

THE CONSTRUCTION WEEKLY

ENR
Engineering News-Record

▷ **WORKERS:** How a labor supplier's use of cultural exchange visas for Eastern European electricians short-circuited

▷ **COMPENSATION:** IT managers lead in raises, bonus increases among A/E firms

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December 3, 2001 \$5

Powerplant Construction

**A special report by
Engineering News-Record
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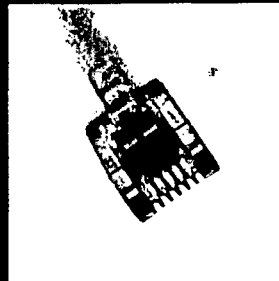


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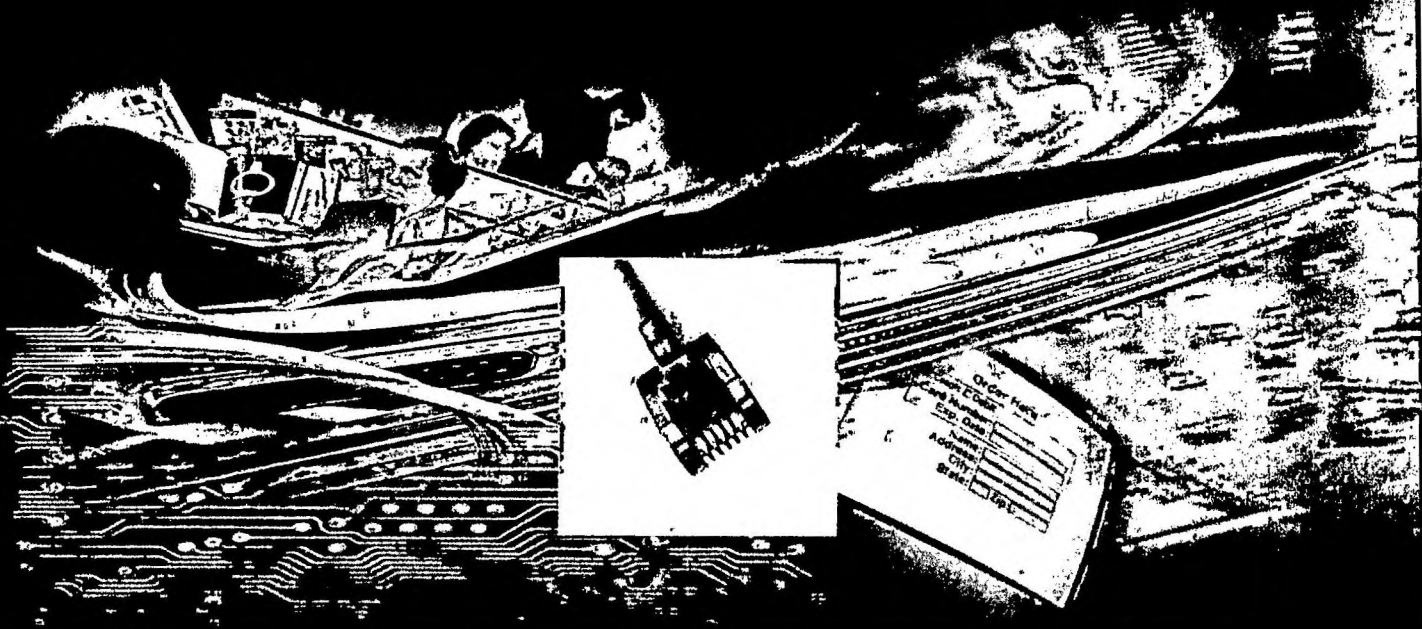


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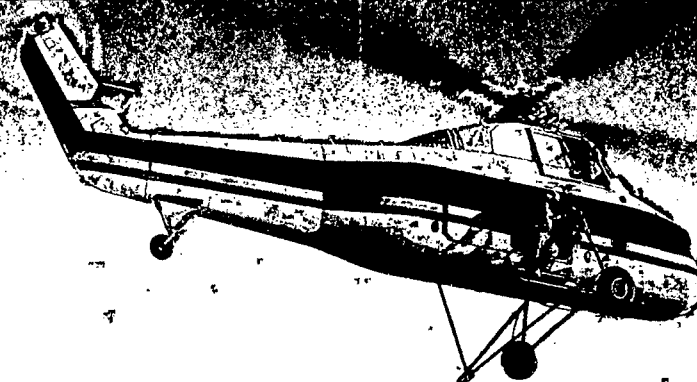
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SPECIAL REPORT

Powerplant Construction
Anticipated shortfalls in power generation have led to a surge in energy construction. ENR and Power magazine take a close look at what has been a booming market.

Cover photo and photo right courtesy of Black & Veatch.



WHERE THERE'S SMOKE Stubborn fires at the World Trade Center site are degrading local air quality but officials claim pollutant levels don't exceed standards. **PAGE 15**

REPLENISHMENT

Contractors are finishing the first phase of an effort to seed the dry bed of Owens Lake in California and prevent dust storms. **PAGE 16**



GROWING PAINS Lake Havasu City in Arizona is beginning a \$463-million program to wean itself off septic systems and build a municipal sewerage system. **PAGE 17**

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CALENDAR

DECEMBER

11-13 POWER-GEN INTERNATIONAL CONFERENCE & EXHIBITION

Las Vegas Convention Center, Las Vegas, Nev. Presented by Power Engineering, this event expects more than 16,000 industry professionals from around the world for three days of presentations, an exhibit floor featuring more than 1,100 companies, college courses, networking events and mega-sessions. *For more information, call (888) 299-8057; e-mail: powergen@pennwell.com; or visit Website at www.power-gen.com.*

13-14 THE "PUBLIC CONSTRUCTION" SUPERCONFERENCE

The Sheraton Palace Hotel, San Francisco. This forum for contractors, owners and attorneys is endorsed and created in association with Associates Owners and Developers. Sessions will focus on proactive methods to mitigate the occurrence of problems on federal, state and municipal public construction projects. *For more information, contact Jo Waugh at (301) 587-7280, or visit Website at www.andreusconferences.com.*

JANUARY

9-12 WORLD OF CONCRETE/

WORLD OF MASONRY Morial Convention Center, New Orleans, La. This event is the construction industry's annual international show on commercial construction. More than 60,000 construction professionals from around the world are expected to attend. Event includes four-day product showcase, two days of live-action demos and a five-day, 85-session education program. There will be more than 700,000 sq ft of indoor exhibit space and additional space outside the convention center. It also features a focused marketplace expressly for concrete producers. Operating concurrently will be the World of Masonry, the world-class trade event for masonry construction. *For more information, call (800) 837-0870, ext. 2653, (outside the U.S., call (630) 705-2653); e-mail: woc@hanley-wood.com; or visit Website at www.worldofconcrete.com.*

11-15 NRC ANNUAL CONFERENCE

Biltmore Hotel, Miami, Fla. The National Railroad Construction & Maintenance Associates expects more than 300 executives from NRC's 100 contractor member firms and supply and associate member firms for five

days of general sessions. Speakers include executives from major railroad and transit agencies, as well as legislators and administration officials. *For more information, call (202) 638-7790, or visit Website at www.nrcma.org.*

12-16 ASHRAE'S 2002 WINTER MEETING AND ASHRAE/ARI EXPOSITION

Atlantic City Convention Center, Atlantic City, N.J. Attendees at this event, held by the American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc., will also be allowed into the ASHRAE co-sponsored International Air-Conditioning, Heating, Refrigerating Exposition. Highlights will be: A diverse technical program divided into 12 tracks and featuring energy management and economics sessions in addition to the large refrigeration track. There will be award presentations, an open session on the future of ASHRAE's energy conservation standard and a public session featuring the ASHRAE report on building safety. More than 1,200 exhibitors and 30,000 visitors are expected. *For more information, contact Anthony Giometti at (404) 636-8400; e-mail: giometti@ashrae.org; or visit Website at www.ashrae.org; for information on the AHR Expo, call (203) 221-9232, or visit Website at www.ahrexpo.com.*

13-17 TRB 81ST ANNUAL MEETING

Connecticut Avenue Collection hotels: Marriott Wardman Park, Omni Shoreham and Hilton Washington and Towers, Washington, D.C. The Transportation Research Board expects to attract over 8,000 transportation professionals from around the world to their annual meeting. There will be more than 1,800 presentations in 450 sessions addressing latest developments in transportation research, policy and practice. *For more information, call (301) 694-5243, or visit Website at www.trb.org.*

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CALENDAR

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CONSTRUCTION WEEK

SPORTS CONSTRUCTION

SAN DIEGO JOB TO RESTART AFTER 14 MONTH DELAY

Work could resume this month on the San Diego Padres' \$411-million baseball stadium after a 14-month hiatus caused by legal and financial woes. The city council's Nov. 21 approval of a \$166-million bond sale is considered a crucial step toward continuing the project. A federal investigation of former council member Valerie Stallings' ties to team owner John Moores prevented the bond sale, prompting the Padres to halt construction after four months (ENR 10/9/00 p. 16). After Stallings resigned, the council again approved the stadium's contracts and financial package, a move upheld last May by the state Superior Court. Most subcontractors are still on board, although finding enough skilled trades people will be a challenge in San Diego's busy building market, says Alan Petrusek, project director for The Clark Construction Group Inc., the stadium's Bethesda, Md.-based contractor. Officials have said that the delays are costing about \$1 million per month. The stadium's opening date has been pushed back from next July to April 2004.

TRANSIT

ISRAEL SEEKS BIDS FOR NEW \$1.1-BILLION BOT RAIL SYSTEM

Israel's state-owned urban transport company is seeking international bids for the first stage of a \$1.1-billion build-operate-transfer light-rail system in metropolitan Tel Aviv. It will be one of the largest single infrastructure projects ever undertaken in the country. The 22-kilometer line, both above and below ground, will carry as many as 400,000 passengers daily. Construction is scheduled to begin in 2004 with a completion date in 2009. The winner will be given a 32-year concession to operate the system.

RADIOACTIVE WASTE

FLUOR, WGI LAND CONTRACTS FOR WORK AT HANFORD

Teams led by Fluor Corp. and Washington Group International have won separate contracts totaling \$107 million to provide construction services related to building a planned \$4-billion nuclear waste vitrification plant at the U.S. Energy Dept.'s Hanford site in Washington state. The contracts were awarded by CH2M Hill Hanford Group Inc., which is

managing the site's existing hazardous waste storage area and is in charge of new infrastructure and structures to support the vitrification plant. The contracts, which have a five-year scope, will require Fluor and WGI to compete for specific projects. WGI is already part of a team led by Bechtel Group Inc. that will build the vitrification plant. Fluor Federal Services is performing E&C services elsewhere at Hanford.

RENEWABLE ENERGY

NORTHWEST UTILITY PLANS TO DEVELOP TIDAL POWER

The Clallam County Public Utility District of Port Angeles, Wash., says it will develop by 2002 an offshore demonstration tidal generation project that will generate 1 Mw of power. The Clallam PUD says it and consortium members—the Makah Nation, Aqua Energy Group Ltd. and the Northwest Energy Innovation Center—will spend between \$1.5 million and \$2 million for the project, which is to go on line in Dec. 2002. The Makahs will own and operate the plant, which consists of floating buoys in 150 to 200 ft of water. The buoys' movement will drive turbines connected to a conventional 1-Mw generator.

POWER SUPPLY

COURT NIXES NYPA'S CLAIM TO EIS EXEMPTION

Denial of an appeal by New York state's highest court will require completion of an environmental impact statement for six small powerplants in and near New York City by Jan. 31 as a condition of their continued operation. The plants, totaling 440 Mw, were completed last summer in a \$500-million crash construction program by the New York Power Authority to meet an anticipated 400-Mw electric-generation shortfall (ENR 6/11 p. 14). Controversy arose when NYPA constructed the plants, which contain 10 gas turbines rated at 44 Mw each, without submitting to a full-dress environmental review known as Article X. The agency claimed an exemption because it intended to operate even the dual-unit plants below the 80-Mw threshold that would require an Article X application. The Court of Appeals let stand a lower appeals court's decision ordering the EIS and requiring NYPA to consider the health effects of emissions that contain fine particulate matter of 2.5 microns. Allee, King, Rosen & Fleming, New York City, which is conducting the EIS, says it will be completed by Jan. 31.

**High-Flying Tower Crane****HELICOPTER LIFTS CRANE TO ROOFTOP PERCH**

Construction of a new "escape stairway" on the outer facade of a 42-story landmark building in Frankfurt, Germany, prevented a tower crane being used in the building's renovation from being anchored to the structure as usual. So contractor Hochtief AG used a helicopter to lift the 71 EC Liebherr tower crane to the roof where it was erected on a cruciform foundation measuring 3.8 x 3.8 m. The crane's erection took just three hours but required 19 helicopter flights making lifts ranging between 1,500 and 4,100 kilograms.

PHOTO COURTESY OF LIEBHERR

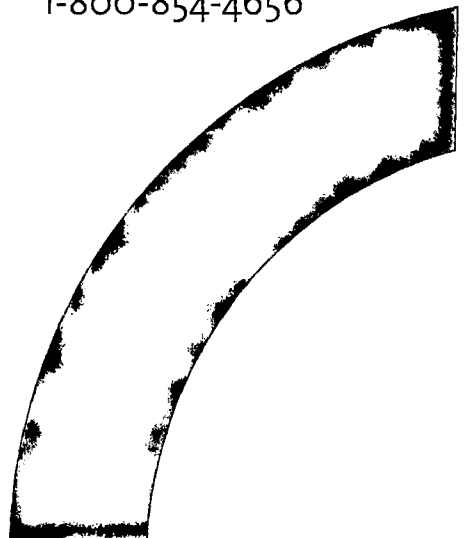


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Supreme Court Won't Rule on Merits of Adarand III Case

Those who thought the U.S. Supreme Court saw problems with the latest version of the *Adarand* minority contracting case were right. On Nov. 27, the justices said in a unanimous opinion they won't rule on the merits of the case, which was before them for the third time since 1995. Some hoped the court would use the case, *Adarand Constructors Inc. v. Mineta*—or *Adarand III*—to rule on disadvantaged business enterprise programs in federal-aid highway contracts. That will have to wait for another day. But observers see that day coming. They say several other DBE highway cases are pending around the country.

"The single most important point is that the Supreme Court did not uphold the federal program. It simply dismissed the case on procedural and jurisdictional grounds without...rendering an opinion on whether the program is constitutional," says Michael Kennedy, the Associated General Contractors' general counsel. "For all intents and purposes, this ends the *Adarand* case."

William Perry Pendley, *Adarand*'s attorney, says he's disappointed by the outcome but the firm has another DBE suit in district court against the Colorado Dept. of Transportation. John Payton, a Washington attorney who filed a brief supporting the U.S. position in *Adarand*, says, "There are other challenges and one of them will probably find its way back to the [Supreme] court." On Nov. 15, the chief judge of the U.S. District Court in Minnesota, James M. Rosenbaum, said the U.S. Dept. of Transportation's DBE program for federal-aid highway

contracts was constitutional. That case is *Sherbrooke Turf Inc. v. Minnesota Dept. of Transportation*. "I don't think the DBE community has a lot to be happy about because the [Supreme] court still has the proclivity to rule against these type of cases," says Arnold M. Jolivet, the National Association of Minority Contractors' national executive director.

In 1995, the high court ruled for white-owned *Adarand*, saying federal racial classifications must be "narrowly tailored" and "further compelling national interests." But it sent the case to a lower court for a decision. The case then moved

up to an appeals court and in 2000 the high court remanded the matter, now *Adarand II*, to the lower court. Noting a change in U.S. DOT DBE rules, the appeals court ruled for DOT. *Adarand* appealed again, creating *Adarand III*.

Adarand I centered on DBE rules for the relatively small program of direct federal road contracts. In its new order, the Supreme Court said it thought *Adarand III* would deal with DBE rules for federal-aid highway work. In that program, totaling more than \$20 billion a year, U.S.

DOT provides most of the funds but states let the contracts. But the high court said *Adarand* asserted it wasn't challenging federal-aid rules.

The justices said the lower court held *Adarand* lacked standing to challenge the direct federal contract rules. They added that "we do not examine standing...simply to reach an issue for which standing has been denied below—exactly what petitioner asks that we do here. Petitioner points out that this case presents questions of fundamental national importance calling for final resolution by this court. But the importance of an issue should not distort the principles that control the exercise of our jurisdiction."

—By Tom Ichniowski

Other highway DBE cases in lower courts may end up at Supreme Court.

■ Energy Agency sees need for 1,200 new powerplants

The federal Energy Information Administration is forecasting that 374,000 Mw of additional U.S. electric generating capacity will be needed in 2020. An expected increase in demand in the southern and western U.S. would mean about 1,200 new 300-Mw powerplants would be needed. EIA, the Dept. of Energy's independent statistical and analytical arm, released its annual *Energy Outlook* on Nov. 14. The new figure is down from the 1,300 powerplants in the agency's forecast last year. "We predict fewer nuclear and coal plant retirements," an EIA official says.

■ Spending Senate 'centrists' craft \$57-billion package

As Congress returns from its Thanksgiving break, a small, bipartisan group of senators is hoping that a \$57-billion proposal they developed will be the basis for ending the stimulus-package

standoff between Democrats and Republicans. But the senators, who call themselves "centrists," have no public works spending in their plan.

The centrists, led by John Breaux (D-La.) and Olympia Snowe (R-Maine), focus on items that are in both the House-passed stimulus package, which reflects the GOP pro-tax-cut stance, and Senate Democrats' plan, which extends unemployment benefits. Snowe notes that the Democratic and Republican plans lack the votes for Senate passage and says the centrists' proposal "represents the 'politics of the possible.'"

That proposal includes \$14 billion in rebates for those who didn't qualify for one under the tax-cut measure enacted in September. It also has accelerated depreciation (\$26 billion), expensing (\$852 million), a 13-week extension of unemployment benefits (\$8 billion), and a \$4.7-billion tax credit to help laid-off workers buy health coverage.

Construction hopes public works money will be added to one of the remaining 2002 appropriations bills.

■ Taxes Ban on Internet levies extended two years

At press time, President Bush was set to sign legislation that extends for two years the moratorium on Internet access taxes. The Senate passed the measure Nov. 15 after earlier disagreements caused the moratorium to expire on Oct. 21. The House had approved the extension on Oct. 16.

The dispute in the Senate centered around a fear that localities would lose retail sales, and sales tax revenue, to online transactions. The White House prefers a five-year extension, but says the two-year plan will provide time to analyze e-commerce's impact on state and local tax receipts. "The government should be promoting Internet usage and availability, not discouraging it with access taxes or discriminatory taxes," says Mark Weinberger, an assistant secretary at the Treasury Dept.

—Compiled by Tom Ichniowski, Sherie Winston and Lira Behrens

NEWS SITE DECEMBER 3, 2001

Labor

DOOR CLOSES ON J-1 TRAINING VISAS

Dennis Laskin says he knows why more than half of the electricians he brought to work in the U.S. with visas from Eastern Europe earlier this year no longer are employed by a labor company he helps run, USA-IT. They were lured by the "big pot of gold" placed in front of them by the International Brotherhood of Electrical Workers, he says. Union contractors now employ many of the visiting workers for twice as much as the \$10 an hour USA-IT paid them.

"They were very content until such time as they saw the opportunity to make twice as much money and remove us from the process," says Laskin.

USA-IT has been prevented from using the J-1 Exchange Visa program to import overseas workers for low-paying jobs at non-union contractors, but not because of the union alone. A State Dept. official branded the practice "an abuse" and allowed the workers already here to take new jobs because it believed USA-IT had used a bait-and-switch technique. Some of the workers complained that USA-IT never provided the promised "electrical management" training, shunted them to low-skill tasks and docked paychecks unfairly for expenses, including household supplies.

Once they were in the U.S., USA-IT assigned the recruits to companies in different parts of the country. USA-IT is not a contractor, but remained the workers' employer. Some were crammed two-to-a-bedroom in apartments provided by USA-IT. "They didn't care what our problems were," says Ocdabiam Barbu, a 28-year-old Romanian. Barbu says that among the deductions from his pay was a \$7.50 charge for orientation.

All of the recruits were fully briefed on pay deductions, replies Laskin. They needed "a lot of hand-holding," he says.

At the jobsites, lowly work assignments grated on recruits who had resumes from their home countries that included mine and shipyard electrical work, project manager or even degrees in electrical engineering.

"They would let us bring the pipe, all the things that didn't need a lot of skill," says Aurel Potoroaca, a 36-year-old from Petrosani, Romania, who now works for the IBEW. "We could put fish tape in the conduit and pull the wire but then the other workers would do the termination."

Any training that was provided was limited and sporadic, workers say. The

program of training, research or study.

In the labor squeeze of recent years, however, technology employers have considered using J-1 visas. USA-IT applied the idea to construction and signed up third-party sponsors and paid them a fee. They included the YMCA of Greater New York. Approved training programs exist for all employers and sponsors, Laskin says. In practice, little education took place, claim workers and Ronald Burke, IBEW's director of construction organizing.

Building trades unions have made targets of other nonunion labor supply companies and USA-IT had prominent clients. The Greenbelt, Md.-based company charged a fee of \$5 an hour on top of the workers' hourly wage for non-union electrical contractors that included Integrated Electrical Services and Encompass Services Corp. Neither company could be reached for comment. However, a spokeswoman for IES told the *Baltimore Sun* earlier this year that it employed 340 workers supplied by USA-IT at different locations and that there had been no complaints. Workers receive class and on-the-job training, she added.

Still, the union continues its campaign against USA-IT. On Nov. 20, the

IBEW won a representation election among a handful of USA-IT workers in the Washington, D.C., area, another setback for USA-IT.

Where he once saw promise in the J-1 visa program and promoted it to contractors, Laskin now sees only wasted potential. But the State Dept. had reasons to intervene, says Stanley Colvin, director of the office of exchange coordination: "We believed the workers were misled about what they would do and what they would make."

By Richard Korman



NEW DEAL Union organizer talks to USA-IT staff in summer.

recruits seemed to understand that the emphasis would be work, hoping to pocket enough money to cover expenses, support families back home and build a nest egg. But when the workers saw disappointing take-home pay, the apparent lack of training seemed more troubling.

It also proved to be the weak spot in USA-IT's innovation in using the J-1 visa for construction craft workers. Until recently, the program had been used for scholars and camp counselors. Any work done by the visa holder must be limited so that he or she can stick to a structured

PHOTO BY GENE SWEENEY FOR THE BALTIMORE SUN

Compensation

DESIGN FIRM MANAGER SALARIES, BONUSES AND BILLING RATES RISE

ARCHITECTS, ENGINEERS AND ENVIRONMENTAL firms are facing new management challenges in the face of an uncertain market. Two recent surveys show that design firm billing rates have not kept pace with manager salaries and firms now must take stock of their businesses.

Over the past four years, base salaries for most top managerial positions rose dramatically, according to a survey of management compensation by Zweig-White, a Natick, Mass.-based management consultant and management recruitment firm. "Bonuses and base salaries continue to increase for all managerial classifications," says Laura Rothman, managing editor of surveys for ZweigWhite. She suspects that a construction downturn won't have an immediate impact on compensation. "Most of the firms I've talked to recently say work is not falling off," she says.

IT managers were the biggest winners, with increases in base salary of 36% and increases in bonuses of 100% between 1998 and 2001, according to the survey. "Design firms have invested so much in hardware and software that they have become dependent on technology," says Carolyn Richman Peart, vice president at Cook Associates, a Chicago-based management recruitment firm. "So IT managers are no longer looked at as technicians, but as managers critical to a firm's success."

Other managers that have seen dramatic salary growth over the past four years are: top financial managers, up 39%; satellite office managers, up 24%; and project managers, up 21%, according to the survey. But financial managers had the lowest growth rate in bonuses, up 20%, compared to marketing directors, who have seen their median bonuses triple, and project managers, whose bonuses doubled.

In the immediate future, demand for managers will depend less on what the manager does than what market he or she has worked in, says William Fanning, director of research for PSMJ/Resources Inc., a Newton, Mass.-based management consulting firm. "For firms in hot markets, the demand for managers is pretty universal," he says. "But if you're in a market where the work has gone away, marketing managers increase in importance."

For many design firms, a slower market may force a re-examination of their financial management. A recent survey of design firm fees and pricing by PSMJ/Resources shows that design firms enjoyed general increases in billing rates, but the increases were not dramatic. Hourly billing rates rose 5.3% in the past year, with rates for some design firm positions increasing as much as 13%.

But some are concerned about design firm billing rates. "You're supposed to

DESIGN FIRM BILLING RATES BY JOB TITLE	
JOB TITLE	AVERAGE HOURLY BILLING RATE
Principal	\$138
Associate	114
Project Manager	100
Project Architect	93
Project Engineer	91
Architect	82
Senior Engineer	92
Engineer	74
Designer	73
Senior Drafter	66
Drafter	55
Spec Writer	82
Estimator	77

Source: PSMJ/Resources Inc.

level oversight of project pricing.

This has led to an increase in demand among design firms for an overall top manager. "More firms are looking for a chief operating officer, the type of person who can run all aspects of the business," says Peart. "This is not new to the industry, but many design firms have resisted the idea of becoming too corporate." But the COO concept is catching on, she says.

Some recent management changes are being driven by clients. "Design firms increasingly are organizing their business to have coherent project teams to serve throughout the life of the project," says Corey N. Hassen, a senior consultant in the engineering and architectural services group for FMI Inc., a Raleigh, N.C.-based management consultant. Clients are demanding project-based teams, rather than moving people in and out during different stages of a project, to provide smoother communication, he says.

Design firms increasingly are using contract labor in place of new hires. "We see firms creating relationships with individuals with special expertise as joint-venture partners," says Peart. These individuals often are included as part of the team during presentations, she says. Hassen agrees. "The whole business of buying up smaller firms is drying up," he says. So some firms are using contract labor as a way to add new expertise without adding to overhead. □

By Gary J. Tulacz

"Bonuses and base salaries continue to increase" for all managerial jobs.

DESIGN FIRM MANAGERS' COMPENSATION

TITLE	MEDIAN BASE SALARY (\$)	MEDIAN BONUS (\$)	AVERAGE (\$)
Principal	110,000	36,000	84,269
Satellite Office Manager	105,000	7,500	21,841
Top Financial Manager	77,000	6,000	13,123
Project Manager	75,000	5,000	14,600
Marketing Director	75,000	4,500	14,469
IT Manager	68,000	4,000	7,933
Human Resources Manager	58,500	3,250	5,849

Source: ZweigWhite Management Compensation Survey

raise prices when demand is high, but fees have been rising only a little above the inflation rate," says PSMJ's Fanning. He says that firms should concentrate on value pricing, or "smart pricing," as he terms it. "Too often, you have project managers pricing a job based on past jobs that were somewhat similar." Fanning says that there should be more top-

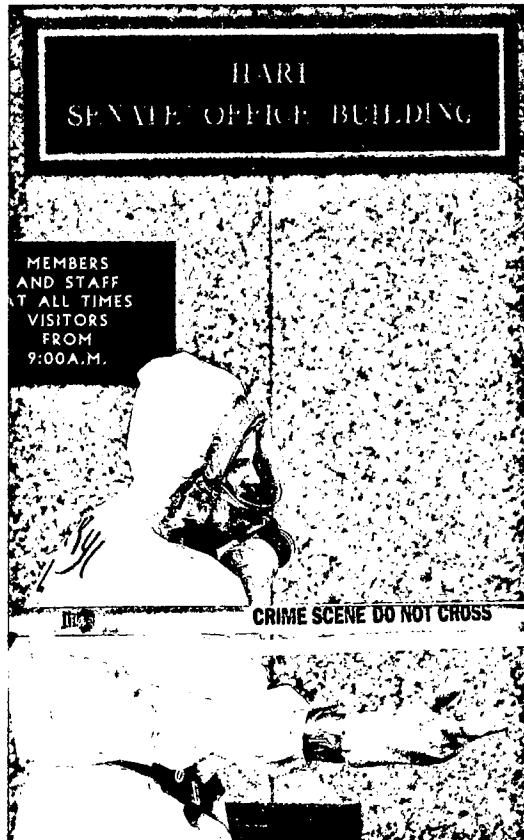
Decontamination

BUG BUSTERS TO GAS ANTHRAX LAIR AS SENATE OFFICES GET CLEANED UP

CLEANUP WORKERS ARE EXPECTED to begin key remediation of the anthrax-tainted Hart Senate Office Building over the Dec. 1-2 weekend. The cleanup has been delayed for weeks as government and industry officials debated the best method for cleaning the 1-million-sq-ft facility. And, officials say it will be another two to four weeks before the building is likely to reopen for business.

Cleanup contractors will focus on the suite of offices used by Senate Majority Leader Tom Daschle (D-S.D.). It was in his office that a letter containing a potent strain of anthrax was opened in October. Over a 12- to 18-hour period, a chlorine dioxide gas solution will be pumped into the offices from a machine outside of the building. Daschle's offices will be isolated from the rest of the building as a concentration of the gas ranging between 500 and 750 parts per million is pumped inside, says Richard Rupert, a U.S. Environmental Protection Agency geologist acting as a site coordinator.

Some preliminary decontamination work already has been done in those offices using a high-tech vacuum cleaner to remove some anthrax spores. Officials say they hope to



CLEANUP Chlorine dioxide was easier than foam.

complete work in the suite by the end of the weekend. The outcome will determine how officials proceed in cleaning up 11 other Senate offices.

Lt. Dan Nichols, a spokesman for the Capitol Police, says that cleaning up the entire Hart building is a "large undertaking." The Capitol Police are in charge of the anthrax investigation and cleanup. Nichols declined to put a price tag on the ongoing effort.

Government officials admit they are in uncharted territory, a fact reflected in the pace of the cleanup. Initially, officials decided to remediate the entire nine-story building using chlorine dioxide gas because it would be the "fastest, most protective and least destructive approach" (ENR 11/12 p. 15). But after reviewing the EPA cleanup plan, some experts claimed that the gas would damage the offices, including computers. The only experience with the gas as an agent to kill anthrax was in labs.

Government officials then adopted a piecemeal approach using a variety of technologies, including application of a foam developed by the Sandia National Laboratories, Albuquerque, N.M., to decontaminate stairwells and freight elevators. That work is done. The foam is produced by EnviroFoam Technologies, Huntsville, Ala.

Officials later determined the gas will not damage computers at concentrations used and that it is more permeable than foam. "Imagine spreading shaving cream everywhere," says an official. □

By Sherie Winston

Surveys

STAFF TURNOVER PLAGUES CONTRACTORS DESPITE REMEDIES

FOR THE PAST EIGHT YEARS, CONTRACTORS have enjoyed a booming market. But their managers and executives have enjoyed an even bigger boom: A shortage of experienced senior people guaranteed that the door was wide open to new opportunities at other companies. Now, two new studies have attempted to define and remedy some of the problems of management turnover.

The average staff-level turnover rate among contractors was 14.1% this year, according to a survey of contractor benefit released by PAS Inc., a Saline, Mich.-based management consulting firm spe-

cializing in the construction industry. Turnover was highest among residential builders, at 15.1%. Highway contractors had the lowest turnover, at 11.7%, followed by heavy contractors at 12.1%, municipal utility contractors at 12.9%, building contractors at 13.8% and industrial contractors at 14.3%.

"The turnover rates are as of August 1 this year, and are actually down a full percent from last year," says Jeffrey M. Robinson, president of PAS. "Our sense is that the turnover rate has probably dropped at least another percent since Sept. 11. But this still is one out of every seven

managers leaving every year, and that's high."

Why managers leave is the focus of another survey by Hornberger Management Co., a Wilmington, Del.-based executive search firm specializing in the construction industry. "When contractors hire us to do a search, they also usually have questions about how to reduce their turnover to stop the bleeding," says Frederick Hornberger, HMC's president.

According to the results of over 1,000 interviews of contractor execs conducted by HMC, dissatisfaction with the immediate supervisor is the top reason that a manager leaves. "Decisions to leave a company are often emotional, rather than financial. In some cases, a firm's turnover crisis can be traced to a single individual," says Hornberger. On the other hand, "we see some managers who we think are underpaid but you would never get them to leave because they like the

PHOTO BY AP/WIDEWORLD

people they work with and feel their job continually challenges them."

Several reasons why people leave relate to lack of advancement. "We figure about 80 to 85% of people have not been promoted by their current employer," says James Vockley, executive vice president of Kimmel Associates, a Nashville-based executive search firm. "Money is down on the list as a motivator, compared to the feeling that you've been dead-ended in your current job." Hornberger agrees: "The old saying 'If it ain't broke, don't fix it' doesn't apply to managers having to do the same thing over and over again."

"Broken promises are one of the key factors in turnover," says Vockley. "Some companies promise moon and stars but then don't come through. These companies are at the greatest risk," he says.

The market downturn may have some impact on turnover, but it will not eliminate the problem. "We see that experienced operations and finance managers

TOP 10 REASONS CONSTRUCTION EXECS LEAVE:

1. Immediate Supervisor
2. Promotion
3. Increased Compensation
4. Stock Ownership
5. Job Security
6. Incompetent Leadership
7. Job Autonomy
8. Broken Promises
9. Ethics & Integrity
10. Unpaid Bonus

Source: Hornberger Management Co.

continue to be in demand," says Robinson. Vockley says that contractors no longer are just hiring bodies to fill potential future requirements. But they continue to need new people to meet current needs. "Middle managers, particularly project managers and superintendents with about 10 years' experience, are in real demand," he says.

