ISSUE BRIEF

ADVANCED COST RECOVERY FOR NUCLEAR REACTORS
A BAD IDEA THAT GETS WORSE BY THE MINUTE

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March 2011

Reconsidering Advanced Cost Recovery

Before the dramatic nuclear incident in Fukushima Japan, the high cost and large capital expenditures associated with the construction of nuclear reactors in the U.S. had made the technology vastly more expensive and risky than alternative approaches to meeting the need for electricity in the United States. For these and other reasons, capital markets have rejected nuclear reactor construction. Recognizing that they cannot raise sufficient funds in capital markets to build new reactors, nuclear utilities have demanded massive subsidies in the form of loan guarantees from U.S. taxpayers and advanced cost recovery from ratepayers.

Imposing rate increases on ratepayers years, or even decades before reactors produce power and guaranteeing that the costs incurred in attempting to construct a new nuclear reactor are paid in full, even if the reactors project is cancelled or abandoned, shifts the risk of nuclear construction onto ratepayers and discriminates against alternative technologies and non-utility developers. This paper explains why, from the consumer and economic points of view, advanced cost recovery for nuclear reactors was a bad idea before the dramatic nuclear accident at Fukushima from the consumer and economic points of view. If it was a bad idea before the accident, after the idea it is a worse idea..

After a nuclear accident, regulators would be foolish not to re-examine safety. When they do, they are likely to conclude that

- more safety measures are necessary, which requires more resources to be expended,
- the construction period, which is a key determinant of costs, will be lengthened, and
- retrofits of existing plants may be required.

After a nuclear accident, policymakers would be irresponsible not to re-examine energy policy. They should focus on

- a re-assessment of standards of care and safety including,
- a re-evaluation of the process by which standards are set and nuclear projects reviewed,
- a re-examination of the weighting of societal costs and benefits of all available options, and
- consideration of the value of gathering more information before committing substantial resources that are locked in.

After a nuclear accident, rational financial analysts would be irresponsible not to re-examine the economics of nuclear reactors. Capital markets are likely to increase the cost of capital for nuclear reactor construction because reactors will be

- viewed as more difficult to complete,
- become less attractive compared to alternative options, and
- seen as imposing more financial risk on utilities.

Thus, if regulators, policymakers and financial analysts do what they are supposed to, nuclear reactor construction will be much more costly and much less inviting as a policy option. This re-evaluation will have a particularly negative effect on ratepayers who are bearing the burden of advanced cost recovery because

- increasing the construction period means utilities hold ratepayer money longer before delivering any value,
- ratepayers have the most to lose when utilities chose to develop nuclear reactors instead of lower cost resources, especially as nuclear costs rise, and
- ratepayers are likely to bear the greatest burden when projects are abandoned.

Outline

Section I of the paper describes how advanced cost recovery undermines the fundamental consumer protection in electricity markets.

Section II describes the harm that advanced cost recovery can do in qualitative terms and evaluates the pending legislation in Iowa.

Section III presents a discussion of the harm that advanced cost recovery does to ratepayers. The precise impact of advanced cost recovery will depend on the terms of the specific statute that authorizes it and the nature of the project that is covered. To illustrate the impact on rates, Section II uses examples from the Southeast, where ratepayers in four states are currently bearing the burden of advanced cost recovery. To illustrate longer term impacts on utility resource decisions, national estimates of the cost of alternatives are reviewed.

II. Consumer Protection and Utility Ratemaking

In order to analyze the impact of advanced cost recovery, we begin by describing traditional ratemaking as the basis of consumer protection for ratepayers of monopoly regulated utilities. Regulated monopoly is the dominant approach to electricity in the U.S. It is the approach in Iowa. We then describe the ways in which advanced cost recovery alters consumer protections.

Consumer Protection Fundamentals

Because electric utility service has long been viewed as a natural monopoly, it has been subject to public utility regulation. Since the delivery of service to consumers is not a competitive activity, consumers must be protected from the natural tendency of service providers to charge whatever the market will bear or provide poor service. Thus, public utility ratemaking is fundamentally consumer protection. In order to understand the issues in the advanced cost recovery debate, it is necessary to review several of the key principles of consumer protection that guide public utility commissions.

Used and Useful

In traditional utility rate making, the utility makes all the investment in the plant necessary to bring it on line with shareholder resources. When the plant is ready to go on line, the utility seeks to put it into rate base. Only when the plant is ready to deliver electricity is it considered to be "used and useful" to the captive customers of the utility. In a general rate case, the utility will seek to charge ratepayer for the sum it has invested in the plant, as well as recover the operating (variable) costs of generating power. The sum invested is also allowed to earn a return on capital during the construction phase, which is typically entered into a separate account (allowance for funds used during construction, AFUDC). The rates charged to consumers also include depreciation of the plant as it is produces electricity, which returns the capital investment to the utility. Thus the utility gets a return of and on its capital while the plant is operating.

This pattern of cost recovery reflects what would happen in a competitive market, which is why it is used as a ratemaking standard. When a product is sold to the consumer, the consumer has the immediate use of the product and the price includes only a normal return on investment (if the market is competitive). Suppliers who are inefficient and have costs above the market price, will not be able to recover those costs from consumers, who would not purchase the overpriced product because they would have lower cost options in the market place. The supplier's inefficiency will come out of the supplier's pocket in the form of a lower rate of return earned on the investment.

