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Southern Alliance for Clean Energy

The Economic Risks of New Reactors in Georgia & Florida

Webinar PRESENTATION

December 2011

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Southern Alliance for Clean Energy

About Us

- **Southern Alliance for Clean Energy (SACE) has been a leading advocate for clean, responsible energy choices that better our communities, our region and our world for over 25 years.**

- **Since its formal inception in 1985, SACE has grown from a small group of individuals into a dynamic organization, with offices across the Southeast and initiatives at federal, state and local levels. SACE continues to expand organizationally, to address the needs of a rapidly changing planet.**

- **As we look towards the future, SACE's commitment to preserve, restore and protect our environment through the use of innovative technology, community outreach, grassroots and grasstops education, and pioneer policy work remains steadfast.**

For more information on Southern Alliance for Clean Energy please visit

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Florida and Georgia Have Cheaper and Safer Alternatives to New Nuclear Reactors

Ellen Vancko
Nuclear Energy & Climate Change
Project Manager

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

About UCS

- The Union of Concerned Scientists is the leading U.S. science-based nonprofit organization working for a healthy environment and a safer world.
- Founded in 1969, UCS is headquartered in Cambridge, Massachusetts, and has offices in Berkeley, Chicago and Washington, D.C.
- The UCS nuclear power program focuses on nuclear safety, security and economics.
- For more information go to www.ucsusa.org.

Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Study Overview

- Big Risks, Better Alternatives, conducted by Synapse Energy Economics, Inc.
- Report looks at two nuclear power projects: Levy 1 & 2 in Florida and Vogtle 3 & 4 in Georgia.
- Both projects were proposed in 2006 to meet then-expected growth in electricity demand.
- Study evaluated both nuclear projects and compared them with other low-carbon alternatives that could do the job at lower cost and risk.

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Key Findings

- Major risks associated with the Levy and Vogtle projects: cost escalation, construction and regulatory delays, and lack of transparency, all of which could lead to much higher costs.
- If history is any guide, the cost estimates for both plants are likely to increase dramatically over time.
- Both Florida and Georgia can significantly prove their energy efficiency investments. In 2011, Georgia ranked 36th and Florida ranked 27thth among the states across six energy efficiency categories, according to ACEEE.
- Neither Florida nor Georgia have renewable energy standards but they do have significant renewable resource potential.
- Ratepayers in both states would be better served by investing in energy efficiency and cost-effective, available renewable energy resources.

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More UCS Resources on Nuclear Power Safety, Security and Economics

- US Nuclear Power After Fukushima (2011)
- Nuclear Power: Still Not Viable Without Subsidies (2011)
- The NRC and Nuclear Power Plant Safety in 2010 (2011)
- Nuclear Loan Guarantees: Another Taxpayer Bailout Ahead? (2009)
- Nuclear Power in a Warming World (2007)

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Synapse
Energy Economics, Inc.

Big Risks, Better Alternatives:
An Examination of Two Nuclear Energy Projects in the U.S.

Southern Alliance for Clean Energy Webinar

December 6, 2011

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Overview of Presentation

- Introduction and Background
- Vogtle 3 & 4
- Levy 1 & 2
- Subsidies for Vogtle 3 & 4
- Impact on ratepayers
- Better alternatives: energy efficiency
- Better alternatives: renewable energy
- Conclusions and recommendations

Synapse Energy Economics, Inc.

