# ALL RISK, NO REWARD:

# Why Munis and Coops Should Not Subsidize The Nuclear Renaissance

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Capital markets will not underwrite the construction of new nuclear reactors because of the severe technology, policy, regulatory, execution, marketplace and financial risks that they face.

Shifting the risk to muni and coop ratepayers does not eliminate risk, it just exposes captive ratepayers to the excess costs that high risk project impose.

# The Economic Risks of New Nuclear Reactor Projects

| Category | Source | Specific Risks Identified in the Analysis | Category | Source | Specific Risks Identified in the Analys |
|---|---|---|---|---|---|
| **Technology** | New Technology Risk | First of a kind costs | **Marketplace** | Uncertain demand growth | Slowing due to recession |
| | | Long-lead time | | | Shifting due to debt and loss of wealth |
| | Alternative technologies | Efficiency potential identified | | Uncertain fuel costs | Natural gas price decline |
| | | Renewable cost declines | | Reactor Costs | Long lead time |
| | | | | | Cost overruns |
| **Policy** | Shifting focus | Emphasis on efficiency reduces need | | | Rate shock reduces demand |
| | | Emphasis on rernewables reduces need | | | |
| | Flexible GHG reductions | Lowers carbon cost | **Financial** | General Conditions | Tight money |
| | | | | | New Liquidity requirements |
| **Regulatory** | NRC Regulatory Reviews | Lack of Experience | | | High-risk premiums |
| | | Change of requirements | | Utility Finance | Increased nuclear operating exposure |
| | | Design flaws and revisions | | | Existing debt and need to refinance |
| | | Site specific contentions | | | Financial ratio deterioration |
| | Loan Guarantee Conditions | Taxpayer protections inhibit loans | | | Rising cost of debt |
| | Rate Review | Recovery of costs challenged | | | Limited & declining cash & equivalents |
| | | | | | Weak balance sheets |
| **Execution** | Construction Risk | Lack of experience | | | Underfunded pension plans |
| | | Counterparty risk | | Project Finance | High hurdle rate for risky projects |
| | EPC contract uncertainties | Cost escalation and volatility | | | Impact of large project |
| | Size, cost and complexity | Cost overruns | | | Debt load and service burden impact |
| | | Delays | | | Capital structure distortion |

## SOURCES OF DATA SLIDES

**External Shocks** Energy Information Administration. *Annual Energy Review*.
**Texas Net Generation:** EIA, Natural Gas Monthly
**The Recession:** CPS presentations
**Projections of Peak Load:** Progress Energy *2008 10-year plan*, p. 2-7; *2009 10-year plan*, p. 2-6; Florida Power and Light, *2008 10-year plan*, p. 40; *2009 10-year plan*, p. 45;
**Crude oil & Natural Gas Prices**: Source: Energy Information Administration, Petroleum Spot Prices, http://tonto.eia.doe.gov/dnav/pet/xls/PET_PRI_SPT_S1_M.xls, Natural Gas Future Prices, Contract 1: http://tonto.eia.doe.gov/dnav/ng/xls/NG_PRI_FUT_S1_M.xls
**Nymex Futures:** Testimony of Garry Miller, Docket No. 090009, May 1, 2009, Exhibit GM-1; Energy Information; Administration, Annual Natural Gas Futures Contract 1, http://tonto.eia.doe.gov/dnav/ng/xls/NG_PRI_FUT_S1_M.xls; Annual *Florida Gas Price Sold to Electric Power Companies*; http://tonto.eia.doe.gov/dnav/ng/hist/n3045fl3a.htm; *FPL Need Study for electrical Power Docket No. 07-0650, Appendix E*, Nymex Futures Contract, http://www.nymex.com/ng_fut_csf.aspx, visited 7/11/2009
**Levelized Cost of Low Carbon Resources:** Congressional Budget Office, *Nuclear Power's Role in Generating Electricity*, May 2008, p.13; Kaplan Carbon SourcesStan, *Power Plants: Characteristics and Costs*, Congressional Research Service, November 13, 2008, Appendix B; Staff draft, *Comparative Costs ofCalifornia Central Station Electricity Generation Technologies Cost of Generation Model*, August, 2009, p. 18; Lazard, *Levelized Cost of Energy Analysis—Version 2.0*, June 2008, p. 10; *Levelized Cost of Energy Analysis – Version 3.0*, for efficiency, onshore wind, biomass, natural gas, coal and nuclear and solar PV, as reported in World Resources Institute, *Renewable Energy Opportunities in Florida*, April 2009; Lovins Amory, and Imran Shiekh, and Alex Markevich, *Nuclear Power: Climate Fix or Folly?*, December 31, 2008.Draft, p. 2; Moody's, New Nuclear Generating Capacity: Potential Credit Implications for U.S. Investor Owned Utilities, May 2008, p. 15; National Research Council of the National Academies, *America's Energy Future: Technology and Transformation, Summary Edition* (Washington, D.C.: 2009), p. 58; Renewable Energy Policy Network for the 21st Century, *Renewables 2007:* Global Status Report, 2008; Standard and Poors, *Assessing the Credit Risk of Competing Technologies for New U.S. Nuclear Power Plants*, August 13, 2008, p. 11.
**Overnight Costs:** Mark Cooper, *The Consumer Economics of Nuclear Reactors: Renaissance or Relapse?*, Institute for Energy and the Environment, Vermont Law School, June 2009, p.24.
**Nuclear Reactor Characteristics**: http://www.nuclear.gov/np2010/neScorecard/neScorecard.html, Company web sites for stock price, Annual Reports for shares outstanding, Exhibit JJR-3 Comparison of Cost Estimates for New AP-1000 Reactors, Docket No. 0900009-EI, for AP-1000 costs Mark Cooper, *The Economics of Nuclear Reactors: Renaissance or Relapse?*, Institute for Energy and the Environment, Vermont Law School, June 2009, p. 24. http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL[1].pdf
**FPL Carbon Compliance:** Florida Power and Light, Docket No. 090009 EI, OPC's Third Set of Interrogatories, Question No. 47, p 1 of 2; EPA Analysis of the American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress, 6/23/09, p. 14, using the highest price and converting real to nominal dollars at the 2.5% rate of inflation assumed by FPL

