

**STRANDED INVESTMENT COSTS
DESIRABLE AND LESS DESIRABLE SOLUTIONS**

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**What are the Transition Costs to a More Competitive Market
and Who Should Pay?**

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**All of us are paying a price today for living
under a system of monopoly regulation that is
not in tune with modern marketplace realities.**

Carlos A. Riva, "The 1994 Electric
Executives Forum," *Public Utilities
Fortnightly*

Introductory Remarks

Forecasting failures are a principal source of the electric industry's investments and commitments that we now believe to be "uneconomic."¹ Paradoxically, since stranded investments are defined as the difference between the book values of generating assets and contract rights and the market value of such assets, estimates of the magnitude of these stranded investment costs rely on still more long-term forecasts of demands over the expected life of the assets. One reason this is a source of concern is that there is no reason to believe that the art of forecasting has improved in the last two decades. A brief review of the "forecasting problem" can set the stage for an evaluation of current forecasts and an evaluation of proposal for allocating these uneconomic costs.

I. THE FORECASTING PROBLEM FOR ELECTRIC UTILITIES

The capital intensity of electric industry assets and the long expected life of such assets makes it necessary that economic forecasts be used to justify investment decisions. The reality, however, is that all long-term economic forecasts that purport to convey useful point estimates, in contradistinction to astrological forecasts, will be wrong.

¹ Two views of the "stranded investment" or "stranded commitment" problem deserve recognition. One view emphasizes that intensifying competition *creates* the stranded investment problem. the second view emphasizes that intensifying competition only *reveals* the stranded investment. The first view is illustrated by the comment of Bernard M. Fox in "The 1994 Electric Executives' Forum," *Public Utilities Fortnightly*, Vol. 132, No. 11, June 1, 1994., p. 39.

Stranded investment could be created if current retail customers bypass their local utility system and thereby bypass paying for those costs incurred to serve them.

The second view is illustrated by the comment of Jeffrey K. Skilling, p.47, of the same source.

[Stranded costs] are not new incremental cost brought about by increasing competition, but instead costs already being borne by utility ratepayers. ... The issue of stranded investments has surfaced because a more market-oriented approach to delivery of electricity has highlighted these inefficiencies."

The view supported in this paper is that there are important elements of truth in both views, and all defensible allocations of the costs of stranded investments will call upon both views for their justification. Might not many investments stranded by intensifying competition be economic under regulation and not economic under competition? If such is the case, stranded investments are "created," in part at least, by changes in public values and objectives.

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Serious economic forecasting starts with a recognition that the most important part of a point forecast is the variance of the estimate, and that variance is merely another point estimate with a variance that is another point estimate, etc. This conclusion holds whether the forecast of demand is used to calculate the generation capacity needed or to estimate the magnitude of stranded investments.

It is important, therefore, that fail-safe alternatives accompany every business plan dependent on a long-term economic forecast. These alternatives ought to sketch options to pursue when the forecast fails on the low side or on the high side.

Since these elementary economic truisms have been recognized by business and economic planners since the mists of early history, one question of interest before us is, why has the electric industry made so many large "uneconomic" investments in the last quarter century?² I suggest that two intertwined mistakes have been made repeatedly; they were made in the early 1970s when generating capacity needs were forecasted and they were made again in the 1970s and 1980s when the "need" for services of non utility generators (NUGs) were forecasted. I stress these reasons here because I fear a repeat of these mistakes when forecasting the content and magnitude of stranded investments.

These mistakes were supported by the tendency of regulatory decision processes to generate certainty out of uncertainty. In so doing, they convey faulty information to all who depend on regulatory agencies for critical information. The process of generating certainty is straightforward. Two conflicting forecast, each with large variances, are likely to be considered unreliable source of information if presented to decision makers, but two conflicting forecasts, each with large variances, that are incorporated into a single agreed-upon forecast in a settlement agreement is likely to be accepted as gospel, especially if it has passed through three or four stages of review before it gets to the decision makers. What starts out as conflicting weak guesses evolves during the decision process into key planning parameters.

