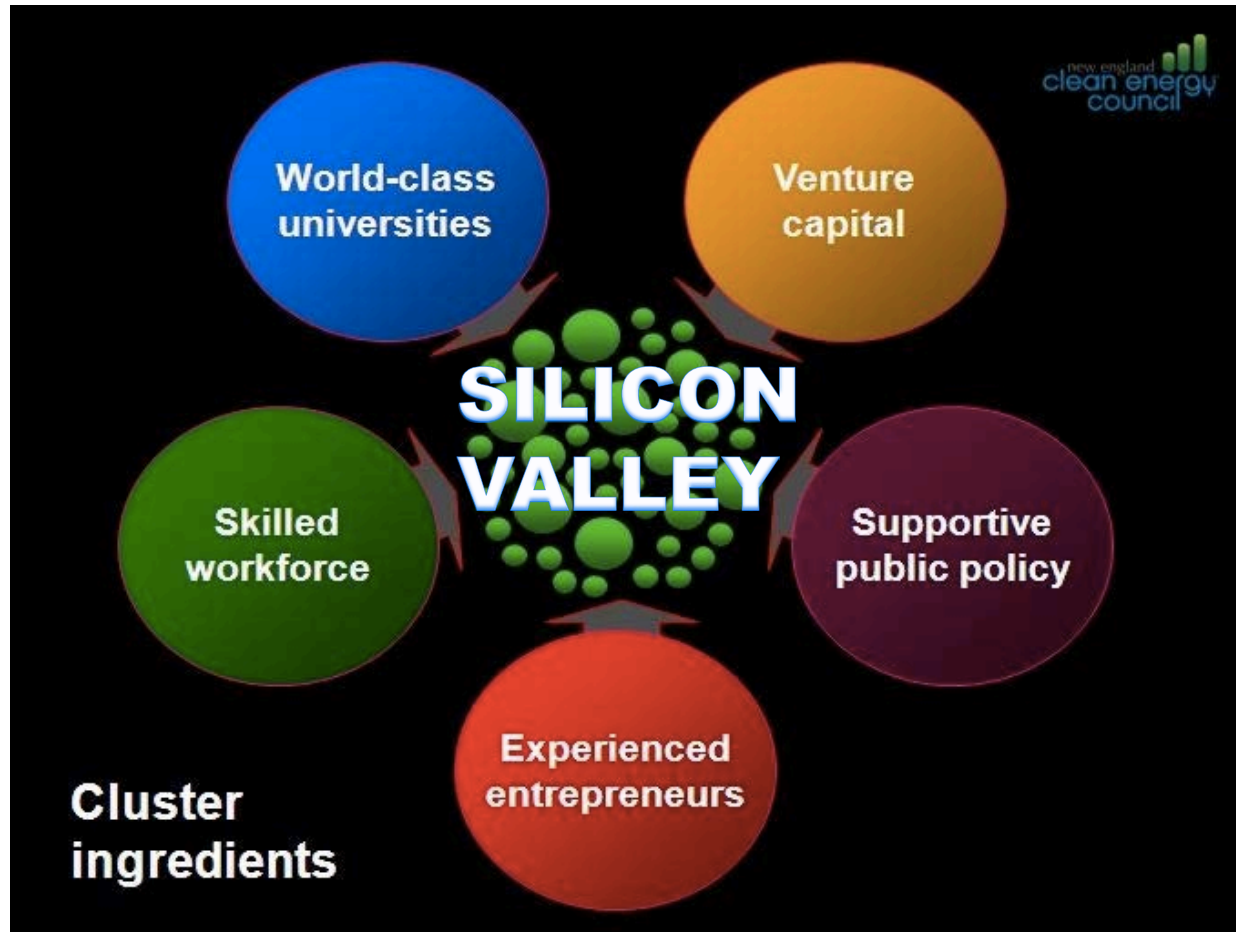
Florida Energy Profile

Figure 1: Florida Installed & Planned Electricity Capacity by Renewable Source



Source: Energy Information Administration and Florida Public Service Commission.