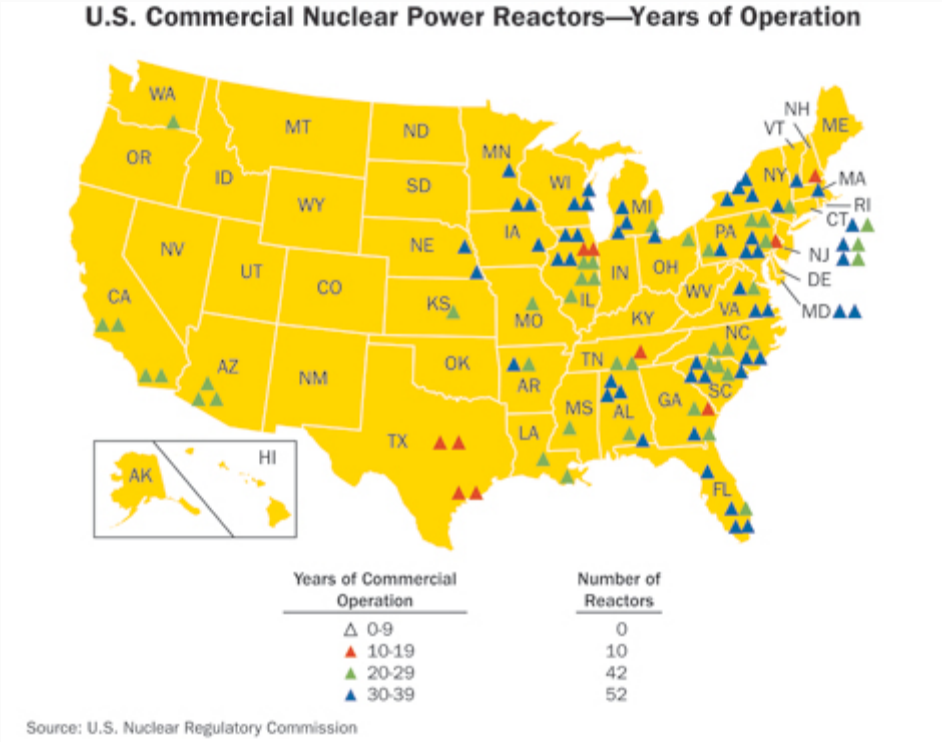
Energy System modeling, analysis, expert testimony, and stakeholder representation for…

- Consumer Advocates and Public Interest Groups in more than 25 states
- More than 20 PUCs and Attorneys General
- Over 40 Environmental Groups and Foundations

Report Available at: http://www.synapse-energy.com

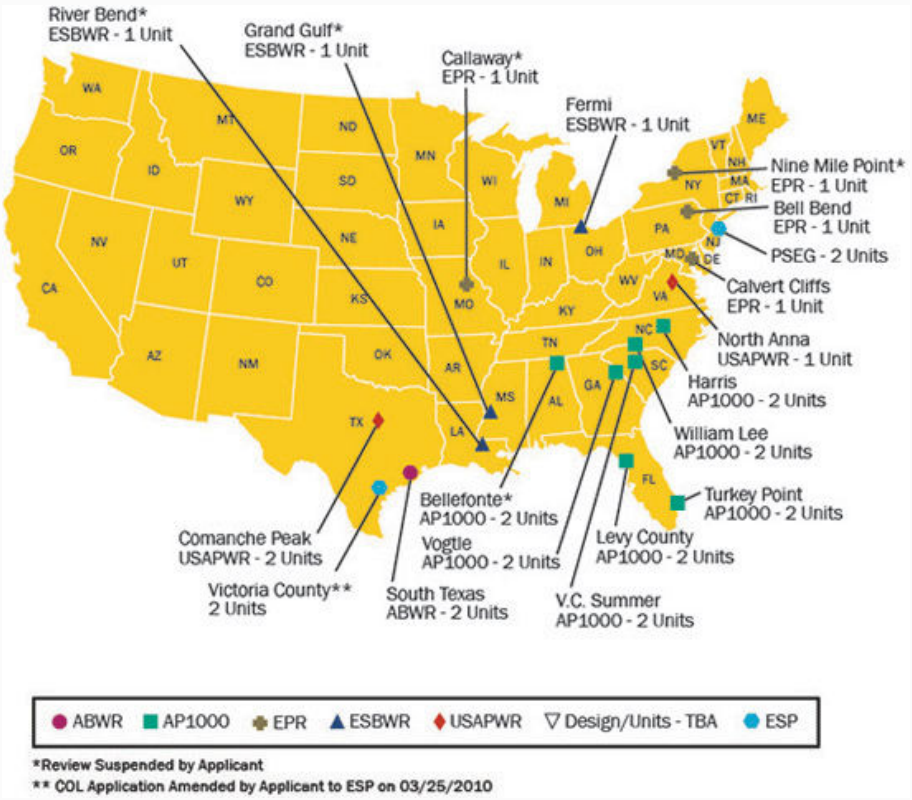
State of Nuclear Power in US

- No plant ordered since 1970's
- 104 reactors operating in US
- Generates approximately 20% of electricity in US



Proposed Reactor Application Locations

- 18 applications for 28 reactors
  - 8 reactors have suspended review or have announced cancellations
    - NRG has cancelled STP Units 3 & 4
    - Exelon has abandoned plans for Victoria County Units 1 & 2
    - UniStar looking for a partner to develop Calvert Cliffs Unit 3

