BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Nuclear Plant Cost Recovery Clause	)	**DOCKET NO. 090009-EI**
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DIRECT TESTIMONY OF DR. MARK COOPER

ON BEHALF OF
SOUTHERN ALLIANCE FOR CLEAN ENERGY (SACE)

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IN RE: NUCLEAR PLANT COST RECOVERY CLAUSE

BY THE SOUTHERN ALLIANCE FOR CLEAN ENERGY

FPSC DOCKET NO. 090009-EI

DIRECT TESTIMONY OF

DR. MARK COOPER

Introduction and Qualifications

Q. Please state you name and address.

A. My name is Dr. Mark Cooper. I reside at 504 Highgate Terrace, Silver Spring, Maryland.

Q. Briefly describe your qualifications

A. I have a Ph.D. from Yale University and have been providing economic and policy analysis for energy and telecom for almost thirty years. I have been the Director of Energy and the Director of Research at the Consumer Federation of America for 27 years, although the opinions I express in this testimony are my personal opinions and not those of the Consumer Federation. I am a Fellow at various universities on specific issues, including the Institute for Energy and the Environment at Vermont Law School. I have testified over 100 times before public utility commissions in 44 jurisdictions in the U.S. and Canada on energy and telecommunications issues and about twice as many times before federal agencies and Congress on a variety of issues, including energy and

electricity. A copy of my resume with energy related activities is attached as Appendix A.

Purpose and Summary of Testimony

Q. What is the Purpose of your testimony?

A. I have been asked by the Southern Alliance for Clean Energy ("SACE") to examine the long-term feasibility of Florida Power & Light's ("FPL") Turkey Point 6 & 7 Reactors ("Turkey Point") and Progress Energy Florida's ("PEF" or "Progress") Levy Nuclear Reactors ("Levy") (collectively "reactors" or "projects") as required by F.A.C. Rule 25-6.0423(5)(c)5.

Q. Please summarize your findings.

A. I have identified dramatically changed circumstances since affirmative determinations of need were made by this Commission for these reactors and present in my testimony evidence on the current marketplace, regulatory, technological, and financial risks of these reactors proposed for construction in Florida by Progress and FPL. These changed circumstances and resulting risks lead me to conclude that completion of the Turkey Point and Levy reactors is no longer feasible in the long term and that incurring additional costs on these reactors would not be prudent.

The decisions by Progress and FPL to build these nuclear reactors were based on four important assumptions that have been called into question in the time since the evidence was filed in their petitions for determination of need ("Need Docket").

(1) They assumed a high rate of demand growth.

(2) They downplayed the contribution that efficiency and renewables can make to meet the need for electricity.

(3) They assumed high prices for fossil fuels based on both commodity prices and the belief that public policy would put a high price on carbon.

(4) They used a low estimate of the cost of nuclear reactors.

The impact of the changed factors on these assumptions that have developed since the Need Docket can be summarized as follows:

Market Factors	
Declining Demand	Eliminates need for large quantity of new generation
Falling price of natural gas	Makes natural gas more attractive
Regulatory Factors	
Efficiency/renewable standards	Reduces need for non-renewable generation
Carbon cost reduction	Makes low carbon resources less attractive
Technological Factors	
Nuclear cost uncertainties	Raises prospects of cost overruns
Growing confidence in cost and availability of alternatives	Makes alternatives more attractive
Financial Factors	
Tight Financial markets	Makes finance more difficult
Increasing concerns on Wall Street about Nuclear reactors	Makes finance more expensive

Any of these changed factors alone could demonstrate that completion of these reactors is not feasible in the long term Taken together, these factors thoroughly undermine the case that the companies have tried to make to demonstrate the long-term feasibility of these nuclear reactors at this time. The evidence presented by the companies to the Commission does not take these changed factors fully into account and does not reflect the highly uncertain future that nuclear reactors face.

If the Commission were to merely conclude that the changes in conditions make the future highly uncertain, that conclusion alone would argue strongly against continuing with these reactors. In an uncertain environment, the assets a prudent person acquires should be flexible, have short lead times, come in small increments and not involve the sinking of large capital costs. The characteristics of nuclear reactors are the antithesis of those best suited to an uncertain environment. They are large, "lumpy" investments that require extremely long lead times and sink massive amounts of capital. Therefore, it would be imprudent to allow the companies to incur any more expenses or recover those costs from ratepayers at this time because the companies have failed to demonstrate the long-term feasibility of completing the reactors.

There are other factors that will be documented by other witnesses that reinforce the conclusion that the reactors are no longer feasible in the long-term, including the failure of some of the projects to obtain regulatory approvals, which were being counted on to stay on schedule and uncertainties and delays in the Nuclear Regulatory Commission ("NRC") licensing process. While one can point to some positive developments in the policy space, such as the possibility of the creation by the U.S.

Congress of a Clean Energy Development Authority, these are vastly outweighed by the negative developments.

Q. How is your testimony organized?

A. First, I set forth how I approach the analysis of the long-term feasibility of these proposed nuclear reactors. Next, I define the conditions that have developed since the Need Dockets that have changed the terrain of nuclear reactors and describe in qualitative terms how these conditions impact the long-term feasibility of the nuclear reactors. Then I provide quantitative evidence to support my conclusions. The bulk of my analysis focuses on the FPL evidence because FPL has presented a recent recalculation of its need analysis. I also raise some concerns that the changes in the economic landscape highlight some aspects of the methodology that FPL has developed specifically to evaluate nuclear reactor economics that may be distorting the picture presented to the Commission.

In contrast, Progress has presented little tangible evidence that it is actually conducting any ongoing analysis, other than the statement of its witnesses that they are thinking about the relevant issues. However, all of the concerns raised about the proposed FPL reactors apply with even greater force to the Progress reactors. The case for building reactors was weaker in the case of Progress than FPL. Progress had higher reserve margins, a more diverse fuel mix, and higher costs for the Levy nuclear reactors, because it is a site that does not have an existing reactor. While all of the changes I have discussed in the case of FPL also affect Progress, Progress has suffered a unique setback, having been forced to shift its schedule by 20 months and renegotiate its EPC contract with the vendor.

Q. Are you sponsoring any exhibits to your testimony?

A. Yes, I am sponsoring the following exhibits:

MNC-1:Impact Of Declining Demand On Summer Peak Load

MNC-2: Natural Gas Wellhead, Henry Hub And Futures Prices

MNC-3: Projected Natural Gas Prices Compared To Nymex Futures Prices

MNC-4: Projections Of Carbon Compliance Costs

MNC-5: Estimates Of Potential Mid-Term Efficiency Savings: By State

MNC-6: Estimates Of Costs Of Alternatives To Meet Electricity Needs

MNC-7: Impact Of Climate Policy On Peak Load: FPL

MNC-8: Impact Of Climate Policy On Peak Load: Progress

MNC-9: Estimates Of Nuclear Reactor Overnight, Costs: 2001-2009

MNC-10: Nuclear Operators, Reactor Cancellations And Moody's Downgrades

MNC-11: Standard And Poor's Credit Profile Considerations

MNC-12**:** Diversity Of Resource Under Various Technology Scenarios

MNC-13: The $1/Kw Cost Factor

MNC-14: The Narrow Margin In FPL's Breakeven Analysis

ANALYZING THE RISK FACTORS

Approach

Q. How do you approach the analysis of the long-term feasibility of the nuclear reactors?

A. The rule adopted by the Commission requires an assessment of the long-term feasibility of the projects. I believe a thorough review of the projects is vital to protect the public interest. In a competitive marketplace firms must constantly review whether their investment decisions continue to be economically viable and justified in light of the changing market, technological, financial and regulatory conditions. For utility services that are offered under franchise monopoly conditions subject to regulatory oversight, the commission is charged with protecting the public from imprudent actions by the utility. It must ensure that utilities exercise the same vigilance with respect to the prudence of their actions as firms in a competitive market.

This regular review of the long-term feasibility of a project is particularly important in the case of nuclear reactors, which are, by their nature, extremely vulnerable to these four types of risk. As very large investments that take a long time to construct, and produce large quantities of electricity, they represent a huge quantity of inflexible, sunk costs. These investments are incapable of responding to change. They are inherently "go-no-go" decisions that should be made before costs are incurred. Because of their size and nature, the Commission needs to address the long-term feasibility of the projects before additional, substantial costs have been incurred.

The companies are well aware that this proceeding requires an affirmative showing of the long-term feasibility of completing these reactors. FPL has redone its breakeven analysis under new sets of assumptions. Progress states that it is considering a wide range of factors that affect the decision to proceed. However, Progress has presented no "detailed analysis" as required by Rule 25-6.0423(5)(c)5 demonstrating the long-term feasibility of completing the Levy project.

The factors that FPL has reanalyzed are appropriate for a decision on whether these projects should proceed, and these are the factors that the Commission should be looking at as the ultimate arbiter of prudence and long-term feasibility. Exercising this judgment before money is spent is infinitely preferable to arguing about it after the money has been spent. Both companies assert that, having reviewed recent changes in the factors that affect the decision to build these reactors, it is prudent to continue and that the completion of the reactors is feasible. However, the companies' review of the changes now faced by these reactors is cursory and insufficient to justify that conclusion.

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MARKETPLACE CONDITIONS

Demand

Q. Have there been changes in the marketplace that affect the long-term feasibility of these nuclear reactors?

A. Yes. There has been a dramatic change in the marketplace since the companies prepared their need analyses in the respective need dockets. The nation has plunged into the worst recession since the Great Depression. Some even call it a depression. Moreover, there is a growing recognition that this change is not simply a severe dip in the business cycle, but rather a major shift in the economy. The spending binge on which the U.S. embarked for a decade, in which households and business became highly leveraged, is likely over. A massive amount of household wealth was destroyed when the housing market bubble burst. Retirement accounts have been devastated by the collapse of the stock market.

Ironically, the decade on which the projections were based in the need docket coincided almost exactly with the decade in which the housing and consumption bubbles were pumped up by excessive leverage. That level of growth was unsustainable. It is my opinion that the shift in consumption is permanent and signals slower growth in the future. However, even if this were just a severe downturn in the business cycle, it would affect the demand for electricity sufficiently to raise questions about the long-term feasibility of these new nuclear reactors.

FPL

Q. Is there evidence that load growth has changed in the FPL service territory?

A. Yes there is strong evidence of a dramatic reduction in consumption that should sharply reduce projected load growth. FPL provides sufficient detail to examine closely the problem of excess capacity created by the nuclear reactors, as shown in Exhibit MNC-1, page 1. The reduction in peak demand between the 2008 and 2009 feasibility analysis is striking. In 2017, which is a crucial year in the 2008 analysis because that was the year the reserve margin hit the limit of 20 percent, the 2009-projected peak is 11 percent lower than the peak projected in 2008. Under the 2009 projection, the FPL does not reach the 2017 peak projected in 2008 until 2022, five years later. By 2040, the projected peak is 20 percent lower.

Q. Is this dramatic shift in demand fully reflected in the 2009 Economic Analysis?

A. With a dramatic decline in demand, averaging between 10 and 11 percent in the decade between 2010 and 2020, all else equal, one would expect to see an equally dramatic increase in FPL's reserve margins. That is not the case. With a drop in the summer peak of more than 10 percent in 2017, FPL shows only a 1 percent increase in reserve margin. In order to achieve that level, it must use the flexibility of natural gas plants to react to the decline of projected peak demand. Comparing Schedule 8 in the 2008 and 2009 10-year plans, we can see natural gas plants moved back a year or two, reduction of inactive reserves and elimination of some additions altogether, while making room for the Turkey Point reactors. Thus in contrast to the ten year time horizon needed for nuclear reactors, the short time frame for deploying gas alternatives is much more flexible for dealing with the uncertainties in demand.

Progress Energy

Q. Is the Progress demand projection similar to that of FPL?

A. The demand reduction projected by Progress is substantial, but much lower than that projected by FPL, as shown in Exhibit MNC-1, page 2. From the peak in 2007 to the trough in 2010, Progress shows a 2.5 percent decline in peak, compared to FPL, which shows a 6.2 percent decline. FPL assumes a more vigorous growth of peak from 2010 forward, but the depth of the decline in the recession still leaves it with a projected peaks in 2017 that is almost 10 percent lower than in the 2008 10-yer plan. For Progress, the reduction in the projected peak for 2017 is only about 2.6 percent lower.

To put these declines in demand into perspective, I note that taken together, the reduction in projected peak summer demand between the 2008 and 2009 10-year plans is

almost 3500 MW, which exceeds the combined capacity of three of the four reactors. Since these utilities represent just under three quarters of the total statewide peak summer demand, and assuming the other utilities in the state have suffered similar reductions in demand, the lowering of the peak statewide in the past year would exceed the capacity of all four plants being considered in this docket.

There are two important implications from this change in demand. First, a lack of demand can undermine the long-term feasibility of the reactor. This played a critical role in the cancellation and abandonment of nuclear reactors in the 1970s and 1980s. Back then, it was oil price shocks and rate shock that undermined demand. Today it is the great recession and, as I describe below, climate policy, that can undermine demand, but the historical experience teaches us that inadequate demand can definitely render nuclear reactors infeasible in the long term. Second, hoping to sell pieces of the plant – either with off system sales at wholesale or equity stakes – in an attempt to salvage failing economics brought on by declining demand may not be feasible with a state-wide reduction in demand.

NATURAL GAS PRICES

Q. Are there other market changes that the Commission should consider?

A. Yes, the price of gas, which plays a central role in Florida, bears close scrutiny. Natural gas was the best alternative to nuclear in the economic analysis of the FPL Need Docket, and FPL has focused on gas in this proceeding. In that Need Docket analysis, the variable cost of gas accounts for 90 percent of the difference between the nuclear

scenario and the gas scenario, and the cost of natural gas is the single largest determinant of the variable cost by far.

In this proceeding, FPL concludes that the prospects for nuclear reactors have actually brightened because of rising fossil prices – both commodity prices and carbon compliance costs. "The primary reasons for the projected general increase in the economic advantage of the Turkey Point 6 & 7 project, compared to the 2007 Need Determination filing, are: (i) currently projected higher natural gas costs, particularly in the early years; and (ii) higher projected environmental compliance costs." (Florida Power & Light Company, Docket No. 0900009-EI, Responses to Staff's Second Set of Interrogatories, Interrogatory No. 45, page 1 of 1).

This conclusion does not comport with the emerging reality. As shown in Exhibit MNC-2, page 1, the price of natural gas has not only tumbled, but it has separated from the price of oil. There are a number of reasons that natural gas might not continue to track oil as closely in the future as it has in the past. It is much more of a regional market than oil. There is increasing optimism about natural gas resources. There are efficiency programs targeted at natural gas consumption in the climate change legislation moving through Congress, which may free up supply and put downward pressures on price. Finally, there is considerable evidence that a significant part of the volatility in the natural gas market over the past decade was caused by excessive speculation brought on by excessive deregulation. The rise in prices and volatility was coincident with the creation of what is known as the Enron loophole and the entry of index traders into the market. There are strong regulatory and legislative measures being put into place to

prevent excessive speculation from again afflicting energy markets. In short, the past decade should be the exception, rather than the rule in natural gas markets.

FPL

Q. Please provide empirical evidence to support your concerns about the natural gas projections employed by FPL.

A. The evidence relies on futures prices. As shown in Exhibit MNC-2, page 2, the Henry Hub futures price, which is the standard base for natural gas pricing, is a near perfect predictor of natural gas wellhead prices. As shown in Exhibit MNC-2, page 3, the Henry Hub price is a near perfect predictor of Florida prices for gas for electric utilities.

Exhibit MNC-3, page 1 shows that the dramatic change in natural gas prices is not reflected in the FPL's analysis. The price of natural gas shown in FPL's "Key Assumption" analysis, is a cross between the mid and the high estimates from the Need Docket. These very high price projections stand in sharp contrast to the prices that prevail in the natural gas futures market. Exhibit MNC-3-page 1 shows the August futures price for Nymex Henry Hub natural gas, in years matching those used in the need docket. On average, the natural gas price in the "Key Assumption" page is about 50 percent higher than the Nymex price.

Needless to say, overestimating the single most important factor in the economic analysis can have a huge impact on the economic calculation made by the company. The Nymex futures prices are a lot closer to the low gas cost scenario from the FPL 2007 Need Docket than they are to the "Key Assumptions" prices used by the company in this

feasibility assessment. In the Need Docket, two of the three nuclear cost scenarios had higher overnight costs than the break even capital cost point in the low gas case.

PROGRESS ENERGY

Q. Do Progress Energy's natural gas prices raise similar concerns?

A. Yes. The assumed natural gas prices used by Progress suggest a dramatic shift in the relationship between the price of natural gas for utilities in Florida and the futures price of gas, as shown in Exhibit MNC-3, page 2. For most of the past decade, the price of gas for electric utilities in Florida tracked the futures price closely, but in the past three years the gap between Florida utility gas prices and futures prices grew, then declined. Compared to Nymex futures prices, the natural gas prices used by Progress suggest a gap between Florida prices and futures prices of $2 to 3$ per mmbtu greater than the historical pattern. The differences represent 20 to 30 percent of the assumed price.

Q. Did the low gas cost scenario also have low environmental costs?

A. Yes it did and I will examine the issue of compliance cost in the analysis of regulatory conditions.

REGULATORY CONDITIONS

Q. Should regulatory conditions enter into the Commission's evaluation of the long-term feasibility of these reactors?

A. Yes. The companies' Need Docket analyses were driven by assumptions about federal regulatory policy. The companies have put a high price on carbon in their

economic analyses. Without the high price on carbon, the economics of nuclear reactors would look very different. To my knowledge, the state of Florida has not put a price on carbon, nor is it contemplating doing so. Thus, the companies have decided to pursue these projects and the Commission has allowed cost recovery based, in part, on assumptions about federal climate change policy.

Q. Are you suggesting that the Commission should not take future climate change policy into account when considering the long-term feasibility of these reactors?

A. Quite the contrary. I believe the Commission should take federal policy into account when considering the long-term feasibility of these reactors, since that is a major source of regulatory risk to state decisions. However, I believe the Commission must take the **entirety** of federal policy into account. The prospect of federal climate change legislation is growing. The idea of putting a price on carbon is only a part of the legislation that is moving through the Congress. H.R. 2454, the American Clean Energy and Security Act, the first piece of climate change policy legislation to pass a house of Congress, does not simply put a price on carbon directly. Rather, it establishes an elaborate scheme of allowances to emit carbon, which will indirectly set a price on carbon. Moreover, policies other than putting a price on carbon, particularly policies to promote efficiency and renewables, play a large role as well.