Just, Reasonable and Prudent

The task of public utility commissions is generally to ensure that the utility delivers the least cost power, subject to the need for reliability (and other) considerations. The public utility commission will consider whether the costs the utility seeks to recover from ratepayers are "just, reasonable and prudent." The commission oversees the decision about which technologies to use and which costs utilities are allowed to recover. Even where the construction of new facilities takes place within the parameters of an Integrated Resource Plan, which is a long term energy plan, the fact that the utility has been told or allowed to build a certain type of plant does not alter the fact that the costs cannot be recovered from ratepayers until the plant is used and useful and the cost (including the return on investment) are found to be just, reasonable and prudent.

One of the focal points of the analysis of just and reasonable rates is the rate of return utilities earn on their investment in equipment. In the marketplace, producers earn a return that is

commensurate with the risk of the investment. The higher the risk, the higher the return. Public utility commissions tend to look to companies in the competitive marketplace as the benchmark for setting the rate of return the utility is allowed to earn. If the seller has chosen a technology that is very risky and tries to recover a higher rate of return, when others have chosen less risky approach, the higher cost supplies will not be able to recover the costs.

These two principles of utility regulation protect consumers from different potential abuses. Used and useful ensures that ratepayers receive service in exchange for the recovery of costs, while prudence ensures that the costs recovered are not excessive. If projects are cancelled or abandoned they do not become used and useful and their costs would not normally be recovered in the marketplace (except if all sellers suffer similar problems, in which case all sellers in the market will put their prices up to cover the costs). However, utilities may recover the costs associated with abandoned projects, if they can show that the decision to commence the project was prudent and the causes of the termination of the project were not imprudence on the part of the utility.

Advanced Cost Recovery Alters the Relationship between the Utility and the Ratepayer

Allowing utilities advanced cost recovery dramatically alters the aforementioned consumer protection process in a number of ways. The utility gets to charge ratepayers before the plant is used and useful. In some cases the utilities demand "guaranteed" recovery of costs. Even when cost are not officially guaranteed, once the costs are pre-approved, the Commission is less likely review the prudence of actual costs and utilities will argue that overruns were unavoidable. The prudence review may be less rigorous (e.g. no review of individual cost elements). Advanced cost recovery becomes particularly troublesome when the reactor is not completed (abandoned). The consideration of abandoned costs under CWIP is likely to be much less rigorous.

There are numerous details that come into play in the push to reduce consumer protection by allowing advanced cost recovery. What changes in the regulatory oversight of costs are made? What types of costs are recoverable? How are they reviewed? Under what conditions are the costs recovered?

Because the underlying public utility regulation may be different between the states and the changes in that state's public utility statute are crafted to redefine the basic concepts of public utility rate making, comparing advanced cost recovery policies across states is extremely difficult. There are a number of factors that vary from state to state and the description of how each factor is defined is totally unstandardized. Moreover, the meaning of the statutes and any changes therein would be subject to interpretation and dispute. Regardless of the details, the fundamental point is that advanced cost recovery is a radical departure from normal utility practice that dramatically alters the relationship between the utility and the ratepayer and abandons the logical tie between utility regulation and normal marketplace dynamics. It is important to keep the difference between "used and useful" and "prudence" in mind, as suggested by Table 1 and the discussion above.

TABLE 1: REGULATORY PRINCIPLES

		Prudence Review	
		Weak	Strong
Used & Useful	No	I Pre-approval	II Rolling Review
	Yes	III Partial Review	IV Traditional Consumer Protection

- In Cell I are some approaches to advanced cost recovery that allow utilities to collect costs as they are incurred once a plan is certified, without any subsequent commission oversight.
- In Cell II are rolling reviews to approve costs as they are incurred, but before the plant becomes used and useful.
- Cell III involves review of costs when the plant becomes used and useful, but subject to weaker standards than are normally applied. For example, the review might only cover the total authorized amount but preclude review of actual costs incurred.
- Cell IV is the traditional approach to consumer protection where costs are recovered when used and useful occurs and is subject to full prudence review.

These different approaches to consumer protection in cost recovery can be applied to the full range of costs that are incurred in the process of providing power. There are several different aspects of cost that legislatures have treated differently in the recent advanced cost recovery legislation.

Development costs (including predevelopment costs) are generally costs incurred in the process of getting a license, preparing a design, etc. The primary costs on which all CWIP policies focus most attention are the construction costs, which can be handled differently depending on whether the plant is completed or not. There may also be stranded costs created when a nuclear reactor comes online and displaces an existing plant that was used and useful. Stranded costs can be handled in a variety of ways. For example, when a plant is removed from service, the capital costs that have not yet been recovered through depreciation can be recovered over a short period of time.

Costs can be recovered in different ways. Costs may be allowed, allowed in part or disallowed. They can be expensed, which means they are passed through to consumers on a dollar for dollar basis in the year in which they are incurred. They can be treated as capital, in which case they are depreciated over time. The length of time can be accelerated or lengthened, i.e. shorter or longer compared to routine practice.

The rate of return on capital can vary. Investments can receive a normal rate of return, a

reduced rate of return or an incentive return above the normal. Special treatment can be afforded to certain categories. For example, capital costs associated with abandoned projects might not be allowed a return.