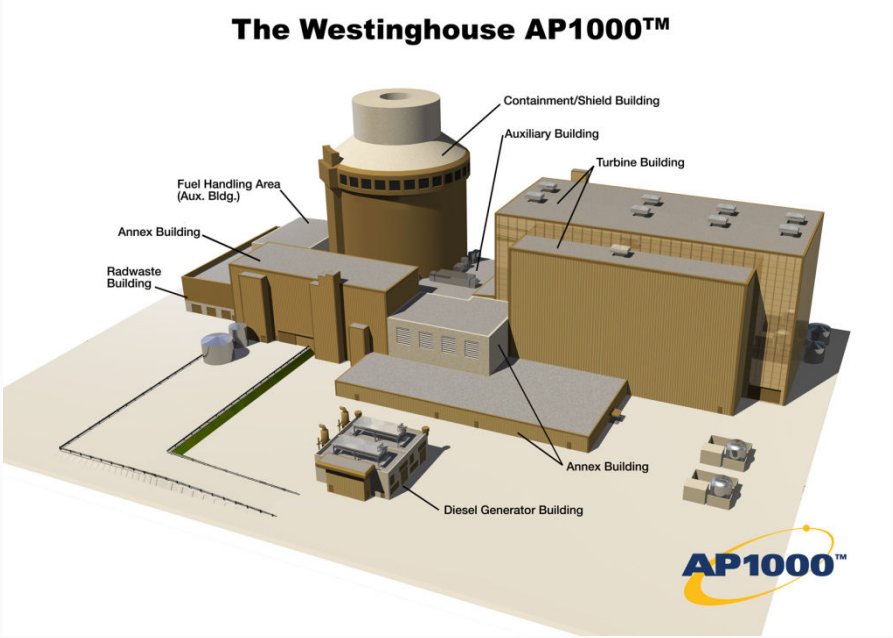


Case Studies of Proposed Plants: Vogtle 3 & 4 and Levy 1 & 2

- Similarities
  - Favorable regulatory environment
    - Recovery of costs before completion
  - Plans to build announced in 2006
- Differences
  - Greenfield site versus expansion of existing site
  - Federal Loan Guarantee for Vogtle 3 & 4
  - Production Tax Credit for Vogtle 3 & 4

Factor	Levy	Vogtle
Ownership (Percentage)	Progress Energy (100%)	Georgia Power (45.7%)
Boilers	Westinghouse AP1000	Westinghouse AP1000
Number of Units	Two	Two
Estimated Capacity (MW)	2,200	2,200
Greenfield Site	Yes	No
Expansion of Existing Site	No	Yes
Expected First Unit Delivery Year	2021	2016
Expected Second Unit Delivery Year	2023	2017
Federal Loan Guarantee	No	Yes
Early Financing Cost Recovery	Yes	Yes
Ongoing Reporting to State Commission	Yes	Yes
Current Total Cost Estimate	$22.5 billion	$14 billion

AP1000: Design Intent



- Modular design: pressurized water reactor
- NRC expected to issue design certification end of 2011???
- Singular design for streamlined approval process
- AP1000 currently in construction in China (Sanmen & Haiyang)
- Has not been built in US

Vogtle 3 and 4

- Georgia Power (45.7%)
  - Oglethorpe Power, MEAG, City of Dalton
- Existing site (Vogtle 1 and 2)
- 1,100 MW each unit
- Expected delivery: 2016 Unit 3, 2017 Unit 4
- Published cost estimate $14.1 billion; Georgia Power Share ($6.1 billion)

Timeline of Events and Announced Costs

Year	Month	Event	Completion Date	Cost Estimate
2006	Aug.	Early site permit application filed with NRC		
2007	Aug.	Limited work authorization application filed with NRC		
2008	March	Construction and operating license application filed with NRC		
2008	March	Georgia Power files certification request with Georgia Public Service Commission		
2008	April	Contract signed with Westinghouse for reactor design		
2008	Aug.	Environmental Impact Statement filed		
2009	March	Georgia PSC approves new Vogtle units. Total cost of project estimated at $14 billion. Georgia Power's share will be $6.4 billion		
2009	Aug.	NRC grants Early Site Permit		
2010	Feb.	Georgia PSC approves cost of new units. Stipulation lowers cost from $6.4 to $6.1 billion		
2010	Feb.	Federal loan guarantees granted. Total guaranteed borrowings would not exceed 70 percent of the company's eligible projected costs, or approximately $3.4 billion, and are expected to be funded by the Federal Financing Bank. Any guaranteed borrowings would be full recourse to Georgia Power and secured by a first priority lien on the company's 45.7 percent ownership interest in the project.	2016 Unit 3 2017 Unit 4	$14 billion
2010	Sept.	NRC's draft Supplemental Environmental Impact Statement states that it has not found an environmental reason to deny a COL		
2011	Jan.	Beginning of early cost recovery plan upon ratepayers		
2012		Anticipated approval of construction and operating license application		