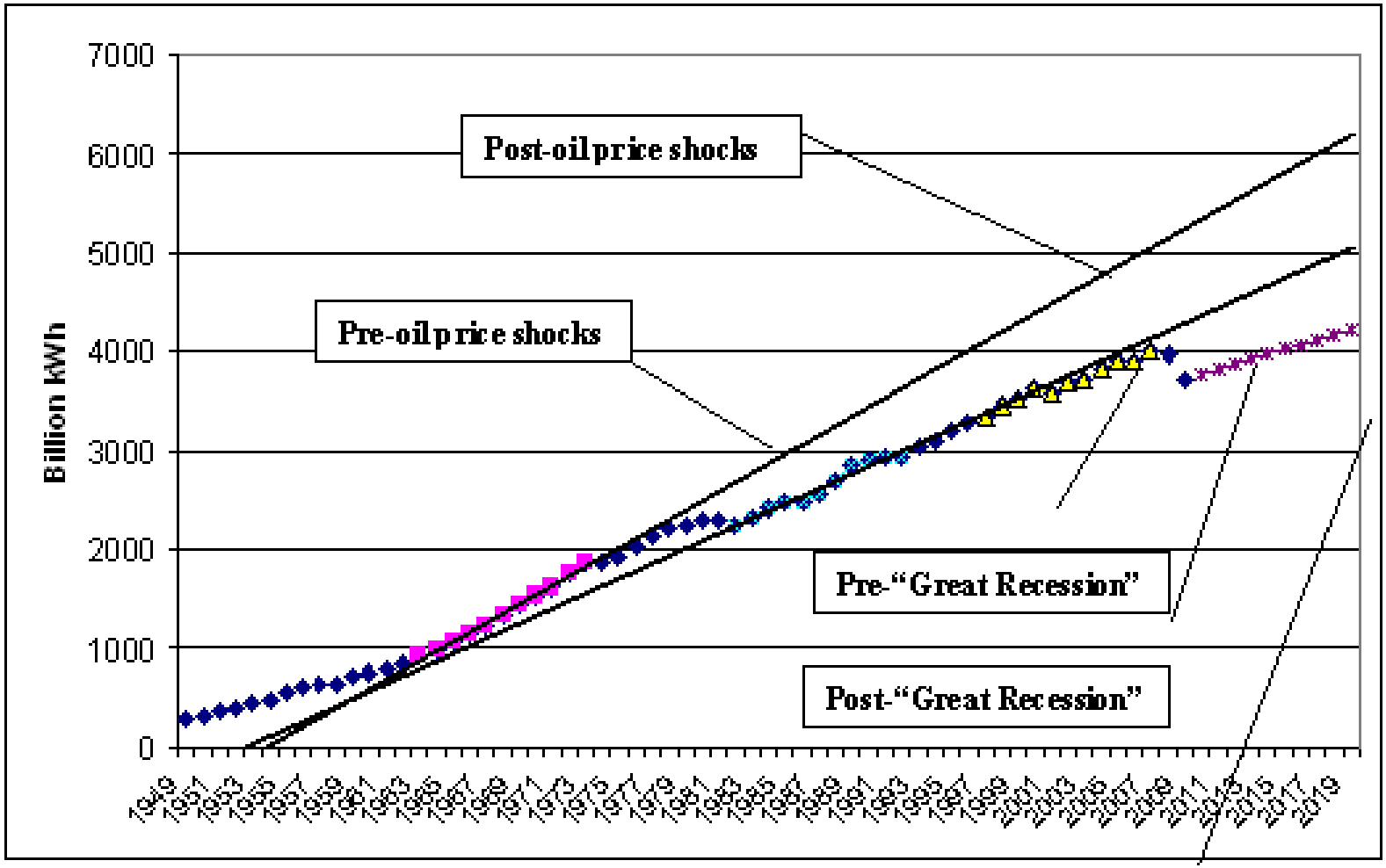
**Reactor Costs:** See Nuclear Reactor Characteristics.