II. THE HARMFUL EFFECTS OF ADVANCE COST RECOVERY

Advanced cost recovery imposes two important types of cost on ratepayers – rate increases that result from the advanced recovery of nuclear reactor costs, long term cost increases that result from the decision to choose the wrong technologies and imposes a number of burdens on and risks on ratepayers. Table 2 summarizes the harms to which advanced cost recovery exposes ratepayers.

Table 2: Threats to Ratepayers From Advanced Cost Recovery

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

The most obvious ones that affect rates directly include:

- The loss of the use of their money and high rates.
- Subsidies induce the utility to undertake risky behaviors that they would not otherwise have engaged in. When those undertakings go bad, the costs of the failures will be borne by ratepayers in the form of expenditures on facilities that do not produce a flow of goods and services.
- The pre-approval process for federal loan guarantees and/or advanced cost recovery reduces scrutiny over cost escalation and overruns, ratepayers will end up paying a higher price than anticipated for the facility. Utilities steadfastly resist proposals to protect ratepayers from the risk of cost overruns.
- Even with subsidies, these projects are so risky and large that they tend to have adverse impacts on the utility's financial rating, which results in substantial increases in the cost of service.

The indirect effects may even be greater: alternatives become a threat to the large facilities because reductions in demand for large central station facilities, like nuclear reactors, raise questions about the need for large additions to supply.

- As a result the commitment to nuclear reactors and central station facilities crowds out deployment of alternatives.[1]

[1] Cooper, Mark. *Policy Challenges of Nuclear Reactor Construction: Cost Escalation and Crowding Out*, Vermont Law

- The size of nuclear projects is so large that financial and managerial resources are always constrained and choices are biased in favor nuclear reactors.
- The nuclear industry opposes legislation that seeks to promote alternatives. They manipulate tariffs and power purchasing authority to undermine the alternatives and put extremely high price estimates on alternatives like efficiency, while low-balling the cost of new nuclear reactors.

The Iowa Legislation

The bills moving through the Iowa legislature are among the most aggressive in removing consumer protection as any in the nation.

- The rolling review applies to all costs associated with development and construction,
- with annual true ups that appear to escape prudence review.
- The return on equity cannot be adjusted for the shifting of risk to ratepayers.
- There is guaranteed recovery of all costs of an abandoned plant and stranded costs for facilities displaced by the nuclear reactor at a full rate of return.
- All advanced costs recovered from ratepayers are excluded from the possibility of refunds that might result from a court case.
- It excuses the utility from showing that it "has considered other source for long-term electricity supply," of that the nuclear reactor is "reasonable when compared to other feasible alternative sources of supply," While it applies such language to all other feasible alternative sources of supply.
- Language that would have allowed alternatives other than nuclear to be selected on the basis of competitive bidding was stricken from the Senate versions.

Nuclear reactors would be excused from the used and useful standard and the least cost principle, while prudence reviews will be rolling and partial at best because they are based on rolling, forward looking analysis and preclude or discourage backward looking examination of actual utility behavior. The approach is an open invitation to cost overruns and the utility is on record as opposing mechanisms that would protect ratepayers from overruns.

Between the relaxed regulation of nuclear costs, the guaranteed recovery ofabandonment and stranded costs, and the disadvantage at which alternative resources are placed, ratepayers in Iowa are certain to have higher electricity bills as a result of this legislation that they would have if it is not enacted.

III. QUANTITATIVE EVIDENCE ON THE BURDEN OF NUCLEAR REACTORS

School, September 10, 2010. http://www.vermontlaw.edu/Documents/IEE/20100909_cooperStudy.pdf.

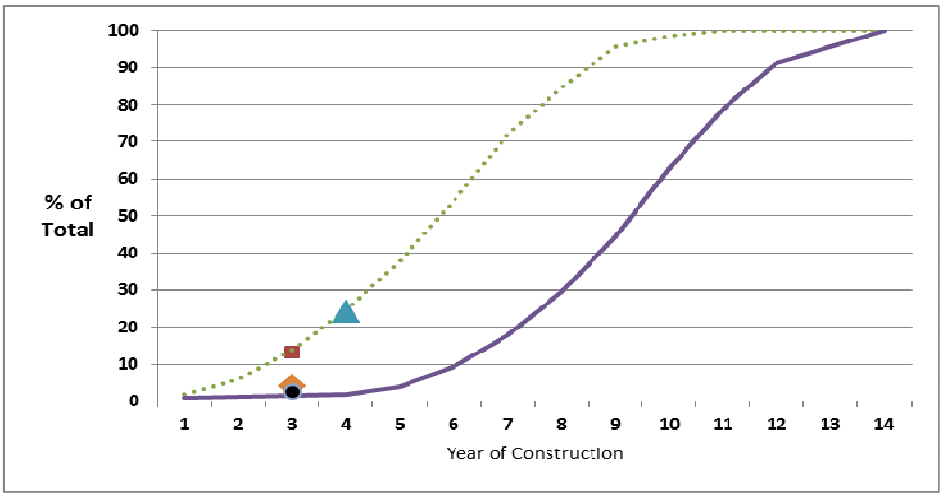
As noted earlier, the specific impact of advanced cost recovery will depend on the underlying statute and the changes to it, the type of nuclear reactor the utility chooses to build, and the alternatives foregone in favor of pursuing the nuclear project. The process of collecting costs before reactors become used and useful has advanced farther in the Southeast than anywhere else in the nation. Five nuclear construction projects involving ten reactors have already collected hundreds of millions from ratepayers. What they are collecting today is only the tip of the iceberg. What they expect to collect in the near future is of equal importance, and what they will collect in the long-term is of even greater importance.

