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RESEARCH

Increasing Construction Costs Could Hamper U.S. Utilities' Plans To Build New Power Generation

Publication date: 12-Jun-2007
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As a result of declining reserve margins in some U.S. regions the U.S. brought about by a sustained growth of the economy, the domestic power industry is in the midst of an expansion. Standing in the way are capital costs of new generation that have risen substantially over the past three years. Cost pressures have been caused by demands of global infrastructure expansion. In the domestic power industry, cost pressures have arisen from higher demand for pollution control equipment, expansion of the transmission grid, and new generation.

While the industry has experienced buildout cycles in the past, what makes the current environment different is the supply-side resource challenges faced by the construction industry. A confluence of resource limitations have contributed, which Standard & Poor's Ratings Services broadly classifies under the following categories:

- Global demand for commodities,
- Material and equipment supply,
- Relative inexperience of new labor force, and
- Contractor availability.

The power industry has seen capital costs for new generation climb by more than 50% in the past three years, with more than 70% of this increase resulting from engineering, procurement, and construction (EPC) costs. Continuing demand, both domestic and international, for EPC services will likely keep costs at elevated levels. As a result, it is possible that with declining reserve margins, utilities could end up building generation at a time when labor and materials shortages cause capital costs to rise, well north of $2,500 per kW for supercritical coal plants and approaching $1,000 per kW for combined-cycle gas turbines (CCGT) (1). In a separate yet key point, as capital costs rise, energy efficiency and demand side management, already important from a climate change perspective, become even more crucial as any reduction in demand will mean lower requirement for new capacity.

Increasing capital costs will affect market participants to varying degrees. For regulated utilities, regulation remains the dominant credit driver. The key credit consideration for utilities with plants under development will be the preapproval of costs in rate base and timeliness of allowed returns as construction progresses. For utilities that choose to accept additional risks posed by nontraditional EPC contracts, agreements for recovery of potential cost increases or self-insurance against contingencies through reserve funds will also be important.

Construction risks of large projects undertaken by unregulated generation affiliates of diversified energy companies may affect the consolidated business risk profile, especially if costs aren't locked in and overages must be recovered from competitive market revenues. Project-financed, single-asset constructions that rely on nonstandard EPC contracts could be challenged to reach investment-grade ratings even if they are fully contracted post-construction.