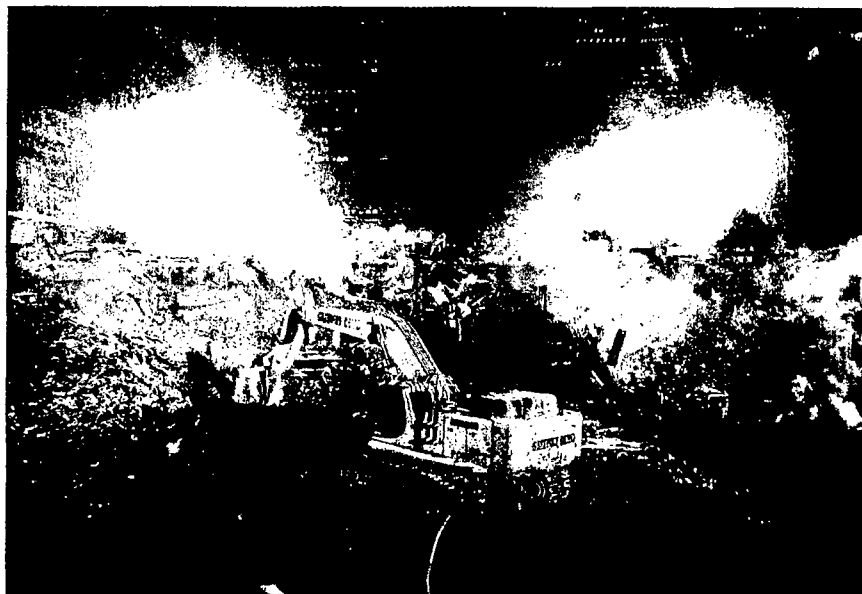
"Firms are still looking for quality business development people and those with preconstruction estimating experience," says Hornberger. "There are contractors now creating a new title—director of preconstruction."

Turnover, even in a slow market, will continue to be a problem for contractors. "As the work force continues to shrink, good people will continue to be in demand," says Vockley. "And contractors will have to compete to recruit them and compete to keep them because, in this industry, the wolf is always at the door." □

By Gary J. Tulacz

Air Quality

WORLD TRADE FIRES DEGRADE AIR, BUT TOXICS IN LINE, OFFICIALS SAY



BURNING ISSUE Site smoke isn't exceeding contaminant standards, data shows.

STUBBORN FIRES AT THE WORLD TRADE Center cleanup site in Manhattan remain the key cause of air quality concerns that brought local activists, politicians and environmental regulators to a verbal clash last week at a New York state Assembly hearing. Assembly Speaker Sheldon Silver (D), whose district includes the WTC site, led legislators in grilling regulators over the nature of site-driven pollution and the extent of air monitoring.

Carl Johnson, deputy commissioner of the state's Dept. of Environmental Conservation, said agencies have been monitoring asbestos, particulates and dioxin since Sept. 11 and updating data on the U.S. Environmental Protection Agency's Website, but these have not exceeded "ambient levels" over a 24-hour period, despite "some spikes reported."

Johnson added that Hudson River water quality has not changed since the attacks, with historic levels of dioxin and chlorinated toxins "in line." But Richard Brodsky, environmental committee chairman, pressed officials on whether site debris itself was tested for hazards, claiming that thousands of gallons of polychlorinated biphenyls may have leaked when a power conduit under WTC Seven was cut. Said Silver: "We won't rebuild lower Manhattan unless we can assure citizens that it's safe to live and work there."

Richard Tramontano, a director of the state health agency, verified that "ground level air quality was causing irritations," but said researchers have yet to fully characterize "what's burning." EPA is only now embarking on a long-term, site-area study, he added. Legislators also pressed for cuts in equipment emissions. Johnson said site vehicles could be refitted to burn low-sulfur fuel, "but we don't know if we have the emergency power to order its use."

Patricia Clark, U.S. Occupational Safety and Health Administration regional director, praised the site's safety record so far, and noted a new safety "partnering" pact signed by the city, site contractors and unions. Richard Cucolo, a state labor department official, said his agency is "coordinating" with owners and contractors at 50 buildings near WTC to determine if scaffolds being used for repairs sustained damage during the attacks.

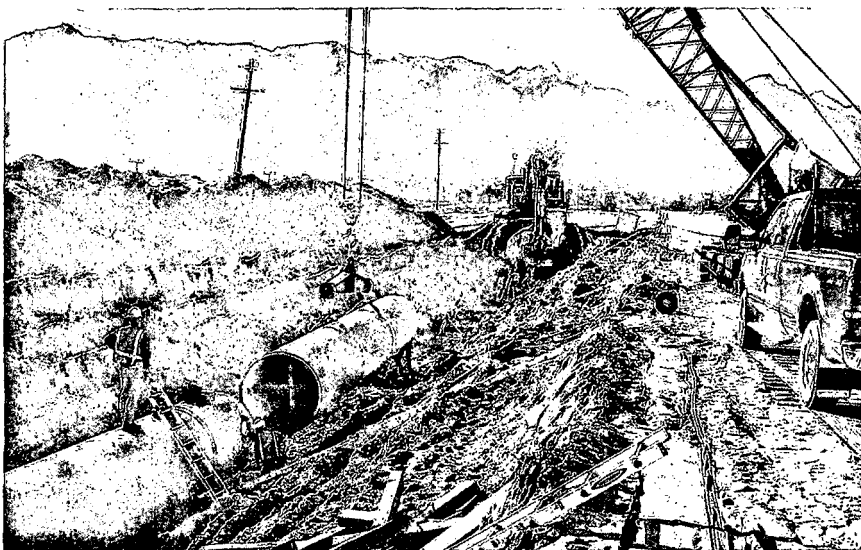
Officials of the city's Dept. of Design and Construction said current 24-hour work shifts will continue, even as winter approaches. Michael Burton, DDC deputy executive commissioner, said the agency received two proposals for a supported fabric structure over some or all of the 500,000-sq-ft site, but it decided against the \$5-million to \$8-million project because of required construction time. □

By Debra K. Rubin

PHOTO BY MICHAEL GOODMAN FOR ENR

Air Quality

LOS ANGELES TRIES UNIQUE SCHEME TO MOISTEN DUSTY OWENS LAKE BED



FLOW Pipe system will saturate soil while salt grass, planted later, will cut emissions.

A UNIQUE BLEND OF A CONVENTIONAL water project and agriculture is taking shape in central California this month as part of an unprecedented air pollution control effort. As a network of pipelines begins to soak 13.5 sq miles of the dry Owens Lake bed, a contractor is starting on the tightly scheduled second phase of the program to control particulate storms that afflict southern Inyo County.

"Nobody's ever done this before," claims Richard F. Harasick, an assistant director of the Los Angeles Dept. of Wa-

ter and Power. The city is undertaking the work to meet a 1998 consent decree requiring it to eliminate plumes that can "block the light of the sun," says Richard R. Coles, a vice president of CH2M Hill Cos. in Santa Ana, Calif., the city's construction manager and lead designer. The lake bed began drying out nearly 100 years ago as the city diverted a key tributary to supply the Los Angeles Aqueduct. The storms threaten residents of nearby Keeler, Calif., with respiratory problems.

Under a \$62-million design-build con-

tract, Barnard Construction, Bozeman, Mont., installed 5 miles of 60-in.-dia steel pipeline, joining the aqueduct to a grid of lateral connectors and distribution lines. Water will saturate soil or induce shallow flooding to "stabilize particles that move on the surface," says Coles. To speed work, the department took the rare step of using design-build, says Harasick. The city was able to meet the initial deadline for flooding 10 sq miles and treat another 3.5 sq miles one year early.

On the project's \$44.3-million second phase, Barnard will install a system that will use salt grass, a native plant, rather than water to control emissions. "It will look like a commercial farm, except we're not growing a commercial crop," Harasick says. A 4.5-sq-mile area will be divided into 644-acre units, each with its own fertilizer and dust control system.

Barnard will install 2,500 ft of 60-in.-dia steel pipe and about 5.8 miles of pipe under 3 ft of cover to connect a new spillway to the aqueduct. Water will be distributed to the lake bed through a network of 24-in.-dia polyvinyl chloride mains, 10-in.-dia submains, and 27 million ft of 1/4-in.-dia drip tube, Brady says.

Four filtration stations using sand media filters will remove small particles that could clog tubes. To prevent briny groundwater from killing plant roots, Barnard will install about 127 miles of 6-in.- and 16-in.-dia perforated polyethylene collector pipe under 4 to 9 ft of cover in engineered grids. Saline groundwater collected by pipes will be mixed with aqueduct water and sent to salt grass. Since grass will need two growing seasons, a December 2003 deadline leaves little room for error. "We're charged with doing a significant amount more of work, in a smaller area, in less time," says Brady. □

By Paul Rosta

Dams

INTERNATIONAL PANEL CRITIQUED

AN OUTSIDE EVALUATION OF THE World Commission on Dams, an ambitious effort to bridge the divide between builders, environmentalists and people affected by dam construction, concludes that such multinational panels have benefits but also limitations.

The critique, released Nov. 21, was written by representatives from the World Resources Institute, Washington, D.C., Lokayan, a Delhi, India, research group, and the Lawyers' Environmental Action Team, Dar es Salaam. It says WCD differed from other blue-ribbon panels of

"eminent persons" by having "active practitioners" from nongovernmental organizations, business and government. Navroz K. Dubash, a World Resources Institute senior associate, says that sort of lineup "can provide legitimacy" but "balancing representatives and managing a credible process remain a challenge."

"The WCD passed one necessary condition for success—it produced a consensus report," the critique said. That report, released in November 2000, called for a "rights and risks approach" to identify stakeholders who should be involved in

making decisions and be consulted on resettlement and other issues related to new dams (ENR 11/27/00 p. 12).

Reactions to WCD's report "signalled that expanding consensus...to the broad set of stakeholders would neither be automatic nor easy," reviewers said. They added that WCD lacked "full industry confidence" and showed the wariness of some governments. For example, an official from China's Ministry of Water Resources resigned from WCD in early 2000.

Unsurprisingly, most NGOs liked the WCD findings, though some wanted it to oppose big dams. But C.V.J. Varma, President of the International Commission on Large Dams, says WCD's report was "unbalanced and contains insufficient commentary on dam benefits...." □

PHOTO COURTESY OF CH2M HILL

Wastewater

LAKE HAVASU CITY BEGINS SWITCH FROM SEPTIC SYSTEMS TO SEWERS

THREATENED WITH A STATE-IMPOSED building ban, Arizona's Lake Havasu City is quickly beginning to spend \$463 million approved by voters last month on an expanded sewerage system. But other fast-growing communities along the Lower Colorado River remain ill-equipped to decommission the large number of septic tanks that leak nitrates along the river—a source of drinking water for 21 million people in California and Arizona.

The successful bond referendum will allow the city to increase local wastewater treatment capacity from the current 2.5 million gal per day to 13.8 mgd, and to decommission 25,000 septic tanks used by 42,000 residents. By next September, the city plans to begin soliciting construction bids for the first \$5-million phase.

State officials pressured the city to act quickly. "We were ready to issue a moratorium on building new septic tanks if



SEPTIC City must lay new sewer mains.

the bond election failed," says Charles G. Graf, deputy director of the Arizona Dept. of Environmental Quality's water quality division.

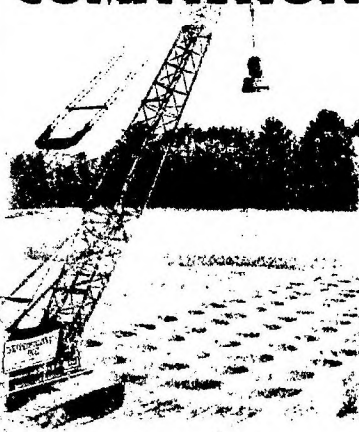
Some of Lake Havasu City's monitoring wells contain four times the federal nitrate limit of 10 parts per million. While

local drinking water wells still contain no more than 7 ppm, nitrates pose a particular risk to infants and the elderly by reducing blood's oxygen-carrying capacity, says Kevin P. Murphy, city public works director.

The city plans to expand two existing wastewater treatment plants that serve 15% of local residences, build a third plant and install 390 miles of gravity mains and 400 miles of laterals. "This is one of the most expensive projects ever undertaken by a community of its size," says Robert S. Schulz, Phoenix-based manager of Burns & McDonnell Engineering Co., a consultant to Lake Havasu City and to the locally based Colorado River Regional Sewer Coalition, which includes the Metropolitan Water District of Southern California in Los Angeles.

The group wants the federal government to pay half of the estimated \$1.6-billion cost to install 34.5 mgd of sewerage for the Lower Colorado's 200,000 residents. "We're trying to prevent a nightmare on the Lower Colorado River," says Lake Havasu City Mayor Melanie Grinstead-Hanak. Total expenditures on the region's sewerage improvements add up to \$45 million since the coalition's founding in 1997 (ENR 10/20/97 p. 32). □

DYNAMIC COMPACTION



Ground Improvement
Contractors Utilizing Dynamic Compaction

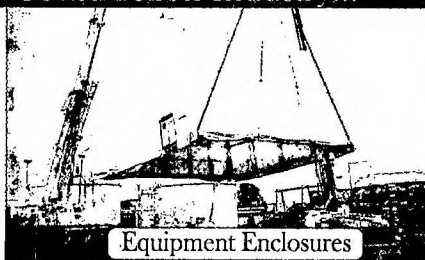
- Old Fills • Loose Soils
- Mine Spoils • Landfills
- Liquefiable Soils

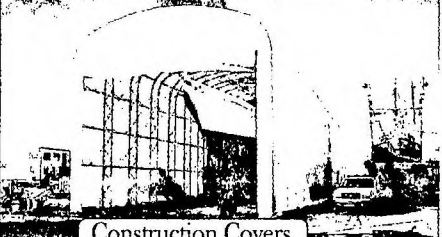
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Pile Driving

GANGED MACHINES TEST-DRIVEN FOR YANGTZE RIVER PORT PROJECT

A SUCCESSFUL PILE-driving test has cleared the way for a U.S. manufacturer to participate in a project to create a deepwater port for Shanghai. American Piledriving Equipment Inc. (APE), Kent, Wash., will gang four of its largest vibro pile-drivers to drive hundreds of 40-ft-dia, steel-rimmed concrete caissons into the bed of China's Yangtze River in a novel attempt to tame the world's third-largest river.

The Chinese hope to deepen the mouth to create a sustainable deep-water port for fourth-generation container ships at Shanghai. APE has a \$2-million contract to deliver and assemble the equipment that will drive 530 piles, each 60 to 80 ft long, into the soft clay bottom of the Yangtze in a first phase of a project to create a 3-mile-long sediment-retention wall. Eventually, the Chinese will spend \$1.8 billion to deepen the mouth of the Yangtze to 12.5 meters.

The Nov. 21 test at APE's Kent site was observed by a Chinese delegation led by Fan Qi Jin, China's deputy transportation secretary and general manager of the Yangtze Estuary Waterway Construction Co. Ltd. Chinese engineers considered as many as seven strategies to solve a thorny problem on what is thought to be the world's largest dredging project. "Large piles were our best solution," says



IN SYNC Vibro drivers together drove demonstration pile.

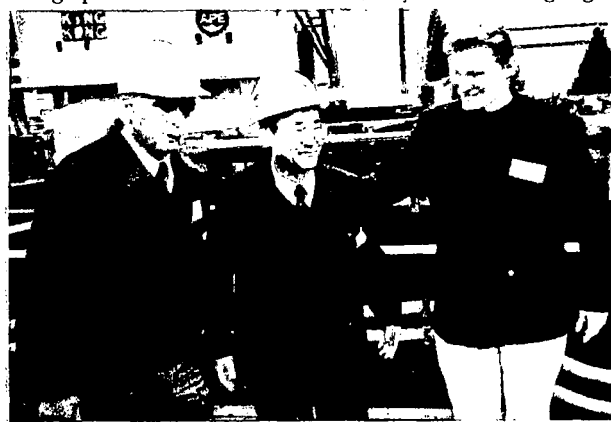
Fan. But initial attempts to place the piles via a vacuum installation failed.

APE Chief Operating Officer John White and CEO Pat Hughes convinced the Chinese that his firm could effectively gang four of its Model 400 King Kong vibro drivers to sink 40-ft-dia, 10-in.-walled, 1.3-million-lb piles 40 ft into the river bottom. The trick, in part, was to synchronize four vibro hammers, each driven by a 990-horsepower engine using computer control systems by Controlled Power Inc., Seattle. "When the idea was first proposed, I thought to myself, 'How in the world are we going to drive a 40-ft-dia pile?'" says White. APE ganged two vibrating hammers in 1994 on a Bonneville Power Administration project, but has never before ganged four. "Now that I've seen the equipment run, my stomach is feeling much better," he says.

APE's ganged drivers will deliver the equivalent of 58,000 in.-lb of force, according to Dave Yingling, APE national equipment manager. Their performance while at work in the Yangtze will be monitored from APE headquarters in Kent via satellite link, he points out.

"The Chinese drive much larger piles than anything we are accustomed to in the West," says White. □

By Stephen Daniels



PLEASED Hughes (left) and White impressed Fan at test.

Companies

UPSTART MACTEC GROWS BIGGER

MACTEC HAS TAKEN ANOTHER GIANT step toward its goal of becoming a \$1-billion company by announcing its intent to purchase all of the outstanding shares of Law Cos. Group's common and preferred stock for \$23.50 per share in cash.

MACTEC, a Golden, Colo.-based engineer-contractor, has grown steadily over the last five years from a company with \$50 million of annual revenue to one with \$300 million. Adding Atlanta-based Law and its \$200 million in revenue pushes the company over the \$500-million mark two years earlier than planned, says Scott State, MACTEC chairman and CEO. "Our next objective is to be over \$1 billion in the next two to three years," he says.

The new combination is an example of what now defines "big" in this indus-

Firm could be \$1 billion in next few years, backed by private equity.

try, says Andrej Avelini, vice president of EFCG, a New York City-based environmental industry financial consultant. "It raises the bar," he says. MACTEC, which State says has private equity backing its planned expansion to billion-dollar size, will continue as a private company. "If growth is sustained at 25 to 30%, we may consider a public offering," he says.

MACTEC units specialize in engineering, government programs and nuclear plant decommissioning. Adding Law will double the size of its engineering group, State says. "It also adds significant geographic expansion," he adds.

Law has turned around from massive losses to profitability and grew nearly 8% this year, says Bruce Coles, its chairman and CEO. "Now we need to look beyond that," he adds. "This is a massive opportunity for our people."

Law is a "hybrid" public company, with stock that does not trade publicly but which must report its activities to the Securities and Exchange Commission. The agreement still must be approved by Law shareholders, but should be complete by the end of the year. □

PHOTO BOTTOM BY STEVE DANIELS FOR ENR

Companies

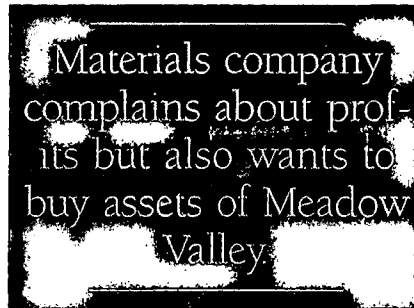
NEW SHAREHOLDER SUES TO OUST BOARD OF MEADOW VALLEY CORP.

APPARENTLY DISGRUNTLED OVER POOR earnings, a recent investor in Phoenix-based Meadow Valley Corp. is suing to oust the contractor's directors. Las Vegas-based Silver State Materials Corp. and Chairman Cyrus W. Spurlino have accused Meadow Valley's directors of "conspiracy" and "wrongful conduct" related to board elections. But Spurlino says he's really suing because he's unhappy that the company isn't more profitable and that its shares have slid.

Spurlino and Silver State aren't longtime stockholders. They began acquiring Meadow Valley shares on Nov. 28, 2000, and together hold 15.8% of its stock. Spurlino's company also is interested in buying the Las Vegas and Phoenix assets of Ready Mix Inc., a unit of Meadow Valley, says Steve Hill, president of Silver State.

Spurlino's lawsuit was filed Nov. 14 in

Clark County, Nev., court. He wants to remove all seven board members because Meadow Valley's initial filing with the Securities and Exchange Commis-



sion in October 1995 "provided false and misleading statements." The filing failed to disclose that board members would serve staggered terms. As a result, the board elections are invalid, Spurlino says. Meadow Valley says that isn't true.

The arguments in the lawsuit are without merit, replies chief executive Brad E. Larson. "It will have little impact on operations," he says.

The technicalities of director terms seems to be Spurlino's way of making a point about lagging profits. For the six months ending July 30, Meadow Valley's revenues decreased 4%, to \$80.8 million. The company recorded a net loss of \$480,000, compared to net income of \$243,000 in the first six months of 2000.

In the past year, Meadow Valley ran into trouble on several New Mexico road contracts. The prime contractor on one job and a subcontractor on another, Johnson Daley Construction Co., filed for bankruptcy protection in May. Its attorney says the state made a huge change on the project and that the state and Meadow Valley made his client bear the financial load. Meadow Valley has \$11.5 million in disputed overrun claims related to the projects.

"They aren't making profits," says Spurlino, noting that the company's shares have fallen to about \$2. He could not be reached for further comment as to whether his assets of Ready Mix Inc. had any bearing on his lawsuit. □

By Tony Illia

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PEOPLE

Raymond J. Milchovich has been named president, CEO and chairman of the board of directors of Foster Wheeler Ltd., the Hamilton, Bermuda-based parent of Foster Wheeler Corp., with operational headquarters in Clinton, N.J. The firm offers design, engineering, construction, manufacturing as well as project development and management services. He succeeds **Richard J. Swift**, who has retired. Previously, Milchovich served as chairman, president and CEO of Kaiser Aluminum Corp.

Paul H. Lemley has joined St. Louis-based J.S. Alberici Construction Inc. as senior vice president and general manager of the Great Lakes Region office. He previously worked for Arcadis Giffels, an architectural firm, serving as senior vice president of their business unit focused on the tier automotive and aerospace suppliers. The firm has also announced that **Robert "Bob" Fritz** has assumed the role of vice president of labor relations. Formerly assistant vice president of labor relations, he replaces **Jack Barnett**, who has retired. **Gregory J. Kozicz** has been named president of RYCO-Alberici Ltd., a Canada-based subsidiary of the parent company. He had been president of BFC Industrial, a Canadian multitrade industrial contractor.



LEMLEY

Pasadena, Calif.-based Parsons Corp. has named **Mike Neumann** as vice president and office manager for Parsons Engineering Science Inc.'s environmental-engineering division. He will manage the daily operations for the St. Louis office in addition to federal business development with responsibilities nationally and for the Midwest region. Before joining Parsons, he was operations manager for Jacobs federal operations' central region.



NEUMANN

Alexander "Sandy" Ardwin has been promoted to chief operating officer of A.P. Construction Co., the Stamford, Conn.-based construction management and general contracting division of The Ashforth Co. He had been senior vice president for operations. Prior to that he served as project director and manager of construction services for O&G Industries in Torrington, Conn.

Emcor Group Inc., a Norwalk, Conn.-based firm providing planning, consulting, mechanical and electrical engineering and facilities services, has named **Gene Martin** senior vice president of EMCOR Energy Services Division. Most recently, he served as president of Keyspan Energy Management Inc., Melville, N.Y.

Samuel D. Palmer has joined Terracon, a consultant engineer based in Lenexa, Kan., as vice president-division manager to lead the company's new southwest division. Based in Las Vegas, Palmer will be responsible for operations in Nevada, Arizona, New Mexico and California. Most recently, Palmer served as regional manager at Kleinfelder in Las Vegas.

HNTB Corp., an international architecture, engineering and planning firm headquartered in Kansas City, Mo., has named **Hugh P. Caspe** as associate vice president, national director of tunnel services. He will work out of the Boston office. Caspe had been principal and owner of Caspe Consulting Co. Inc. for the past three years, and before that led the national tunnels practice for Sverdrup Corp. He also is a member of The Moles, a group of individuals engaged in underground construction.



CASPE

HDR Inc., an engineer, architect and project developer based in Omaha, has announced the following executive promotions. **Wayne Moody** has been named vice president in the Raleigh, N.C., office. Previously, he was transportation section manager. **Melford J. Placilla**, a national director of HDR's design-build transportation section, has been promoted to vice president. He will be based in the Orange, Calif., office. Also, **Glenn D. Pearson** moves up to vice president in the Dallas engineering office. He previously participated in the planning, design and construction of engineering projects.

James E. Wendle has been promoted to a principal at Process Plus, an engineering and design firm based in Cincinnati, Ohio, that works in chemical, pharmaceutical and food industries. He was project manager. Before that, he was a partner with Peoria, Ill.-based River City Construction Inc. In his new position, Wendle will focus on project management, construction management and business development. He is a member of the Design Build Institute of America.

Please mail press releases of executive appointments or promotions only to People Editor Barbara Nathaniel. These also can be e-mailed to her at nathanie@mcgraw-hill.com. Please include color photographs where possible.

Obituary

BE&K'S BOLVIG DIES AT AGE 72

C. PETER BOLVIG, the "B" in engineering and construction giant BE&K, has died at age 72 following a short illness.

In 1972, Bolvig, Bill Edmonds and Ted Kennedy formed BE&K to tap what they correctly perceived was going to be a booming nonunion industrial construction market. At the time, all three were vice presidents at Rust Engineering Co. in Birmingham, Ala., where



PETER BOLVIG (L)

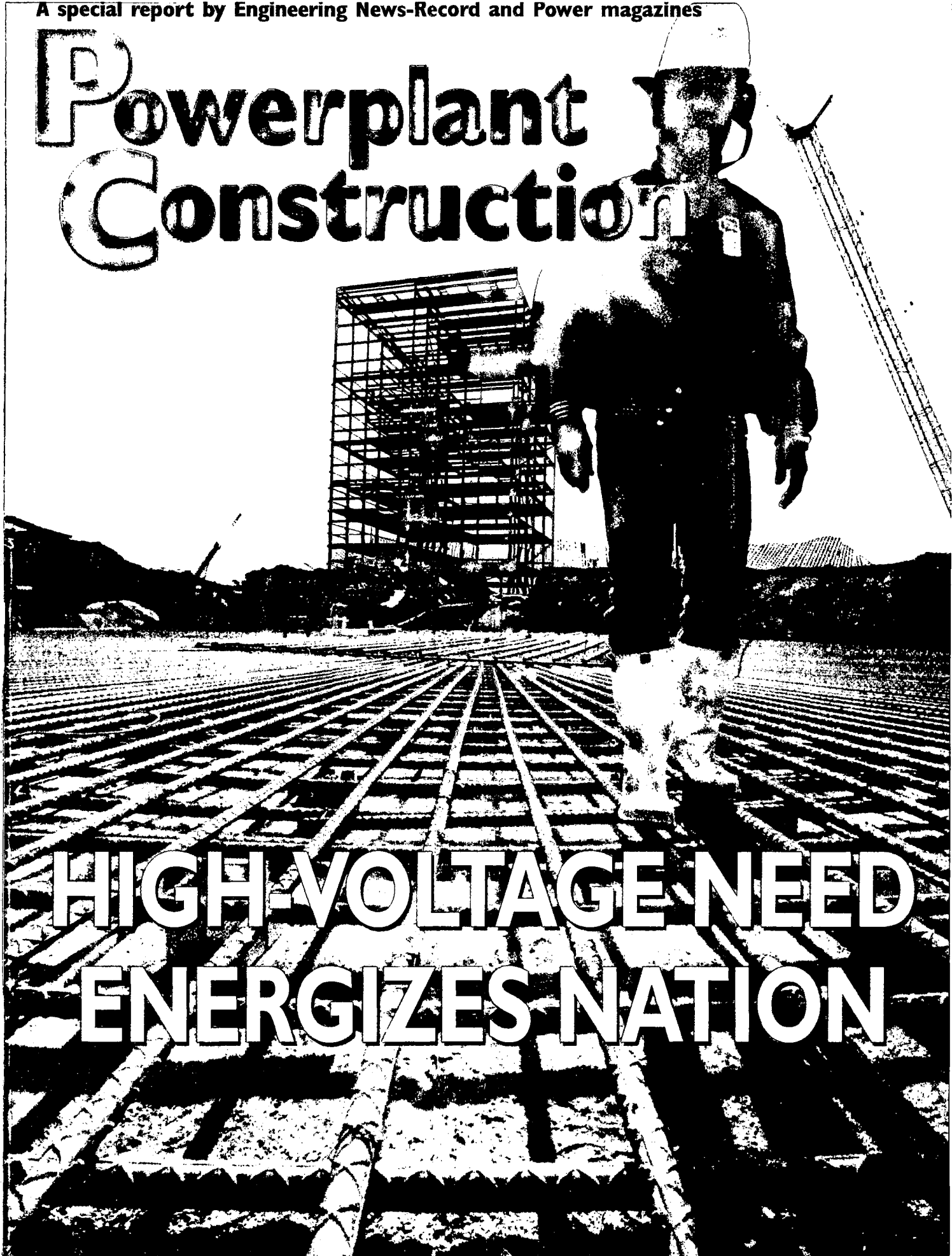
BE&K is headquartered. Starting with just three employees, BE&K now is ranked 25th among ENR's Top 400 contractors, with \$1.4 billion in construction revenue in 2000.

"In the early days, we pretty much divided up ourselves into various areas," says Kennedy. Bolvig handled marketing, Edmonds engineering and Kennedy construction. "Peter was very good at it," says Kennedy, now the firm's chairman. "He had nothing to market except an idea."

Bolvig retired as vice president in 1982, but was the source of "the feeling of care and concern for employees" that continues today, says Kennedy.

A special report by Engineering News-Record and Power magazines

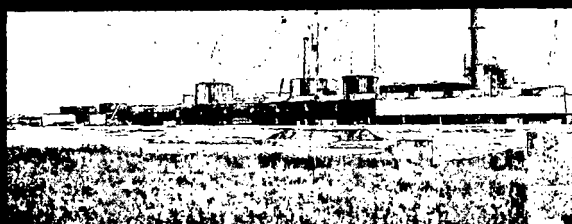
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*Vermont Governor's Award
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A compendium of project summaries on a cd can be accessed at our website www.nepco.com,
or in printed form from NEPCO's Marketing Department

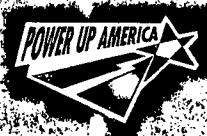


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A special report by Engineering News-Record and Power magazines

Powerplant Construction

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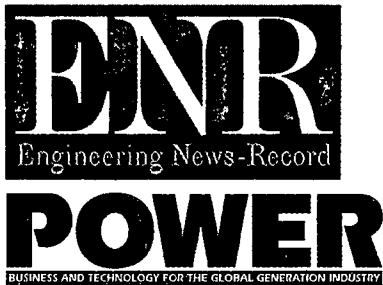
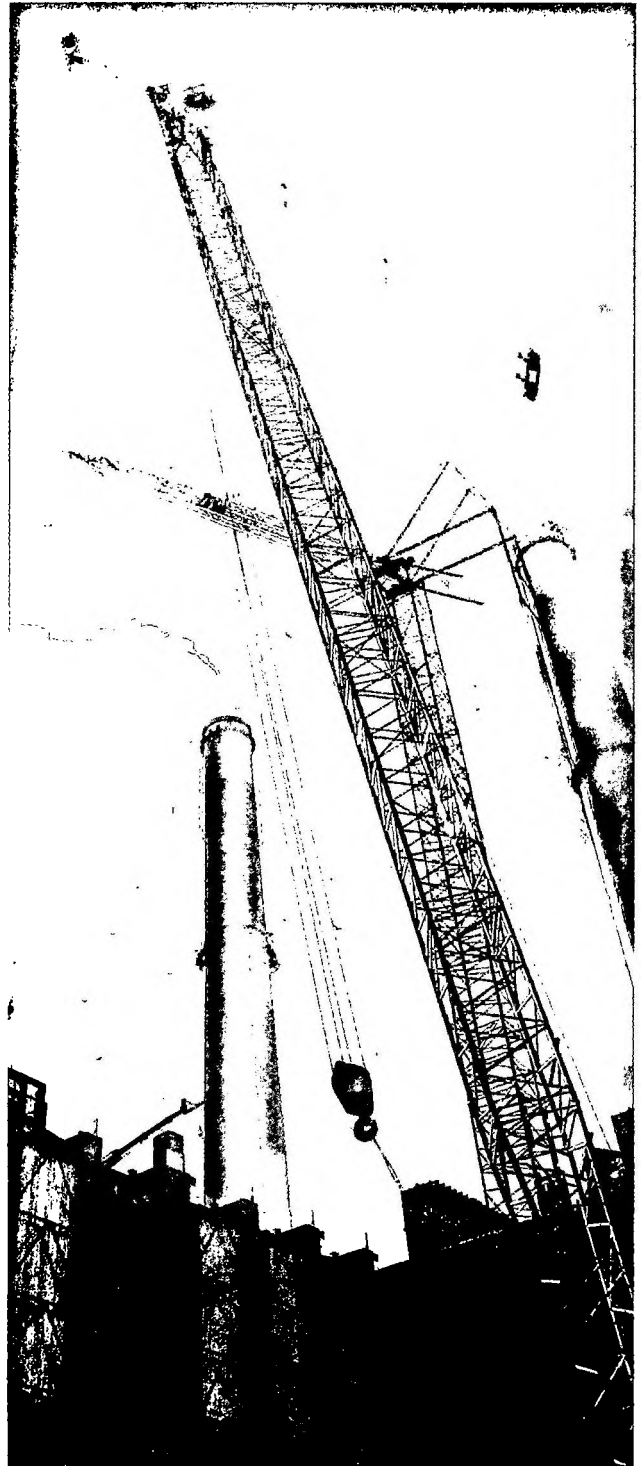
Fewer and bigger power owners dominate market as firms build and buy their way into new strategic positions

New Powerplants Populate Market 63

List of U.S. plants over 50 Mw that are new, under construction and planned offers state-by-state market trends

Viewpoint. 85

Lower power prices and weaker demand have already begun to erode credit, says market analyst Peter Rigby



In this issue of **Powerplant Construction**, Engineering News-Record and Power magazines, both flagship publications of The McGraw-Hill Cos., combine decades of experience in covering construction and energy trends to provide an in-depth report on the global market for powerplant construction.

