

Stranded Assets and Transition Costs

William W. Hogan

*Mossavar-Rahmani Center for Business and Government
John F. Kennedy School of Government
Harvard University
Cambridge, Massachusetts 02138*

**Harvard Electricity Policy Group
Cambridge, MA**

June 8, 2021

STRANDED ASSETS

Cost Exposure

One definition of stranded costs captures the major issues. It could be expanded to include costs of assets that have been constrained by public policy.

“Stranded Costs are the book costs of existing utility investments that have traditionally been recovered in a regulated utility’s rates but would not be recoverable in a competitive market. In essence, in a competitive market, a utility cannot charge a price high enough to recover stranded costs because rivals will be willing to supply electricity at a lower price. An example of the costs that would be stranded in a transition to competition are those associated with nuclear power plants that cost far more to build than conventional power plants.”¹

The treatment of stranded costs depends on many issues, but a key element is the role of public policy outside of typical market forces.

¹ Sheldon Silver, Michael J. Bragman, and Paul D. Tonko, “Shedding Light on the Governor’s Failed Electric Utility Restructuring,” A Briefing Paper on Moving to Competition in the Electric Industry, New York State Assembly, 1999.

The history of stranded assets in the energy transitions is long and varied. Now, with the Green Agenda, will the experience be different and can we learn from the past?

Stranded Assets: This Time is Different.

Reinhart and Rogoff subtitled **This Time is Different** to describe “Eight Centuries of Financial Folly” and the durability of hope over experience.² Material changes in relative market economics for long-lived assets create the problem of stranded assets. Wise investors look ahead to avoid or insure against such losses, but sophisticated investors have been surprised in the past. For energy, the regulatory compact implies symmetry under cost-based regulation, but the record presents a history of prominent challenges. Before electricity, natural gas restructuring found interstate pipelines with out-of-market take-or-pay costs estimated at the time at 40% of their book value. The FERC settlement process applied rough justice to the painful allocation between pipelines and their regulated customers. In electricity restructuring, the early days were dominated by stranded assets, and policy discussions were distorted for years by the implications for who would pay for stranded assets. Questions remain regarding short- and long-term effects. Today’s clean energy agenda is changing the mix of assets in ever more profound ways, shifting toward a more capital-intensive industry. Developers of new projects, and state politicians who favor them, argue that long-term contracts or rate-base arrangements, that shift stranded-cost risk to consumers, will mean lower costs of financing and an assurance that the projects will be constructed. How does one weigh those benefits against the risk that consumers will pay for something that long before the contract has ended is well out-of-the-money? Stranded assets that have been the focus of attention will likely grow, and it would take historic optimism to assume that new stranded assets will not appear across all sectors of the electricity system. What is being done now to deal with existing stranded assets? Will out-of-market costs become a bigger problem in the future? What is the split of responsibility between private investors and regulators representing regulated customers? Given the prominence of stranded assets in the past, are we hoping that this time is different?

² Carmen M. Reinhart and Kenneth S. Rogoff, [This Time Is Different: Eight Centuries of Financial Folly](#), Princeton University Press, 2009,

STRANDED ASSETS

Cost Exposure (1994)

In a competitive market, price is set not by average cost but by the equilibrium in the market. The difference between the competitive market value and the regulated book value is the value of the potential stranded asset. For many companies, the value of the total potential stranded assets is larger than the book equity of the firm.

- **Power Plants.** In the competitive world, the price of the power from expensive power plants is determined in the wholesale market for the commodity energy output. In a market like that of many regions of the U.S., where there is excess capacity and many available sources of power supply, the market price may be relatively low, too low to support the historical capital costs of the existing power plants.
- **NUG Contracts.** Nationwide, non-utility generators (NUGs) have responded vigorously to the PURPA legislation of 1978 and to subsequent state legislative and regulatory initiatives. The majority of new generation built in recent years or currently planned new capacity is from NUGs. Many of these contracts include prices that are well above the marginal cost of energy in the current market.
- **Other Regulatory Assets.** Regulatory assets are accounting concepts; their value rests on the strength of a state regulatory decision to allow future recovery of certain costs from ratepayers. The assets are on the books, but require regulation to retain their value. Examples include capitalized demand-side management expenditures, deferred taxes and capitalization of retirement obligations.

