Energy Efficiency and Renewable Energy in Florida

Presented to the Florida Energy and Climate Commission (FECC)

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Report Breakdown

Current Incentive Mix *FSU CEFA & IESES*	*Barriers to Commercialization* *FESC*	*Regulatory Changes* *UF PURC*
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Overall Findings

- **Timing** – A window is now open to participate in development of the nascent cleantech industry.

- **Comprehensive Response -** Programs should focus simultaneously on the entire ecosystem of renewable energy, from supply (R&D, Commercialization and Manufacturing) to demand (Subsidy or Policy) and find the resources to cost effectively leverage the current federal stimulus funding.

- **Mitigate Risk to all Stakeholders** - Policy and actions at every level of state government should be geared to limiting risk, including policy and regulatory, technology, financial and market.

- **Value, Support and Leverage all Key Resources -** Florida utilities, R&D assets, existing industries, key business and public policy organizations.

Project Overview

Introduction: Energy Efficiency, Renewable Energy, Clean Energy, and Cleantech in Florida

I. Current Incentive Mix: State of Florida and Federal

II. Barriers to Commercialization and Project Finance

III. Regulatory Changes

IV. Conclusions and Recommendations

I. Current Incentive Mix

Current Incentive Mix

State of Florida – Include:

- The Corporate Tax Credit
- Renewable Energy Production Tax
- Renewable Energy Technologies Investment Tax Credit
- Renewable Energy Property Tax
- Solar Energy Systems Equipment Sales Tax Exemption
- Renewable Energy Equipment Sales Tax Exemption
- Renewable Energy Technologies Grants Program
- the Solar Energy System Incentives Program (a state rebate program).

Federal – the Federal Production Tax Credit (PTC) is a significant incentive. Other types include: corporate deduction, depreciation, tax credit, Federal grants, federal loans, Industry recruitment/support, personal exemptions, personal tax credits, and production incentives.

Summary of Renewable Technology Costs and Estimated Economic Impacts for Florida

Technology	GSP ($ Millions)	Jobs	Income ($ Millions)
Solar	N/A	7.41-30/MW	N/A
Biomass*	1,149**	17,682	687**
Wind	N/A	0.71-2.79/MW	N/A

*Statewide, ** in $2007

Sources: Southern Bioenergy Roadmap, Southeast Agriculture & Forestry Energy Resources Alliance (SAFER) UF/IFAS publication: http://www.saferalliance.net. Economic Impacts of Extending Federal Solar Tax Credits, Solar Energy Research and Education. Foundation (SEREF), http://www.seia.org/galleries/pdf/Navigant%20Consulting%20Report%209.15.08.pdf.

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Government Incentive Programs

Type of Incentive	Pros	Cons
Up Front Incentives such as Grants and Tax Credits	•Can be used as a source of funds to secure additional financing •No ongoing oversight responsibility •Total incentive amount known	•Risk of non-performance lies with the government •Due diligence on recipient is critical
Performance Based Incentives such as Production Credits based on Units of Output	•Risk of non-performance lies with the producer •Incentive amount per unit of production is known •Less producer due diligence required	•Requires ongoing oversight responsibility •May not be able to use incentive to secure additional financing

Summary of Remaining Balances as of January 29, 2010 of Renewable Tax Credits and Sales Tax Refunds for Florida

Type of Incentive	Eligible Technology	Fiscal Year 06-07	Fiscal Year 07-08	Fiscal Year 08-09	Fiscal Year 09-10
Renewable Tax Credit	Hydrogen (Vehicles)	$3,000,000	$3,000,000	$3,000,000	$1,452,413
Renewable Tax Credit	Hydrogen (Stationary Fuel Cells)	$1,500,000	$1,500,000	$0	$0
Renewable Tax Credit	Biofuels Infrastructure	$3,152,517	1,980,340	$4,029,544	$6,500,000
Renewable Sales Tax Refund	Hydrogen (Vehicles)	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Renewable Sales Tax Refund	Hydrogen (Stationary Fuel Cells)	$1,000,000	$1,000,000	$658,945	$764,823
Renewable Sales Tax Refund	Biofuels Infrastructure	$1,000,000	$996,017	$958,651	$517,273

To date, only the Renewable Tax Credit for Hydrogen (Stationary Fuel Cells) has a zero balance.

http://myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/arra_funding_and_opportunities

Allocations for FY09-10 and Unused Portion as of January 29, 2010 of State of Florida Funds

Funding Source	Type of Funding	Allocation	Unused as of Jan 29, 2010
2009/2010 State Funds ($19M)			
	Renewable Energy Tax Credit	$11M	$7.9M
Performance-based	Production Tax Credit	$5M	
	Sales and Use Tax	$4M	$3.28M
	Renewable Energy Technology Grant Program	$0	
	Solar Rebate	$0	
	Total	**$19M**	**$11.18M**

Source: Personal Communication with State Energy Office staff member April Groover, February 22, 2010

Estimated Economic Impact of Some State Incentives in Terms of Jobs Created (Funds for 2009-2010)

State Energy Program	Actual allocation	Jobs Created as per Actual Allocation
Solar Energy (Water Heating) Loan	$10,000,000	103
Solar Energy Rebate Program	$14,408,000	193
Solar for Schools & Storm Shelters	$10,000,000	119
E-85 Installation/Conversion Revolving Loans	$5,000,000	62
Program Administration, Marketing & Analysis	$1,074,300	17
Subtotal - Renewable Energy	**$40,482,300**	**494**

Economic Impact Analysis performed by FSU CEFA using Regional Economic Models, Inc., or REMI (V.9.5.26 169 sector model).