The mistakes on which I want to focus are (1) ambiguity of regulatory objectives and (2) the over-estimation of utilities' monopoly powers.

The Problem of ambiguity of Regulatory Objectives

Although economic regulation of natural monopolies is almost always justified as a method for reducing the inefficiencies of an unregulated monopoly, regulation when

² Some of the estimates of uneconomic investments, even if halved, suggest an industry and regulatory failure of massive proportions. They also remind us of the maximum that the hardest system of regulation to reform is a grossly inefficient one since there are so many interests threaten by improvements in efficiency.

actually imposed seldom results in an unqualified pursuit of efficiency. Instead, it tends to embody several objectives. Furthermore, the debate over the appropriate uses of utility monopoly powers never ends. Objectives seem to multiply as the regulatory system ages.

The proponents of regulating in pursuit of economic efficiency argue for the elimination of monopoly rents and pricing in pursuit of efficiency, but far more powerful voices urge the creation of monopoly rents and the use of them to purchase desirable social objectives.³ For these persons, the harm of an unregulated monopoly is not that it generates monopoly rents and inefficient prices but that it allow those rents to accrue to the owners of the monopoly rather than to a "responsible" social agency.

The multiplicity of objectives and the intensity of their pursuit is familiar to every student of regulation as it is practiced in the U.S.⁴ They include not only the cost of explicit programs added to the utilities' agendas, but the efficiency reductions caused by mis-pricing, by efficiency standards, imposed in the name of fairness, price stability, reliability, or simply "due process."

One of the more dramatic example of costs imposed on utilities that would not be imposed on unregulated firms operating in competitive markets is the cost of ensuring relative price stability. In a market in which demands fluctuate, the regulator has a choice of stabilizing price and satisfying all demands by varying outputs, of stabilizing outputs and satisfying all demands by varying prices, or of selecting some mixture of the two. U.S. regulators have had a tendency to favor price stability and, as a consequence, to support the maintenance of capacity needed to obtain such stability. Gaining price stability for many by maintaining large "reserve" margins of generating capacity is expensive compared to using hedging contracts for those who are willing to pay for such

³ It is noteworthy that the most publicized response of the U.S. DOE to the California Public Utilities Commission's April 20, 1994, order announcing its intent to require retail wheeling by California utilities was an expression of concern that the Administration's Climate Challenge initiatives were threatened by widespread retail wheeling. The environmentalists were also quick to note that many of their valued programs were also threatened, and some California legislators were also quick to express concerns about the threat to certain social welfare and tax programs.

⁴ A recent example of these cost was given by Bernard M. Fox in "The 1994 Electric Executives' Forum" cited above.

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The Problem of Fading Monopoly Powers

The second mistake by regulators and industry executive when evaluating forecast was that of over-estimating the strength and durability of utilities's monopoly powers. Both regulators and utility managers, and later consumer spokespersons, environmentalists and public-sector planners, failed to appreciate the erosion of the industry's monopoly powers. In particular, this was a failure to recognize the degree to which the natural monopoly of generation had been fading for years, only to be propped up and re-enforced by tying arrangements with the natural monopolies of distribution and transmission. The cause of the fade was the development of extensive, efficient systems of transmission combined with extensive, efficient systems of communications within and among utilities.

There is a certain irony in the phenomena of PUCs urging utilities to pay above-replacement-cost prices for non-utility generating services while counting on the monopoly power of utilities to pass those costs on to customers. In reality, they were not counting on the monopoly powers over generation; they were counting on the natural monopolies of transmission and distribution, supported by state powers, to protect the fundamental position of regulated electric firms. They overestimated all these powers. They were so accustomed to thinking of the vertically-integrated utility as the natural monopoly that it blinded them to forces that are remarkably clear with hindsight.