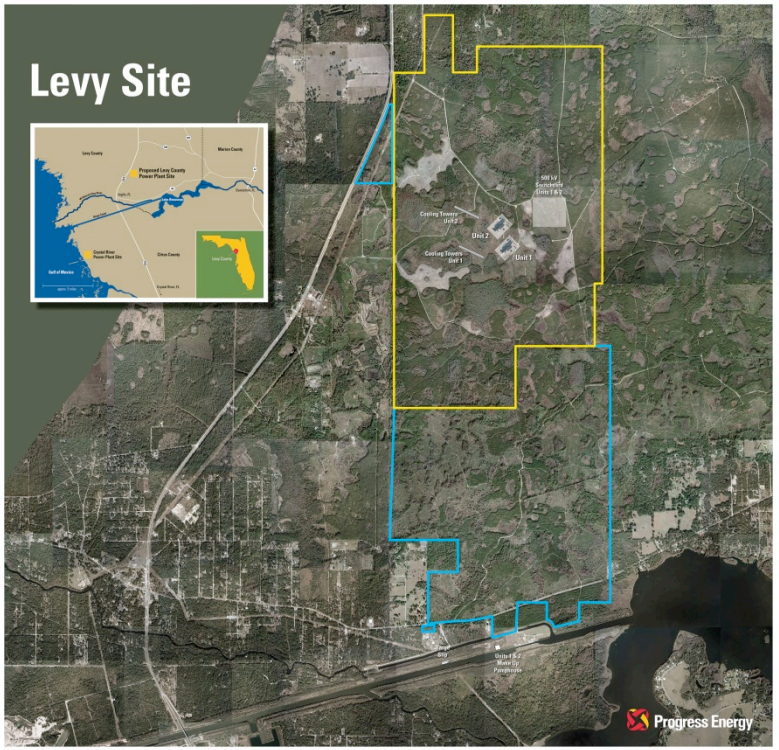
Vogtle 3 & 4: Levelized Cost Estimates

- Range informed by Company's experience with Vogtle 1 & 2. Initial cost projection: $660 million. Final cost: $8.87 billion
- **Low Estimate**: ($14 billion): levelized $63/MWh
- **Mid Case**: $115/MWh or ½ of trajectory of high estimate
- **High Estimate**: 200% or 2/3 of cost estimate from Vogtle 1 and 2. $168/MWh

Category	Units	EE	NG CC	Biomass	Wind On-Shore	Coal	Wind Offshore	Solar PV	Vogtle (Mid)
Capital Cost	$/kW	N/A	$1,200	$4,400	$2,250	$3,000	$6,000	$3,300	$10,775
Capital Cost	$/MWh	$40	$17.44	$57.73	$83.64	$43.61	$167.28	$184.01	$101.53
Fuel Cost	$/MWh	0	$47.08	$30.13	$0.00	$20.49	$0.00	$0.00	$8.58
O&M (Fixed and Variable)	$/MWh	0	$3.72	$16.02	$12.02	$8.64	$25.30	$6.95	$13.13
Emission Cost	$/MWh	0	$14.91	$0.04	$0.00	$36.45	$0.00	$0.00	$0.00
Tax Credits	$/MWh	0	$0.00	-$13.63	-$13.63	$0.00	-$13.63	-$55.20	-$7.89
All-In Costs	$/MWh	**$40**	**$83.15**	**$90.30**	**$82.04**	**$109.19**	**$178.96**	**$135.76**	**$115.35**