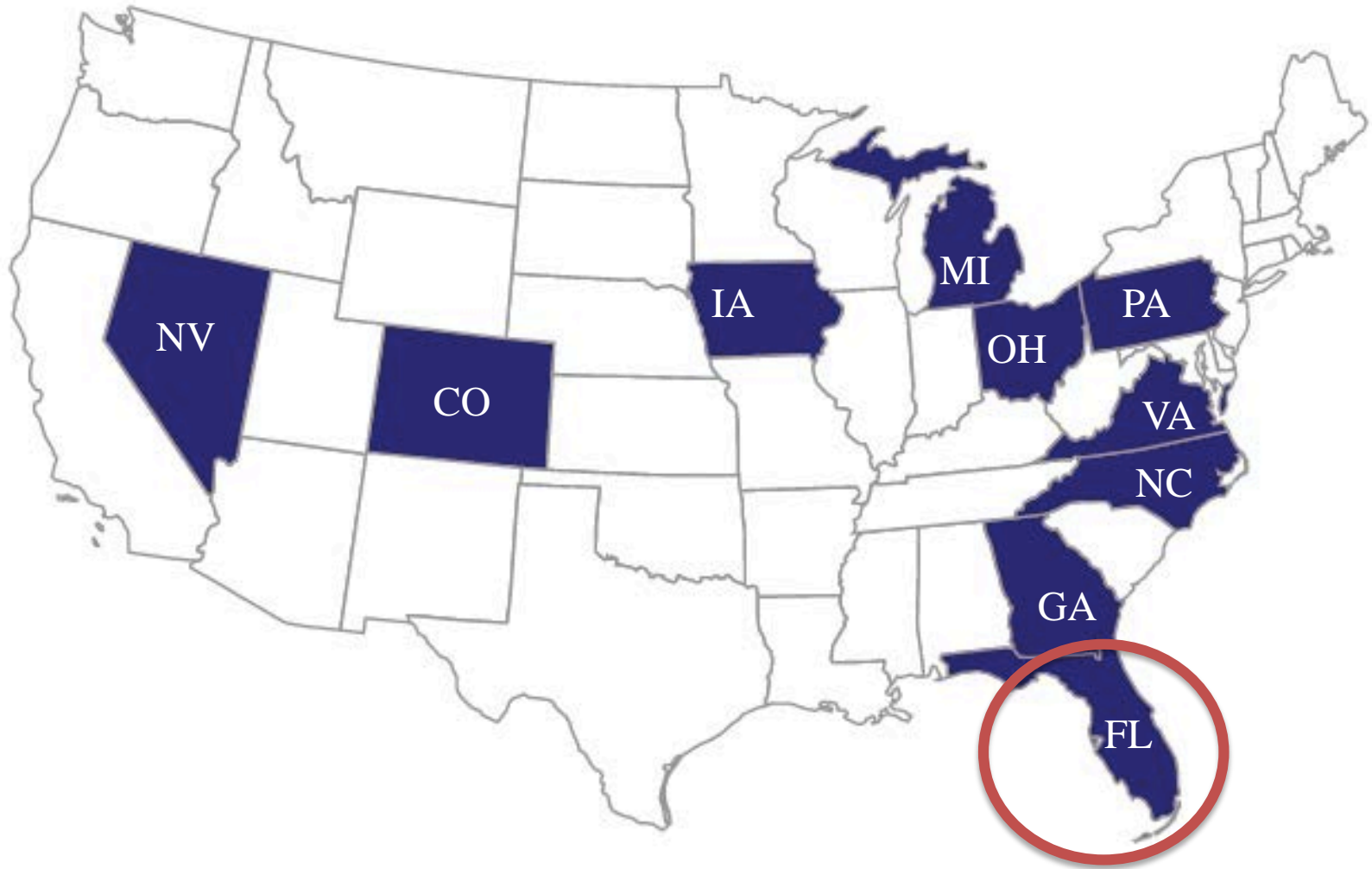
Industry Cluster Development



Roadmap

- Jobs Numbers
- Technology Projections
- Supply Chains
- Policies
 - Cluster-specific
 - Access to Capital
 - Workforce Development
 - Innovation Ecosystem
 - Cross-cutting Best Practices