Q. Please describe the full suite of federal policies that affect the long-term feasibility of these nuclear reactors.

A. On the supply-side, the legislation has a renewable energy standard that would require utilities to meet an increasing part of their load with renewables. Within a decade, they would be required to get 20 percent of their generation from renewables, with as much as 8 percent of that total coming from efficiency. At the same time, the legislation includes a number of provisions that have sharply lowered projections of the cost of carbon credits, such as efficiency and renewable mandates, subsidies for carbon control technologies and domestic and international offsets. All of these lower the demand for allowances and therefore the price. This means that the assumed compliance costs of fossil fuels are lower than projected by the companies in prior proceedings and this proceeding.

On the demand side, there is a substantial mandate for energy efficiency. This is embodied, in part, in the ability to meet 40 percent of the renewable resource standard with efficiency and, in part, in dramatic improvements in building codes and appliance standards. Mandates to improve the energy efficiency of new buildings by 30 percent in the near term and 50 percent in the longer term will have a substantial impact on energy demand over the life of the reactors being considered in this proceeding. Funds from certain allowances are set-aside to improved efficiency, particularly for natural gas. Similarly, the American Recovery and Reinvestment Act of 2009 includes a huge increase in funding to improve the energy efficiency of existing buildings. As the efficiency of buildings and appliances improves, the demand for electricity and natural gas declines.

These regulatory factors – increased renewables, lower demand through efficiency, and a lower price on carbon – must be considered in the evaluation of

alternative scenarios for future supply of electricity. Extracting only the price of carbon from the policy landscape and inserting it in the economic analysis, while ignoring the other aspects of policy, distorts the picture being presented to the Commission. These other policies would further undercut the claim that nuclear reactors are feasible in the long-term. Many of these other aspects have been part of the climate change policy debate for quite some time. Taken together, these changes on the demand side, as well as the renewable standard, will have a substantial impact on the need for new non-renewable generation and undermine the long-term feasibility of building these reactors.

FPL

Q. Would the cost of compliance of fossil fuels be affected as a result of these policies?

A. One would expect that it would. Decreasing demand for allowances due to the efficiency and renewable policies and access to low cost offsets would depress the price. In its "Key Assumptions" FPL has increased the price of carbon compliance above the highest level from the 2007 analysis. As Exhibit MNC–4, page 1 shows, the long run price under all the environmental scenarios has more than doubled. As Exhibit MNC-4, page 2 shows, the "Key Assumption price" is roughly equal to the Env II price. In 2040 the price is almost 50 percent higher than the EPA estimate of carbon costs in the wake of HR 2454. Over the 25-year period, the key assumption price on carbon is over 35 percent higher than the EPA price. In fact, the EPA prices are close to the Env I price.

Progress

Q. Does the compliance cost assumption of Progress suffer from similar problems?

A. Yes. As shown in Exhibit MNC-4, page 3, the EPA compliance costs associated with HR 2454 are slightly lower than those listed in the Progress prudency filing. The high cost scenarios are way above the most recent projections. Focusing attention on the low range of estimates dramatically alters the perspective the Commission should take on the proposed reactors. In the case of Progress, the reactors were as likely to fail the economic test as pass it with carbon compliance costs in the low range.

Q. Would the cost of natural gas be affected by the suite of federal policies?

A. Yes. The EPA analysis indicates a 20 percent reduction in the cost of gas in 2025. The delivered cost of gas for electricity in 2025 is lower that the Henry Hub futures price in 2021.

TECHNOLOGICAL CONDITIONS

Efficiency and Renewables

Q. Should changing technological conditions factor into the analysis of the long-term feasibility of these reactors?

A. Yes. While climate policy is seen as giving a direct advantage to reactors by putting a price on carbon, that policy does much the same for other technologies. In fact, there are ways in which the alternative technologies are likely to receive an even larger boost. There are also many programs targeted at various technologies that are in earlier

stages of development that may enjoy larger cost reductions as the science advances and the scale of production ramps up.

I believe there are three technological developments that are shifting the terrain in ways that disfavor nuclear reactors – the availability and cost of conserved energy, the availability and cost of renewables, and the availability and cost of nuclear reactors.

Q. Please describe the emerging terrain for efficiency technologies.

A. There is a growing consensus that the cost of many alternatives is lower than that of nuclear reactors. For efficiency, the change in the terrain is largely a matter of increasing confidence that substantial increases in efficiency are achievable at relatively low cost. The detailed analysis of potential measures and the success of some states at reducing demand through energy policies have increased the confidence that efficiency is a reliable option for meeting future needs for electricity by lowering demand, as shown in Exhibit MNC-5.

I believe that the technology of efficiency has come into much sharper focus in the past year. Numerous studies of the potential for and cost of improvements in efficiency in the residential, commercial and industrial sectors have shown that large quantities of energy can be saved at relatively low cost, as summarized in Exhibit MNC-5. One study was done specifically for Florida, which found that aggressive policies to reduce energy consumption could lower demand by 20 percent at a cost of less than 3.5 cents per kWh.

Thus, independently of any regulatory mandate, as the technology of efficiency is proven out, the Commission should consider greater reliance on it as part of the least cost

approach to meeting the need for electricity. The combination of regulatory and technological changes will drive efficiency into the electricity sector, undermining the long-term feasibility of the reactors.

Q. Please describe the emerging terrain of renewables.

A. The concern with climate change has sharpened the focus on the cost and availability of renewable technologies. For renewables, the change is in strong cost reductions that are expected as new technologies ramp up production. As shown in Exhibit MNC-6, paged 1 and 2, in half a dozen studies the cost of alternatives that included renewables and/or efficiency, every analyst found several non-fossil resources less costly than nuclear.

The only two technologies on which there is a wide difference of opinion about cost are solar photovoltaics and nuclear, as shown in Exhibit MNC-6, page 3. The other technologies included in recent studies there is much better agreement. The combination of regulatory and technological changes will drive renewables into the electricity sector, undermining the long-term feasibility of the reactors.

Q. How do the regulatory and technology changes alter the context for assessing the long-term feasibility of these reactors?

A. They dramatically alter the context. HR 2454 intends to lower demand for nonrenewable generation resources. It could do so significantly. The renewable energy standard ("RES") builds to 20 percent by 2022. Improvements in the building codes start quickly with a 30 percent reduction in consumption from new buildings by 2010 and

build to a 50 percent reduction by 2014 for residential building and 2015 for commercial buildings. Additional improvements of 5 percent are called for every three years after 2017/2018. Revenue for retrofitting of existing buildings would begin when the allowances go into force. Appliance efficiency standards will unfold over time. Studies by the American Council for an Energy Efficient Economy suggest that the building codes, appliance standards and retrofitting of existing buildings could lower demand by as much as 7 percent. The renewable energy standard would be on top of the building code, appliance standards and retrofit impacts, pushing the theoretical total reduction of demand for nonrenewable generation past 25 percent, but there are a number of mechanisms that would lower that impact. In particular, states that cannot or choose not to expand renewables can make alternative compliance payments of $25 per MWh to states that exceed the combined efficiency renewable energy standard.

On a national average basis, the EPA projects a 10 percent reduction in demand and growth in renewables equal to 1.1 percent of demand.[1] An earlier analysis suggests the weatherization program in the American Recovery and Reinvestment Act would lower demand by 1.4 percent.[2] The impact varies from state-to-state, however. The American Council for an Energy Efficient Economy estimated the impact of the improvement in building codes and appliance standards in Florida would be 20 percent

[1] EPA Analysis of toe American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress, 6/23/09, p. 26

[2] Contrast EPA Analysis of toe American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress, 6/23/09, p. 26, with EPA Preliminary Analysis of toe Waxman Markey Discussion Draft: American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress, 4/20/09, p. 23. the former includes the effect of the ARRA in the reference case, the latter does not. I attribute the difference to the ARRA

above the national average.[3] In a state where so much efficiency is available at less than 2.5 cents per KWh, it would make sense to petition for the maximum efficiency contribution to the RES (8 percent) and develop as much renewable energy as is economic, before sending money to California, Washington, Minnesota and Massachusetts. Combining these factors, a reasonable range for the impact on Florida would be a 10 to 20 percent reduction in the demand for non-renewable generation.[4]

FPL

Q. What impact does including the efficiency and renewable policies in HR 2454 have on FPL's projections for load growth and demand for nonrenewable resources such as nuclear reactors?

A. They would have a major impact. The 20 percent scenario is described in Exhibit MNC-7, page 1. Under this scenario, FPL does not reach the peak for 2017 projected in the Need Docket until 2036. Exhibit MNC-7, page 2 presents the 10 percent scenario, and under this scenario, FPL does not reach the peak projected in the Need docket for 2017 until 2028. The combination of the great recession and H.R 2454 climate policy extends the decision horizon by one to two decades. In an uncertain environment, that is a lot of breathing room. Utilities should be managing their resources to accommodate this

[3] Energy Savings from Codes and Standards Count Towards EERS Savings Goals, available at http://www.aceee.org/energy/national/EERScssavings.pdf

[4] The American Council for and Energy Efficient Economy puts the savings from Title I and Title II of HR2454 at 5.4 quds in 2020 and 12.2 quads in 2030. These savings work out to 12.2 percent of the energy consumed in the electricity sector and in 2020 and 25.6 percent of the energy consumed in 2030 (see HR. 2454 Addresses Climate Change Through a Wide Variety of Energy Efficiency Measures, available at http://www.aceee.org/energy/national/HR2454_Estimate06-01.pdf)

shift and the first thing they should do is take the least flexible projects out of the queue, such as new nuclear reactors.

Progress

Q. What is the impact of including the efficiency and renewables scenarios on Progress Energy's load growth and demand for nonrenewable resources?

A. It is in the same direction, but smaller because the company assumes a smaller near term impact of the recession on the growth of demand, as shown in Exhibit MNC-8. The peak load for 2017 projected in the 2008 10-year plan does not occur until 2034 under the 20 percent scenario (Exhibit MNC-8, page 1) and 2026 under the 10 percent scenario (Exhibit MNC-8, page 2). Moreover, the 2017 peak has considerable excess capacity above the reserve margin requirement of 20 percent, which adds several years to a projection of when generation resources become constrained.

Q Do the analyses presented to the Commission by the companies reflect these developments?

A. It does not appear to. The demand projections appear to reflect the effects of the "great recession" to differing degrees, but not the aggressive efficiency policy embodied in the legislation that passed the House of Representatives. There is no hint of a renewable energy standard of 12 to 20 percent.

NUCLEAR REACTOR COSTS

Q. Pleases describe the uncertainties about the cost of nuclear reactors.

A. For nuclear reactor costs, the evidence on technology points in the opposite direction. Early in this decade vendors and contractors at the Department of Energy produced very low estimates of the cost of nuclear reactors, claiming that things have changed since the first generation of reactors. In the eight years since those initial, promotional studies were released, the estimate of the cost of nuclear reactors has increased dramatically, especially among Wall Street and independent analysts. As long as the costs placed before the Commission are "non-binding," the Commission must be aware of the growing uncertainty about the cost of nuclear reactors. As long as they are "non-binding," the prospect of cost escalation places ratepayers at risk, especially where costs for construction work in progress is being granted.

In fact, the extreme uncertainty about nuclear reactor costs has caused FPL to create a whole new framework for evaluating options. As FPL put it in the Need Docket:

> The second difference in the economic analysis approach step that developed the CPVRR costs for the resource plans is that no generation or transmission capital costs associated with Turkey Point 6 & 7 were included in the analysis. The reason for this is that *FPL does not believe it is currently possible to develop a precise projection of the capital cost associated with new nuclear units with in-service dates of 2018-on*. Consequently, FPL's economic analysis approach normally used to evaluate generation options has been modified to include a second economic analysis step." ("Need Study for Electrical Power, Docket No. 07-0650-EI, Florida Power and Light Company, October 16, 2007, pp. 104-105, emphasis added).

In the 21 months since that statement was made, there have been dozens of studies of the projected costs of nuclear reactors. The cost in 2008 $ have ranged from a low of just under $2400/kW to a high of just over $10,000/kW, as shown in Exhibit MNC-9.

As described in the FPL need study, FPL's cost estimate was derived from an early low estimate for a different type of reactor and its current estimates remain in the low range of projections. Each of FPL's estimates (low, middle and high) is in the bottom quarter of the comparable estimates. The wide range of cost scenarios considered within each of the studies attests to the uncertainty that afflicts all of the studies and to which FPL has testified.

The two conclusions I would draw from this analysis are (1) the range of costs considered by FPL is narrow and too low and (2) the uncertainty is huge. This only reinforces my opinion that the prudent course would be to avoid rigid, expensive choices, especially if there is time to let the uncertainties diminish before decisions must be made.

FINANCIAL CONDITIONS

Q. What financial factors are affecting the long-term feasibility of these reactors?

A. There are two categories of factors – the general financial environment and the specific plant finance. The general environment for raising large sums of money has clearly deteriorated. Money is tight. How long that will last and the nature of the long-term environment remains to be seen.

In a sense, the marketplace, regulatory and technological risks combine with the nature of nuclear reactors to create the severe financial risk that nuclear reactors face. The financing of the construction of large nuclear reactors has also come under greater scrutiny by Wall Street.

A recent special comment by Moody's underscores the challenges that these huge projects pose. Moody's identifies the developments in the project and regulatory areas that are positives for nuclear reactor construction, but still concludes that the negatives are a great concern and declares that it "is considering taking a more negative view for those issuers seeking to build new nuclear power plants" (p. 1) because "We view nuclear generation plans as a "bet the farm" endeavor for most companies, due to the size of the investment and length of time needed to build a nuclear power facility." (p. 4).

Moody's goes on to outline the complex factors affecting nuclear reactor construction and operation.

> Project risks are somewhat more clear today than during the last build cycle, in the 1970s, since we now have a track record that measures nuclear power's operating performance; strong plant economics due to low fuel cost; proven efficient and safe operating capabilities; new and refined regulatory procedures; and more certainty over reactor designs before construction begins. (p. 2)
>
> Much has changed since the last major nuclear-generation construction cycle (1965-1995). The industry has learned from experience, including up-front regulatory oversight of development and investment; streamlined

federal NRC approval procedures; and enhanced construction cycles and techniques.

In addition, new environmental regulations, specifically those aimed at reducing carbon dioxide emissions; appear well positioned for near-term implementation. These environmental developments should otherwise bolster the case for new nuclear generation, as it is viewed as one of the only large-scale generation technology with a no-carbon footprint. (p. 7)

On the other side, there are a host of issues and challenges in Moody's view that weigh in the opposite direction. In each of the important areas of risk, uncertainties and challenges abound.

The inherent nature of the projects continues to be a challenge and creates marketplace and technological risk.

The sheer size, cost and complexity of new nuclear construction projects will increase a utility's or power company's business and operating risk profile, leading to downward rating pressure. The length of a nuclear construction effort also entails lengthy regulatory reviews and potential delays in recovering investments, changing market conditions, shifting political and policy agendas, and technological developments on both the supply and demand side. (p. 5)

Notwithstanding the fact that public policy has created favorable conditions for reactor construction in some aspects of regulation, there are other aspects that pose continued risk at in both execution risk and regulatory risk.

> While a constructive regulatory relationship will help mitigate near-term credit pressures, we will remain on guard for potential construction delays and cost overruns that could lead to future rate shock and/or disallowances of cost recovery. Given the lengthy construction time needed for nuclear projects, there is no guarantee that tomorrow's regulatory, political, or fuel environments will be as supportive to nuclear power as today's. (p. 7)
>
> Less clear today is the effect that energy efficiency programs and national renewable standards might have on the demand for new nuclear generation. National energy policy has also begun eyeing lower carbon emissions as a key desire for energy production—theoretically a huge benefit for new nuclear generation—but the price tags associated with these development efforts are daunting, especially in light of today's economic turmoil. It isn't clear what effect such shifts, or changes in technology, will have for new nuclear power facilities. (p. 2)

The result of these market, regulatory and technological uncertainties and risks is to create financial pressure on projects, pressures that are reflected by project specific concerns and the general turmoil in the credit markets.

> Given these long-term risks, a company's financial policy becomes especially critical to its overall credit profile during construction. In general, we believe a company should prepare for the higher risk associated with construction by maintaining, if not strengthening, its balance sheet, and by maintaining robust levels of available liquidity capacity. (p. 5)

Credit conditions are yet another question. Few, if any, of the issuers aspiring to build new nuclear power have meaningfully strengthened their balance sheets, and for several companies, key financial credit ratios have actually declined. Moreover, recent broad market turmoil calls into question whether new liquidity is even available to support such capital-intensive projects. (p. 2)

Moody's continues to see execution risk in these projects and points to the history of the financial difficulties that utilities building reactors in the 1970s and 1980s as instructive for evaluating current projects.

Moody's is considering applying a more negative view for issuers that are actively pursuing new nuclear generation. History gives us reason to be concerned about possible significant balance-sheet challenges, the lack of tangible efforts today to defend the existing ratings, and the substantial execution risk involved in building new nuclear power facilities. (p. 2)

Q. Do these concerns apply to the nuclear reactors proposed by FPL and Progress?

A. Yes. As I have shown above these marketplace, regulatory and technology risks weigh heavily on the proposed Florida reactors. The execution risk remains a serious concern as well. In the case of Florida, where both of these reactors before the commission are still awaiting approval for the 16th and 17th revision in its "standard" design, where the NRC has determined that one utility could not proceed under a Limited Work Authorization ("LWA") and therefore has been forced to delay the project and renegotiate its EPC contract, paying fees just to stand in line, and where the developer of

the prototype has shelved its plans to make its project the "model," Moody's concerns seem well founded and the assumption that execution risk has been solved deserves to be questioned.

The downgrades of utility ratings cut to the heart of the problems encountered by the industry during "the last major nuclear-generation construction cycle (1965-1995)." As shown in Exhibit MNC-10, I have identified 68 firms that engaged in the construction or operation of nuclear reactors in the U.S. Of those 68 firms, three quarters endured cancellation of at least one plant and half suffered a ratings downgrade. Both of the utilities involved in this proceeding suffered downgrades. Cancellations are the ultimate proof of that reactors can become infeasible and financial risk plays a key role in triggering the cancellation.