Nuclear Rate Shock

Delay

Since the timing of cost recovery is the core issue in advanced cost recovery, delay in bringing reactors online is important issue. Four of the five projects have fallen behind their originally announced schedules, but they all are collecting or seeking to collect costs in advance. When utilities fall behind schedule, the consumer receives nothing in return for the money for a longer period of time. Figure 1 highlights the problem of delay. It shows the cumulative percentage

Figure 1: Construction Cost Schedules for Southeast Reactors



Summer; Levy Delayed; Lee; Vogtle ; Turkey Point Original; Delayed

Sources: FPL, Exhibit SRS-5, Page 1 of 1, Docket No. 10009-EI; Progress Energy Florida's Supplemental Response to Citizen's Third Set of Interrogatories to Progress Energy Florida (No. 47) Docket No. 100009-EI, Submitted July 7, 2010; Georgia Public Service Commission, "Bill Analysis Sheet: Georgia Nuclear Energy Financing Act, SB 31, As Passed Senate" (1/21/2009). SCE&G Combined Application, Exhibit F9 Public) Docket No. 2008-196-E – Order No 2009-104, February 27, 2009.

of the total construction costs that will be incurred in each year of the construction schedule. It shows the pattern of cost recovery as originally specified and later delayed by one utility – FPL for

its Turkey Point reactors. The pattern of delay is similar for Levy, although the construction schedules are proprietary. Four of the five projects are likely to unfold on the delayed schedule, meaning that the utilities will hold ratepayer funds for at least a decade before the reactors produce any power. Only Vogtle is "on schedule," although it is only in the site preparation phase.

Rate Increases

Figure 2 presents two estimates of rate increases put forward by utilities. The top figure shows projected rate increases for South Carolina in cents per kilowatt hour. Rates start and cents and increase by almost two cents before power is generated from the new reactors. The increase mounts to 3.2 cents before the two reactors begin to generate some fuel cost savings. With rates having mounted to over 11.5 cents, the initial fuel cost savings are minuscule, less that one-tenth of a penny. The utility has delayed it online date, but is still collecting advanced cost recoervy from consumers.

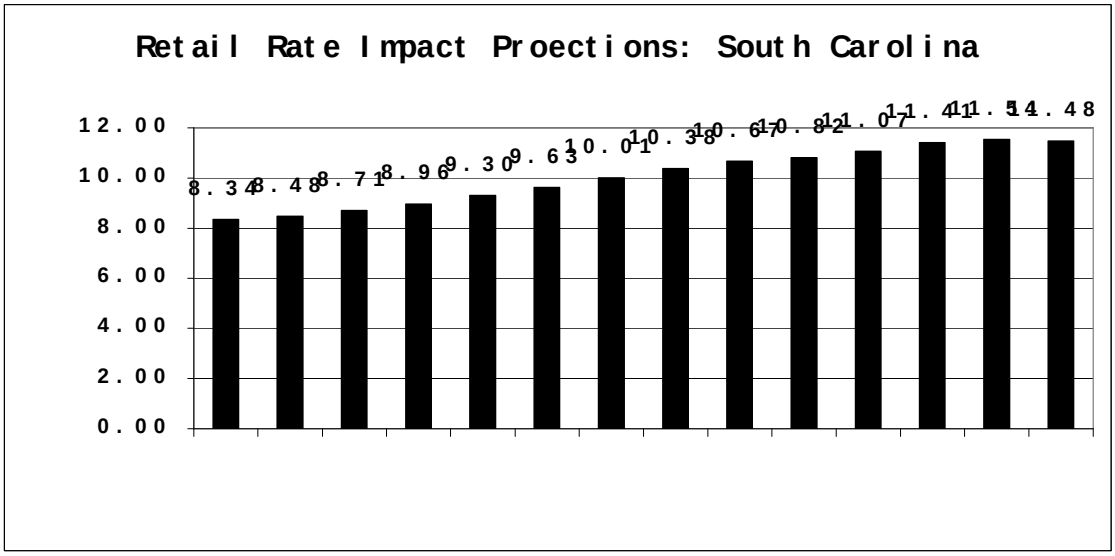
The bottom section of Exhibit 1 presents the recent estimate of the monthly bill cost of nuclear reactors for a typical customer in the Southeast (1,000/kwh) offered by progress energy. The sum would mount from a few dollars to over $50 per a month before any power from the reactors is delivered to the grid. Before both units are used and useful the monthly cost would be almost $68 dollars.

This estimate of rate impacts in the bottom figure reveals more than just the magnitude of the increase. The bottom line which shows fuel cost savings identifies when the reactor will come online. The first reactor produces power in 2021, five years after it was originally scheduled. Although the table does not show earlier years, the consumers will have been paying for the reactor for a decade before it produces any power. Note that in the year when both units are fully used and useful, the fuel savings is about one third of the cost of the reactor.

The top graph implies a rate increase of $32 per 1000 kwh, which is a little less than half of the rate increase in the bottom graph. The reason is that that the utility in the top graph projected a total cost that was about half, before any delays, of the total cost used by the utility in the bottom graph, with delays. Either way, the increase in large and advanced cost recovery cannot be said to avoid rate shock.