Powerplant Construction is the result of significant effort by the staffs of both magazines. ENR Associate Publisher Laura Viscusi, Power Editorial Director Robert G. Schwieger and

ENR Editor-in-Chief Janice L. Tuchman conceived the section. Robert Swanekamp, editor-in-chief of Power, Thomas F. Armistead, ENR associate editor; William G. Krizan, ENR Assistant Managing Editor; and Richard Korman, ENR Senior Editor, wrote key stories. ENR Managing Senior Editor Debra K. Rubin and ENR Managing Editor John J. Kosowatz edited copy; ENR Art Director Guy Lawrence designed the issue, and ENR's Agnes Montalban-Salvio managed editorial production.

PHOTO COURTESY OF BLACK & VEATCH

Power Reaches High Plateau

Industry shake-out and fuel uncertainties cast new doubts on long-term development plans

Since 1998, the U.S. has experienced an unprecedented and largely unexpected boom in new power-plant construction. Between 1999 and 2001, about 83,000 Mw of new capacity has come on line, adding nearly 10% to the generation base. Another 300,000 Mw to 400,000 Mw of new capacity is in the pipeline, virtually all proposed by independent "merchant" developers who have replaced traditional utilities as the industry's driving force.

But almost no one believes that all of the projected capacity will actually be built. Market forces, constraints on available fuel, transmission capacity and financial resources will factor strongly. Several late-2001 analyst reports dismissed "capacity glut" worries, claiming that the boom may have already peaked and wondering how sharply new capacity development will fall off.

For 2002, analysts expect capacity additions to continue around 45,000 Mw, about the same as 2001. But after that, all bets are off and most expect a drop-off. The initial predictions of high-capacity additions for the 2002-2007 period simply cannot be taken at face value, says Neil Stein, an analyst with Credit Suisse First Boston. As few as one in three an-



STAYING UP Capacity adds expected to remain stable in 2002.

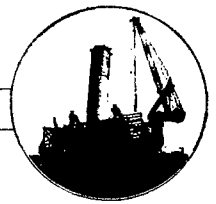
nounced projects may actually get built.

SHAKE-OUT

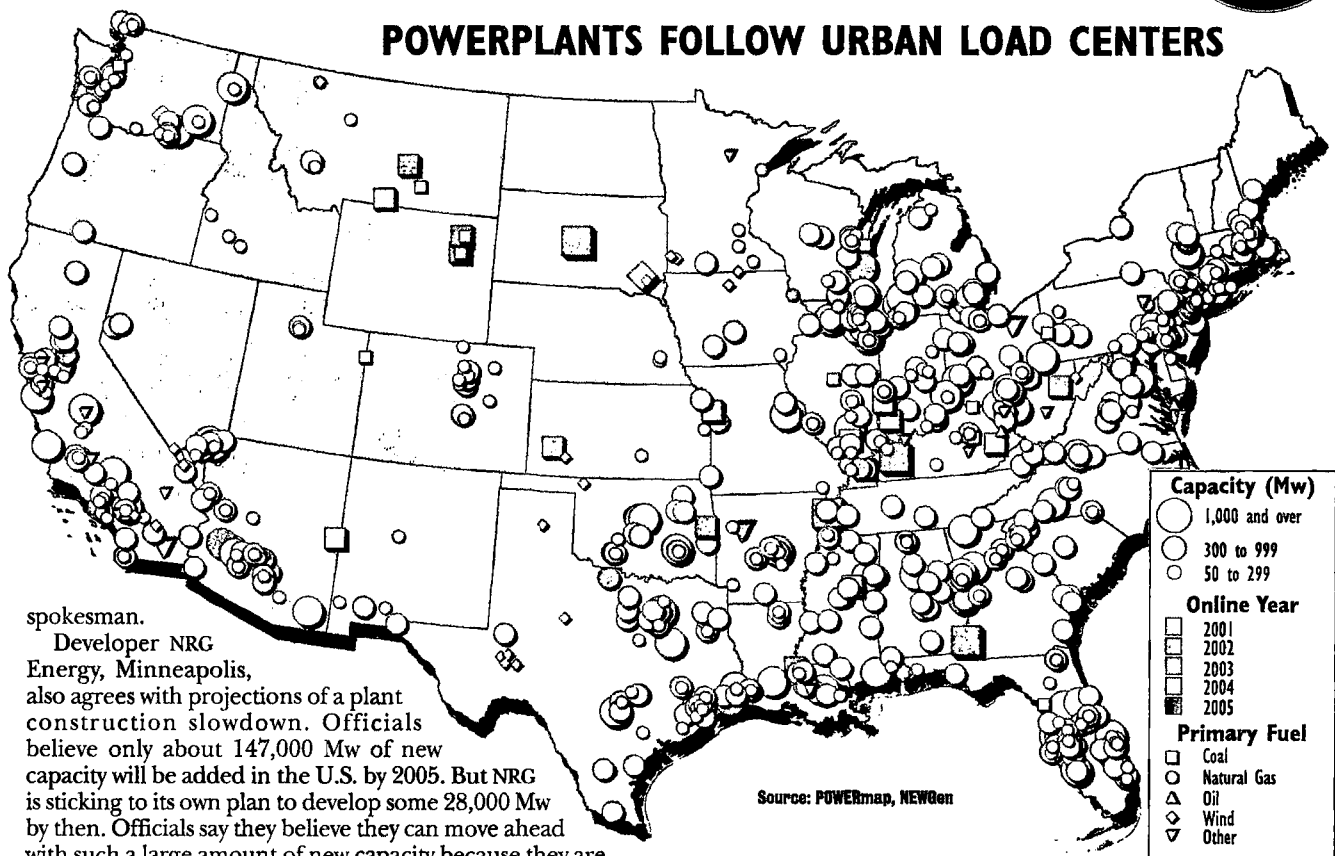
The underlying 2.5 to 3% annual demand growth in the U.S. market would normally support additions of 25,000 Mw to 30,000 Mw per year. That means a substantial baseline level of new plant construction is still likely, especially in capacity-short regions such as the West and Northeast. Most analysts also expect a shakeout in ownership of new merchant capacity, with a small number of financially strong players consolidating their positions as weaker groups fade.

The stunning collapse of Enron in November 2001 and earlier announcements by several other major players of more cautious powerplant development strategies increased the sense that the boom was beginning to fade. Officials of developer AES Corp., Arlington, Va., say that they have recognized the new conditions and have become more conservative. "It now takes a lot more for our people in the field to get a new project approved by headquarters," says a

PHOTO COURTESY OF BECHTEL



POWERPLANTS FOLLOW URBAN LOAD CENTERS



Source: POWERmap, NEWGen

spokesman.

Developer NRG Energy, Minneapolis, also agrees with projections of a plant construction slowdown. Officials believe only about 147,000 Mw of new capacity will be added in the U.S. by 2005. But NRG is sticking to its own plan to develop some 28,000 Mw by then. Officials say they believe they can move ahead with such a large amount of new capacity because they are operating in several separate regions.

COLLISION

A sustained 3% annual growth in U.S. electricity demand through the 1990s collided with a virtual standstill in new powerplant construction through the mid-1990s, squeezing the electricity industry's overall capacity reserve margin from about 20% in 1990 to about 7% in 2000. In response, a small army of project developers descended on practically every location in the U.S. where a gas pipeline came close to a power transmission line. State environmental and regulatory agencies were hit with a barrage of air and water permit applications, causing some states, including Tennessee and Kentucky, to call "time out" and reassess their permitting procedures for powerplants.

But California, desperate for new power sources, began turning around permits in a few months. Officials in many other states, determined to avoid California's mistakes, welcomed new plants. Georgia, for example, put a limit on utility purchases of out-of-state power to force more plant construction at home and Louisiana approved new tax incentives for merchant plants.

According to the Electric Power Supply Association, a Washington, D.C.-based lobbying group for the independent power industry, there were at least 524 merchant projects—322,700 Mw of capacity—either in construction or in development in the U.S. as of late 2001. The NEWGen data base of RDI, like ENR and Power a unit of the McGraw-Hill Cos., lists 473,000 Mw of new capacity in construction or development, but says that about 60,000 Mw of this has been canceled or put on hold. The rate of cancellations and suspensions is now outpacing new project announcements, RDI reports.

According to Ray Niles, senior market analyst for Salomon

Smith Barney, reserve margins had already begun inching up by 2000. By mid-2001, the rapid construction of new capacity coupled with slow growth caused a decline in forward energy prices. He now expects many developers to cut back project plans based on negative commodity drivers, with the new "down cycle" bottoming out in 2003 when a more balanced market will emerge.

FUEL CONSTRAINTS

Christopher Ellinghaus, senior analyst with Williams Capital Group, New York City, argues that it would be virtually impossible to install 400,000 Mw of new merchant capacity in the U.S. anytime soon. He claims that 90% of the proposed plants use gas and there simply isn't enough of a supply to fuel them all. Ellinghaus notes that fueling an extra 300,000 Mw of gas-fired capacity would require an addition of 14 Tcf to gas supplies by 2005, an increase of more than 50%. At best, the gas industry is expected to increase supplies 1 to 3% annually in the coming years. He expects capacity additions of 46,000 Mw in 2001 and between 36,000 Mw and 53,000 Mw in 2002 based on plants now in construction and in advanced development. Thereafter, he expects the gas constraints will limit further additions to about 20,000 Mw annually through 2005.

Coal-fired projects have been proposed in several regions in the last two years precisely as a hedge against over-reliance on gas. The problem with coal is that the permitting and construction process is much longer than for gas. Projects initiated in 2001 are not expected to come on line before 2005 at best. Coal also presents more air-quality and "not-in-my-backyard" objections than gas, and most "clean coal" technologies are still in the demonstration stage.

Nuclear got a boost from the Bush administration's energy

MAP COURTESY OF RDI

Powerplant Construction MARKET OVERVIEW



plan in 2001. A few large merchant nuclear operators, including Entergy, Dominion Energy and Exelon, are mulling new reactor projects in 2002, the first in over 25 years in the U.S. But the Sept. 11 terrorist attacks created a major new security issue for the nuclear industry. The public may simply refuse to accept building new reactors.

TRANSMISSION

A third major factor likely to restrict new powerplant construction is the nation's patchwork electricity transmission system, which was not built to handle large-scale merchant traffic between regions. Several states have been forced to slow permitting because local grids cannot handle additional load. The North American Electric Reliability Council, an industry group that loosely coordinates grid operations, has specifically warned that excessive new plant construction may overburden transmission systems in the Southeast, Southwest and Midwest. NERC reports that less than 10,000 miles of new transmission capacity will be built in the U.S. in the next 10 years. That 5% addition to current capacity is well below likely generation additions.

The Federal Energy Regulatory Commission has begun to address these problems by mandating creation of a few large Regional Transmission Organizations (RTOs), which would have wide powers to plan new transmission links. The administration also is considering legislation to get eminent-domain power for transmission projects deemed to be of national importance.

A final major constraint to massive new investment in powerplants is money itself. Industry analysts estimate that the power industry since 1999 has borrowed about \$50 billion to finance the new wave of plant construction. The less optimistic forward energy price estimates and the recession have created a new climate in which credit ratings for the competitive energy industry are expected to drop, making it harder to refinance existing loans and raise new capital. The chillier financial climate likely will most affect projects financed with short-term loans and selling mainly into volatile peaking markets.

A related problem is Wall Street's valuation of energy company stocks, which tend to closely follow up and down cycles in wholesale electricity prices. After several years of increases through early 2001, stock values began to drift downward around midyear, according to Barry Abramson, an analyst with UBS Warburg. Abramson does not see a stock value drop as the "end of the world" and says that the power generation business as a whole will continue to be profitable and provide decent returns to investors. "It is just that not everyone in the business will be able to do well and a period of declining power prices could help separate the strong players from the weaker ones," he says.

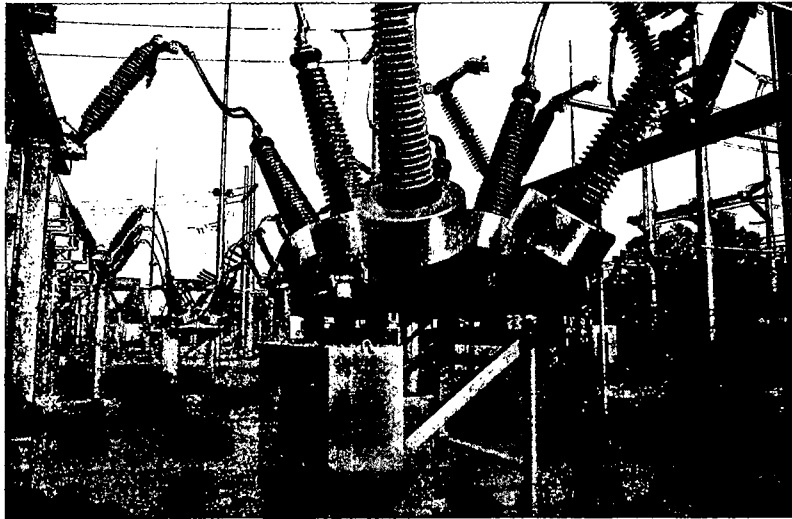
For the merchant generation companies, the clear trend in

2001 has been away from continuing all-out expansion of capacity to gain market share and toward a more market-oriented strategy focused on finding buyers for the new capacity and hedging production as far into the future as practical. This has tended to favor developers with integrated electric generation, gas and energy-marketing strategies such as Duke Energy, Mirant and Dynegy. Groups that may have less of an advantage are large generators such as Calpine Corp., NRG Energy and AES, which have been slower to develop marketing businesses.

During late 2001 some developers, such as PG&E National Energy Group and Constellation Energy Group, announced slowdowns in new plant development, while others, such as Calpine and NRG, held to ambitious pre-2001 capacity development goals. But Calpine also said that it would pay attention to changing market conditions.

The experience of the last few years has also shown that some potential restraints on powerplant construction have not materialized. There was wide concern in 2000 about a looming shortage of turbines. Many new plants were being proposed and

energy companies committed for dozens of turbines at a time to assure availability. But it appears the actual turbine demand in 2000 was below expectations because several plants were canceled and the supply is now keeping up with demand. It also appears that the sudden halt in the move toward retail competition, due especially to the failure of deregulation in California, has not noticeably affected merchant generation construction.



PINCH POINT Old attitudes hamper delivery of power to load centers.

While California actually did return its system to retail regulation this fall, generation there remains under control of merchant generators. The real issue for developing new capacity in the state is that the rules for selling wholesale power to the utilities remain unresolved.

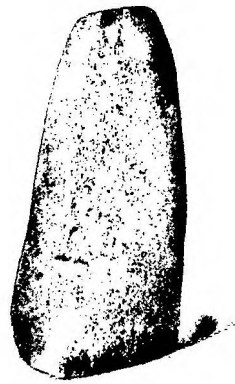
Overall, EPSCA calculates that 36% of all generation in the U.S. is now operated on a competitive merchant basis, compared to 8.5% in 1997. This includes both newly built merchant plants and utility plants divested to competitive groups.

Even with the fading boom in the U.S. generation market, things are generally considered worse in international markets where economic and politic instability and more recent terrorism threats have forced U.S. developers to pull back. Jean-Louis Poirier of the PA Consulting Group, Washington, D.C., says that about 315,000 Mw of new capacity is likely to be built worldwide in the coming 10 years with a total value of \$200 billion. He predicts about 220,000 Mw of this will be in North America with much of the rest in Europe.

That means the U.S. will be the main attraction in the global marketplace for new plant construction for the foreseeable future, replacing overseas markets that had boomed in the 1990s. And despite the downturn in the market, prospects for new construction are still better than they've been in years. □

By Paul Kemezis

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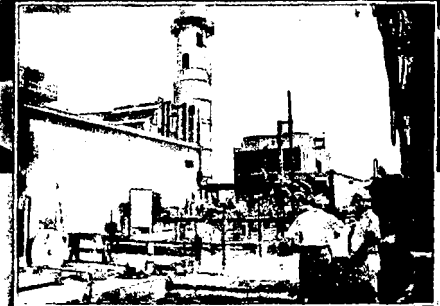
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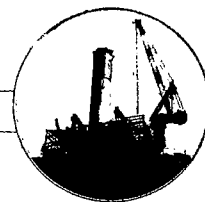
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Shortage of Qualified Contractors Opens Doors for New Contenders

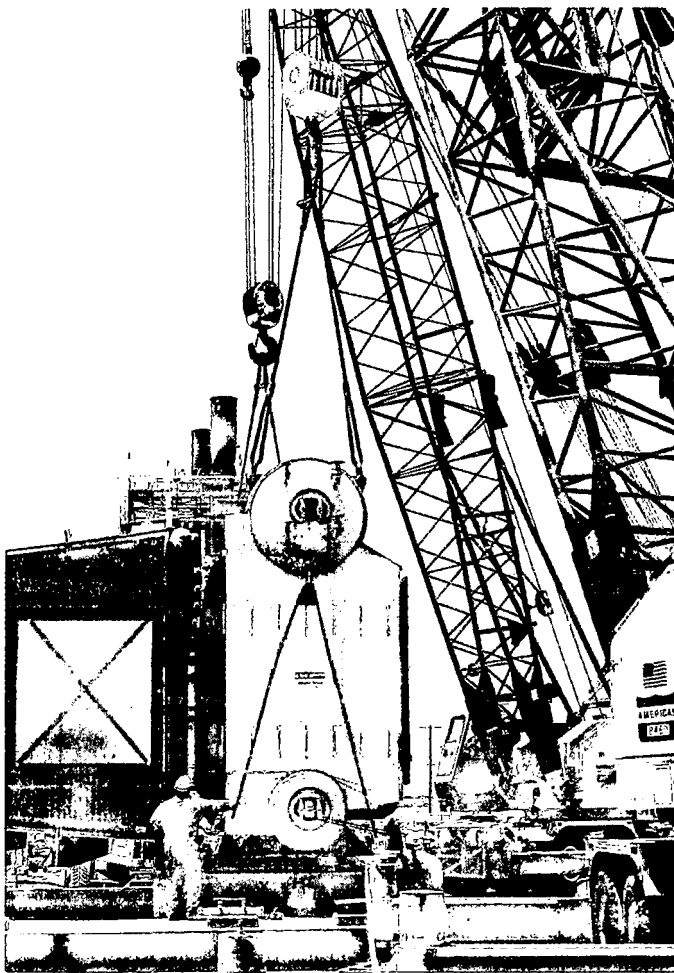
But experienced engineers on team remain indispensable

In response to the abrupt halt to nearly all construction in the microelectronics market, a contractor long successful in that industry recently polled professional staffers about prior work experience. He found a substantial number had done powerplant engineering or construction. The contractor now is considering how to crack the power market.

Success in power hinges on good estimating, proper attention to risk allocation, qualified people and cost and schedule controls, says Bob Milhiser. But the power division vice president of engineer-constructor Burns & Roe Enterprises Inc., Oradell, N.J., says new players must "understand the power business—what assets or qualities could they bring?" He advises looking for a niche where a newcomer can apply its strengths.

Experience in process-industry construction—pulp and paper, petrochemicals and fertilizer—is good preparation to compete in powerplant construction, Milhiser notes. A contractor without process-industry experience could gain entrée by focusing more narrowly. A microelectronics-industry contractor, for example, might provide instrumentation and controls for powerplants.

"It looks like connecting wires," says Jeffrey M. Levy, president and COO of Norwalk, Conn.-based specialty contractor EMCOR Group Inc. "But it's really about understanding the flow of the job." Many of the approximately 45 electrical and mechanical contractors that belong to the EMCOR group of companies serve the powerplant construction market, but their learning curve was



BOOMING Gas-fired generation continues market dominance.

costly. "The first time we do a power project in each of our companies, it is not as profitable as the next ones," he says. "Probably the most important thing is to recognize that you don't know what you don't know. You can understand the skills, read the drawings, but the flow of the work and construction sequence and access are crucial."

The backlog of gas-turbine orders has attracted more attention, but a similar shortage of experienced powerplant constructors has created an opportunity

for industrial contractors, says Charles E. Crocker Jr., vice president of engineering and construction for Reliant Energy Wholesale Group, Houston. "Contractor availability has become a nightmare recently." Where once it was possible to get a constructor on board 24 months before a powerplant's scheduled commercial-operation date, the time required has grown to a 30-month minimum, he says.

EXPERIENCE

Having an experienced powerplant engineer on the team is key, says Crocker. "Guys who've managed large projects can manage powerplant projects as long as engineering help is part of the team," he says.

A few years ago, a Reliant project was built by an engineer and constructor who "were not well known for powerplant projects," says Crocker. They did well enough on plant construction, but got into trouble in the startup phase. "The team didn't have the technical depth that we need," he says.

Last summer, Reliant's 10-unit, 870-Mw merchant plant in Aurora, Ill., was completed on time by a team composed of Graycor Inc., Homewood, Ill.; Sachs Electric Co., Chesterfield, Mo.; and Chicago-based Sargent & Lundy LLC. "Graycor has a great reputation, just not on powerplants per se," says Crocker. "They have some people on the team who do have some powerplant experience." But S&L's strong powerplant experience helped assure the team's success. Now, a joint venture of Graycor and Murphy Co. Mechanical Contractors & Engineers, St. Louis, will be teamed again with S&L for engineering and con-

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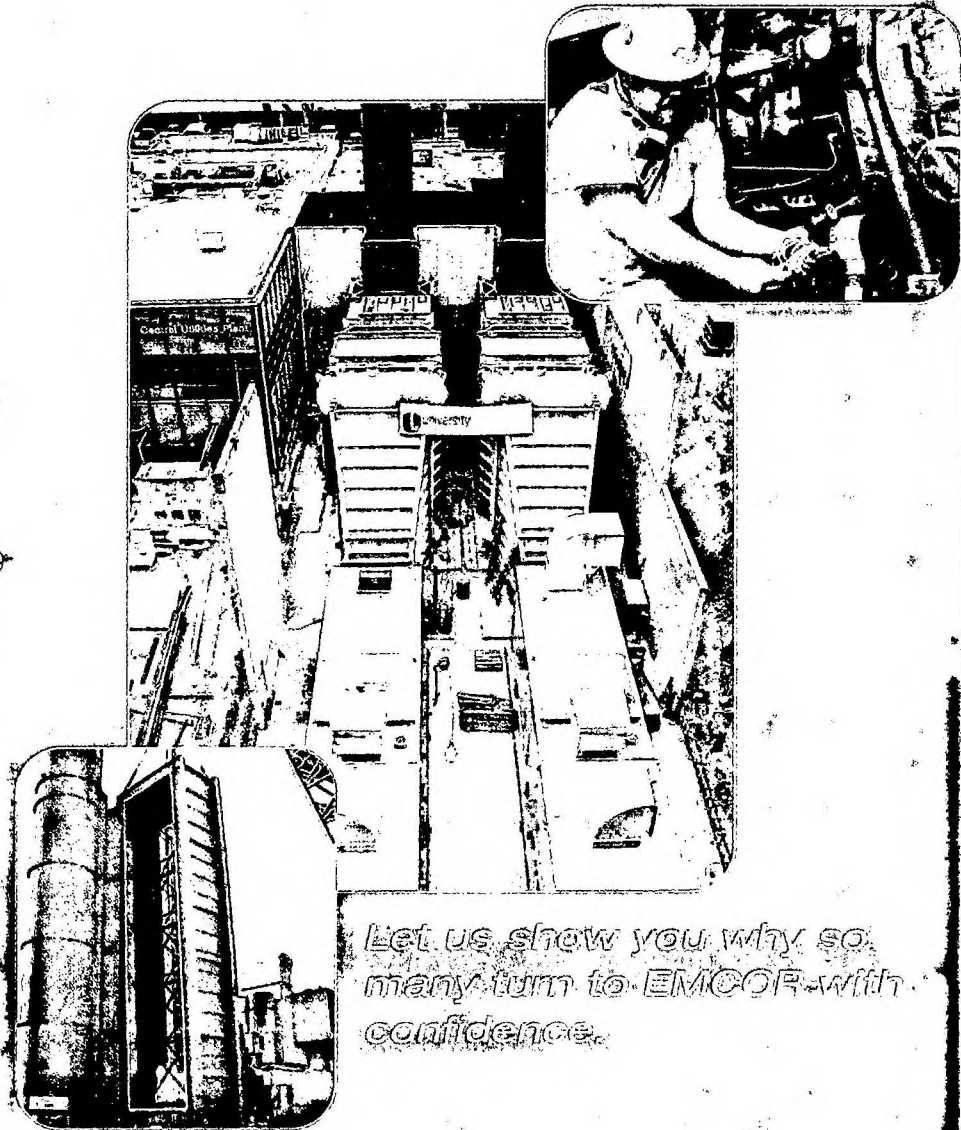
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struction of Reliant's 550-Mw, dry-cooled, combined-cycle Bighorn project in Primm, Nev.

"It's easier for a contractor who has built other [process] plants but hasn't built powerplants to get into the business than it is for engineers," says Crocker. "It's best if the contractor has powerplant experience." But a seasoned engineer is indispensable, he insists.

Anchorage-based VECO Corp. was launched into powerplant construction from a process-plant base. The engineering, procurement and construction contractor's roots are in the refining and petrochemical market, but with the advent of cogeneration, VECO made the natural shift to power. Today, roughly 20% of the firm's gross revenue is power-derived, says Geza T. Szabo, senior vice president of VECO's power sector.

VECO's target power market is primarily cogen, both simple and combined-cycle units of less than 250 Mw, and includes waste-heat recovery plants and wood-waste boilers. "There continue to be great opportunities throughout North America," says Szabo. "The U.S. alone faces a 200,000-Mw power shortfall, an infrastructure deficit on the order of \$135 billion, especially on the East Coast and in the deep South."

COAL COMES BACK

Last winter's record-high gas prices won new respect for coal. "We are doing coal projects today of some type in 26 states," says Doug Riedel, director of marketing for the power division of Burns & McDonnell, Kansas City. Coal units, built in the 1960s and 70s and thought to be headed to retirement, have become "valuable assets," he says. But as gas prices have fallen again, the environmental advantages of gas-fired powerplants have kept gas turbines popular. "Hundreds of turbines have been purchased," Riedel says, "and unless something catastrophic happens, those turbines will be installed and there will be a need for design engineering."

THE TOP 25 POWER DESIGNERS

RANK	FIRM	\$MIL.
1.	Bechtel Group Inc., San Francisco, Calif.	972.00
2.	Sargent & Lundy LLC, Chicago, Ill.	317.00
3.	Black & Veatch, Kansas City, Mo.	288.39
4.	Duke Engineering & Services, Charlotte, N.C.	282.10
5.	Foster Wheeler Corp., Clinton, N.J.	174.00
6.	Parsons Corp., Pasadena, Calif.	162.50
7.	Burns and Roe Group Inc., Oradell, N.J.	136.67
8.	Washington Group International Inc., Boise, Idaho	128.00
9.	Fluor Corp., Aliso Viejo, Calif.	121.90
10.	Parsons Brinckerhoff Inc., New York, N.Y.	102.60
11.	URS Corp., San Francisco, Calif.	101.60
12.	Burns & McDonnell, Kansas City, Mo.	82.00
13.	Earth Tech, Long Beach, Calif.	80.00
14.	Harza Engineering Co., Chicago, Ill.	64.75
15.	Tetra Tech Inc., Pasadena, Calif.	63.50
16.	Utility Engineering Corp., Amarillo, Texas	59.60
17.	VECO Corp., Anchorage, Alaska	58.00
18.	AECOM, Los Angeles, Calif.	43.40
19.	BE&K Inc., Birmingham, Ala.	38.30
20.	Power Engineers Inc., Halley, Idaho	32.60
21.	R.W. Beck, Seattle, Wash.	31.70
22.	Raymond Professional Group Inc., Chicago, Ill.	27.90
23.	TRC, Windsor, Conn.	26.70
24.	Bibb & Associates Inc., Lenexa, Kan.	25.40
25.	CDI Engineering Group, Philadelphia, Pa.	24.10

Source: ENR Top 500 Design Firms—April 16, 2001

THE TOP 25 POWER CONTRACTORS

RANK	FIRM	\$MIL.
1.	Bechtel Group Inc., San Francisco, Calif.	3,539.00
2.	Fluor Corp., Aliso Viejo, Calif.	1,503.00
3.	Foster Wheeler Corp., Clinton, N.J.	1,453.00
4.	Washington Group International Inc., Boise, Idaho	1,449.00
5.	NEPCO, Bothell, Wash.	1,228.56
6.	Black & Veatch, Kansas City, Mo.	1,225.70
7.	H. B. Zachry Co., San Antonio, Texas	932.45
8.	TIC Holdings Inc., Steamboat Springs, Colo.	547.06
9.	The Shaw Group Inc., Baton Rouge, La.	519.70
10.	Parsons Corp., Pasadena, Calif.	446.10
11.	Burns & McDonnell, Kansas City, Mo.	397.00
12.	J. A. Jones Inc., Charlotte, N.C.	376.70
13.	Peter Kiewit Sons' Inc., Omaha, Neb.	320.62
14.	Williams Group International Inc., Stone Mountain, Ga.	265.49
15.	Day & Zimmermann International Inc., Philadelphia, Pa.	207.00
16.	Dick Corp., Pittsburgh, Pa.	194.00
17.	Gemma Power Systems, Glastonbury, Conn.	158.00
18.	Barton Malow Co., Southfield, Mich.	130.50
19.	H+M Co. Inc., Jackson, Tenn.	91.00
20.	Chicago Bridge & Iron Co., Plainfield Ill.	83.00
21.	Fru-Con Construction Corp., Ballwin, Mo.	73.38
22.	VECO Corp., Anchorage, Alaska	71.50
23.	BE&K Inc., Birmingham, Ala.	62.20
24.	The Whiting-Turner Contracting Co., Baltimore, Md.	62.00
25.	J. S. Alberici Construction Co. Inc., St. Louis, Mo.	54.80

Source: ENR Top 400 Contractors—May 21, 2001

Burns & McDonnell's reality check is to ask whether the prospective client owns turbines. The turbine shortage is not quite as critical as it was six months ago, but it is still crucial to do business "with people who control turbines," Riedel says. Without turbine contracts in hand, prospective gas-fired powerplants may well remain prospective—"bragawatts," in one wry industry phrase.

EMCOR's Levy sees opportunity in the aging U.S. powerplant inventory. "You've got some plants that are simply tired iron, and are not going to be the most efficient way to meet the country's needs," he notes. Levy sees this especially in some small projects that fly under the radar screen of the big general or EPC contractors. "Central stations will give way to distributed and regional generation," he says.

SMALL IS BEAUTIFUL

College and university campuses offer many opportunities for small EPC projects. After doing a gas-turbine cogen study for the University of California at San Diego a few years ago, University Mechanical Co., a San Diego-based EMCOR unit, won the EPC contract for the 20-Mw plant, valued at more than \$20 million. California's power emergency "turned the plant into a brilliant investment," giving UCSD a strategic advantage, Levy says. And the project attracted the attention of other universities and colleges, leading to similar work for EMCOR. "College campuses tend to have increasingly growing energy needs, but we had no idea that this powerplant was going to take off so much," Levy says.

The need for essential infrastructure on the periphery of the powerplant construction market presents still other opportunities to qualified contractors. Dashiell Corp., a Houston-based subsidiary of Exelon Infrastructure Services, provides turnkey construction of switchyards, substations and short transmission lines inter-

Powerplant Construction COMPANIES

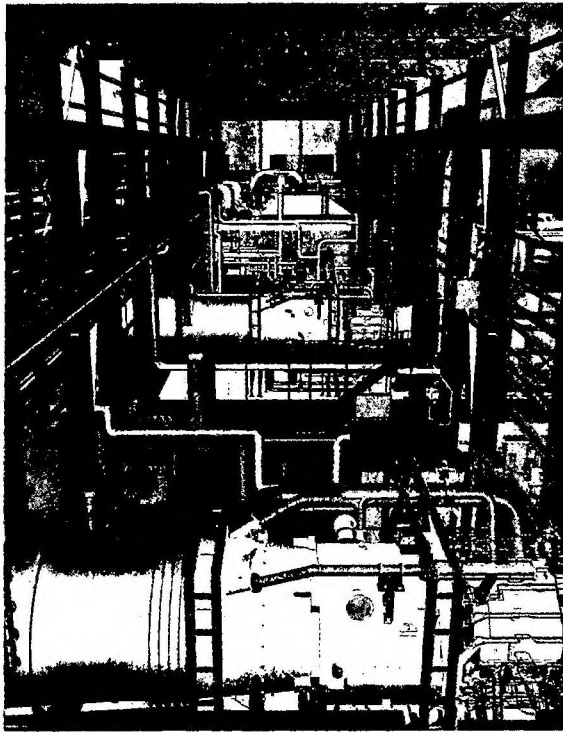


PHOTO COURTESY OF BURNS & ROE ENTERPRISES INC.

EXPERIENCE COUNTS Understanding plant flow is crucial.

connecting generation stations with the power grid.

Dashiell has built high-voltage substations for the Gulf Coast petrochemical industry, and gained work in independent power when private developers began developing inside-the-fence cogen projects at petrochemical plants.

Projects, typically switchyards rated from 138 kv to 500 kv, run between \$5 million and \$25 million, with open-book, negotiated, lump-sum contracts and schedules of 12 to 16 months, says Henry Jackson, Dashiell's president. "They are all driven by tight time frames," with liquidated damages running between \$5,000 and \$25,000 per day, he adds.

Owners—usually independent power producers or utilities—are looking for a single contact to take



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responsibility for the tie-in between the powerplant and the grid. "The trend is contracting with the IPP," says Jackson. Dashiell in turn may subcontract some work, but "we feel we get more value added if we do the

entire package," he adds.

Dashiell's technical focus calls for a sizable technical staff and a fleet of specialized equipment. With 2001 volume of about \$120 million, the company has 60 to 70 people in its engineering group, about half of whom hold a professional engineer's license. Company-owned bucket trucks, trenchers, backhoes and cranes serve about 25 crews in the southeast and southwest. "A [general] contractor would have a hard time doing this turnkey approach," says Jackson.

