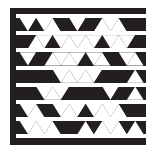


Decommissioning Obsolete Power Plants **WHY DO IT NOW?**

By Edward Malley and David Zarider



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For electric generating companies (GENCOs), these are critical times. Electric power production is dominated by an aging fleet of power plants. Evolving energy demand and energy feedstock patterns are altering the economics of power plant operations. Regulations are emerging rapidly that create both compliance obligations and compliance opportunities for GENCOs. It is because of this unprecedented level of economic and regulatory change, that future of industry will be won by those who address these issues in a strategic and decisive fashion.

The United States electric generating market will soon belong to low-cost producers of clean energy. The 6,275 electric power plants in the U.S. average more than 40 years of service. These GENCOs continue to actively maintain antiquated and economically marginal plants and must therefore pay high operating and maintenance costs. This profile is not sustainable indefinitely.

Meanwhile, the pace of change is robust. The price of gas, a cleaner fuel, has become competitive with coal. Domestic gas supplies, with the advent of the shale plays, are plentiful. The EPA as well as several state regulatory entities have proposed new regulations that will ultimately lead to the installation of expensive retrofits, the creation of offset credits, or closure of marginal plants. Most states have even established renewable objectives that establish targets that shift energy generation portfolios of regulated utilities toward technologies such as wind, solar and biofuels. Traditional GENCOs have the best opportunity to trim costs, reduce emissions and become profitable after many years of difficult market conditions by rationalizing capacity, adjusting portfolios of power generation, and ultimately, closing less efficient power plants.

Why Decommission Now?

GENCOs are reluctant to decommission existing conventional power production because they do not want to give up generating sites, or because they can't yet make sense out of the uncertain regulatory and economic environment. Replacing power generation portfolios is not a short-term activity. It takes years to seek permission to close plants, decommission facilities, to address fuel

shifting issues, and ultimately to permit and construct new capacity. Progressive-thinking GENCO managers will find ways to install new capacity at existing sites and then close outdated plants starting today.

Decommissioning antiquated power plants is an essential step in the new generation development process. It is often the one that requires the most time to plan. There are often complications that arise with closing permits, addressing environmental issues above the surface, below grade, and in ancillary facilities such as coal ponds. It is because of the lead times that characterize any decommissioning process, that elements of work must be deemed to be on the critical path for any plant modernization upgrade. Any actions contemplated today may take years to fully implement.

Natural Gas Fuel Substitution - A Clear Economic Driver

From an economic perspective it is the conversion of coal fired plants to natural gas that will be the largest economic driver. It is not unlikely that oil fired plants and other antiquated production sources will be immune from the process. The common rationale for closures will be that better economic alternatives are available. Some of these changes have already begun. Much more is necessary.

Modern combined cycle gas turbine technology is simply more efficient in the requirement for heat energy in the conversion to electricity (8,500 BTU per KWHr) than conventional steam or combustion turbine technology (>10,000 BTU per KWHr). This has not gone unnoticed in the industry, Coal-fired electric generation declined by 11 percent to 44.5 percent in 2009, from 48.2 percent in 2008. Over the last 10 years, the number of coal-fired plants has decreased from 645 to 594. (Much of this production capacity might be idled, but not yet decommissioned). Their use decreased from 72 percent in 2003 to 64 percent in 2009. Several factors have eroded the advantage that coal-fired generation had historically enjoyed because of its lower fuel costs. These factors include lower natural gas prices and higher coal prices; surplus capacity at efficient natural gas plants; and the cost of

complying with current environmental regulations. From 2013 to 2018 additional regulations will likely go into effect. They are expected to force retrofitting or retirement of approximately 60-to-100 GWs of capacity, or about 100 coal-fired power plants.

Natural gas-fired power generation increased by 4.3 percent in 2009, increasing its share of the electricity market to 23.3 percent—its highest share since 1970. The number of natural gas-fired plants has increased from 1,576 to 1,675. Gas fired generation capacity has increased from 33 percent in 2003 to 42 percent of the U.S. fleet in 2009.

Renewable generation made up 10.6 percent of total generation in 2009. The largest three contributors were hydro (6.9 percent) and wind (1.9 percent), followed by wood and wood-derived fuels (0.9 percent). Discounting the hydro portion, renewable generation made up 3.6 percent of total generation.

