

Synapse
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Coal-Fired Power Plant Construction Costs

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AUTHORS

David Schlissel, Allison Smith and Rachel Wilson



22 Pearl Street
Cambridge, MA 02139

www.synapse-energy.com
617.661.3248

Introduction

Construction cost estimates for new coal-fired power plants are very uncertain and have increased significantly in recent years. The industry is using terms like “soaring,” “skyrocketing,” and “staggering” to describe the cost increases being experienced by coal plant construction projects. In fact, the estimated costs of building new coal plants have reached \$3,500 per kW, without financing costs, and are still expected to increase further. This would mean a cost of well over \$2 billion for a new 600 MW coal plant when financing costs are included. These cost increases have been driven by a worldwide competition for power plant design and construction resources, commodities, equipment and manufacturing capacity. Moreover, there is little reason to expect that this worldwide competition will end anytime in the foreseeable future.

Cost Estimates for Proposed Coal-Fired Power Plants

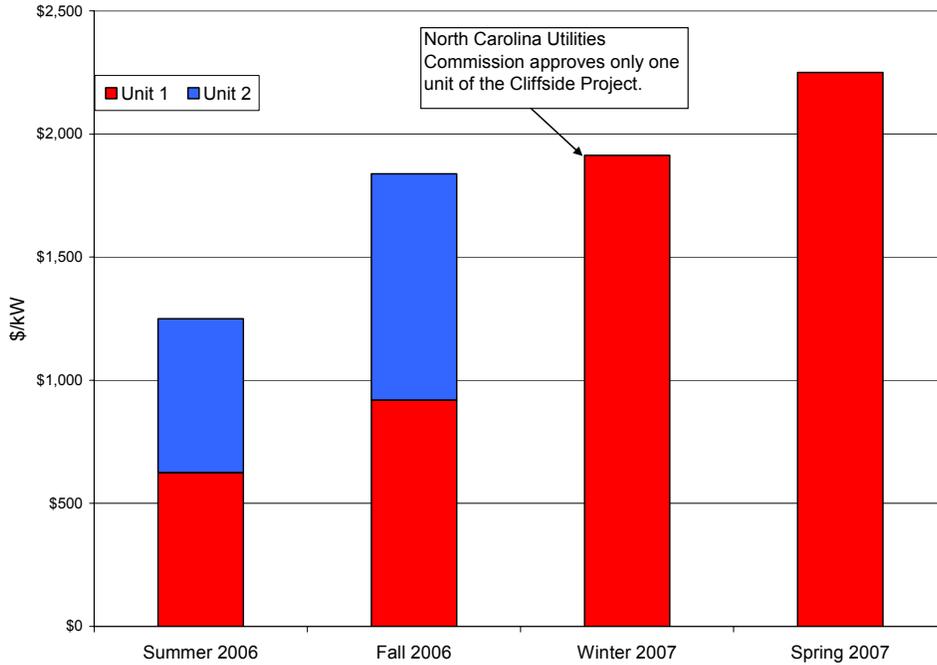
As recently as 2005, companies were saying that proposed coal-fired power plants would cost as little as \$1,500/kW to \$1,800/kW. However, the estimated construction costs of new coal plants have risen significantly since then.

The following examples illustrate the cost increases that proposed projects experienced in the past two or three years:

- Duke Energy Carolinas’ summer 2006 cost estimate for the two unit Cliffside Project was approximately \$2 billion. In the fall of 2006, Duke announced that the cost of the project had increased by approximately 47 percent (\$1 billion). After the project had been downsized because the North Carolina Utilities Commission refused to grant a permit for two units, Duke announced that the cost of the remaining single unit would be about \$1.53 billion, not including financing costs. In late May 2007, Duke announced that the cost of building the single Cliffside unit had increased by yet another 20 percent. As a result, the estimate cost of the one unit that Duke is building at Cliffside is now \$1.8 billion exclusive of financing costs. Thus, the single Cliffside unit is now expected to cost almost as much as Duke estimated for a two unit plant only two years ago in the summer of 2006.