Moody's is not the only Wall Street firm to recognize the challenges facing nuclear reactors, as shown in Exhibit MNC-11. Even at a promotional conference, Standard and Poor's noted that "challenges for the industry participants abound" (p. 18). Even recognizing that there are positive aspects of the current environment, as Moody's did, Standard and Poor's identifies more aspects of the current situation that are negative. Interestingly, even with a loan guarantee, Standard and Poor's sees significant financial issues. The utilities proposing the reactors in Florida are not on the list for the first round of loan guarantees, so the challenges facing these projects are even greater.

Thus, the Commission needs to be sensitive to the potential financial risks of these plants. Credit downgrades raise the cost of capital and can have a significant impact on the cost of electricity and undermine not only the long-term feasibility of the reactors, but also the viability of the utility.

Let me stress again that the importance of uncertainty is a key fact for the Commission to take into account and the importance of demand projections. One of the key factors contributing to the bust of the nuclear boom of the 1970s was the inability or unwillingness of utilities that had become committed to nuclear construction to cope with reduced demand growth. The oil price shocks of the 1970s and the rate shock of the 1980s destroyed the demand that the nuclear reactors were intended to supply.

Today we have a similar demand shock created by the great recession and the pending climate change policy. It is highly unlikely that demand will reach the levels predicted in the Need Dockets for decades. Between the two utilities, FPL and Progress have lowered their projection of peak demand for 2017 by almost 3700 MW. That is equivalent to the capacity of three of the four units they are planning to build. Climate change policy could reduce the need for nonrenewable capacity by another 3300 to 6600 MW in their service territories in the next two decades. The chance that Florida will actually need these four reactors should climate change legislation be enacted along the line of HR 2454 is virtually zero. If climate change legislation were not enacted now or in the future, the carbon compliance prices assumed by the companies would not come to pass. In that case, the reactors could not be justified on economic grounds. Either way, these reactors are not feasible in the long-term.

DIVERSITY

Q. Do the other goals the Florida legislature has set for the electricity sector alter you conclusion?

A. Not at all. The goal of promoting diversity of resources to lower vulnerability to a variety of threats argues for efficiency and renewables just as much as nuclear. Efficiency is the most reliable form of meeting needs because it is always on. Lowering demand lowers the reliance on all other forms of energy. Renewables also provide diversity.

To evaluate the effect of alternatives on the diversity of sources, I have calculated an index known as the HHI index. The index is used frequently in economics to evaluate the concentration of markets. In fact, the Merger Guidelines of the Department of Justice and the Federal Trade Commission are written in terms of the HHI. The index is calculated by taking the share of each entity making up the market (in this case the share of the resource in the total) squaring it, summing the squares and multiplying by 10,000 to clear the fraction. A monopoly or utility reliant on a single source would have an HHI of 10,000 [(1 * 1) *10,000].

Exhibit MNC-12 shows the HHI for three scenarios for both FPL and Progress. It has the nuclear and gas scenarios from the Need Docket and contrasts this to an efficiency and renewables scenario in which HR 2454 induced efficiency and renewables are at 15 percent (half way between the 10 and 20 percent scenarios discussed above). Efficiency is assumed to be 12 percent of the total resource, while incremental renewables are set at 3 percent. In both cases, the efficiency and renewable mix is more diverse than either the nuclear or the gas scenarios, when one counts efficiency as a "resource."

ECONOMIC ANALYSIS

FPL's Breakeven Analysis

Q. Is the breakeven analysis the common approach to making the comparison between alternatives?

A. No. Because FPL is unsure of the cost of nuclear reactors it has created a new methodology to evaluate one option, whether or not to build nuclear reactors. The typical methodology is a levelized cost comparison of the different alternatives.

Q. Are there aspects of the break-even analysis that bear close scrutiny in light of the changed conditions you have identified?

A. Yes there are several aspects. At a general level, the breakeven analysis improperly narrows the scope of the review. Generally, analysts calculate the projected cost per kilowatt-hour. Each alternative would be considered on its merits. In the breakeven analysis, FPL compares two or three large-scale alternatives. It does not ask whether other alternatives would be less costly.

More specifically, there are two aspects of the breakeven framework that FPL has developed which should be examined carefully in light of the changing conditions I have identified. These aspects are escalation and excess capacity.

Q. Please describe your concerns about escalation.

A. The wide variation in the projected costs of power from nuclear reactors stems from a difference of opinion over the overnight costs and escalation of construction costs. In the FPL analysis cost escalation is equal to one-quarter of the overnight costs and it is

treated separately form overnight costs. FPL assumes a zero real cost escalation. That is, the rate of increase in the cost of construction equals the rate of inflation. Many other studies assume significant, real cost escalation.

FPL calculated a fixed cost recovery factor, which is the cumulative present value of the revenue requirement per $1/kW of overnight capacity (the $1/kW factor). It is not clear to me how the escalation of construction costs is included in the calculation of the revenue requirement. It could have been embedded in the stream of costs as a percentage of the construction cost. If one wants to test an alternative escalation rate, one would have to modify the calculation of the $1/kW recovery factor. The $1/kW factor has changed significantly between 2007 and 2009, as shown in Exhibit MNC-13. The decline in the implicit $1/kW factor accounts for between one-tenth and one-quarter of the increase in the breakeven capital figure.

Q. Please describe your concerns about excess capacity.

A. The breakeven analysis essentially calculates how much nuclear capacity can be purchased with the variable cost savings from building new nuclear reactors. Over 90 percent of the savings comes from variable costs, largely fuel costs. In other words, nuclear capacity is paid for with fuel cost savings. The analysis proceeds in two steps. First, the system costs are calculated with and without nuclear capital costs, then the cost of building nuclear reactors is compared to the amount of money available from the savings.

The operating cost estimates should not include excess production and the variable costs associated with that production. If capacity is idled because of excess, then

the carrying cost of that excess should be subtracted from the savings. These are costs that would not be incurred if the system were "right" sized. Because nuclear reactors come in larger units and have higher capital costs, while natural gas units are small, lower in capital cost and have higher operating costs, ensuring that the model takes these differences into account become more important when demand declines and excess capacity increases.

Absorbing excess capacity with "off-system" sales raises two issues. First, to the extent that off-system sales are claimed, the net costs of production and net revenues should be deducted from the system cost total for purposes of the breakeven analysis. Second, in an environment where demand is slackening and reserve margins are rising all around, the assumption that off-system sales can take place should be examined.

The cost of operating the system is driven by assumptions about plant capacity, capacity factors and heat rates. The 20 percent reserve margin creates a circumstance in which the implicitly capacity factor (80 percent) is lower than the assumed capacity factors for the major alternatives being compared. The reserve margin is the insurance premium that Floridians pay to ensure that the lights stay on. Reserves in excess of the reserve margin are excessive. Over a long time horizon, the ability to match supply and demand (plus the reserve margin requirement) should be rewarded. If excess capacity is used to make off-system sales, those revenues should be subtracted from the system costs in the break-even analysis.

While the excess capacity is a few percentage points spread over a number of years, it can make a difference if it is handled properly. The economic advantage claimed for nuclear is actually quite small, when compared to the total costs of the

system. As shown in Exhibit MNC-14, using the high capital costs and the 2007 $1/kW factor, but leaving all other assumptions alone, the cost advantage of nuclear is less than five percent in eight of the nine cost cases. The handling of excess capacity in the context of such a small difference between system costs with and without nuclear reactors could be quite important.

Progress

Q. Does the economic analysis offered by Progress raise similar concerns?

A. Yes. While Progress has pursued a more traditional approach to assessing the economics of nuclear reactors compared to other options, its analysis raises concerns that are similar to those I have expressed for FPL. The excess capacity question is important in the case of Progress because its base case already has a large excess above the reserve margin requirements and the large project creates even greater excess.

This is particularly important in the case of Progress because it has argued that the construction periods of the two reactors must be kept close together to achieve cost savings. Since the economic analysis is done at the average cost of the two reactors and the link between them in time is so tight, this project is not really two 1100 MW reactors, it is one 2200 MW project. If the decision were made to drop the second reactor, the cost of the first reactor would rise and the Commission would have to redo the whole economic analysis at a much higher cost. Slackening demand growth drives a time wedge between the first and second units, as it takes more time for demand growth to reduce the excess capacity resulting from the addition of large units. Progress does not

need the second units as quickly and capturing the cost economies of the rapid build creates excess capacity that last longer.

This obviously ties directly to the cost escalation issue. Progress used a single point estimate for cost, which was between FPL's mid and high point, but the cost is nonbinding from the Commission's point of view and is being renegotiated in light of the long slippage in schedule. The Commission is being asked to allow the recovery of hundreds of millions of dollars of costs from a project, whose total cost, and therefore long run feasibility, are unknown in the context of an industry that suffered severe cost overruns in the past and is exhibiting a rapid run up in cost projections.

Q. Please summarize your conclusions.

A. The small cost advantages claimed for these nuclear units in the future underscores how important all of the changing conditions I have identified are. The Florida legislature has created an environment that provides incentives for nuclear reactors, but it has not written a blank check nor created a blindfold. The utilities and the Commission must act prudently within the confines of the incentive structure the legislature has established. In this prudence review the utilities ask for cost recovery for these proposed nuclear reactors by constructing an economic analysis that gives nuclear a slight, or 4-5 percent, cost advantage. However, that analysis rests on a series of assumptions that are no longer consistent with reality, if they ever were – high demand growth, very little contribution from efficiency and renewables, high fossil fuel costs, and low nuclear reactor costs.

My testimony has identified seven factors that are moving strongly against nuclear reactors. Any one of the seven could reverse the conclusion reached by the utilities that nuclear reactors are less expensive.

(1) Slowing demand growth due to a major shift in the economy

(2) Moderating natural gas prices

(3) Federal policies to require a growing role of efficiency and renewables

(4) Moderating CO2 compliance costs

(5) Improving technology and cost of efficiency

(6) Improving technology and cost of renewables

(7) Escalating nuclear reactor costs.

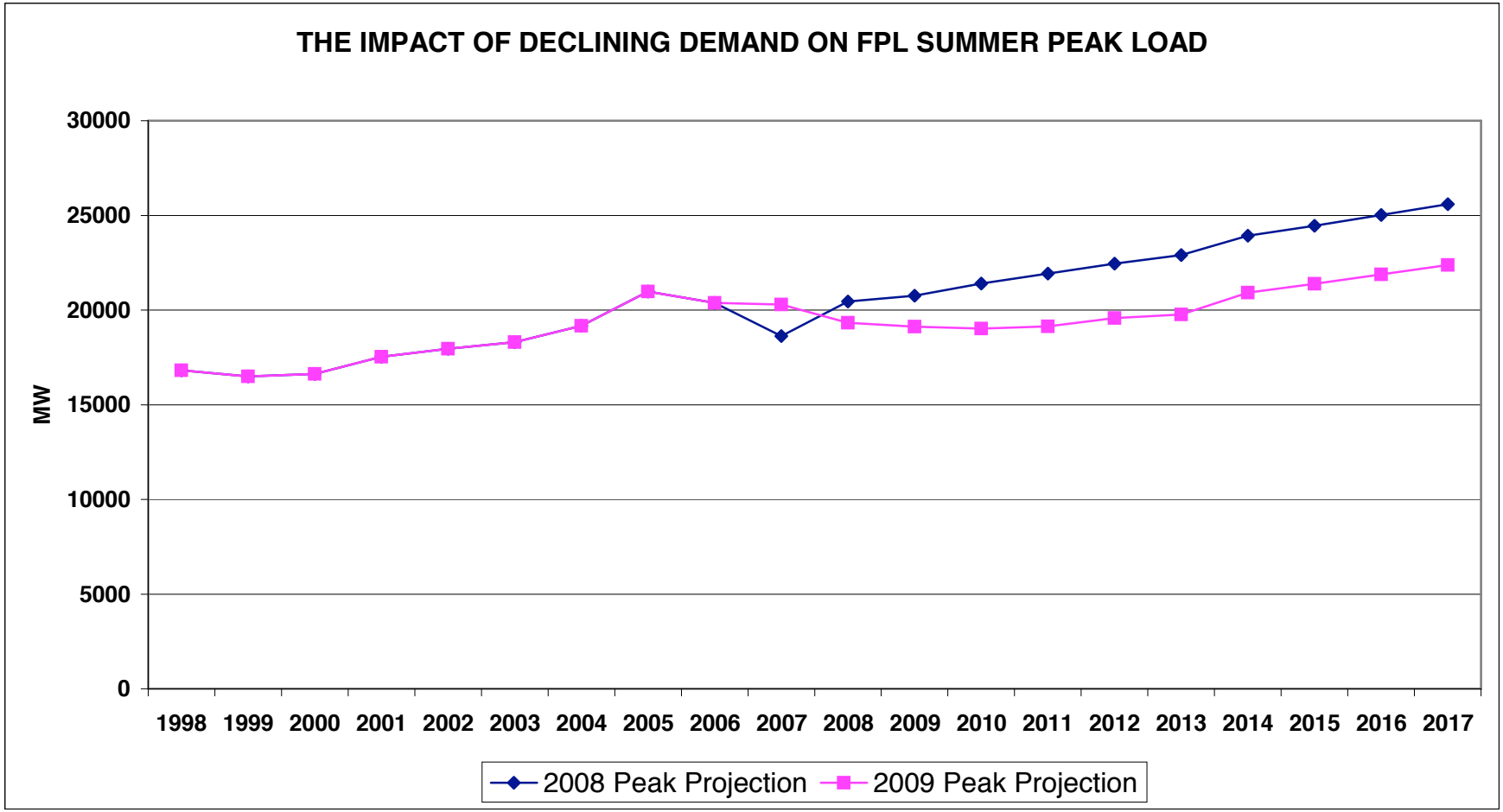
Given that all seven of these factors are moving strongly against nuclear reactors, it is highly likely that the reactors will cost consumers much more than the alternatives. And, given that relatively little has been spent on the proposed reactors now, this is the moment for the Commission to take the required hard look at the long-term feasibility of the completion of these reactors. Spending more on nuclear reactors and allowing the utilities to recover those costs from ratepayers would be imprudent.

Q. Does this conclude your testimony?

A. Yes it does.

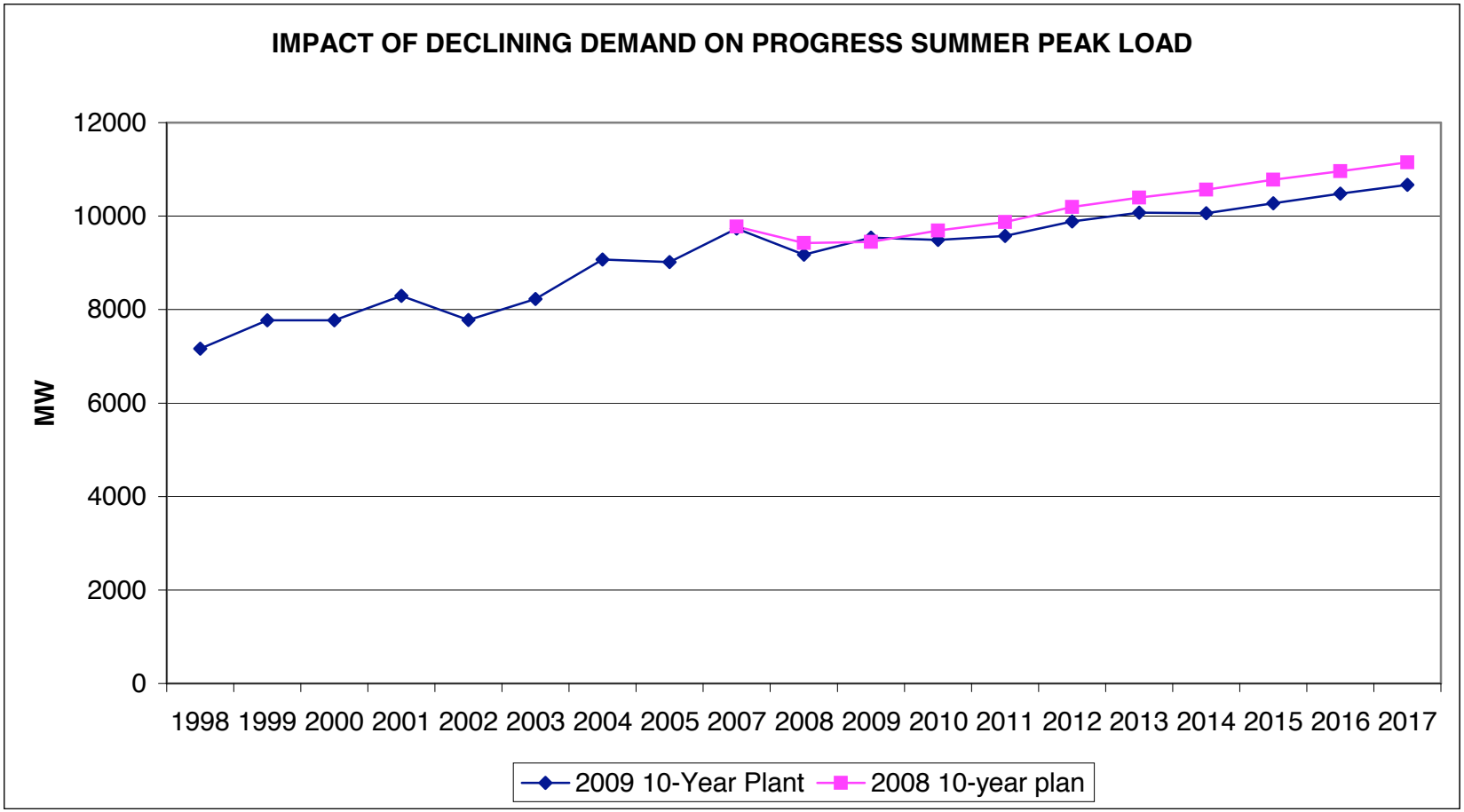
EXHIBITS ACCOMPANYING DIRECT TESTMONY OF MARK N. COOPER