Incentive Programs

- May want to include incentives that target industries that are already performing well in Florida
  - Lower performance risk
  - Fixed costs are already being paid – incentive scope only needs to consider marginal costs

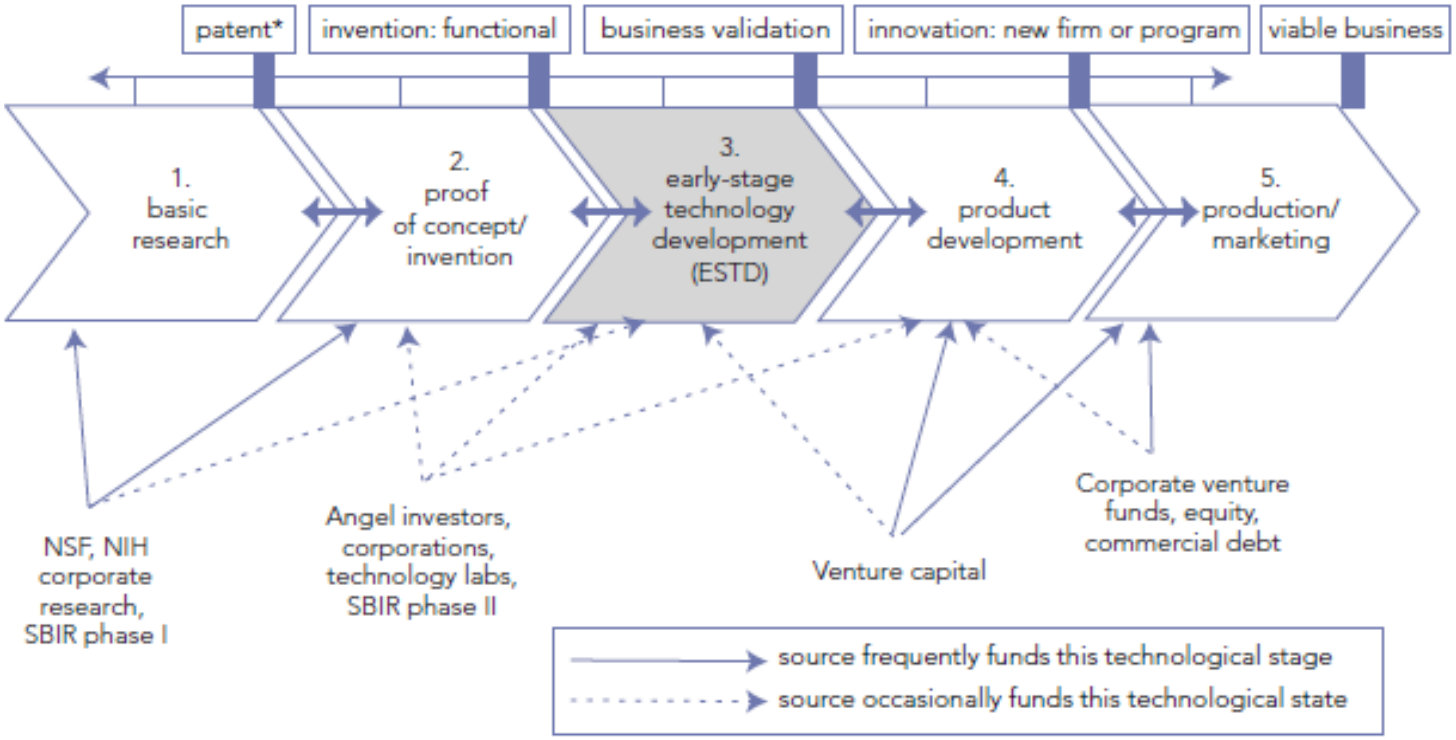
- Combination of incentive programs
  - Up front incentives such as grants and tax credits to allow existing companies to expand, or new companies to enter
  - Per unit production incentives to encourage companies to produce

II. Barriers to Commercialization and Project Finance

Research Methodology

- SOW suggested a Gap Analysis (Current and Desired State and resultant Gap)
- Florida has the 4th largest GSP. Comparing performance against the 4th position on identified metrics has been recently used by Enterprise FL and others.
- Segmented data from myriad sources into FECC Four-Stage model.
  - Primary Information sources included representatives of Florida industry, technology investor community, incubator network, universities, and state agencies / government
  - Secondary information sources included NSF, Dow Jones Venture Source, the National Association of Seed and Venture Funds, and Ventyx
- Information was not available by state or tech. for 1) angel deal flow and volume or 2) dollar value of project finance by state for cleantech or renewable projects. Proxy measures (e.g. MW of added capacity) were utilized.
- For a complete picture, researchers also identified key assets driving performance (e.g. Florida's research performance at 16th in the US is better understood in the context of its 13th position in the number of PhD scientists and engineers).
- National programs that have proven successful in closing the Gaps in key metrics were studied for report programmatic recommendations.

Sequential Model of Development



Source: National Institute of Standards and Technology (NIST): Between Innovation and Invention: An Analysis of Funding for Early-Stage Technology Development, page 33, November 2002.

Current Assets/System Inputs

	1) R&D Transition	2) Early Capital	3) Mid/Late Capital	4) Project Finance
	Total PhD Sci & Engineers 06	**Number of Angel Groups 07**		**ST Pub Benefit Funds for RE**
FL Rank/Amount	**13th**/17,630	**9th**/5		**1 of 32**/$0
#4 State/Amount	MA/32,400	NC & IL/9		CT/$444M
	Total University Faculty 07	**Total VC Firms w/ Principal Office in State 09**		**RPS STDs by ST, Nov 09**
FL Rank/Amount	**6th**/16,792	**12th**/33		**1 of 14**/0%
#4 State/Amount	PA/19,926	IL/107		CT/27%
	Total Tenure Track Faculty 07	**Avg VC Under Management by State 00-08**		
FL Rank/Amount	**7th**/9,375	**17th**/$1,459M		
#4 State/Amount	OH/10,450	CT/$12,578M		
	Faculty Student Ratio 07	**Commitments to VC Funds by State 00-08**		
FL Rank/Amount	**45th**/21	**18th**/$165M		
#4 State/Amount	CA,NY,TX,PA,MA/15	CT/$1,713M		
	Avg. Acad Lic Managers 02-06	**VC Firms in State with a Clean Tech Focus 09**		
FL Rank/Amount	**8th**/25	**13th**/3		
#4 State/Amount	TX/43	MA/17		
	Avg. Acad Patent Exp. 02-06	**State VC Funds by Total Fund Size**		
FL Rank/Amount	**10th**/$6.7M	**21st**/$29.5M		
#4 State/Amount	PA/$10M	MI/$204M		
		Seed/Early Focus ST VC Funds	**"All Focus" State VC Funds**	
FL Rank/Amount		**14th**/$29.5	NA/$0	
#4 State/Amount		IL/$83.5	OK/$100M	
		State Angel Tax Credits		
FL Rank/Amount		**1 of 32**/0%		
#4 State/Amount		VA/50%		