Eventually the shifts toward natural gas production will become site constrained. Existing inefficient production properties are an ideal location for new production.

Three Factors Favor Decommissioning Demolition

Economic, environmental and corporate social responsibility concerns justify decommissioning and demolition of obsolete power plants.

For competitive power generators, Environmental Protection Agency (EPA) rules will cause GENCOs to close marginal plants and rationalize over-capacity. Eventually, commodity prices for coal and gas will reach new equilibrium (Credit Suisse, 2010) Merchant generators will make rational business decisions to be the low-cost provider of energy in the markets they serve. Since the cost of retrofitting coal plants (\$700/KW) is similar to the cost of rebuilding new gas plant capacity (\$900/KW) and the operating costs of gas turbine technology is much lower than retrofit technology, competitive power generators will almost always benefit by rebuilding new capacity.

Regulated utilities have an earnings growth opportunity as they manage their higher-emitting plants through a combination of retrofitting old coal-fired plants with scrubbers and building new gas-fired or renewable energy plants. Regulated utilities are required to provide a reliable electric supply at a reasonable price, and their evaluation may consider economic, fuel mix and other factors. Many older generating facilities are fully depreciated and do not

provide investors with a return on equity. Since regulated utilities earn a return on equity through the consumer rate base, new investment will drive profit growth.

Fuel cost profiles have changed dramatically. Oil is currently \$16/MMBTU (one million BTUs), natural gas is \$3.40/MMBTU and coal is about \$2/MMBTU. Combined Cycle Gas Turbine technology is 30 percent more efficient than steam turbine technology, reducing the coal price advantage without expensive emission controls.

Maintaining old power plants, even in a mothballed state, is expensive. Costs include, at a minimum, management, labor, security, environmental compliance and taxes. While these dated plants can run as peaking units and recover operating costs at elevated spot market electricity rates, running new and more efficient plants as peakers can result in even greater profits. Furthermore, removing many of the small, high polluting plants enables remaining cleaner, more efficient plants to offset costs associated with plant closures.

The cost of decommissioning and demolition is relatively small (\$10/KW plus remediation less salvage) compared with the cost of retrofit or rebuild. Scrap and salvage alone may be valuable enough to offset demolition costs. Competitive power generators and regulated utilities may seek to avoid these costs or defer them until they can confirm a future use. Meanwhile, generating companies pay increased operating costs to maintain these older and less efficient mothballed generating plants.

Clean is Not Cheap

The federal EPA and individual states have proposed new regulations that will affect air emissions, cooling water and coal combustion residues. Specifically, the EPA has enacted the “Greenhouse Gas (GHG) Tailoring Rule” focused on large facilities emitting more than 25,000 tons of greenhouse gases a year. These facilities would be required to obtain permits that demonstrate the use of best practices and technologies to minimize GHG emissions. The “tailoring” rule proposes new thresholds for greenhouse gas emissions that define when Clean Air Act (CAA) permits must be obtained under the New Source Review (NSR) and Title V operating permit programs for new or existing industrial facilities. These thresholds would “tailor” the permit programs to limit which facilities would be required to obtain NSR and Title V permits and would cover nearly 70 percent of the national GHG emissions that come from stationary sources, including those from the nation’s largest emitters (i.e., power plants, refineries, and cement production facilities).

Additionally, the EPA has promulgated one-hour ambient air quality standards for sulfur dioxide and nitrogen dioxide, both several times more restrictive than the standards they have replaced. It would seem that the one-hour SO₂ standard is specifically targeting emissions from large coal and heavy fuel oil fired generating facilities since it is unlikely the high SO₂ emissions from older generating units can achieve compliance with these very stringent air quality standards.

The current schedule for draft and final rules, and the number of impacted plants is as follows:

Timeline for Potential EPA Regulations Impacting the Electric Industry

Proposed Rule	Draft Rule	Final Rule	Implementation	Impacted Plants
Clean Air Transport Rule – SO _x and NO _x limitations	July 2010	April 2011	2012 – 2018	86 Coal Plants >25 MW in 31 States
Cooling Water Intake §316(b) Best Technology Available	June 2011	July 2012	2014 - 2018	253 Oil/Gas Steam Units 94 Coal Steam Units
Clean Air Act NESHAPS Standards for Hazardous Air Pollutants - Mercury MACT Rule	March 2011	November 2011	2012 - 2015	59 Coal and Oil Fired Plants
Coal Combustion Residues	April 2010	2011	2014 - 2018	Handful of Plants are Vulnerable
Mandatory Reporting of Greenhouse Gas Emissions	October 2009	December 2010	Current	None – Monitoring Only at this Time