Necessary Conditions for Successful Economic Regulation

Necessary conditions for successful economic performance under the U.S. system of economic regulation are:

1. that the structure of the industry be consistent with the underlying economics of the industry,
2. that regulatory practices be consistent with the underlying theories of economic regulation, and
3. that the practices of regulation and the industry be consistent with widespread public values.
4. that the monopoly power of the regulated firm be strong enough to survive the pricing errors that appear to be inescapable features of the system.

In the last two decades these necessary conditions have been fading for the electric utility industry. Today, that industry fails all four tests:

First, the structure of the industry depends for its justification on a belief that generation is a natural monopoly, which it hasn't been since the transmission and communications systems made it possible to coordinate many generators over a large area.

Second, underlying theories of regulation call for limiting economic regulation to natural monopolies.

Third, widespread public values support the use of impersonal, competitive markets to allocate goods and service when such markets can promise efficient results.

Fourth, the monopoly power of electric utilities derived from transmission services and distribution services is not sufficient to protect the regulated firm for the magnitude of pricing errors for generation services inherent in the fully distributed cost model of pricing.

Utility managers and regulators less intent on using monopoly powers for purposes other than efficiency might have noticed the fading of their monopoly powers much sooner. Similarly, regulators and utility managers less captured by the mindset of detailed and extensive adjudications might have elevated their level of abstraction when viewing the industry and recognized better its inter-relations with its economic environment.

Interim summary

Utility managers and regulators, confident on their abilities to use utilities' monopoly powers to recover any costs created by forecasting failures, accepted risks in the 1970s and 1980s that more observant managers and regulators might have avoided. As we contemplate that failure of management and regulators, and the proposition that the art of economic forecasting has not improved noticeably in the last two decades, we must deduce that we should not place any more faith in long-term forecast of demands on which estimates of stranded investments are based than we ought to have placed in the long-term forecasts of demand and fuel prices made in the 1970s and early 1980s that got the industry in its current predicament.

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Most of the current estimates of stranded investments are based on a simple forecast that current price-cost relations in the industry will prevail for the remaining life of the stranded investments. Such forecasts cannot be taken seriously since the restructuring itself will make dramatic changes in price-cost relations for many customers. It is useful to reconsider changes that might have significant impacts on the magnitude of stranded investments. Useful estimates of stranded investments must be based on forecast that recognize that generating assets are durable: they can render services for many years in the future and during that time the national economy will move from recession to prosperity and back to recession many times. The value of such assets in the marketplace will recognize the opportunity of upside gains from such durable assets.

III. STRANDED INVESTMENTS IS A NUMBER TO BE CREATED NOT A NUMBER TO BE DISCOVERED

While it is not useful to design the transition to minimize the transition costs, it is useful to fully exploit opportunities to improve efficiency and simultaneously reduce transition costs and/or raise funds for stranded investment compensation. There may be many such opportunities. The working hypotheses proposed herein are:

1. Any action that improves efficiency and reduces the magnitude of stranded investment (or raises funds to be used to compensate stockholders) is an action that ought to be taken.
2. The size of stranded investments next year is dependent on regulatory policies adopted today.

One critical question is, are regulators flexible enough to grasp these opportunities, and can they cooperate in doing so?

The starting point for the analysis is that current regulatory pricing policies reduce the efficiency of the industry below its potential. Some of these policies will not survive the transition to competitive bulk power markets and others, if not changed, will hold the efficiency of the new, competitive industry below its potential.

The analysis builds upon four propositions:

Proposition One. If stranded investments exist, there also exists a potential for repricing utility services so that benefits to all consumers can be gained. In fact, it is likely that the larger the stranded investments and "bad contracts" problem, the greater is the

opportunity for quick efficiency improvements.

Proposition Two. The task of regulators is not to block the transition until utility stockholders have been compensated for stranded investments, but to exploit efficiency improvements quickly and compensate stockholders by sharing the benefits of efficiency improvements with them.

Regulators have at their disposal many ways to reduce the dimensions of the stranded investment problem and to do so rather quickly. Once they accept industry restructuring as inevitable and a problem to be managed rather than a force to be resisted, they can begin to reduce the magnitude of the problem. Cooperation between federal and state regulators and among state regulators is important if gains are to be large and predictable.