Levy 1 and 2

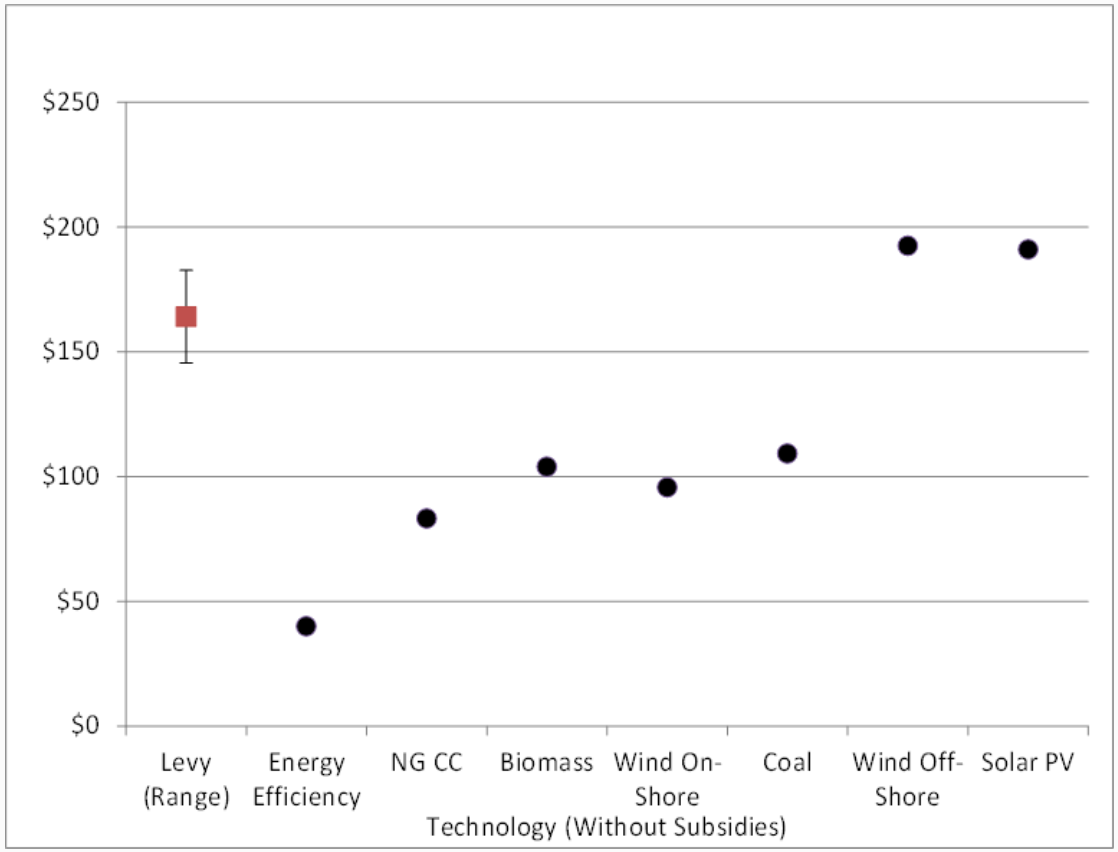
- Progress Energy Florida (100%)
- Greenfield site
- 1,100 MW each unit
- Expected delivery 2021 Unit 1, 2023 Unit 2
- Published cost estimate at $22.5 billion