REGULATORY TRANSITION

Cost of Shifting Costs (1994)

In part, the public policy motivation for developing a transition strategy depends on the potential magnitude of these costs of allocating sunk costs. Preliminary review suggests the priorities:

- **Transition Overhead Costs.** Meetings and other overheads are comparatively cheap.
- **Price Distortions.** With relatively low elasticities of demand given the existing stock of electricity-using equipment, the short-term price distortions are small. This is a frequent result in economic analyses of the "deadweight" loss of short-term mispricing.
- **Bankruptcy and Financial Health.** Pre-bankruptcy costs could be large, but post-bankruptcy costs tend to be small or non-existent. This is a common argument for quick reorganization of troubled companies.
- **Credibility of Government.** The potential impact is large, but there is a familiar public goods problem: the independent effect on electricity is likely to be difficult to estimate.
- **Transition Cooperation.** The experience in railroads and other industries suggest that this cost could be very large. *Managers at many companies are "mesmerized" by the stranded asset problem.* Reallocation of the pie may be far more important to each individual interest group, even though collectively the disputes will delay and constrain the benefits of a more efficient electricity market. (emphasis added)

RECOVERY OF SUNK INVESTMENTS

Overview (1994)

The recovery of sunk investments that are stranded assets is a key issue in the transition to a competitive generation market.

- If stranded asset costs are large and recovery is not envisioned, any smooth transition to a deregulated generation market would be thwarted and costs increased.
- The transition to a competitive generation market is not a zero-sum game. The greater the costs savings that accompany the transition to competition, the easier the transition to a competitive market will be for customers, regulators, and utilities. If operating costs fall, rates can be lower than under current regulatory projections.
- Recovery of sunk costs need not forestall a transition to a more competitive market. The goal here is to design recovery mechanisms that are compatible with competition.
- If stranded costs are to be recovered in a more competitive market, the costs must be collected through a monopoly segment. The most direct mechanism is through access fees for connection to the wires, or a functional equivalent.

ELECTRICITY MARKET

Natural Gas Restructuring

Transformation of the natural gas industry started with well-head price deregulation and then addressed pipeline transmission. Over time, prices ceilings were removed and pipelines were required to establish open access. The principles established helped set the stage for open access and non-discrimination in electricity. (www.energy.gov)

- **Natural Gas Policy Act of 1978.** From 1938 to 1978, the Federal government regulated only the interstate natural gas market. The Natural Gas Policy Act of 1978 (NGPA) granted the Federal Energy Regulatory Commission (FERC) authority over intrastate as well as interstate natural gas production. The NGPA established price ceilings for wellhead first sales of gas that vary with the applicable gas category and gradually increase over time. Second, it established a three-stage elimination of price ceilings for certain categories: the price ceilings for certain "old" intrastate gas were eliminated in 1979, for certain "old" interstate gas and "new" gas in 1985, and for certain other "new" gas in 1987.
- **Maryland Peoples Counsel Case in 1985.** DC Circuit appeals case (761 F.2d 768) eliminated discriminatory "special marketing programs." The ruling left a legacy of high price contracts that could not be sustained in a market.
- **FERC Order 436 in 1985.** Made it easier for LDCs and other companies to buy gas directly from producers and other parties. However, it led only to partial restructuring of the industry because pipeline companies were encouraged, rather than required, to provide open access service
- **FERC Order 500 in 1987.** Established provisions for the pass-through of some take-or-pay costs to customers other than through a rate case. Required a pipeline company to absorb between 25 and 50 percent of these costs.
- **FERC Order 636 in 1992.** Required pipelines to unbundle (i.e., separate) their sales services from their transportation services.

