Does Stranded Cost Recovery Distort Competition?

There is not necessarily a conflict between stranded cost recovery and efficient competition. In fact, dealing properly with the stranded cost measurement and recovery problem at the time the transition framework for expanding competitive opportunities goes into effect will avoid cost shifting and inefficient competition based on sunk costs. Reasonably simple mechanisms are available to implement stranded cost recovery policies that are fair to investors and promote efficient competition.

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The expansion of competitive opportunities in the electricity sector and associated structural and regulatory reforms must deal with a variety of transition issues. One of these transition issues is the treatment of investments and contractual obligations that utilities undertook pursuant to their historical responsibilities as regulated public utilities. Some of the costs associated with these investment and contractual obligations may not be recoverable as the industry is restructured, as customers gain increased opportunities to choose their electricity supplier, and as regulatory and public policy obligations historically placed on utilities change. The difference between (1) the revenues that utilities would receive in the future to compensate them for the costs of these historical investments and contractual obligations pursuant to regulatory institutions prevailing when the commitments were made, and (2) the revenues that

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they will receive in the future when generation services are sold in a competitive market defines the utility costs that are potentially "stranded" by the expansion of competitive opportunities.[1] That is, the lost net revenues utilities realize over time when they sell generation services in a competitive market, and are required to sell transmission and distribution service to their competitors at regulated embedded cost rates, represent their potentially stranded costs.

Many utilities, government officials, and academic commentators have argued that transition arrangements should be put in place that provide a reasonable opportunity for utilities to recover these potentially stranded costs.[2] Typically, the proposals provide for recovery through non-bypassable access charges that retail or wholesale customers would pay over time regardless of which competing supplier of generation service they choose when generation supplier choice is made available to them. Similar provisions for stranded cost recovery were included as part of the transition to competition in the telecommunications and natural gas industries.[3]

It is not my purpose here to revisit the debate about whether or not provisions should be made to provide utilities with a reasonable opportunity to recover their potentially stranded costs as part of the transition to competition. I have written elsewhere why I believe that including appropriate provisions for stranded cost recovery in the reform program is good public policy based on equity, efficiency, and political considerations.[4] Rather, in this paper I address one argument being made by those who oppose providing for stranded cost recovery. Specifically, a frequently raised objection to allowing utilities to recover costs that would otherwise be "stranded" by competition is that stranded cost recovery will *necessarily* distort future competition among generation service providers. For example, writing in a recent issue of the *Harvard Business Review*, Professor Peter Navarro argues that "if full recovery is allowed … the stranded-cost surcharge will effectively shield existing high-cost generators from threats from new low-cost competitors …. It may also raise rates indirectly by erecting barriers to entry in the generation market, reducing the number of competitors …."[5] Navarro's argument is based in part on the assumption that generating plants that have potentially stranded costs are by definition "economically obsolete" and in part on the assumption that stranded cost recovery necessarily biases competition in favor of "high-cost" generators and against "low-cost" generators.

The claim that stranded cost recovery necessarily distorts competition and erects barriers to entry is simply wrong.

The claim that stranded cost recovery necessarily distorts competition, protects economically obsolete plants from competition, erects barriers to entry, etc., is simply wrong. It reflects a misunderstanding of when and why stranded costs may emerge and how they can be recovered in ways that have no distorting effects on competition. Professor Navarro's discussion in particular is based on the "sunk cost fallacy," a trap into which every student who has passed an elementary economics course is expected not to fall.[6] As long as an appropriate methodology is utilized to calculated the relevant access charges, exit fees, or other bill components established to provide stranded cost recovery, there will not be any competitive advantage afforded utilities receiving revenues to recover stranded costs either in competition with existing generators or new entrants. That is, stranded cost recovery, when properly structured, should not lead "high-cost" generators to be run instead of "low-cost" generators, or make it profitable for an incumbent supplier to beat a new entrant that has lower total economic costs. To the contrary, the application of an appropriate stranded cost methodology should provide the correct economic incentives to facilitate efficient competition.

I. Competitive Markets: The Basic Principles

To understand the stranded cost issue and how it affects efficient competition we must first distinguish between "sunk costs" and "avoidable costs." Sunk costs are composed of capital investments and long-term contractual commitments that have been incurred in the past by utilities to fulfill their public service responsibilities and whose magnitude is unaffected by future utility behavior. Avoidable costs are future capital and operating costs that have not yet been incurred but which may be incurred in the future as a consequence of utility supply behavior. Avoidable costs depend directly on future decisions made by generation suppliers regarding how much electricity to supply from existing facilities, how they will maintain and operate these facilities to achieve their supply goals, whether they invest in existing or new facilities to expand supply capabilities, and whether they choose to retire existing facilities. In the short run (i.e., given the existing stock of generating facilities and contractual commitments), the avoidable costs of generating electricity include future fuel and non-fuel operating and maintenance costs required to maintain the facilities' availability to supply and actually to produce the electricity required to meet supply commitments. In the longer run, the avoidable costs of generation include future capital expenditures associated with investments in existing or new generating capacity, as well as future fuel and non-fuel operating and maintenance expenses required to produce electricity from it.