The Resource Challenge

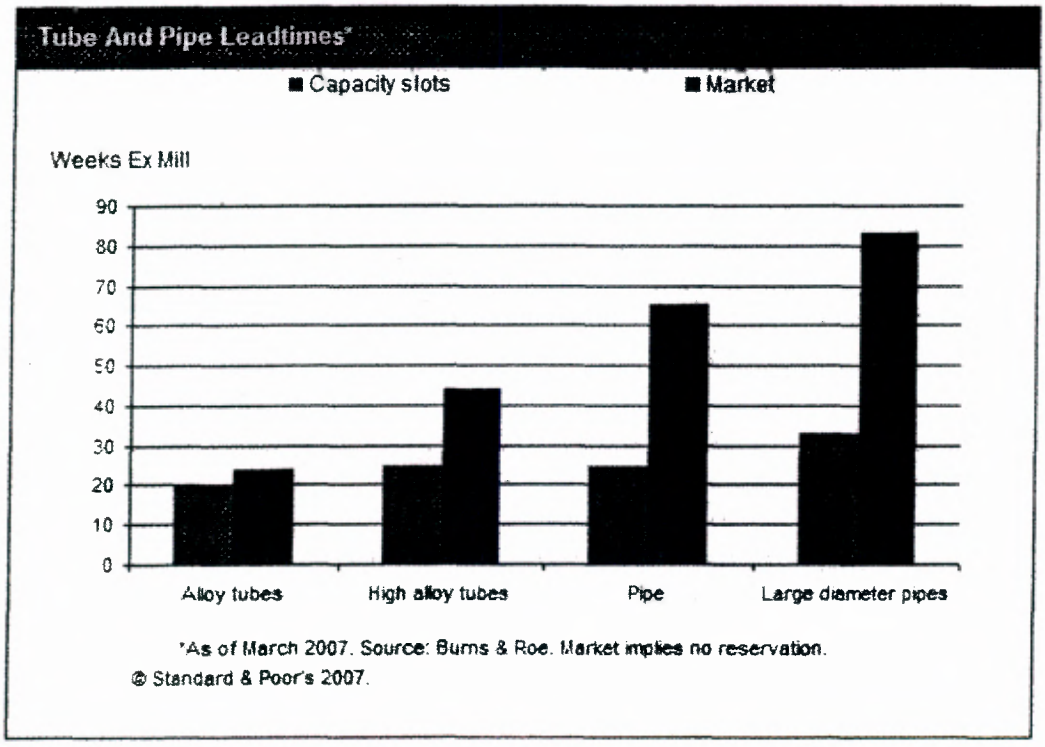
Global demand for commodities

A rapid increase in global demand, predominantly from Asia, has resulted in a sharp increase in prices for

commodities important in the power sector. Some industry sources estimate that China's consumption accounted for about 40% of world cement supply and 25% of world steel supply in 2005 (2). A number of construction materials have seen a dramatic price increase in each of the years since the first quarter of 2004, and still remain at elevated levels. Prices of steel--up 50% in first half of 2004 alone--leveled off in 2005 but were on the rise again in 2007, up 20% over December 2005 (3). Copper products (up 60% since December 2005) and cement (up 15% since 2005) are the current drivers for continuing upward price pressures.

Material and equipment supply

In recent years, price competitiveness has encouraged (read: forced) original equipment manufacturers to employ global sourcing for raw material and fabrication needs. But here too the rapid growth in Asia, which is drawing on global supply for raw materials, is resulting in longer lead times and price increases. An example of this rapid growth is China: It went from an exporter of iron ore to being the world's largest importer by 2004 (4). Lead times for materials have increased (see chart) as raw material suppliers and fabrication facilities are taking reservation fees in order to secure availability of material and fabrication slots.



Relative inexperience of new labor

While an extreme materials price escalation may have run its course, labor costs are becoming the new driver for industry inflation. The Construction Cost Index (CCI) (4) and the Building Cost Index (BCI) have increased at a compound annual growth rate of 5% and 5.5%, respectively, over the past three years. We learned in discussions with EPC contractors that the cost of labor has nearly doubled since the last round of construction in 2001. This labor cost and supply situation is due to a significant amount of construction experience that has retired and replaced by a new, less experienced work force resulting in reductions in labor productivity. And it could get worse: In the engineering sector, over 45% of labor will be eligible for retirement over the next five years. At the same time, strong global labor construction demand is leading to shortages of skilled labor, especially in the energy sector, which threatens the schedule and in-service dates of projects.

Contractor availability

Only a few contractors can absorb the risk of major construction projects. Sponsors are seeing more single bidder projects and an overall reduction in the number of bidders for projects.

Contract provisions are changing

The supply-side issues are causing a change in contract provisions offered by the construction industry. EPC contracts with guaranteed prices that shield utilities from cost overruns are now either very expensive, contain clauses that one can drive a truck through, or simply aren't offered. Simultaneously, we have seen the advent of risk-sharing mechanisms such as multi-prime contracting (EPCM), which distributes construction risk between contractor and sponsor but lowers installed cost.

To be clear though, the record of construction over the past few years when contractors got hit with performance penalties is another reason that contract provisions have changed. Still, the supply issues have allowed contractors the upper hand. We have increasingly seen the use of adjustment clauses as contractors respond to material price escalations, including:

- Material escalation clauses that track the actual variation of prices from bid amounts,
- The use of indices to adjust prices, commonly CCI (which assigns a higher weighting to labor costs) and also the Materials Cost Index,
- An escalation allowance line item in contracts that serves as a cap for the contractor to recover unanticipated cost increases,
- The use of surcharges typically to limit fuel-only escalations, and
- The re-emergence of cost-based plus contracting.