Proposition Three. Improvements in efficiency is the social objective of restructuring the industry. Competition is only one instrument for inducing efficiency improvements; reformed regulation is a second instrument. Competition, unaided and undirected, will not produce as many benefits as can competition made efficient by improved regulation.

Proposition four. Faulty pricing of regulated services has brought into existence far more generating capacity than is currently needed for reliable and efficient services, and faulty pricing will entice even more capacity into existence if that pricing is permitted to continue.

Pricing to Improve Efficiency and Reduce Stranded investments

The pricing problem can be usefully separated into the problem of overpricing and the problem of underpricing. It is convenient to deal with the problem of overpricing first.

The first principle of regulatory pricing is that prices charged by a regulated firm should not encourage a customer, or a subset of customers, to turn to an alternative supplier when that supplier incurs a cost to produce the service greater than the cost at which the regulated firm can produce it *and* requires those customers who remain with the regulated firm to bear higher costs.

Regulators, with their concentration on fairness objectives rather than efficiency objectives and who have only a limited knowledge of the economic cost of providing services, find it difficult to avoid this mistake. They appear to have made this mistake by perpetuating the famous, or infamous, "interstate settlements procedures" in the telecommunications industry. A good case can be made that this process saddled AT&T

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with cross subsidies and inefficient prices that encouraged "high cost" competitors into the industry.⁵

Regulators made a similar mistake when they chose to "encourage" cogeneration and small power production by selecting high-end-of-the-range estimates of avoided costs. In New York the legislature, with its 6 cent law, proved once more the importance of the working rule that postulates that "all useful point forecasts will be wrong." Some may be wrong on the high side, some on the low side; some alternate errors over time, and some, when made, have smaller standard errors of estimates than others, but all will be wrong in some degree or another. Only astrologers and some stock analysts avoid the embarrassment of never being wrong, and they do so by being vacuous, that is, they speak in tautologies or with empty words.

In recapitulation, whatever solution is chosen for the stranded investments problem, it should not be one that attracts additional investments in the industry that increases the amount of stranded investments. A high priority for the industry and its regulators ought to be to change current pricing practices that have such characteristics.

For example, it appears that even with existing excess capacity, some utilities will find it necessary to add peaking capacity soon. This demand for capacity derives directly from the policy of protecting ratepayers from the high prices that on-peak costs would create if prices were set to recover such costs. Since such cost are not recovered in peak periods, they must be recovered at other times. Because peak period prices are kept well below peak-period costs -- sometimes set to recover only a very small fraction of peak-period costs -- there exist only weak incentive to conserve during such periods. The consequence is excess generating, transmission and distribution capacity in the system.

When competitive markets are permitted to set such prices, high prices will develop during peak-demand periods. Such competition will create or reveal stranded investments in excess peaker capacity. Pricing reforms that promise to ration existing capacity services by raising prices during peak-demand periods might deter some investments that will be converted into stranded investments as soon as competitive markets develop.

⁵ In qualification, a better case can be made that AT&T's monopoly over long distance services was doomed the day microwave communications were proven to be reliable for a broad range of services, since that technology narrowed the range of tolerable regulatory error below that needed to make the U.S. system of regulation work.

IV. CHALLENGERS VERSUS DEFENDERS IN THE GENERATION INDUSTRY

One big source of stranded investments is capital intensive base-load generators, both nuclear and coal. That problem deserves a more lengthy analysis.

Consider an existing plant (herein called the defender plant and assumed to be utility owned) and a replacement plant (herein called the challenger plant and assumed to be owned by a NUG) where the average cost of the challenger is lower than the average cost of the defender. If the choice were between the two plants, each pricing its services at average cost and shareholders are required to suffer the loss involved in closing down the defender, it is obvious that utility consumers would be better off if the defender was closed down and the challenger replaced it.