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Current Situation – Clean Tech

	1) R&D Transition	2) Early Capital	3) Mid/Late Capital	4) Project Finance
	CT Fields of Acad. R&D 08	SBIR/STTR Avg. 00-08		Energy M&A Avg. (US) 00-08
FL Rank/Amount	**11th**/$828M	**11th**/$3.6M		NA/NA ($6.4B)
#4 State/Amount	MA/$1,366M	NY/$6.6M		UNK
	CT Patents 02-08 Avg.	Clean Tech (CT) VC Deals Avg. 00-09 $ Investment		VC Energy IPO's (US) 00-08
FL Rank/Amount	**9th**/11	**9th**/$52.7M		NA/NA ($358M)
#4 State/Amount	CT/33	TX/$156.1M		UNK
		Early Energy Avg. 00-09 $ Inv	Mid+ Energy Avg. 00-09 $ Inv	MW Added R.E. Fuels 00-09
FL Rank/Amount		**27th**/$1M	**14th**/$21.4M	**25th**/19MW
#4 State/Amount		NY/$12M	TX/$197.5	CA/171MW
		Early Environ. Avg. 00-09 $ Inv	Mid+ Environ. Avg. 00-09 $ Inv	
FL Rank/Amount		**16th**/$1.1M	**3rd**/$28.7M	
#4 State/Amount		WA/$5.6M	MA/$14.1	
		Early Ind. Avg. 00-09 $ Inv	Mid+ Ind. Avg. 00-09 $ Inv	
FL Rank/Amount		**24th**/$.1M	**23rd**/$.441M	
#4 State/Amount		AZ/$3.6M	TX/$9M	
	ARRA Energy (Combined) 09 Awards			
FL Rank/Amount	3rd/$414.1M			
#4 State/Amount	TX/$361.7M			
	ARRA ARPA -E Awards 09	ARRA Biomass 09 Awards	ARRA Geothermal 09 Awards	ARRA Smart Grid 09 Awards
FL Rank/Amount	**1of 33** with $0	**4th**/$50M	**35th**/$.250M	**1st**/$267M
#4 State/Amount	CO/$14.1M	FL/$50M	CA/$24.5M	CA/$203M

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Current Situation – Clean Tech (cont)

	1) R&D Transition	2) Early Capital	3) Mid/Late Capital	4) Project Finance
		ARRA SBIR/STTR 09 Awards	ARRA Battery 09 Awards	ARRA Reg. Smart Grid, 09
FL Rank/Amount		**4th**/$1.2M	**3rd**/$95.5M	**1 of 42** with $0
#4 State/Amount		FL/$1.2M	SC/$50.1M	TX/$27.4M
			ARRA Adv. Vehicles 09 Awds.	
FL Rank/Amount			**1 of 32** with/$0	
#4 State/Amount			WI/$15M	
		Global Clean Technology VC Investment in 09 (Pre.)		Global M&A Activity 09 (Pre.)
FL Rank/Amount		NA/NA ($5.6B)		NA/NA ($31.8B)
#4 State/Amount		UNK		UNK
				Global IPO Activity 09 (Pre.)
FL Rank/Amount				NA/NA ($4.7B)
#4 State/Amount				UNK (72% Asia)

Stage 1 – R&D Transition

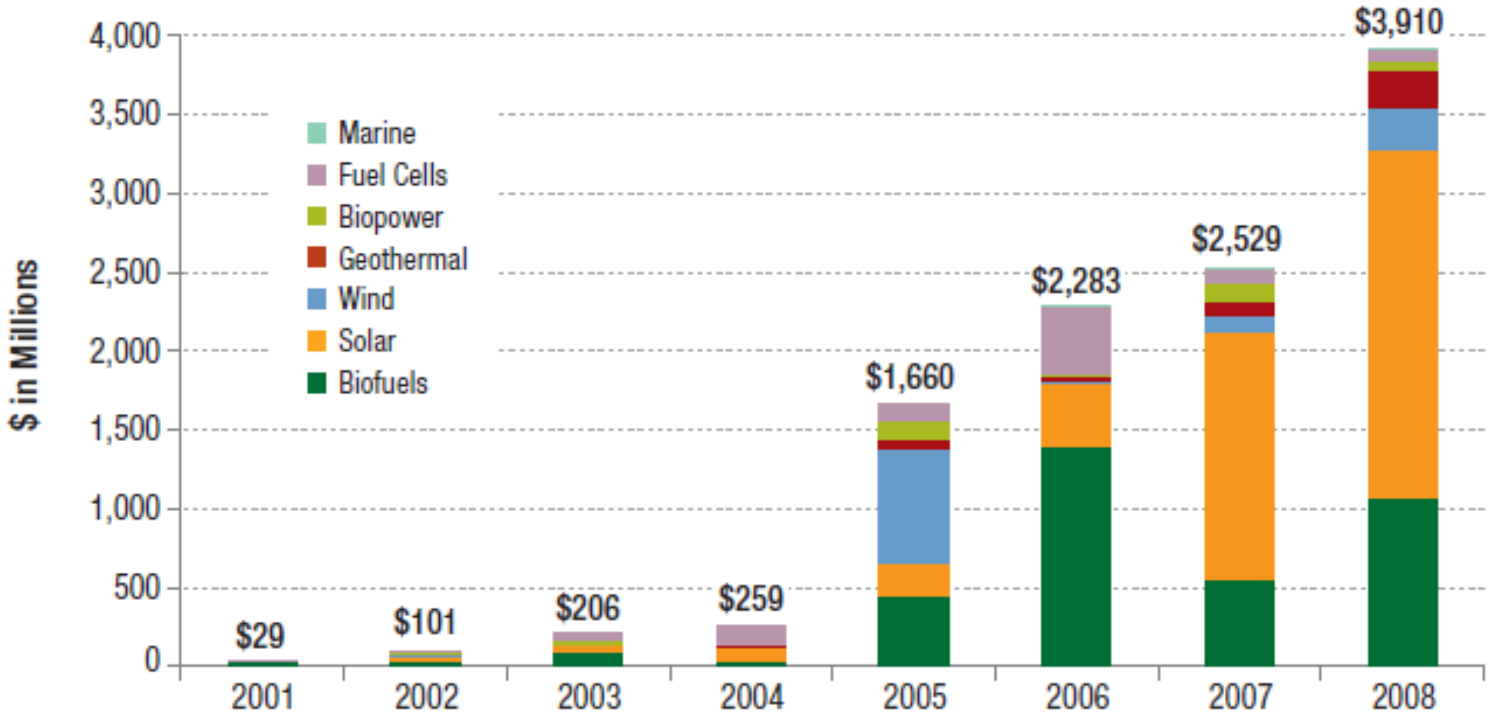
- Florida has not achieved the expected level of investment in R&D for all technologies combined, for clean technologies, and for current assets and/or system inputs, including academic research, academic patents, academic licenses, and academic resources.