The economic slowdown doesn't dim Jackson's faith in the still-



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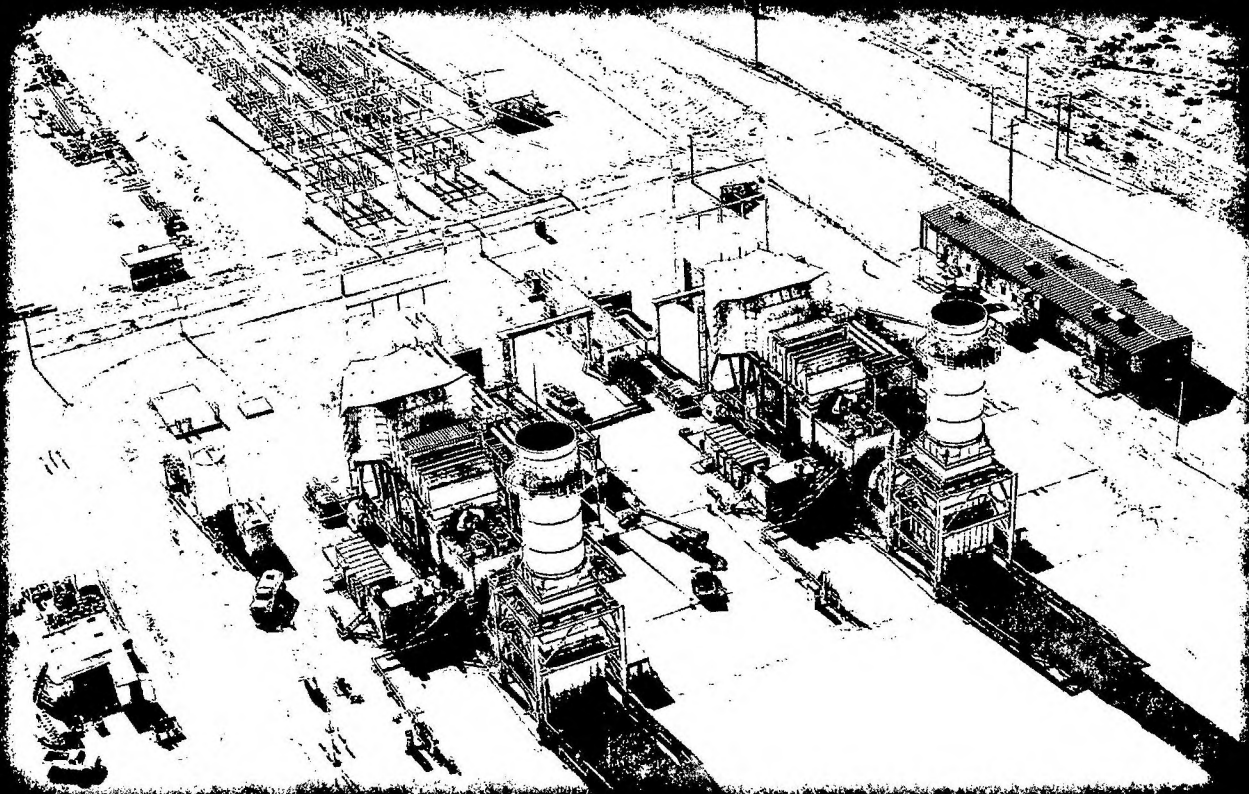


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hot power market. "We think the market will continue to grow. It will mature in some places," he allows. "The southeast has a tremendous amount of activity at this moment," especially Mississippi and Alabama. "If you really have deregulation, they're going to have to replace all these 50-year-old powerplants."

RISK TAKERS

Allocation of risk is the factor that will make or break a contractor, says VECO's Szabo. "You've got to be very selective. You can lose your pants if you don't have proper contracts." Equipment manufacturers, such as GE or ABB, will accept responsibility for performance, but not for schedule. If the equipment malfunctions, "the EPC contractor can be left holding the bag for delays," Szabo says. "There are liquidated



LEVY

damages associated with nearly every project today. That's the biggest concern."

Dan Zabilansky, senior vice president of Lockwood Greene, Charlotte, N.C., notes that liquidated damages for powerplant



KNAPP

EPC contracts run from \$50,000 to \$80,000 per day, "so you better know what you're doing."

One pitfall for unwary EPC contractors is in the purchase order for power island equipment, says Al Knapp, senior vice president at Steamboat Springs, Colo.-based contractor TIC Holdings Inc. Manufacturers often provide boilerplate purchase orders signed by developers and then assigned to the EPC contractor, whose terms include a 90-day grace period after start-up for necessary equipment modifications. "[Equipment makers] are in a learning environment as well," Knapp acknowledges. But the manufacturer's liquidated damages, typically \$400 per day, are not nearly as highly motivating as the contractor's. The EPC contractor thus must pick up on the grace period's significance and be prepared to mitigate the risk in such contract language.

"Financial strength is a problem in our industry," says Chris Tye, senior vice president of project services for Duke/Fluor Daniel, Charlotte, N.C. The



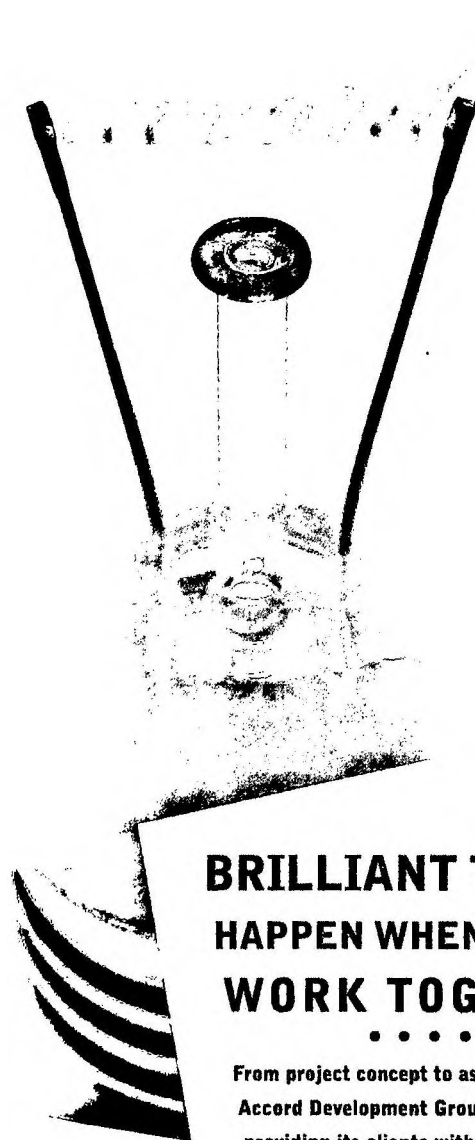
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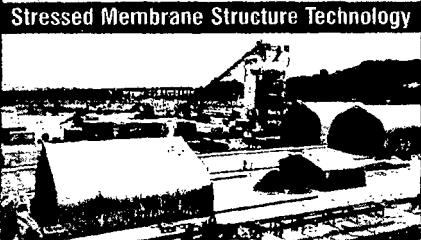
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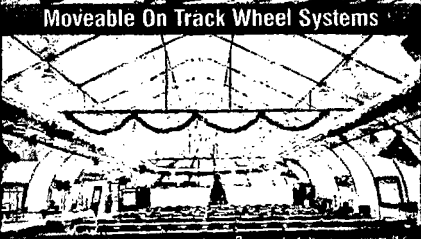
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1. MYR Group Inc., Rolling Meadows, Ill.	353.65
2. Red Simpson Inc., Alexandria, La.	164.35
3. Bracknell Corp., Minneapolis, Minn.	113.67
4. Davis H. Elliot Co. Inc., Roanoke, Va.	61.11
5. The Newtron Group Inc., Baton Rouge, La.	60.50

MECHANICAL CONTRACTORS

1. AZCO Inc., Appleton, Wis.	48.88
2. Titan Contracting & Leasing/The Horn Cos., Owensboro, Ky.	45.00
3. McCarl's Inc., Beaver Falls, Pa.	25.30
4. Harder Mechanical Contractors Inc., Portland, Ore.	24.29
5. Corrigan Co., St. Louis, Mo.	21.36

UTILITY CONTRACTORS

1. Quanta Services Inc., Houston, Texas	590.97
2. MasTec Inc., Miami, Fla.	200.10
3. Henkels & McCoy Inc., Blue Bell, Pa.	134.64
4. UTILX Corp., Kent, Wash.	84.00
5. W.A. Chester LLC, Washington, D.C.	23.53

MULTI-DISCIPLINE M/E/U CONTRACTORS

1. Exelon Infrastructure Services Inc., Morton, Pa.	507.36
2. Encompass Service Corp., Houston, Texas	164.88
3. EMCOR Group Inc., Norwalk, Conn.	69.20
4. Hooper Corp., Madison, Wis.	40.91
5. GEM Industrial Inc., Walbridge, Ohio	14.60

Source: ENR Top 600 Specialty Contractors-October 8, 2001

company seeks only full-service, turnkey contracts. "Most of our clients project-finance, and they need guarantees from us for schedule, performance and price," he says. "We can use the balance sheets of our parents [Duke Energy and Fluor Corp.] for those guarantees." Financial depth is "becoming a bigger and bigger issue," agrees Zabilansky. "The customer wants us to have the experience and financial wherewithal to back it up."

WORRIES

The tight labor market also haunts the industry (see story, p. 28). "A majority of people who have failed either have not been able to find qualified labor or have not gotten the expected productivity they put into their bid," says Riedel. The shortage includes professional staff, notes Bob Gould, vice president, power sales for Parsons Corp., Houston. "Our greatest challenge to success is finding enough qualified people with powerplant experience to form a core nucleus in the business," he says.

The sustained boom in powerplant construction, now three or four years old, has led to some worry about overbuilding. "We have been putting on a lot of generation," Riedel says, "but there is still a need for considerable base-load generation." He adds that 90% of plants being built today are either peaking or intermediate plants. "There has been no significant base-load construction in 20 years," Riedel notes. "As natural gas prices rise, base-load generation—coal, even nuclear—may become more attractive. And a few [base-load] coal plants would keep quite a few engineers out there busy."

But the return of coal could exacerbate labor shortages. Six months ago, TIC's Knapp was afraid coal-fired power

would "take over." Construction of a coal plant can take four to five times the man-hours required for a comparably sized gas-fired plant, he notes. "The boiler has



GOULD

to be totally field-erected." Contrast that with a gas turbine, which is shipped on a skid and essentially needs only to be hooked up. Then add the coal-handling equipment—conveyors, rail-car unloading facilities—and emission-control equipment, none of it required for a gas turbine. "Coal is a hard push," Knapp says, considering the state of the economy, lower gas prices and the emissions.



TYE

While the powerplant market remains strong, says Knapp, "we're on the downhill side of this bubble. Projects coming on line in 2002 and 2003 could put us in an overcapacity situation, although transmission constraints could still create power shortages." He adds that the state of the economy since Sept. 11 "is a real concern to me." Powerplant construction today is hovering around 70% of TIC's business. Knapp expects that to drop off "dramatically" after 2003.

By Thomas F. Armistead, Mary Buckner Powers and Steve Daniels



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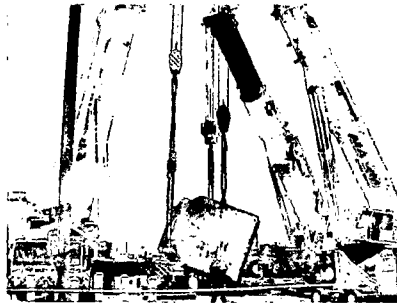
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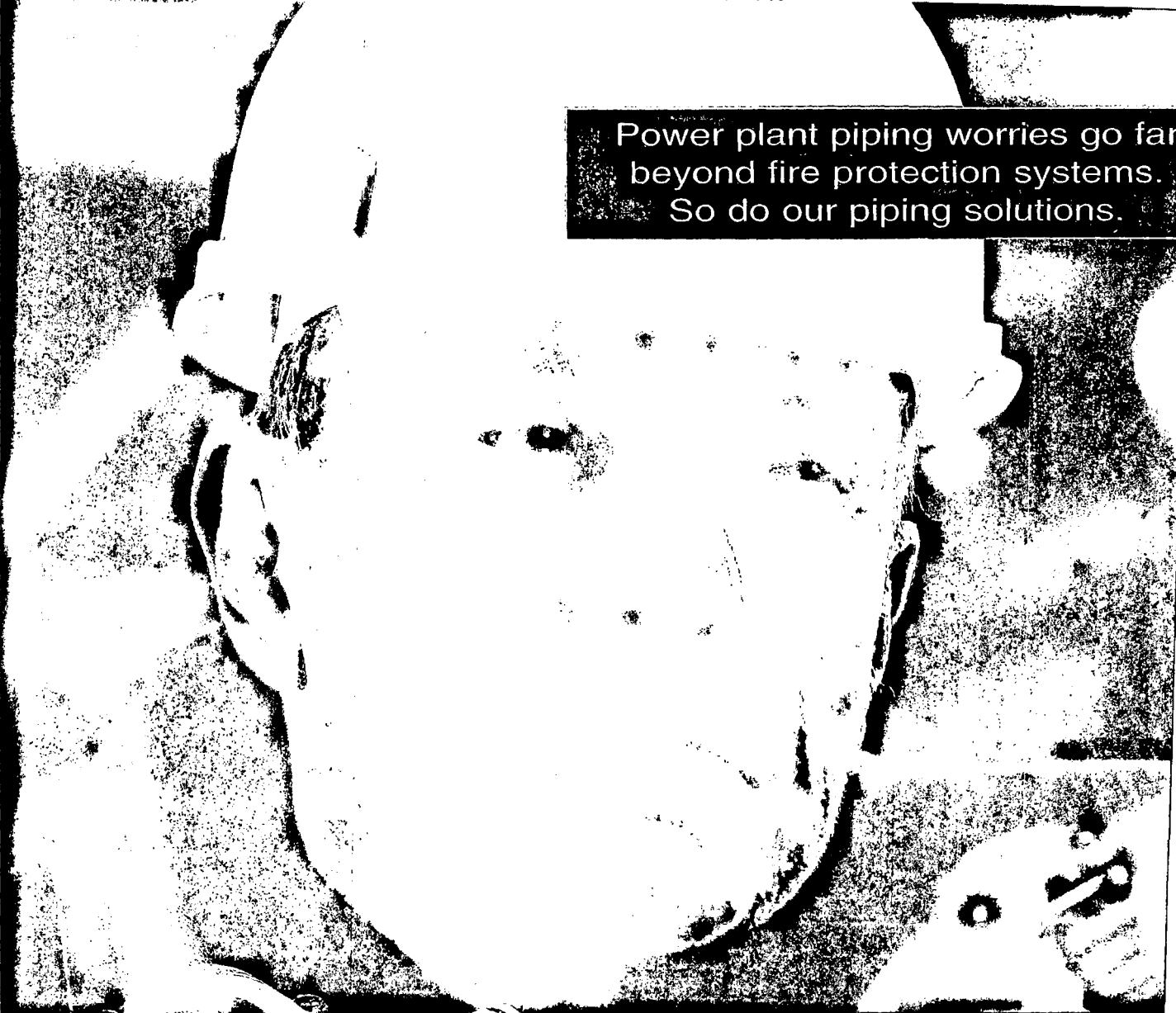
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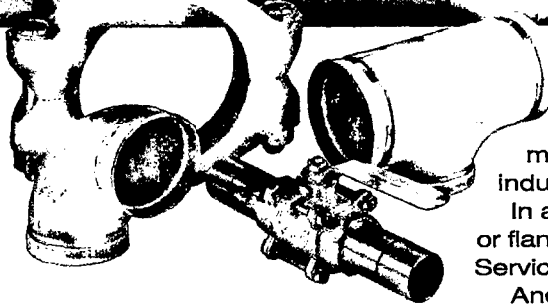
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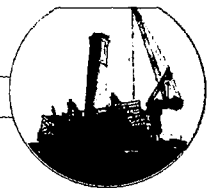
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Risk-Sharing Returns to Contracts and Rearranges Market Priorities

Banks, bond investors still favor totally wrapped EPC



STAFFED Graycor self-performs key parts of projects.

What a difference six months makes. Powerplant contractors are being choosier about what terms they will work under and on many projects are sharing the risks of cost overruns with owners through target prices. A half-year ago such risk-sharing was rare and in most cases unimaginable.

To be sure, the "totally wrapped" project—where all risks are assigned to an engineer-procure-construct company—remains the most common contractual form and isn't likely to disappear. That type of contract is generally replete with performance guarantees and hefty liquidated damages that lenders and bond investors love.

But there are plenty of choices available for contractors today on the hundreds of gas-fired, peak-demand type of plants being built under tight schedules, especially for those classified as "plans-

and-specs" jobs. Strategies suited to the seller's market have put some less-than-huge diversified industrial and power contractors, such as Homewood, Ill.-based Graycor and Lake Forest, Calif.-based ARB Inc., in enviable positions. They are loading up on lower-risk work on projects of several hundred megawatts, leaving the megaprojects and the risks of running out of productive craft workers to Bechtel Group, Duke/Fluor Daniel and others.

The changes aren't unexpected. In the past year, contractors had been send-

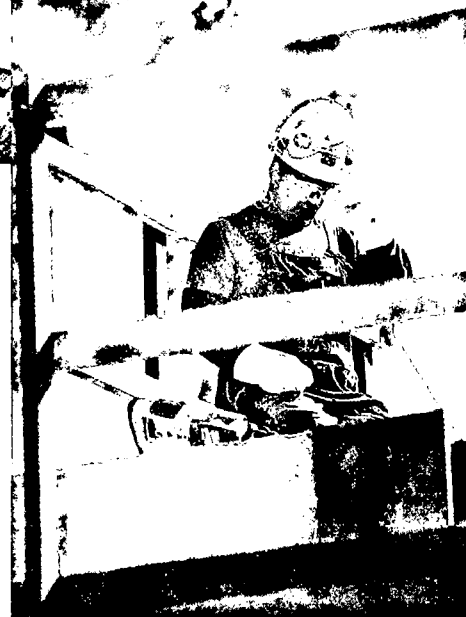
ing loud and blatant signals that they wanted risk allocation in engineer-procure-construct contracts adjusted now that demand for their services is running higher. Rod J. Ragan, who until recently was a senior energy services executive with Pasadena, Calif.-based Parsons Corp., complained about EPC contractors taking risks for equipment, construction and start-up and performance testing. "Is this fair?" he asked. "Even more important, as hundreds of new generation facilities are planned, can the E&C firms continue to bear this risk?"

Some well-publicized losses helped dramatize the point. In the previous 12 months, Duke/Fluor Daniel and Washington Group International have reported sub-

stantial cost overruns and possible penalties on power projects. A year earlier, Stone & Webster had declared bankruptcy and sold itself to The Shaw Group Inc., Baton Rouge. And the 500-lb gorilla of power contracting, Bechtel, is looking at liquidated damages of \$31 million on the Red Hills power project in Choctaw County, Miss. Bechtel said in court papers that a lack of skilled workers

kept it from finishing on time.

Contractors can now limit their vulnerability to such losses. Only a few years ago, "If an owner didn't like what an engineer or contractor was doing they would just throw the contractor off," says Keith Reisters, a vice president of FMI,



PHOTOS COURTESY OF BRIAN FRITZ/BRIAN FRITZ PHOTOGRAPHY



the Raleigh-based management consultant and investment banker. "But there's so much work that's not a reality any more. So owners have had to step up" and assume more risk.

In EPC contracting, "The pendulum has swung past center to the favor of the EPC," says Don Zabilansky, senior vice president of Lockwood Greene, Spartanburg, S.C.

And the swinging pendulum is re-defining strategies about who will work for whom, providing some companies a beachhead on less-risky terrain that was previously off limits.

By limiting the number of projects for which it will compete, Shaw Group, which began performing turnkey contracts in the last few years, says it will work only on a cost-plus basis where its risk is limited to its fee. This is the most conservative approach among EPC companies and the Baton Rouge-based company's ability to succeed with it over several years has yet to be proven.

For many contractors, the return of cost-plus contracts—once a standard during the construction of nuclear powerplants in the 1980s—is a welcome development.

One power industry executive, who asked not to be named, says that such contracts have only a limited role. While he says his company is thinking about "test-driving" some cost-plus con-

tracts on a selective basis, he also complains that "contractors would like to make the whole market cost-plus. It won't happen."

Another power industry executive says that his company will consider negotiating with contractors if it can get the contingency and risk money out of the project price. That could save 8 to 15% on a typical EPC contract.

While pure cost-plus remains a rarity, other types of risk-sharing are now com-

mon. About a year ago, power developers, especially those with large multiple orders, began taking back the warranty risks associated with the power island equipment. The cost of insurance for liquidated damages associated with these risks had gone sky-high and owners decided they could save money by not paying contractors fees that included insuring those risks.

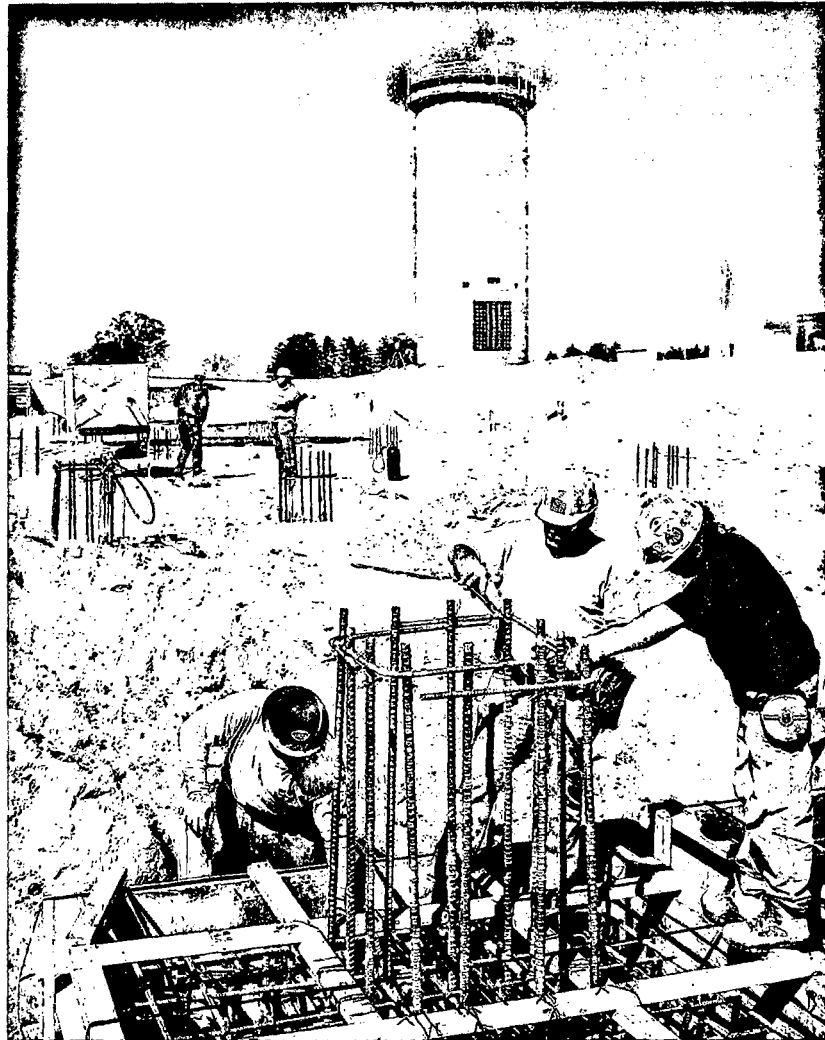
Risk-sharing on labor overruns and

mark the completion of a familiar cycle. "It's a model that used to be done in the 1960s, and it's nothing new. The contractual approach has gone through cycles of the old total reimbursable, to subcontracting lump sum by discipline managed by the client, to EPC. Now it's returning to where the owner can lessen the cost by taking out the risks for the contractors."

Risk-sharing is more common when the owner provides the financing, so leveraged independent power producers and their lenders and investors are unlikely to play the game. Toby Hsieh, a power industry debt analyst with Standard & Poor's (like ENR and Power, a unit of the McGraw-Hill Cos.), says that of all the great many projects financed through bonds "none are done that way. Lenders haven't accepted" the risks of labor overruns, he says.

The new realities appear to favor industrial contractors who define themselves as constructors and shun risks not associated with construction at the site. These companies have strong home bases, knowledge of local labor markets and the ability to self-perform parts of the job or to add value by building more than the base generating units.

Target prices, often used with negotiated construction contracts for which a substantial amount of



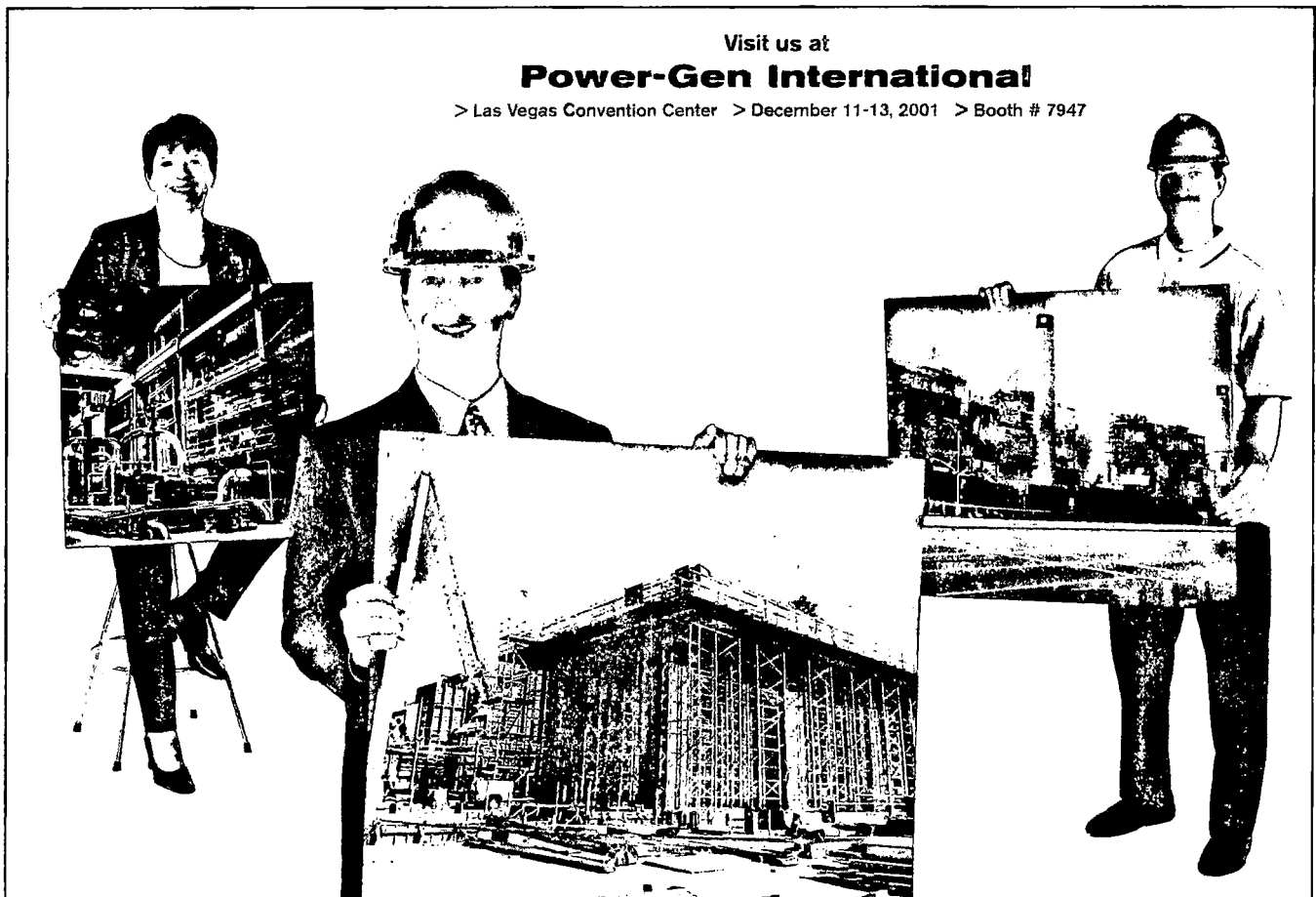
CAUTION Losses on Washington Group jobs underlined risks of overruns.

quantities is a more recent phenomena. When one contract involving a target price and shared cost-overruns first crossed the desk of Winter Park, Fla., attorney V. Frederic Lyon nine months ago, "I said, 'What a fat deal for the contractor.' I have since seen it come up time and time again."

To Raymond F. Rugg, senior vice president for business ventures, sales and planning at Utility Engineering Corp., Minneapolis, the new contracting terms

design has been done, give these companies a greater feeling of security. Under one type, contractors and owners create a target price, but if less is spent, both contractor and owner reap savings. Liquidated damages may be applied to some aspects of the project even if a target price is being used. Often, the contractor's pricing is shown to the owner, and in some cases the built-in contingency fees are given to the owner.

Graycor has one finished and one



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ongoing project that involve target prices. Graycor is building a 530-Mw, simple-cycle peaking powerplant in University Park, Ill., for PPL Global, a unit of PPL Corp., Allentown. The construction team for the project includes subcontractor McCarl's Inc., a mechanical contractor owned by PPL, and Sargent Electric Co., Pittsburgh. A recently completed project involving a target price is the 250-Mw peaker at Kennerdell, Pa., for Constellation Power Source. The plans and specs for this project were well-developed when construction began.

Bruce Evenson, Graycor's manager of estimating, calls this style of target pricing a dead-band system because only the owner, not the contractor, reaps any gain or suffers any loss if the job falls within an established percentage "band" of the target price. Owner and contractor may split any savings or cost overruns beyond the dead band according to a predetermined percentage. Often, Graycor's share of any penalties is limited to the size of its fee.

The difference between a typical EPC contract and the targeted prices is that the contractor doesn't have to put so much risk money into its estimates. "There has been a shift in business in the market in the last six to eight months where owners are starting to recognize if you want an EPC contractor to take on a lot of risk they will build a lot of money and cost into the estimate to make sure they are covered," says Evenson. "Too many major contractors have gone under because they accepted risks they were not capable of accepting. So our philosophy is that we are a constructor. We don't accept performance risk on any jobs." Graycor, however, will form joint ventures for engineer-construct and EPC

construction projects.

Another powerplant contractor, ARB Inc., worked under a target price contract on the new Elk Hills project near Taft, Calif.

After finishing one plant being developed by a joint venture of Sempra Energy Resources and Occidental Energy Ventures, ARB signed up with the same clients for the construction work on another project, the 570-Mw combined-cycle plant in Elk Hills. The contractor says it is working on a fast-track schedule where its payment depends on production and safety incentives. After establishing a target price with a well-defined scope, ARB and its client will share any underruns or overruns. "If we have a bill or quantity and base contract on something that has increased or decreased, we will adjust on unit rates," says Tim Healy, who is in charge of industrial construction for ARB.

He says the company's arrangement on Elk Hills is the result of a good record and relationship.

Lockwood Green's Zabilansky says negotiating possible labor overruns is now a routine practice for his company. "In areas where labor is lower cost and more predictable, contractors are still taking more risk," he says. "But where labor cost is high, and where it's hard to determine how much will be available on the day you break ground, small errors can be costly. We say, 'Do you want to take the risk? If we do better [and save money], you get the benefit.'"

Urban areas with higher hourly pay rates can be expensive if there are labor overruns. And California can be a hard place to build. One powerplant development executive says that California is difficult because its aging construction craft force can't provide enough people with specialized skills, such as fiber-optic cable connections and chromium pipe welding.

"Unions have the labor market locked up pretty tight," says the executive. "California is a whole separate issue."

ARB found itself well-positioned when the power construction market suddenly surged in California. It had done enough power-related work during the slow years, keeping relationships with the constantly-changing cast of power companies, and had been an active industrial contractor with the solid corps of craft supervisors and craft workers now so urgently needed. For now, Healy says ARB won't travel out of California to work on new power generation projects.

Graycor also feels it is well-armed with craft workers. It self-performs much of the civil part of its powerplant contracts.

On the EPC side, the partnership pairings involving engineers and contractors are constantly changing. The only difference, says FMI's Reister, is that now the engineers are assuming more risk in hope of earning a bigger part of the profits.

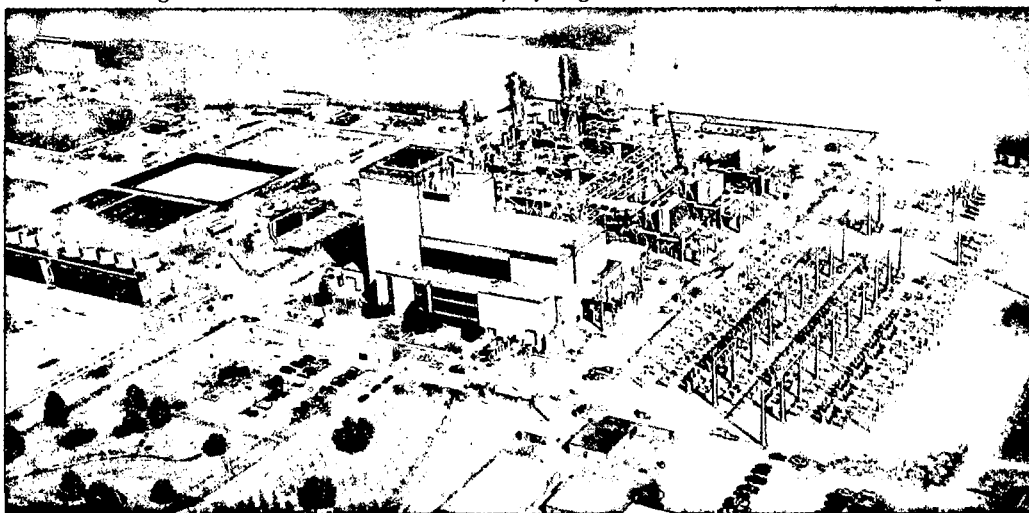
Utility Engineering Corp. works in joint ventures with contractors like H.B. Zachry and TIC. It generally takes a lump-sum price for its engineering services and shares the overall risk or profit with its contractor partner.

