There were the pyramids. There was the Manhattan Project. And then there was the Apollo program.

Now TXU is adding a new chapter to the history of out-sized human endeavor, embarking on a plan to add 9,000 megawatts of new coal-fired generation in Texas. As with all bold efforts, TXU’s plan has generated a good deal of debate and criticism across the state. To better understand the scope of the building effort, the technologies that will be employed and its potential for influencing other generation construction efforts around the country, EnergyBiz submitted a list of questions to Mike Childers, the chief executive officer of TXU’s Generation Development. Childers, 45, was recruited to join the company a year ago by C. John Wilder, TXU’s CEO. His comments follow.
Currently, TXU has 5,837 megawatts of coal generation in Texas. You plan to spend $10 billion to build 11 additional coal-fired plants in the state. How will you sequence the building program? Will you start the plants all at once?

**CHILDERS:** TXU is planning to begin construction on each facility immediately following issuance of the air permits. We expect to have Oak Grove Units 1 and 2 online and generating substantial revenues by April and October 2009. The eight new units, or “reference” units, will be located at existing power plant sites in Fannin, Freestone, McLennan, Mitchell, Rusk and Titus counties. If approved, the new units are expected to be operational by 2010.

**energybiz:** Will all 11 plants have the same design?

**CHILDERS:** The eight reference plants will have essentially the same design: a supercritical coal boiler burning Powder River Basin (PRB) coal with a selective catalytic reduction system for nitrogen oxide and a fabric filter for particulate control.

Oak Grove will use two supercritical coal boilers burning locally mined Texas lignite with a selective catalytic reduction system for nitrogen oxide, a fabric filter for particulate control, and sorbent injection for mercury removal.

Sandow will use two circulating fluid bed (CFB) boilers burning locally mined Texas lignite with a selective non-catalytic reduction system for nitrogen oxide and a fabric filter for particulate control.

**energybiz:** Where will you get the labor?

**CHILDERS:** Our investment plan is projected to create thousands of Texas jobs and save Texans billions of dollars. With the approval of these projects, the $10 billion investment will create approximately 50,000 construction and other temporary jobs and tens of thousands of permanent jobs, and add nearly $18 billion to the state’s gross product.

To meet the expected demand for skilled workers as a result of its plan, TXU Power has joined with Bechtel and Fluor to evaluate training opportunities and available educational grants in the Central Texas region. We want Texans to fill these roles, and our goal is to ensure that they have the training opportunities necessary to succeed.

Through extensive work with Workforce Solutions of Brazos Valley, and the Central Texas, East Texas, and Heart of Texas Workforce Development Boards, the group will identify the specific labor needs by skill set and find solutions to provide the needed training. In addition, TXU, Bechtel and Fluor will investigate possible state and federal educational grants for participating institutions.

The group is partnering with several Central Texas institutions to investigate opportunities for skills training and curriculum, including Blinn College, McLennan Community College, Navarro Community College, Temple Community College, and Texas State Technical College – Waco. In addition, representatives from the Texas Education Agency, Region 6 Education Service Center (ESC), and Region 12 ESC are members of the partnership.

**energybiz:** Construction on this scale is unprecedented in the utility industry. Will you have any new approaches to keep costs from escalating as the projects take off?

**CHILDERS:** Based on examination of other major construction programs, we know scale is necessary to drive down cost and construction time, corresponding directly to customer value. Our objective is to develop and implement a sustainable business model to build power generation facilities for less cost and in less time, and to operate power-generation facilities at superior reliability and cost levels relative to the industry. This will allow TXU to profitably serve customers with the most secure, low-cost and environmentally friendly power possible. TXU believes its model will also provide new markets with economic benefits similar to those projected for Texas. Expected benefits in Texas include a reduction in long-term power prices by $1.7 billion annually, approximately 50,000 construction and other temporary jobs, tens of thousands of permanent jobs, and nearly $18 billion added to the state’s gross product. We’ve been encouraged by early discussions with leaders in other markets and expect to announce progress in expanding outside of Texas by the end of the year.

**energybiz:** What new generation technologies will be used at these plants?

**CHILDERS:** We’ll use the best available emissions-control technologies on the proposed units and retrofit existing units to reduce overall key air emissions by 20 percent, actually making the air cleaner in Texas. These will include:

- Dry flue gas desulfurization for sulfur dioxide (SO₂)
- Selective catalytic reduction (SCR) for nitrogen oxides (NOx)
- Baghouses for particulate matter (PM)
- Sorbent injection for mercury control

Like existing TXU power plants, all of the new units will meet or exceed all state and federal environmental standards.