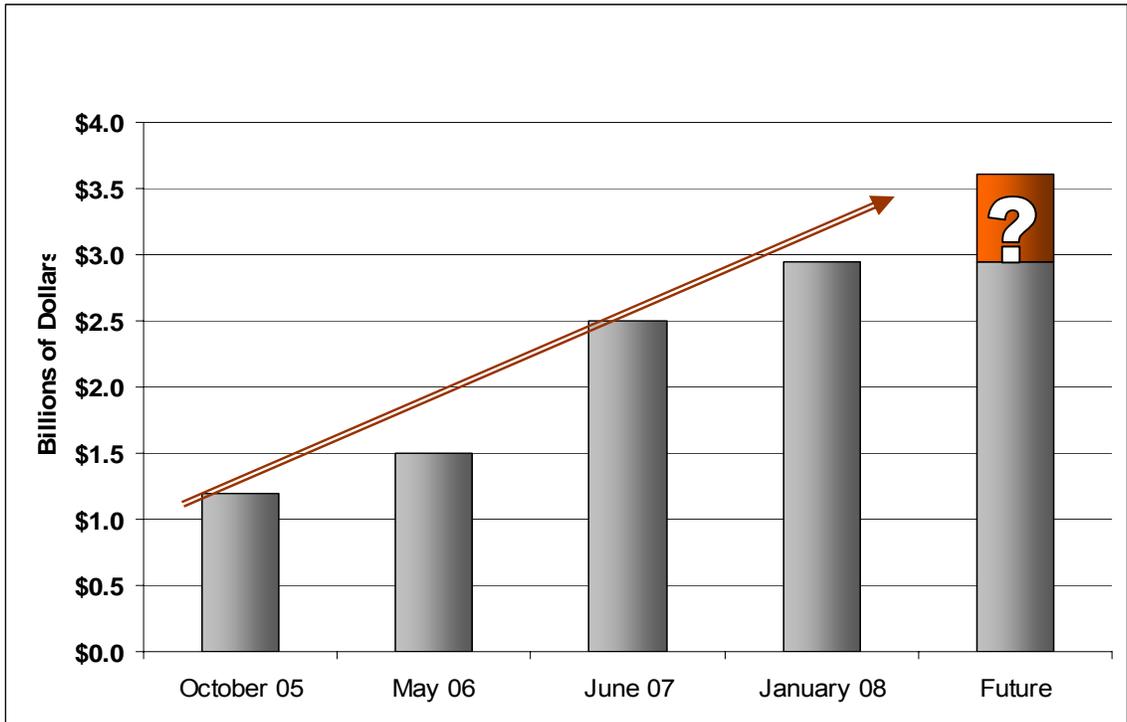
The increases in the estimated cost of the Cliffside Project are presented in Figure 1 below.

Figure 1: Duke Energy Carolinas Cliffside Project Cost Increases 2006-2007 (\$/kW)



- As shown in Figure 2 below, the estimated cost of AMP-Ohio's proposed 960 MW coal-fired power plant project nearly doubled between May 2006 and January 2008. The estimated cost increased by 15 percent in just the six months between June 2007 and January 2008. The estimated cost of the 960 MW plant is currently estimated at nearly \$3 billion, without any financing costs. This represents a construction cost of more than \$3,100 per kW. And the available evidence suggests that plant costs will continue to rise.

Figure 2: AMP-Ohio AMPGS Cost Increases 2005-2008 (\$)



- In mid-June 2008, Wisconsin Power & Light (“WPL”) announced a nearly 40 percent increase in the estimated cost of its proposed 300 MW Nelson Dewey 3 coal-fired power plant. The previous estimate had been prepared in late 2006. The estimated cost for this Circulating Fluid Bed plant is above \$3,500/kW, in early 2008 dollars. The company has similarly estimated that the cost of building a new supercritical coal plant also would exceed \$3,500/kW. In support of its new cost estimates, WPL presented testimony that noted that “EPC [Engineering, Procurement and Construction] pricing for other non-IGCC, primarily coal-fired generating projects under construction or in the planning stages have similarly increased with many projects falling in the \$2,500 to \$3,800/kW range, without AFUDC or uncommon owner’s costs (e.g., major railway additions).”¹
- In April 2008, Duke Energy Indiana announced an 18 percent increase in the estimated cost of its proposed Edwardsport coal plant just since the spring of 2007. Duke said that “the increase in the cost estimate is driven by factors outside the Company’s control, including unprecedented global competition for commodities, engineered equipment and materials, and increased labor costs.”² Duke noted in its Petition to the Indiana Utility Regulatory Commission that this

¹ Direct Testimony of Charles J. Hookham on behalf on Wisconsin Power & Light Company in Public Service Commission of Wisconsin Docket No. 6680-CE-170, June 2008, at page 21.