IMPACT OF DECLINING DEMAND ON SUMMER PEAK LOAD



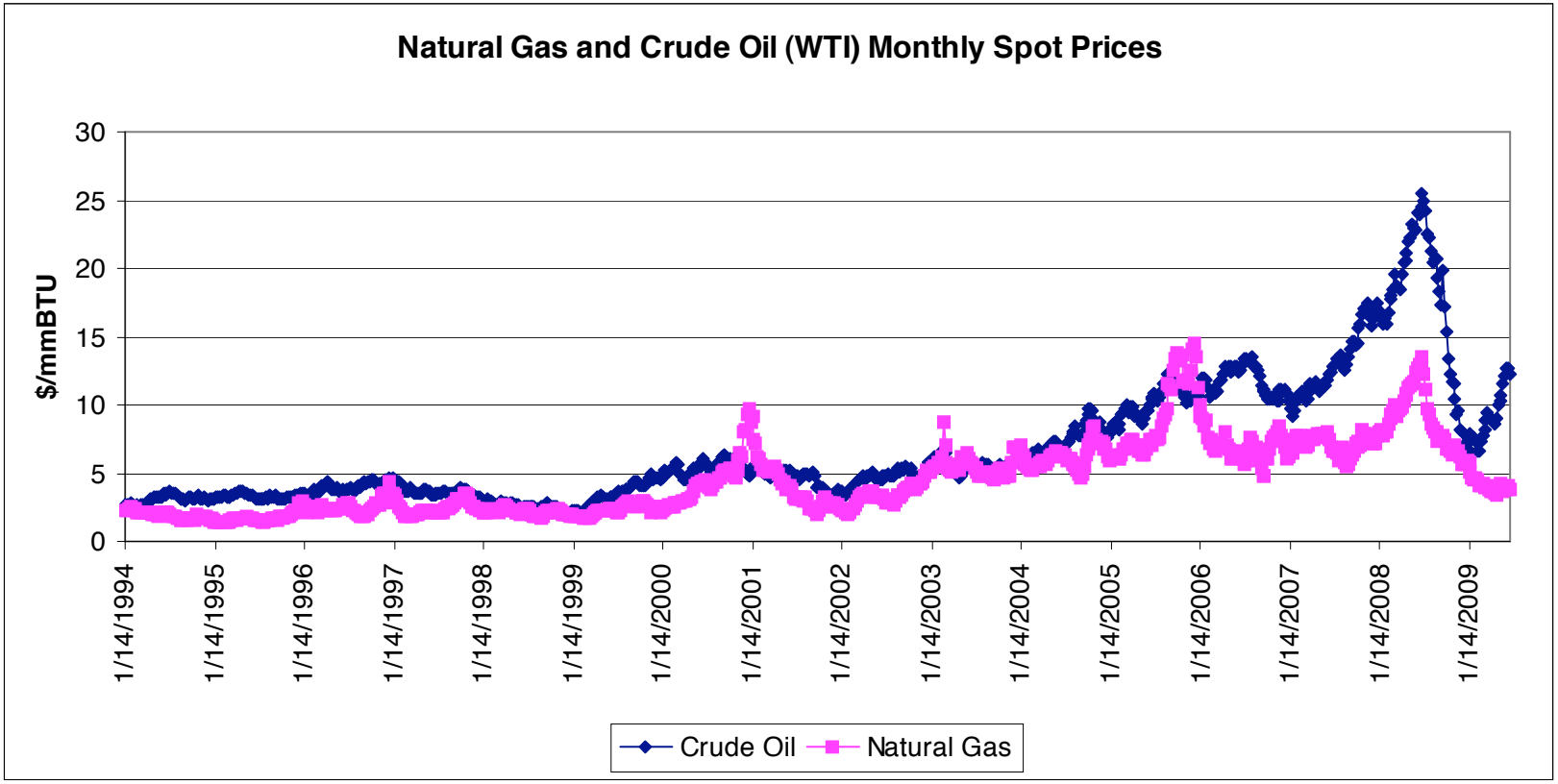
Source: 2008 10-year plan, p. 40; 2009 10-year plan, p. 45.

IMPACT OF DECLINING DEMAND ON SUMMER PEAK LOAD



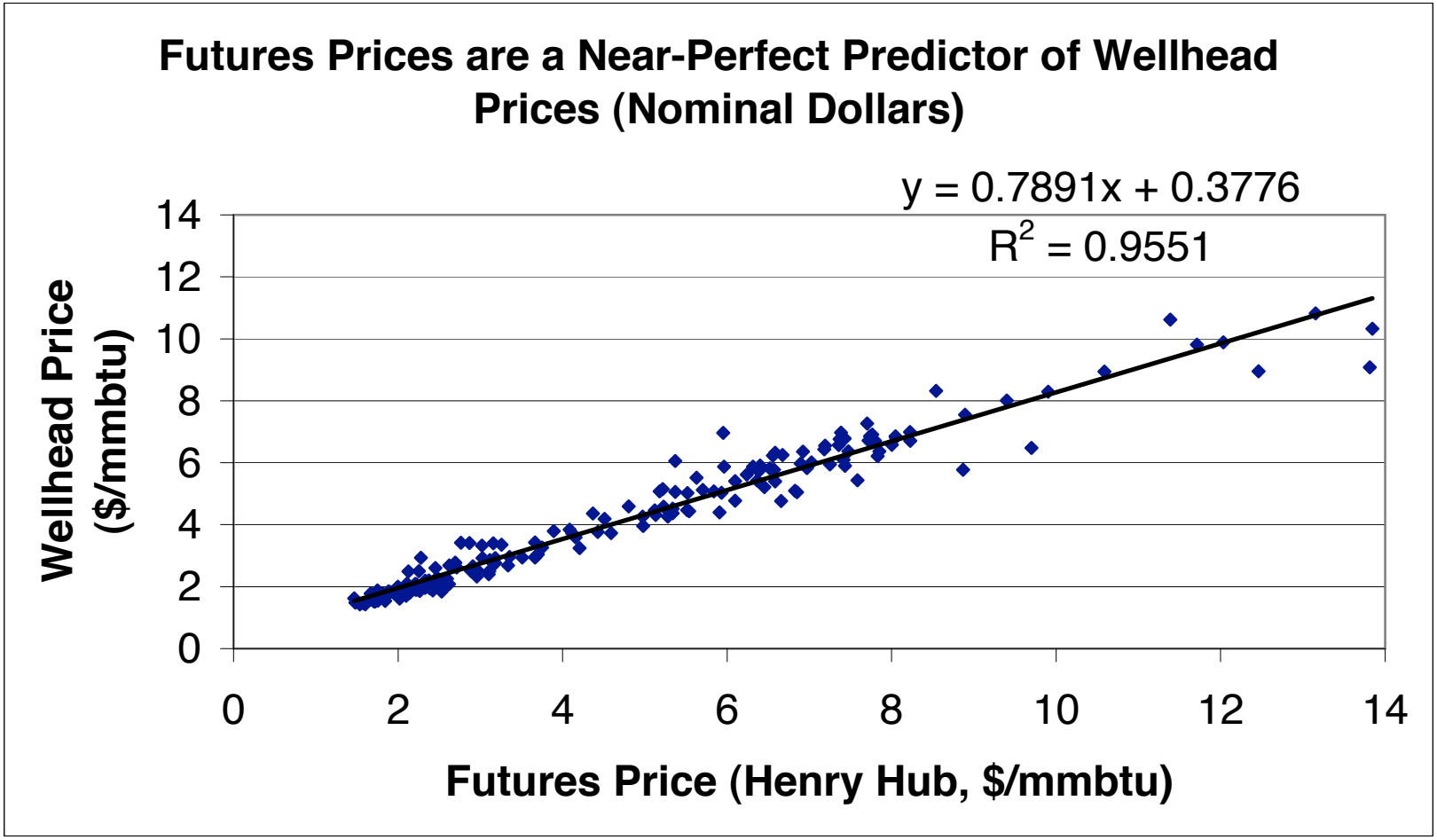
Source: 2008 10-year plan, p. 2-7; 2009 10-year plan, p. 2-6.

NATURAL GAS WELLHEAD, HENRY HUB AND FUTURES PRICES



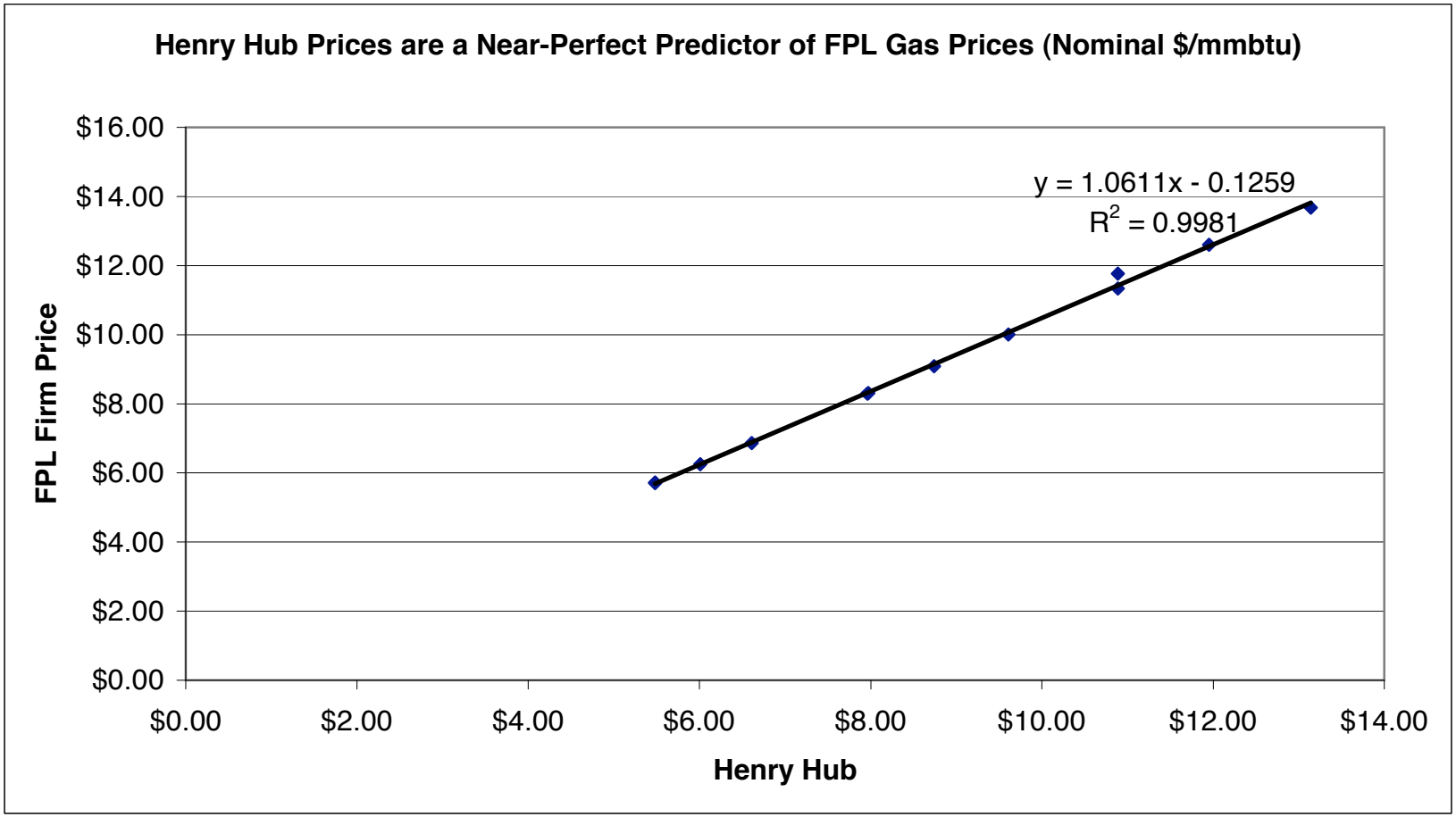
Source: Energy Information Administration, Petroleum Spot Prices,
http://tonto.eia.doe.gov/dnav/pet/xls/PET_PRI_SPT_S1_M.xls
Natural Gas Future Prices, Contract 1: http://tonto.eia.doe.gov/dnav/ng/xls/NG_PRI_FUT_S1_M.xls

NATURAL GAS WELLHEAD, HENRY HUB AND FUTURES PRICES



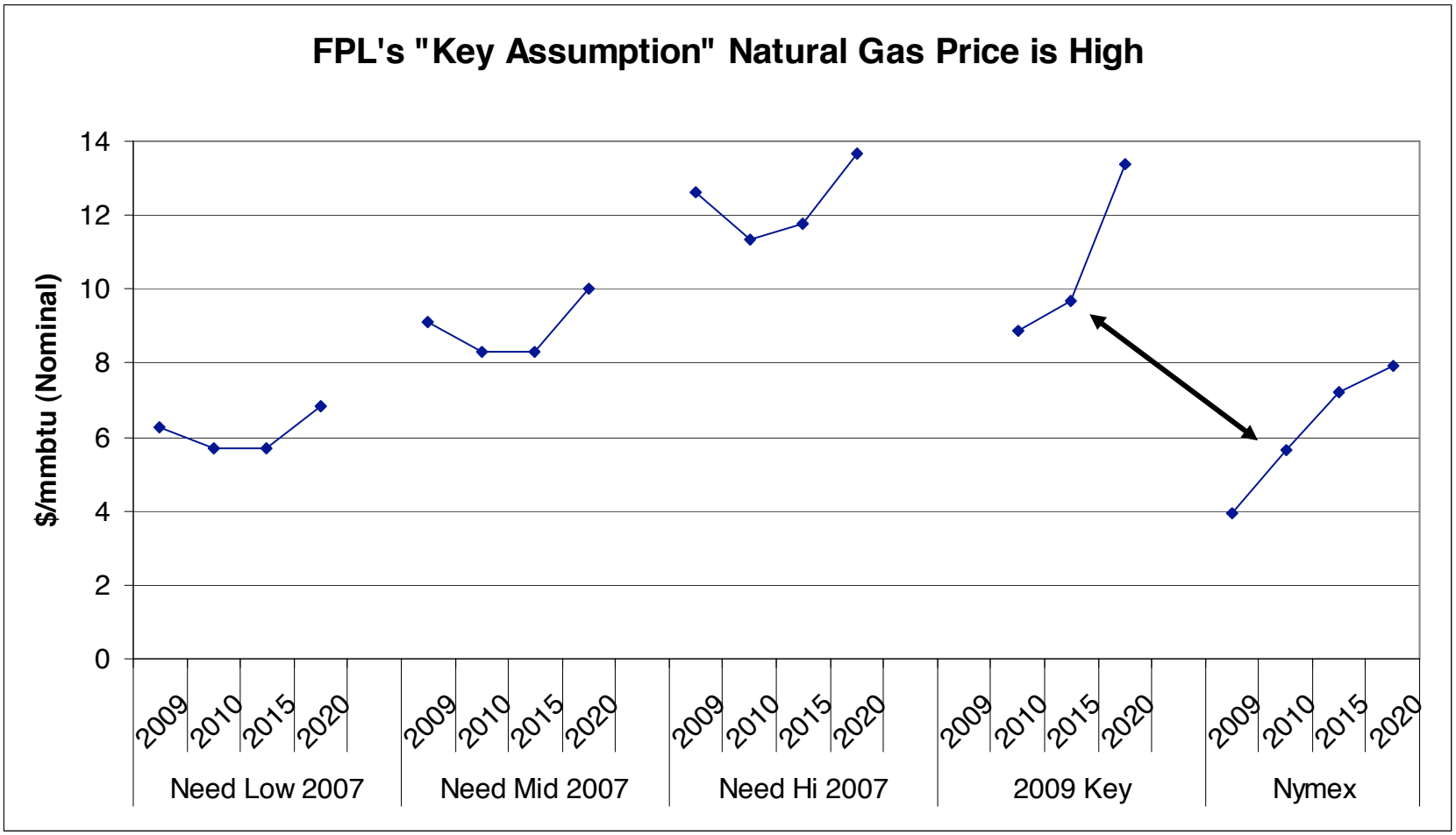
Source: Energy Information Administration: http://tonto.eia.doe.gov/dnav/ng/ng_pri_fut_s1_m.htm, http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm, visited 7/11/2009

NATURAL GAS WELLHEAD, HENRY HUB AND FUTURES PRICES



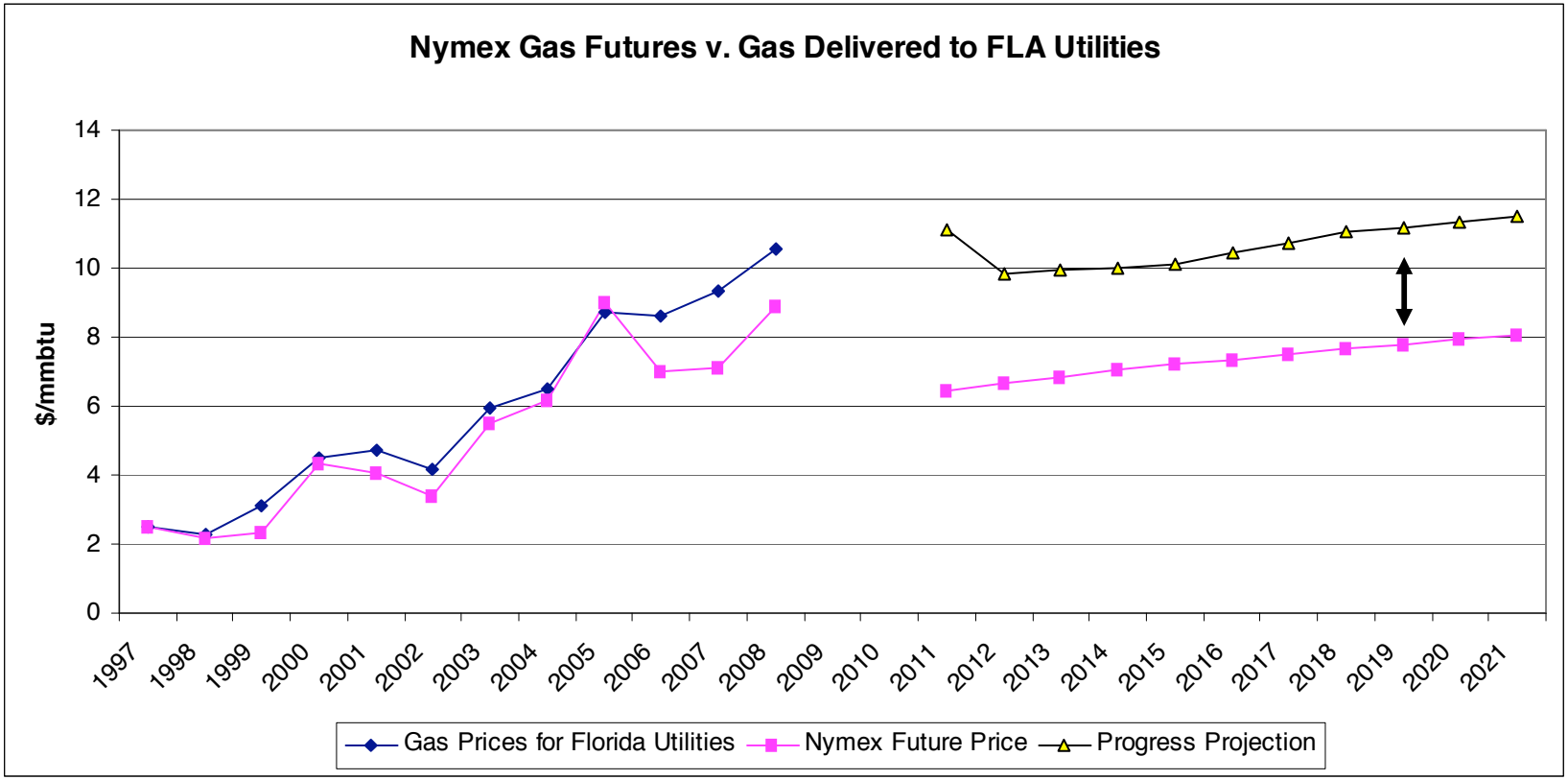
Source: FPL Need Study for electrical Power Docket No. 07-0650, Appendix E