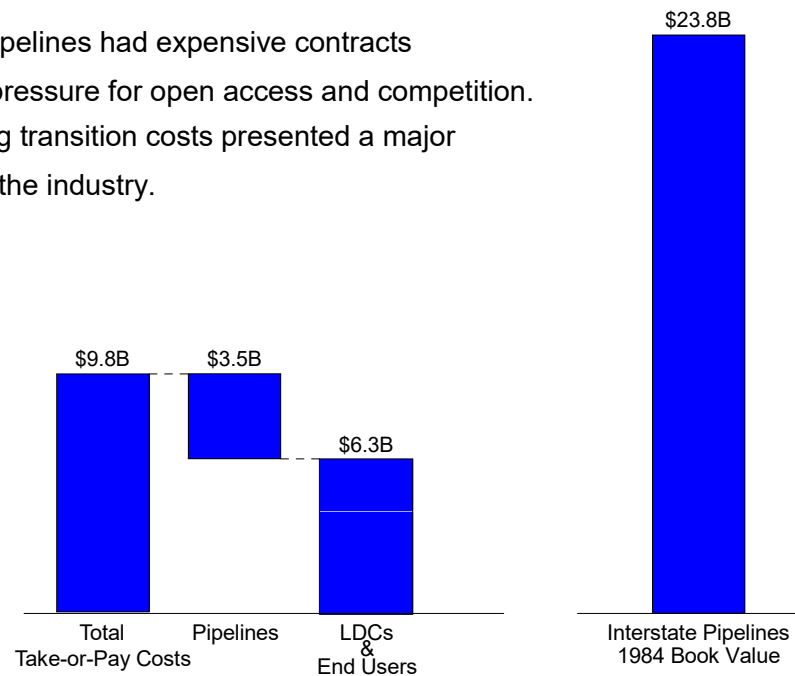
ELECTRICITY MARKET

Natural Gas Restructuring

Natural gas prices declined. The legacy of high price contracts produced a large “take-or-pay” overhang that had to be addressed as part of the transition.

GAS RESTRUCTURING IMPOSED TRANSITION COSTS

Interstate Pipelines had expensive contracts which built pressure for open access and competition. The resulting transition costs presented a major problem for the industry.



Source: FERC Annual Report (1991); EIA Statistics of Interstate Pipelines (1990)

ELECTRICITY MARKET

Nuclear Power Problems

In the electricity system, the record of nuclear power mishaps contributed to the changing view of energy costs and pressure for greater reliance on markets than central planning.

- **Three Mile Island.** On March 28, 1979, the Three Mile Island Unit 2 (TMI-2) nuclear power plant near Middletown, Pennsylvania, suffered a partial core melt. (Nuclear Regulatory Commission, Annual Report - 1979, NUREG-0690, Washington DC.)
- **Whoops.** In 1983 Washington Public Power Supply System defaulted on \$2.25 billion of bonds due to inability to complete five nuclear reactors. "It was the largest municipal bond default in U.S. history." (Myhra, David. 1984. Whoops!/WPPSS: Washington Public Power Supply System Nuclear Plants. Jefferson, NC: McFarland)
- **Seabrook.** PSNH filed for bankruptcy in 1988 after the courts barred it from passing along the Seabrook 2 costs to its customers. (Encyclopedia.com)
- **Shoreham.** In 1989 the final deal ended the saga of the Shoreham nuclear power plant on Long Island. Over \$6 billion dollars installed cost, and no electricity. (Jonathan Koomeya, Nathan E. Hultma "A reactor-level analysis of busbar costs for US nuclear plants, 1970–2005," *Energy Policy*, Volume 35, Issue 11, November 2007, Pages 5630–5642.)

ELECTRICITY MARKET

Electricity Restructuring

Not all the turmoil in the electricity transition produced stranded assets. The key distinction is the symmetry of risk and rewards and the impacts of public policy.

“Besieged by creditors and crippled by the sagging wholesale power market, Calpine Corp. lost almost \$10 billion in 2005 as it filed for U.S. Bankruptcy Court protection, the company said Friday.

The San Jose company’s loss included \$4.5 billion in noncash write-offs for plants and projects that have plummeted in value, as well as \$5 billion in reorganization and bankruptcy costs, according to the 2005 financial report filed with the Securities and Exchange Commission.

Calpine, which on Dec. 20 filed the nation’s eighth-largest Chapter 11 bankruptcy case, operates 41 power plants in California and 51 elsewhere in North America. Those operations lost \$708 million in 2005, in contrast with producing income of \$9.9 million a year earlier, the company said.”³

Calpine adopted a business strategy and would enjoy high rewards if successful and would face the costs if the market turned out to be different than expected. This is quite different than the situation where public imposes asymmetric risks.

³ Los Angeles Times, May 20, 2006

ELECTRICITY MARKET

Reality Tests and Guaranteed Surprise

A passing reflection on history reinforces the view that there is great uncertainty about energy technology choices for the future. There are many examples of both bad and good surprises.

TVA'S NUCLEAR PLANT AUCTION SET FOR NOVEMBER

“The Tennessee Valley Authority, in apparently a first in the US power industry, plans to auction its unfinished Bellefonte nuclear plant in Alabama on November 14 in what amounts to a “fire sale” of epic proportions.