Given the pattern of cost recovery, consumers will not break even for decades, if ever. Under current conditions, it is highly unlikely that they will never break even. When consumers are forced to pay for reactors before they are used and useful, they lose the use of their money. The harm imposed by this loss of value depends on how much the consumer could have made if the funds had been invested, or how much the consumer must pay, if the funds must be borrowed to pay the bill. For example, the average monthly bill shown in the bottom graphs before the reactors become fully used and useful is $31 without taking the time value of money into account. If the consumer must increase his or her credit card debt, the value of the lost use of the money would increase to $53.

Figure 2: Rate Impacts of Advanced Cost Recovery



SCE&G Combined Application, Exhibit M, page 2 of 2

Levy Estimated Residential Rate Impacts ($/1000 KWH)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Est. NCRC Rate	7.98	23.78	6.51	13.70	21.47	29.35	38.47	43.42	25.69	18.47	0.94	-
Est. Base Rate (Note 1)	-	-	3.14	3.14	4.58	5.10	5.40	5.87	28.70	46.06	67.71	67.71
Est. Rate Impact of Levy Capital Additions	**7.98**	**23.78**	**9.65**	**16.85**	**26.05**	**34.45**	**43.87**	**49.29**	**54.39**	**64.53**	**68.65**	**67.71**
Est. Fuel Savings Rate Impact (Note 2)	-	-	-	-	-	-	-	-	**(7.45)**	**(13.84)**	**(26.69)**	**(26.85)**

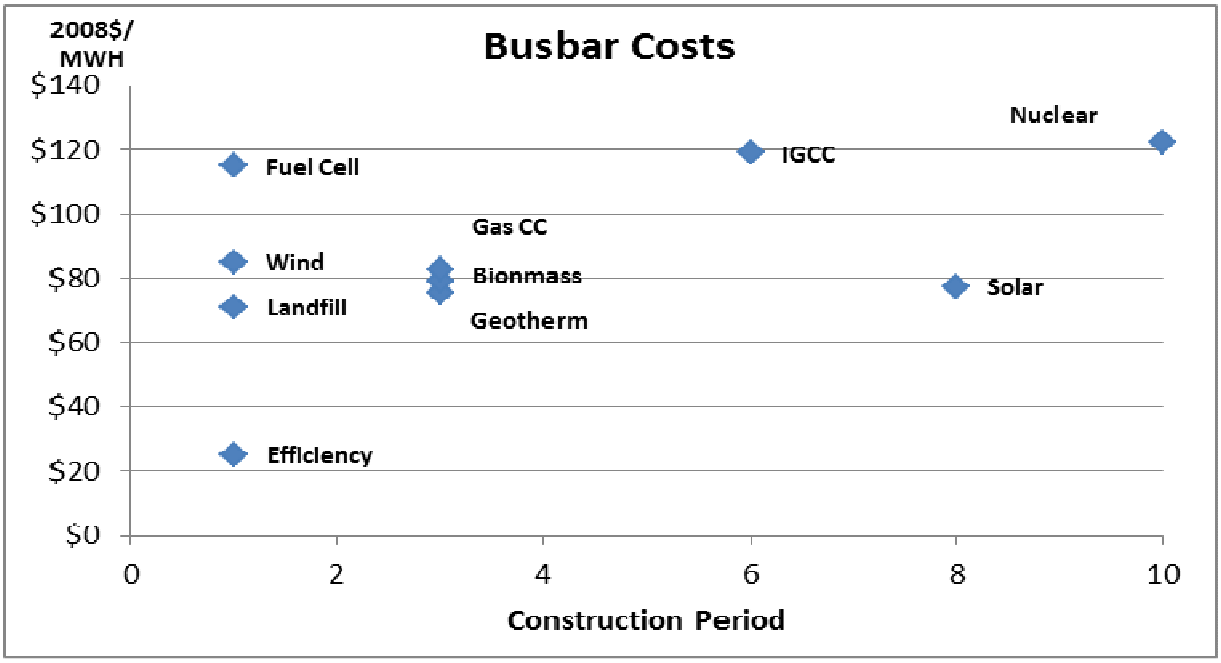
Progress Energy Florida's Supplemental Response to Citizen's Third Set of Interrogatories to Progress Energy Florida (No. 47) Docket No. 100009-EI, Submitted July 7, 2010.
http://www.cleanenergy.org/images/testimony/PEF%20SUPP%20RESPONSE%20OPC%20ROG%203%20NO%20%2047.pdf

Distorting Long- Term Decisions

In order to know when, if ever, the ratepayer breaks even, we must also know what other resources would have been added to the utility resource portfolio and subtract those costs from the projected cost of the nuclear reactor. Before this project begins to deliver power to the grid, there are numerous alternatives that have lower costs.

Figure 3 shows the levelized cost and timing of availability for resources as estimated by Lazard. Lazard is a Wall Street firm that has the distinction of being the only such analyst that recognizes efficiency as a resource. Lazard's costs for nuclear involve a construction period of nuclear of almost seven years, but the experience of the Southeast suggests it will be longer, ten years or more on average. Lazard is also optimistic about future solar prices.

FIGURE 3: CONSTRUCTION PERIODS AND LEVELIZED COST OF ALTERNATIVE RESOURCES



Source: Lazard, *Levelized Cost of energy Analysis – Version 3.0, June 2009,* nuclear construction period is adjusted to reflect experience of ongoing projects.