AJP States

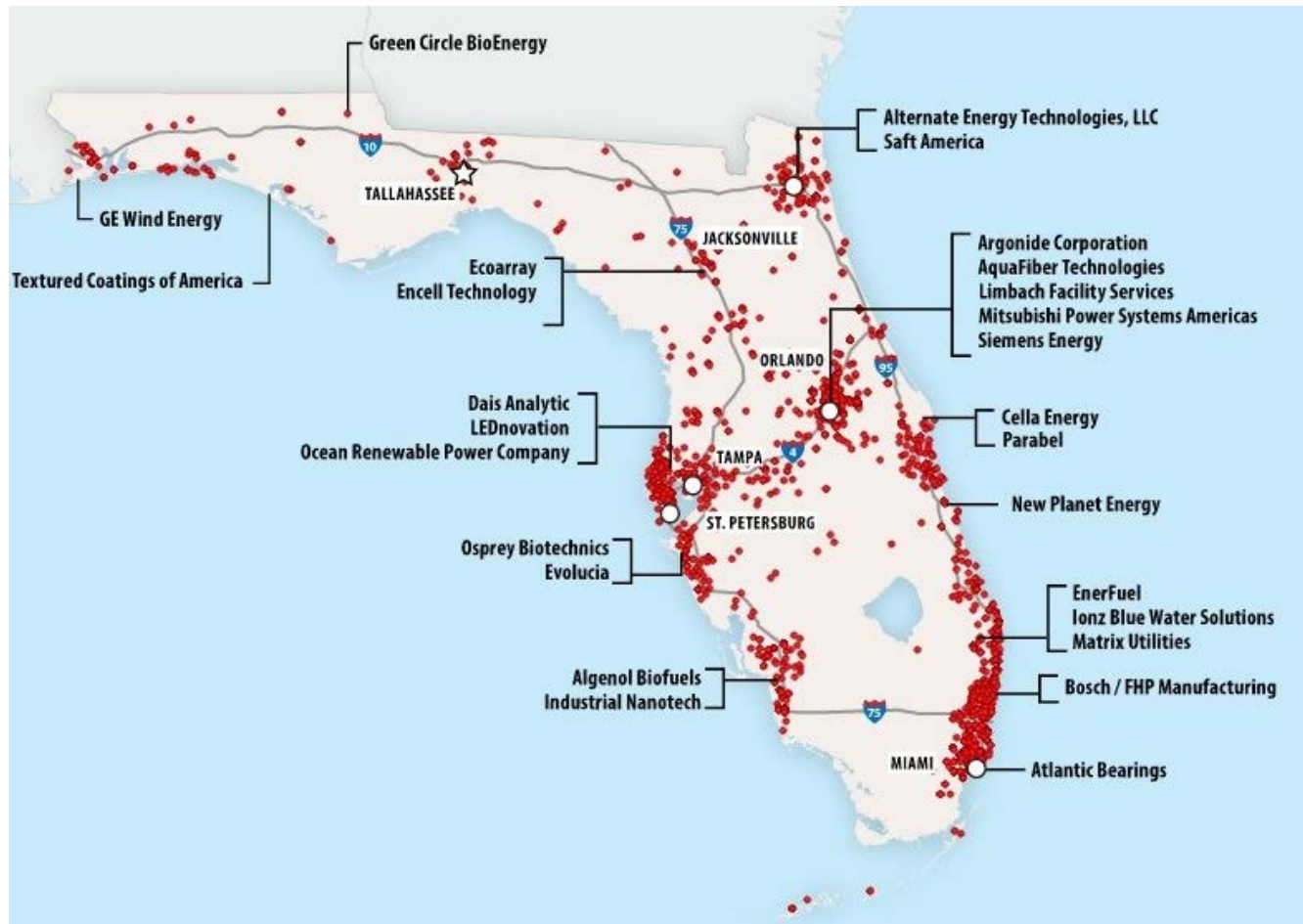


Methodology

- Economic impact, cost-benefit, & fiscal impact analysis using IMPLAN
- SWOT cluster analysis and online policy research of best practices
- Interview research (37 total):
 - Government: Office of Energy, PSC, TBP, etc.
 - Universities/Labs: FSU, UF, ICPR, ICAMR, etc.
 - Companies: GE, Algenol, ABB, Acciona, Green Circle Bio, etc.
 - Utilities: FPL, Duke Energy Florida
 - Associations: SE Coastal Wind, FBBA, SEIA, SACE, etc.

Industry Cluster Development

Figure 1: Florida Cleantech Cluster & Key Companies



Source: Enterprise Florida.

Industry Cluster Selection



	BIOFUELS & BIOMASS	NATURAL GAS CC TURBINES	SOLAR MFG & INSTALLATION	WIND TURBINE MFG
CLUSTER				
FLORIDA HAS AN ANCHOR COMPANY		X		X
FLORIDA HAS A SUPPLIER BASE		X		X
FLORIDA HAS MATERIALS & RESOURCES	X			
FLORIDA HAS INNOVATION CAPACITY	X	X	X	
FLORIDA HAS WORKFORCE CAPACITY	X	X	X	X
CLUSTER IS EXPORT HEAVY		X	X	X
CLUSTER IS NOT EASILY OUTSOURCED	X			X
SYNERGIES WITH OTHER CLUSTERS	X	X	X	X

Industry Cluster Selection



	BIOFUELS & BIOMASS	NATURAL GAS CC TURBINES	SOLAR MFG & INSTALLATION	WIND TURBINE MFG
DEMAND				
FLORIDA HAS LARGE EXISTING DEMAND		X	X	
FLORIDA HAS HIGH LATENT DEMAND	X		X	
POLITICAL FEASIBILITY				
CREATES ROBUST EMPLOYMENT		X	X	X
CREATES HIGH-WAGE LABOR		X	X	X
SUPPORTS BROAD ECONOMIC DEVELOPMENT	X		X	