PROJECTED NATURAL GAS PRICES COMPARED TO NYMEX FUTURES PRICES



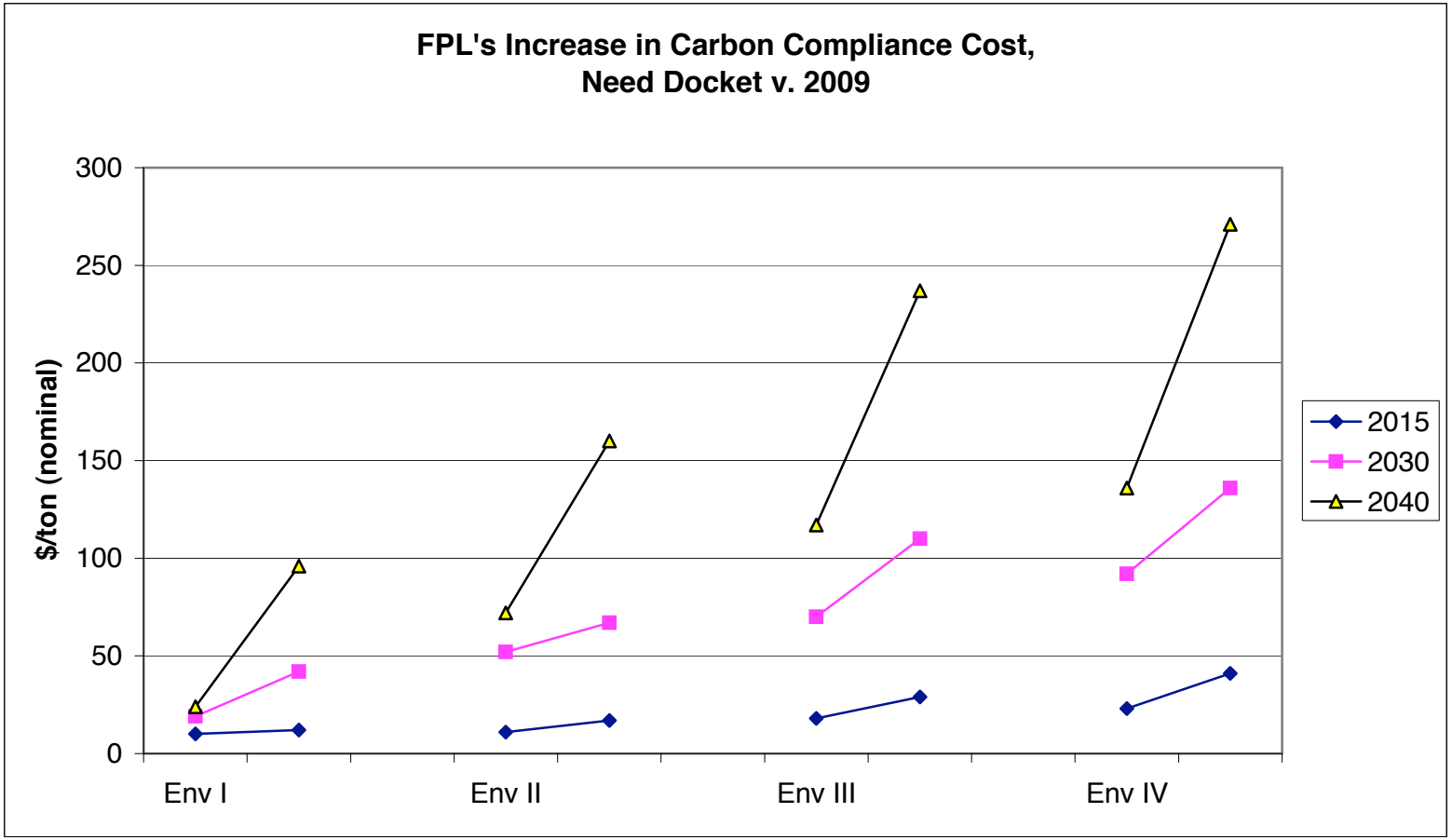
Source: **FPL Need Study for Electrical Power Docket No. 07-0650, Appendix E; Nymex Futures Contract, http://www.nymex.com/ng_fut_csf.aspx, visited 7/11/2009**

PROJECTED NATURAL GAS PRICES COMPARED TO NYMEX FUTURES PRICES



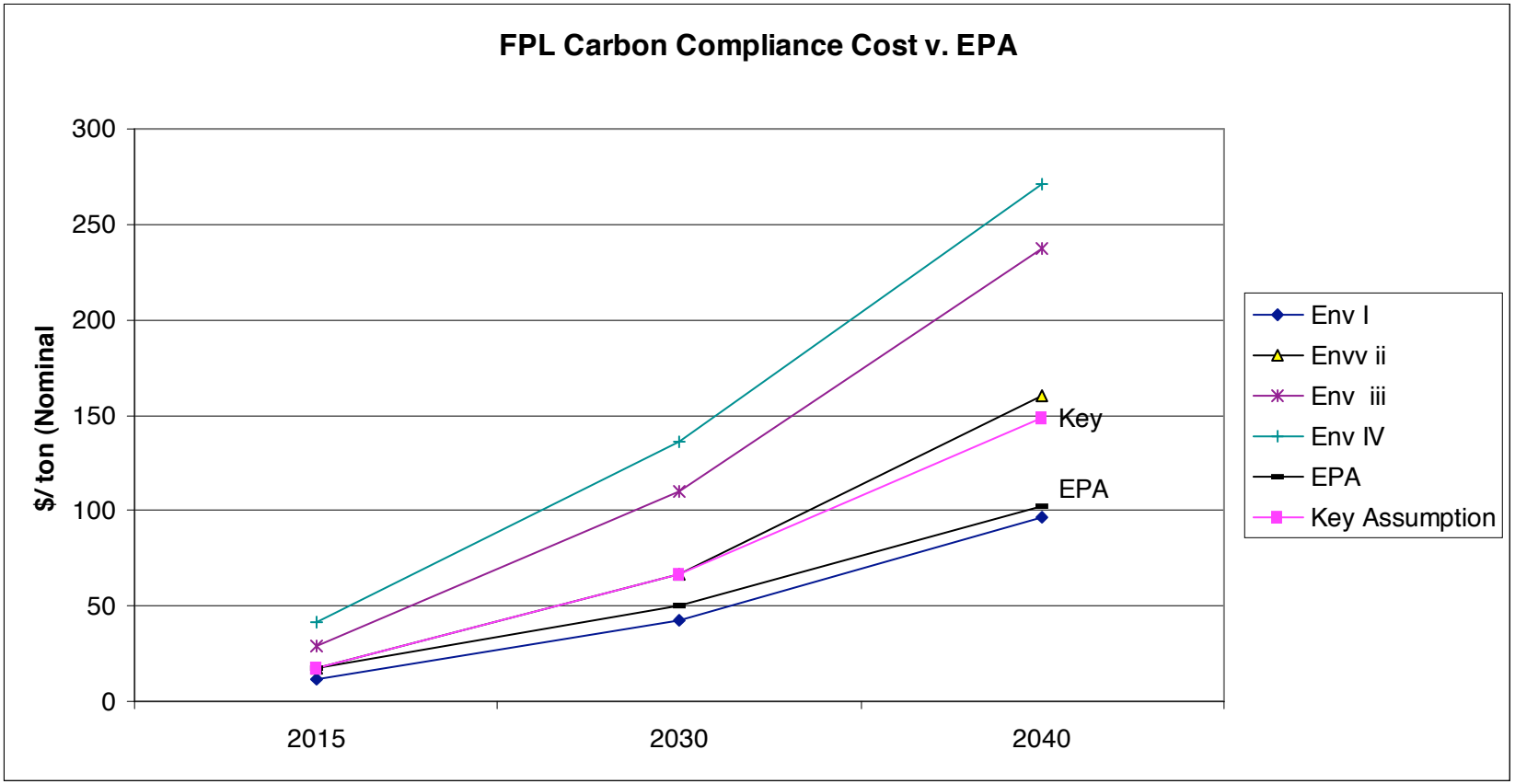
Source: Testimony of Garry Miller, Docket No. 090009, May 1, 2009, Exhibit GM-1, page 2of 2; Energy Information Administration, Annual Natural Gas Futures Contract 1, http://tonto.eia.doe.gov/dnav/ng/xls/NG_PRI_FUT_S1_M.xls
Annual Florida Gas Price Sold to Electric Power Companies; *http://tonto.eia.doe.gov/dnav/ng/hist/n3045fl3a.htm;*
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

PROJECTIONS OF CARBON COMPLIANCE COSTS



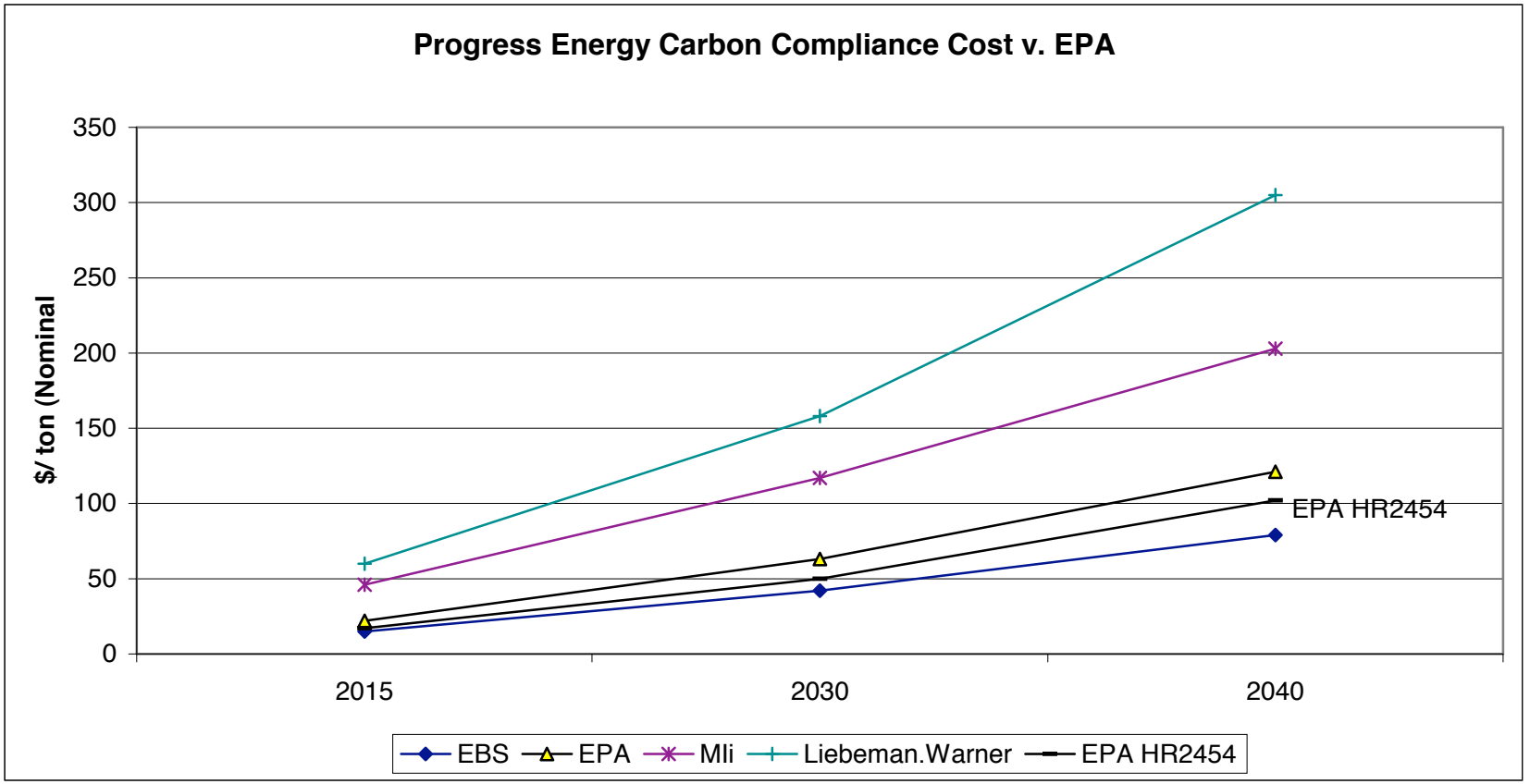
Source: Florida Power and Light, Need Study for Electrical Power, Docket No. 070650-EI, Appendix F, page 3 of 4; Florida Power and Light Docket No. 090009 EI, OPC's Third Set of Interrogatories, Question No. 47, p 1 of 2.

PROJECTIONS OF CARBON COMPLIANCE COSTS



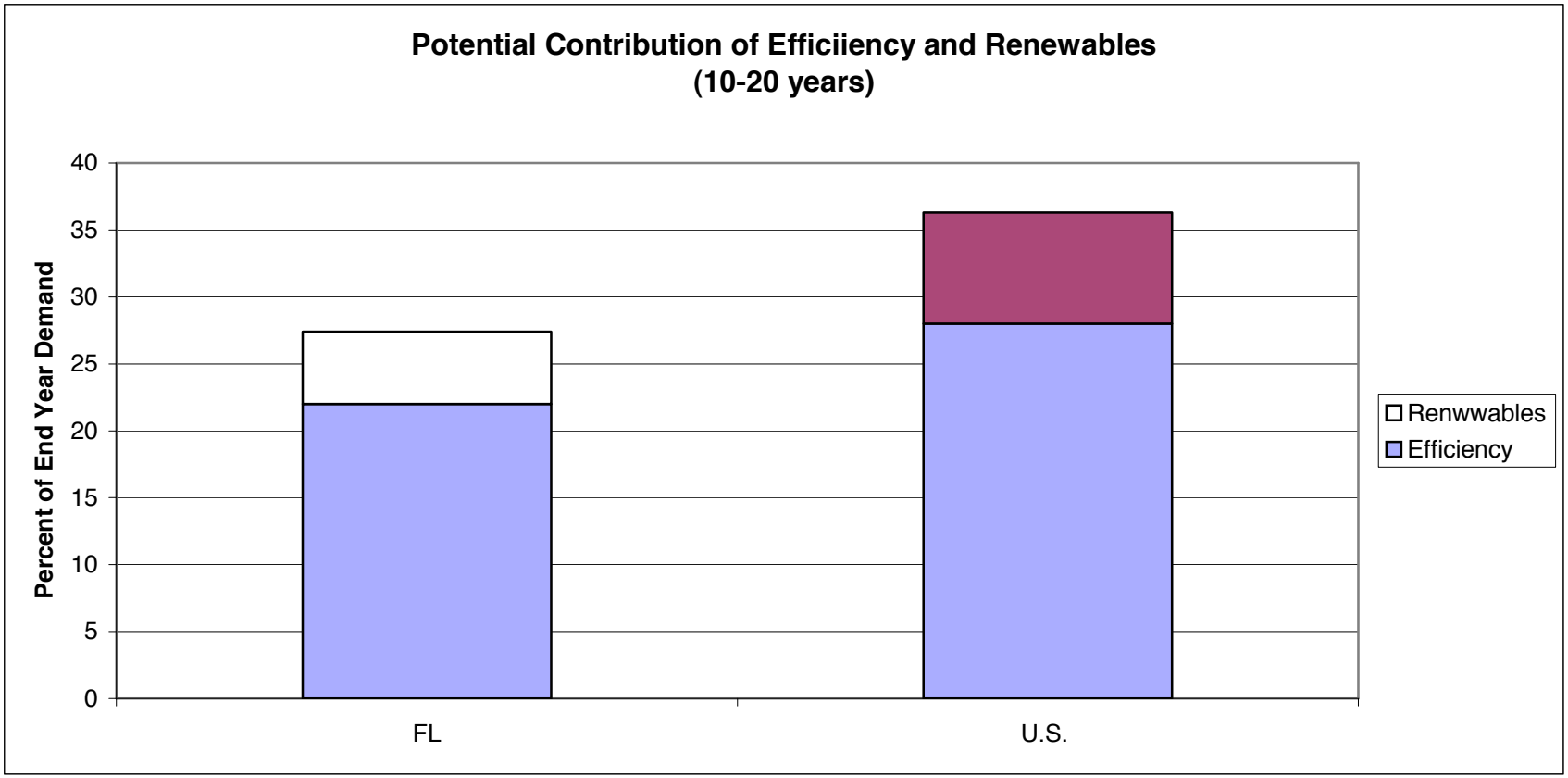
Source: Florida Power and Light, Docket No. 090009 EI, OPC's Third Set of Interrogatories, Question No. 47, p 1 of 2; EPA Analysis of toe American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress, 6/23/09, p. 14, using the highest price and converting real to nominal dollars at the 2.5% rate of inflation assumed by FPL

PROJECTIONS OF CARBON COMPLIANCE COSTS



Source: Testimony of Garry Miller, Docket No. 090009, May 1, 2009, Exhibit GM-1, page 1 of 1; EPA Analysis of toe 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