# Marketplace Risk:

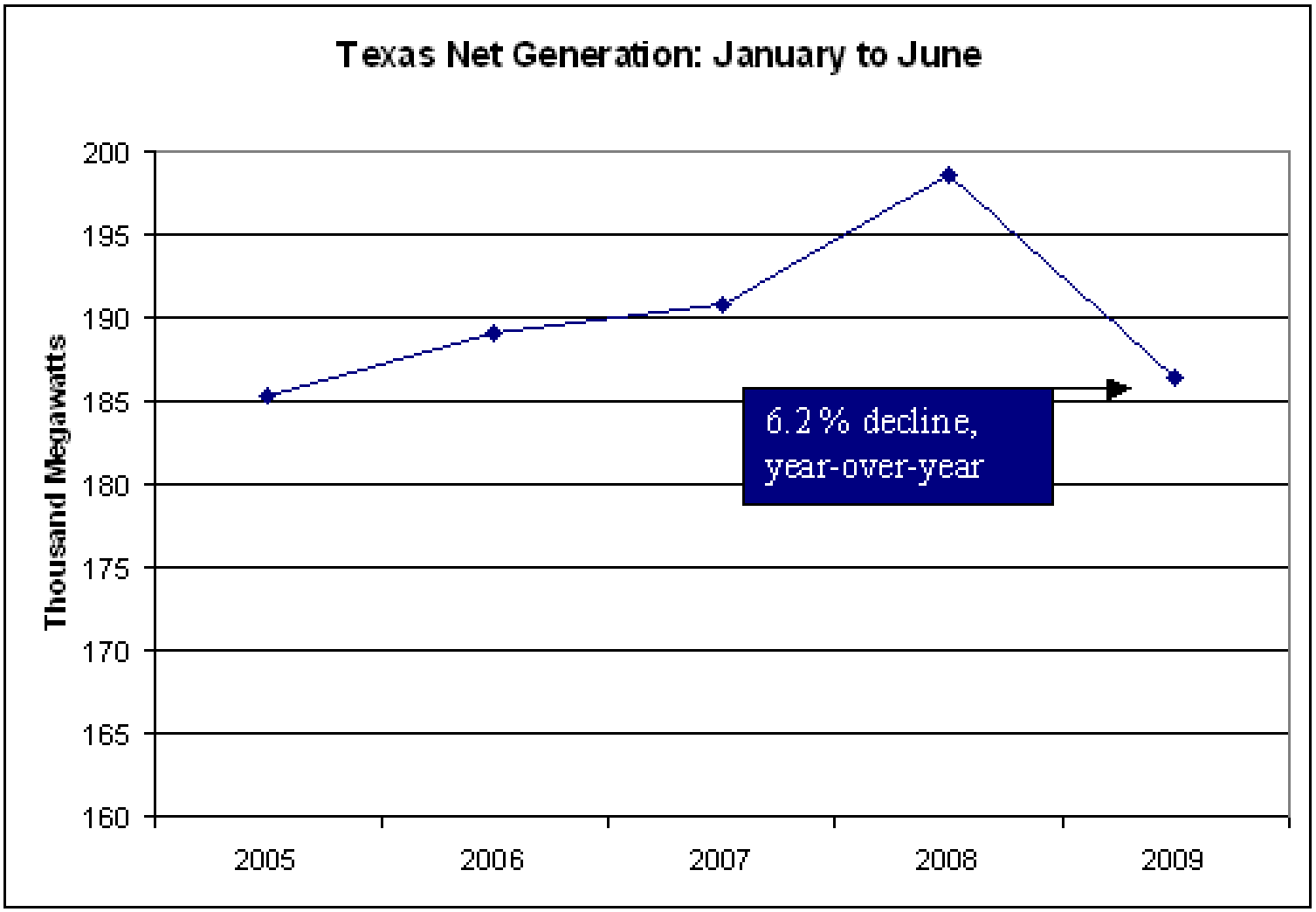
Demand

Supply

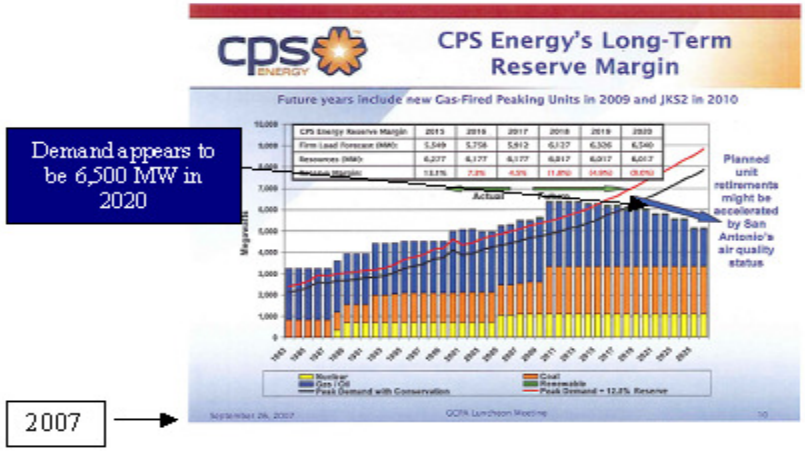
## External Shocks and Public Policy Shift the Level and Growth Rate of Demand

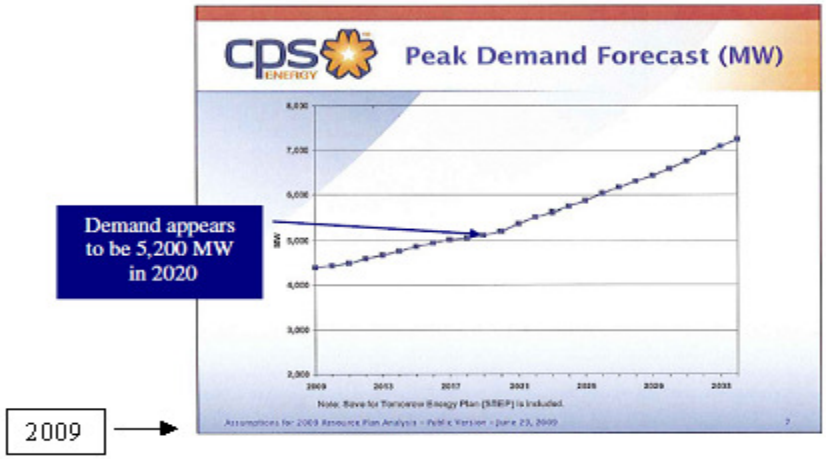



HR 2454, Title I & II
Efficiency only (20%)