So far, says Rugg, his company has stayed away from exclusive relationships in order to be able to work with contractors in different regions. "Some have better relations with trade crafts" in specific areas, says Rugg.

As a result, he says, designers and contractors don't form exclusive alliances: "Everybody's dating but nobody's getting married."

By Richard Korman

**ARB
has enough
power work in
California and
won't travel
until the state
is built.**



SERIAL PARTNERS Utility Engineering and TIC built Colorado plant, but alliances aren't permanent.

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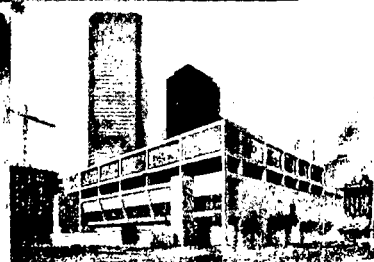
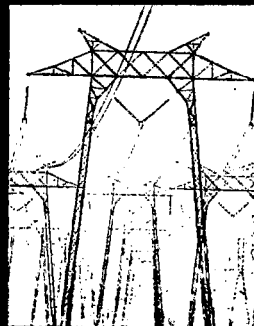
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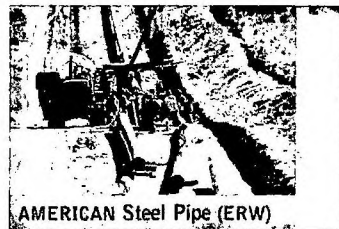
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Market Gyration Make Hitting Targets for Skilled Crafts an Art

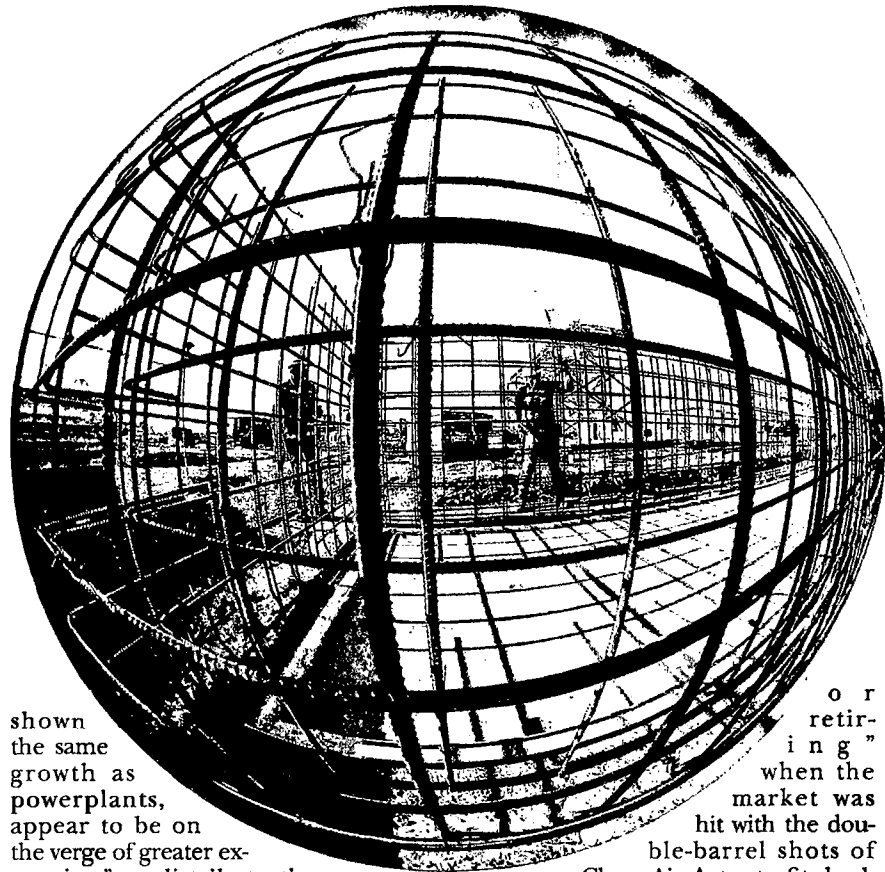
Shortages abate as industry cools and workers move

The industry's ability to field a skilled craft force traditionally has been challenged by construction's seasonality, cyclicity and hard work. But trying to hit the bull's eye in demand has been made doubly difficult by the swinging and twisting target, put in motion partially by a huge surge in powerplant construction over the past two years and an overall U.S. construction market that has been expanding for a record 10 years. Only recently are there signs that the industry may be in for a breather and a chance to mitigate labor shortages that vary by region and project.

Activity is plateauing at a very high level. Construction slowed in the U.S. for the fifth consecutive month to a seasonally adjusted annual rate of \$843.1 billion in September, according to the latest figures available from the U.S. Dept. of Commerce, which measures construction put-in-place. Although construction activity is easing up, it still was expanding in September, at a 3.4% annual rate compared to 6.5% in April.

While not a meltdown by any means, the growth rate for new powerplant construction is expected to cool to the point of recession next year. According to the F.W. Dodge Division of the McGraw Hill Cos., new contract awards will decline 11.4% in 2002, to \$15.5 billion from \$17.5 billion in 2001. (McGraw-Hill also is the parent of ENR and Power.) However, the U.S. Commerce Dept. predicts 3.1% growth to \$20.3 billion for electrical utility work actually put in place in 2002.

There may have been too much of a good thing as power producers and the construction industry tried to meet anticipated electricity shortages. "Talk of capacity shortages has begun to shift toward concern about oversupply given the huge volume of construction under way and reduced demand for power from a faltering economy," says Dodge chief economist Robert A. Murray, Lexington, Mass. Powerplant construction "is projected to retreat 11% as plans for additional powerplants are reconsidered. Transmission lines, which have not



shown the same growth as powerplants, appear to be on the verge of greater expansion" to distribute the new power, he says.

The recent boom follows a bust in powerplant activity from 1993 to 1998, when Murray says new contract awards languished at an average of just \$3.6 billion a year because of the uncertainty of deregulation. That has posed a problem for the boilermakers' union, with about 25,000 high-skilled members, contractors and other sources of labor who have been hard-pressed to keep up with the flip-flopping demand.

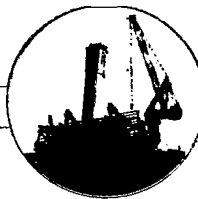
"The boiler industry and boiler craft over the last 10 to 15 years had been in repair work mode [with] fewer jobs for fewer people," notes Dale Branscum, director of the construction division of the boilermakers' union in Kansas City, Kan. "Labor was migrating to other fields

or retiring" when the market was hit with the double-barrel shots of

Clean Air Act retrofit deadlines for coal-fired powerplants and new plants ordered by owners to meet the looming energy shortages, says Branscum. "Our manpower is being pulled in two directions," he adds.

Although conditions vary widely, welders often are the craft shortest in supply in powerplant construction. Often treated as a separate craft in the open shop, welders are supplied by several unions in the organized sector, such as the boilermakers', plumbers and pipefitters' and ironworkers' unions. And among welders, certified boiler-tube welders are "kings" because of the high level of skill, difficult working conditions and tremendous demand at peak times in spring and fall when utilities traditionally shut down plants for maintenance.

PHOTO COURTESY OF TERRY LOWENTHAL/BECHTEL CORP.



nance. "Pressure welders are probably the most specialized...and most coveted by contractors," says Branscum. "We focus and pay particular attention to welders" in training and recruitment, he says.

Certification of welders is expedited by the Common Arc program administered by the National Association of Boilermaker Employers, Geneva, Ill. Tests periodically are held in which boilermakers can be assessed by groups of employers, says NACBE Executive Director John F. Erickson. This cuts down on the expense of testing for individual employers and provides workers with greater work opportunities, he notes.

The plumbers and pipefitters' union also is beefing up its welding skills. Top-of-the-line welding skills are needed in aging conventional and nuclear plants as they change out generators and other equipment, says union President Martin J. Maddaloni. The union also has niche training aimed at providing work for members in powerplants, such as a valve replacement program for nuclear plants.

But Maddaloni thinks that some of the shortages are man-made, overstated and related to poor project planning. "I honestly believe that the emphasis on labor shortages in construction is played out a little more than it should be," he says. With all of the plants shutting down in the spring and fall, "you kill the person for three months, and as soon as that is over, there is nowhere to go....You can't put people on the shelf."

Nonetheless, the plumbers and pipefitters' union has expanded its mem-

bership, from about 286,000 to 320,000 over the past five years. About 35% are employed in powerplant construction. "Contrary to what some may think, the doors are open if people want to come in," Maddaloni says.

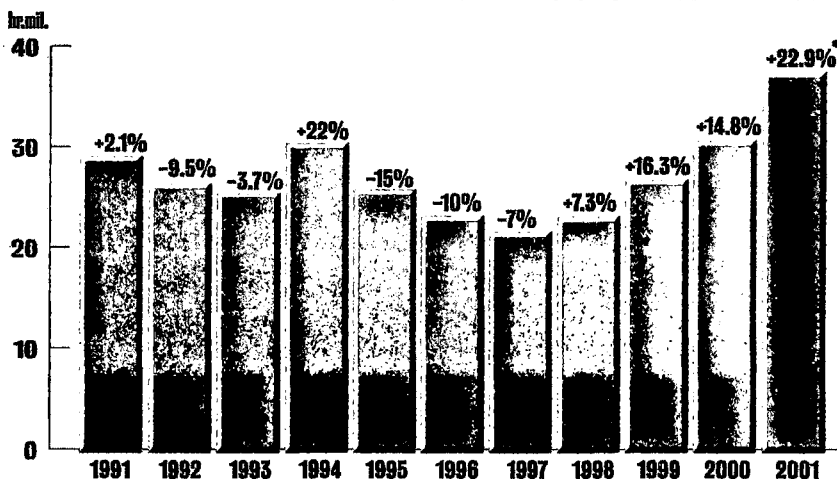
The union also has been beefing up its "distance learning" capability to enhance the portability of its members and their ability to train in more remote locations, which often are the homes of new powerplants. "By the middle of 2002, we will have all training centers and local unions connected so that they can do distance learning," says Maddaloni.

"The demise of the steel industry and cutbacks in autos" has made the labor issue in power a little tamer, says Noel Bork, executive vice president of NEA—The Association of Union Constructors, Arlington, Va., and impartial secretary of the National Maintenance Agreements Policy Committee. Those pacts provide uniform working conditions in much the same way as a national project agreement, without the need to negotiate one for each project. Bork notes that power now accounts for 30% of the hours worked under the national agreements, up from a traditional 22%.

Although not maintenance projects, some peaking plants currently are being built entirely under the agreements if the parties all agree. "We promote the agreements as a tool [and] there is a comfort factor with contractors, users and the building trades," Bork says. Adds Branscum: "There is not a lot of opposition to it."

Open shop contractors also report

HOURS WORKED BY UNION BOILERMAKERS SHOW WILD SWINGS



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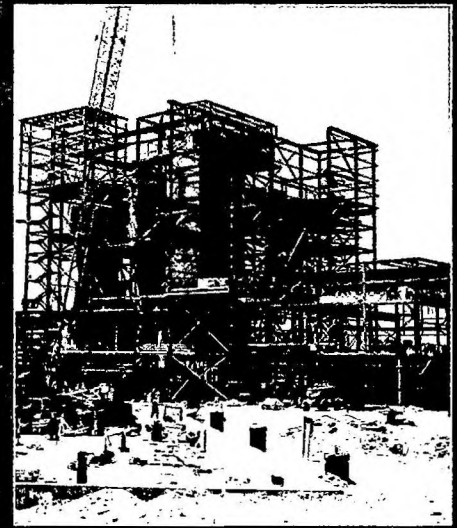
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that the craft labor situation is easing because of the severe drop in construction activity in the metals, forest products, petrochemical and other industrial markets, partly caused by the strong U.S. dollar that has made some of those industries noncompetitive with imports. "Outside of power, there is not a lot of demand," says Ted C. Kennedy, chairman of BE&K Inc., Birmingham, Ala.

Still, spot labor shortages are occurring in some areas because of a work force that is increasingly reluctant to travel, says Kennedy. "We have two powerplant projects in northern Alabama with lots of applicants and another in Oklahoma that is going begging," says Kennedy. When the contractor asked the Alabamians if they wanted to go to Oklahoma, they said: "No, we will stay here and wait for a job," Kennedy explains.

BE&K and other big nonunion firms use per diem and other incentives to lure workers to particular projects. While nonunion workers in powerplant and other markets almost always earn less than union workers (see table), incentives can boost their pay considerably.

Contractors are making incentive payments for living expenses, safety, attendance, productivity and other things to attract and keep workers on projects, says Jeffrey M. Robinson, president of Personnel Administration Services, Saline, Mich. A PAS survey of large nonunion contractors in the power market employing over 30,000 craft workers indicated that they pay an average per diem of \$44.18 to workers on about half of their shutdown and outage work.

"This adds about \$5 an hour" to compensation, but is not included in the official wage-fringe number, says Robinson. "This is an owner-driven thing. They don't want to increase the wages" and want the flexibility to turn the incentive on and off, he says.

Of the contractors paying the incentives, those for safety average 26¢ per hour, attendance 61¢, project completion 71¢ and production 64¢, according to the PAS survey.

Where workers are in short supply, contractors are working with owners and suppliers to plan for more modularization, prefabrication and constructibility to cut down on field work. Even "little things" like having fabricators not paint the ends of steel that needs to be welded makes a big difference, says Kennedy.

BE&K, TIC Holdings Inc., H.B. Zachry Co. and other big nonunion contractors also are cooperating among themselves to keep local skilled craftspersons busy in an area, even though the firms are fierce

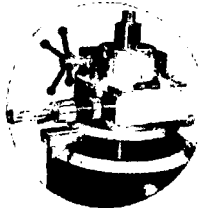
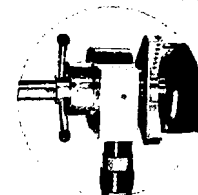
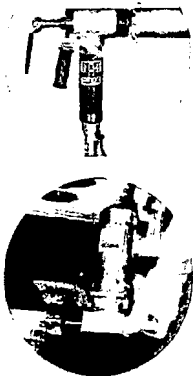
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competitors. All support and use the open-shop, modular training curricula of the National Center for Construction Education and Research, Gainesville, Fla., which also keeps records on what modules workers complete.

"If we have a project going down and BE&K and Zachry have one coming up, the human resources people will work together to move [skilled craft people] over," says H. Dean Risinger, vice president for training and development for TIC, Steamboat Springs, Colo., which currently employs about 3,000 craft workers in the power market and has 15 plants under contract. "We need to keep them working in an area," he says. Adds Kennedy: "It doesn't do any of us any good for people to leave."

"We are not having a lot of difficulty in staffing plants, but there is always a challenge in craft quality," says Risinger. "We are working through NCCER to bring quality up." Kennedy notes that the train-

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Ironworkers-reinforcing	35.43	20.06	17.09
Ironworkers-structural	35.85	20.73	19.76
Laborers-heavy	25.47	13.32	13.72
Millwrights	33.10	20.38	20.03
Heavy equipment operators	33.67	21.70	20.82
Painters	30.05	NA	11.44
Pipofitters	36.99	20.94	21.28
Plumbers	37.73	NA	21.26
Welders	NA	21.12	19.03

¹ ENR's 20-city average, including fringes; ² PWS power/industrial open-shop wage report (wages and fringe benefits); ³ PWS Open-shop wage survey (all markets, wages and fringe benefits); NA=Not available
Source: ENR Construction Economics Dept., Personnel Administration Services Inc.

ing records and curricula give the firms a common language and ability to assess training levels.

If shortages appear on power and other projects, a new type of hybrid contractor now is available to provide teams of skilled non-union journeymen along with helpers and supervision. Not a labor broker, Atlanta-based Craft-Force can perform entire civil or mechanical packages under the overall supervision, direction and inspection of the general contractor, says President Steve Greene, former head of craft training and development for Fluor Daniel and Becon Construction. "People work for us and are not leased," he emphasizes. The firm now has a team of 50 working on a cogeneration plant in Dalton, Ga., and has a database of 10,000 workers who have expressed an interest in working for the firm, says Greene.

Notes TIC's Risinger: "We are receptive [to the concept] and it is another tool in the toolbox." □

By William G. Krizan

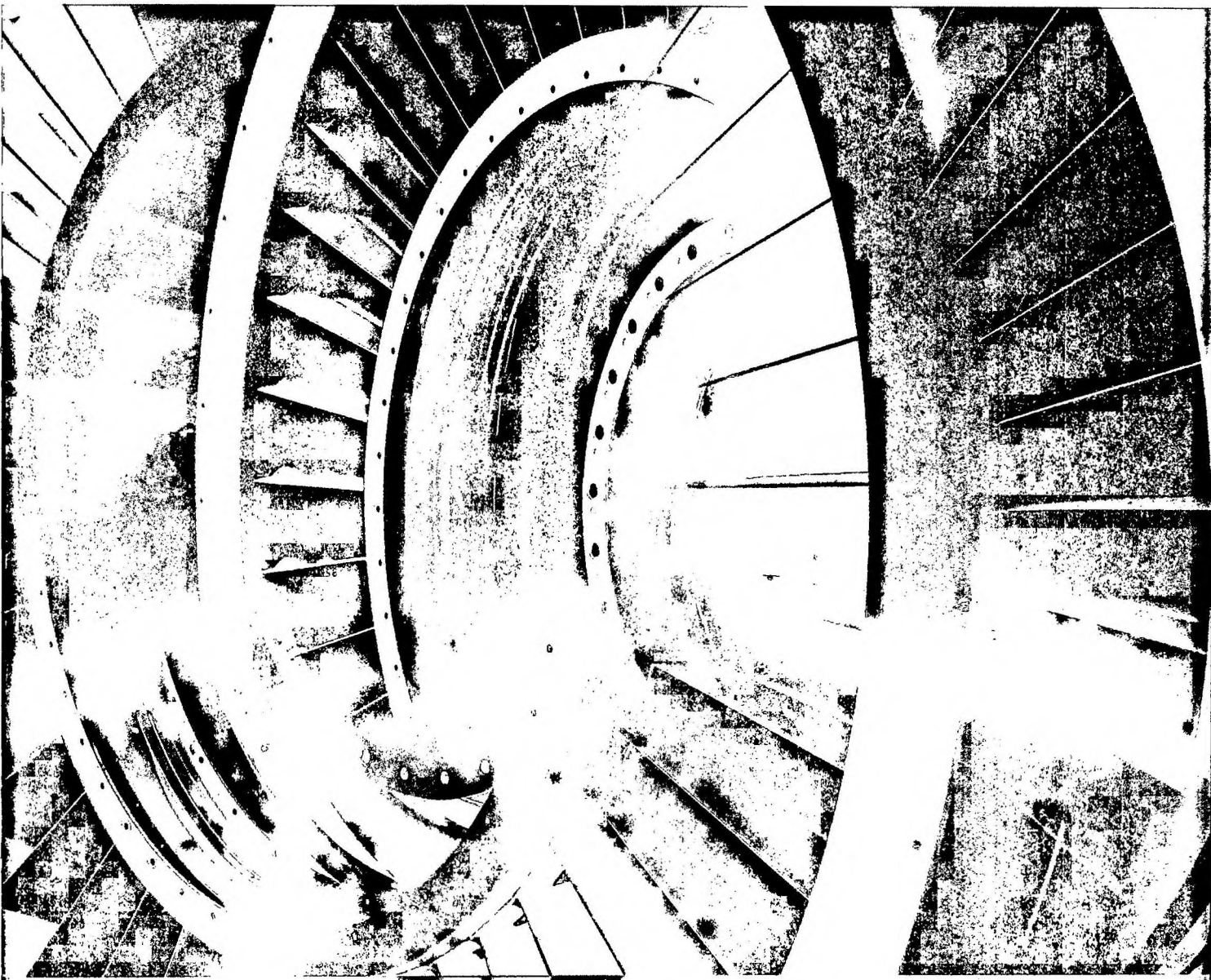


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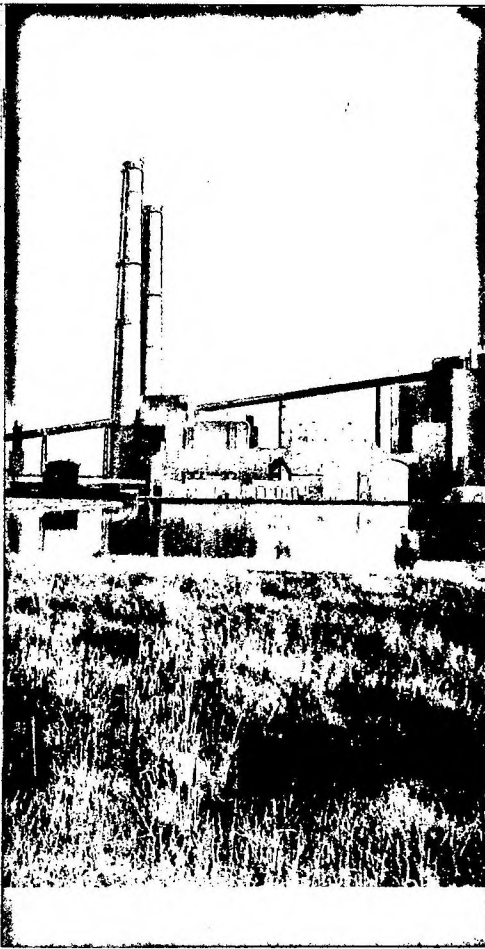
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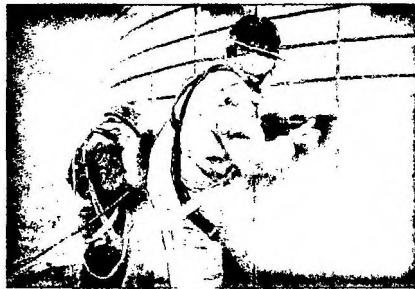
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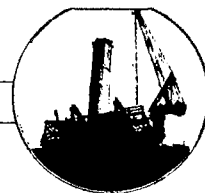
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Gas Turbines Continue To Dominate New Construction

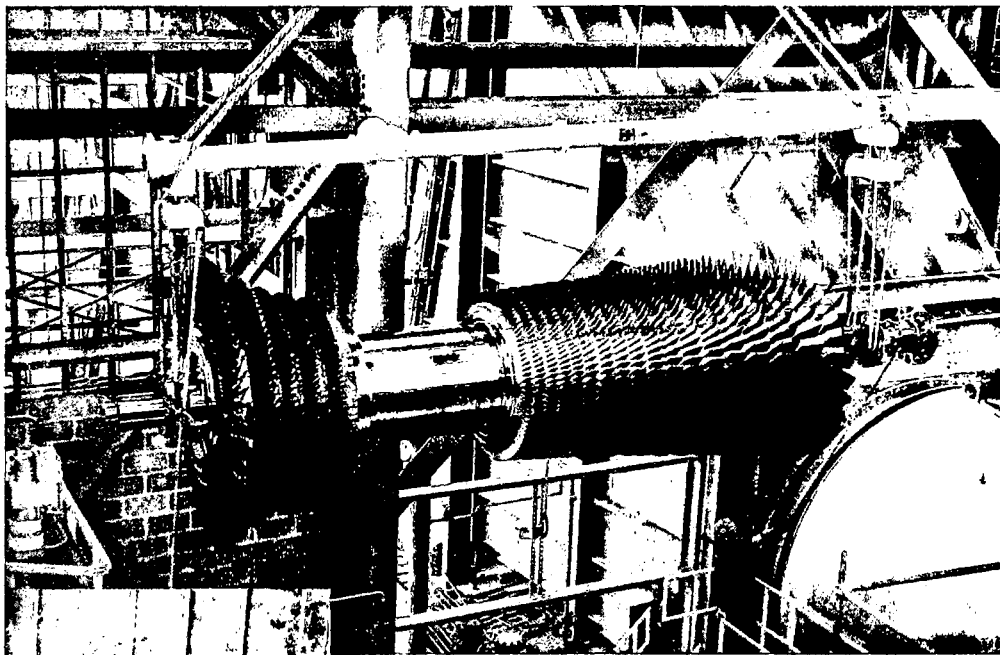
Low emissions and lower building costs are still decisive

Even as consensus emerges that only about half of all planned power-plant projects will ever get past an artist's rendering, sales of gas-turbine plants, in both simple and combined cycle, are expected to remain high, soaring above competing technologies. But project completion will be limited by constraints in natural-gas pipelines, high-voltage transmission systems, site permitting, equipment manufacturing and skilled labor, among other factors.

In simple cycle, high-temperature gas turbines offer quick construction, low emissions and rapid start-up capabilities for peaking service. Coupling the GT to a heat-recovery steam generator (HRSG) and steam turbine for combined-cycle (CC) operation yields the highest thermal efficiency of all electric generating systems commercially available today. cc-plant capital costs, although rising, remain lower than new nuclear and coal-fired projects, and substantially lower than renewable energy projects.

DOMINANT

Four models of advanced GT dominate today's North American market. Siemens Westinghouse Power Corp., Orlando, Fla., makes two—the V84.3A and 501F. Paris-based Alstom supplies the GT24, and GE Power Systems, Schenectady, N.Y., sells the 7FA, recently updated with the 7FB. Each of these, with orders backlogged for several years, has demonstrated efficiency levels greater than 55% in CC application, based on lower heating value (LHV). Each also has demonstrated low air emissions using dry



EFFICIENT Simple- and combined-cycle plants rule market.

low- NO_x (DLN) combustors. DLN combustors lower the peak flame temperature—and thus NO_x emissions—by burning a leaner mixture of fuel and air.

More advanced DLN offerings reduce NO_x emissions to 15 parts per million or less throughout the entire load range with the addition of

selective catalytic reduction (SCR) systems. But most new combined-cycle GT projects today are required to meet a 2- or 3-ppm NO_x limit. This has increased capital costs of CC plants because owners have to purchase the expensive DLN combustors plus an SCR. It also has increased production costs because users must purchase, store and handle ammonia consumed in the SCR, and because

backpressure from the SCR reduces the gas turbine's fuel efficiency.

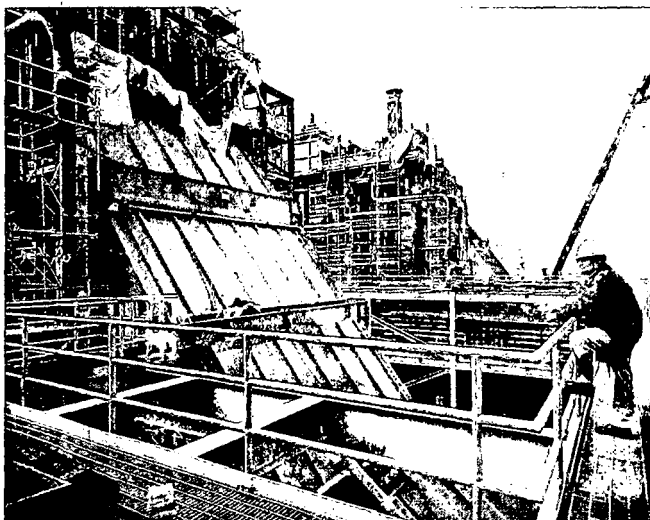
F-class GTs have demonstrated low emissions and high efficiencies, but also problems meeting reliability and durability expectations in the field. The problems span all manufacturers, and include failed tie bolts, inadequate rotor stiffness, fatigue failure of turbine blades, flashbacks in the DLN combustors and spiraling operation and maintenance costs for prematurely failed hot-section components.

Lingering problems have dogged the GT24, which took a different road from competing models toward high thermal efficiency. Instead of a higher firing temperature, the GT24 uses a "sequential combustion" system to gain efficiency.

Similar to a Rankine-cycle steam plant's reheat cycle, the unique sequential combustion system heats the working fluid—in this case, the combustion air—in two intervals. The GT24 comprises two annular combustors located in series: the



Powerplant Construction TECHNOLOGY: GAS



MODEL PROJECT Klamath plant adds cogen to combined cycle.

EV combustor and the sequential EV combustor, with a single-stage high-pressure turbine in between. Downstream of the SEV combustor is a four-stage low-pressure turbine. Hot gases from the EV combustor expand through the high-pressure turbine and then are reheated

units in the field continues to grow. From coast to coast, an estimated 48,000 Mw of GTs entered service in 2001, 66,000 Mw are planned to start up in 2002 and 69,000 Mw in 2003 (see *Powerplant Construction* p. 63).

A model of advanced CC projects is

in the SEV combustor before being expanded for a second time in the low-pressure turbine. Alstom had to assemble a large team of engineers to redesign and progressively implement modifications across its fleet of troubled GT24s, and set aside \$800 million to negotiate settlements with its customers.

While manufacturers and users improve the durability of F-class GTs, the number of

the Klamath cogeneration plant—a joint development of the city of Klamath Falls, Ore., and PacifiCorp, Portland, Ore. Started up in summer 2001, the award-winning Klamath plant features two Siemens Westinghouse 501FD GTs in combined-cycle operation.

On top of the efficient combined cycle, Klamath adds a cogeneration process—exporting up to 275,000 lb/hour of 325-psi steam to an existing wood-products facility for even greater overall thermal efficiency. Aging, inefficient boilers at Collins Wood Products were curtailed when the cogen plant came on line, saving fuel and reducing net air emissions.

The Klamath plant achieves further environmental benefits through funding carbon-offset projects, such as reforestation underproducing private lands in Oregon, recovering methane from underground coal mines to fuel engine-based powerplants and expanding the Klamath Falls geothermal district-heating system.

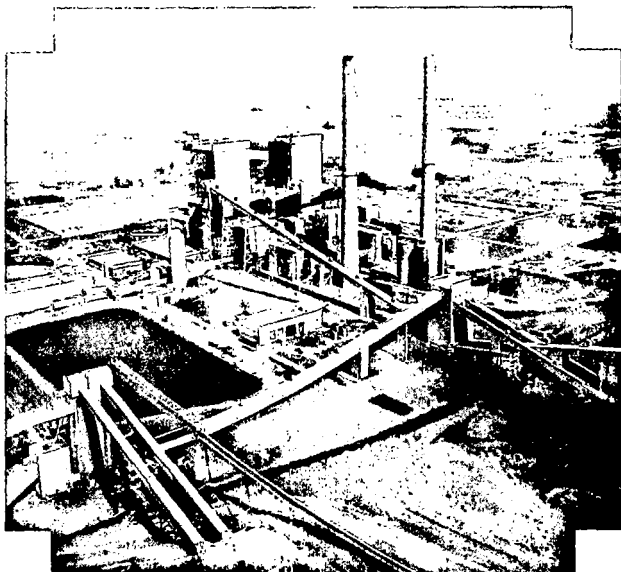
Another high-profile GT project is the 320-Mw Sunrise facility, which entered commercial service last June in Kern County, Calif. Built by Black & Veatch, Kansas City, for a joint venture led by



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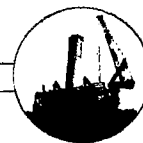
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Edison Mission Energy, Irvine, Calif., the project features two GE 7FAs in simple cycle. Indicative of its political weight in power-starved California, the plant's ribbon-cutting ceremony was attended by no less than Gov. Gray Davis (D).

PHASED

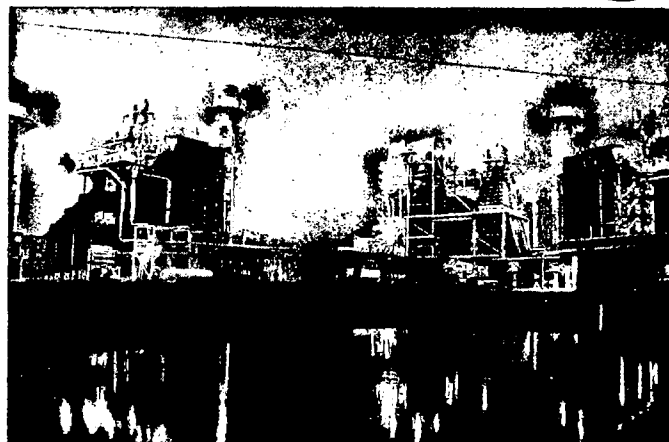
A few miles away, the 570-Mw Elk Hills power project is taking shape. To help meet electricity shortfalls, the owners—San Diego-based Semptra Energy Resources and Occidental Energy Ventures Corp.—are using phased construction, installing simple-cycle GTs first and later adding the steam cycle. Simple-cycle operation at Elk Hills—featuring two GE FA units—is planned for April 2002, with more than 300 Mw of capacity. Another 270 Mw of steam-cycle capacity—from one HRSG and one steam turbine—is planned for March 2003.

GTs enter the service base also by repowering existing steam plants. In the typical repowering project, an aging boiler is replaced by an advanced GT/HRSG train, which is then coupled to the existing steam turbine/generator. Repowering can transform uncompetitive assets

with air-emissions problems into fuel-efficient, clean-burning capacity.

While repowering has been talked about for a decade or so, only a handful of actual projects have been completed. That is changing as several developers began pushing dirt in 2001. Consolidated Edison Co. of New York Inc.'s East River project is under way and scheduled for completion in summer 2002. The 1950s-vintage plant is adding two dual-fuel GE 7FAs and two supplementary-fired HRSGs to supply 288 Mw of capacity and up to 3 million pph of steam to the utility's steam-distribution network. Engineering and procurement services are by Washington Group International, Boise.