MINIMIZES POWER COST IMPACTS		X		

Industry Cluster Selection



	BIOFUELS & BIOMASS	NATURAL GAS CC TURBINES	SOLAR MFG & INSTALLATION	WIND TURBINE MFG
DEMAND				
STATE INCENTIVES & STANDARDS				
EPA 111(D) SUPPORTS GROWTH	X	X	X	X
POLITICAL FEASIBILITY				
HIGH GROWTH FORECAST		X	X	X
FLORIDA CAN BECOME MARKET LEADER	X			

Biofuels & Biomass: SWOT



Table 1: Biofuels & Biomass Industry SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • Abundance of inedible biomass feedstocks due to ideal growing conditions • Internationally recognized leaders in bioenergy research • Algae biofuels production and research leader • Florida has 75% recycling goal by 2020 	<ul style="list-style-type: none"> • RFS repealed in 2013 • Florida imports most of its ethanol supply • Industry lacks political organization in the state
Opportunities	Threats
<ul style="list-style-type: none"> • Biomass facilities must be located near intended feedstock • Supports rural economic development • Diverse downstream markets • US military represents immediate, early customer • Large European demand for woody biomass • EPA 111(d) will drive demand for biofuels 	<ul style="list-style-type: none"> • Direct competitors include Alabama, Louisiana, and Mississippi • Competing downstream markets • Competing land uses • Biomass research is still in early stages

Source: AJP analysis.