While the near term impact on ratepayer bills attracts a great deal of attention, as it should, it is ultimately the long term impact that is paramount. Figure 2 shows the levelized cost and timing of availability for resources as estimated by Lazard. .. Since many of the alternatives can be brought on line quickly, the long lead time of advanced cost recovery is a pure loss to consumers. They could have had the money in their pockets and paid for less costly alternatives.

Given these processes and tendencies, the most valuable asset that advanced cost recovery robs from ratepayers and regulators is time. The long lead times and high costs of nuclear tie up the utility's resources at the expense of the alternatives. With each passing year, options are foreclosed.

Building new nuclear reactors is one of the last things utilities should be thinking about in the current economic environment. Some utility management had reached this conclusion long before Fukushima. One particularly outspoken executive is John Rowe, CEO of the largest nuclear utility in the U.S., put it bluntly, "nuclear can't compete."[2] As shown in Figure 4, over the past three years, nuclear has moved to the end of the line compared to efficiency, natural gas, and wind. This analysis was offered a few days before the incident at Fukushima. That incident, as discussed above, will increase every type of risk that has plagued nuclear reactors in the past, which are described in Figure 5. By shifting risk to ratepayers, when so many more attractive options are available and allowing the utility to choose reactors without showing they are least cost, as the Iowa legislation would, massive, unnecessary and excessive costs will be imposed on ratepayers. Nuclear reactors are a bad idea that is getting worse by the moment.

Job Creation

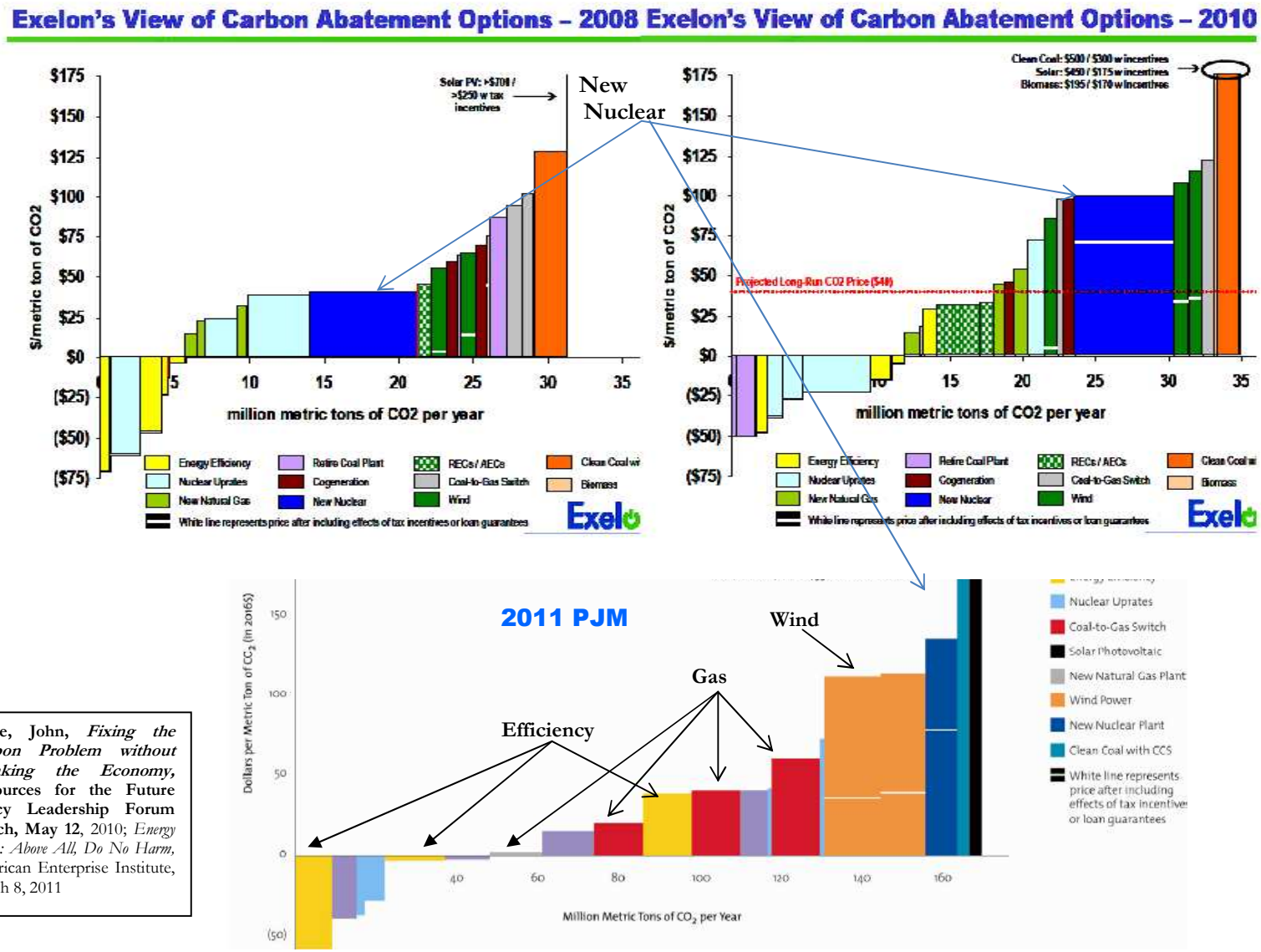
The high cost and capital intensity of nuclear reactors affects another of the benefit that is frequently claimed for new nuclear reactors – job creation. The inherent characteristics of nuclear reactors – huge capital costs and long, slow construction periods resulting in expensive power – mean they are an extremely poor approach to addressing the current concern of unemployment. Because nuclear reactors involve large expenditures and are large construction projects, they tend to create construction jobs and require operational labor. The claim to superior job creation collapses when one considers the alternatives.