- For clean technologies, the state needs to close an annual R&D funding gap of over $500 million to be commensurate with the state's GSP.

Stage 2 – Early Capital

- For 2000-2008, Florida experienced an average early capital federal (primarily SBIR/STTR) funding gap of:
  - $46 million annually for all techs
  - $3 million annually for cleantech
- For 2000-2008, Florida experienced a VC funding gap of $353 million annually for all technologies.
- For 2000-2009, the annual VC funding gaps for early capital investment in clean technologies were
  - $11 million annually for clean energy
  - $8 million annually for other clean technologies.
- State specific data for Angel investors was not available.

U.S. VC and Private Equity Investment in Renewable Energy Technology Companies, 2001–2008 ($ Millions)



Figures represent Disclosed Deals derived from New Energy Finance's Desktop database.
Source: U.S. Department of Energy - Energy Efficiency &Renewable Energy: 2008 Renewable Energy Data Book, July 2009, page 112.

Stage 3 – Mid-Late Capital

- For 2000 to 2008, Florida on average received $490 million annually for all techs and this analysis estimates that the state funding gap is:
  - $788 million annually for all techs
  - $36.7 million a year for cleantech

- In 2009, following the federal government awards of Stimulus Funding of clean technologies, Florida received over $414 million or a projected funding surplus of $52.4 million compared to the state's expected position.

Stage 4 - Project Finance

- Asset financing options include public markets, private equity (VC, equity markets, hedge funds), federal stimulus package and state incentives, M&As, SPACs, banks and private debt, carbon finance, monetization of RECs, PPAs, tax benefits and other revenue streams, and long-term power price hedges.
  - Main sources of debt & equity are banks, capital markets, private debt
  - Market certainty, particularly a sufficient and predictable revenue stream supporting renewable projects, dominates financial decision making
- Project finance banking and capital markets affected by global recession - reduced availability of credit & increased business risk forced investors become more conservative in estimating risk-return profile.
- From November 2008 - January 2010, US Cleantech Index performed exceptionally well compared to the S&P 500, recovering nearly all its recession-related losses

Primary Barriers to Comm. & Project Finance

- Perceived risks of nascent technology, financial and business risks and potential revenue streams
- Insufficient R&D investments interpreted by investors as limited government endorsement of a cleantech business environment
- Inconsistency and unpredictability of policies/regulations affecting the industry introduces risk.
- High initial costs of clean energy techs
- Fossil fuels receive ~2.5X clean energy federal subsidies
- Pioneering states have gained advantage by making first moves in technology, product or marketing innovation & created new market demand for cleantech

Potential Programs for Consideration

- **R&D Stage**
  - Support Innovation Caucus/FL Chamber/Council of 100/SUS BOG initiatives to 1) increase SUS funding, and 2) provide GAP Program funding (phase 1 trials, prototypes, etc.)
  - Catalyze and build on R&D Partnerships with industry by expanding FHTCC model across Florida – also supported by Innovation Caucus
- **Early Stage Capital**
  - Allow angel & corp. investors to earn a transferable corporate income tax liability credit for qualified high risk early venture investment
  - Expand the Florida Opportunity Fund to invest in pre-commercialized cleantech
- **Mid to Late Stage Capital**
  - Design carbon finance market for Florida to provide market confidence to investors
  - Enhance state's role as purchaser of cleantechs (e.g. energy efficiency techs)
- **Project Finance**
  - Partner with corporate leaders and others to establish a special purpose fund which can be used in loan guarantee programs, longer term grants to support commercialization of clean technologies, and other similar purposes
  - Authorize Florida to partner with DOE to access the Section 1705 Loan Guarantee Program that could help Florida secure $400–800M of federal loan guarantees

III. Regulatory Changes: RPS

Renewable Energy Industry in Florida

- Performs well in data collected by the U.S. Energy Information Administration (CY2008)