Biofuels & Biomass: Policies

- Adoption of a biomass generation carve-out
- Advocate for carbon capture & utilization clarifications in CPP
- CO2 pipeline legislation
- Financial support for biomass co-generation retrofits
- Support compliance with sustainable forestry practices

Natural Gas CC Turbines



Table 1: Natural Gas Combined Cycle Turbines Industry SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> ● Presence of anchor OEM company ● Technology transfer from existing institutions ● Large number of existing natural gas plants, including one that co-generates with solar 	<ul style="list-style-type: none"> ● Lack of diversity in natural gas turbine companies ● Low job intensity of natural gas generation ● No obvious candidate companies for relocation to Florida
Opportunities	Threats
<ul style="list-style-type: none"> ● Florida’s continued reliance on natural gas ● Coal waning as a competitor ● Low current levels of natural gas exports ● Natural gas generators are complementary to both solar thermal and PV technologies ● Enthusiasm for nuclear power has diminished 	<ul style="list-style-type: none"> ● Overreliance on natural gas generation ● Potential tightening of EPA rules on CO2 emissions ● Load growth limited by energy efficiency ● Declining industry revenue ● Medium level of industry competition ● High and increasingly higher barriers to market entry

Source: AJP analysis.

Natural Gas CCT: Policies

- Streamline CHP interconnection rules
- Provide financial incentives for CHP

Solar Mfg. & Installation



Table 1: Solar Industry SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • 3rd in solar resource potential in US • 7th most solar jobs in US • Total solar potential exceeds energy demanded • Utilities willing to own and operate solar • Solar thermal tax incentives • World-class solar research institutes and universities • Great solar workforce training 	<ul style="list-style-type: none"> • No state RPS • No third party ownership of PV allowed • PV industry has limited political power • Utility current and future dependence on natural gas
Opportunities	Threats
<ul style="list-style-type: none"> • Large downstream market potential • Cost reductions in the supply chain • Highest utility energy generation in the country • EPA 111(d) will drive demand for solar 	<ul style="list-style-type: none"> • Trend toward outsourcing solar manufacturing to China • Increasing pressure by utilities to impose high fixed-costs on customers with solar • Higher power costs reducing employer attraction • Solar growth somewhat dependent on grid technology • Scaling and business plan challenges among solar companies

Source: AJP analysis.

Solar: Policies

- Adopt RPS with solar carve-out
- Allow third-party sales for electricity
- Property tax treatment for solar systems
- Accurately reflect value of solar in rates
- Pilot program for group purchasing

Wind Turbine Manufacturing



Table 1: Wind Manufacturing Industry SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • Ranks 9th in US in wind manufacturing jobs • Presence of anchor OEM companies • Emerging wind turbine components supplier base • NextEra is the largest owner of wind power capacity • Crossover potential with major aviation manufacturing • Port and rail infrastructure that can handle large cargo and containers • High-skilled manufacturing labor 	<ul style="list-style-type: none"> • No state RPS • No third party PPAs • Limited onshore wind resource • Lack of accurate offshore wind speed measurements
Opportunities	Threats
<ul style="list-style-type: none"> • 375 MW estimated onshore wind potential • 10.5 GW estimated offshore wind potential • Proximity to major wind installation states • Port/rail infrastructure creates export potential for large parts & components • EPA 111(d) will drive demand for wind 	<ul style="list-style-type: none"> • Expired federal PTC for wind • Multiple authorities governing the Gulf • NIMBY opposition to offshore wind from coastal populations • DOI permits for offshore wind • High risk of hurricanes along Gulf Coast