In an efficient competitive market, the outcome of the competitive contest between generators will be based on *avoidable costs* only. For a supplier deciding whether to produce more or less, the only costs that are relevant to this decision are the costs that will be affected by it—the avoidable costs. If the price at which additional output can be sold exceeds the associated avoidable costs, then it is profitable to supply the associated goods and services. If the price falls short of the avoidable costs, then the goods and services will not be profitable to supply. Sunk costs are irrelevant to future decisions to supply more or less, to close down a facility, to make investments to expand the facility, etc. This is because, by definition, sunk costs cannot be affected at all by present or future firm behavior. They are what they are. Profits can only be increased if opportunities can be found to supply goods and services that produce revenues that exceed the associated *avoidable* costs. Similarly, from a societal perspective, supply decisions can only be evaluated properly by comparing the avoidable costs of alternatives, not their sunk costs. The allocation of scarce productive resources can only be affected by decisions that change how these scarce resources are utilized in the future. These are precisely the resources associated with a supplier's avoidable costs, and it is only decisions regarding these avoidable costs that are relevant from the societal perspective of efficient allocation of scarce productive resources. Past investment decisions and their associated sunk costs are bygones from a supply-side resource allocation perspective.[7] In a well-functioning competitive market, future decisions about what to produce and how to produce it should be distinct from past investments and contractual commitments that are sunk costs.

In an efficient competitive market, the outcome of the competitive contest between generators is based on avoidable costs *only.*

Thus, the generators with the lowest avoidable costs should be preferred by the market and those with the highest avoidable costs should be operated or constructed only when prices get high enough to make it profitable to call on these supply sources to balance supply and demand. In the short run, prices in a competitive market will tend to be equal to the short-run avoidable cost of supplying an additional unit of output *at the output and price levels where supply and demand are bal-*

anced. This competitive price will be greater than or equal to the average variable cost of all suppliers whose short run avoidable costs are sufficiently low that it makes it profitable for them to be active in the market at this market-clearing price. That is, "inframarginal" suppliers with relatively low operating costs will earn some short-run competitive market "rent" at the competitive price level. This competitive market rent is how fixed capital and operating costs are repaid in a perfectly competitive market. Suppliers whose avoidable costs exceed the market value of their production should not and would not supply in a competitive market.

In the long run, both capital costs incurred to expand capacity and any operating costs incurred to produce electricity from that capacity are avoidable. In the long run, the competitive market price will tend to equal the long run incremental (or avoidable) cost of supply—incremental and therefore avoidable capital and operating costs—by an efficient new entrant into the market. This is because in a competitive market new entrants will come into the market as long as they expect prices to cover the incremental capital and operating costs that they must incur to become active suppliers. They will stop entering when prices fall to a lower level. In the short run, competitive prices may be below (excess capacity) or above (tight supplies) long-run marginal cost. However, the amount of capacity made available to the market by new suppliers or expansion investments by incumbents will tend to adjust to bring short-run and long-run prices into equilibrium at a point where the short-run avoidable costs and the long-run avoidable costs are equal.

II. Stranded Cost Recovery and Efficient Competition

A. Avoidable Costs Are the Basis of Efficient Competition

If efficient supply decisions are properly based on avoidable costs in the short run and long run, and prices in perfectly competitive markets in turn reflect these avoidable costs, how do we harmonize the goal of promoting efficient competition among generators with the goal of honoring past regulatory commitments by providing for stranded cost recovery? These dual goals are consistent with one another as long as:

(1) We define and calculate the relevant stranded costs in a way that places generators fully at risk for all *avoidable costs* they may incur in the future when they supply generation services in competitive markets;[8] and

(2) We require all customers to pay transition charges to compensate their historical utility supplier for potentially stranded costs, regardless of which generator, broker or retailer in the relevant market is chosen by a customer to be its generation service supplier.

Suppliers whose avoidable costs exceed the market value of their production should not and would not supply in a competitive market.

If these principles are followed, *both* generator supply decisions and customer choices among competing suppliers of generation services will be completely independent of the level of stranded cost recovery received by individual generators and the stranded cost charges paid by customers. This will ensure that there are no competitive advantages or disadvantages created by provisions for stranded cost recovery. To see this, consider the following simple example.

Let's say that "God" provides us with a precise estimate of a utility's potentially stranded costs so that, for the moment, we do not have to worry about how to measure the magnitude of the potentially stranded costs at issue. Assume that the aggregate value of a utility's stranded costs is $S per year or $s per customer per year. (The generating assets at issue here are durable capital facilities that are expected to provide electricity over a number of years into the future. The capital costs of these facilities are reflected in regulated rates by amortizing their recovery, with an appropriate return on investment, over an administratively determined accounting life for the equipment. I will assume that stranded cost recovery would follow a similar amortization schedule. This would ensure that stranded cost recovery will not lead rates to increase above what they would otherwise have been under the traditional regulatory regime.) Assume further that every customer is required to pay a network access charge of \$s per year to provide for stranded cost recovery, and a fee for use of the local utility's transmission and distribution wires (\$t per kWh), and is then free to shop among competing suppliers of generation services. The customer pays the best price she can negotiate with competing suppliers. Let's call the "market price" at which the customer purchases generation services \$p per kWh. Then the customer's bill for q kWh of usage is given by:

$$\text{Customer's Bill} = \$s + \$tq + \$pq.$$

The portions of the bill represented by the access charge (\$s) and the transmission and distribution charge (\$tq) are independent of the price of generation service (\$p) that the customer is able to negotiate in the market.[9] If a generation supplier can offer a price lower than \$p then the customer has every reason to switch to that supplier. If the utility's own generation has an avoidable cost that is greater than \$p/kWh, the utility's customers will do better by buying from the alternative supplier. Thus, from the customer's perspective, the incentive is to find the generation supplier that offers the best deal, since the customer's bill will reflect a stranded cost charge (\$s) and a charge for T& D services (\$tq) regardless of which generation supplier is chosen. Therefore, a customer has absolutely no incentive to favor a supplier with high avoided costs over a supplier with low avoided costs as long as the supplier with low avoided costs competes in such a way as to give customers at least some of the advantage of its lower avoided costs.