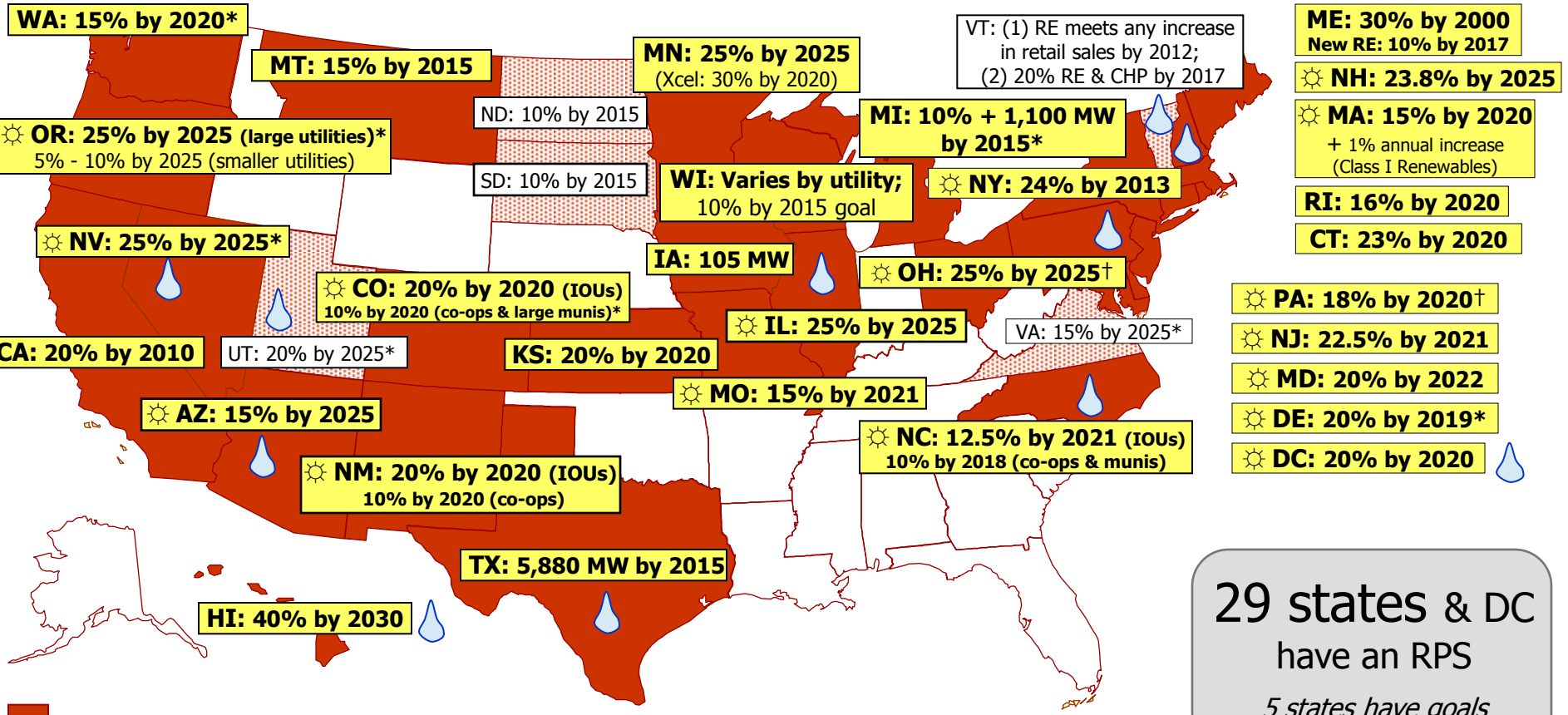
- Solar Thermal Collectors (~17M sq ft across U.S.)
  - 3rd largest producer (7% of U.S. production)
  - Largest consumer (31% of U.S. production)

- Geothermal Heat Pumps (416,000 tons capacity)
  - 3rd largest producer (14% of U.S. production)
  - 10th largest consumer (3% of U.S. production)

- PV Cells and Modules (~1GW across U.S.)
  - Virtually no production (~0% of U.S. production)
  - 3rd largest consumer (2.5% of U.S. production)

Renewable Portfolio Standards in the U.S.

www.dsireusa.org / September 2009



29 states & DC have an RPS

5 states have goals

State renewable portfolio standard

State renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

Extra credit for solar or customer-sited renewables

† Includes separate tier of non-renewable alternative resources

Recent National RPS Study

A recent study by Navigant* (February 2010) findings support the implementation of a Florida RPS program to maximize economic development through job creation. Additional findings:

- A 25% by 2025 national RES would result in 274,000 more jobs supported by the renewable electricity industry than without a national RES. This is equivalent to 2.36 million additional job-years.
- A national RES will lead to job growth in all states, especially those currently without state-level renewable electricity standards.
- The biomass, hydropower, and waste-to-energy industries would see significant job gains in the Southeast United States under a strong national policy. Biomass jobs would double, with most of the increase concentrated in Louisiana, Florida, Georgia, Alabama and Kentucky.
- Meaningful near-term RES targets (12% by 2014 and 20% by 2020) are critical to ensure global competitiveness for the US renewable electricity industry, and stronger long-term targets (25% by 2025) are needed to attract long-term manufacturing investment and project development.
- See: http://www.res-alliance.org/public/RESAllianceNavigantJobsStudy.pdf

Economic Analysis of RPS

- Qualitative, rather than quantitative analysis
- Economic effects of RPS alone are difficult to distinguish from effects of incentive packages to producers
- Examined RPS policy from other states as well as anecdotal production data
- RPS may not be a 'silver bullet' to economic development – states like Michigan and Ohio experienced growth in the renewable energy sector before implementation of RPS

IV. Conclusions and Recommendations

Recommend Whether Florida Should Renew Current Incentives With Technical Changes and Review Of Funding Levels, and How to Cater Non-Sunseting Existing Incentives To The Clean Technology Sector

State Incentives Current Pros/Cons

Pros:

- The current SEP individual energy programs (e.g., solar for schools, etc.) project 494 jobs given a total allocation by ARRA to the SEP, of $40.4 Million.
- The Renewable Tax Credit for Hydrogen (Stationary Fuel Cells) is being fully utilized.

Cons:

- Slow start to program for renewable energy tax credits and sales and use taxes; a considerable amount is still remaining to be used ($11.18 Million out of a possible $15 Million).
- The Hydrogen vehicles renewable sales tax refund is currently not being tapped, and as of February 2010, has the entire $2,000,000 still unused.

Our Recommendation: Due to the project's timeline, an in-depth examination of the existing incentives, including sunseting procedures, was not able to be fully examined in order to provide concise recommendations. In this study we have found that: to be more renewable energy friendly and create more opportunities for economic development, the state of Florida should consider continuing the programs in addition to the programs and incentives already in place: tax credit programs (a corporate tax credit, a property tax credit), direct state grants and loans, economic development incentives to support job-creating new industries, and production incentives.