ESTIMATES OF POTENTIAL MID-TERM EFFICIENCY SAVINGS

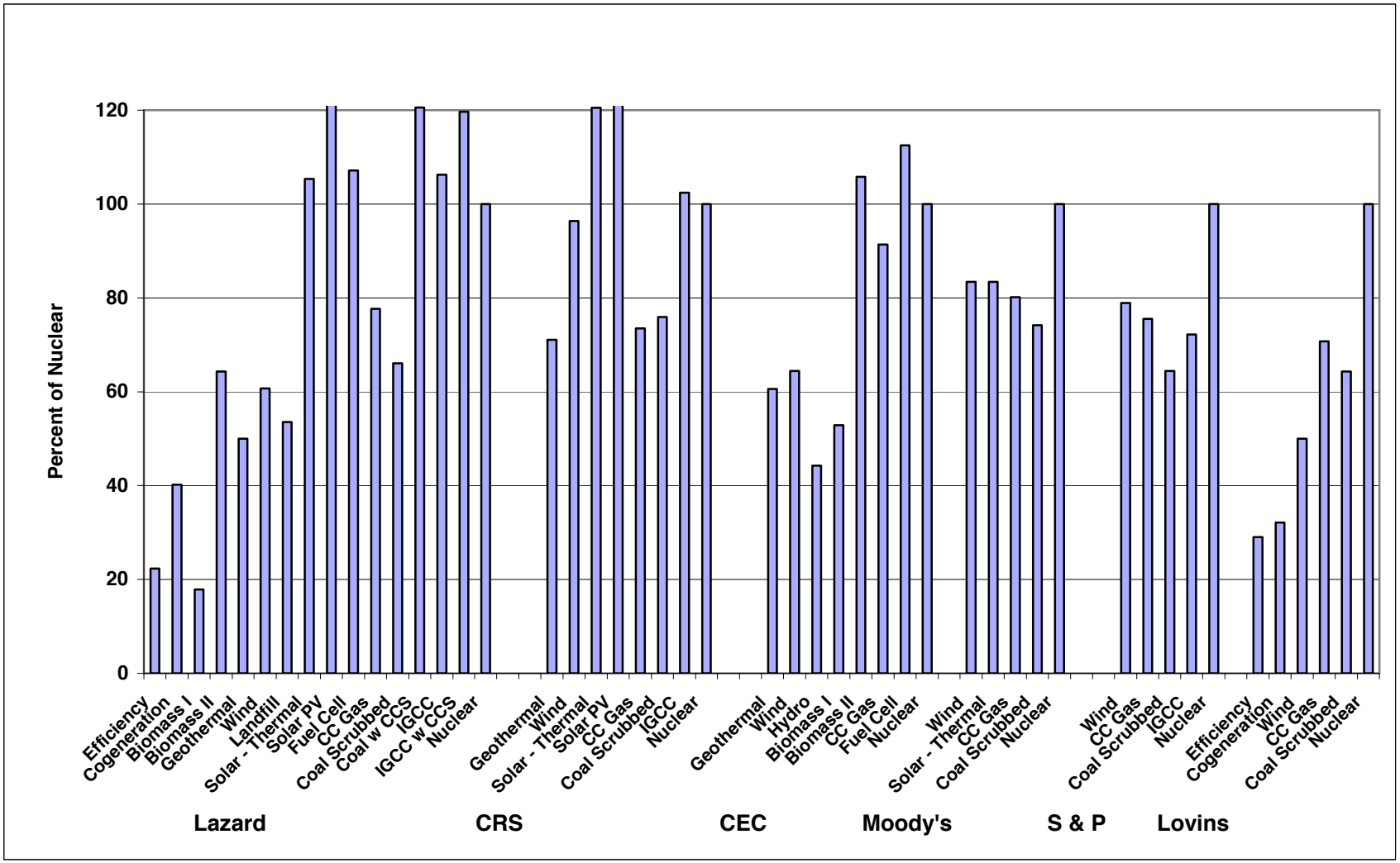


ESTIMATES OF POTENTIAL MID-TERM EFFICIENCY SAVINGS

Source: **Florida is from Elliott, R. Neal, et al.** ***Potential for Energy Efficiency and Renewable Energy to Meet Florida's Growing Energy Demands,*** **American Council for an Energy Efficient Economy, June 2007, p. 9, 12. The national average is the simple average individual state studies in the following. American Council of an Energy- Efficient Economy, et al., 2009,** ***Shaping Ohio's Energy Future,*** **March 2009, p.13, 15, 17. American Council of an Energy-Efficient Economy, et al., 2008,** ***Energizing Virginia: Efficiency First,*** **September 2008, p. 14, 16, 18. American Council for an Energy-Efficient Economy, 2007, Howard Geller, et al.,** ***Utah Energy Efficiency Strategy: Policy Options,*** **November 2007. American Council for an Energy- Efficient Economy, 2007,** ***Energizing Virginia: Efficiency First,"*** **September 2008. Beck, Frederic, et al. 2002,** ***Powering the South: A Clean & Affordable Energy Plan for the Southern United States,*** **REPP, January 2002. Ecotope, Inc., American Council for an Energy-Efficient Economy, Tellus Institute, Inc., 2003,** ***Energy Efficiency and Conservation Measure Resource Assessment,*** **(Energy Trust of Oregon Inc., January 2003. Elliott, R. Neal, et al., 2007,** ***Potential for Energy Efficiency, Demand Response and Onsite Renewable Energy to Meet Texas' Growing Electricity Needs,*** **American Council for an Energy-Efficient Economy, March 2007. Laitner, John "Skip," Maggie Eldridge, and R. Neal Elliot, 2007,** ***The Economic Benefits of an Energy Efficiency and Onsite Renewable Energy Strategy to Meet Growing Electricity Needs in Texas,"*** **American Council for an Energy-Efficient Economy, September 2007. Optimal Energy Inc, et al., 2003,** ***Energy Efficiency and Renewable Energy Resource Development Potential in New York State,*** **August 2003. Prindle, William, R. Rooney, Tom, et al., 2004,** ***Estimating the Potential for Cost Effective Electric and Peak Demand Savings in Connecticut,*** **2004 ACEEE Summer Study on Energy Efficiency in Buildings, 2004. Southwest Energy Efficiency Project,** ***The New Mother Lode: The Potential for More Efficient Electricity Use in the Southwest,*** **November 2002, p. 3-13. Stoft, Steven,** ***The Economics of Conserved-Energy "Supply" Curves,*** **Program on Workable Energy Regulation, April 1995. Wyandotte Municipal Services Optimization Plan, Michigan Public Service Commission, Case No. U-18558, p. 6.**

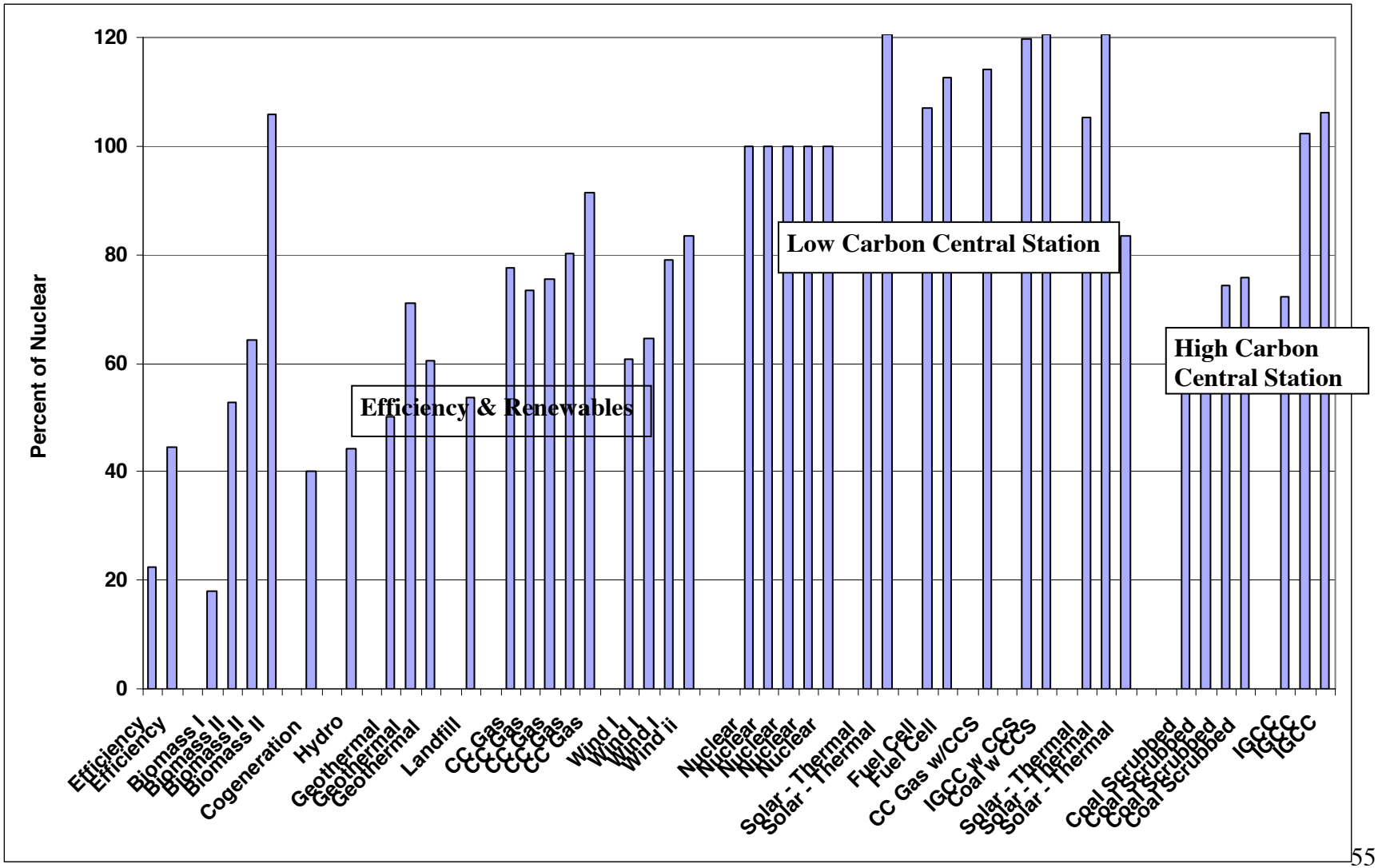
ESTIMATES OF COSTS OF ALTERNATIVES TO MEET ELECTRICITY NEEDS

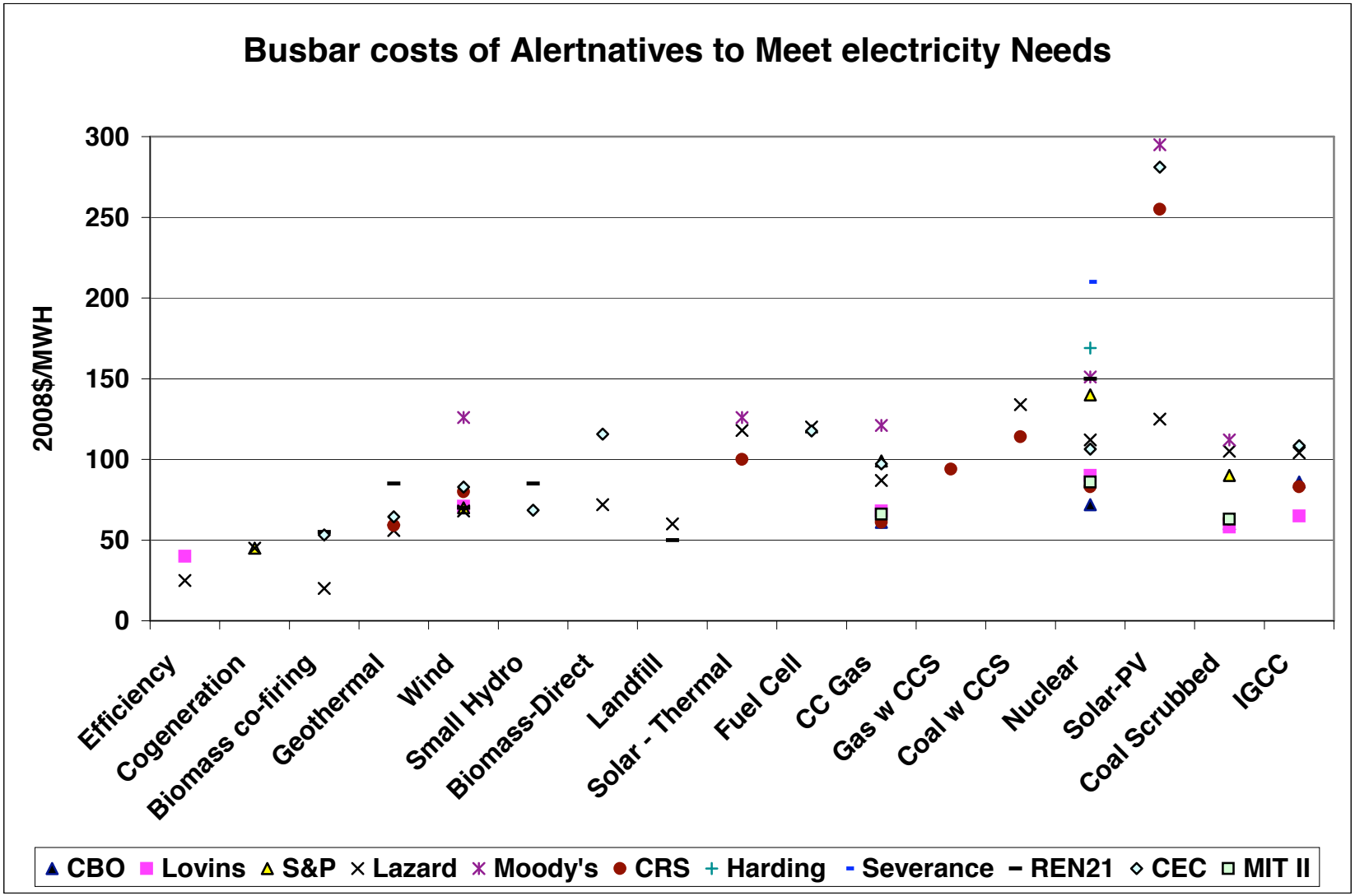
(Arranged by Author; Nuclear Reactor Cost = 100%)



ESTIMATES OF COSTS OF ALTERNATIVES TO MEET ELECTRICITY NEEDS

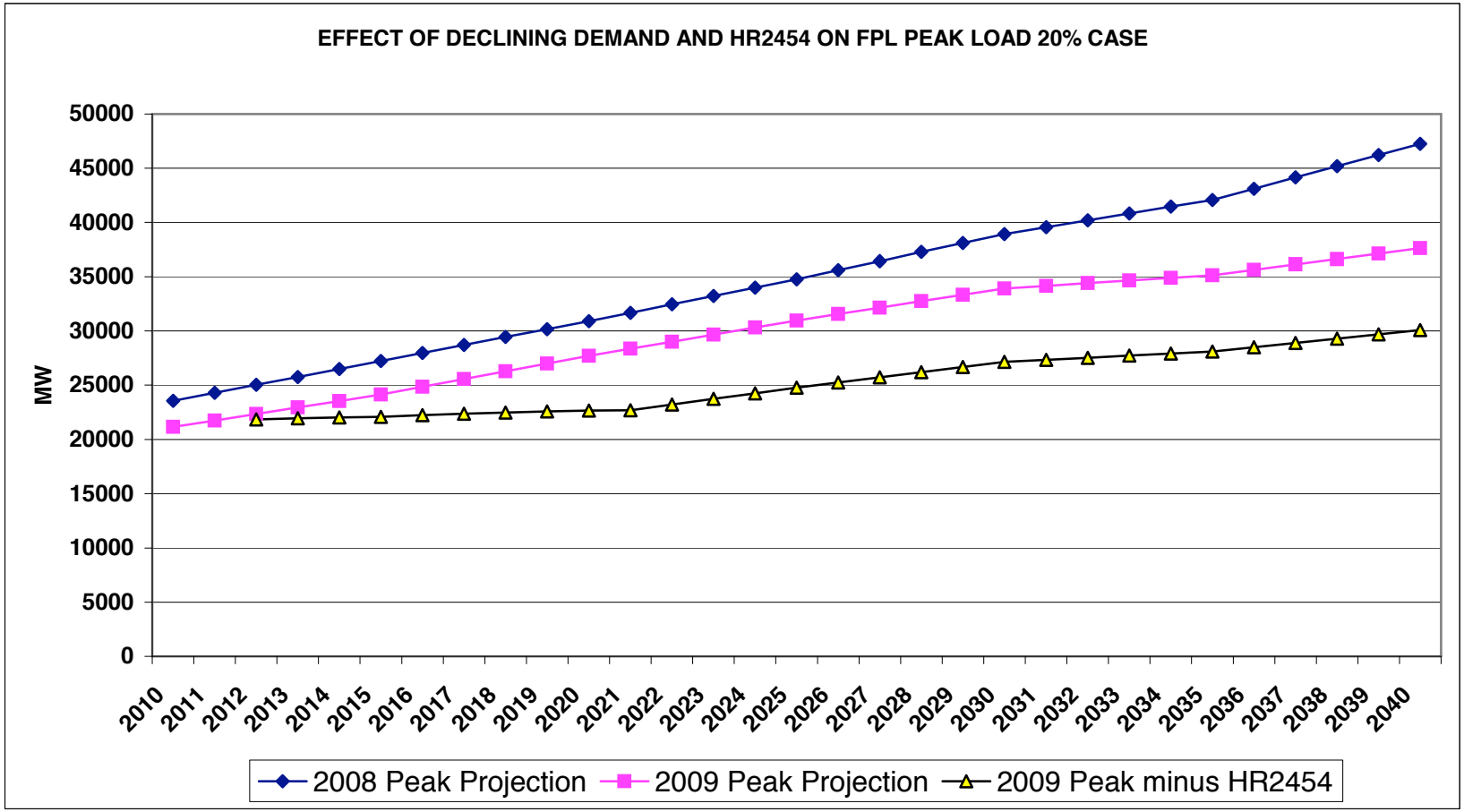
(Arranged by Technology; Nuclear Reactor Costs = 100%)




Busbar costs of Alertnatives to Meet electricity Needs
2008$/MWH
300
250
200
150
100
50
0
Efficiency
Cogeneration
Biomass co-firing
Geothermal
Wind
Small Hydro
Biomass-Direct
Landfill
Solar - Thermal
Fuel Cell
CC Gas
Gas w CCS
Coal w CCS
Nuclear
Solar-PV
Coal Scrubbed
IGCC
CBO
Lovins
S&P
Lazard
Moody's
CRS
Harding
Severance
REN21
CEC
MIT II