It is not in the interest of the utility receiving stranded cost recovery to induce customers to buy from its own generators when more economic alternatives are available.

Nor is it in the interest of the utility that is receiving stranded cost recovery to induce customers to buy from its own generators when more economic alternatives are potentially available to them from competitors. To see this, assume that the utility's generators have an avoidable generation cost equal to \$a/kWh and the market price is equal to \$p/kWh. Assume further that the utility's distribution customers have total purchases (regardless of generation supplier) equal to Q. Then the net revenue earned by the distribution utility that also has generating assets subject to stranded cost recovery is equal to:

$$\text{Utility net revenue} = \$S + \$tQ + (\$p - \$a)Q_u$$

where ($Q \geq Q_u$).

The utility makes additional profits by making sales from its own generators (Q_u) if and only if its avoidable cost \$a is less than the market price \$p at which it can sell the electricity that it supplies. The revenues it receives from the access charges paid by all customers to recover stranded costs (\$S), as well as the transmission and distribution charges (\$tQ), are completely independent of which generation suppliers the customers choose. Therefore, a utility receiving the revenues from the access fees has no incentive to supply from its generating facilities unless it is economical to do so. The utility receiving stranded cost recovery (\$S) will find it profitable to supply electricity from its own generators if and only if market prices exceed its avoidable costs. This is the only way that it can earn additional profits, since the recovery of its stranded costs is independent of which generator supplies a particular customer, or whether the generators of the utility receiving stranded cost recovery supply anything at all to the market. Indeed, if the utility's generators are really "economically obsolete," in the meaningful sense that their avoidable costs exceed the market value of the electricity they expect to be able to supply in the future, then they would have every incentive voluntarily to shut down these plants and simply be content to receive the revenues from the access charges designed to compensate them for the sunk costs of their historical investments in generating capacity.[10] In short, there is absolutely no reason to believe that stranded cost recovery necessarily creates competitive market distortions. To the contrary, if stranded costs are calculated and billed properly, it will forestall inefficient competition that is socially undesirable.

B. Distinguishing Sunk Costs from Avoidable Costs

Some of the confusion on this issue appears to result from a misunderstanding about the difference between sunk costs and avoidable costs and their implications for resource allocation. Regulated electricity rates include a combination of sunk costs and avoidable costs. This traditional ratemaking methodology reflects two basic regulatory policy principles that have emerged in the U.S. over the past century. First, utility suppliers cannot be expected to commit investment funds to provide service to customers (or to enter into long-term contracts), unless they have a reasonable expectation that they will recover no less than the cost of these investments or contractual commitments, including a fair rate of return on these investments reflecting the utility's cost of capital. Second, consumers are protected from being charged more than is necessary to compensate utilities for the costs of their investments, ongoing operating costs and contractual commitments. A complex set of accounting rules and regulatory review procedures has emerged that is used to set utility rates based on the average cost of providing service. The average cost used to establish prices includes the amortization of historical investments, including a fair return on investment, the costs of long-term contractual commitments to purchase power from third parties, and the ongoing costs of operating utility facilities and providing associated services. These regulated prices thus reflect a mix of sunk cost components and avoidable cost components and may be above or below the competitive spot market value of the associated electricity at a particular point in time. On average across U.S. utilities, the cost of generation services (capacity plus energy) embedded in regulated retail rates is less than four cents/kWh (out of the seven cent/kWh average "bundled" rate). This is roughly equal to the long run avoidable cost of new generating facilities. However, the average cost of generation services embedded in "bundled" utility rates varies widely from utility to utility based on a variety of factors, including the peculiarities of regulatory accounting rules.

Comparing the average accounting cost of different generating units tells us nothing about their relative efficiencies or their relative avoidable costs.

C. Relative Generator Efficiencies Should Not Reflect Sunk Costs

These considerations regarding the way regulated rates are determined lead to several very important points with respect to relative generator efficiencies and the efficiency consequences of competition based on regulated rates which do not carefully unbundle a stranded cost bill component:

1. Comparing the average accounting cost (sunk plus avoidable) of different generating units tells us absolutely nothing about their relative efficiencies or their relative avoidable costs. Comparing average accounting costs, as Professor Navarro appears to have done, does not provide useful information for determining whether a generating plant is "economically obsolete" or for determining whether one plant has lower avoidable costs than another (or than a new entrant).

2. If utilities compete with one another based on regulated rates which reflect a combination of sunk costs and avoidable costs, the resulting competition between generators may be inefficient. Utilities with relatively high embedded costs but low avoidable

costs could be disadvantaged in competition with utilities with relatively low sunk costs but relatively high avoidable costs. Some of the "low-cost" utilities mentioned by Navarro are low cost only in the sense that they operate old power plants that have been fully depreciated (and paid for by their retail customers who should have a claim on their "low-cost" output), but which are not nearly as efficient on an avoidable cost basis as some newer existing generating facilities. Competition based on average embedded costs could easily lead "high-cost" generators to be able to undercut "low-cost" generators when we look at "cost" from the appropriate economic efficiency perspective of avoidable costs rather than sunk costs. This would of course be very inefficient. We can avoid this socially undesirable result by dealing properly with stranded costs.