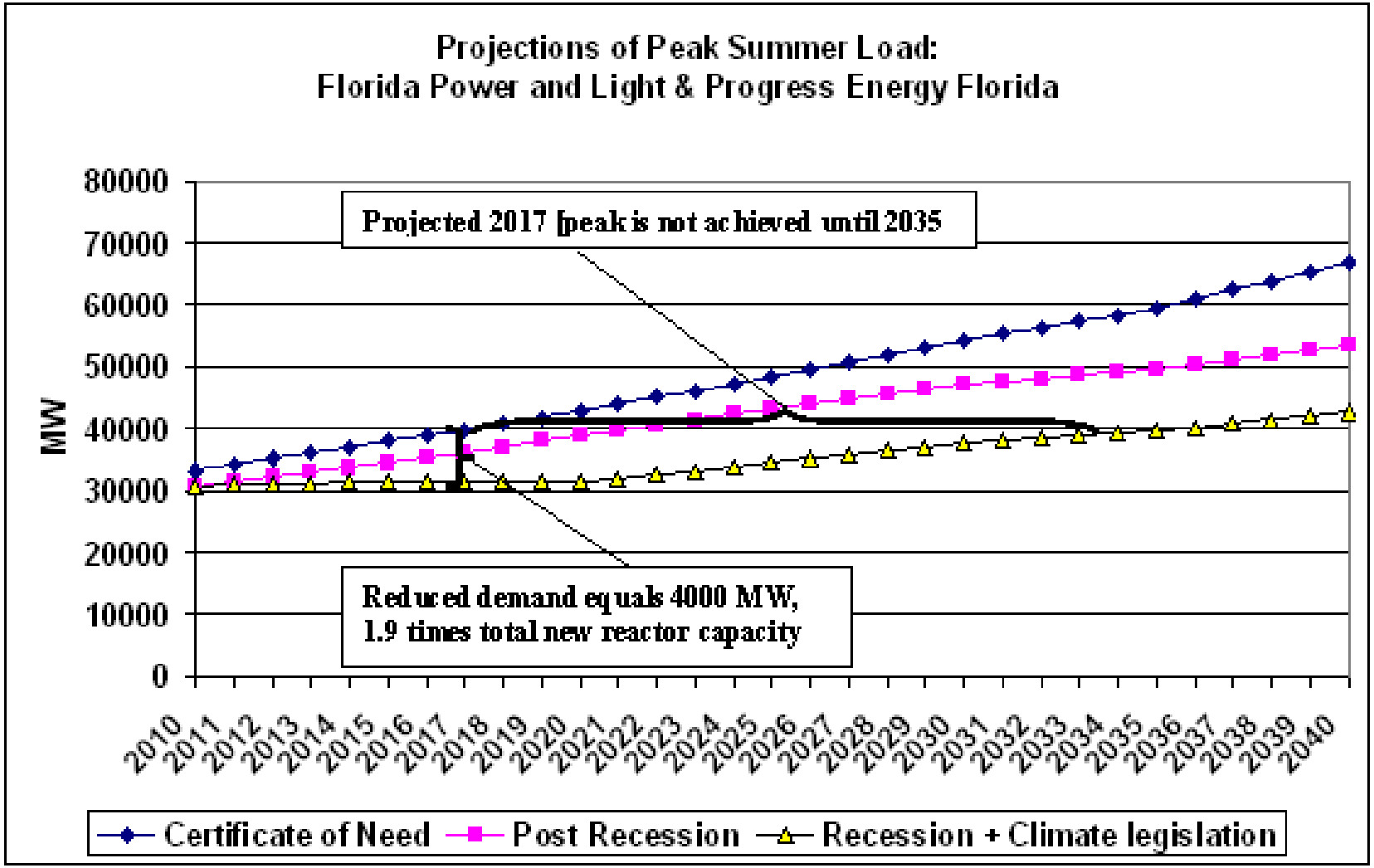

Texas Net Generation: January to June
Thousand Megawatts
200
195
190
185
180
175
170
165
160
2005
2006
2007
2008
2009
6.2% decline,
year-over-year

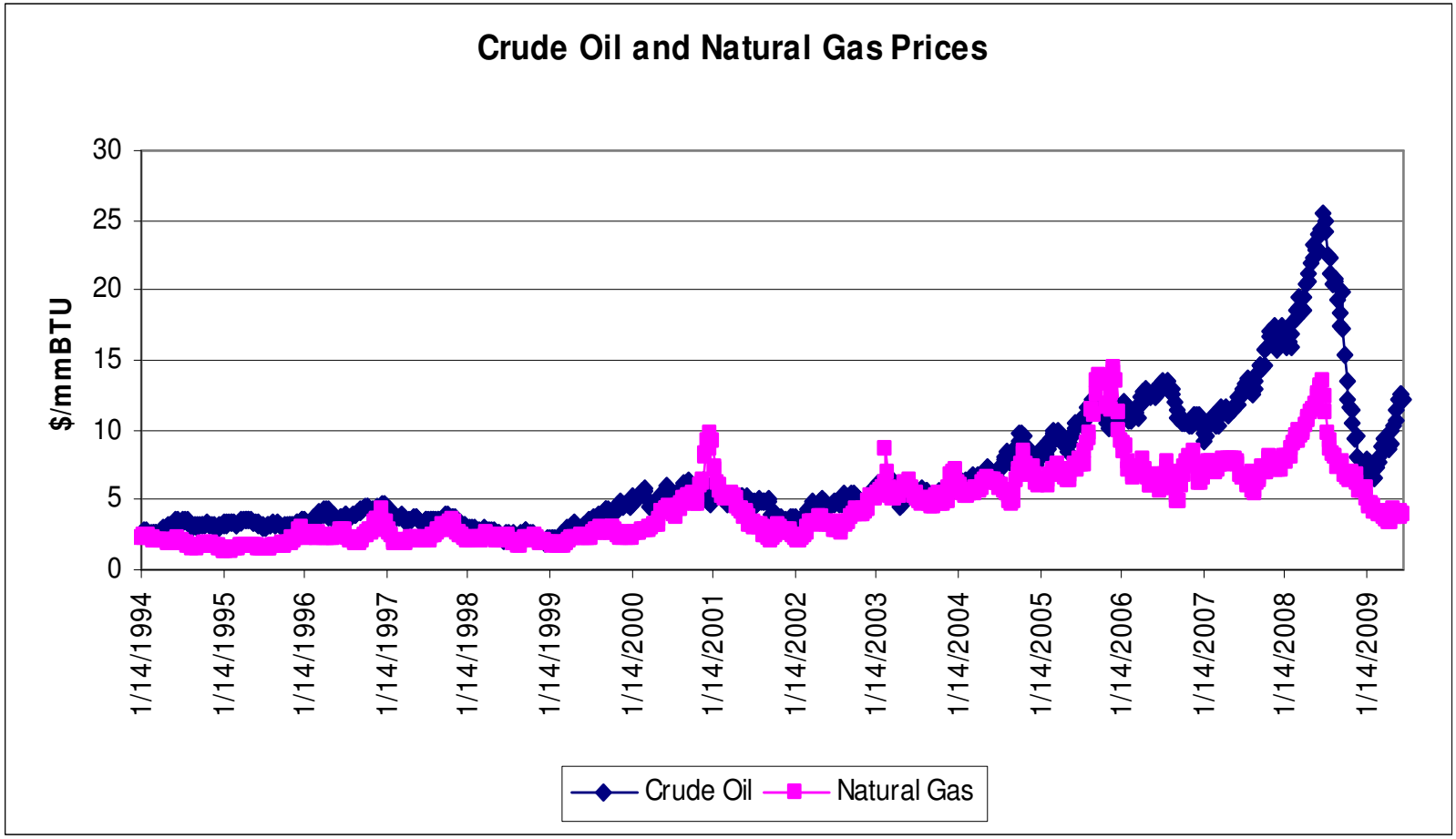
# The recession appears to have reduced CPS projected peak demand significantly