The U.S. coal plant inventory and air pollution controls are characterized as follows:

US Coal Fleet	Nameplate Capacity	% of Capacity
Coal Plants with no air emission controls	103 GW	31%
Coal Plants with scrubbers but no SCRs	65 GW	19%
Coal plants with SCRs but not scrubbers	58 GW	17%
Coal Plants with all major pollutions controls	114 GW	34%
Total US Coal Fleet	340 GW	100%

Clean is not cheap (Credit Suisse, 2010). To meet the proposed air emission rules, GENCOs must install flue gas de-sulfurization scrubbers for sulfur oxides (SO_x) removal, selective catalytic reduction systems for nitrogen oxides (NO_x) removal and activated carbon injection for mercury removal. For eastern plants burning bituminous coal, estimated capital costs for retrofit scrubber/SCR /activated carbon technology are \$450 – \$700 per KW of capacity plus operating costs of \$3 per MWhr. For western plants burning sub-bituminous coal, estimated capital costs are lower, at \$150 per KW, but operating costs are higher at \$5 per MWhr. Closed-loop cooling water systems are also expensive at \$150 per KW. Retrofit costs are comparable to new build costs (\$1,000 per KW) for combined cycle gas turbine technology, which has lower emissions and operating costs than coal plants.

The above referenced inventory of air compliance requirement ignores one of the big areas of uncertainty in the regulatory environment, the cost of closing coal ponds. Whether there are EPA guidelines in place that treat the residue as a recyclable product, hazardous waste, or a classification determined on a case by case basis, the costs of these closures can potentially be as expensive as the dismantlement of the power plants themselves.

Avoiding compliance issues only serves to delay project development options. Regulatory ambiguity will always exist. It is only by directly developing site specific closure strategies that new generation can be developed.

Aging Fleet Threatens GENCO mission

Discussing corporate social responsibility in their mission statements, GENCOs maintain that they exist to deliver electricity safely, reliably, efficiently and in an environmentally sound manner; to provide a fair return to investors; and to improve the quality of life in communities they serve.

Without question, GENCOs deliver electricity with excellent safety records. However, our aging fleet is not as reliable, efficient or clean as modern technology. GENCOs will be forced to retire their oldest fleet assets because of mechanical breakdowns, economics or high emissions that do not comply with new ambient air quality standards.

This trend is already well underway, as demonstrated by coal's share of the market declining from 48 percent to 42 percent. Gas and renewable energy sources have filled this gap. It no longer makes sound business sense to extend the useful life of out-of-date facilities by deferring best available technology. Nor is it sound strategy to run less-efficient plants and risk pricing them out of the market.

TRC's resume speaks to its experience in power plant decommissioning and demolition. Our approach is holistic and therefore helps focus on the real objective, new generation as quickly and as effectively as possible. We have helped decommission power plants from California to New York.

TRC encourages GENCOs to move forward with their plans to rationalize capacity, modernize their fleets, cuts costs and reduce emissions.

There is no time to lose. The time to act is now.

Ed Malley and Dave Zarider are senior TRC executives and manage the company's REPOWER™ program.

CONTACT INFORMATION

Edward Malley
646.522.6488
emalley@trcsolutions.com

Dave Zarider
949.466.3146
dzarider@trcsolutions.com

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TRC Can Help Right Now

As stated at the top of this paper, the U.S. electric generating market belongs to low cost producers of clean energy. GENCOs continuing to use 40-year old technology will suffer the same fate as other producers who fail to keep up with the state of the art. Industry experts currently estimate closure of 50 GWs of capacity over the next 10 years, and increased industry profits because of closing less efficient power plants.

Decommissioning and demolition should be considered. TRC offers REPower playbooks, plans and specifications and full turnkey solutions for power plant closure projects.

Our services include:

- Asset Recovery
- Asbestos and Hazardous Materials Assessments
- Structural Evaluation
- Permit Identification and Regulatory Approval Strategies
- Community Relations
- Plans and Specifications
- Procurement Support
- Construction Support Services
- Full Turnkey Solutions with LVI Services, Inc.