3. Efficient competition among generators will proceed only if stranded costs are "unbundled" from utility rates and new rate designs are put in place that collect the stranded costs through non-bypassable access charges paid by all consumers independent of the identity of the generation supplier committed to supply particular customers. Specific arrangements properly to calculate the level of stranded costs and to allow utilities to collect these costs in a competitively neutral way is the best way to ensure that competition among generators reflects their true relative economic costs—their avoidable costs—and not regulated rates that reflect an arbitrary mix of sunk costs and avoidable costs.

In summary, there is absolutely no necessary incompatibility between stranded cost recovery and efficient competition between generators as long as we properly distinguish between sunk costs and avoidable costs in both the stranded cost payments made to generators and the bills paid by customers. Indeed, absent appropriate provisions for stranded costs, competition based on regulated rates could lead to incentives for socially inefficient bypass of incumbent utilities that have the lowest avoidable costs.

Efficient competition among generators will proceed only if stranded costs are collected through non-bypassable access charges.

III. Measurement and Implementation Issues

If we knew with certainty from some exogenous source ("God" in the example above) what the appropriate magnitude is for the stranded cost properly recoverable by each vertically integrated distribution utility (i.e., \$S in the example above), implementing a stranded cost recovery program that does not distort competition would be very easy indeed. It would simply be a question of taking the known aggregate value of the stranded costs required to be recovered in each year, allocating the responsibility to pay for these costs across customers, and collecting revenues from all of the utility's distribution customers, including those who take generation service from other suppliers, as a network access charge. Unfortunately, there is no all-knowing "God" who can give us the correct values for each utility's stranded costs up front at the time stranded cost recovery provisions go into effect. The stranded costs must be measured for each utility and this measurement process is inevitably subject to some uncertainty. Thus, a measurement procedure needs to be identified which provides an accurate estimate of stranded costs, either "up front" at the time the transition to competition begins, with this "up-front" estimate being amortized over a reasonable time period, or adjusts what customers pay for stranded costs on an "ongoing" basis to reflect changing generation service costs and market values. Furthermore, the measurement approach taken should not lead to indirect competitive distortions.[11]

Before discussing measurement issues and alternative measurement approaches, let me provide a more precise definition of a utility's potentially stranded costs. The "stranded cost" of a generating facility or purchased power contract at a particular point in time is equal to its sunk costs (investments, contractual commitments, regulatory assets, etc.) *minus* the net operating income earned by any generation services it supplies from these facilities in each future year, applying common discount rates and amortization rates to express on a comparable basis, sunk capital costs, payment obligations under purchased power contracts, generator operating costs, and market revenues derived from the sale of generation services. The net operating income of the generating facility whose stranded costs are to be calculated is in turn equal to the revenues the utility earns from sales of generation services minus the avoidable costs incurred to supply them. This stranded cost computation formula is subject to the condition that the stranded costs recovered over the relevant amortization period (properly discounted) cannot be greater than the sunk costs of the generating facility, including any ongoing contractual or regulatory commitments, as of the date when the transition period goes into effect. In summary:

Stranded Cost = (Sunk Cost Commitments)–(Operating Earnings on Generation Services)

Operating Earnings = (Generation Revenues)–(Avoidable Generation Costs)

Subject To: Stranded Cost Recovery No Greater Than Sunk Cost Commitments[12]

It should be obvious that there is no way to calculate the magnitude of the relevant stranded costs with certainty "up front" at the time the transition mechanism for recovery of stranded costs is first put in place, except in a few special cases. With utility-owned fossil generating plants this is the case because these plants are long-lived capital assets that can produce electricity over many years into the future. While we know the sunk costs of a fossil generating facility today, the market value of the electricity it will pro-

It should be obvious that there is no way to calculate the magnitude of the relevant stranded costs with certainty 'up front.'

duce in the future and the associated avoidable costs are inherently uncertain. The potentially stranded cost of a generating facility might turn out to be significantly lower than its sunk cost if the generating unit can supply generation services in the future that have market values in excess of the avoidable costs incurred to supply them.[13] The "margin" reflected by the difference between the market value of these generation services and their avoidable cost should be credited against the sunk costs of the unit in any stranded cost calculation. However, it is impossible to know with any certainty today what future market values, sales volumes or associated avoidable costs will be each year for ten or more years into the future.

Calculating the stranded costs at a single point in time for a nuclear power plant is more challenging than it is for conventional generating plants. In the case of a nuclear plant, we must also recognize that there are decommissioning liabilities whose costs are sunk in the sense that they cannot be avoided, but the associated expenses will be incurred over many years into the future regardless of whether the unit runs or not. Thus, in the case of a nuclear unit, the relevant sunk costs are not even known with certainty today.