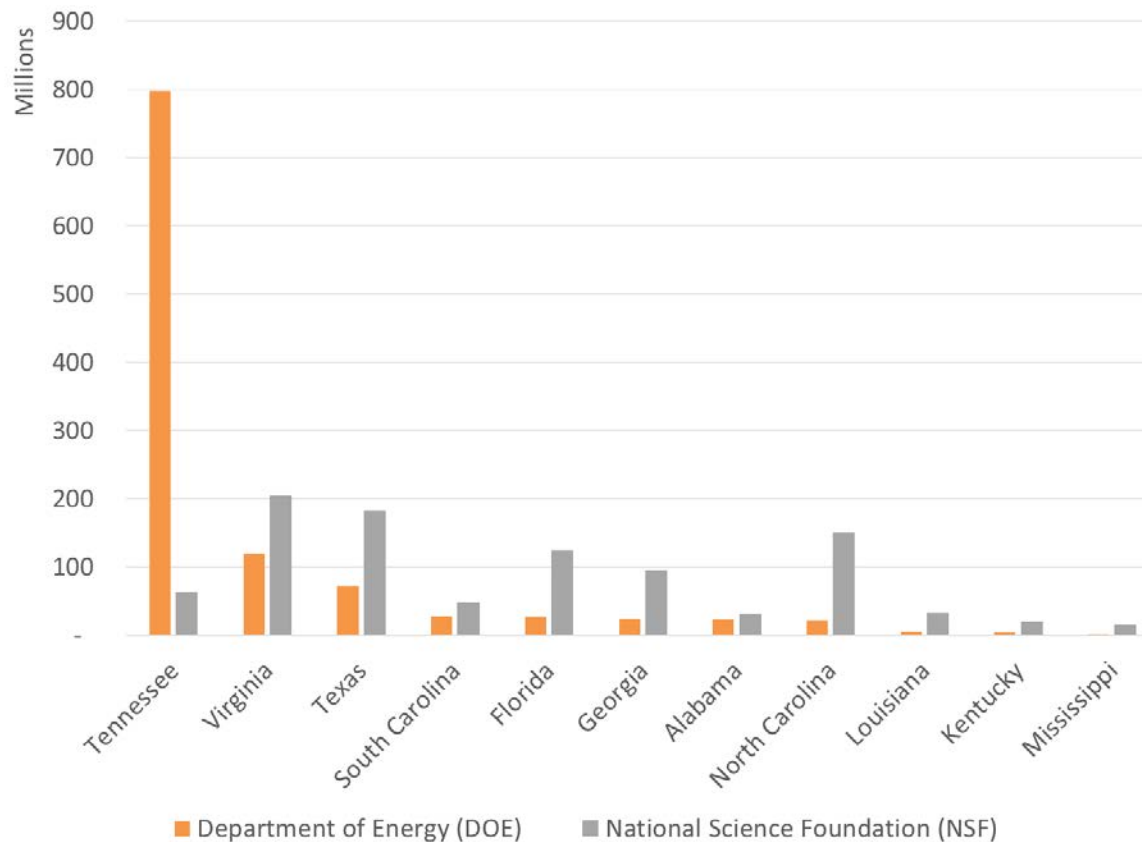
Source: AJP analysis.

Wind Mfg: Policies

- Support compliance with Jones Act
- Offer wind manufacturing financial incentives
- Pursue trade mission to develop supplier base