**energybiz:** TXU plans to spend up to $2.5 billion of its investment to retrofit equipment and adjust the fuel mix at existing plants to reduce emissions, and to use the best available environmental control technology at the new plants. What levels of carbon dioxide, sulfur dioxide and mercury emissions levels will exist at your coal fleet after these enhancements? How will those levels compare with emissions levels today — and five years ago?
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CHILDERS: TXU’s solution for its customers includes the most significant voluntary emissions-reduction program of its kind in the United States. While we’ll more than double capacity, we’ll reduce total key emissions by 20 percent from current levels. This means that even after TXU adds 9 gigawatts of new power, its Texas generation fleet will have lower key emissions than today. The emissions intensity of its coal generation will be reduced by almost 70 percent, making TXU the cleanest large-scale coal-generation fleet operator in the nation. We plan to achieve this environmental progress through retrofitting existing facilities with state-of-the-art emissions controls, increasing the use of more expensive but cleaner coal in existing facilities, and employing the best available control technology on the new facilities. TXU will spend $2.5 billion of its more than $10 billion program on environmental controls that will allow TXU to meet this commitment to lower key emissions below today’s levels. TXU has also requested the Texas Commission on Environmental Quality make TXU’s environmental commitment legally enforceable. The principle of more-than-offsetting key emissions would be good public policy for Texas, and we believe all builders should be held to that standard.

After the program is complete, the new portfolio will have 20 percent lower total emissions of sulfur dioxide (SO$_2$), nitrogen oxides (NOx), and mercury, and almost 70 percent lower emissions rates.

**CHILDERS:** Your 5,800-megawatt coal-fired generation fleet is among the best performing in the industry, judged by capacity factors. To what do you attribute that?

**CHILDERS:** Through application of the TXU Operating System, with its program of lean concepts and continuous improvement, the progress TXU’s solid-fuel power generation fleet has made to achieve operational excellence is the best in the industry. TXU’s 5,800-megawatt coal-fired generation fleet is consistently producing at an industry-leading capacity factor that is almost 10 percent above the top-decile capacity factor for U.S. coal-fired generation plants. TXU’s coal-fired power plants are also on a trajectory to achieve top-performing cost management.

**CHILDERS:** TXU Power owns and operates one of the largest lignite surface-mining operations, producing about 23 million tons of lignite a year. Do you have plans to expand your own coal production in line with your expanded coal generation?

**CHILDERS:** TXU plans to open a lignite mine near the town of Kosse to support the planned Oak Grove plants. Sandow 5 will be fueled by lignite already being mined at the site, but the rest of the coal will be transported into Texas from Wyoming’s Powder River Basin.

**CHILDERS:** Where will you get most of the coal for your new coal-burning units?

**CHILDERS:** Wyoming’s Powder River Basin will supply the fuel for the eight reference plants. Oak Grove will burn Texas lignite, as will Sandow Unit 5.

** CHILDERS:** Significantly increasing coal imports into Texas can become a logistics nightmare. How will you deal with potential rail problems?

**CHILDERS:** TXU chose the plant sites based on their ready access to rail transportation. We plan to have dual-rail access at all sites. We are managing our risk by diversifying and we’re currently in the process of negotiating agreements with Burlington Northern and Union Pacific.

**CHILDERS:** TXU plans to buy up to 5,000 megawatts of power generation in the Eastern U.S. and plans to file license applications for up to 6,000 megawatts of nuclear-fueled generation. What is your objective outside Texas?

**CHILDERS:** TXU is reviewing its inventory of sites that were identified for nuclear power development over the last 30 years along with potential new sites in Texas and in other states.

**CHILDERS:** What is the potential of generating power from methane gas created in landfills and biomass facilities? You are exploring the technologies. How important can they become in your mix of generation?

**CHILDERS:** Exploring that as a technology alternative is just one element of our planned $1.5 billion to $2 billion investment in next generation technologies, and will likely be a small, but important element of our future generation mix, just as all renewable power sources are.