Finally, consider the measurement of stranded costs associated with long-term purchased power contracts. QF contracts, for example, generally commit the utility to purchase a maximum amount of energy as provided for in the contract at a price determined by a contractual formula that often depends on future fuel prices and inflation rates. Both the quantities supplied and the formula-based prices may vary widely over the term of the contract. The utility's commitments to make purchases and payments under these contracts are sunk costs, although we will not know the precise magnitude of these liabilities until the contract plays out. The stranded costs associated with a purchased power contract are equal to the amount the utility must pay for the energy supplied under such contracts, less the market value of this electricity. The actual values for each of these variables will only be revealed over time as the performance on the contract is observed and market values for the electricity supplied under these contracts are revealed. In each of these cases, the relevant magnitude of the net present value of these stranded costs *today* can only be determined with uncertainty by estimating each of its constituent components for each of many years into the future.[14]

Clearly, *if* a decision is made to estimate a utility's stranded costs "up front" at the time the transition to competition goes into effect, and to amortize this value over a number of years into the future to derive associated access charges, it is important to find an estimation method that is reasonably accurate, provides for a reasonable allocation of estimation risks, *and* does not lead to competitive distortions. However, it also must be recognized that any up-front approach will turn out to be "wrong" after the fact. For example, if market values for electricity generation turn out to be higher than projected to compute the access charge for recovering stranded costs, customers will end up paying "too much," and if market values for electricity generation are lower than projected, investors will receive "too little" compensation.

As a result, there is considerable merit in stranded cost measurement approaches that I refer to as "ongoing" methods. These methods start with a utility's sunk cost commitments, but include an ongoing adjustment mechanism that reflects changes in market values and the underlying factors that impact avoidable costs (e.g., fuel prices)—so that the access charges customers end up paying reflect the actual stranded costs as defined above. While these methods provide more accurate and credible values for the stranded costs that customers are asked to pay, they must be carefully designed to avoid creating indirect competitive distortions.

There is considerable merit in stranded cost measurement approaches that I refer to as 'ongoing' methods.

IV. Issues in Developing an Ongoing Stranded Cost Mechanism

In order to get a better sense for what is involved in measuring the magnitude of a utility's stranded costs and how alternative approaches can be applied to avoid creating competitive distortions, a brief discussion of measurement issues is warranted. Navarro and others have argued that stranded cost recovery will favor a utility's generating plants in competition with generation supplied by other utilities or independent suppliers. I therefore focus on measurement methods applicable to utility-owned generating capacity only. As the previous discussion makes clear, there are three sets of variables that must be accounted for properly to ensure that customers are charged the appropriate amounts to compensate for stranded costs associated with a utility's existing generating assets. They are: (1) sunk cost, (2) the market value of electricity, and (3) avoidable costs and generator performance.

A. Sunk Costs

The relevant sunk costs associated with utility investments in generating plants are straightforward to calculate. They can be measured directly from the utility's books and include the book value of generating plant net of book depreciation and the book value of any regulatory assets attributable to generation.[15] The latter include deferred taxes, premiums paid on reacquired debt, post-retirement health care and other deferred labor charges, and provisions for nuclear decommissioning expenses and other environmental cleanup costs associated with past activities. Aside from the nuclear and environmental cleanup costs, which are difficult to estimate with any precision today and will have to be adjusted over time to reflect economic, technological, and policy changes, the other sunk cost elements can be measure quite accurately up front at the time the transition framework goes into effect.

For regulatory assets, no further adjustments for avoided costs or market prices are required since these accounting values don't supply any electricity directly. The stranded cost component of rates for recovery of regulatory assets is simply the amortized value of the (sunk) book value of these items at the time the transition framework is implemented, plus a component to reflect ongoing sunk commitments associated with nuclear decommissioning and other environmental cleanup costs resulting from past activities.

B. The Market Value of Electricity

The market value of electricity produced by utility generating assets is critical to any stranded cost calculation. It can be estimated up-front as the present value of electricity expected to be supplied in the future by generating facilities at the time the transition framework goes into effect, or measured over time based on actual market conditions during a defined transition period. If the up-front approach is used, the stranded costs for utility assets are then equal to the (sunk) book value of the generating assets minus the net present value of the operating income (i.e., net of avoidable operating costs) associated with the unbundled generation services these assets are expected to produce. Obviously, projecting what generation service market values, output supplied and associated avoidable production costs will be over periods of ten years or more into the future is a difficult and potentially contentious exercise. If market values of electricity turn out to be higher than projected, utilities will end up collecting more than their "actual" stranded costs. If market values for electricity turn out to be less than projected, utilities will recover less than their "actual" stranded costs.

An "ongoing" approach avoids this estimation risk. This approach involves calculating, directly or indirectly (see below), a

stream of stranded cost values over a period of years based on actual realizations of the market values of the electricity supplied by the generators. It begins with the annual depreciation charges and return on undepreciated book investment for the generating assets at issue to reflect the amortization of sunk costs. From this is subtracted, one way or another, the net operating income actually achieved by the generator in that year based on actually sales revenues, less an allowance for the avoidable costs incurred to produce it. An ongoing year by year calculation based on appropriate market price indicia, production profiles and avoidable cost benchmark values (see below), is likely to yield fairer and more accurate results than an up-front measurement mechanism that relies on several uncertain net present value calculations.