Recommend A Portfolio Of Programs To Decrease Financial Barriers To Clean Sector Technology Commercialization

Program Category	Availability in Florida	Recommendation
Rebates	Solar Energy System Incentives Program Expires June 2010 Plus utility programs	•Amend: expiration date •Link to project performance
Direct Loans	•PACE Financing – None created •Several utility offered programs	•Revise to include best practices •Legislation to require IOUs to offer program
Matching loans	Not offered	Implement
Loan Guarantees	Not offered	Implement
RPS Set-aside and RECs	Not offered	Implement
Sales Tax Exemptions	Renewable Energy Equipment & Solar Energy Systems Equipment Sales Tax Exemption	Continue the program as is, but with no expiration date

Recommend A Portfolio Of Programs To Decrease Financial Barriers To Clean Sector Technology Commercialization (Cont)

Program Category	Availability in Florida	Recommendation
Interest Rate Buy-down	Not offered	Investigate
Linked Deposits	Not offered	Investigate
Leases	Not offered	Investigate
Production Incentives	Offered (e.g. GRU FIT, OUC Pilot Solar Programs)	Investigate partnership with IOUs and implementing following state RPS

Recommend Whether To Pursue A RPS

Recommend an RPS

Pros:

- Increases demand for renewable energy products and services
- Ability to target favored technologies
- Reduces the need for rebates

Cons:

- Almost certainly leads to higher electricity prices, which may increase the costs to existing and prospective businesses
- Favored technologies may not prove to be the most effective in the long run
- Cost caps could result in production of less renewable energy than anticipated
- Eligibility of energy efficiency to qualify under the standard may reduce the amount of renewable energy produced
- Renewable Energy Credit market places additional administrative and oversight burden on government
- Does not provide upfront capital support and requires a long-term support/contract in order to be successful

Recommend a Clean Energy Standard (CES)

Pros:

- Expand the scope of available technologies to meet clean energy needs
- Increases demand for clean energy products
- Federal assistance for nuclear power is increasing and more people are acknowledging its part in a low emissions future

Cons:

- Nuclear power is not widely viewed as 'environmentally friendly'
- May need to address long term storage issue for spent fuel, as federal programs have not advanced
- Almost certainly leads to higher electricity prices, which may increase the costs to existing and prospective businesses
- Cost caps could result in production of uncertain amounts of renewable energy
- Renewable Energy Credit market places additional administrative and oversight burden on government

Appendix

The Florida Energy Systems Consortium

The Florida Energy Systems Consortium (FESC)

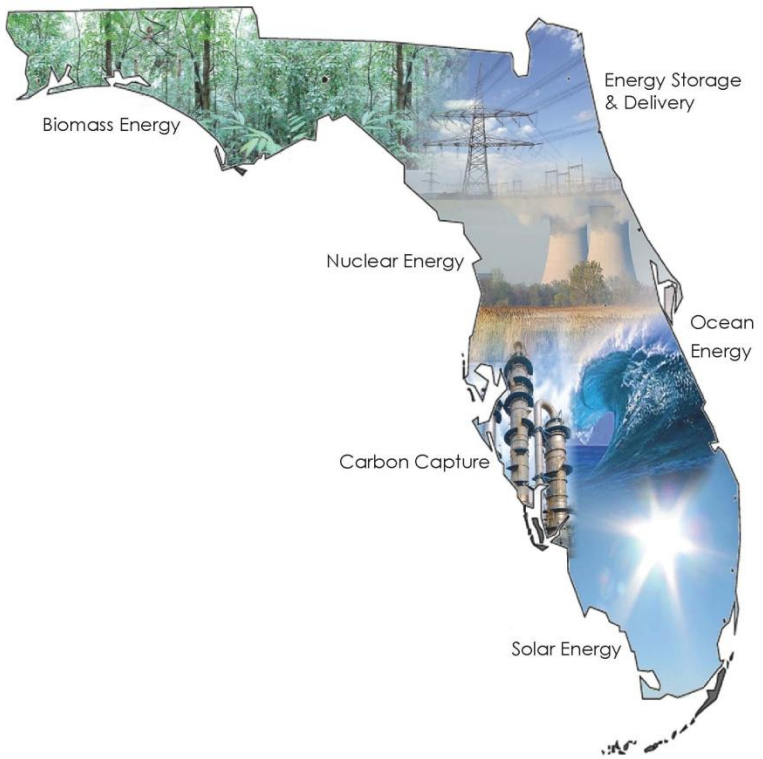
- was created by Florida Statute to share energy related expertise and promote collaboration among the energy experts at its 11 public universities.

Goal

- Uniting Florida's Universities to become a leader in energy research, education, technology, and energy systems analysis.

Vision

- Florida Universities innovating for sustainable energy generation, distribution and usage systems.



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FSU Center for Economic Forecasting and Analysis (CEFA)

Mission

The FSU Center for Economic Forecasting and Analysis (CEFA) specializes in conducting economic research and performing economic analyses to examine public policy issues across a spectrum of research areas. CEFA provides advanced research and training in the areas of energy, aerospace, and environmental economics, and economic development, among other areas. FSU CEFA also serves as a foundation for training students on applied economics, using modeling software and other econometric and statistical tools.

Key Areas of Expertise:

- Sustainable Energy
- High Tech Economic Research
- Environmental/Natural Resources
- Economic Development
- Economics
- Economic Impact Analysis
- Econometrics

UF Public Utilities Research Center (PURC)

Research

Expanding the body of knowledge in public utility regulation, market reform, and infrastructure operations (e.g. benchmarking studies of Peru, Uganda, Brazil and Central America)

Education

Teaching the principles and practices that support effective utility policy and regulation (e.g. PURC/World Bank International Training Program on Utility Regulation and Strategy offered each January and June)

Service

Engaging in outreach activities that provide ongoing professional development and promote improved regulatory policy and infrastructure management (e.g. in-country training and university collaborations)

Definitions of Renewable Energy, Energy Efficiency, Clean Energy and Cleantech

Renewable Energy – FL HB 7135 definition; and a resource that can be replenished at a rate equal to or greater than its rate of depletion (i.e., solar, wind, geothermal, and biomass resources).