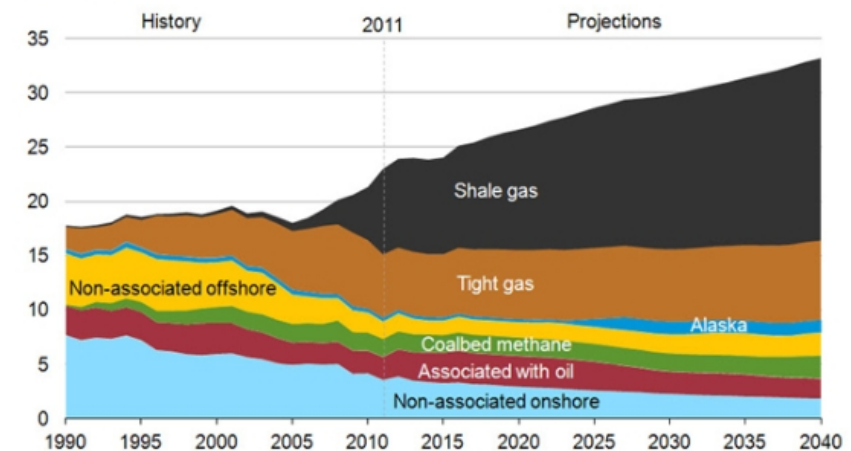
Over more than four decades, an estimated \$6 billion was pumped into the project imagined at a time of far different economic and electricity projections and expectations. Bellefonte's minimum asking price — \$36.4 million.”

(Megawatt Daily, October 18, 2016, p. 3)

U.S. Shale Miracle:

Once the technology crossed the market threshold, deployment was both large and rapid.

U.S. dry natural gas production
trillion cubic feet



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013 Early Release*

Good wholesale electricity market design is necessary to provide open access with non-discrimination principles that encourage entry and innovation.

ELECTRICITY MARKET

Subsidies and Market Interventions

If you are willing to spend enough money, you can make anything look cheap.

“Subsidies pose a more general problem in this context. They attempt to discourage carbon-intensive activities by making other activities more attractive. One difficulty with subsidies is identifying the eligible low-carbon activities. Why subsidize hybrid cars (which we do) and not biking (which we do not)? Is the answer to subsidize all low carbon activities? Of course, that is impossible because there are just too many low-carbon activities, and it would prove astronomically expensive. Another problem is that subsidies are so uneven in their impact. A recent study by the National Academy of Sciences looked at the impact of several subsidies on GHG emissions. It found a vast difference in their effectiveness in terms of CO₂ removed per dollar of subsidy. None of the subsidies were efficient; some were horribly inefficient; and others such as the ethanol subsidy were perverse and actually increased GHG emissions. The net effect of all the subsidies taken together was effectively zero!”

So in the end, it is much more effective to penalize carbon emissions than to subsidize everything else.” (Nordhaus, 2013, p. 266)

“Subsidies are contagious. Competition in the markets could be replaced by competition to receive subsidies.” (Monitoring Analytics, 2017, p. 2)

Subsidies also create the problem of future stranded assets.

There is a large range of possible strategies. In general, practical approaches will be hybrids that include many components. The list should be expanded. It is being fleshed out in many analyses underway around the country.

- **Cold Turkey.** If government could act unilaterally and there were no costs of shifting costs, a quick transition would be possible, with no consideration for the allocation of sunk costs. There would be large regulatory and financial writedowns.
- **Delay.** If competitive pressures can be contained, delay of implementation of a more efficient, open access electricity market would allow gradual working off of excess costs and excess capacity.
- **Surcharges.** The residual monopolies of the "wires" businesses will continue to be regulated. Ultimately these monopoly segments are the only place to collect surcharges that allow for full open access competition for wholesale commodity electricity and simultaneous recovery of sunk costs that are above market. There are two broad approaches to identifying and implementing surcharges.

Bottom Up. Following the accounting conventions of traditional cost-of-service regulation, adjust depreciation rates, revalue assets, reassign costs, etc.

Top Down. Start with the acceptable final rate to customers and then separate the cost of commodity energy from all other costs for the final "pipe." Apply some combination of price cap and cost of service over the transition.

Progress with the transition to an efficient, open access electricity market requires or implies a set of arrangements for dealing with the stranded assets. Further research and analysis can help in several areas:

- **Theory.** Develop further the conceptual basis for a distinction between transition in cost-of-service regulated industries and transitions in competitive markets.
- **Motivation.** Develop further the outline and analysis of the cost of shifting costs to provide the information needed to evaluate the tradeoffs in fashioning a transition strategy.
- **Strategy.** Elaborate the range of options for allocating and recovering sunk costs, and search for transition paths and decisions that are compatible with the long-run goal of encouraging a more efficient electricity market.