C. Avoidable Costs and Generator Performance

Perhaps the most important challenge is to estimate the appropriate avoidable costs for utility generating units which will be used ultimately to define the amount of stranded costs customers are required to pay during the transition period. The up-front approach requires that avoidable costs and generator performance for many years into the future be estimated up front when the NPV stranded cost estimate is developed. The ongoing approach requires only that reasonable values for avoidable operating costs be defined for each future year during which stranded cost recovery is to be allowed. These values could be made contingent on prevailing economic conditions during the transition period (e.g., gas prices). These benchmark values for avoidable costs need not and probably should not be reset administratively each year. Instead, at the beginning of the transition period, a profile of future operating costs, generator availability rates, and production levels can be established which the utility must live with. This profile can include pre-specified adjustments for actual realizations of gas price indices, general inflation indices, and a limited number of other factors. If the utility does not meet the norms reflected in these profiles, its shareholders are penalized financially, and if it beats these norms, they are rewarded. This is how we ensure that the utility receiving stranded cost recovery has adequate incentives to "mitigate" stranded costs by keeping avoided costs as low as possible and making all sales that are economical. This is also how we can ensure that utilities receiving stranded cost recovery compete fairly by placing their shareholders at risk for recovering reasonable values for the avoidable costs of generating electricity solely from revenues they earn from sales of generation services to serve load and to supply ancillary network support services.

D. Simple Stranded Cost Recovery Mechanisms

Let me provide a simple example of how this ongoing approach could work in practice. Assume that the sunk costs associated with a utility's generating assets are $k per customer. Assume further that the utility's regulators have determined that it should be able to supply electricity in the future from generating facilities it owns at an avoidable cost benchmark value of $a/kWh. This avoidable cost benchmark may be adjusted upward or downward over time with changes in gas price indices, general inflation indices, etc. But it must be decoupled from the actual avoidable costs incurred by the utility in the future. Ex post adjustment for *all* operating costs incurred would destroy the efficiency incentives envisioned for this mechanism by turning it in to a cost-plus system. Finally, let me assume that all retail customers have "direct access" and can buy generation services in a competitive market for a price $p/kWh. This price will fluctuate over time as market conditions change. The utility then offers its retail customers the following "contract" to supply them with generation service:

Access Charge = $k per customer (or reflected in bills in more complex ways to avoid cost shifting)

Commodity Charge = $a per kWh

(For simplicity, I have assumed a uniform value for the avoided cost and the associated commodity charge that does not vary by time of use. In practice, both the avoidable cost benchmark and the commodity charge can vary by time of use and with the quantities actually supplied from the utility's generators.) Now, if the market price for electricity (p) turns out to be greater than the utility's avoidable cost benchmark value $a, customers receive an implicit credit of ($p-$a) per kWh because they have the option to purchase from the utility (q_u) at a lower price $a reflecting the utility's avoidable costs. As a result, the stranded cost component of their bills is *effectively* given by:

$$\text{Stranded Cost Component} = \$s - (\$p - \$a)q_u,$$

subject to ($p - $a) ≥ 0, which is precisely what it should be. As the market price rises, the customers' stranded cost payment obligations fall. If the market price of electricity is less than the utility's benchmark avoidable costs ($p < a$), customers can purchase at the market price $p, rather than exercise the "option" to buy from the utility at the higher avoidable cost benchmark $a. They would then end up paying $k as the stranded cost component of their bills, which is the correct value in this case.

If the utility's generators subject to stranded cost recovery cannot recover their avoidable costs from market-based sales of generation services, any shortfall would be a shareholder risk rather than something that can be added to customers' bills as a stranded cost charge.[16] This mechanism is particularly neat because it is not necessary actually to compute a stranded cost charge, since the access charge is equal to the easily measured sunk costs and the net stranded cost obligation falls out automatically as market prices change over time.

Moreover, this simple mechanism is fully compatible with efficient competition. If the utility's avoidable costs are below the market price, its units will run and should run to provide generation services in an efficient competitive market, as discussed above. By establishing benchmark performance norms to determine the utility's avoidable costs and the associated price $a at which the utility is committed to provide generation service to customers, the utility has incentives to hold its actual production costs down and to beat the performance targets embodied in the avoided cost norms. If other suppliers can supply generation services more cheaply, both retail customers and the utility have incentives to arrange for it to displace service provided by the utility's generating assets. If the utility's avoidable costs exceed the market value of electricity, its generators should not run, and competing suppliers should displace them; this is precisely the result this mechanism would achieve.

Since the utility's stranded cost recovery is capped at the sunk cost value $k, it only loses money by generating when the avoidable costs are higher than the associated market value $((p - a) < 0)$. Thus, it has no incentive to supply generation services from its own facilities when it is cheaper for its customers to buy from competing suppliers. Moreover, retail customers are free to turn to cheaper generation supply sources, putting pressure on the utility to lower its costs so that it can compete more effectively with competing suppliers.

The approach outlined above is a very simple example of performance-based regulation (PBR) for generating plants subject to stranded cost recovery. To meet the stranded cost recovery, efficiency, and fair competition goals I identified earlier, generators receiving stranded cost recovery must have appropriate incentives to keep avoidable costs as low as

possible and to sell as much electricity as they can if, and only if, its market value exceeds the associated avoidable costs. The mechanism that I discussed above has precisely these attributes. The key technical challenge is arriving at the appropriate performance benchmarks to define the avoided cost-based commodity charge ($a) and any adjustment indices. After that, it's just a matter of simple arithmetic to ensure that customers get an appropriate credit ($p-$a) against their sunk cost-based access charges as market prices fluctuate above the avoidable cost benchmark, and to cap their payment commitment at the relevant sunk cost values ($k). Competition combined with the profit motive does the rest of the work.