**CHILDERS:** What plans does TXU have to add to its wind and solar generation?

**CHILDERS:** TXU plans to expand its use of renewable energy, including wind power. A new company, TXU Renew, was created to double TXU Wholesale’s renewable energy portfolio by 2011 with enough wind energy to power 275,000 homes. This new business unit will focus on the growing renewable energy market by investing in renewable power production, resulting in a portfolio of approximately 1,400 megawatts.

“Our objective is to develop and implement a sustainable business model to build power generation facilities for less cost and in less time…”
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When it comes to wringing the last drop of efficiency out of generation, you can look to a Kentucky cooperative to learn how it can best be done.

The Electric Power Research Institute has honored the East Kentucky Power Cooperative for its plant maintenance technology and operational excellence.

Specifically, EPRI singled out the co-op’s plant-maintenance system for providing significant savings over the life of the generation units. “EKPC’s senior management provided the leadership necessary to ensure a commitment across all levels of the organization to ensure the successful implementation of these process improvements,” EPRI said in a news release.

Randy Dials, co-op vice president of power production, “was instrumental in providing management support and guidance” and for “encouraging his staff to proactively embrace plant optimization techniques across the organization,” EPRI said.

The co-op provides wholesale electricity to 16 distribution cooperatives that serve nearly 500,000 Kentucky homes, farms, businesses and industries.

EnergyBiz contacted Dials to discuss his work in Kentucky, the achievements of his co-op, and lessons for the power industry. His edited comments follow.

energybiz: Describe your approach to plant maintenance optimization.

DIALS: Our plants are getting some age on them. Like all utilities right now, we have added pressure to make sure that we are getting the best results for our maintenance dollars. In addition, in the next five years, about 25 percent of our 350 operations and maintenance workers will be retiring. We want to optimize the talent that we have today. We had a very short time to capture this experience and to make sure we were getting the most for our dollar. EPRI had a program, Power Plant Maintenance Optimization. We basically took that and contracted with EPRI Solutions to take a look at our maintenance practices to make sure that we had identified the critical items and that we were taking our dollars and putting them in the right place. We also wanted to document our people’s experience. We were very concerned that as key people retire a lot of their experience and talent would walk out the door with them. We wanted to make sure we had our maintenance procedures preserved. We had that documented as a resource so that a new person could bring up a file on a piece of equipment and say, “Yes, here’s the history on that equipment; here’s what you should do to service it; and here are the service records.”
Over the past half-century, Bechtel has set an unrivaled standard for performance in the power industry. We’ve built more than 350 fossil and 150 nuclear units on six continents. We have pioneered cost-saving mass customization of fossil plant design, construction, and operations. And we’ve been out front supporting emerging technologies such as coal gasification and fluidized-bed combustion. With prime responsibility for more commercial nuclear plants than any other firm, we’ve been tapped for the toughest jobs the nuclear industry has offered: Building the first private commercial plant. TMI Unit 2 cleanup. Stabilizing Chernobyl. Steam generator and reactor pressure vessel head replacements. Next-generation design. When it comes to power projects, no one offers greater teamwork, experience, service, or dependability than Bechtel. No one.
Florida Power & Light Co. (FP&L), Juno Beach, FL, has a service territory extending throughout much of South Florida. South Florida, like the Gulf Coast and much of the Eastern Coast of the U.S. is prone to hurricanes. The pressure from the public, media and governmental agencies can be intense when catastrophic weather events or other incidents occur that disrupt the electric service upon which virtually all homes and business are dependant today. Thus when South Florida was raked by several hurricanes in the recent past, the pressure to do something became intense. Improvements in outage response times were in fact mandated by the Florida Public Service Commission.

FP&L turned to Cingular's wireless network for its mobile workforce management system to provide better restoration times for customers. By pushing the work to the field more rapidly, with all the necessary directions, equipment loads, and information on likely locations where the most customers can be restored the most rapidly, FP&L has been able to improve its response time when there are outages.

Also, because existing grid information systems at FP&L were based on older CDPD technology, FP&L replaced that technology with wireless telemetry on the Cingular network, enabling more detailed and timely reporting on the status of the grid. In the past, when an outage occurred, FP&L could determine its location and likely cause within fairly broad boundaries. Now, having wireless telemetry installed on approximately 1,500 of its substations and industrial meters, the utility now can much more finely pinpoint outages and likely failed lines or systems. These installations are ongoing, but the wireless capability provided by Cingular has enabled FP&L to better meet the demands of hurricane-weary Floridians and their regulators.