A unique repowering project recently



BOOSTERS HRSGs push powerplant efficiencies to near 60%.

was completed at the Fort St. Vrain station, owned by Public Service Co. of Colorado (PSCO), where advanced GTs replaced a one-of-a-kind gas-cooled nuclear reactor. Fort St. Vrain's original 330-Mw reactor was conceived and built at a time when nuclear power dominated new construction in the U.S., and when electric utilities had the money and inclination to risk technology-press-

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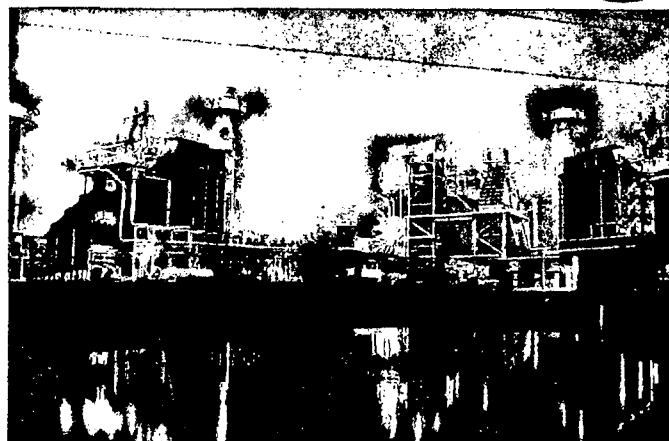
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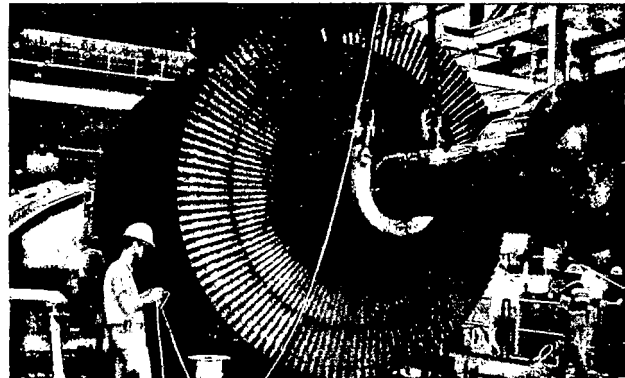
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TECH GAS



ing projects. But PSCO struggled for years with operation and maintenance problems before it finally shut down the gas-cooled reactor in 1989.

A decade later, the advance of CC technology, coupled with market incentives through industry deregulation, drove PSCO to repower the idle station, using three GE FAs and three supplementary-fired HRSGs. Three power trains were needed to take full advantage of existing capacity in the steam-turbine generator. The first of these trains started operating in 1998; the second in 1999; the third in 2001. Utility Engineering Corp., Denver, provided engineering, procurement and construction services for all three phases of the project.

With new construction and repowering projects moving ahead at breakneck speed, the order backlog for F-class turbines now stretches for years. And the future may hold even more promise for GT suppliers, as newer G- and H-class machines move toward commercialization. These next-generation designs will use steam rather than air to cool hot-gas-path components, thus enabling firing temperatures—and subsequently thermal efficiencies—to be increased.

In the "partially" steam-cooled G-class, steam cools the combustor to maintain the same level of NOx emissions as earlier models, but at a higher firing temperature—approximately 2,580°F, versus 2,400°F for the F-class. The Siemens Westinghouse W501G also features an aggressive compression ratio for a design efficiency of 58% (LHV), in CC configuration.

The first operational steam-cooled GTs in the U.S., W501Gs from Siemens Westinghouse, are PG&E National Energy Group's 360-Mw combined-cycle Millennium powerplant in Charlton, Mass., and the City of Lakeland, Fla.'s, McIntosh 249-Mw simple-cycle unit. Both achieved commercial operation in 2001.

In the fully steam-cooled H-class, steam cools the combustor, plus turbine blades and vanes, enabling a firing temperature of 2,600°F. The GE version of the H-class GT also employs the world's largest single-crystal airfoils, which are intended to make the turbine blades more resistant to high-temperature cracking than the multidirectional crystal design used in most of today's GTs.

GE's first H-class unit is under construction at the Baglan Energy Park in South Wales, U.K., scheduled for start-up in the summer of 2002. The single-shaft CC—a 36-ft-long, 15-ft-dia, 370-ton behemoth—is designed to break the 60% thermal efficiency barrier (LHV).

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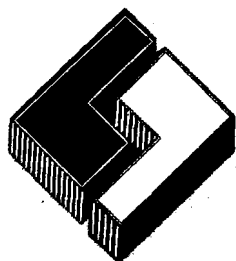
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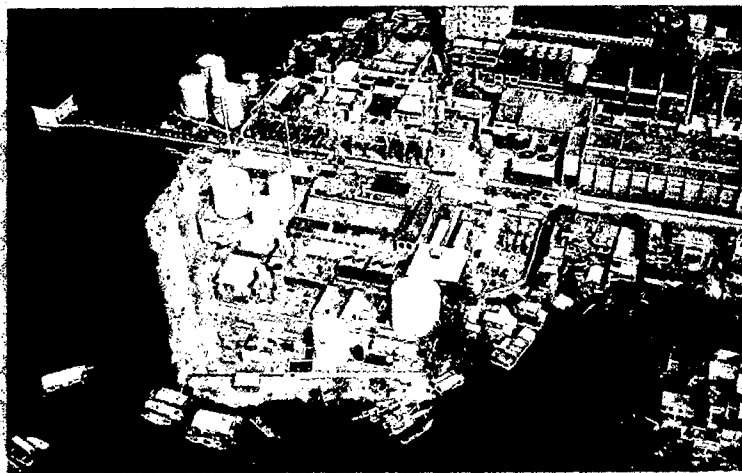
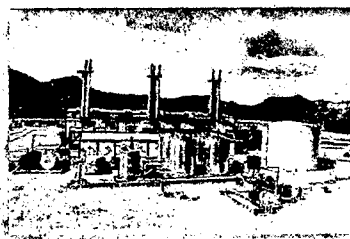
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TECH GAS



the manufacturers of HRSGs to respond in kind to ensure an overall improvement in the integrated CC plant and handle tougher temperature and pressure conditions. Triple-pressure reheat steam systems, for example, now are offered by all major HRSG manufacturers.

Triple-pressure steam systems yield lower stack temperatures than older, dual-pressure systems because they recover more thermal energy from GT exhaust. That's good for cycle efficiency, which developers and financiers like, but it limits the fuel choice to natural gas, say many HRSG users. Users have found that in the presence of even low levels of sulfur—such as when firing No. 2 fuel oil—stack temperatures must be kept above 330°F to avoid acid-gas corrosion.

**Merchant
developers
need to pay par-
ticular attention
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ing issues.**

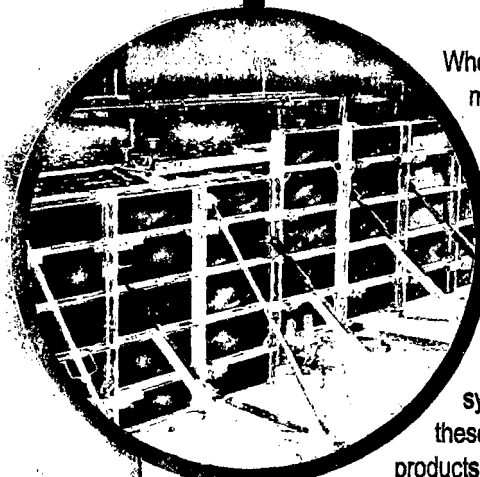
Another design issue is installation of a damper in the HRSG exhaust stack. Many developers choose to omit the device to reduce cost. But users have found this can shorten HRSG tube life. HRSGs without stack dampers depressurize within a few hours after shutdown, meaning almost every restart is from cold conditions. On the typical P22 steam header, cold-start fatigue damage may be 30 to 40 times that caused by a hot start because of the "condensate quench" phenomenon.

Merchant developers need to pay particular attention to tube life, stack corrosion, and other HRSG operating issues because of the need for cycling capability in today's competitive market. The HRSG's increased physical size, elevated gas temperature, and tougher steam conditions—when coupled to advanced GTs—have also substantially increased thermal stresses and fatigue damage, particularly in the superheater section. HRSG design often fails to take these increased stresses into account, engineers say. Imprudent operating procedures, some taken directly from suppliers' manuals, further aggravate the situation, according to boiler experts. □

By Robert Swanekamp

From Foundation to Finish

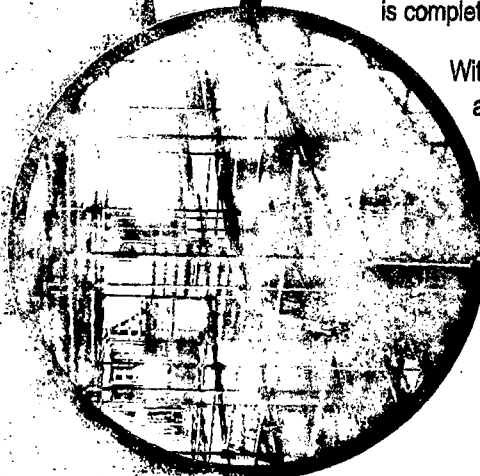
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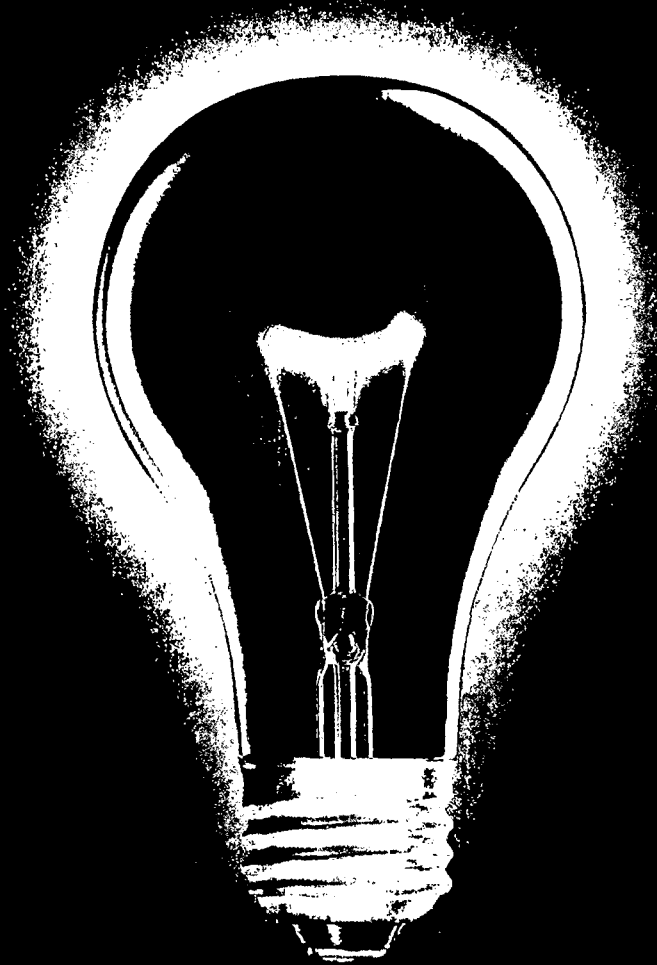
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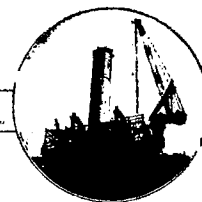


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High Gas Prices and Technology Brighten King Coal's Star

Menu of choices now is broader than in past years

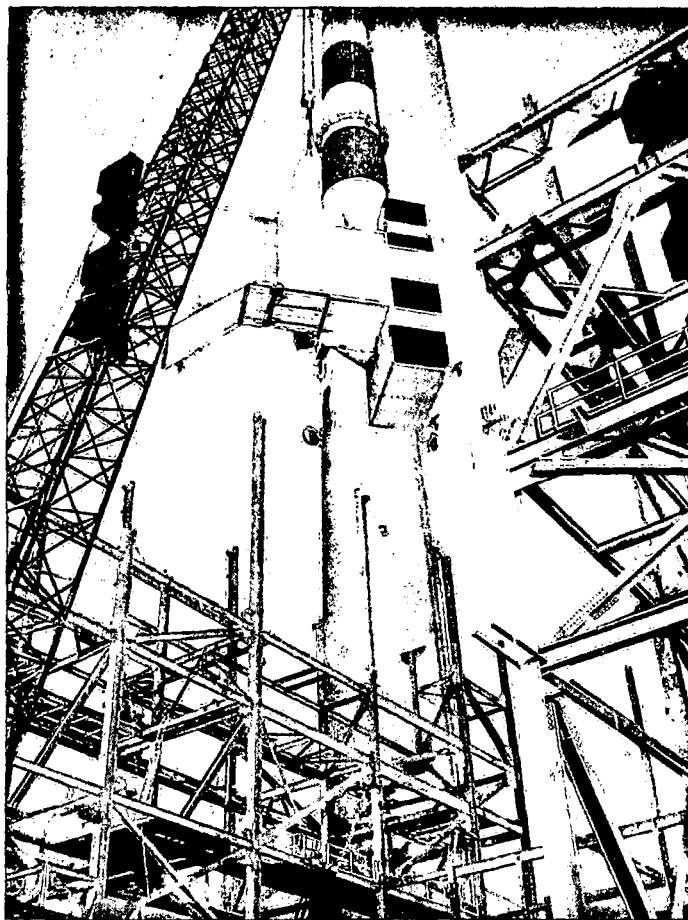
Last winter's sustained spike in natural gas prices restored some luster to "king coal" as an electricity-generation fuel. The pace of announcements of new coal-fired powerplants picked up throughout 2001 and technologies that reduce the emissions from coal combustion drew renewed interest.

Project developers taking a fresh look at coal have found a rich menu of choices in both fuels and technologies that didn't exist 20 years ago—a menu that enables coal to be both low-cost and environmentally acceptable.

The reinvigorated coal market is being led by Powder River Basin coals, which offer both environmental and economic advantages over eastern coals. Most PRB mines, located in eastern Wyoming and Montana, produce coal that emits less than 1 lb per million Btu of sulfur dioxide (SO₂), making it the coal of choice despite its relatively low heat content.

PRB coal seams 60 to 100 ft thick and lying close to the surface allow producers to use large surface-mining extraction equipment. Wyoming PRB coal sells for 20¢ to 26¢ per million Btu, giving it a price advantage over eastern coals. The economic and environmental benefits are leading to development of a number of new PRB-coal-burning plants and plants already burning PRB coal have increased their capacity factors. Most significantly, scores of plants burning coal from other regions switched to PRB coal or PRB-based blends.

The upward trend in PRB coal consumption likely will continue. The first new pulverized-coal project in recent years, the 80-Mw Wygen Unit 1, announced in early 2001, is based on PRB



NEW Hawthorn is first pulverized coal plant in recent years.

coals. Scheduled for operation in July 2003, the facility near Gillette, Wyo., will feature a 1,005°F, 1,620-psi superheated-steam boiler, supplied by Babcock & Wilcox Co., Barberton, Ohio. B&W also will engineer, design, procure and construct the facility, including its substantial emissions-control systems.

Coal wastes processed into fuel in the form of briquettes or pellets also are garnering new attention, spurred by the Nonconventional Sources of Fuels Tax Credit. Most waste coal has a high sulfur content, so a utility boiler typically requires a flue-gas desulfurization system to

reduce sulfur emissions.

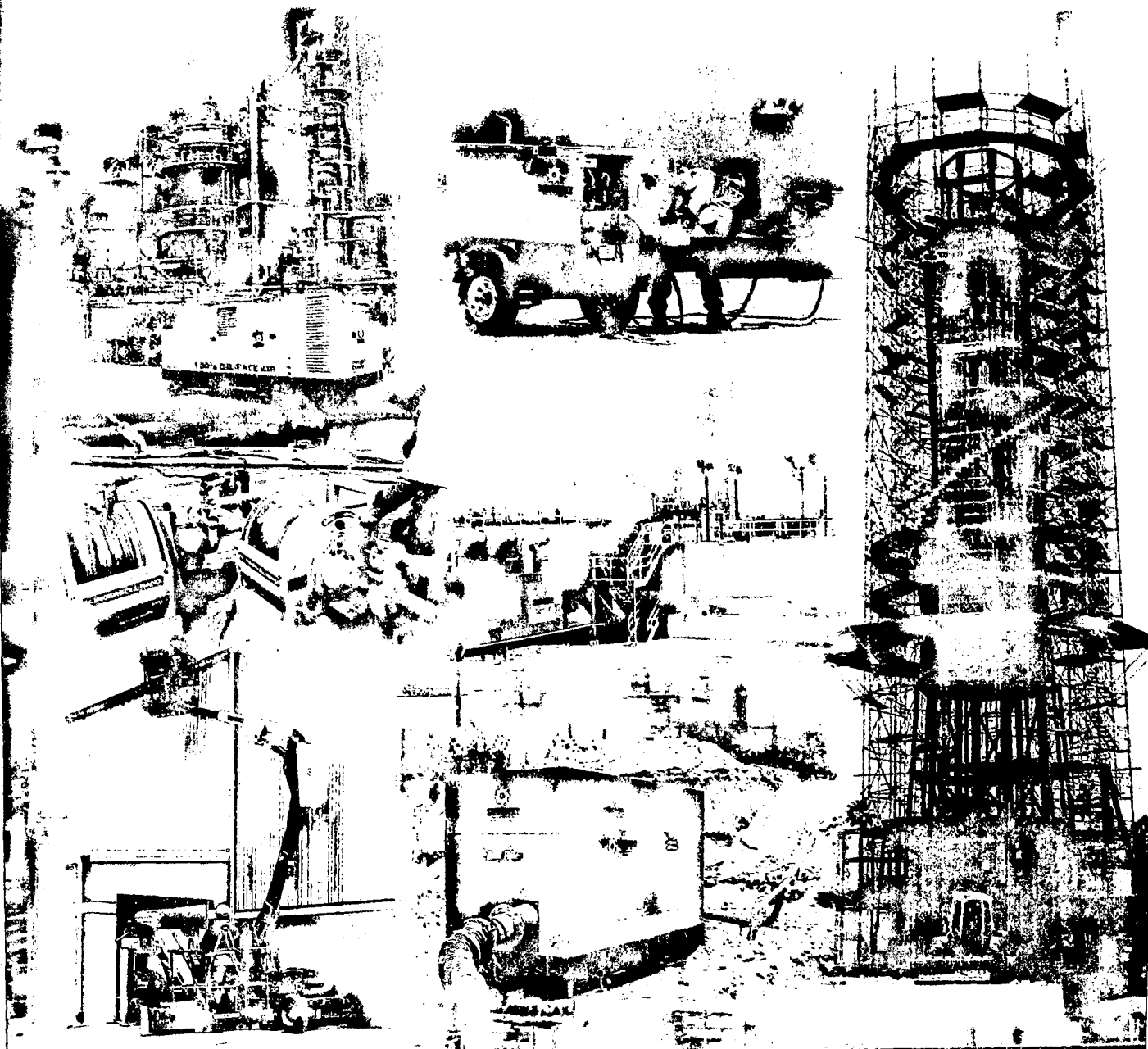
Contributing to coal's rebirth are emissions-control technologies that enable cleaner, more efficient combustion. Since its unhealthiest peak over 30 years ago, U.S. air quality has improved dramatically, even while coal consumption in powerplants has tripled—powerful testimony to emissions-control technologies. Many "new" technologies are simply improvements to older, post-combustion technologies, including electrostatic precipitators, selective catalytic reduction and FGD systems.

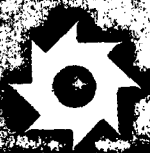
Typical is an upgraded ESP, recently supplied by Wheelabrator Air Pollution Control, Pittsburgh, at the 1,230-Mw Crist station in Pensacola, Fla. The new hammer-rapped rigid-discharge electrode precipitator features wide-spaced plates set 16 in. apart, higher voltage and rapping insulators, and rigid electrodes and tumbling hammer rapping—a combination well suited to difficult coal dusts. Initial performance tests measured particulate emissions of 0.01 lb per million Btu and opacity levels less than 2% at volumetric rates of 1,264-million cu ft per minute.

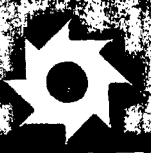
A staggering 60,000 Mw of existing coal-fired capacity in the U.S. will be retrofitted with SCR systems by May 2004 to bring emissions of nitrogen oxides (NOx) into compliance with U.S. Environmental Protection Agency regulations. An SCR system for the 600-Mw New Madrid Unit 2, installed in 2000 for Associated Electric Cooperative Inc., Springfield, Mo., was the first application of SCR to a utility-scale boiler firing PRB coal. It reportedly is achieving 93% NOx reduction.

Although SCR technology has been suc-

CREATION...

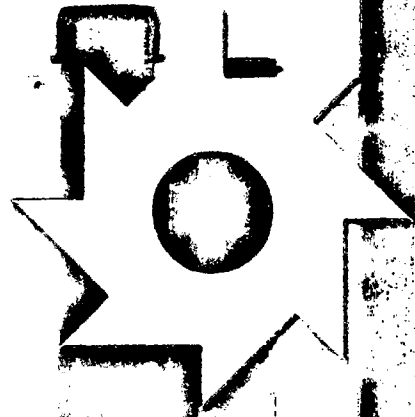



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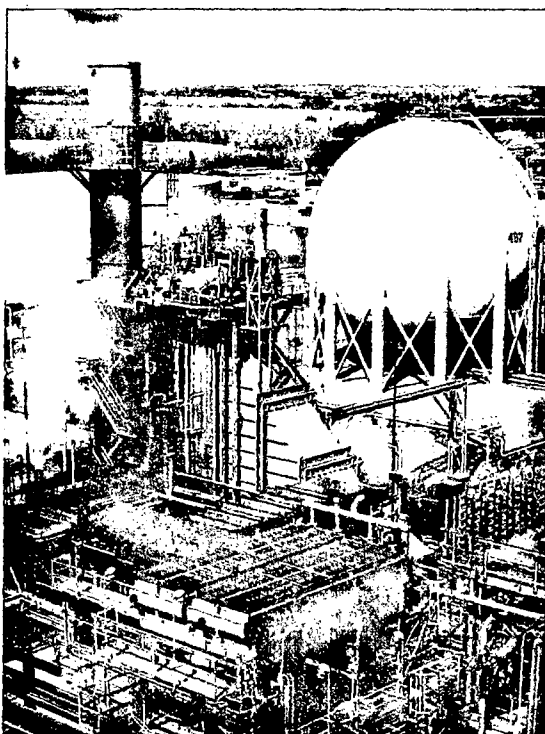


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STRETCHING Gasification uses low-cost feedstock.

cessfully used on gas-fired plants in the U.S. and coal-fired plants overseas, its application to large-scale, high-pressure boilers firing U.S. coals presents technical challenges. Columbus-based Ohio Power Co.'s 2,600-Mw Gavin station, for instance, found itself in the national news last summer when it unexpectedly emitted thick blue plumes of sulfuric acid following start-up of a new SCR. A frenzy of developmental and commercial design activity is seeking to make the Babcock Borsig Power-supplied SCR system—as well as other new SCRs starting up at coal-fired plants—work more reliably and effectively.

Supplementing the post-combustion technologies of ESP, FGD, and SCR, low-NOx burner (LNB) technology minimizes emissions from coal-fired plants during combustion. LNB designs, frequently

used in combination with overfire air, have been extensively retrofitted into utility boilers over the past 5 to 10 years, as mandated by the Clean Air Act Amendments of 1990.

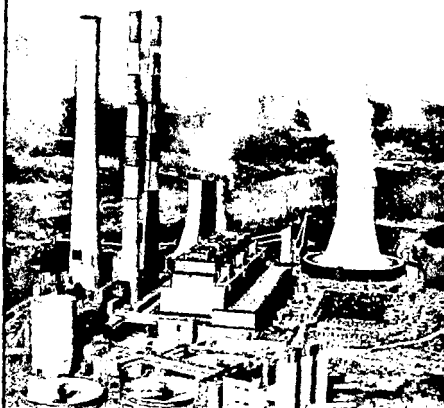
FIRING UP

The number of announced new coal-based construction projects in the U.S. vaulted from one to 10 in the first few months of 2001, and now stands at some two dozen. A harbinger of these projects was the Hawthorn Unit 5 project, completed last year by the team of Kansas City Power & Light Co., B&W and Burns & McDonnell, Kansas City. Firing PRB coal with reduced sulfur emissions, the new unit also is equipped with SCR, dry FGD, the most advanced LNBs commercially available and the largest pulse-jet fabric filter system in the U.S.

Many coal-fired plants constructed in the next few years will feature circulating fluidized-bed (CFB) technology. The low operating temperature of CFB boilers means that air emissions are inherently low. What's more, CFB boilers are able to cleanly burn a wide variety of fuels, so a CFB plant is able to switch fuels quickly

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and frequently to exploit changes in fuel markets. In a CFB boiler, the fuel rides on a bed of sand and is fluidized from below by a continuous jet of combustion air. The result is excellent fuel-air mixing and nearly ideal combustion.

Perhaps the highest-profile CFB project is located at Jacksonville Electric Authority's Northside station in Florida. The Northside project is one of the last of the Clean Coal Technology projects, with the U.S. Dept. of Energy sharing the cost of retrofitting atmospheric CFB boilers into Northside Units 1 and 2. After the CFB retrofit is complete, the plant will fire pet-coke, coal or a combination of both.

IGNITING?

But coal's long-term future may lie in gasification—an endothermic process in which a solid fuel is thermochemically converted into a low- or medium-Btu gas. The resulting "syngas" can be used like natural gas to fuel a wide range of clean powerplant technologies, such as boilers, gas turbines, spark-ignited reciprocating engines, fuel cells and Stirling engines.

High-profile U.S. gasification projects are the three utility projects co-funded by DOE's Clean Coal Technology program: Wabash River, Polk, and Piñon Pine. Since start-up in the late 1990s, Wabash River and Polk have made progress in overcoming technical problems with gasification, and both facilities continue to operate—though with marginal financial results. But being one of the only air-blown, rather than oxygen-blown, gasification projects in the world appears to have doomed the Piñon Pine project near Reno, Nev. It was officially terminated Jan. 1, 2001, without achieving integrated operation of the gasifier, hot-gas

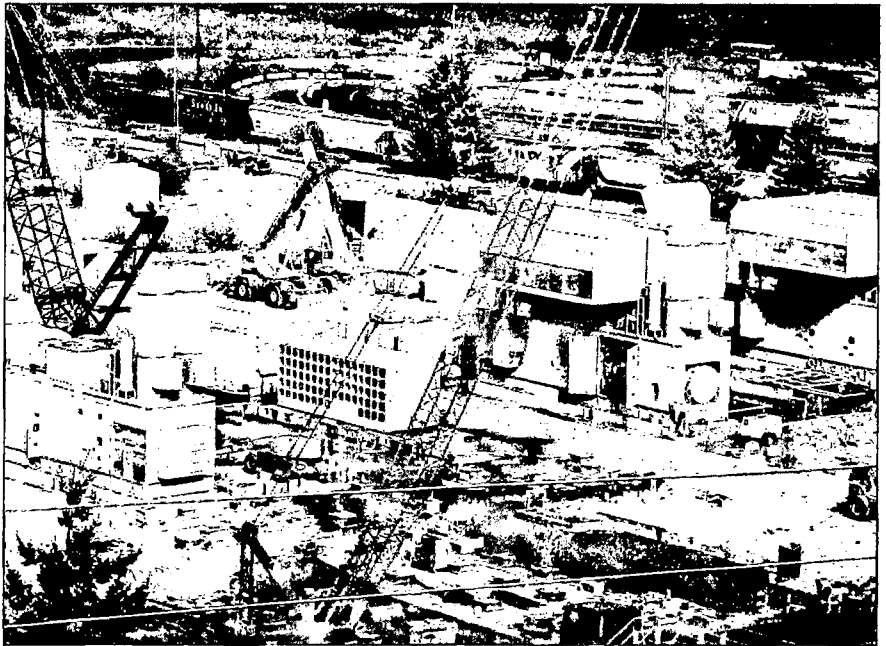
cleanup system and gas turbine.

But a long-delayed fourth gasification project, the 400-Mw Kentucky Pioneer Energy Project in Clark County, may be moving forward. It will not be based strictly on coal, but on a low-cost feedstock that blends coal and municipal solid waste. It is set to operate in 2003.

Low-cost feedstock is the key to other gasification projects, which have been developed on their own economic mer-

it. These plants—such as the 180-Mw Motiva Enterprises' Delaware City, Del., refinery project, which started up in April 2000, and the 35-Mw El Dorado plant, which was developed in 1997 by Texaco Alternative Energy Inc., White Plains, N.Y. (now ChevronTexaco Worldwide Power & Gasification, Houston)—fire "bottom-of-the-barrel" fuels from refinery wastes. □

By Robert Swanekamp



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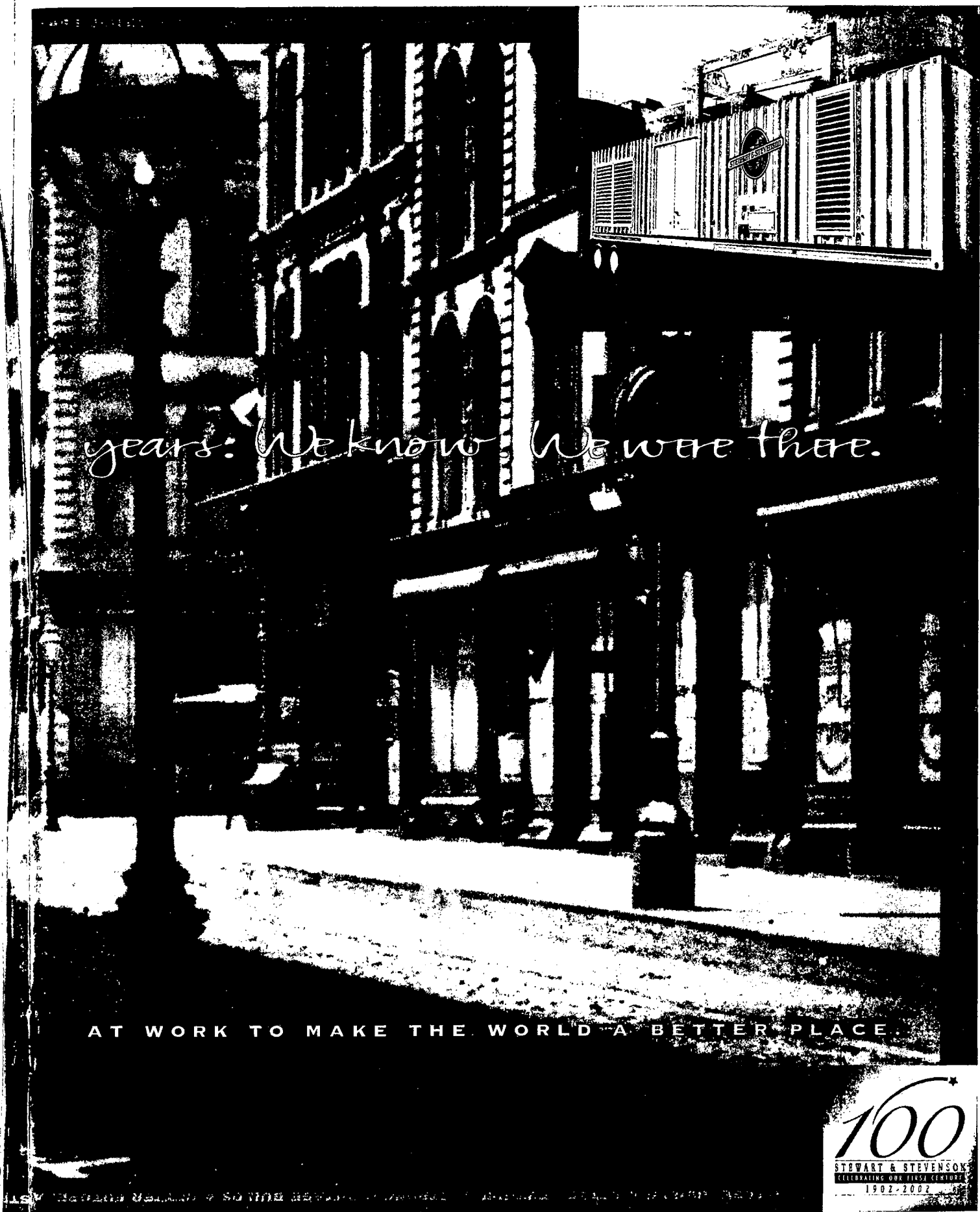
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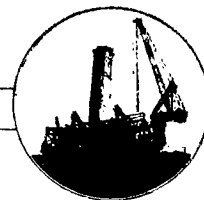
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Growing Power Needs Spur Expansion of Existing Capacity

Collaboration and technology upgrades boost projects

Hydrowater was one of the foundations of U.S. economic development in the 20th Century, evidenced by monumental projects such as Hoover and Grand Coulee dams. But as the century closed, prime hydropower sites had been exploited and the technology's long-term environmental and societal impacts questioned. Those consequences, in many cases, reduced interest in hydropower.

Today, changes in market conditions and advances in technology have sparked a renewed attention to hydropower, with construction of new plants and rehabilitation of existing ones again under way. Last year, the Federal Energy Regulatory Commission formally asked hydro owners in the power-starved western U.S. to explore ways to increase energy production from existing dams. Permit applications for new hydro developments jumped from two per month to over 30 per month by the summer of 2001.

RELICENSING

While the noisy debate about breaching dams and prematurely shuttering hydro plants grabs headlines, some owners have actually succeeded in extending plant lives. In April 2001, the National Hy-

dropower Association bestowed its annual Achievement Award on Tacoma Power for its efforts to build consensus among all parties in relicensing the 462-Mw Cowlitz River project in Washington state. Such collaborative efforts, sanctioned by FERC a few years ago, are growing as applicants accept the challenge of linking diverse parties interested in hydropower projects.