Clean Energy – Energy from renewable sources such as biomass, wind, solar power. Clean Energy must be: renewable and have low or zero negative environmental impact.

Energy Efficiency – Simply "using less energy to provide the same service". Examples include in the area of lighting, HVAC and retrofitting, new construction and marketing, education and outreach.

Cleantech – Include "knowledge-based products and services that optimize the use of natural resources while reducing ecological impact and adding economic value through lowered costs or improved profitability". Cleantech spans many industries, from clean energy technologies, to water purification to materials-efficient production techniques.

* Refer to report for listing of clean energy sectors and NAICS codes.

Summary of Federal Incentives

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Energy Efficient Commercial Buildings Tax Deduction	Corporate Deduction	Efficiency Technologies	$0.30-$1.80 per square foot, depending on technology and amount of energy reduction	$1.80 per square foot
MACRS + Bonus Depreciation	Corporate Depreciation	Renewable Energy Technologies	50% bonus depreciation	
Residential Energy Conservation Subsidy Exclusion	Corporate Exemption	Solar Water Heat, Solar Space Heat, Photovoltaics, and Efficiency Technologies in the Residential Sector	Subsidy is exempt from income tax	

Summary of Federal Incentives (2)

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Business Energy Investment Tax Credit	Corporate Tax Credit	Renewable Technologies	30% for solar, fuel cells and small wind 10% for geothermal, microturbines and CHP	Fuel cells: $1,500 per 0.5 kW Microturbines: $200 per kW Small wind turbines placed in service 10/4/08 - 12/31/08: $4,000 Small wind turbines placed in service after 12/31/08: no limit All other eligible technologies: no limit

Summary of Federal Incentives (3)

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Energy Efficient Appliance Tax Credit for Manufacturers	Corporate Tax Credit	Clothes Washers/Dryers, Dishwasher, Refrigerators	Dishwashers: $45 or $75 per unit, varies by energy and water efficiency Clothes washers: $75 - $250 per unit, varies by type, and energy and water efficiency Refrigerators: $50 - $200, depending on energy-efficiency rating	The aggregate amount of credit allowed is $75 million per taxpayer. Certain refrigerators and clothes washers will not add to the aggregate credit amount.
Energy Efficient New Homes tax Credit for Home Builders	Corporate Tax Credit	Whole Building	$1,000-$2,000, depending on energy savings and home type	$2,000

Summary of Federal Incentives (4)

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Renewable Energy Production Tax Credit	Corporate Tax Credit	Renewable Energy Technologies	2.1¢/kWh for wind, geothermal, closed-loop biomass 1.1¢/kWh for other eligible technologies. Generally applies to first 10 years of operation	
Tribal Energy Grant Program	Federal Grant Program	Efficiency and Renewable Technologies	Varies by Solicitation	
Treasury Department Renewable Energy Grants	Federal Grant Program	Renewable Energy Technologies	30% of property that is part of a qualified facility, qualified fuel cell property, solar property, or qualified small wind property 10% of all other property	$1,500 per 0.5 kW for qualified fuel cell property $200 per kW for qualified microturbine property 50 MW for CHP property, with limitations for large systems

Summary of Federal Incentives (5)

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Rural Energy for America Program Grants	Federal Grant Program	Efficiency and Renewable Technologies	Varies	25% of Project Cost
Clean Renewable Energy Bonds	Federal Loan Program	Renewable Technologies in the Public Sector	Varies	
Energy Efficient Mortgages	Federal Loan Program	Residential Energy Efficiency and Renewable Technologies	Varies	5% of Property Value
Qualified Energy Conservation Bonds	Federal Loan Program	Efficiency and Renewable Technologies in the Public Sector	Varies	
Department of Energy Loan Guarantee Program	Federal Loan Program	Efficiency and Renewable Technologies in the Non-Federal Sector	Project Cost over $25 million	
Rural Energy for America Program Loan Guarantee	Federal Loan Program	Efficiency and Renewable Technologies in the Commercial and Agricultural Sector	Varies	$25 million
Qualifying Advanced Energy Manufacturing Investment Tax Credit	Industry Recruitment/Support	Advanced Lighting and Renewable Energy Technologies	30% of qualified investment	

Summary of Federal Incentives (6)

Program	Incentive Type	Eligible Technologies	Amount	Maximum Amount
Residential Energy Conservation Subsidy Exclusion	Personal Exemption	Efficiency and Solar Technologies	100% of subsidy	
Residential Energy Efficiency Tax Credit	Personal Tex Credit	Efficiency and Biomass Stove Technologies	30% of project cost	$1,500
Renewable Energy Production Incentive	Production Incentive	Renewable Energy Technologies in the Public Sector	2.1¢/kWh	10 years
Residential Renewable Energy Tax Credit	Personal tax Credit	Renewable Energy Technologies	30% of Project Cost	Maximum amounts apply to equipment placed in service in 2008 Solar-electric systems, solar water heaters, wind turbines, and geothermal heat pumps placed in service after 12/31/2008: no maximum Fuel cells: $500 per 0.5 kW

Status of Federal Incentives

- Department of Energy has been one of these least effective agencies at distributing ARRA money (4% as of the beginning of February)