- Because they are capital intensive, they produce relatively few jobs per dollar invested.
- Because they result in high-cost power, they drain resources from household budgets, which means consumers have less to spend on other goods and services that have much higher economic multipliers, particularly in the local economy.
- Because they raise the cost of doing business, they tend to hamper the ability of other enterprises in the state to compete in regional, national and global markets.
- Because the equipment vendors are foreign corporations and the capital expenditures generate high levels of income, the drain on the local economy is compounded.

Given the long licensing and slow ramp up in construction, they are the antithesis of "shovel ready" projects. In short, choosing nuclear reactors over efficiency and renewables not only produces many fewer local jobs in the aggregate, but takes much longer to get those jobs.

[2] **Rowe, John, *Fixing the Carbon Problem without Breaking the Economy,* Resources for the Future Policy Leadership Forum Lunch, May 12**, 2010; *Energy Policy: Above All, Do No Harm,* American Enterprise Institute, March 8, 2011

Figure 4: The Increasingly Dim View of Nuclear Economics and Improving View of Alternatives



Rowe, John, *Fixing the Carbon Problem without Breaking the Economy,* Resources for the Future Policy Leadership Forum Lunch, May 12, 2010; *Energy Policy: Above All, Do No Harm,* American Enterprise Institute, March 8, 2011

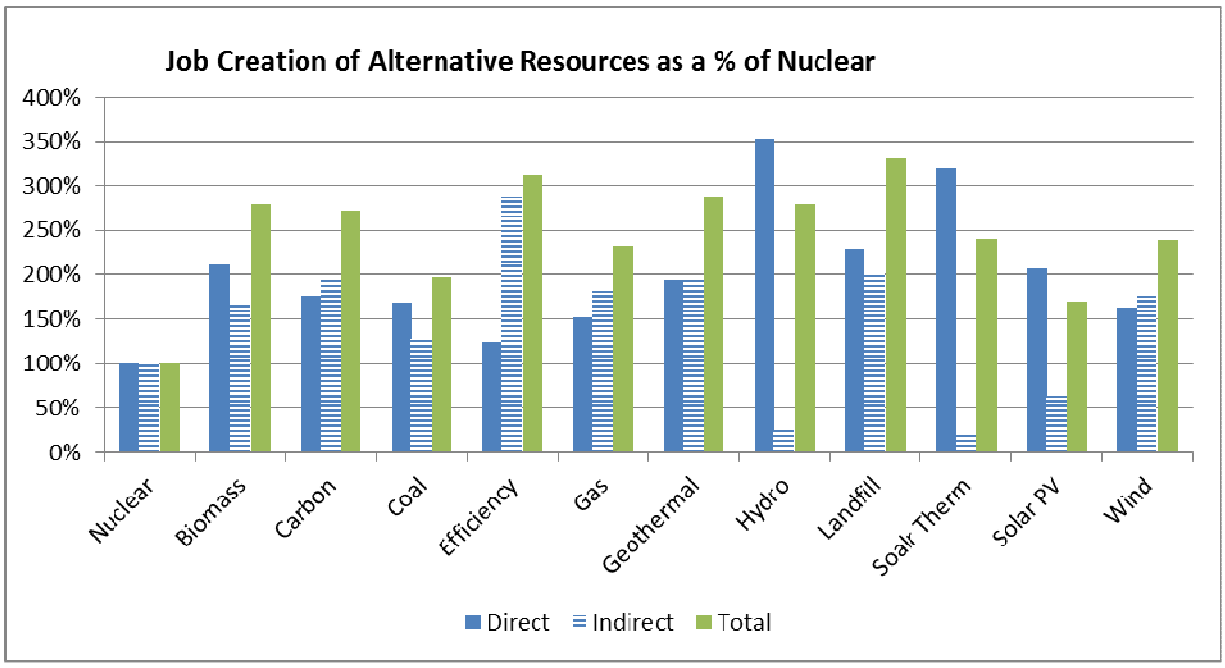
Figure 5: The Types of Risks Affecting New Nuclear Reactor Projects