ENTERING REHAB

Some new projects also are quietly coming on line in North America. Most are in the West and use small hydro turbines to replace energy-dissipation equipment in water-supply systems. A typical example is the 200-kw project at a water treatment facility for California's Palmdale Water District, designed by Montgomery Watson Harza, Broomfield, Colo. A much larger project is the 170-Mw Keenleyside facility, recently built near an existing dam on the Columbia River, near Castlegar, B.C. It comprises a two-unit, single monolith powerhouse and a 1,200-ft-long concrete face rockfill dam. The design-build team, headed by Peter Kiewit Sons Inc., Omaha, met an aggressive schedule that required continuous coordination with designers and equipment suppliers.

New development is not just focused on small facilities. Owners of large-scale hydro plants are aggressively rehabilitating and upgrading existing facilities to add capacity, improve reliability, reduce O&M cost, comply with tighter environmental rules or extend plant life. Some studies estimate such efforts will add up to 17,000 Mw of capacity without building a single new dam.

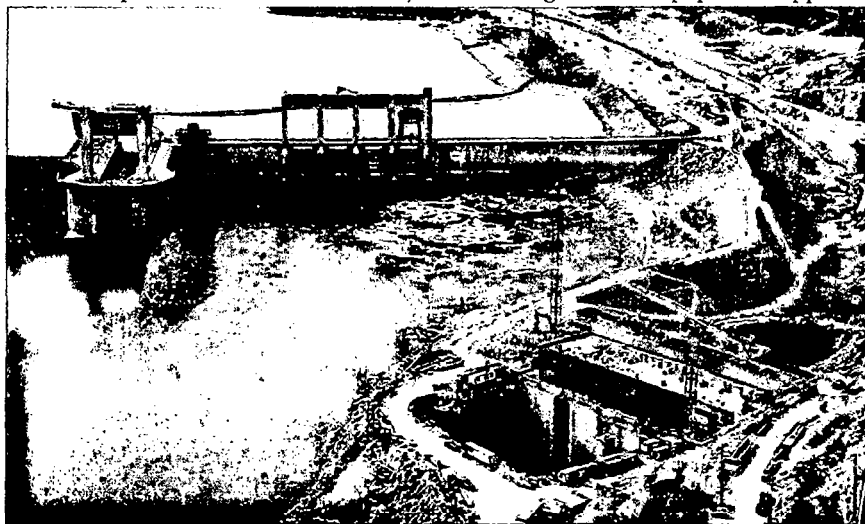
Two major upgrades are under way at the massive Grand Coulee facility in Washington state, set for completion in 2007. Runners of the 18 original main turbines in the left and right powerplants will be replaced to increase efficiency and performance. The replacement of stators and stator cores, an impressive effort because of their size—each stator ring weighs 740 tons, stands 12 ft tall, and is 76 feet in diameter—was finished in 1998 and accomplished without removing rotors or replacing any of the rotating elements' components. The new stators have raised Grand Coulee's total capacity to 6,809 Mw at full head.

FISH-FRIENDLY

Application of advanced technologies can boost plant operating efficiencies by 5% or more, and capacities by 20% or more. Three-dimensional computational fluid dynamics software is boosting hydro turbine performance and helping to make equipment more environmentally friendly.

In fall 2001, one such turbine was introduced by two Massachusetts firms, Alden Research Laboratory Inc., Holden, and Concepts NREC, Woburn. Design also was supported by the U.S. Energy Dept. and the Hydropower Research Foundation Inc. The turbine features only three blades, fewer than conventional hydro turbines, to reduce fish mortality. But the blades are also much longer to extract enough energy from water. To accomplish this, blades are wrapped around the central hub in a corkscrew that minimizes sudden changes in flow velocity, which could injure fish. □

By Robert Swanekamp



FACE LIFT Keenleyside project in Canada adds a 170-Mw powerhouse at existing dam.

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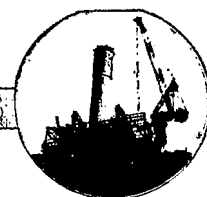
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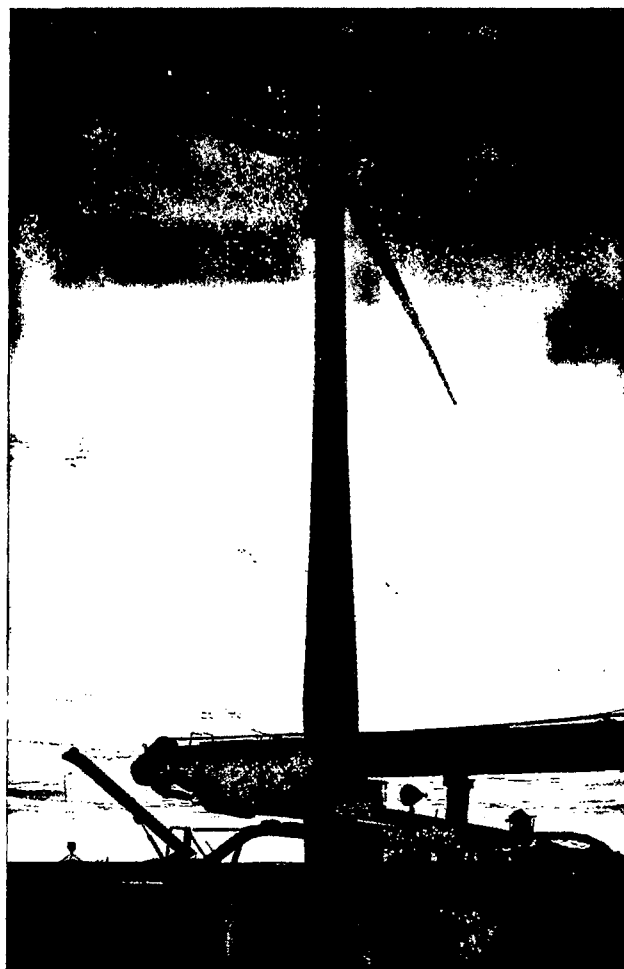
New focus is on fuel cells, wind turbines and biomass

Despite decades of research and many government incentives, renewable-energy technologies still struggle with technical challenges and high costs. But the lure of non-polluting, infinite energy resources keeps attention focused on making the dream a reality. Leading the field in alternative technologies today are fuel cells, wind turbines and biomass-based gasification.

Fuel-cell researchers seek cost-effective ways to convert or "reform" natural gas, propane, methanol and diesel oil into the hydrogen that cells require. Another hurdle is fuel cells' own capital cost, nearly \$4,000 per kw. Research to reduce the cost of solid-oxide fuel cells got a big push in 1999, when the U.S. Energy Dept. awarded grants to four firms: McDermott Technology Inc., Alliance, Ohio; Allied Signal Inc., Torrance, Calif.; NexTech Materials Ltd., Worthington, Ohio; and Technology Management Inc., Cleveland.

One of the world's largest fuel-cell projects, 1 Mw, was installed in 2000 at an Anchorage postal facility. Owned by Chugach Electric Association Inc., it has five phosphoric acid fuel cells and was driven by the need for power reliability in "the high nines," or 99.99%.

Windpower may be the fastest growing alternative. About 2,000 Mw of new U.S. windpower capacity came on line in 2001, mostly in the Midwest, Texas and the Northwest. The American Wind Energy Association says there are now 175 suppliers offering wind-based products to customers. Proponents attribute growth to steady technical improvements, which have cut costs by nearly 80% since the first modern wind farms started up in the early 1980s. There are now more robust turbines, lighter blades and varied-speed



BLOWIN' IN THE WIND 2,000 Mw of capacity came on line in 2001.

electronic controls, in sizes ranging from 250 kw to more than 1 Mw. Despite wind-turbine improvements, low capacity, catastrophic storm damage and premature turbine failures feed doubts about wind-farm reliability and equipment durability.

Interest in biomass-fueled technology is being driven by global climate change concerns. Broad definitions of biomass include methane gas produced by landfills and wastewater-treatment plants, as well as municipal solid waste burned in conventional boilers. Current interest focuses

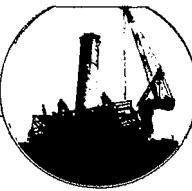
on "organic" biomass, defined as combustible cropland and forest materials, wood-processing and agriculture wastes and urban wood wastes. Organic biomass produces lower carbon dioxide emissions than fossil fuels and contains negligible amounts of sulfur compared to its solid-fuel counterparts coal and petcoke.

Organic biomass fuels about 350 U.S. powerplants totaling 7,500 Mw, in direct-fired or "mass-fired" conventional boilers. The 1978 Public Utility Regulatory Policies Act spurred a construction boom but many 1980s-era plants shut down when lucrative PURPA deals expired or were bought out by local utilities. Many direct-fired biomass plants also suffered from high O&M costs, a consequence of high moisture and contaminants in biomass fuel.

Newer technologies are being developed. These include co-firing biomass in existing coal-based powerplants, firing it in fluidized-bed boilers and gasifying it to create a low-Btu synthetic gas capable of fueling a gas turbine, a reciprocating gas engine or a fuel cell. Six U.S. powerplants are now co-firing coal and biomass commercially. The issue is whether fuel savings with biomass coal-firing can offset capital costs needed to modify a plant and labor and maintenance costs to operate the co-firing system.

Gasification technology may be the best hope for the future. The two most advanced biomass-gasification projects, in Maui, Hawaii, and Burlington, Vt., both aim to produce biogas that can be fired in a 5-Mw to 10-Mw gas turbine and are at a similar development stage. Gasifiers have successfully gasified biomass fuel, but exhaust-gas cleanup system testing and actual firing in a gas turbine await. □

By Robert Swanekamp



Nuclear Renaissance Converges On Life Extension and Upgrades

New technologies offer some hope for once-dead market

Only a few years ago, no one was talking about nuclear power construction projects in the U.S. The Energy Information Administration estimated then that over half of the country's nuclear plants would cease operation and shut down by 2015. Interest in license renewal appeared low; decommissioning was the industry's only hot market niche.

How things have changed. In 2000, Constellation Nuclear's Calvert Cliffs site in Lusby, Md., and Duke Energy Corp.'s Oconee station in Charlotte became the first U.S. nuclear plants to complete relicensing, successfully extending their 40-year licenses for an additional 20 years. Today, some 40 additional nuclear units have either filed renewal applications or advised the Nuclear Regulatory Commission of their intent to do so. The vast majority of the remaining units operating also are set to renew in the next few years.

SCENARIOS

The licensing turnaround has prompted predictions that licensing of a new nuclear plant may be at hand, for the first time since the 1979 Three Mile Island accident. Two scenarios have emerged: A reactor already NRC design-certified could be added to an existing plant site, or a small, modular reactor with lower costs and shorter construction schedule could be built at a greenfield site.

Chicago-based Exelon advocates the first option, borrowing the 110-Mw pebble-bed modular reactor being developed in South Africa. While similar to other gas-cooled reactors so far unsuccessfully tried in the U.S., the technology makes more sense in a market-driven power business than multibillion-dollar conventional reactors, says Exelon CEO Corbin McNeil.

But Richmond-based Dominion Energy Inc. believes that a "familiar" design advanced through evolution would be faster and cheaper. One key example is the AP-1000, Westinghouse Electric Co.'s 1,000-Mw advanced pressurized water reactor. It is set for NRC certification in late 2004. Another is the advanced boiling water reactor, developed by GE Nu-

clear Energy. It first went commercial in the late 1990s at Tokyo Electric Power Co.'s Kashiwazaki-Kariwa station.

Unlike previous reactors, the advanced designs feature "passive safety systems," which assure plant safety using natural forces such as gravity. GE's ABWR features a host of safety innovations, including internal recirculation pumps that eliminate pressure-vessel piping connections below the level of the top of the core to ensure that the core remains covered in the case of a piping failure.

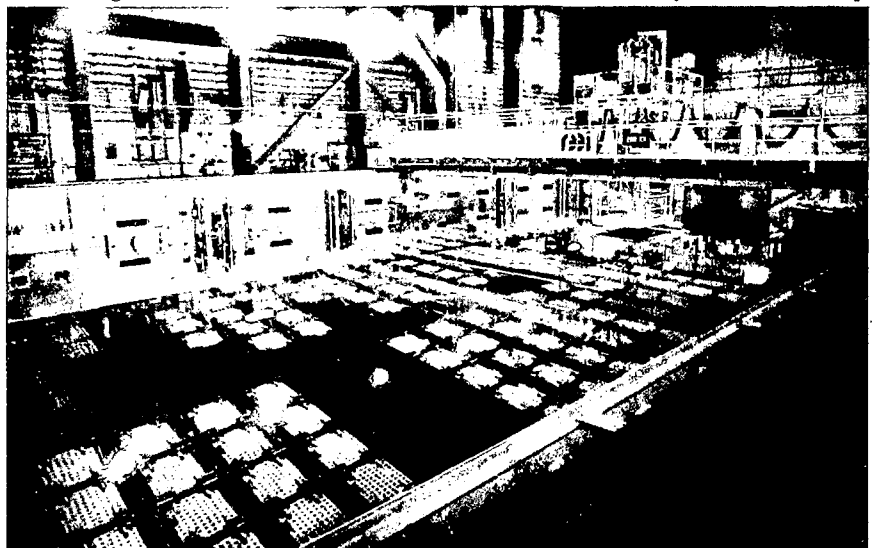
UPBEAT?

Despite upbeat talk, many analysts see regulatory issues, public opinion and institutional realities of new nukes as only slightly more favorable than before. Real construction projects are still six to 10 years away. But some say near-term prospects are brightening. The partially finished Watts Bar Unit 1 project was reactivated in the mid-1990s, bringing 1,270 Mw of new capacity to the Tennessee Valley Authority and paving the way for other restarts such as Browns Ferry Unit 1. Two other units at that site and two at the Sequoyah station have already restarted since being shut down in 1985.

Uprate projects at the country's 104 operating nuclear units can deliver a low dollar-per-kw cost, making them top-notch competitors to other sources of new capacity, proponents claim. Now pending at NRC are 14 license applications for power uprates, which would add more than 1,000 Mw of new nuclear capacity. Some industry analysts estimate that as much as 8,000 Mw can be added in the U.S. if the full potential of uprates is exploited by today's fleet of reactors.

Nuclear operators are also considering digital upgrades of instrumentation and controls systems. Studies show that these could mitigate plant scrams, forced outages and other operational problems. Potential designs are based on technology proven in fossil fuel plants and in process industries. Exelon has initiated such upgrades at its LaSalle and Quad-Cities plants as part of a plan to improve performance and reliability of reactor water level and recirculation flow control systems. New control systems will remove obsolete components, provide redundancy for improved reliability, and allow performance of online diagnostics and maintenance to optimize outage efficiency. □

By Robert Swanekamp

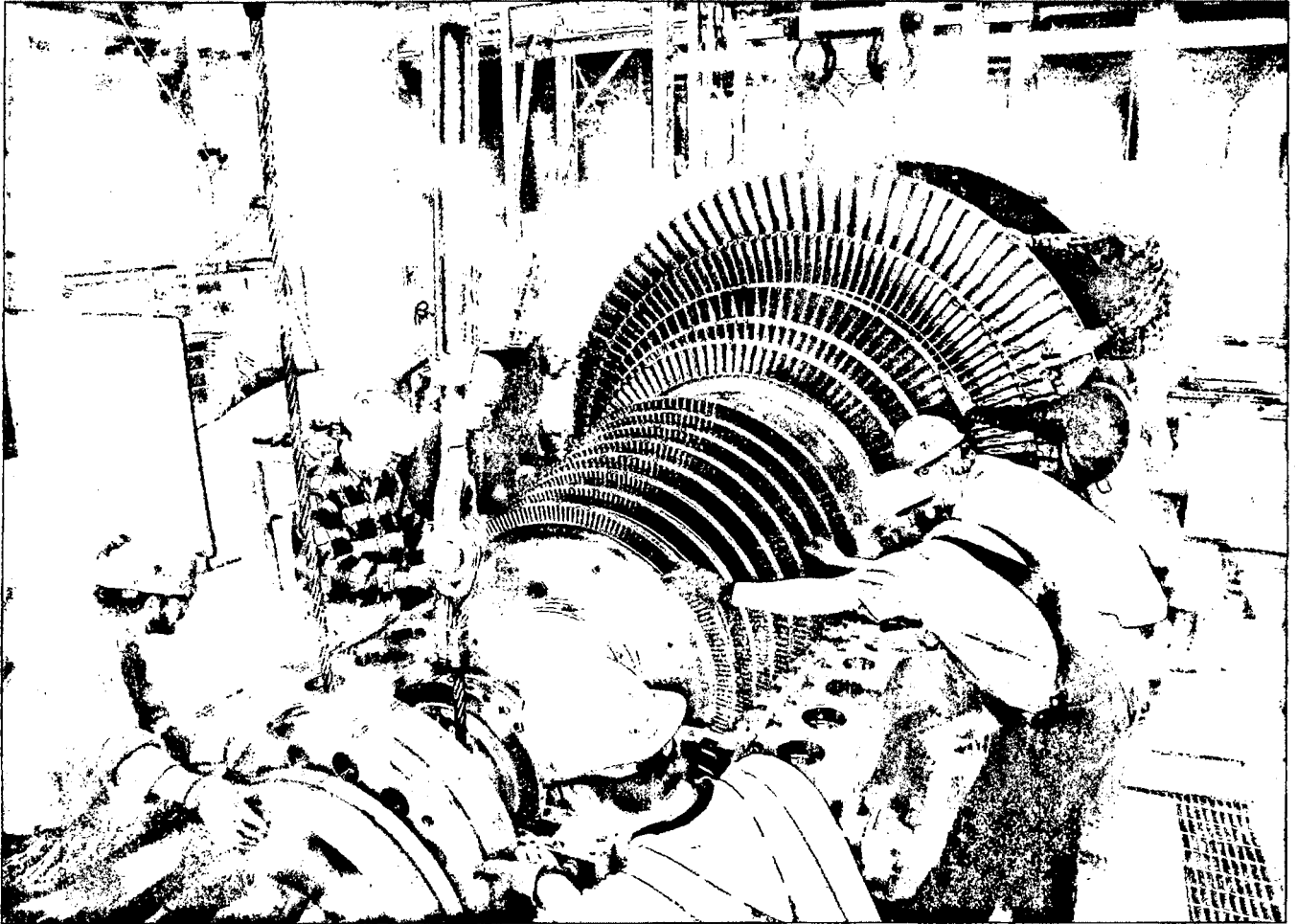


COOL Nuclear work was dormant, but relicensing and technology fixes are heating up.

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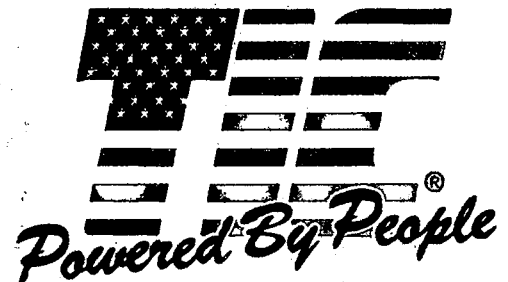


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AES's goal is to add 15 to 20 new projects annually. In 2000, it added 39. In the U.S. and Canada, AES currently has 15 operating plants totaling 6,583 Mw and seven plants under construction totaling 3,926 Mw. Today the company is focusing

more heavily on North America than in the recent past. It has strengthened its position in the Midwest by purchasing IPALCO in Indiana and has several merchant plants set to come on line in the next two years in the Northeast and Texas. Despite a setback in Nevada, where a plant acquisition was canceled by state order, AES continues to expand in the West. In July 2001, the company boosted its position in the state by acquiring the energy assets of Thermo Ecotek Corp., Walham, Mass. Included in the deal are a 1,056-Mw expansion of the former San Bernardino, Calif, generating station now

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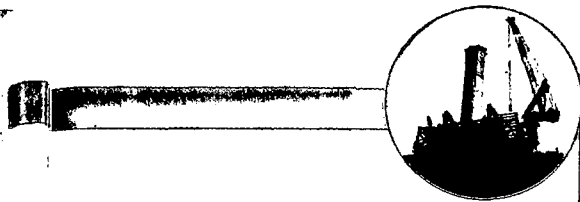


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under construction, a natural-gas storage project in Colorado and a 210-Mw generation project in Florida.

AES has contracted with Williams Energy Services and Merchant Energy Group of the Americas to sell its U.S. power. The company has 27,000 global employees and reported revenue of \$6.69 billion for 2000, up 106% from 1999.

2. EDISON MISSION ENERGY

Net equity ownership: 23,487 Mw

Location: 18101 Van Karman Ave., Ste 1700
Irvine, Calif. 92612

Phone: 949-752-5588

Fax: 949-752-5624

Website: www.edlson.com

Chairman: John Bryson

President/CEO: Alan Fohrer

EDISON MISSION ENERGY, A SUBSIDIARY of Edison International and an affiliate of utility Southern California Edison Co., develops, acquires, builds, owns, manages and operates independent power facilities globally using gas, oil, coal, geothermal, hydro, and other technologies.

Edison Mission started out in the 1980s by developing qualifying facilities under the Public Utility Regulatory Policies Act, forming a strong early base in California. The company's central business strategy is to play an active role as a long-term owner in all phases of power generation, from planning through construction and commercial operation. Edison Mission has 34 operating U.S. plants, totaling 15,713 Mw, and two under construction, totalling 740 Mw.

Edison Mission also owns interests in oil and gas producing operations and related facilities in Texas, Alabama, New Mexico, Illinois, California and Colorado. The firm, which offers substantial development, financial, engineering and construction experience, works with a wide range of partners and looks for those with a strong local presence. Edison reported revenue of \$3.2 billion in 2000, up from \$1.6 billion in 1999, and employs about 3,200 people globally.

3. NRG ENERGY INC.

Net equity ownership: 22,735 Mw

Location: 901 Marquette Ave., Ste 2300
Minneapolis, Minn. 55402

Phone: 612-373-5300

Fax: 612-373-5430

Website: www.nrgenergy.com

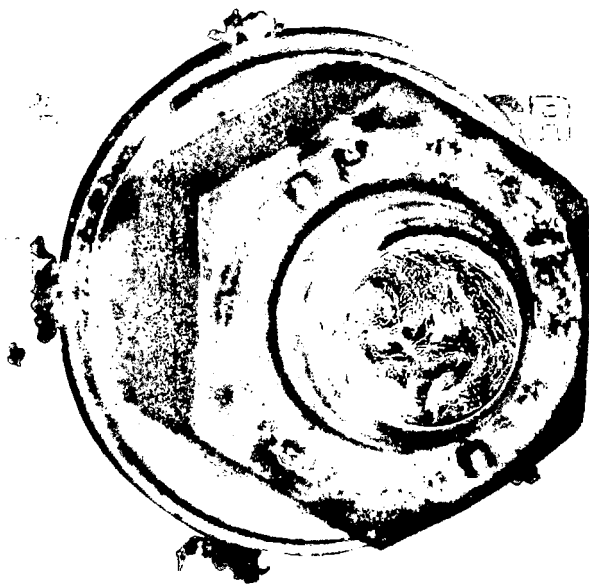
Chairman/President/CEO: Dave Peterson

NRG ENERGY ACQUIRES, DEVELOPS, operates and owns power generation and cogeneration facilities; thermal energy

POWERPLANT CONSTRUCTION • 57



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production, transmission and resource recovery facilities; and landfill gas facilities worldwide. The firm, incorporated in 1989, uses natural gas, coal, oil, landfill gas, hydro, refuse-derived fuel and biomass technologies in its projects.

In the U.S., NRG has 62 operating plants totaling 21,168 Mw, with five totaling 3,434 Mw under way. NRG aims to be a leading global generation firm with a top-three position in selected core markets and plans to increase its portfolio's capacity to 50,000 Mw by year-end 2005. NRG has several plants under way that will offer more than 4,000 Mw. Acquisitions pending include two plants in Connecticut and one in New Jersey. In July 2001, NRG agreed to purchase five In-deck Energy Services plants totaling 2,255 Mw. NRG develops and maintains strategic regional partnerships. For 2000, revenue topped \$2 billion, up from \$432.5 million the previous year. Net income rose to \$182.9 million, up from \$57.2 million. The firm has a global work force of 3,000.

4. CALPINE CORP.

Net equity ownership: 22,710 Mw

Location: 50 W. San Fernando St.
San Jose, Calif. 95113

Phone: 408-995-5115

Fax: 408-995-0505

Website: www.calpine.com

Chairman/President/

CEO: Peter Cartwright

CALPINE DEVELOPS, BUILDS, OWNS, AND operates power generation facilities and sells electricity and steam, mostly in the U.S., but has expanded into Canada and the United Kingdom over the past year. Calpine's goal is to have net ownership of 70,000 Mw in operation by year-end 2005. It also intends to increase operating capacity in California to 8,800 Mw.

The firm's current portfolio, all in Canada and the U.S., includes 55 operating plants totaling 9,683 Mw, 25 projects under construction totaling 15,563 Mw, and 29 projects being developed representing 17,869 Mw. Current and planned projects grew from 24,000 Mw to over 43,000 Mw between June 2000 and June 2001. Calpine attributes this to execution of its strategy to build and acquire low-cost generation facilities around the U.S. in key demand markets.

Since 1988, Calpine has concentrated on development, acquisition, operation, and maintenance of gas-fired and geothermal powerplants. It began building merchant plants in 1996, with a 231-Mw project in Pasadena, Texas. A June 2001, merger with Canada's Encal Energy Ltd. brought Calpine the equivalent of over

1 trillion cu ft of proved and probable natural gas reserves. Calpine has nearly 30 plants in development and reported 2000 net income of \$324.7 million, based on revenue of \$2.3-billion, a 238% increase over 1999. It now employs 2,900 people, up from 1,400 in 2000.

5. MIRANT CORP.

Net equity ownership: 20,874 Mw

Location: 1155 Perimeter Center W.
Atlanta, Ga. 30338

Phone: 678-579-5000

Fax: 678-579-5001

Website: www.mirant.com

President/CEO: Marcie Fuller

Executive VP/COO: Ray Hill

MIRANT, FORMERLY SOUTHERN ENERGY Inc., was spun off from parent Southern Co. in April 2001. As a stand-alone company, Mirant has adopted a rapid growth strategy aimed at reaching 50,000 Mw worldwide by 2005 through aggressive growth in North America and in selected markets overseas. The company aims to reach 30,000 Mw in North America alone by 2004. In the U.S., Mirant currently has 23 operating plants totaling 13,226 Mw and four plants under construction totaling 1,968 Mw.

As a major generator in California, however, Mirant has been under legal and political attack since December 2000 for allegedly withholding capacity and violating environmental rules. The controversy caused it to delay construction on two major gas-fired projects in northern California, but greenfield projects in 10 states have been announced.

As of mid-2001, the firm had equity in more than 14,000 Mw of domestic capacity and says it will develop another 7,000 Mw. Mirant is targeting generation assets in New York City, Boston, Chicago, Washington, Dallas and San Francisco, but will also explore work in the Southeast despite potential conflict of interest issues with parent firm Southern's regulated utilities. The 7,000-employee Mirant reported \$12.4 billion in U.S. revenue in 2000, and net income of \$336 million, up 35% from 1999.

6. EXELON GENERATION

Net equity ownership: 20,686 Mw

Location: 300 Exelon Way, Ste 310
Kenneth Square, Pa., 19348

Phone: 610-765-6925

Fax: 610-765-6916

Website: www.exeloncorp.com

CEO: Corbin A. McNeill Jr.

EXELON GENERATION CONSISTS OF three business units operating only in the U.S.: Exelon Nuclear, which operates 17 nuclear reactors at 10 stations; Exelon



Power, which manages, operates, and maintains 4,800 Mw of intermediate and peaking units powered by water, coal, natural gas, oil, and landfill gas; and Exelon Power Team, a wholesale marketing and energy financial trading unit.

Exelon Generation says it will add to its generating portfolio through mergers and acquisitions, fossil plant ownership and power purchase agreements. The company also expects to expand into Canada and possibly into Mexico. Exelon's current portfolio consists of 60 operating plants totaling 24,686 Mw, with two plants totalling 504 Mw set to start up in mid-2002. Exelon Generation had assets of \$5.73 billion and pre-tax income of \$474 million on revenue of \$3.93 billion in 2000. About 8,500 of its 9,000 employees work at plant sites.

7. RELIANT ENERGY INC.

Net equity ownership: 17,482 Mw

Location: 111 Louisiana St.
Houston, Tex. 77002

Phone: 713-207-5670

Website: www.rellantenergy.com

**Chairman/President/
CEO:** R. Steve Letbetter

RELIANT ENERGY HAS 32 OPERATING plants totaling 10,676 Mw and six plants in the U.S. under construction totaling 3,624 Mw. It began to withdraw from Latin American markets in 2000 and will divest its minor holdings in India by the end of 2001 to focus on North America and Europe. In the U.S., Reliant has developed a strong generation presence in most key markets through acquisition and recent aggressive greenfield development of gas- and coal-fired merchant projects. The company has nearly 50 combustion turbines on order and set for delivery by mid-2003. The firm could grow quickly in 2004 based on its option to purchase 14,040 Mw of now-regulated generation in the Houston area.

8. DUKE ENERGY CORP.

Net equity ownership: 17,240 Mw

Location: 528 S. Church St.
Charlotte, NC 28202

Phone: 704-592-6200

Fax: 704-382-4964

Website: www.duke-energy.com

President/CEO: James Donnell

DUKE ENERGY BEGAN AS A DEVELOPER of greenfield private power projects in

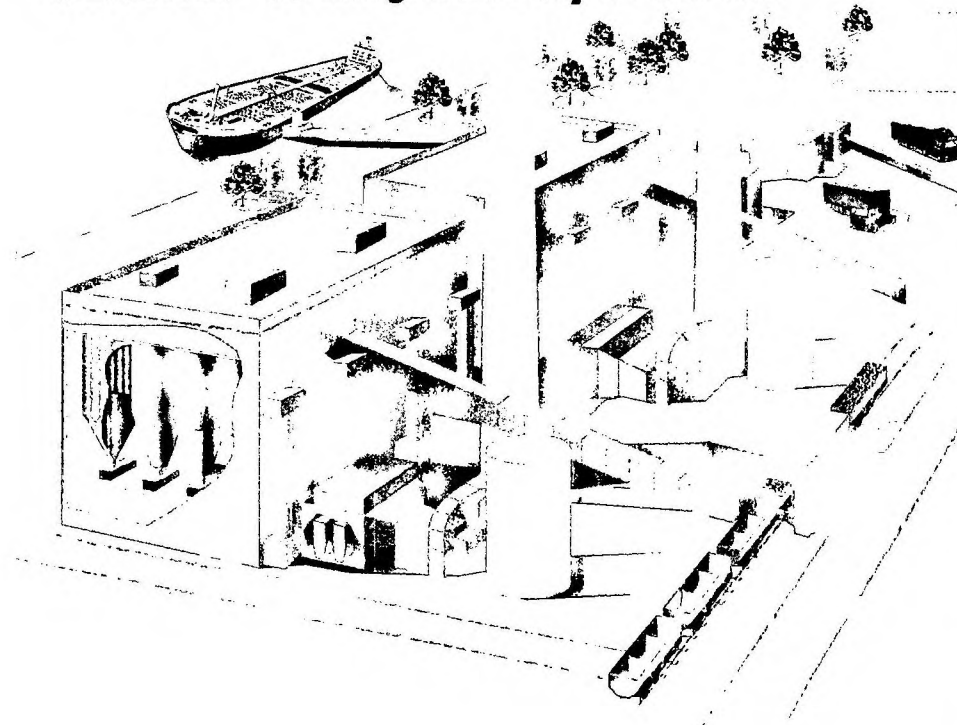
the U.S. but now acquires, develops, owns, and operates powerplants around the world. It quickly shifted to the international arena when the U.S. market slowed in the early 1990s.

But the company has moved quickly in the growing U.S. market, acquiring plants and focusing on greenfield projects in the last three years. In the U.S. and Canada, Duke has 15 operating plants or energy companies totaling 9,107 Mw, with nine projects in construction totaling 6,162 Mw.

Duke Energy also owns electric utility Duke Power and gas pipelines and energy trading operations in the U.S. So far, Duke has sold roughly 4,870 Mw of capacity in Texas, Missouri, Mississippi and Oklahoma. Since its 1997 merger with PanEnergy Corp., Houston, Duke has moved rapidly in emerging California, Northeast, and Midwest markets. It paid \$501 million for three plants in California totaling 2,645 Mw, is leasing a fourth 706-Mw plant near San Diego and plans expansions at its existing California sites.

Duke has announced at least 35 projects, representing roughly 25,000 Mw, concentrating on New England, Texas-

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Oklahoma, the Midwest, the Southeast and California.

The goal is to add 20,000 Mw by 2004. But Duke's aggressive project development effort has run into setbacks in Florida, where a state court voided regulatory approvals for two major projects, although others have been approved. The company also has faced criticism in California for alleged market manipulation, but it refutes the charges.

9. TRACTEBEL POWER

Net equity ownership: 16,730 Mw

Location: 1177 W. South Loop

Houston, Texas 77227

Phone: 713-552-2036

Fax: 713-522-2364

Website: www.tractebelpowerinc.com

President/CEO: Wes Schattner

TRACTEBEL DEVELOPS, ACQUIRES, builds, owns and operates powerplants, gas pipelines, and distribution compa-

nies. It was founded as an electrical engineering and utility company in the 1890s in Belgium and, until World War I, had an extensive worldwide business operating powerplants and building electric tramways. Not until the late 1980s did the firm again venture into the global arena, acquiring small projects in the U.S. There and in Canada, it now has 16 operating plants totaling 1,413 Mw, two plants in construction totaling 812 Mw, and three projects planned totalling 2,660 Mw.

Under a new global strategy, Tractebel's primary focus is in North America. It started building merchant power projects in Texas, the Northwest and the Southeast, and has purchased a liquid natural gas importing business in Boston to support its generation activities. Choctaw, Miss., will be home to a 462-Mw lignite-fired plant, while a new 350-Mw gas-fired plant will open in Ennis, Texas.