Energy Innovation in Florida

Figure 1: Federal R&D Obligations by Agency for Southeast States, 2012

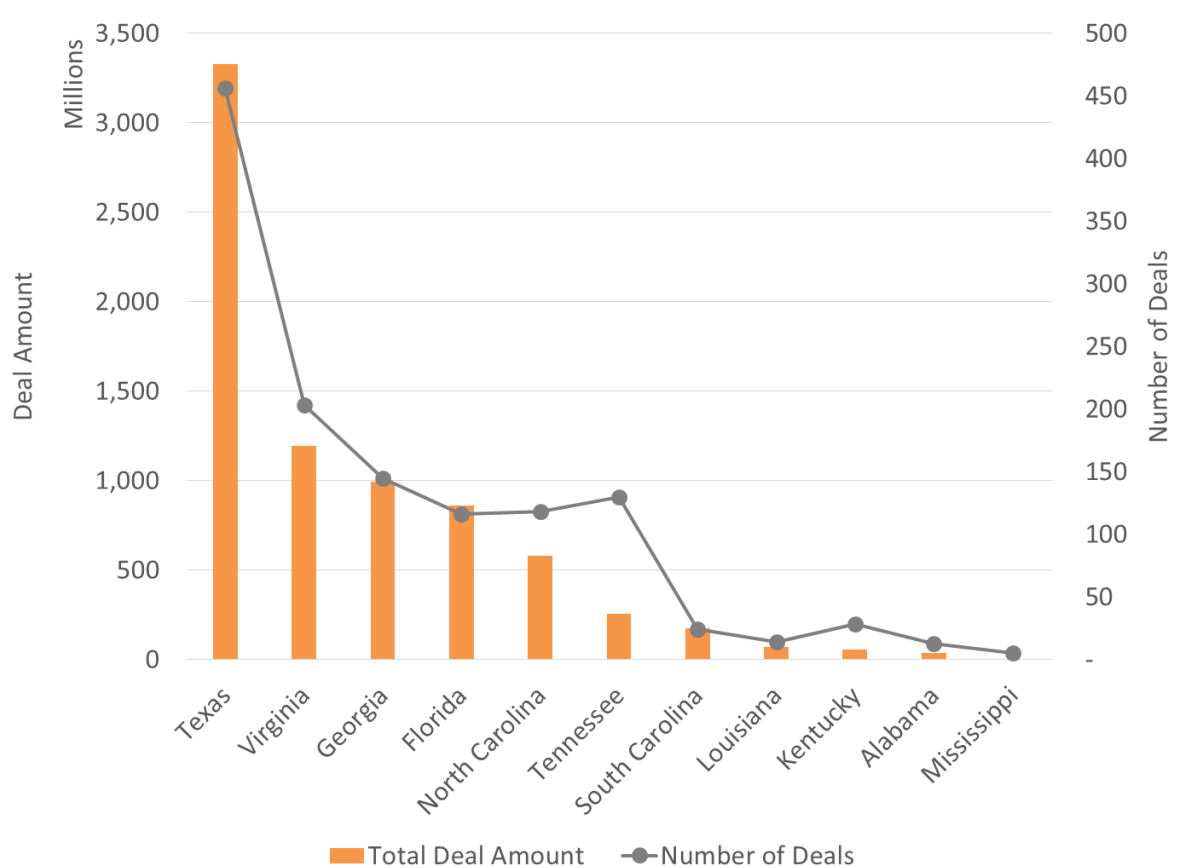


Source: National Science Foundation.

Energy Innovation in Florida



Figure 1: VC Deal Number and Deal Amount in Southeast States, Q12012-Q32014



Source: PwC Moneytree Survey.

Energy Innovation in Florida



Table 1: Top 10 VC-funded Companies in Florida

Company	Sector	Capital Raised (\$ Millions)	Location
APR Energy	N/A	\$850	Jacksonville
Arizona Chemical	Biofuels & Biochemicals	\$485	Jacksonville
Waste Pro	Recycling & Waste	\$100	Longwood
OpenPeak	Energy Efficiency	\$98	Boca Raton
Algenol Biofuels	Biofuels & Biochemicals	\$94	Bonita Springs
Seven Seas Water	Water & Wastewater	\$78	Tampa
Solicore	Energy Storage	\$70	Lakeland
ENER1	Energy Storage	\$56	Ft. Lauderdale
Advanced Disposal Services	Recycling & Waste	\$53	Jacksonville
Intellon Corporation	States Smart	\$48	Ocala

Source: Cleantech i3 Database.

Energy Innovation: Policies

- Support Florida's angel networks
- Identify partners to establish energy-focused accelerator
- Improve PACE financing
- Create energy wing to Florida's infrastructure bank
- Pursue EDA's Regional Innovation Strategies Program grants

Key Takeaways

- Florida already has a strong and growing base of energy innovation, manufacturing, and companies
- Demand-side policies may be the only major barrier to unlocking the clean energy cluster for Florida

Questions/Contact

- Thank you for the invitation and your time (especially FESC)
- Feedback on potential state policies and/or general feedback appreciated


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