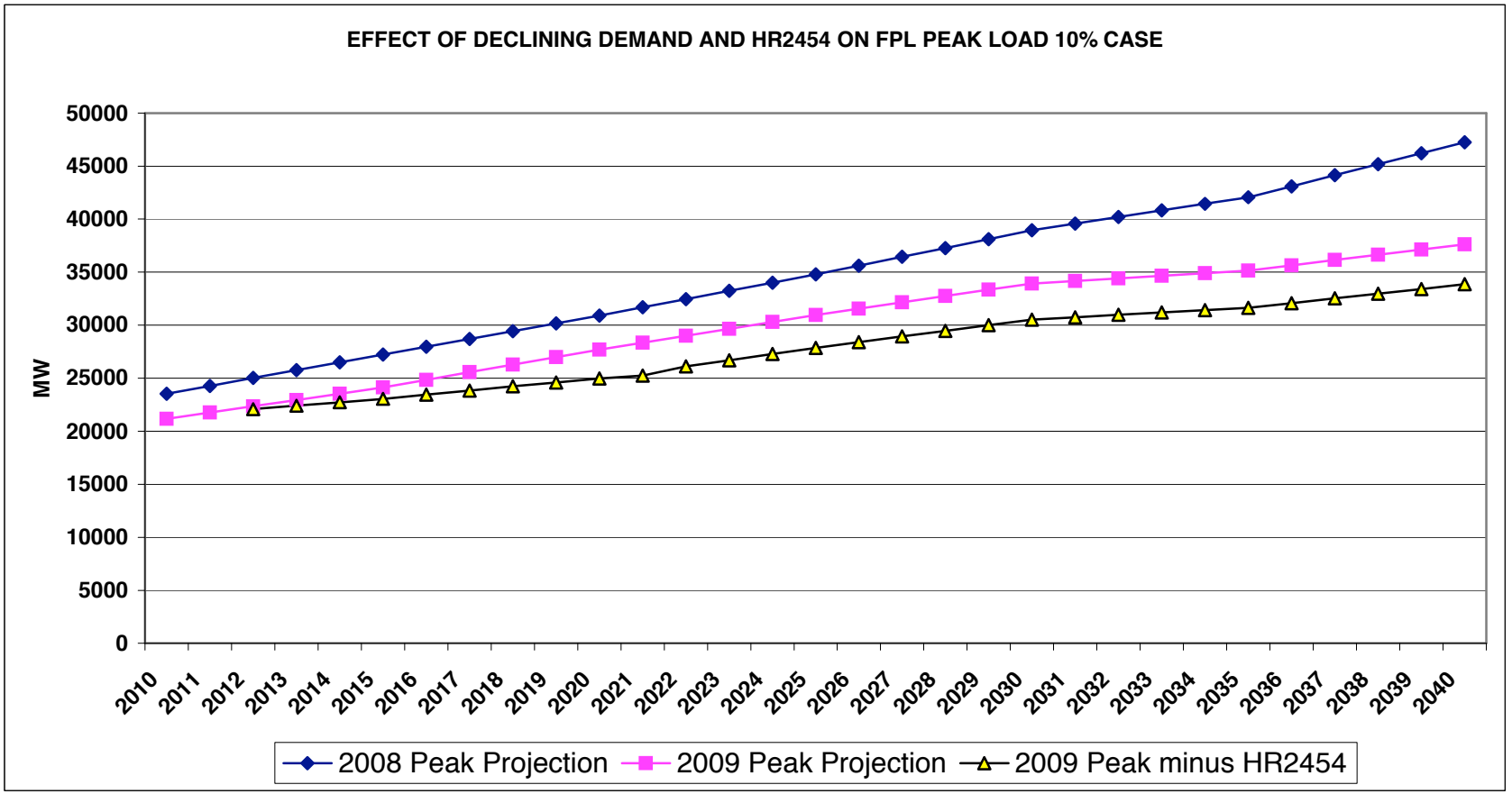
Sources: Congressional Budget Office, 2008, *Nuclear Power's Role in Generating Electricity*, May 2008, p.13; Kaplan, Stan, 2008, *Power Plants: Characteristics and Costs*, Congressional Research Service, November 13, 2008, Appendix B; Deutch, John, M. et al., 2009, *Update of the MIT 2003 Future of Nuclear Power*, MIT Energy Initiative, 2009; p. 6; Du Yangbo and John E. Parsons, 2009, *Update on the Cost of Nuclear Power, Center* for Energy and Environmental Policy Research, May 2009, MIT II; Joel Klein, 2007,Comparative *Costs of California Central Station Electricity Generation Technologies Cost of Generation Model*, ISO Stakeholders Meeting Interim Capacity Procurement Mechanisms, October 15, 2007, p. 14; Lazard, 2008, *Levelized Cost of Energy Analysis—Version 2.0*, June 2008, p. 10; **Lovins Amory, and Imran Shiekh, and Alex Markevich, 2008b, *Nuclear Power: Climate Fix or Folly?,* December 31, 2008.**Draft, p. 2; Moody's, 2008, New Nuclear Generating Capacity: Potential Credit Implications for U.S. Investor Owned Utilities, May 2008, p. 15; **Renewable Energy Policy Network for the 21st century, 2008, *Renewables 2007: Global Status Report,* 2008; Severance, Craig A. 2009, *Business Risks and Costs of New Nuclear Power*, January 2, 2009;** Standard and Poors, 2008b, *Assessing the Credit Risk of Competing Technologies for New U.S. Nuclear Power Plants*, August 13, 2008, p. 11.

IMPACT OF CLIMATE POLICY ON PEAK LOAD: FPL



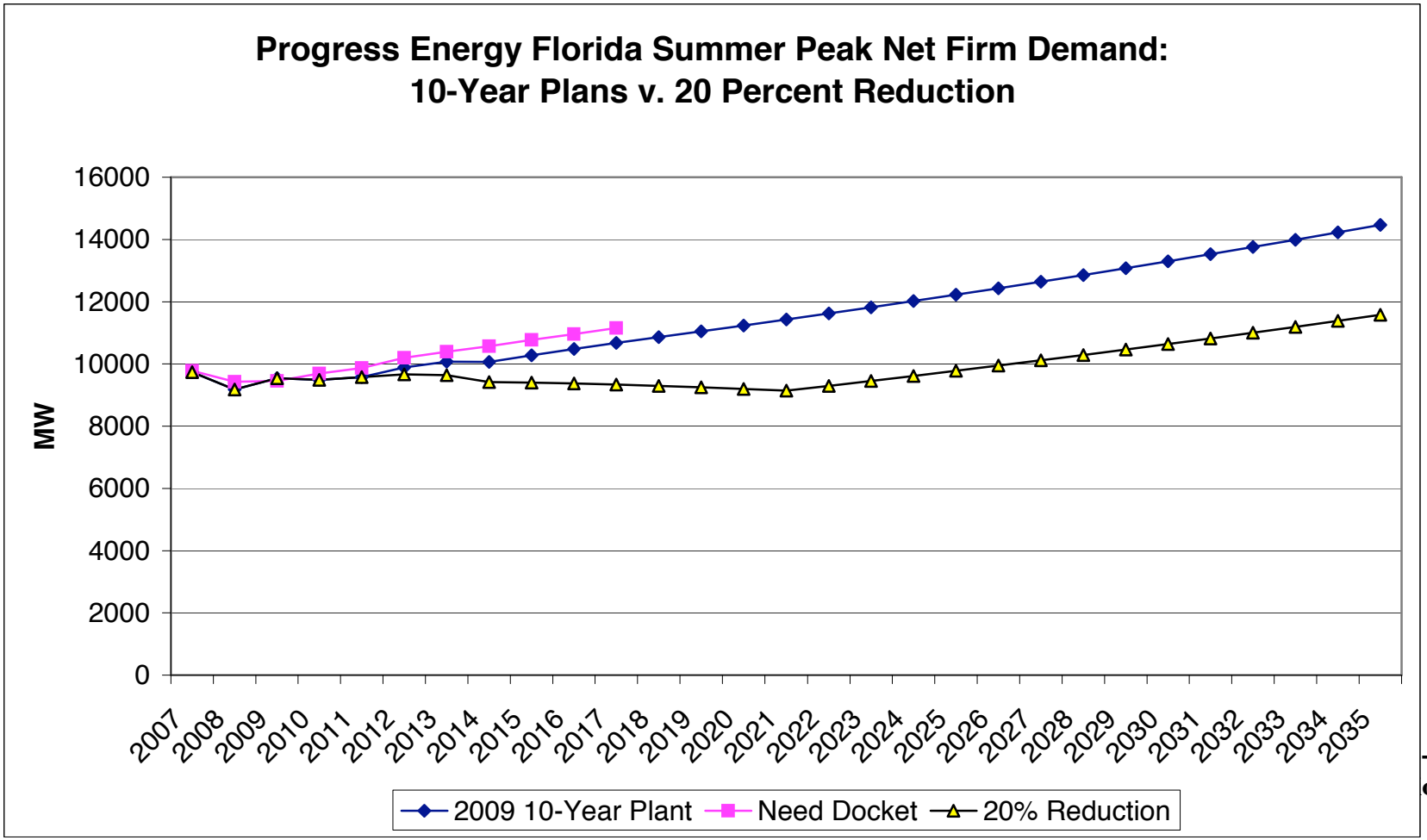
Source: Direct Testimony of Steven R. Sims, Docket No. 090009-EI, SRS-1; linear interpolation of five-year interval data. H.R. 2454 is set at 20% below 2009 Peak Projection

IMPACT OF CLIMATE POLICY ON PEAK LOAD: FPL



Source: Direct Testimony of Steven R. Sims, Docket No. 090009-EI, SRS-1; linear interpolation of five-year interval data. H.R. 2454 is set at 20% below 2009 Peak Projection

IMPACT OF CLIMATE POLICY ON PEAK LOAD: PROGRESS



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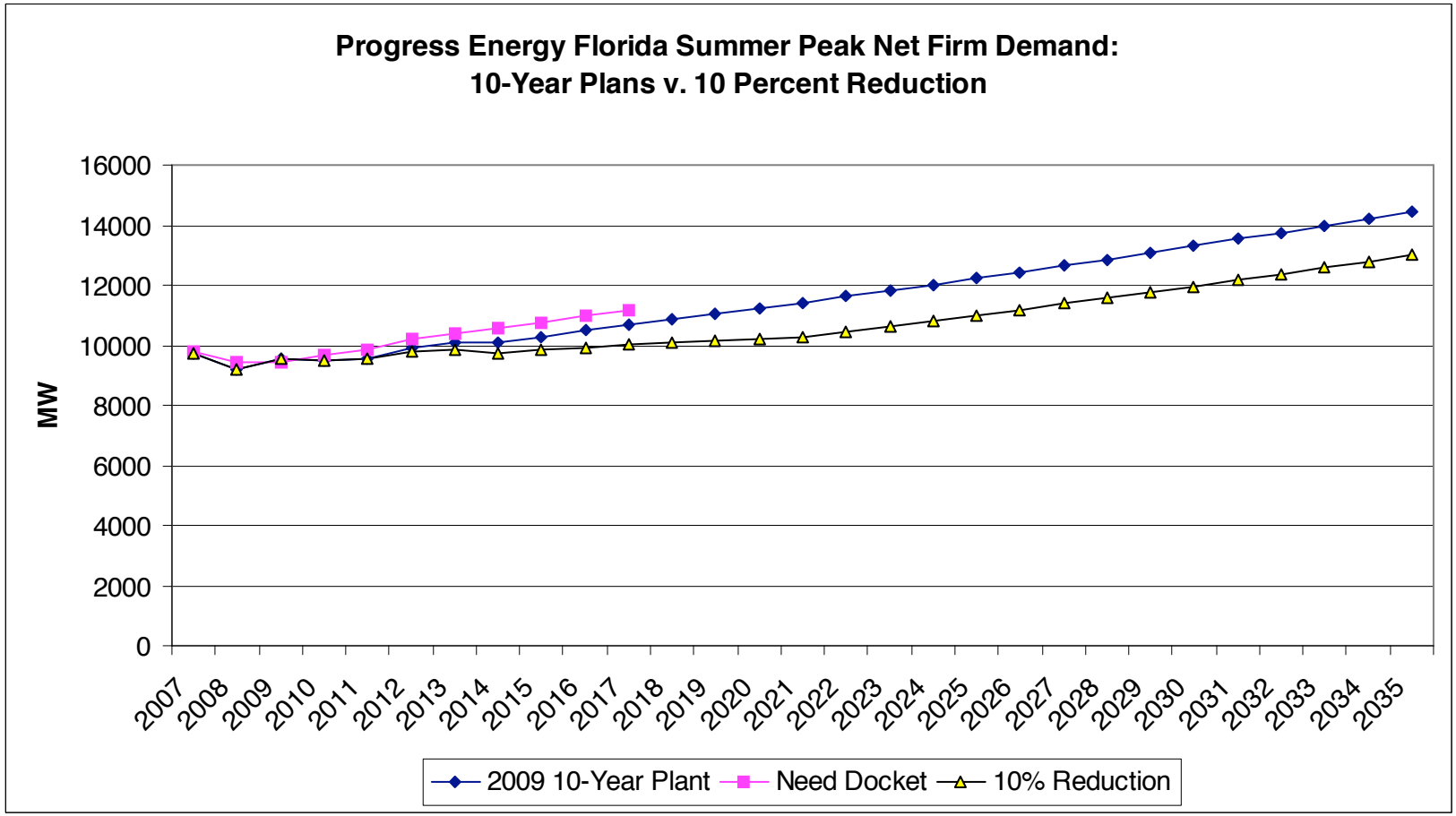
IMPACT OF CLIMATE POLICY ON PEAK LOAD: PROGRESS



Source: 2008 10-year plan, p. 2-7; 2009 10-year plan, p. 2-6.
H.R. 2454 set at 20% of projection

ESTIMATES OF NUCLEAR REACTOR OVERNIGHT, COSTS: 2001-20089
(2008$ derived with the GDP deflator)

Original Estimate	Date of Estimate	Source of Estimate	Overnight Cost kW		
			Low	Mid	High
SAIC	2001	U of C	2300	2300	2300
SAIC	2001	U of C	1840	1840	1840
SAIC	2001	U of C	1570	1570	1570
SAIC	2001	U of C	1295	1295	1295
Scully	2002	U of C	1434	1434	1674
Sandia	2002	U of C	2131	2131	2131
EIA	2003	U of C	215	2015	2217
EIA	2003	U of C	1241	1563	1784
MIT	2003	MIT	1175	2350	
U of C	2004	U of C	1380	1725	2070
TVA	2005	TVA		1853	
CEC	2007	CEC		3021	
Keystone	2007	Keystone	3018		3018
Harding	2007	Harding		3329	
South Texas 3&4	2007	CRS	2931	3214	3754
Turkey Point 3&4	2007	FPL	3179	3678	4644
Calvert 3	2007	CRS		5778	
Levy 1&2	2008	CRS		4260	
Summer 2&3	2008	CRS		4387	
Vogtle	2008	GA PUC		4381	
Callaway 1	2008			4250	
Duke	2008	Lovins		4800	
S&P	2008	S & P		4100	
EIA	2008	EIA		3400	
CRS	2008	CRS		3900	
CBO	2008	CBO		2358	
Lazard	2008	Lazard	3750		5250
Moody's	2008	Moody's		6250	
Severance	2008	Severance	3596	4070	
MIT II	2009	MIT		4092	
Bell Bend	2009	PPL			9375
Harding - Medium	2009	Harding 09	5524	7263	9217
Harding -	2009	Harding	6189	8184	10383

High		09			

ESTIMATES OF NUCLEAR REACTOR OVERNIGHT, COSTS: 2001-20089

Sources: Congressional Budget Office, 2008, *Nuclear Power's Role in Generating Electricity*, May 2008, p.13; Deutch, John, M. et al., 2009, *Update of the MIT 2003 Future of Nuclear Power*, MIT Energy Initiative, 2009; p. 6; Du Yangbo and John E. Parsons, 2009, *Update on the Cost of Nuclear Power, Center* for Energy and Environmental Policy Research, May 2009. Energy Information Administration, 2009, "Electricity Market Module," *Annual Energy Outlook*, March 2009, p. 89. Harding, Jim, 2007, "Economics of Nuclear Power and Proliferation Risks in a Carbon-constrained World," *Public Utilities Fortnightly*, December 2007, p. 71;Harding, Jim, 2009, Economics of Nuclear Reactors and Alternatives, Carnegie/NPEC Conference, February 2009; p. 7; Joskow, Paul, 2006, *Prospects for Nuclear Power a U.S. Perspective*, May 19, 2006; Kaplan, Stan, 2008, *Power Plants: Characteristics and Costs,* Congressional Research Service, November 13, 2008, Appendix B.; Keystone Center, 2007, *Nuclear Power Joint Fact-Finding*, June 2007, p. 42; Joel Klein, 2007,Comparative *Costs of California Central Station Electricity Generation Technologies Cost of Generation Model*, ISO Stakeholders Meeting Interim Capacity Procurement Mechanisms, October 15, 2007, p. 14; Lazard, 2008, *Levelized Cost of Energy Analysis—Version 2.0*, June 2008, p. 10; Lovins Amory, and Imran Shiekh, and Alex Markevich, 2008b, *Nuclear Power: Climate Fix or Folly?,* December 31, 2008, Draft, p. 2; MIT, 2003 *The Future of Nuclear Power*, 2003, p. 42; Moody's, 2008, New Nuclear Generating Capacity: Potential Credit Implications for U.S. Investor Owned Utilities, May 2008, p. 15; Schlissel, David and Bruce Biewald, 2008, *Nuclear Power Plant Construction Costs,* Synapse, July 2008, p. 2; Severance, Craig A. 2009, *Business Risks and Costs of New Nuclear Power*, January 2, 2009; Standard and Poors, 2008b, *Assessing the Credit Risk of Competing Technologies for New U.S. Nuclear Power Plants*, August 13, 2008, p. 11; Tennessee Valley Authority, 2005, ABWR Cost/Schedule/COL Project at TVA's Bellafonte Site, August 2005, p. I-7; University of Chicago, 2004, *The Economic Future of Nuclear Power: A Study Conducted* at the University of Chicago, August 2004.