- Delays compounded by administrative requirements and tax questions

Current Situation – All Technology

	1) R&D Transition	2) Early Capital	3) Mid/Late Capital	4) Project Finance
	Total R&D	**SBIR/STTR Avg. 00-08**		**M&A Avg. (US) 00-08**
FL Rank/Amount	**16th**/$6.34B	**12th**/$41M		NA/NA ($46.9B)
#4 State/Amount	TX/$17.1B	MD/$87M		UNK
	Acad. Research	**Early VC$ Avg. 00-08**	**Mid+ Stage VC$ Avg. 00-08**	**VC Backed IPO (US) Avg. 00-08**
FL Rank/Amount	**11th**/$1.6B	**14th**/$118M	**11th**/$490M	NA/NA ($7.2B)
#4 State/Amount	MD/$2.7B	TX/$471M	NY/$1,278M	UNK
	Avg. Acad. Disclosures 02-06	**Est. Early Angel $ Avg. 01-09**	**Est. Mid+ Angel $ Avg. 01-09**	**MW Added 00-09 All Fuels**
FL Rank/Amount	**8th**/556	NA/NA (***$10.12B US)***	NA/NA (***$10.28B US)***	**2nd**/2,256MW
#4 State/Amount	PA/802	UNK	UNK	IL/1,217MW
	Avg. Acad. Patent Apps 02-06			**Avg. CapEx at Utils. (US) 03-08**
FL Rank/Amount	**7th**/336			NA/NA ($58.4B)
#4 State/Amount	MD/514			**UNK**
	2008 Utility Patents			
FL Rank/Amount	**12th**/2,046			
#4 State/Amount	WA/3,517			
	Avg. Active Acad. Lic. 02-06			
FL Rank/Amount	**17th**/515			
#4 State/Amount	TX/1,440			
	Avg. Univ. Startups 02-06			
FL Rank/Amount	**7th**/16			
#4 State/Amount	NY/27			

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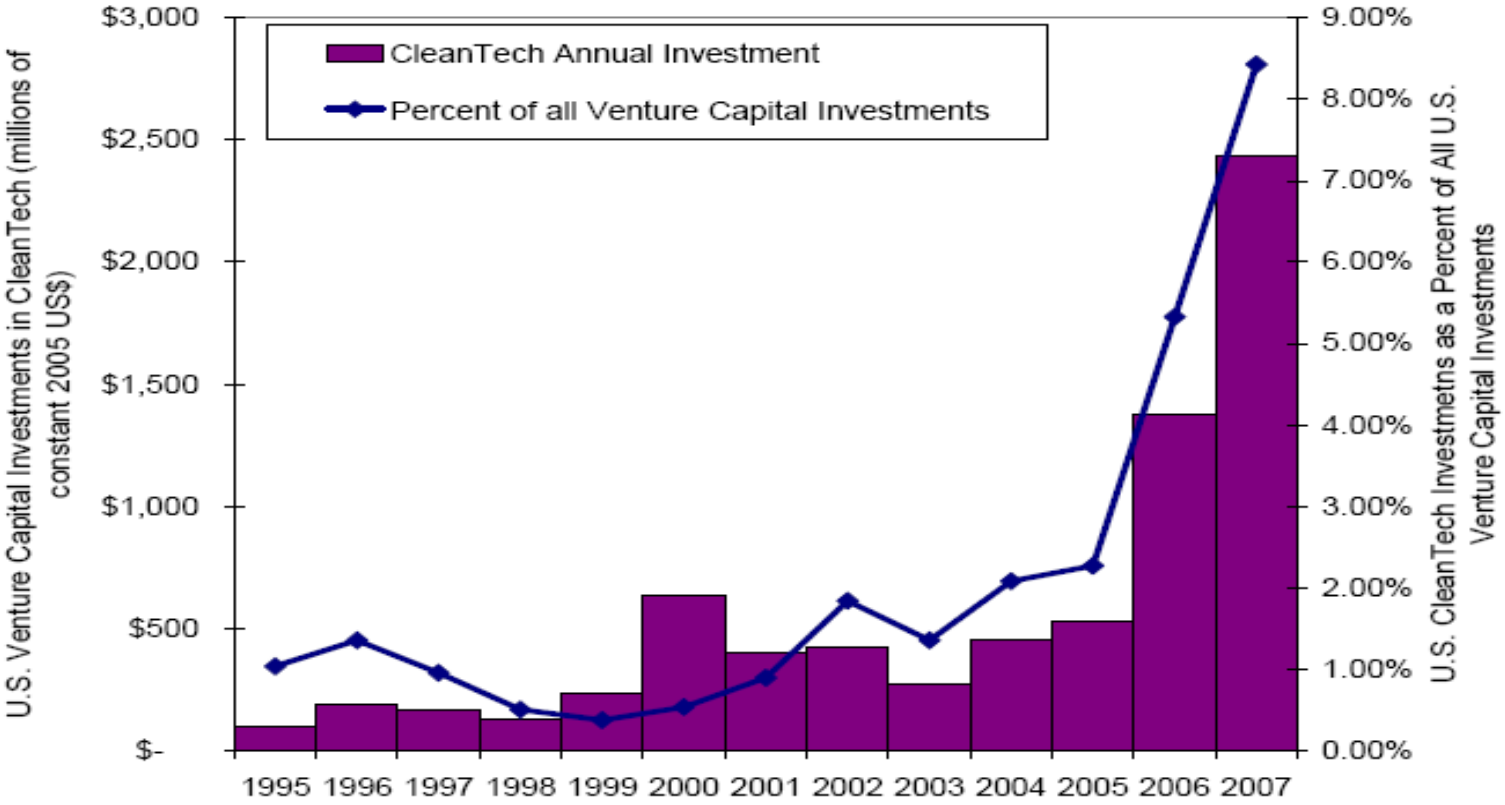
U.S. VC Investments in Cleantech: 1995-2007 (Million Constant 2005 U.S. Dollars)



Source: Dooley, J.J. (Pacific Northwest National Laboratory): Trends in U.S. Venture Capital Investments Related to Energy: 1980-2007, October 2008.

Geothermal Heat Pump Production

Geothermal Heat Pump Manufacturing Activities, 2008

Release Date: October 2009

Next Release Date: October 2010

Table 4.8 Geothermal Heat Pump Shipments by Origin, 2007 and 2008
(Rated Capacity in Tons)

Origin	2007	2008
Arkansas	1,867	3,618
Florida	44,328	61,388
Indiana	99,166	115,428
Michigan	30,179	31,561
Minnesota	8,524	13,010
New York	-	13,961
Ohio	2,401	3,459
Oklahoma	58,792	117,460
Pennsylvania	943	4,849
South Dakota	-	18,709
Tennessee	581	129
Texas	44,519	32,447
Shipments from United States/Territories	291,300	416,019
Imported	-	86
Total Shipments	**291,300**	**416,105**

- = No data reported.
Source: Energy Information Administration, Form EIA-902, "Annual Geothermal Heat Pump Manufacturers Survey."