² Verified Petition in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-1, filed on May 1, 2008, at pages 3-4

projected increase in cost “is consistent with other recent power plant project cost increases across the country.”³

Nor are coal-fired power plants that are under construction immune to further cost increases. For example, Kansas City Power & Light just announced a 15 percent price increase for the latan 2 power plant that has been under construction for several years and is scheduled to be completed by 2010. This shows that one cannot assume that the cost of a plant will be fixed when construction begins.

Indeed, in the past utilities were able to secure fixed-price contracts for their power plant construction projects. However, it is not possible to obtain fixed-price contracts for new power plant projects in the present environment. The reasons for this change in circumstances has been explained as follows by a witness for the Appalachian Power Company, a subsidiary of American Electric Power in testimony before the West Virginia Public Service Commission:

Company witness Renchek discusses in his testimony the rapid escalation of key commodity prices in the [Engineering, Procurement and Construction] industry. **In such a situation, no contractor is willing to assume this risk for a multi-year project.** Even if a contractor was willing to do so, its estimated price for the project would reflect this risk and the resulting price estimate would be much higher.⁴ [Emphasis added.]

A fall 2007 assessment of AMP-Ohio’s proposed coal-fired power plant similarly noted that the reviewing engineers from Burns and Roe Enterprises:

agree that the fixed price turnkey EPC contract is a reasonable approach to executing the project. However, the viability of obtaining a contract of this type is not certain. The high cost of the EPC contract, in excess of \$2 billion, significantly reduces the number of potential contractors even when teaming of engineers, constructors and equipment suppliers is taken into account. Recent experience on large U.S. coal projects indicates that the major EPC Contractors are not willing to fix price the entire project cost. This is the result of volatile costs for materials (alloy pipe, steel, copper, concrete) as well as a very tight construction labor market. When asked to fix the price, several EPC Contractors have commented that they are willing to do so, but the amount of money to be added to cover potential risks of a cost overrun would make the project uneconomical.⁵

³ Id., at page 7.

⁴ Ibid., at page 16, lines 16-20.

⁵ *Consulting Engineer’s Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, for the Division of Cleveland Public Power, Burns and Roe Enterprises, Inc., October 16, 2007, at page 11-1.

In fact, rising commodity prices and increasing construction cost risks have been responsible, at least in part, for the cancellation or delay of more than fifty proposed coal-fired power plants since mid-2006. The following examples are illustrative of the factors and risks which have contributed to these cancellations and delays:

- Tenaska Energy cancelled plans to build a coal-fired power plant in Oklahoma in 2007 because of rising steel and construction prices. According to the Company's general manager of business development:

“.. coal prices have gone up “dramatically” since Tenaska started planning the project more than a year ago.

And coal plants are largely built with steel, so there's the cost of the unit that we would build has gone up a lot... At one point in our development, we had some of the steel and equipment at some very attractive prices and that equipment all of a sudden was not available.

We went immediately trying to buy additional equipment and the pricing was so high, we looked at the price of the power that would be produced because of those higher prices and equipment and it just wouldn't be a prudent business decision to build it.”⁶

- Westar Energy announced in December 2006 that it was deferring site selection for a new 600 MW coal-fired power plant due to significant increases in the facility's estimated capital cost of 20 to 40 percent, over just 18 months. This prompted Westar's Chief Executive to warn: “When equipment and construction cost estimates grow by \$200 million to \$400 million in 18 months, it's necessary to proceed with caution.”⁷ As a result, Westar Energy has suspended site selection for the coal-plant and is considering other options, including building a natural gas plant, to meet growing electricity demand. The company also explained that:

most major engineering firms and equipment manufacturers of coal-fueled power plant equipment are at full production capacity and yet are not indicating any plans to significantly increase their production capability. As a result, fewer manufacturers and suppliers are bidding on new projects and equipment prices have escalated and become unpredictable.⁸

⁶ Available at www.swtimes.com/articles/2007/07/09/news/news02.prt.

⁷ Available at [http://www.westarenergy.com/corp_com/corpcomm.nsf/F6BE1277A768F0E4862572690055581C/\\$file/122806%20coal%20plant%20final2.pdf](http://www.westarenergy.com/corp_com/corpcomm.nsf/F6BE1277A768F0E4862572690055581C/$file/122806%20coal%20plant%20final2.pdf).