NUCLEAR OPERATORS, REACTOR CANCELLATIONS AND MOODY'S DOWNGRADES

Operator	Current Operator	Cancelled Plant	Moody's Downgrade	Period	Highest Grade	Lowest Grade	Ranks Moved
Alabama Power & Light		1	1	1975-1987	A2 FMB	Baa3	4
Amerern/Union electric	1						
Indiana Michigan/AEP	1		1	1973-1979	A2 FMB	Baa2	3
Arizona Public Service Co.	1	1	1	1981-1993	A2 FMB	Baa3	4
Baltimore Gas & Electric Co./Constellation	1	1	1	1974-1979	A2 FMB	A2	--
Boston Edison Co.		1					
Carolina Power & Light Co.	1	1					
Central Maine Power		1					
Cincinnati Gas & Electric Co.		1					
Cleveland Electric Illuminating. Co./First Energy	1	1	1	1981-1993	Aa2 FMB	Baa3	7
Commonwealth Edison Co./Exelon	1		1	1968-1990	Aa2 FMB	Baa1	5
Connect. Power & Light		1		1972-1978	Aa2 FMB	A2	3
Consolidated Edison Co.		1	1	1972-1978	A2 FMB	Baa2	3
Consumers Power Co.		1	1	1969-1974	Aaa FMB	Aa2	2
Delmarva Power & Light Co.		1					
Detroit Edison Co.	1	1	1	1985-1992	Baa1 SS	Baa2	1
Duke Power Co.	1	1					
Duquesne Power			1	1974-1988	Aa2 FMB	Baa2	6
Florida Power & Light Co.	1	1	1	1972-1984	Aa2 FMB	A2	3
Florida Power Corp.		1					
Georgia Power Co./Southern Company	1	1	1	1975-1990	Baa2 FMB	Baa2	--
Gulf States Utilities Co./Entergy		1		1980-1988	A2 FMB	Ba3	7

Houston Lighting & Power Co.		1	1	1987-1994	A2 FMB	A3	1
Illinois Power Co/Amergen	1	1	1	1984-1989	A2 FMB	Baa3	4
Iowa Power & Light Co.		1		1973-1977	Aa2 FMB	Baa2	6
Jersey Central Power & Light Co./First Energy		1	1	1968-1980	A2 FMB	Ba2	6
Kansas City G & E				1982-1986	Baa2 FMB	Baa3	1
Long Island Lighting Co.		1	1	1972-1990	Aa2 FMB	B2	12
Metropolitan Edison/Amergen	1		1	1973-1984	A2 FMB	B2	9
Louisiana Power & Light/Entergy	1	1	1	1983-1988	Baa3 FMB	Ba2	2
New England Power Co.		1	1	1971-1992	Aa2 FMB	A1	2
Niagara Mohawk			1	1968-1988	Aaa FMB	Baa2	8
New York State Electric & Gas		1					
Northeast Nuclear Energy Co.		1	1				
Northern Indiana Public Service Co.		1		1973-1985	Aa2 FMB	Baa2	6
Northern States Power Co.		1		1970-1976	Aa2 FMB	Aa2	--
Nuclear Management Company	1						
Ohio Edison Co./First Energy	1	1	1				
Pacific Gas & Electric Co.	1	1	1	1983-1988	A1 FMB	A1	--
Philadelphia Electric Co.		1	1	1973-1991	Aaa FMB	Baa3	9
PPL	1			1982-1986	Aa2 FMB	A2	3
Portland General Electric Co.		1					
Potomac Electric Power Co.		1					
Power Authority of the State of New York		1					
Progress FLA	1			1975-1981	A2 FMB	A2	--
Progress Carolina	1			1970-1987	Aa2 FMB	Baa2	6
Public Service Colorado			1	1976-1990	Aa2 FMB	A3	4
Public Service Co. of New Hampshire		1	1	1980-1991	Baa2 FMB	Caa2	9
Public Service Company of Oklahoma		1					
Public Service Electric & Gas Co.	1	1	1	1973-1987	Aa2 FMB	Aa3	1
Public Service of Indiana		1					
Puerto Rico Water Resources Authority		1					

Puget Sound Power & Light Co.		1	1	1978-1986	Baa2 FMB	A3	2
Rochester Gas & Electric Corp.		1	1	1969-1975	Aa2 FMB	A2	3
San Diego Gas & Electric Co.		1					
SC Electric & Gas			1	1979-1985	A2 FMB	A1	1
Southern Company	1						
Southern California Edison Co.	1	1	1	1979-1985	Aa2 FMB	Aa2	--
System Energy Resources Inc.		1					
Tennessee Valley Authority		1					
TXU	1						
Toledo Edison Co./First Energy	1	1	1				
Union Electric Co.		1	1				
Virginia Electric & Power Co./dominion	1	1	1				
Wisconsin Electric Power Co.		1	1				
Woolf	1						
Total Unique	22	50	35				

Source: Moody's "New Nuclear Generation: Ratings Pressure Increasing," Special Comment, June 2009; pp. 11-12; Cancelled plants are from http://clonemaster.homestead.com/files/cancel.htm; Current owners from http://www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/graphicsandcharts/usnuclearpowerplantownersoperatorsandholdingcompanies/; as Moody's only rated investor owned utility reactors owned or cancelled by rural co-ops of munis are not included.

Docket No. 090009-EI
Exhibit MNC-11
STANDARD AND POOR'S CREDIT PROFILE CONSIDERATIONS

Business risk profile

- New Technology Risk ⇧
- Construction Risk ⇧
- How much risk is mitigated by EPC contract? ⇧⇩
- Nuclear operating exposure will increase ⇧
- Regulatory framework for recovery of investment ⇧

Financial risk Profile

- Debt imputation: 25% for projects vs. 50% for regulated utilities ⇧
- Even with DOE guarantee, debt loads can increase significantly ⇧
- 80/20 vs. 60/40 capital structure ⇧
- Despite DOE guarantee, debt service will be fully accounted for ⇧
- Ability to recover cash return on work in progress ⇩

Source: Dimitri Mikas, "Financing New Nuclear Construction & Implications for Credit Quality," *Is there a Nuclear Renaissance,* p. 20 Standard and Poor's May 28, 2009, arrows point in the direction of the impact on risk

DIVERSITY OF RESOURCE UNDER VARIOUS TECHNOLOGY SCENARIOS

	FPL			PEF		
Resource	No Nuclear % of total	Gas % of total	Efficiency % of total	No Nuclear % of total	Gas % of total	Efficiency % of total
Coal	6.95	6.95	5.91	24	20	20.4
Gas	73.70	70.00	62.65	56	36	47.6
Oil	1.75	1.95	1.49	5	3	4.25
Nuclear	17.30	20.80	14.71	12	38	10.2
Other	0.30	0.30	7.00	3	3	8
Efficiency			8.00			9
HHI	5782	5385	4290	3890	3158	2949

Source: FPL, average of scenarios at FPL Need Study for electrical Power Docket No. 07-0650, p. 117, PEF: Testimony of John Benjamin Crisp, Docket No. 080148-EI, JBC-8, page 1 of 1;

Docket No. 090009-EI
Exhibit MNC-13
Page 1 of 1

THE $1/KW COST FACTOR

Total Cost Diff. 2007	Break Even Cost 2007	Implicit $1/kW Factor 2007	Total Cost Diff. 2009	Break Even Cost 2009	Implicit $1/kW Factor 2009	2009 Breakeven @2007 Factor	Factor Change as % of Break even change
6325	3206	1.972863	9909	5234	1.893198	5022.649	10.42165
8965	4543	1.973366	11943	6308	1.89331	6052.097	14.49876
9994	5065	1.973149	12892	6810	1.893098	6533.718	15.83277
10512	5327	1.973343	14352	7581	1.893154	7272.936	13.66743
11207	5680	1.973063	15334	8099	1.89332	7771.671	13.53157
12148	6157	1.973039	13981	7385	1.893162	7086.024	24.3466
13222	6701	1.973138	14965	7905	1.893106	7584.364	26.63087
13711	6949	1.97309	16377	8650	1.893295	8300.18	20.56553
14367	7281	1.973218	17415	9199	1.893141	8825.685	19.46377

Source: Testimony of Steven R. Sims, Docket No. 070650-EI, Exhibits SRS-7 and SRS-8; Direct Testimony of Steven R. Sims, Docket No. 090009-EI, Table 45

Docket No. 090009-EI
Exhibit MNC-14
Page 1 of 1

THE NARROW MARGIN IN FPL'S BREAKEVEN ANALYSIS

Nuclear w/o Capital	Capital Cost (Case A)	No Nuclear Gas	Nuclear advantage % of Gas
122528	131940	132437	0.4
143521	152933	155464	1.6
153171	162583	166063	2.1
168265	177677	182617	2.7
164719	174131	190583	8.6
175249	184661	178700	-3.3
174367	183779	189332	2.9
189638	199050	206015	3.4
196670	206082	214085	3.7

Source: Direct Testimony of Steven R. Sims, Docket No. 090009-EI, Table 45; Capital costs calculated as Case A multiplied by $1/kW cost factor.

APPENDIX A
CV OF DR. MARK COOPER WITH ENERGY RELATED ACTIVITIES

MARK N. COOPER

504 HIGHGATE TERRACE

SILVER SPRING, MD 20904

(301) 384-2204

markcooper@aol.com

EDUCATION:

Yale University, Ph.D., 1978, Sociology

University of Maryland, M.A., 1974, Sociology

City College of New York, B.A., 1968, English

PROFESSIONAL EXPERIENCE:

President, Citizens Research, 1983 - present

Senior Fellow for Economic Analysis, Institute for Energy and the Environment, Vermont Law School - Present

Research Director, Consumer Federation of America, 1983 - present

Fellow, Stanford Center on Internet and Society, 2000 - Present

Fellow, Donald McGannon Communications Research Center, Fordham University, 200 5-present

Director, Digital Society Project, Consumer Federation of America, 2002 - Present

Associated Fellow, Columbia Institute on Tele-Information, 2003-2006

Principle Investigator, Consumer Energy Council of America, Electricity Forum, 1985-1994

Director of Energy, Consumer Federation of America, 1984-1986

Director of Research, Consumer Energy Council of America, 1980-1983

Consultant, Office of Policy Planning and Evaluation, Food and Nutrition Service, United States Department of Agriculture, 1981-1984

Consultant, Advanced Technology, Inc., 1981

Technical Manager, Economic Analysis and Social Experimentation Division, Applied Management Sciences, 1979

Research Associate, American Research Center in Egypt, 1976-1977

Research Fellow, American University in Cairo, 1976

Staff Associate, Checchi and Company, Washington, D.C., 1974-1976

Consultant, Division of Architectural Research, National Bureau of Standards, 1974

Consultant, Voice of America, 1974

Research Assistant, University of Maryland, 1972-1974

TEACHING EXPERIENCE:

Lecturer, Washington College of Law, American University, Spring, 1984 - 1986, Seminar in Public Utility Regulation

Guest Lecturer, University of Maryland, 1981-82, Energy and the Consumer, American University, 1982, Energy Policy Analysis

Assistant Professor, Northeastern University, Department of Sociology, 1978-1979, Sociology of Business and Industry, Political Economy of Underdevelopment, Introductory Sociology, Contemporary Sociological Theory; College of Business Administration, 1979, Business and Society

Assistant Instructor, Yale University, Department of Sociology, 1977, Class, Status and Power

Teaching Assistant, Yale University, Department of Sociology, 1975-1976, Methods of Sociological Research, The Individual and Society

Instructor, University of Maryland, Department of Sociology, 1974, Social Change and Modernization, Ethnic Minorities

Instructor, U.S. Army Interrogator/Linguist Training School, Fort Hood, Texas, 1970-1971

PROFESSIONAL ACTIVITIES:

Member, Advisory Committee on Appliance Efficiency Standards, U.S. Department of Energy, 1996 - 1998

Member, Energy Conservation Advisory Panel, Office of Technology Assessment, 1990-1991

Fellow, Council on Economic Regulation, 1989-1990

Member, Increased Competition in the Electric Power Industry Advisory Panel, Office of Technology Assessment, 1989

Participant, National Regulatory Conference, The Duty to Serve in a Changing Regulatory Environment, William and Mary, May 26, 1988

Member, Subcommittee on Finance, Tennessee Valley Authority Advisory Panel of the Southern States Energy Board, 1986-1987

Member, Electric Utility Generation Technology Advisory Panel, Office of Technology Assessment, 1984 - 1985

Member, Natural Gas Availability Advisor Panel, Office of Technology Assessment, 1983-1984

Participant, Workshop on Energy and the Consumer, University of Virginia, November 1983

Participant, Workshop on Unconventional Natural Gas, Office of Technology Assessment, July 1983

Participant, Seminar on Alaskan Oil Exports, Congressional Research Service, June 1983

Member, Thermal Insulation Subcommittee, National Institute of Building Sciences, 1981-1982

Round Table Discussion Leader, The Energy Situation: An Open Field For Sociological Analysis, 51st Annual Meeting of the Eastern Sociological Society, New York, March, 1981

Member, Building Energy Performance Standards Project Committee, Implementation Regulations Subcommittee, National Institute of Building Sciences, 1980-1981

Participant, Summer Study on Energy Efficient Buildings, American Council for an Energy Efficient Economy, August 1980

Member, University Committee on International Student Policy, Northeastern University, 1978-1979

Chairman, Session on Dissent and Societal Reaction, 45th Annual Meeting of the Eastern Sociological Society, April, 1975

Member, Papers Committee, 45th Annual Meeting of the Eastern Sociological Society, 1975

Student Representative, Programs, Curricula and Courses Committee, Division of Behavioral and Social Sciences, University of Maryland, 1973-1974

President, Graduate Student Organization, Department of Sociology, University of Maryland, 1973-1974

HONORS AND AWARDS:

American Sociological Association, Travel Grant, Uppsala, Sweden, 1978

Fulbright-Hayes Doctoral Research Abroad Fellowship, Egypt, 1976-1977

Council on West European Studies Fellowship, University of Grenoble, France, 1975

Yale University Fellowship, 1974-1978

Alpha Kappa Delta, Sociological Honorary Society, 1973

Phi Delta Kappa, International Honorary Society, 1973

Graduate Student Paper Award, District of Columbia Sociological Society, 1973

Science Fiction Short Story Award, University of Maryland, 1973

Maxwell D. Taylor Award for Academic Excellence, Arabic, United States Defense Language Institute, 1971

Theodore Goodman Memorial Award for Creative Writing, City College of New York, 1968

New York State Regents Scholarship, 1963-1968

National Merit Scholarship, Honorable Mention, 1963

PUBLICATIONS:

ENERGY

Books and Chapters

"Recognizing the Limits of Markets, Rediscovering Public Interest in Utilities," in Robert E. Willett (ed), Electric and Natural Gas Business: Understanding It! (2003 and Beyond) (Houston: Financial Communications: 2003)

"Protecting the Public Interest in the Transition to Competition in New York Industries," The Electric Utility Industry in Transition (Public Utilities Reports, Inc. & the New York State Energy Research and Development Authority, 1994)

"The Seven Percent Solution: Energy Prices, Energy Policy and the Economic Collapse of the 1970s," in Energy Concerns and American Families in the 1980s (Washington, D.C.: The American Association of University Women Educational Foundation, 1983)

"Natural Gas Policy Analysis," in Edward Mitchell (Ed.), Natural Gas Pricing Policy (Washington, D.C.: American Enterprise Institute, 1983)

Equity and Energy: Rising Energy Prices and the Living Standard of Lower Income Americans (Boulder, Colorado: Westview Press, 1983)

Articles and Papers:

"The Failure of Federal Authorities to Protect American Energy Consumers From Market Power and Other Abusive Practices," *Loyola Consumer Law Review,* 19:4 (2007)

"Too Much Deregulation or Not Enough," *Natural Gas and Electricity*, June 2005

"Real Energy Crisis is $200 Billion Natural Gas Price Increase," Natural Gas and Electricity, August 2004

"Regulators Should Regain Control to Prevent Abuses During Scarcity," Natural Gas, August 2003

"Economics of Power: Heading for the Exits, Deregulated Electricity Markets Not Working Well," *Natural Gas*, 19:5, December 2002

"Let's Go Back," Public Power, November-December 2002

"Conceptualizing and Measuring the Burden of High Energy Prices," in Hans Landsberg (Ed.), High Energy Costs: Assessing the Burden (Washington, D.C.: Resources For the Future, 1982)

"Energy Efficiency Investments in Single Family Residences: A Conceptualization of Market Inhibitors," in Jeffrey Harris and Jack Hollander (Eds.), Improving Energy Efficiency in Buildings: Progress and Problems (American Council for An Energy Efficient Economy, 1982)

"Policy Packaging for Energy Conservation: Creating and Assessing Policy Packages," in Jeffrey Harris and Jack Hollander (Eds.), Improving Energy Efficiency in Buildings: Progress and Problems (American Council for An Energy Efficient Economy, 1982)

"The Role of Consumer Assurance in the Adoption of Solar Technologies," International Conference on Consumer Behavior and Energy Policy, August, 1982

"Energy and the Poor," Third International Forum on the Human Side of Energy, August, 1982

"Energy Price Policy and the Elderly," Annual Conference, National Council on the Aging, April, 1982

"Energy and Jobs: The Conservation Path to Fuller Employment," Conference on Energy and Jobs conducted by the Industrial Union Department of the AFL-CIO, May 1980

Research Reports

A Consumer Analysis of the Adoption of the California Clean Cars Program in Other States: Florida, Consumer Federation of America, November 2008

Climate Change and the Electricity Consumer: Background Analysis to Support a Policy Dialogue, Consumer Federation of America, June 2008

Ending America's Oil Addiction: A Quarterly Report on Consumption, Prices and Imports, Consumer Federation of America, April 2008

A Consumer Analysis of the Adoption of the California Clean Cars Program in Other States: Arizona, Consumer Federation of America, March 2008

A Step Toward A Brighter Energy Future, Consumer Federation of America, December 2007

A Consumer Analysis of the Adoption of the California Clean Cars Program in Other States: New Mexico, Consumer Federation of America, November 2007

Not time to Waste: America's Energy Situation Is Dangerous, But Congress Can Adopt New Policies to Secure Our Future, Consumer Federation of America, October 2007

Technology, Cost and Timing, Consumer Federation of America, July 2007

Florida's Stake in the Fuel Economy Battle, July 2007

Big Oil v. Ethanol, Consumer Federation of America, July 2007

Too Little, Too Late: Why the Auto Industry Proposal To Go Low and Slow on Fuel Economy Improvements Is Not in the Consumer or National Interest, Consumer Federation of America, July 2007

The Senate Commerce Committee Bill Is Much Better For Consumers and The Nation Than the Automobile Industry Proposal, Consumer Federation of America, June 2007

Rural Households Benefit More From Increases In Fuel Economy, Consumer Federation of America, June 207

A Consumer Pocketbook And National Cost-Benefit Analysis of "10 in10", Consumer Federation of America, June 2007

Time to Change the Record on Oil Policy, Consumer Federation of America, August 2006

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