Category	Source	Specific Risk
Technology risk stems from the fact that the new generation of nuclear reactors is new and uncertain. Cost estimates have increased dramatically over the past five years, doubling or tripling. At the same time, costs of efficiency and renewable technologies are declining and availability is rising.	New technology risk	First-of-a-kind costs Long lead-time
	Alternative technologies	Efficiency potential identified Renewable cost declines
Policy risk stems from the fact that federal policy is in flux. While nuclear advocates have looked to climate policy, which may put a price tag on carbon emissions, as a primary driver of the opportunity to expand the role of nuclear power, they have failed to take account of the equally strong possibility that climate policy will create a very substantial mandate for conservation and renewables, which will dramatically shrink the need for new, nonrenewable generating, large base load capacity.	Shifting focus	Emphasis on efficiency reduces need Emphasis on renewables reduces need
	Flexible GHG reductions	Lowers carbon cost
Regulatory risk stems from the chance that regulators will move slowly in approving reactors or authorizing their cost recovery. The new designs have proven challenging, with the reference designs going through numerous revisions. Site-specific issues, which cannot be standardized, have proven contentious. While a few states have approved construction work in progress and other measures to ensure cost recovery, the vast majority have not.	Loan guarantee conditions	Taxpayer protections inhibit guarantees
	Rate review	Recovery of costs challenged
	NRC regulatory reviews	Lack of experience Change of requirements Design flaws and revisions Site-specific contentions
Execution risk stems from the fact that reactors have not been built in the U.S. in decades and the industry does not have a great deal of capacity. Of the 19 projects that have applied for licenses at the Nuclear Regulatory Commission, 17 have suffered from one or more of the following problems: delay, cancellation, cost escalation, or financial downgrade.	Construction risk	Lack of experience
	Engineering, procurement & construction contract uncertainty	Cost escalation and volatility Cost overruns
	Size, cost and complexity	Delays, Rework costs
Marketplace risk on the demand-side flows from the current recession, the worst since the Great Depression, which has not only resulted in the largest drop in electricity demand since the 1970s, but also appears to have caused a fundamental shift in consumption patterns that will dramatically lower the long-term growth rate of electricity demand. On the supply-side of the market, there are a host of alternatives that have lower cost to meet the need for electricity in a carbon-constrained environment and there is growing confidence in the cost and availability of these alternatives.	Uncertain demand growth	Slowing due to recession Shifting due to debt and loss of wealth
	Uncertain fuel costs	Natural gas price decline
	Reactor costs	Long lead time, Cost overruns Rate shock reduces demand
Financial risk stems from all of the above risks and are magnified by tight conditions in money markets and the fact that utility balance sheets are weak and too small to support the large size of nuclear reactor projects. The nature of the projects imposes additional financial risks, so much so that, for most utilities, the projects are so large that Moody's has called them "bet the farm" decisions. exposure	General conditions	Tight money, High-risk premiums New liquidity requirements
	Utility finance	Rising cost of debt, Weak balance sheets Limited & declining cash & equivalents Financial ratio deterioration, Increased operating
	Project finance	High hurdle rate for risky projects, Impact of large project Impact of large project, Capital structure distortion

Source: Mark Cooper, *All Risk, No Reward* (December 2009)

Figure 6 shows that nuclear reactors are a very bad investment from the point of view of job creation, compared to the alternatives available. It shows the number of jobs created directly by the construction and operation of the project as well as the indirect job creation through the multiplier effect of spending. We find that alternatives produce more jobs, on average about twice as many jobs on a per kilowatt hour generated basis. [3]

FIGURE 6: JOB CREATION BY ALTERNATIVE APPROACHES TO MEET ELECTRICITY NEEDS



Sources: Direct jobs: Max Wei, Shana Patadia and Daniel Kammen, Putting Renewables and Energy Efficiency to work: How Many Jobs can the Clean energy Industry Generate in the US?", *Energy Policy,* 38(2010); Total Jobs: Rachel Gold, et al, *Appliance and Equipment Efficiency Standards: A Money Maker and Job Creator,* (American Council for an Energy-Efficient Economy, January 2010); Lazard, *Levilized Cost of Energy Analysis – Version 3.0,* June 2009.

[3] The estimates are conservative for several reasons.The direct job impact is based on estimates derived from EPRI studies in the *Energy Policy* article. Where no EPRI estimate is available, we have used the lowest estimate cited by the authors. The indirect jobs estimate is based on the premise that less costly alternatives leave money in cconsumers' pockets, which has a powerful multiplier effect as they spend it. This analysis is conservative in two respects. First, the multipliers are taken from the ACEEE study cited in the table. ACEEE shows that general consumer spending create 2.35 jobs per dollar compared to a dollar spent on energy production and distribution. Since nuclear is below the average, this is a conservative estimate. Second, the cost savings to consumers are estimated on the basis of the levelized cost analysis presented by Lazard, which use rather low nuclear costs. Notwithstanding these conservative assumptions, we find that the alternative create over twice as many jobs per kwh.

Conclusion

Utilities claim that advanced recovery of costs delivers a number of benefits, which justify the dramatic restriction of consumer protection. Some of the claimed benefits are economic – advanced cost recovery is supposed to reduce the total revenue requirement in the long run and moderate the "rate shock" that hits consumers when expensive, capital intensive projects come online. Also, big construction projects create lots of construction jobs for a short period of time. Some of the claimed benefits are environmental – reduced reliance on fossil fuels which suffer price volatility (in the case of natural gas) or are heavy emitters of greenhouse gases (in the case of coal).

The response to the claimed benefits from consumer advocates has long been straightforward. Advanced cost recovery robs consumers of the time value of their money. The shifting of risk biases utility decision making so strongly toward expensive options that consumers are bound to be worse off. Any accounting and rate shock benefits can only make nuclear reactors a little less worse; it does not make them better. Paying too much for nuclear power results in many fewer jobs and much less reduction in emissions than could have been achieved if more cost-effective choices had been made.

Nuclear power suffers these problems under all circumstances. Major nuclear incidents require the authorities responsible for oversight of the nuclear industry to re-examine the technology. If the accident at Fukusima causes them to abandon advanced cost recovery as a subsidy for nuclear reactors consumers will be a lot better off.