If, however, the choice were between the two plants, each pricing its services at average cost, and customers of the defender are obliged to ensure that the defender's stockholders recover their assets, consumer interests would call for the replacement of the defender with the challenger if present discounted value of the cost savings produced by the challenger over the remaining life of the defender is greater than the cost of compensating the defender. In effect the best strategy for the customers of the defender is to "buy out" the defender, close the plant and buy from the challenger.

If, on the other hand, the discounted present value of the expected stream of cost savings is not as large as the cost of "buying out" the defender, the best strategy for the consumers is to postpone period by period the elimination of the defender until the discounted cost benefits do exceed the "buy out" cost.

This logic create a paradox. If the customers "buy" the defender's plant, and thereby become the new defender, and the defender plant has short run marginal costs (SRMC) less than the challenger's average total cost (ATC), rational consumers will not close it down; they will operate it at prices at or below the ATC of the challenger and recover some of what they paid to buy it. Only if the ATC of the challenger is below the SRMC of the defender will they close the plant and invite the challenger to enter the business.

Once is it is recognized that the defender can produce for the remainder of the life of his assets at SRMC, and that the challenger must expect prices equal to or greater than his ATC to be attracted into the industry, an alternative comparison of consumer benefits becomes possible. First, it is obvious that if the defender (the original one or the new one who is the agent of customers of the old one) is required to bear the capital loss of his operations, and he has the ability to control his price, he can set a prices just at or below the ATC of the challenger and deter entry for the remainder of the

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defender's plant life. At the end of his plant's life he would surrender the market to the challenger. His customers remain better off with his pricing approach than with the entry of the challenger at the challenger's prices.

This approach allows defenders who bears the risk of capital losses to minimize such losses. Its by-product is that challengers are deterred from entry until the defender's SRMC rises to equal the challenger's ATC. Society, consequently gets the lowest possible real cost of production.

When the case in which the defender's customers have agreed to carry all capital risks is re-analyzed, it is apparent that customers who compensate the defender for the difference between his ATC and the ATC of the challenger do not do so in order to entice the defender to leave the industry and bring the challenger in, but to create a circumstance in which the defender can get his prices below the ATC of the challenger and deter, at least delay, the entrance of the challenger.

The earlier analysis was pitched at such a high level of abstraction that many important characteristics of the electric utility industry were overlooked. Two characteristic of the current circumstance deserve emphasis.

1. A well established principle of utility pricing is that when demands of customers reflect the "law of demand," that is, customers tend to buy more when the price is low than when it is high, *ceteris paribus*, there is a two-part tariff that will increase their welfare over that produced by a volumetric rate if the energy component in the two-part tariff is below the volumetric rate and equal to or above SRMC and the second part of the tariff does not vary with actual takes of energy. Consumer welfare is maximized when the energy charge is equal to SRMC. One widely understood objective of regulators is to find such two-part tariffs.
2. A less well emphasized principle is a corollary of this first one, namely, customers who can be served under two-part tariffs will always prefer the technology with the lowest marginal cost if the ATC of the technologies are equal.

Since the current transition is one in which most challengers will use natural gas and most defenders are using coal or nuclear, the defender will have lower marginal cost over most of the ranges of their outputs. Consequently, defender with an ATC equal to that of the challenger has a competitive advantage.

V. RECOVERING STRANDED INVESTMENTS

If stockholders of the defender plant must be compensated for capital losses caused by selling at an ATC equal to the challenger's ATC when the defender's ATC is higher, where might the monies come from? The answer proposed here is that three sources have a potential to generate funds for stranded investments and simultaneously contribute to improved economic efficiency.

Example One. Owners of durable capital operating in competitive markets normally expects to recover their capital and profits in peak-demand periods. In a society with business cycles, that means prolonged periods of little recovery of capital followed by prolonged periods of relatively large recovery.⁶ Regulators and industry executives should not try to evaluate stranded investment under the assumption that current excess capacity will last forever and that the slow grow of the past few years will last forever. On the contrary, one objective of regulators and industry executives ought to be to work off excess capacity so that the proportion of time when generating assets can be expected to recover some fixed cost is increased.