Extent Of Cost Increase

We assessed the magnitude of cost increases by comparing coal projects under construction during 2003 to 2006. Table 1 lists some coal-fired generation projects currently under development:

Table 1

Coal Plants Under Construction

Power plant	Location	Primary owner	Size (MW)	Type of unit	EPC contract	Year EPC contracted	Broke ground	Expected completion	Project cost ($ per kW)
Council Bluffs Unit 4	Iowa	MidAmerican Energy Co.	790	Super-critical	Fixed	2002	2003	2007	1,816
Elm Road	Wisconsin	Wisconsin Energy Corp.	1,230	Super-critical	Fixed	2002/2003	2004	2009/2010	1,781
Weston 4	Wisconsin	WPS Resources Corp.	500	Super-critical	Multi-prime	2002/2003	2004	2008	1,580
Nebraska City 2	Nebraska	Omaha Public Power District	653	Sub critical	Fixed	2004	2005	2009	1,600
Iatan Unit 2	Missouri	Kansas City Power & Light Co.	850	Super-critical	Multi-prime	December 2005	2006	2010	1,965
Plum Point	Arkansas	Plum Point Energy Associates	663	Sub-critical	Fixed	2005	2006	2010	2,150
LongView	Pennsylvania	LongView Power LLC	695	Super-critical	Multi	2006	2007	2010	2,600

Sub and supercritical technologies result in minor differences to capital cost. Adjustments were made to AFUDC/funded interest to make the comparison relevant. Some projects also have modest other costs such as coal cars or transmission connects. AFUDC--Allowance for funds used during construction. EPC--Engineering, procurement, and construction.

The sample is small but the trend is evident. Broadly, capital costs have risen, from about $1,700 per kW in 2003-2004 to about $2,500 per kW by year-end 2006. The increase was sharp from 2005 to 2006. A

key comparison is between Nebraska City #2 (NC#2) and the Plum Point Project as these two allow us to control all other cost variables--they are of similar size and have a fixed priced EPC that is contracted with the same construction consortium (we recognize that the existing site gives NC#2 some advantages). The important distinction is that the construction contracting was a year apart. Capital costs for Plum Point were almost 35% higher. The fixed price EPC component for Plum Point was almost 40% higher, increasing to nearly $1,325 per kW compared with $960 per kW for NC#2. For the Longview project, which completed construction contract negotiations a year after Plum Point, the EPC contract price is a further 30% higher at about $1,700 per kW.

New combined-cycle plants have similar issues

We had informal discussions with some EPC contractors to determine the effect on new combined-cycle plants (see table 2). The theme is similar. Labor costs have nearly doubled since the last construction cycle, from about 25% to nearly 40% of total project cost. Other factors included higher costs of commodities like copper, steel, and cement, somewhat offset by reductions in turbine costs. The range of about $745 to $785 per kW is about 20% to 25% higher than costs in 2002. The high range is about 60% higher than price in 2002.

Table 2

Combined-Cycle Plant Cost Comparison*

($ per kW)	EPC 1	EPC 2 low range	EPC 3	Average	EPC 1 high range	EPC 2 High Range
EPC cost	630	615	650	632	870	760
Soft cost¶	160	125	195	160	220	225
Total	790	740	845	792	1090	985

*Costs estimated by three different EPC contractors. Estimates are identified as EPC 1, EPC 2, and EPC 3. ¶Soft costs include water supply, finance, legal, IDC, and natural gas pipe connects. EPC--Engineering, procurement, and construction.

Still, these units have shorter construction lead times and can be carried on utilities' balance sheets without significant credit impact. Together with potential future costs relating to climate change, we could see the cancellation of some coal-fired construction projects and a shift in favor of natural gas fired units. However, supply, longer-term prices, and volatility of natural gas will remain concerns.

Credit Implications For Industry Participants

Because the electric industry is entering a period of sustained building after a prolonged absence, companies are again highly dependent on regulatory decisions for full recovery of these growing costs. There has also been a shift in this round of heavy construction to predominantly rate-based recovery as regulated utilities undertake many large projects. However, regulators are dealing with cost pressures from a variety of other factors, such as expiring frozen/capped periods, fuel cost recovery, distribution related base rate requests, and extensive spending related to environmental emissions control. After the relatively calm period of transition/rate freeze agreements between 1996 and 2005, the sheer volume of rate cases facing regulators will pose a challenge. Balancing competing priorities of maintaining reliability and avoiding rate shocks will be an unenviable job, and some rate-case orders may result in regulatory deferrals or even pressure the full recoverability of rate-based plants, which could weaken some utilities' credit quality.