Projections of Peak Summer Load: Florida Power and Light & Progress Energy




Crude Oil and Natural Gas Prices
$/mmBTU
30
25
20
15
10
5
0
1/14/1994
1/14/1995
1/14/1996
1/14/1997
1/14/1998
1/14/1999
1/14/2000
1/14/2001
1/14/2002
1/14/2003
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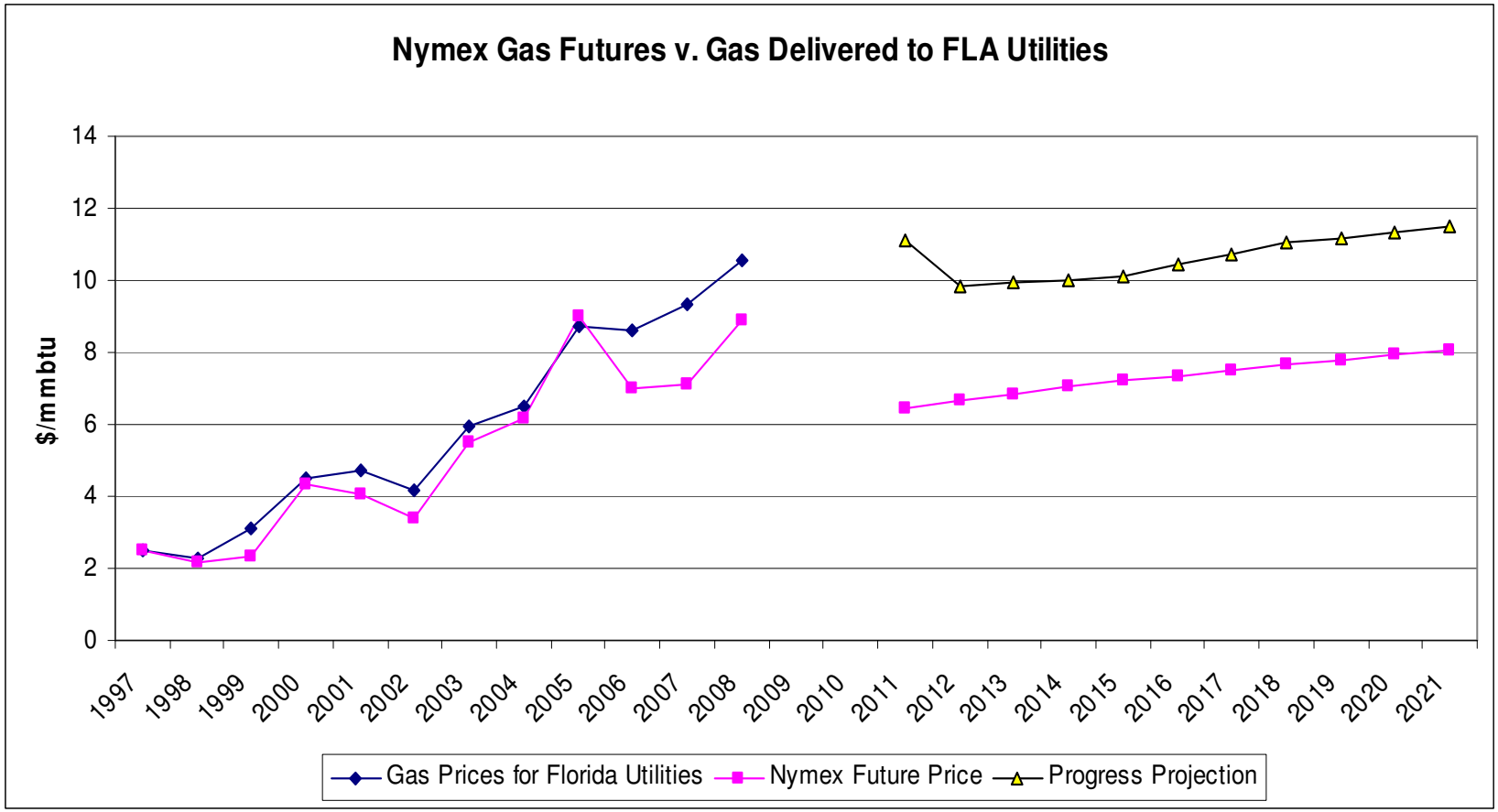
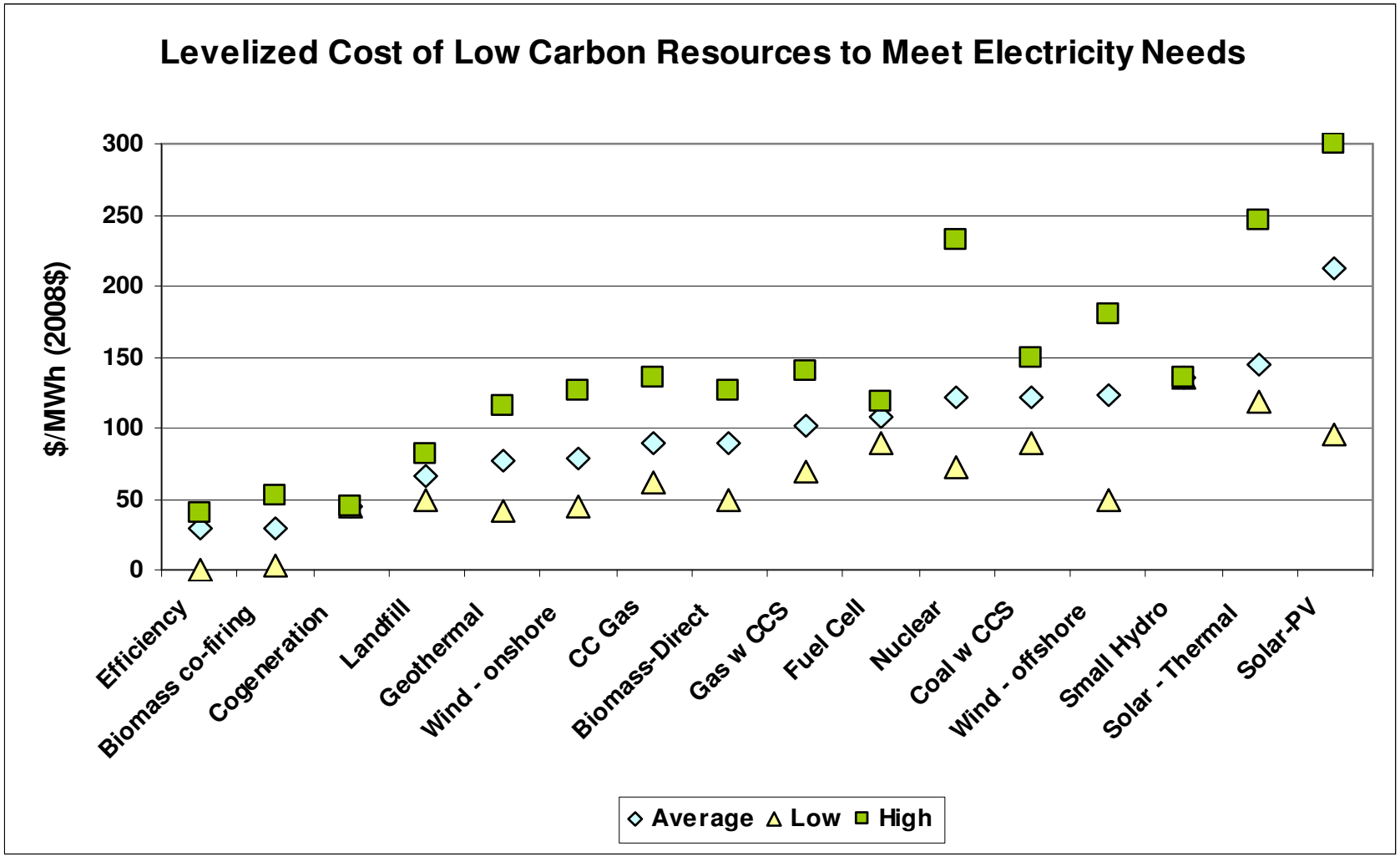
1/14/2007
1/14/2008
1/14/2009
Crude Oil
Natural Gas