Example Two. Many generators are demand constrained rather than price constrained, that is, the owners would prefer to run them more at prevailing prices but can't find a buyer for the power. Once efficient, competitive markets are created, such markets will provide generator owners with unlimited buyers for their generators' services. Once such markets are created, nation-wide, all generators can run at the capacity factor chosen by their owners in response to market determined prices. As long as the system has excess capacity, the market determined prices are not likely to cover full costs, but the opportunity to run at the chosen capacity factor will tend to lower the unit cost of the low marginal cost plants below what many of them could obtain in the balkanized regulatory system. As excess capacity is worked off, either by economic growth or by the closing of uneconomic plants, the market determined prices for generation output will rise towards and to the ATC of challenger plants.

Example Three. Earlier it was noted that some utility assets have a market value higher than their book value. This provides an opportunity to improve the efficiency of utility operations by some creative accounting. It does not necessarily further efficiency for firms to buy power at market-determined prices that are efficient and simultaneous move that power over transmission and distribution lines that are underpriced by

⁶ Economic cycles other than the business cycles can create opportunities for some fixed cost recovery. Two examples are daily cycles and annual cycles. The importance of annual cycles for some business is illustrated by the specialty store that recovers most of its fixed cost in the two month Christmas season and the garden store that recovers most of its fixed cost in the two month planting season.

V. RECOVERING STRANDED INVESTMENTS

If stockholders of the defender plant must be compensated for capital losses caused by selling at an ATC equal to the challenger's ATC when the defender's ATC is higher, where might the monies come from? The answer proposed here is that three sources have a potential to generate funds for stranded investments and simultaneously contribute to improved economic efficiency.

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efficiency standards. Regulators can serve the efficiency objective by increasing the prices of transmission and distribution services when those prices reflect embedded cost that are less than replacement costs.

Two sources of funds for making stranded investments payments can arise. First, regulators can price on a replacement cost basis and compensate owners on an original cost basis and use the difference to compensate owners of stranded generation investments or to pay compensation to NUGs for accepting revised power sales contracts. Second, regulators can cease recording depreciation allowances for all transmission and distribution assets whose book values is below their replacement costs. An equivalent increase in depreciation can be taken on the assets whose book values are above their market values. Such policies can bring down the magnitude of stranded investments for which direct compensation must be paid.

Obviously, regulators can pursue both policies. Furthermore, depreciation can be stopped on each generator whose book value is less than its market value so as to concentrate that capital recovery on plants with book values above their market values. They can also match generators with book values below market values and generators with book values above market values into a package that has market value and book value equal and insist that stockholders who want to be compensated for the stranded investments of the generator with book value above market value accept the package as a deregulated asset.

A careful investigation of the value of land and other assets included in the package should obviously precede such package creation. A recognition that many plants may have a plant life far longer than book life can also help in making a market valuation of generating assets.

Such policies might tax the ingenuity of accountants, but with cooperation from federal regulators state regulators might find that such policies could add to efficiency and reduce the scope of more painful forms of "taxation" that may be required to raise funds for stranded investments compensation.⁷

⁷ Compare, "Consistency in approach is needed so that there are no wide differences in the treatment of stranded investment from state to state. Such difference could artificially upset the competitive playing field, especially between adjoining states." Charles F. Goff, "The 1994 Electric Executives' Forum." P.44.

VI. CONCLUSIONS

Absence a change of mind by the Congress, the electric industry will be restructured to create a competitive generating market. This change will also demand a restructuring of the jurisdictional responsibilities of regulators. The appropriate objective for regulators and the industry is that both the industry and its regulatory agencies be structured and to operate in conformity with underlying economic realities, with current theories of regulation, with current public values and with the capabilities of the regulatory system.

To accomplish these objective, to further the efficient workings of the industry, and to maintain public support for the restructuring, it is necessary that net benefits flow to all customers from the restructuring during the restructuring, not merely after it.

Given the diversity among states and the need for a high degree of uniformity in neighboring states, industry leadership in crafting plans for programs to master the stranded investments problem should be a high priority.

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