Recognizing the need for new power, some states are enacting laws that allow utilities to seek regulatory decisions that effectively preapprove the costs of new generation facilities. Rulemaking clarity is also being provided by specifying the rate-making principles that commissions will apply when that new generation can be placed in the utility's rate base. House Bill 577 in Iowa, Senate Bill 79 in Wisconsin, Senate Bill 1416 in Virginia, and House Bill 1910 in Oklahoma are examples of such efforts. While the laws in Wisconsin, Oklahoma, and Virginia remain untested, MidAmerican Energy Co. used Iowa's HF 577 to seek preapproval of its 60.67% ownership interest in the Council Bluffs facility. Pursuant to rate settlements in Iowa, MidAmerican Energy will be permitted to include in its rate base the Iowa portion of up to $682.5 million in construction costs and earn a 12.29% return on equity once the 790 MW plant is completed. Costs exceeding this cap would be recoverable if determined to have been prudently incurred.

Credit implications for regulated utilities should be fairly straight forward. As long as the utility in the process of building a large project has access to protective safeguards like regulatory preapproval for construction, timely recovery on capital work in progress, and other cost-recovery mechanisms, it can meaningfully mitigate the large risks posed by construction projects. Still, these utilities will have to manage overall risks during the construction process to avoid cost overruns. For example, despite their approved fixed-price EPC construction for the Elm Road project, Wisconsin Energy Corp. and Madison Gas & Electric Co. will have to absorb cost escalations from more stringent environmental requirements if overall cost overruns exceed 5% of the approved capital cost.

Regulated utilities that forego the protection of a fixed EPC will increase their exposure to construction risk from material cost increases, scheduling delays, and performance issues. In such cases, we look for regulatory pre-agreements that lessen the risk of disallowance or restricted reserves that mitigate the risk of overruns. Some utilities also address risk by partaking in large projects through joint ownership interest. Utilities have also used a combination of these strategies. The Iaton 2 project is a good example of a EPCM approach that is structured to protect its owners' credit quality. The project has five owners, but two owners, Kansas City Power & Light Co. and Empire District Electric Co., are allowed to accelerate plant-related amortization expense in rate proceedings occurring before the in-service date, and the project has nearly 12.5% of project costs in contingency reserves.

Unregulated generation companies can't recover any of their capital investment through regulated means and must rely on market prices to recover these investments. The current environment of increasing prices has pressured the economics of merchant generation. While capacity markets can provide visibility into market-based revenues in some areas, they have not developed enough to provide the certainty needed to support generation projects with long lead times. However, the capacity clearing price of PJM's first reliability pricing model auction for the eastern Mid-Atlantic Area Council subregion is close to the price that can support new CCGT capital costs. However, it's too early to tell whether this will drive significant unregulated construction activity. We do expect some unregulated generation affiliates of diversified utilities to consider self-build options for CCGTs to lower installed cost. Implications for credit quality will depend on the relative magnitude of construction risk and the presence of mitigating factors like contingency reserves.

Regions with strong demand and depleting reserve margins will see some project finance-based debt issuances. The 695 MW Longview project is a good example of a recently rated merchant project finance transaction. However, in that case, merchant risks dominated the credit–quality considerations. Plum Point is an example of a fully contracted coal-fired plant with a fixed-price EPC currently under construction. The project has investment-grade characteristics supported by 16.5% of the EPC contract price in contingency reserve and contingent equity during construction.

Notes

(1) We exclude nuclear from this discussion as investments in nuclear units may only be in the medium to long term, and potentially at over $4,000 per kW.

(2) John Gallagher and Frank Briggs, Construction Briefings, December 2006, Thomas West.

(3) U.S. Bureau of Labor Statistics.

(4) The Financial Times, Jan. 27, 2004.

(5) Engineering News-Record, a unit of McGraw-Hill Companies. Both the CCI and BCI indexes have labor as the major component at 80% and 64%, respectively.

Other Sources

- "Construction Contract Provisions: Credit Considerations For Utilities That Are Building Owned Generation" published on RatingsDirect on March 30, 2005.
- "Regulatory Support Is Key For U.S. Utilities Building New Coal-Fired Power Plants" published on RatingsDirect on Nov. 3, 2006.