Nymex Gas Futures v. Gas Delivered to FLA Utilities
$/mmbtu
14
12
10
8
6
4
2
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Gas Prices for Florida Utilities
Nymex Future Price
Progress Projection

# Technology Risk:

# Lower Cost Alternatives


Levelized Cost of Low Carbon Resources to Meet Electricity Needs
$/MWh (2008$)
300
250
200
150
100
50
0
Efficiency
Biomass co-firing
Cogeneration
Landfill
Geothermal
Wind - onshore
CC Gas
Biomass-Direct
Gas w CCS
Fuel Cell
Nuclear
Coal w CCS
Wind - offshore
Small Hydro
Solar - Thermal
Solar-PV
Average
Low
High

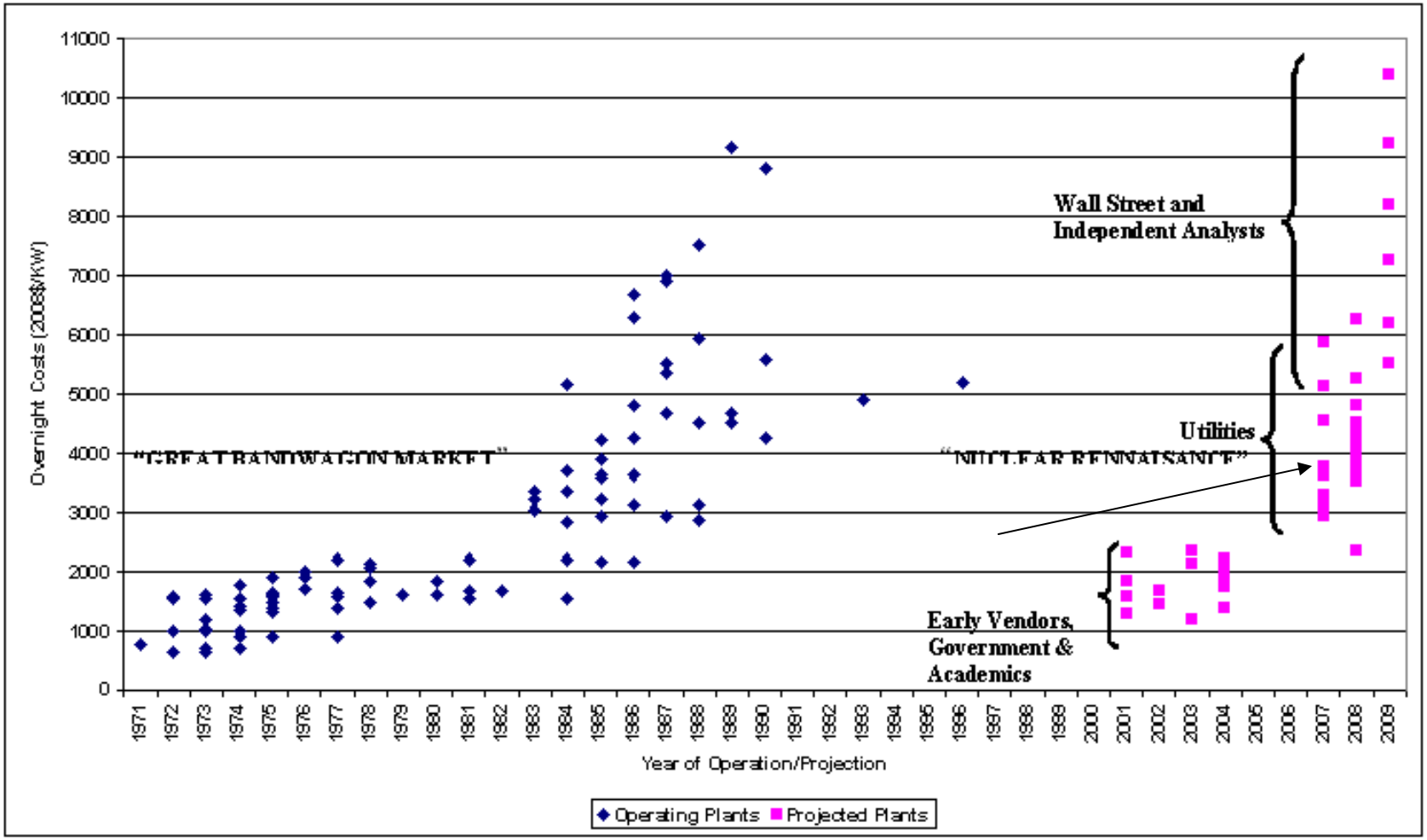
Execution Risk

Cost Overruns

Delays

Financial Downgrades

*Overnight Cost of Completed Nuclear Reactors Compared to Projected Costs of Future Reactors*



# Key Nuclear Reactor Project Characteristics and Adverse Events

| Company | Project Name | Company # of Project | Design Type | Reference Design | Units at site | State | Units in State | Power Pool | Brownfield (1 = yes) | Moody's Level of Activity | Capital as % of Market Cap | Advese Events |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ameren | Callaway | 1 | EPR | 0 | 2 | MO | 2 | SPP | 1 | 1 | | Cancelled because of no CW |
| Southern | Vogtle | 1 | AP1000 | 1 | 2 | GA | 2 | SERC | 1 | 3 | 57 | Negative financail advice |
| SCEG | Summer | 1 | AP1000 | 0 | 2 | SC | 4 | SERC | 1 | 3 | 140 | Downgrade |
| FPL | Turkey Pt. | 1 | AP1000 | 0 | 2 | FL | 4 | FRCC | 1 | 1 | 65 | Application not filed, Struggli |
| NRG | STP | 1 | ABWR | 1 | 2 | TX | 6 | ERCOT | 1 | 3 | 100 | Struggling to find partners |
| Luminant | Comanche | 1 | USAPWR | 1 | 2 | TX | 6 | ERCOT | 1 | 0 | | Suspended |
| Progress | Harris | 2 | AP1000 | 0 | 2 | NC | 2 | SERC | 1 | 1 | | |
| Dominion | N. Anna | 1 | ESBWR | 1 | 1 | VA | 1 | SERC | 1 | 1 | | Suspended |
| Detroit Ed | Fermi | 1 | ESBWR | 0 | 1 | MI | 1 | MAIN | 1 | 1 | | |
| Entergy | River Bend | 2 | ESBWR | 0 | 1 | LA | 1 | SERC | 1 | 1 | | Delayed, Changed design |
| PPL | Bell Bend | 1 | EPR | 0 | 1 | PA | 1 | ECAR | 1 | 2 | 125 | Cancelled because of no CW |
| Unistar | Calvert | 2 | EPR | 1 | 1 | MD | 1 | MAAC | 1 | 3 | 70* | |
| Unistar | Nine Mile | 2 | EPR | 0 | 1 | NY | 1 | NPCC | 1 | 3 | 70* | Suspended |
| Entergy | Grand Gulf | 2 | ESBWR | 0 | 1 | MS | 1 | SERC | 1 | 1 | | Delayed, Changed Design |
| Duke | Lee | 1 | AP1000 | 0 | 2 | SC | 4 | SERC | 0 | 2 | 86 | Delayed due to lack of dema |
| Exelon | Victoria | 1 | ESBWR | 0 | 2 | TX | 6 | ERCOT | 0 | 1 | | Delayed, Changed design |
| Nustar | Bellefonte | 1 | AP1000 | 0 | 2 | AL | 2 | SERC | 0 | 1 | | Cancelled due to lack of nee |
| Progress | Levy | 2 | AP1000 | 0 | 2 | FL | 4 | FRCC | 0 | 2 | 173* | Delayed due lack of work Au |

* These percentages are for each project in a 2 project company, Unistar claculation puts ownerhsip a 50%