Timeline of Events and Announced Costs

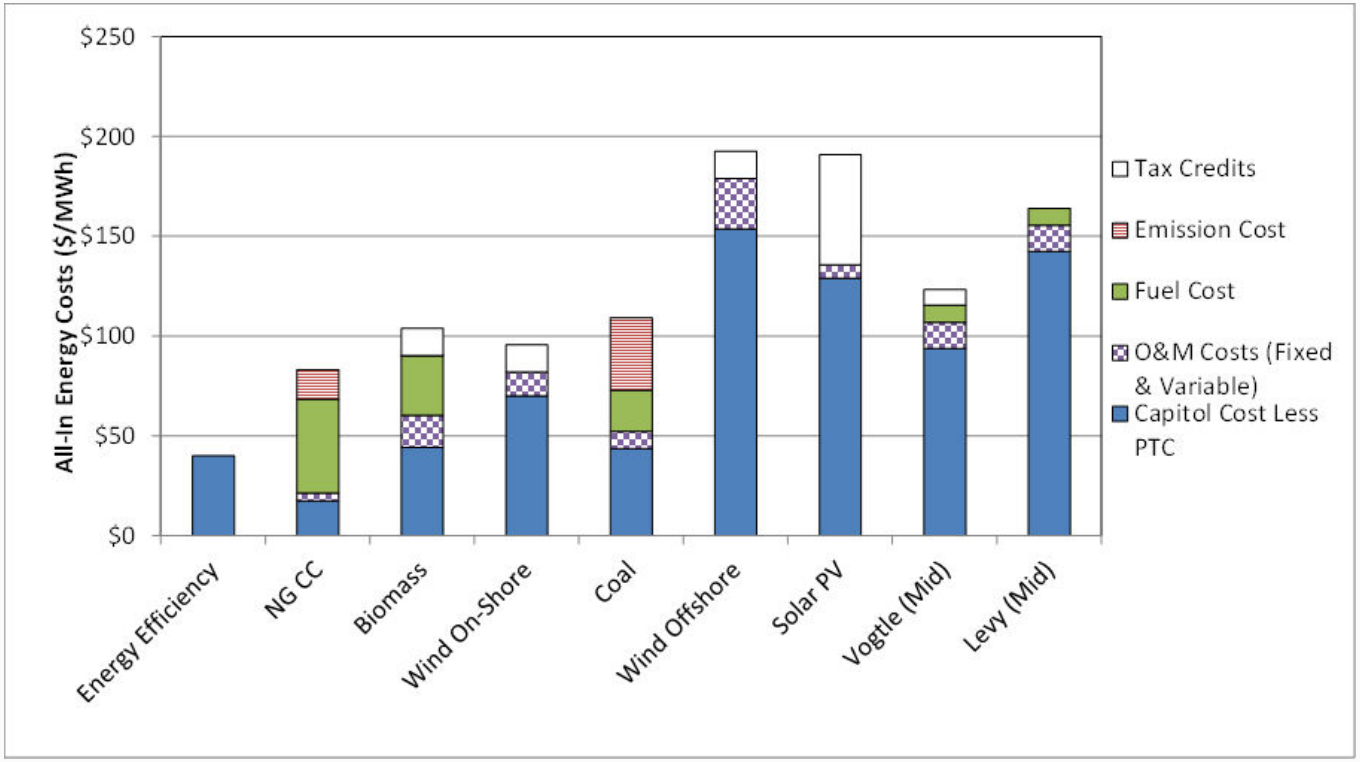
Year	Month	Event	Completion Date	Cost Estimate
2006	Dec.	Progress selects Levy site for single unit	2016 Unit 1	$2.5 to $3.5 billion
2008	March	Progress triples cost estimates for Levy Units 1 and 2 to $17 billion		
2008	July	Florida PSC approves need for two units		
2008	Aug.	Construction and operating license filed with NRC		
2008	Aug.	Approval given to project from governor and his cabinet		
2009	Jan.	Progress signs contract for reactor design		
2009	May	Progress files 2010 cost recovery plan to PSC		
2009	May	Progress announces at least a 20-month delay on planned reactors		
2010	Jan.	Progress announces unspecified delays to Levy project based on Florida PSC decision that denied $500 million rate hike request	2016 Unit 1 2018 Unit 2	
2010	Feb.	Progress extends delay on Levy project to at least 36 months	2019 Unit 1 2021 Unit 2	$17 billion
2010	May	Cost estimate for project increases from $17.2 billion to $22.5 billion		$22.5 billion
2010	May	The timeline for the Levy project is delayed to 2021 for Unit 1 and 2023 for Unit 2	2021 Unit 1 2023 Unit 2	

Levelized Cost Estimates



- **Low Estimate**: ($22.5 billion): levelized $146/MWh
- **Mid Case**: 15% increase of project costs $25.9 billion or $164/MWh
- **High Estimate**: 30% increase of project costs or $29.3 billion. $183/ MWh

Comparison of Mid-case Cost Estimates for Both Proposed Plants



- Impact of Tax Credits shown for nuclear and alternatives

Differences Between Proposed Projects Driving Cost Estimates

- Federal Loan Guarantee
  - $8.33 billion DOE loan guarantee announced February 2010
  - Allows Georgia Power to borrow at below market rates
  - Allows Georgia Power to increase debt fraction (Synapse increases debt fraction to 75%)
- Production Tax Credit (PTC)
  - 1.8 cents per kWh for first 1,000 MW
  - Cap at $125 million per year for first eight years of operation
  - PTC extends through December 31, 2020
  - Synapse's analysis assumed only Vogtle 3 & 4 would receive PTC