References

Monitoring Analytics (2017) *2016 State of the Market Report for PJM*. Available at:

http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016/2016-som-pjm-volume2.pdf.

Nordhaus, W. D. (2013) *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World*. New Haven: Yale University Press. Available at:

http://books.google.com/books?hl=en&lr=&id=YfzYAQAAQBAJ&oi=fnd&pg=PT7&dq=The+Climate+Casino:+Risk,+Uncertainty,+and+Economics+for+a+Warming+World&ots=g2IR0lTh_s&sig=FMS8QxAOSGvw7pfCZugeOwjoX-E (Accessed: 1 January 2014).

William W. Hogan is the Raymond Plank Research Professor of Global Energy Policy, John F. Kennedy School of Government, Harvard University. This paper draws on research for the Harvard Electricity Policy Group and for the Harvard-Japan Project on Energy and the Environment. The author is or has been a consultant on electric market reform and transmission issues for Allegheny Electric Global Market, American Electric Power, American National Power, Aquila, AQUIND Limited, Atlantic Wind Connection, Australian Gas Light Company, Avista Corporation, Avista Utilities, Avista Energy, Barclays Bank PLC, Brazil Power Exchange Administrator (ASMAE), British National Grid Company, California Independent Energy Producers Association, California Independent System Operator, California Suppliers Group, Calpine Corporation, CAM Energy, Canadian Imperial Bank of Commerce, Centerpoint Energy, Central Maine Power Company, Chubu Electric Power Company, Citigroup, City Power Marketing LLC, Cobalt Capital Management LLC, Comision Reguladora De Energia (CRE, Mexico), Commonwealth Edison Company, COMPETE Coalition, Conectiv, Constellation Energy, Constellation Energy Commodities Group, Constellation Power Source, Coral Power, Credit First Suisse Boston, DC Energy, Detroit Edison Company, Deutsche Bank, Deutsche Bank Energy Trading LLC, Duquesne Light Company, Dyon LLC, Dynegy, Edison Electric Institute, Edison Mission Energy, Electricity Authority New Zealand, Electricity Corporation of New Zealand, Electric Power Supply Association, El Paso Electric, Energy Endeavors LP, Exelon, Financial Marketers Coalition, FirstEnergy Corporation, FTI Consulting, GenOn Energy, GPU Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd., GDF SUEZ Energy Resources NA, Great Bay Energy LLC, GWF Energy, Independent Energy Producers Assn, ISO New England, Israel Public Utility Authority-Electricity, Koch Energy Trading, Inc., JP Morgan, LECG LLC, Luz del Sur, Maine Public Advocate, Maine Public Utilities Commission, Merrill Lynch, Midwest ISO, Mirant Corporation, MIT Grid Study, Monterey Enterprises LLC, MPS Merchant Services, Inc. (f/k/a Aquila Power Corporation), JP Morgan Ventures Energy Corp., Morgan Stanley Capital Group, Morrison & Foerster LLP, National Independent Energy Producers, New England Power Company, New York Independent System Operator, New York Power Pool, New York Utilities Collaborative, Niagara Mohawk Corporation, NRG Energy, Inc., Ontario Attorney General, Ontario IMO, Ontario Ministries of Energy and Infrastructure, Pepco, Pinpoint Power, PJM Office of Interconnection, PJM Power Provider (P3) Group, Powerex Corp., Powhatan Energy Fund LLC, PPL Corporation, PPL Montana LLC, PPL EnergyPlus LLC, Public Service Company of Colorado, Public Service Electric & Gas Company, Public Service New Mexico, PSEG Companies, Red Wolf Energy Trading, Reliant Energy, Rhode Island Public Utilities Commission, Round Rock Energy LP, San Diego Gas & Electric Company, Secretaría de Energía (SENER, Mexico), Sempra Energy, SESCO LLC, Shell Energy North America (U.S.) L.P., SPP, Texas Genco, Texas Utilities Co, Tokyo Electric Power Company, Toronto Dominion Bank, Transalta, TransAlta Energy Marketing (California), TransAlta Energy Marketing (U.S.) Inc., Transcanada, TransCanada Energy LTD., TransÉnergie, Transpower of New Zealand, Tucson Electric Power, Twin Cities Power LLC, Vitol Inc., Westbrook Power, Western Power Trading Forum, Williams Energy Group, Wisconsin Electric Power Company, and XO Energy. The views presented here are not necessarily attributable to any of those mentioned, and any remaining errors are solely the responsibility of the author. (Related papers can be found on the web at www.whogan.com).