E. Market Valuations of Assets

An alternative "up-front" approach to estimating stranded costs associated with utility generating assets is to measure directly the "market value" of each generating asset at the time the transition framework goes into effect as one might go about measuring the market value for a used car or a house. That is, we draw the market value from observations on market transactions for similar capital assets, or solicit bids to purchase the asset. The asset's value based on comparisons with comparable sales or the actual sale price achieved at auction is by definition the market value of the asset. This market value in turn reflects buyers' and sellers' expectations about the future market values of generation services and the future cost of supplying them. It would be subtracted from the book value of the asset to yield its *expected* stranded cost. Finally, the resulting expected stranded cost estimate would be amortized over some defined future recovery time period and included on customer bills during this transition period.[17]

Unfortunately, there isn't yet a well-developed market for purchases and sales of generating plants, as there is for houses and used cars, so there do not exist "comparables" to rely on to value plants. Furthermore, the value of a generating plant at auction will depend on expectations about the prices and sales opportunities that will be available to the generator in the future. Since the relevant markets that are likely to emerge post-restructuring and open access are not yet well developed, there is little to go on to enable potential buyers or evaluators of generating plants to make accurate estimates of the future value of the output of generating plants that will rely on market-based sales revenues.

As a result, it is not clear that the market will value utility generating assets fairly if they are sold prematurely before the competitive market for their output has been fully developed. Unless the utility takes purchased power contracts back from the buyers of the generators sold at auction (or spun off), their market values are likely to reflect high discount rates due to the considerable uncertainties about future market and regulatory conditions and the resulting net stranded cost values may accordingly be very high. Customers may end up paying too much in total in the long run if this approach is taken. This may be the case because the stranded cost values developed in this way will implicitly reflect very low expected market prices. The actual market prices for generation services that customers would then be required to buy in a competitive market in the future may be much higher than what was implicitly assumed when the plants were valued. Of course, even if this valuation approach gets the *expected value* of the generating plants right, actual market values for generation service will turn out to be either higher or lower than anticipated. The risk of future market price fluctuations—up or down—would then fall fully on consumers once their stranded cost obligations are fixed up front. Since the utility will have disposed of its generating assets, its shareholders will not see a symmetrical "upside" or "downside" in the future from market price fluctuations. These risks will be transferred to those who purchase the assets.

If generating assets are sold off *with* purchased power contracts taken back by the distribution utility that owns the generators being auctioned, based for example on the amortization of the net book values of the generators sold plus estimates of their future O&M costs for power supplied over a future ten-year period, we are likely to get a fair market value for any generators auctioned *given* the provisions of the purchased power contracts to which the utility would then become committed. However, if we proceed in this way we will only have turned the problem of estimating the stranded costs of a utility-owned asset into a problem of estimating the stranded costs associated with the "above market" long-term contracts that have

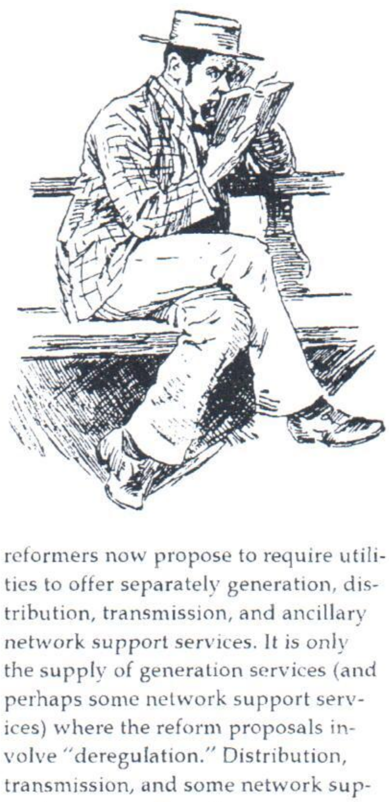
been taken back by the utility to support the asset sale. Moreover, if we have enough information to define an efficient purchased power contract, we can use this information to specify the cost and performance norms required to implement the ongoing approach to stranded cost measurement discussed above. We would then be able to insulate customers from the market price risk that they would otherwise bear if an up-front approach is utilized.

IV. Conclusion

In principle, there is no conflict between stranded cost recovery and efficient competition. Indeed, dealing clearly with the stranded cost measurement and recovery problem at the time the transition framework for expanding competitive opportunities goes into effect will avoid cost shifting and inefficient competition based on sunk costs. The key implementation challenges are associated with clearly separating responsibility for sunk costs from responsibility for avoidable costs and developing measurement and compensation mechanisms that produce fair values for customer obligations to pay for potentially stranded costs. I have discussed a very simple and practical implementation mechanism that achieves all relevant equity, efficiency, and competition goals. A number of alternative practical approaches with similar attributes are also available for regulators to rely on. The bottom line is that: (1) concerns that stranded cost recovery is inherently incompatible with efficient competition are simply wrong, and (2) getting the stranded cost measurement and recovery mechanisms right is not very difficult. ■

Endnotes:

1. It is not appropriate to characterize what is being proposed for electricity as "deregulation." Utility shareholders committed capital to fully integrated business enterprises in which retail customers purchased a single integrated product—delivered electricity—from their local utility. Industry reformers now propose to require utilities to offer separately generation, distribution, transmission, and ancillary network support services. It is only the supply of generation services (and perhaps some network support services) where the reform proposals involve "deregulation." Distribution, transmission, and some network support services will continue to be regulated based on embedded costs. If reform proposals called for full deregulation of all of these services, as in railroads, combined with transmission access requirements, there probably would be no stranded cost problem: transmission and distribution services could be priced at levels reflecting their higher economic replacement cost.