Impact on Ratepayers

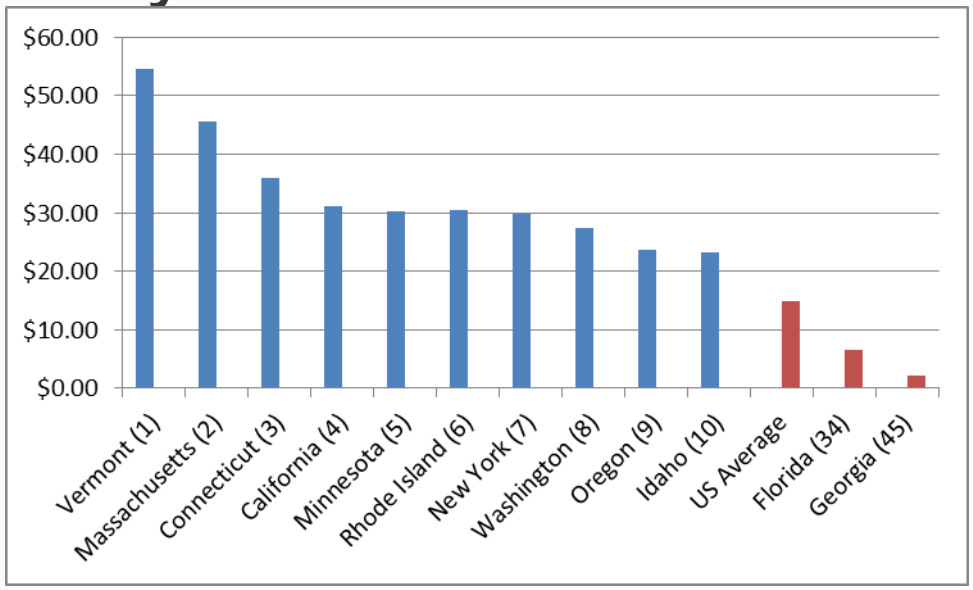
- Ratepayers will be paying for the plants before single kilowatt-hour is generated
- Impact based on **current** cost estimates. Could be higher if costs of plants increase
- Georgia Power
  - Recovery of financing costs
  - Georgia Power's estimate is that by 2018 ratepayer (1,000 kWh/month) is paying $120 per year
- Progress Energy Florida
  - Recovery of preconstruction and construction costs
  - By 2021, amounts to $717 per year for Progress ratepayer (Based on 2010 testimony)

Better Alternatives: Energy Efficiency

Energy Efficiency

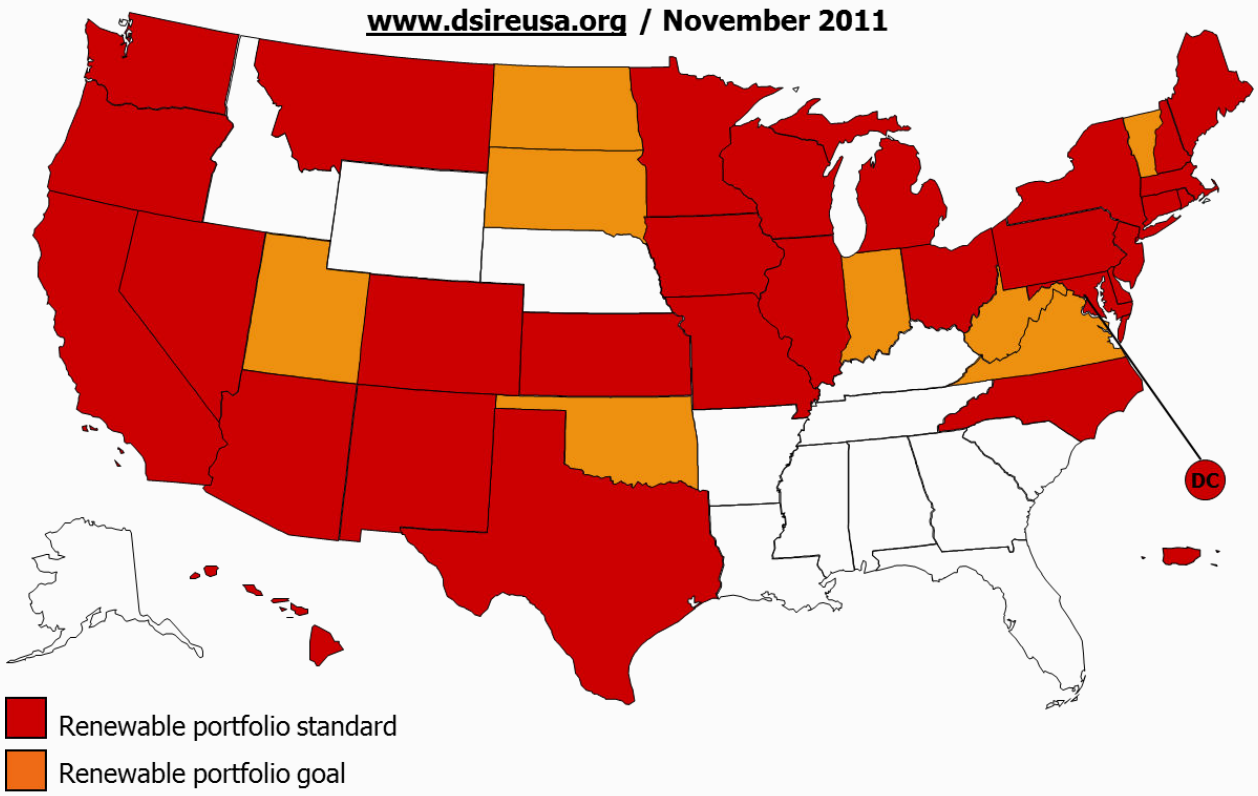
- Georgia has no energy efficiency targets
- Florida reduced targets this year