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| Dominion | N. Anna | 1 | ESBWR | 1 | 1 | VA | 1 | SERC | 1 | 1 | | Suspended |
| Detroit Ed | Fermi | 1 | ESBWR | 0 | 1 | MI | 1 | MAIN | 1 | 1 | | |
| Entergy | River Bend | 2 | ESBWR | 0 | 1 | LA | 1 | SERC | 1 | 1 | | Delayed, Changed design |
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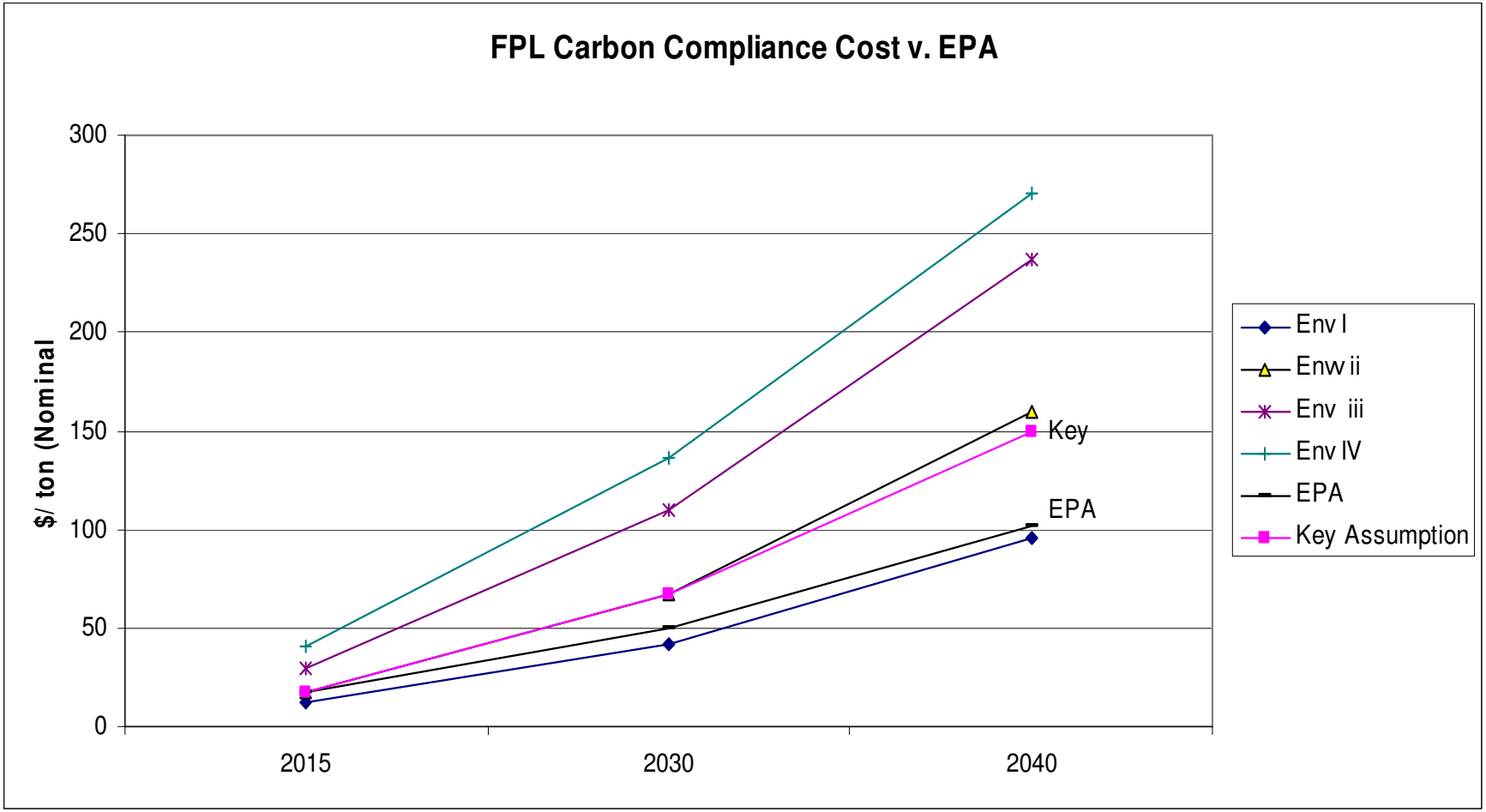
| Duke | Lee | 1 | AP1000 | 0 | 2 | SC | 4 | SERC | 0 | 2 | 86 | Delayed due to lack of demand |
| Exelon | Victoria | 1 | ESBWR | 0 | 2 | TX | 6 | ERCOT | 0 | 1 | | Delayed, Changed design |
| Nustar | Bellefonte | 1 | AP1000 | 0 | 2 | AL | 2 | SERC | 0 | 1 | | Cancelled due to lack of need |
| Progress | Levy | 2 | AP1000 | 0 | 2 | FL | 4 | FRCC | 0 | 2 | 173* | Delayed due lack of work Authorization |

* These percentages are for each project in a 2 project company, Unistar claculation puts ownerhsip a 50%

# Policy Risk:

Efficiency and renewables mandates reduce the need for non-renewable generation and combine with additional flexibility to reduce the projected cost of carbon far below what was initially expected.


FPL Carbon Compliance Cost v. EPA
$/ ton (Nominal
300
250
200
150
100
50
0
2015
2030
2040
Key
EPA
Env I
Enw ii
Env iii
Env IV
EPA
Key Assumption

# Financial Risk:

Utility balance sheets cannot support the projects, even with loan guarantees and CWIP

**Reactor Costs Compared to Market Capitalization of Active Projects**

| Utility | Reactor | Market Capital (Billion) | Reactor Capital Requirement (Billion) | Reactor as % of Market Cap. |
|---|---|---|---|---|
| Duke | Lee | $19.8 | $17 | 86% |
| Florida Power & Light | Turkey Point | 21.4 | 14 | 65 |
| Progress | Levy | 17 | 9.8 | 173 |
| SCANA | Summer | 5.8 | 4.1* | 140 |
| Southern | Vogtle | 14 | 24.5 | 57 |
| NRG | South Texas | 6.5 | 6.5* | 100 |
| CPS | South Texas | 6.3` | 6.5* | 100 |
| Unistar | Calvert | 5.9 | 4.2* | 71 |
| | Nine Mile Pt. | | 4.2* | 71 |
| PPL | Bell Bend | 11.2 | 14 | 125 |

**Threats to Taxpayers and Ratepayers**

| Area of Impact | Threat to Taxpayers and ratepayers | Likelihood of impact |
|---|---|---|
| Technology choice | Failure to adopt least cost approach | Certain |
| Project completion | Burden of failed projects | Highly likely |
| Project oversight | Lax review of project management | Highly likely |
| Financial ratings | Downgrade or Negative | Near certainty |
| Discount rate | Misallocation of resources | Certain |