⁸ [Id.](#)

The increases in construction costs being experienced by proposed coal-fired power plants are due, in large part, to a significant increase in the worldwide demand for power plant design and construction resources, commodities and equipment. This worldwide competition is driven mainly by huge demands for power plants in China and India, by a rapidly increasing demand for power plants and power plant pollution control modifications in the United States required to meet SO₂ and NO_x emissions standards, and by the competition for resources from the petroleum refining industry.

The limited capacity of EPC firms and equipment manufacturers also has contributed to rising power plant construction costs. This has meant fewer bidders for work, higher prices, earlier payment schedules and longer delivery times. The demand for and cost of both on-site construction labor and skilled manufacturing labor also have escalated significantly in recent years.

In addition, the planned construction of new nuclear power plants is expected to compete for limited power plant design and construction resources, manufacturing capacity and commodities.

It is reasonable to expect that the factors that have led to skyrocketing power plant construction costs in recent years will lead to further increases in costs and construction delays in the five or more years before the projects are scheduled to be completed. For example, a May 15, 2008 story in the Wall Street Journal noted that “escalating steel prices are halting and slowing major construction projects worldwide and limiting shipbuilding and oil and gas exploration.” The same article noted that “Steel prices are up 40 percent to 50 percent since December, and industry executives say they have not reached a peak” and “raw materials prices have surged in the past year, fueled in part because of the rapid industrialization of China, India and other developing nations.”

Indeed, there is no reason to expect that the worldwide competition for resources or the existing supply constraints and bottlenecks affecting coal-fired plant construction costs will clear anytime in the foreseeable future.

The Virginia State Corporation Commission denied the request of Appalachian Power Company to build a coal-fired power plant in West Virginia. The Commission found that the proposal was neither “reasonable” nor “prudent.” In its order denying the request to build the new coal-fired power plant, the Virginia Commission also found that the Company’s cost estimate for the project was not credible and that the Company had not updated its cost estimate since November 2006. The Commission further noted that the Company (“APCo”) will not obtain actual or firm prices for components of the project until after receiving regulatory approval.⁹ The Virginia Commission Final Order included the following language concerning risk: “Indeed APCo has no fixed price contract for any appreciable portion of the total construction costs; there are no meaningful price or performance guarantees or controls for this project at this time. This represents an extraordinary risk that we cannot allow the ratepayers of Virginia in [Appalachian Power

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April 14, 2008 Final Order of the Virginia State Corporation Commission in Case No. PUE-2007-00068, at page 5.

Company’s] service territory to assume.” This is the very same “extraordinary” risk that the customers and ratepayers of investor-owned companies and publicly-owned utilities building new coal-fired power plants are being asked to assume because there are no fixed prices or contracts for the projects.

Finally, there is no currently commercially available technology for post-combustion capture of carbon dioxide from pulverized coal power plants. Moreover, it is estimated that such technology may not be commercially available until 2020 or 2030, if then. However, it is expected that the addition of carbon capture and sequestration technology will greatly increase the cost of generating power at coal-fired power. In fact, a number of independent sources agree, as illustrated in Table 1 below, that adding and operating CCS equipment will raise the cost of generating electricity at new coal-fired power plants by perhaps as much as 60% to 80%.

Table 1: Projected Increase in the Cost of Generating Power Due to Carbon Capture and Sequestration

Source	Projected Increase in Cost of Electricity from Addition of CCS
Duke Energy Indiana ¹⁰	68%
MIT Future of Coal Report ¹¹	61%
Edison Electric Institute ¹²	75%
National Energy Technology Laboratory ¹³	81%

¹⁰ Testimony of James E. Rogers in Indiana Utility Regulatory Commission Cause No. 43114, Joint Petitioners’ Exhibit No. 1, at page 13, lines 6-11.

¹¹ *The Future of Coal, Options for a Carbon-Constrained World*, Massachusetts Institute of Technology, 2007, at page 19.

¹² Letter to Hon. Edward J. Markey, Chairman, Select Committee on Energy Independence and Global Warming, from Thomas R. Kuhn, Edison Electric Institute, September 21, 2007, at page 4.

¹³ *Cost and Performance Baseline for Fossil Energy Plants, Revised August 2007*, DOE/NETL – 2007/1281, at page 17.