American Council for an Energy Efficient Economy (ACEEE): Survey of 2010 Per Capita EE Spending:



Better Alternatives: Renewable Energy

- 29 other states and territories have targets
- 8 states have goals
- Georgia and Florida have neither renewable



Better Alternatives Florida: Renewables

- 2008 Navigant Consulting prepared study for Florida Public Service Commission identifying Renewable Energy (RE) potential in the state. (http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/Assessment.aspx)
- Study identified range of 136,393 to 142,862 MW of RE potential in state
- Florida's current capacity 59,073 MW (2009 EIA data)
- Levy 1 & 2's capacity: 2,200 MW

Resource	Technical Potential Megawatts (MW)
Photovoltaic on rooftops	52,000
Photovoltaic in ground arrays	37,000
Concentrated solar power	380
Solar water heating	1,136
Onshore wind	186
Offshore wind	40,311
Biomass (available but not collected)	400 – 1,359
Biomass (potentially available)	3,945 – 9,555
Landfill gas (new sites)	110
Anaerobic digester gas	35
Waste heat (sulfuric acid conversion)	140
Ocean current	750
Total	**136,393 – 142,862**
Levy 1 & 2	2,200

Better Alternatives Georgia: Renewables

- Georgia has not commissioned a study on renewable energy potential in the state
- 2009 SACE analyzed renewable energy potential in the South, including Georgia
- Study identified that by 2025; RE could generate 99,809 GWh of electricity for state
- Georgia's current generation at 128,698 GWh (2009 EIA data)
- Vogtle 3 & 4 annual generation 16,380 GWh (Synapse calculation)

SACE Maximum Annual Feasible Potential Generation (gigawatt-hours) for Georgia by Source	
Energy Source	**2025 (GWh)**
Onshore Wind	3,635
Offshore Wind	52,788
Biomass	22,703
Hydroelectric	2,015
Solar	18,668
Total	99,809
Total (Vogtle 3 & 4)	16,380
From: SACE 2009, Calculation for Vogtle 3 & 4	

Conclusions and Recommendations: Georgia

- Our analysis suggests that the final project cost is far from certain, and is likely to be much higher than the current estimate.
- Our mid-range estimate of the levelized cost for Vogtle 3 & 4 is $115 per MWh based on history of Vogtle 1 & 2. This estimate is above all of our mid-range cost estimates for energy efficiency, renewable resources (except off-shore wind and solar PV), and conventional generation.
- Georgia Power ratepayers will pay an estimated $120 per year by 2018 in financing charges based on the *current* cost estimate. Should the cost of the project increase, then the impact on customer bills will also increase.
- Available studies show that there is substantial energy efficiency and renewable energy resource potential in Georgia that could be utilized to meet the state's future energy needs at far lower cost and risk.
- Georgia should commission new, independent energy efficiency and renewable energy studies for the entire state to help inform and guide policymakers in weighing the costs and benefits of different alternatives for meeting future energy needs. The last energy efficiency potential study was conducted in 2005 and the state has never commissioned a study to assess the renewable resource potential.
- Georgia should take immediate steps to set statewide energy efficiency and renewable energy targets that are consistent with those of leading states.

Conclusions and Recommendations: Florida

- The project schedule for Levy 1 and 2 has been significantly delayed from the initially proposed operating dates. Concurrently, Progress has increased its construction cost estimates. Between 2008 and 2010, the cost estimate increased by $5 billion, or approximately 30 percent.
- Our mid-range analysis of the levelized cost for the project is $164 per MWh. This is well above our mid-range cost estimates for alternatives such as energy efficiency, renewable energy resources, and conventional generation.
- Progress Energy's own filings show that, based on current cost estimates, its residential ratepayers will pay $718 per year by 2021 for the Levy project—even **before** it generates any electricity. Should project costs increase further, customers will see a corresponding increase in their bills.
- Florida should take steps to increase its energy efficiency targets to levels more consistent with leading states.
- Florida has ample renewable energy potential to meet electricity load growth. Additionally tapping into the renewable energy potential will help diversify Florida's resource mix.
- Any additional demand growth in Florida can be met through available and cost-effective renewable energy resources and conventional resources such as natural gas.

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