2. The Federal Energy Regulatory Commission, the California Public Utilities Commission, the Massachusetts Public Utilities Commission, the President's Council of Economic Advisors, and other agencies have embraced the principle of stranded cost recovery subject to "mitigation" requirements.

3. The railroad industry was *de facto* simply deregulated. There was no requirement that railroads "unbundle" the provision of "track and switching" services from the supply of rolling stock, with an obligation to make the tracks available at regulated embedded cost rates to competing suppliers of rolling stock.

4. William J. Baumol, Paul L. Joskow and Alfred E. Kahn, The Challenge for Federal and State Regulators: Transition From Regulation to Efficient Competition in Electric Power, Dec. 1994.

5. Peter Navarro, *Electric Utilities: The Argument for Radical Deregulation*, HARV. BUS. REV., Jan.-Feb. 1996.

6. There are numerous other factual and logical errors in Professor Navarro's paper which I will not pursue here. However, I must point out that in 1981, Professor Navarro argued that utilities were not building enough coal and nuclear plants and were using reserve margin targets that were too low from an economic perspective. He concluded that oil-fired plants were economically obsolete and that gas-fired plants would have been economically obsolete if the price of gas had been deregulated and allowed to rise to its competitive market level. He criticized regulators for not providing utilities with adequate financial incentives to make what were then perceived to be needed investments. Peter Navarro, *The Soft, Hard, or Smart Path: Charting the Electric Utility Industry's Future Course*, PUB. UTIL. FORT., June 18, 1981, at 25-30. If regulators and utilities had followed Navarro's advice—advice that may have been quite sound at that time—the stranded cost problem today would be worse than it actually is. Navarro also advised regulators to provide credible

regulatory commitments to allow utilities to recover their investment and operating costs plus an adequate return on their investments to provide better investment incentives. This is precisely the kind of commitment that Navarro is now arguing that regulators should break. Finally, Navarro apparently does not understand that a significant fraction of stranded costs is associated with long-term contracts utilities were legally obligated to sign by federal and state laws and mandatory regulatory cost accounting rules that stretched out recovery of certain costs for many years longer than would have been the case in a competitive electricity market.

7. Of course, if public policy does not deal properly with the recovery of stranded costs, it could adversely affect future supply costs if it undermines the credibility of regulatory commitments and the sanctity of contractual promises, leading to higher required rates of return and investments in more costly but less capital-intensive projects. For a discussion of the role of credible contractual commitments in supporting least-cost investments, *see* Paul L. Joskow, *Contract Duration and Relationship Specific Investments*, AM. ECON. REV., March 1987.

8. There are some costs that will be incurred in the future that are not avoidable. These include obligations under long-term purchased power contracts, nuclear decommissioning costs, and environmental cleanup costs associated with past actions (e.g., cleanup of Superfund sites).

9. For simplicity, I have specified $s as a lump sum charge. But this assumption is not critical for ensuring that stranded cost recovery is competitively neutral. The stranded cost charges can be recovered through demand and energy charges as long as the charges are based on the customer's aggregate metered consumption and not on which generator or retailer the customer has chosen to be its generation supplier.

10. Stranded cost recovery should not be dependent on whether or not specific generators continue to produce. Retirement may be the most economical decision for some plants. A stranded cost recovery rule that is contingent on continued operation of a plant could lead to competitive distortions by creating incentives to keep plants running that should be retired.

11. Contrary to what might be inferred from Navarro's discussion, however, if the measurement process does create competitive distortions, these distortions are not eliminated or necessarily even reduced by adopting a rule that utilities should recover 75 percent or 50 percent of their stranded costs rather than 100 percent.

12. Sunk cost commitments include commitments to pay for nuclear decommissioning costs, to honor purchased power contracts, and to pay for environmental cleanup costs associated with past actions. They may also include certain ongoing costs incurred by a utility to meet mandated service obligations and transition costs associated with closing or selling a generating unit.

13. The sunk costs of fossil generating facilities may be a good approximation of their stranded costs in regions of the country where there is substantial excess capacity, capacity values are close to zero and the price of energy has been driven to average fuel and variable O&M costs. In this case, the stranded costs for nuclear units would have to include the depreciated book investment in the units plus the sunk commitments for future decommissioning costs whose magnitudes will not be known until they are realized.

14. Stranded costs associated with "regulatory assets" such as deferred taxes, premiums on reacquired debt, post-retirement health care benefits, etc., are much easier to measure since these "assets" produce no electricity in the future and incur no avoidable costs. The accounting values for such "regulatory assets" can be included directly in the utility's potentially stranded cost.

15. My preference would be to handle regulatory assets as a separate stranded cost category and not go to the trouble of trying to allocate these balance sheet items to different production categories.

16. The only exceptions here would be future costs which represent sunk commitments associated either with past behavior or ongoing regulatory obligations.

17. Note that this is in fact the calculation that is done administratively when we use the "up-front" approach to estimating the net present value of the operating income produced by the electricity expected to be supplied from utility generating facilities (discussed above), and then subtract this net present value figure from the book value of these facilities to get the capitalized value today of the potentially stranded cost associated with these generators. As discussed earlier, the problem here is accurate measurement of the relevant market price and avoidable cost variables up front. The asset valuation approach that relies on comparable sales or an auction relies on market participants to estimate the future revenues and costs that the asset will achieve and to apply their own discount rates to these estimates to formulate their bids.