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“FP&L turned to Cingular’s wireless network for it’s mobile workforce management system to provide better restoration times for customers.”

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What we were trying to do was to take the money, the people and the time to get the best benefit we could...

Randy Dials is East Kentucky Power Cooperative vice president of power production.

energybiz: When did you do this?
DIALS: We started doing it probably two and one-half years ago.

cable biz: And did you finish it?
DIALS: No, it's still ongoing. There are three phases. First, we identified the critical equipment and made sure that we are maintaining that equipment. Next, we wanted to make sure that we had the documentation on what we needed to do for our new people. Then, after that, we want to come in and look at all of our assets from a maintenance standpoint. What are the industry maintenance practices and maintenance techniques? We evaluate ourselves to see if we are doing those things to the best of our abilities, to optimize our talent and our resources. We're just getting to that phase right now.

cable biz: Have you identified any savings that you've achieved?
DIALS: We've done some small things. Say there is a filter that we're changing every six months and we determine we do not need to do that as often. But it is hard to document savings.

cable biz: How many people work on operations and maintenance in your facilities?
DIALS: About 350 people in the power plants.

cable biz: And how many do you think are going to retire in the next few years?
DIALS: In the next five years, about 75 people of the 350.

cable biz: Your goal is to not have that harm power reliability?
DIALS: Right. We think this program will help us.

cable biz: Are your maintenance expenses going down?
DIALS: For the last five years it has gone down about 6 percent as a percent of megawatts produced.

cable biz: What is your maintenance budget?
DIALS: Maintenance averages somewhere around $3 per megawatt hour produced per year.

cable biz: Summing up, what has been your main objective?
DIALS: What we were trying to do was to take the money, the people and the time to get the best benefit we could out of our resources.
The North American utility industry is beginning a massive build-out and refurbishment of energy assets to address capacity, environmental, and reliability issues. The challenges utilities face for their construction programs are enormous, including securing the required resources and regulatory approvals and meeting aggressive commissioning schedules.

However, the greatest single issue utilities confront for these programs may be managing escalating costs. Costs for most, if not all, construction have been escalating due to high demand for materials, equipment, and labor resources, and the increased influence of geopolitical events on commodity markets. Utilities have not seen these kinds of market and resource challenges since the 1970s when the industry completed its last major build-out of baseload capacity.

Since 2003, the U.S. Producer Price Index (PPI) has been escalating at two to three times the average annual rate seen during the last decade. From 1996 to 2005, the average annual PPI was 2.41 percent, compared to PPIs of 5.3 percent, 6.2 percent and 7.3 percent, respectively, for 2003, 2004 and 2005. These PPIs represent an aggregate rate for all U.S. commodities; however, when you isolate select power plant equipment and material from the PPI, you realize that power-plant-related costs are rising at an even greater rate.

The average 2005 producer price increase for major power plant equipment was 9.3 percent compared with 7.3 percent for all U.S. commodities. Escalation this year is trending higher. Rates for the first eight months of 2006, when trended to year-end, suggest a 13 percent escalation rate. Much of the potential 2006 increase is due to the recent extraordinary rise in copper prices, a major material component of electrical transformers. However, the compounding effect of year-to-year, above-average escalation has the potential to catch utilities off-guard, especially for projects that are planned and executed over multiple years, the typical scenario for utility construction.

Scrubbers Soar in Price
Utility flue-gas desulfurization (FGD) programs, more commonly known as “scrubbers,” represent an immediate and interesting illustration of the potential impact of cost escalation for utility construction programs. Utilities have been planning and executing scrubber programs since the early part of this decade. The recent run-up in the cost of steel, cement, labor and other program-related commodities, along with some scope changes and perhaps some overly optimistic estimating, have resulted in scrubber program cost increases averaging 28 percent since companies first began developing cost estimates for their scrubbers.

Many utilities with active scrubber programs have experienced a significant level of cost increases — but only a few have acknowledged it publicly. Prices for nickel, a major component of alloy steel used in scrubber equipment, have increased on the London Metals Exchange by far more than 100 percent since January 2006. Likewise, costs for copper, a component in transformers, valves, and other equipment, are up by a similar amount during the same period. Steel, cement, resin and labor costs also have all increased considerably the last few years.

Things aren’t going to improve any time soon. The utility industry is at the front end of a massive building cycle to update aging energy infrastructure. For example, according to the EUCG benchmarking organization, more scrubber retrofits are expected to come online on or after 2009 than during the four prior years. EUCG, formerly known as the Electric Utility Cost Group, is an association of professionals and companies concerned with utility performance. The looming build-out will occur during a time in which the U.S. Gulf Coast region will undergo massive clean up and revitalization. Additionally, China, India, and other emerging economies also are exhibiting a major appetite for construction commodities to fuel their economies and bolster their own infrastructure. And in the background of all this are massive plans for new power plants and other related projects in the United States and throughout the industrialized world.

Therefore, the demand for critical equipment, material, and labor for these future projects is by no means waning, which supports the argument that the utility industry is in the early stages of what could be a protracted inflationary period. How it plays out will depend on much more than just utility-related, supply-demand economics. Rather, the global marketplace will dictate the outcome more than anything else. But the first chapter of this unfolding story suggests that the utility industry may face a wild ride.

Putting a Lid on Cost Increases
By George Sharp
Managing Cost Uncertainty

To varying degrees, cost uncertainty has always been a concern for utilities. However, this concern gets exacerbated during inflationary times such as in today’s marketplace. A sellers’ market introduces its own set of challenges, many of which are new to owners who are used to shifting the majority of project risk onto contractors.

Much of this risk can be managed, though not completely mitigated, through the prudent use of business intelligence. The key is to develop an internal intelligence function devoted to monitoring, measuring and communicating risk issues to project management. The primary role of the individual or individuals responsible for business intelligence includes:

- Monitoring the market daily to identify, ascertain, and communicate risk issues to the project team.
- Reviewing commodity, equipment, and labor escalation as reported by government and consultancy sources and translating this information into actionable recommendations for management. Actionable recommendations include timing important equipment or commodity buys if the contract allows, refreshing cost estimates to more accurately reflect the competitive environment, and indexing cost escalation to appropriate sources rather than allowing the cost to accelerate by a fixed amount.
- Monitoring the financial health of contractors and suppliers regularly to protect projects from potential critical-path hiccups. The financial health of suppliers is also an important indicator of whether the market is a sellers’, buyers’, or balanced market.
- Making the business intelligence function the hub for market-related business intelligence. This ensures the intelligence is being reviewed in its proper context and is being communicated in a uniform and consistent fashion.

Developing a business intelligence function to help manage cost escalation is by no means a panacea, but it does increase the likelihood that informed decisions become the rule. It also may protect the owner from being taken advantage of during the construction boom-times ahead.

By most measures, utility construction projects are entering a time period of what could be a protracted inflationary cycle. Escalation is real, broad-based, and impacting project decision-making on a scale not seen since the 1970s. Scrubber programs, new power plants, and most other utility-related construction and maintenance activities are being affected by the cost escalation of materials, equipment, and labor. Management must make informed decisions based on internal business intelligence to successfully complete major construction projects.

Source: U.S. Bureau of Labor Statistics

George Sharp heads business intelligence and commercial analysis for American Electric Power’s contract administration group and serves on EUCG’s board of directors.
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2006 Mobile Data Report

As utilities continue to push enterprise application such as CIS, ERP, EAM, Workforce Management and others out to field crews through mobile data systems, quantum leaps in the effectiveness and efficiency of these teams and individuals in the field are being realized. This “mobile” segment of the utility market is, not surprisingly, the fastest growing segment of the utility enterprise solutions market. The SEG Enterprise Solutions Market Intelligence Service (ES-MIS) has identified more than 200 projects opportunities; the leading application areas for these planned project activities are mobile projects. This market has been building for some time, but the convergence of technology, operating needs, and regulatory requirements has created a unique window of opportunity for utilities to finally push their operations to the field.

The 2006 Sierra Energy Group Mobile Data report tracks this continuing advance including:

- Data from recent mobile surveys as well as the ES-MIS programs.
- How virtually all ERP and EAM vendors are “enabling” mobile systems in their software.
- Details on enterprise system spending (including mobile) by 650 prominent utilities over three years.
- The on-going growth in the number of mobile data-equipped vehicles at utilities.
- Descriptions of the differences between the GIS-centric and the Workforce Management-centric mobile approaches and how they are growing together.
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