10. PSEG POWER LLC

Net equity ownership: 16,468 Mw

Location: 80 Park Plaza

Newark, NJ 07101

Phone: 973-430-7000

Website: www.pseg.com

President/COO: Frank Cassidy

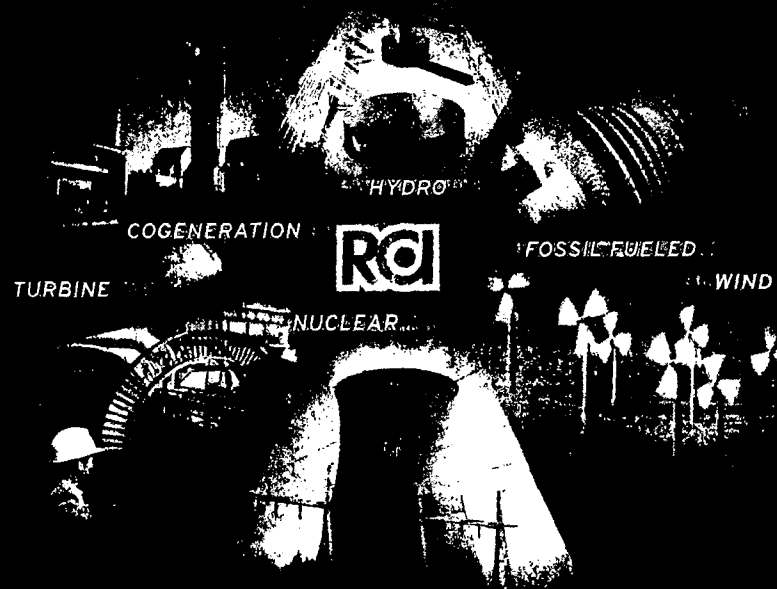
PSEG PARTICIPATES IN THE COMPETITIVE power industry through two unregulated units, PSEG Power LLC and PSEG Global. The former develops and acquires merchant plants in North America and markets their output. In the next three years, PSEG expects its portfolio to grow to between 18,000 and 20,000 Mw, up from 13,710 Mw. PSEG Global operates mainly in overseas markets, although it has also developed and acquired U.S. projects, and continues to own and operate them.

PSEG has 27 operating U.S. plants, totaling 17,924 Mw and three under construction totaling 2,686 Mw. PSEG Power originally received 10,200 Mw of fossil and nuclear capacity under a corporate restructuring. In addition, the firm purchased a 400-Mw fossil-fired plant in New York in 2000, and is developing a 750-Mw combined-cycle plant at the same site.

PSEG is developing four combined-cycle plants in New Jersey and Ohio, totaling 3,636 Mw. PSEG Power agreed in 2000 to buy 10,000 Mw of gas and steam turbines from GE Power Systems for \$863 million, to be used for future expansion. PSEG had \$764 million in 2000 net income and expects to increase earnings 7% annually.

The above material was excerpted from "202 Independent Power Companies," published by Platts, a division of The McGraw-Hill Cos. For more information, please call toll-free in the U.S. and Canada: 877-288-8897; all others, please call 212-438-3054.

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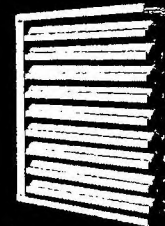
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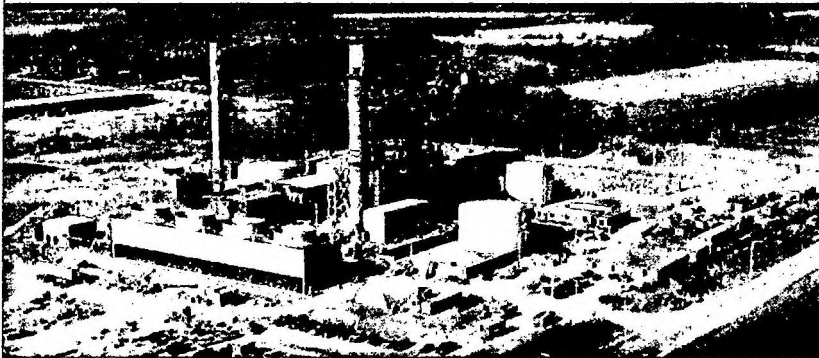
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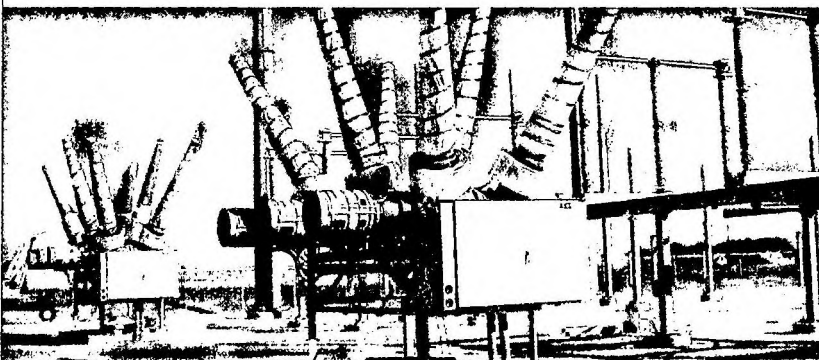
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LAKEFIELD GENERATION FACILITY LAKEFIELD JUNCTION, MINNESOTA

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- 345 kV
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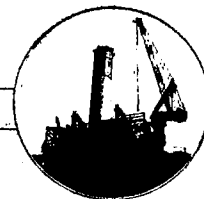
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Powerplant Construction GENERATING STATIONS

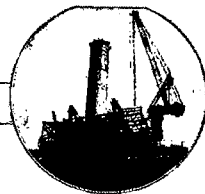


NEW U.S. POWERPLANTS OVER 50 MW Recently Completed, Under Construction and Planned

LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
ALABAMA						
Smith	Goat Rock	1,120	Southern Power	2003-2004	CC	Gas
Not yet located	Tenaska Central Alabama	885	Tenaska Energy	2003	CC	Gas
Decatur	Morgan Energy	790	Calpine Corp.	2002	CC	Gas
Bynum	Calhoun Energy	624	FPL Energy	2003	GT	Gas
Gantt	Vann	590	Alabama Electric Co-op Inc.	2001	CC	Gas
Bucks	Barry	525	Alabama Power Co.	2001	CC	Gas
Billingsley	Tenaska Lindsay Hill	510	Tenaska Energy	2002	CC	Gas
Mobile	Hog Bayou-A248	240	SkyGen Energy LLC	2001	CC	Gas
ARIZONA						
Gila Bend	Gila River	2,348	Panda Energy International	2003	CC	Gas
Not yet located	Mesquite	1,250	Semora Energy Resources	2003	CC	Gas
Not yet located	Redhawk	1,120	Pinnacle West Energy	2002	CC	Gas
Not yet located	La Paz County	1,080	Allegheny Energy Supply Co.	2005	CC	Gas
Harquahala	Harquahala Valley	1,080	PG&E National Energy Group	2003	CC	Gas
Gila Bend	Gila Bend	845	Gila Bend Power Partners	2004	CC	Gas
Phoenix	Santan	825	Salt River Project	2005	CC	Gas
Springerville	Springerville	760	Tucson Electric Power Co.	2004-2005	ST	Coal
Coolidge	PPL Sundance	600	PPL Global LLC	2001	GT	Gas
Casa Grande	Signal Peak	580	Reliant Energy	2004	CC	Gas
Arlington Valley	Arlington Valley	570	Duke Energy North America	2003	CC	Gas
Fort	South Point	562	Mohave Calpine Corp.	2001	CC	Gas
Casa Grande	Desert Basin	550	Reliant Energy	2001	CC	Gas
Phoenix	West Phoenix	530	Pinnacle West Energy	2003	CC	Gas
Wileup	Big Sandy Energy	520	Calithness Energy LLC	2003	CC	Gas
Kingman	Griffith Energy	520	Primesouth Inc.	2001	CC	Gas
Phoenix	West Phoenix Calpine	500	Calpine Corp.	2002	CC	Gas
Phoenix	Kyrene	250	Salt River Project	2002	CC	Gas
Phoenix	West Phoenix	120	Arizona Public Service Co.	2001	CC	Gas
Tucson	De Moss Petrie	75	Tucson Electric Power Co.	2001	GT	Gas
ARKANSAS						
El Dorado	Panda Union	2,200	Panda Energy International	2002-2003	CC	Gas
Russellville	River Mountain	720	AES Corp.	2005	H	Wat
Malvern	Hot Spring	642	Duke Energy North America	2002	CC	Gas
Deft	Deft	600	Teco Power Services Corp.	2003	CC	Gas
Wrightsville	Wrightsville	550	Mirant Corp.	2002	CC	Gas
Pine Bluff	Pine Bluff	222	SkyGen Energy LLC	2001	CC	Gas
Fulton	Fulton	183	Arkansas Electric Co-op Corp.	2001	GT	Gas
Ozark	Fitzhugh	112	Arkansas Electric Co-op Corp.	2003	GT	Gas
CALIFORNIA						
San Bernardino	Mountain View	1,132	AES Corp.	2003	CC	Gas
Byron	East Altamont	1,090	Calpine Corp.	2004	CC	Gas
Moss Landing	Moss Landing	1,080	Duke Energy North America	2002	CC	Gas
McKittrick	La Palma	1,048	PG&E National Energy Group	2002	CC	Gas
Pittsburg	Pittsburg Delta	880	Calpine Corp.	2002	CC	Gas
Victorville	High Desert	750	Constellation Power Inc.	2003	CC	Gas
Not yet located	Inland Empire	600	Calpine Corp.	2004	CC	Gas
Hayward	Russell City	600	Calpine Corp.	2004	CC	Gas
Burney	Three Mountain	570	Covanta Energy Corp.	2004	CC	Gas
Yuba City	Sutter	540	Calpine Corp.	2001	CC	Gas
San Francisco	Potrero	540	Mirant Corp.	2003	CC	Gas
Antioch	Contra Costa	530	Mirant Corp.	2003	CC	Gas
Blythe	Blythe Energy	520	FPL Energy	2003	CC	Gas
Bakersfield	Pastoria (Tejon)	504	Calpine Corp.	2001	CC	Gas
Pittsburg	Los Medanos	500	Calpine Corp.	2001	CC	Gas
Bakersfield	Western Midway	500	Edison Mission Energy	2003	CC	Gas
Otay Mesa	Otay Mesa	500	PG&E National Energy Group	2003	CC	Gas
Rio Linda	Rio Linda	494	FPL Energy	2004	CC	Gas
Tupman	Elk Hills Merchant	478	Occidental Oil & Gas Corp.	2002-2003	CC	Gas
Fellows	Sunrise	320	Edison Mission Energy	2001	GT	Gas
Burbank	Magnolia	254	Burbank Public Service Dept.	2004	CC	Gas
Lancaster	Lancaster	240	Electricity Provider Inc.	2002	GT	Gas
Wilmington	Harbor	237	Los Angeles Dept. of Water & Power	2001	GT	Gas
San Jose	Los Esteros	180	Calpine Corp.	2002	GT	Gas
Chino	Chino Pegasus	180	Delta Power Co. LLC	2001-2002	GT	Gas
Gilroy	Gilroy Energy	135	Calpine Corp.	2001	GT	Gas
Palm Springs	Indigo Energy	135	InterGen North America	2001	GT	Gas
Otay Mesa	Larkspur	90	InterGen North America	2001	GT	Gas
Vernon	Vernon	86	Vernon Municipal Light Dept.	2002	GT	Gas
Modesto	Woodland Ave	84	Modesto Irrigation District	2003	CC	Gas
Corona	Corona Golden Cheese	65	Dynegy Power Corp.	2002	CC	Gas
Benicia	Benicia Refinery	51	Valero Energy	2001	GTS	Gas
San Diego	Otay Mesa Peaker	50	Calpeak Power LLC	2001	GT	Gas
King City	King City	50	Calpine Corp.	2001	GT	Gas
Escondido	Escondido Ramco	50	Ramco Inc.	2001	GT	Gas
COLORADO						
Hudson	Rocky Mountain	600	Calpine Corp.	2004	CC	Gas
Aurora	Colorado Energy	336	SkyGen Energy LLC	2003	GT	Gas

Type of technology: CC-combined cycle; GT-simple cycle gas turbine; GTS-gas turbine with steam sendout (cogen); H-hydraulic turbine; ST-conventional steam turbine; STS-steam turbine with steam sendout (cogen); W-wind turbine;
Fuel Sources: Biomass-biomass; CGas-coal gas; Coal-coal or lignite; OCGas-coal-oven gas; OCGas-petroleum coke; Gas-natural gas; LNG-liquefied natural gas; Oil-oil; Water-water; Wind-wind

Powerplant Construction GENERATING STATIONS



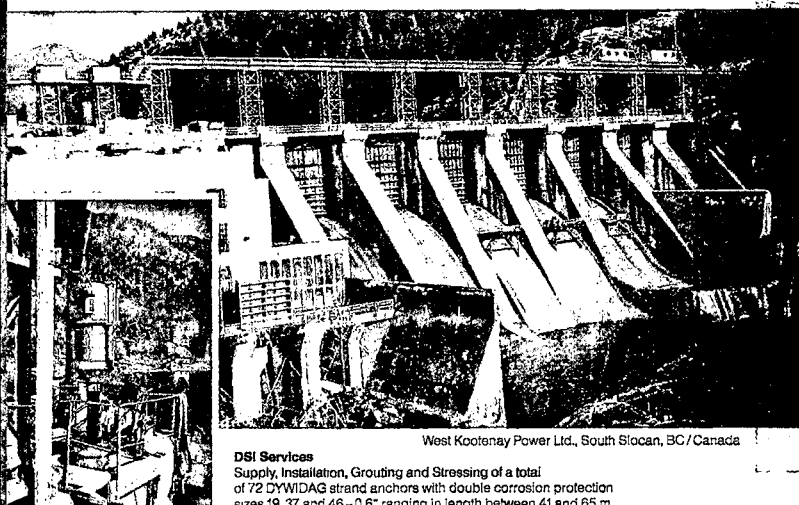
NEW U.S. POWERPLANTS OVER 50 MW Recently Completed, Under Construction and Planned

LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Fountain	Fountain Valley	240	Black Hills Energy Ventures	2001	GT	Gas
Colorado Springs	Enron Excel	215	Enron Power Corp.	2001	GT	Gas
Lamar	Lamar South	182	Enron Wind Corp.	2002	W	Wind
Platteville	Fort St. Vrain Repower	140	Public Service Co. of Colorado	2001	CC	Gas
Brighton	Brighton	140	Tri-State G&T Assn.	2002	GT	Gas
Limon	Limon	140	Tri-State G&T Assn.	2001	GT	Gas
Wellington	Rawhide	78	Platte River Power Authority	2002-2003	GT	Gas
CONNECTICUT						
Killingly	Lake Road Killingly	792	PG&E National Energy Group	2002	CC	Gas
Milford	Milford Power	544	El Paso North America	2002	CC	Gas
Meriden	Meriden Power	544	NRG Energy Inc.	2004	CC	Gas
Oxford	Towantic	540	Calpine Corp.	2003	CC	Gas
Wallingford	PPL Wallingford	230	PPL Global LLC	2001	GT	Gas
DELAWARE						
Wilmington	Hay Road	490	Connectiv Energy Supply Inc.	2001-2002	CC	Oil
Dover	NRG Energy Dover	88	NRG Energy Inc.	2001	GT	Gas
FLORIDA						
Debary	Sanford Repower	1,320	Florida Power & Light Co.	2003	CC	Gas
Ft. Myers	Fort Myers	912	Florida Power & Light Co.	2001	CC	Gas
Vero Beach	Blue Heron	910	Calpine Corp.	2003	CC	Gas
West Cocoa	Oleander	850	Constellation Power Inc.	2002	GT	Gas
Ft. Pierce	Fort Pierce	640	Duke Energy North America	2002	GT	Gas
Eustis	Lake County Dena	640	Duke Energy North America	2003	GT	Gas
Orlando	Stanton	640	Southern Power	2003	CC	Gas
Lakeland	McIntosh	831	Lakeland Electric & Water	2001-2004	CC-ST	Gas-Coal
Not yet located	Palmetto Power	589	Dynegy Power Corp.	2002	GT	Gas
Lynn Haven	Lansing Smith	574	Gulf Power Co.	2002	CC	Gas
Deerfield Beach	Deerfield Enron	510	Enron North America	2002	GT	Gas
Port St. Lucie	Enron Midway	510	Enron North America	2002	GT	Gas
Baldwin	Brandy Branch	510	Jacksonville Electric Authority	2001	GT	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GT3=gas turbine with steam condenser (cogen); H=hydroelectric turbine; ST=conventional steam turbine; STS=steam turbine with steam condenser (cogen); W=wind turbine;
Fuel Source: B=mass-biomass; G=gas-coal gas; C=coal-coal or lignite; C&G=coke-oven gas; C&P=petroleum coke; G&N=natural gas; L&N=liquefied natural gas; O=oil; W=water; Wind=wind

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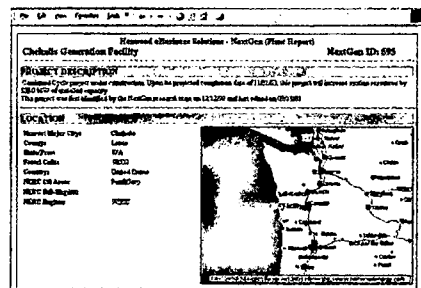
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- ✓ Uncovers potential target areas for new facilities.
- ✓ Displays graphs based on individual unit development cycles and compares those figures against a specified regional load forecast.
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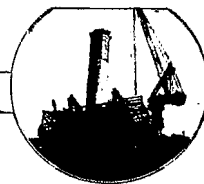


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NEW U.S. POWERPLANTS OVER 50 MW Recently Completed, Under Construction and Planned

LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Arcadia	New Port Richey	510	Mirant Corp.	2002	GT	Gas
Wauchula	Hardee Granite	510	NRG Energy Inc.	2002	GT	Gas
Holopaw	Holopaw	510	Reliant Energy	2002	GT	Gas
Tampa	Gannon	510	Tampa Electric Co.	2003-2004	CC	Gas
Bowling Green	Payne Creek	500	Seminole Electric Co-op Inc.	2002	CC	Gas
Not yet located	Pasco El Paso	480	El Paso North America	2002	GT	Gas
Bartow	Hines	470	Florida Power Corp.	2003	CC	Gas
Tampa	Polk County-A412	380	Tampa Electric Co.	2003-2005	GT	Gas
Indiantown	Martin County	340	Florida Power & Light Co.	2001	GT-GC	Gas
Auburndale	Osprey Energy Center	320	Calpine Corp.	2003	CC	Gas
Port St. Lucie	Port St. Lucie	250	Competitive Power Ventures	2003	CC	Gas
Kissimmee	Cane Island	250	Kissimmee Utilities Authority	2001	CC	Gas
Piny Point	Gulf Coast	245	Competitive Power Ventures	2003	CC	Gas
Ft. Pierce	King	170	Fort Pierce Utility Authority	2002	CC	Gas
Auburndale	Auburndale	135	Calpine Corp.	2002	GT	Gas
Gainesville	J R Kelly	70	Gainesville Regional Utilities	2001	CC	Gas
GEORGIA						
Dalton	Murray	1,284	Duke Energy North America	2002	CC	Gas
Roopville	Wansley	1,132	Southern Power	2002	CC	Gas
Franklin	Tenaska Georgia	980	Tenaska Energy	2001-2002	GT	Gas
Augusta	Augusta Energy	800	SkyGen Energy LLC	2003	CC	Gas
Columbus	Talbot County	651	Oglethorpe Power Corp.	2003	GT	Gas
Center	Dahlberg	560	Southern Power	2001-2002	GT	Gas
Roopville	Wansley	520	Oglethorpe Power Corp.	2002	CC	Gas
Franklin	Heard County	501	Dynegy Power Corp.	2001	GT	Gas
Monroe	Tiger Creek	450	LG&E Power Inc.	2001	GT	Gas
Rincon	Effingham County	350	Progress Energy Inc.	2003	GT	Gas
Monroe	Monroe	180	Carolina Power & Light Co.	2001	GT	Gas
IDAHO						
Rathdrum	Rathdrum Cogentrix	270	Cogentrix Energy Inc.	2001	CC	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GT3=gas turbine with steam add-on (cogen); H=hydroelectric turbine; ST=conventional steam turbine; ST3=steam turbine with steam add-on (cogen); W=wind turbine;
Fuel Source: B=biomass; C=coal; G=gas; L=liquefied natural gas; N=natural gas; O=oil; W=water; Wind=wind

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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Middletown	Garnet Energy	250	Ida-West Energy Co.	2004	CC	Gas
Mountain Home	Mountain Home	90	Idaho Power Co.	2001	GT	Gas
ILLINOIS						
Bourbonnais	Bourbonnais Energy	1,683	NRG Energy Inc.	2005	CC	Gas
Joliet	Kendall County	1,200	LS Power LLC	2002-2003	CC	Gas
Nelson Twp.	Nelson Township	1,168	LS Power LLC	2003	CC	Gas
Aurora	Aurora Project	905	Reliant Energy	2001	GT	Gas
Not yet located	Lake County Exelon	850	Exelon Generation Co.	2005	CC	Gas
Bedford Park	Agro Power	750	Corn Products International Inc.	2003	CC	Gas
Elwood	McDonnell	750	Dominion Energy Inc.	2001	GT	Gas
Mt. Vernon	Panda Jefferson	680	Panda Energy International	2003	CC	Gas
Dixon	Lee County	640	Duke Energy North America	2001	GT	Gas
Sidney	Sidney	500	PG&E National Energy Group	2003	CC	Gas
Elgin	Elgin Energy	488	AmerenEnergy Resources	2002	GT	Gas
Murdock	Cstar	400	Enerstar Power Corp.	2002-2004	GT	Gas
Grand Tower	Grand Tower	370	AmerenEnergy Resources	2001	CC	Gas
Hutsonville	Hutsonville	370	AmerenEnergy Resources	2003	CC	Gas
Louisville	Clay County	350	Entergy Wholesale Operations	2003	GT	Gas
Round Lake	Round Lake	350	Indeck Energy Services	2003	GT	Gas
Chicago	Chicago Southeast	350	Peoples Energy Corp.	2002	GT	Gas
Holland Twp.	Holland Township	340	Constellation Power Inc.	2002	CC	Gas
Cordeva	Cordeva Energy	330	MidAmerican Energy Co.	2001	CC	Gas
Crete	Crete Entergy	320	Entergy Wholesale Operations	2002	GT	Gas
Chicago	Calumet Energy	315	Wisvest Corp.	2001	GT	Gas
University Park	University Park	300	Constellation Power Inc.	2001	GT	Gas
Kimmunity	Kimmunity	234	AmerenEnergy Resources	2001	GT	Gas
Patoka	Patoka	206	AmerenEnergy Resources	2001	GT	Gas
Rockford	Rockford Energy	171	NRG Energy Inc.	2002	GT	Gas
Marion	Marion	150	Southern Illinois Power Co-op	2003	GT	Gas
Neoga	Shelby County	132	Reliant Energy	2001	GT	Gas
Elkhart	Elkhart	91	Corn Belt Energy Corp.	2004	ST	Gas
INDIANA						
Lawrenceburg	Lawrenceburg	1,150	PSE&G Power	2003	CC	Gas
Otwell	Tenaska Pike County	1,020	Tenaska Energy	2004	CC	Gas

Type of technology: CC-combined cycle; GT-simple cycle gas turbine; GT3-gas turbine with steam condenser (cogen); H-hydroelectric turbine; ST-conventional steam turbine; ST3-steam turbine with steam condenser (cogen); W-wind turbine;
 Fuel Source: B-biomass; C-coal; G-gas; O-oil; L-liquefied natural gas; W-water; Wind-wind



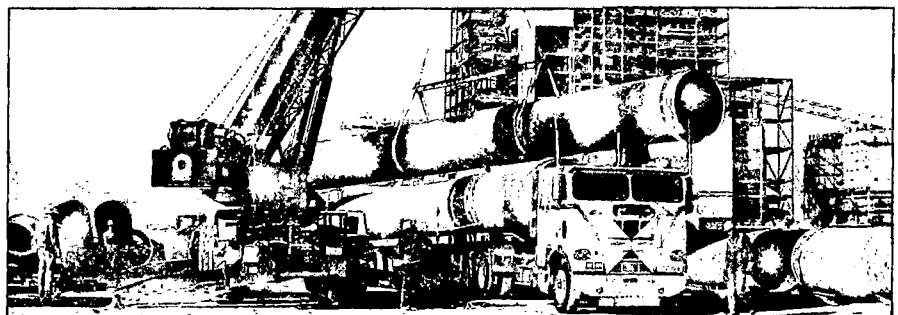
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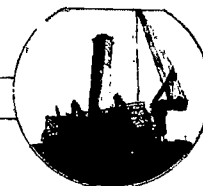
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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Mitchell	Lawrence Cogentrix	819	Cogentrix Energy Inc.	2004	CC	Gas
Wheatland	Knox County	640	Duke Energy North America	2003	GT	Gas
New Carlisle	New Carlisle	630	Allegheny Energy Supply Co.	2002-2005	GT-CC	Gas
W Terre Haute	Vigo County	620	Duke Energy North America	2002	CC	Gas
Whiting	Whiting Refinery	545	BP Amoco	2001	CC	Gas
W. Terre Haute	Sugar Creek	533	Mirant Corp.	2002-2004	GT-CC	Gas
Petersburg	Pike County	500	Enviropower LLC	2004	ST	Coal
Cloverdale	Putnam	500	Spark Energy Corp.	2002	GT	Gas
Morristown	Morristown	340	PSE&G Power	2003	GT	Gas
Not yet located	Lawrence	320	Hoosier Energy REC	2004	GT	Gas
Poneto	Montpelier	224	DPL Energy	2001	GT	Gas
Noblesville	Noblesville	201	PSI Energy Inc.	2004	CC	Gas
Cadiz	Henry County	135	Cinergy Capital & Trading Inc.	2001	GT	Gas
New Carlisle	St. Joseph County	90	Acadia Bay Energy Co.	2003	GT	Gas
Evansville	A B Brown	84	Southern Indiana Gas & Electric Co.	2002	GT	Gas
Anderson	Anderson	80	Indiana Municipal Power Agency	2003	GT	Gas
Indianapolis	Georgetown Substation	80	Indianapolis Power & Light Co.	2001	GT	Gas
East Chicago	Indiana Harbor	50	LTV Corp.	2001	STS	Gas
IOWA						
Pleasant Hill	Pleasant Hill	540	MidAmerican Energy Co.	2003-2005	GT-CC	Gas
Mosalem	Mosalem	220	Northern Alternative Energy	2002	GT	Gas
Spencer	Earl F. Wisdom	80	Corn Belt Power Co-op	2004	GT	Gas
Northwood	Worth County	80	Midwest Renewable Energy Corp.	2001	W	Wind
KANSAS						
Holcomb	Sand Sage	600	International Energy Partners LP	2005	ST	Coal
Colwich	Gordon Evans	150	Kansas Gas & Electric Co.	2001	GT	Gas
Montezuma	Gray County	110	FPL Energy	2002	W	Wind
KENTUCKY						
Not yet located	Marshall County	640	Duke Energy North America	2002	GT	Gas
Not yet located	Kentucky Pioneer	540	Global Energy Inc.	2003	CC	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTS=gas turbine with steam sendout (cogen); H=hydraulic turbine; ST=conventional steam turbine; STS=steam turbine with steam sendout (cogen); W=wind turbine;
Fuel Source: Biomass-biomass; Gas=coal gas; Coal=coal or lignite; Cog=coal-oven gas; Coke=petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind

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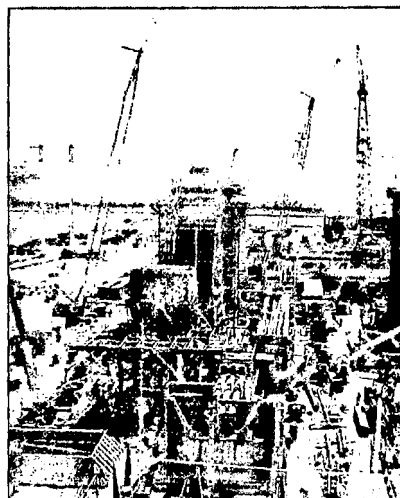
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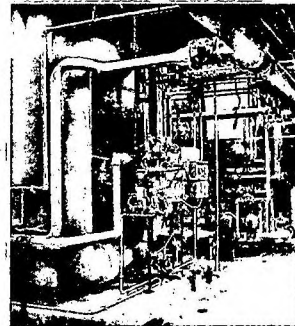
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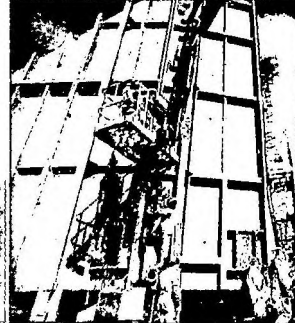
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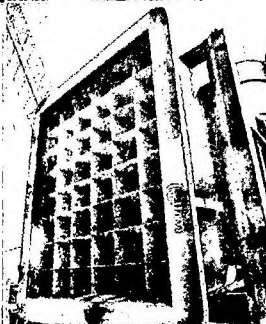
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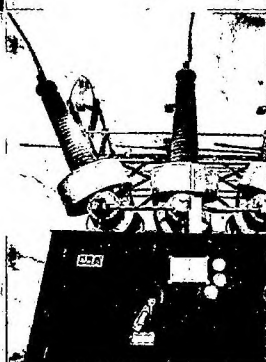


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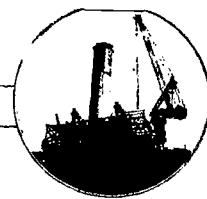
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Fuel Source: Bmass=biomass; Ogas=coal gas; Cowl=coal or lignite; Cogs=coke-oven gas; Cokes=petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind; Wood=wood



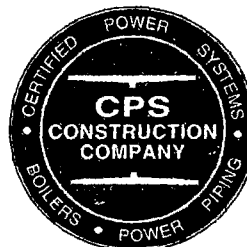
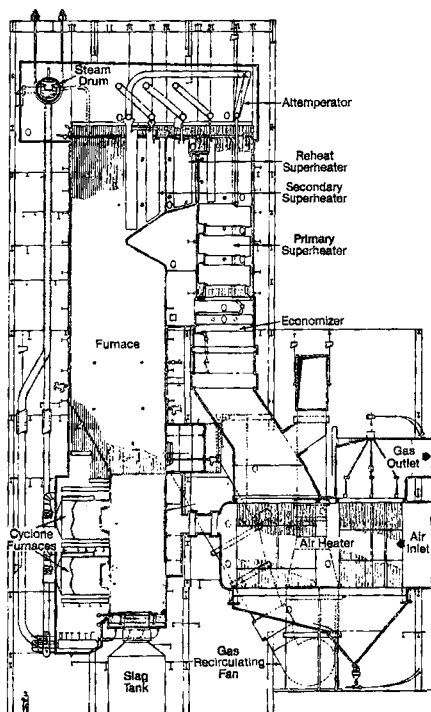
Powerplant Construction GENERATING STATIONS



NEW U.S. POWERPLANTS OVER 50 MW Recently Completed, Under Construction and Planned

LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Waldorf	Kelson Ridge	550	Orion Power Holdings Inc.	2003	CC	Gas
MASSACHUSETTS						
Charlestown	Mystic	1,512	Sithe Energies	2002	CC	Gas
Weymouth	Fors River	759	Sithe Energies	2002	CC	Gas
Bellingham	Bellingham	700	FPL Energy	2003	CC	Gas
Sandwich	Canal Repower	664	Mirant Corp.	2002	CC	Gas
Blackstone	Blackstone	570	American National Power Inc.	2001	CC	Gas
Bellingham	Bellingham LP	558	American National Power Inc.	2002	CC	Gas
Medway	Framingham	540	Sithe Energies	2003	GT	Gas
Charlton	Millennium	370	PG&E National Energy Group	2001	CC	Gas
Everett	Island End	350	Tractebel Power Inc.	2002	CC	LNG
Brockton	Brockton	272	Brockton Power LLC	2002	CC	Gas
Cambridge	Kendall Square	170	Mirant Corp.	2002	CC	Gas
West Springfield	West Springfield	100	Consolidated Edison Development Inc.	2002	GT	Gas
MICHIGAN						
Niles	Niles	1,100	Indeck Energy Services	2004	CC	Gas
Berrien	Berrien Energy	1,030	Calpine Corp.	2004	CC	Gas
Covert Twp.	Covert	1,000	PG&E National Energy Group	2003	CC	Gas
Carson City	Renaissance	680	Dynegy Power Corp.	2002	GT	Gas
Wyandotte	Wyandotte Energy	644	Mirant Corp.	2003	CC	Gas
Dearborn	Dearborn Industrial	550	CMS Generation Co.	2001	CC	Gas
Jackson	Jackson KMI	550	Mirant Corp.	2002	CC	Gas
Not yet located	Gratiot County	510	Dominion Energy Inc.	2004	GT	Gas
Augusta Twp.	Augusta Park	340	El Paso North America	2003	GT	Gas
Sumpter Twp.	Sumpter Township	340	First Energy Corp.	2002	GT	Gas
E. China Twp.	East China	320	DTE Energy Services	2002	GT	Gas
Dowagiac	Dowagiac	300	International Energy Partners LP	2002	GT	Gas
Zeeland	Zeeland	298	Mirant Corp.	2001-2002	GT-CC	Gas
MINNESOTA						
Trimont	Lakefield Junction	534	Great River Energy	2001	GT	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GT3=gas turbine with steam condenser (cogen); H=hydraulic turbine; ST=conventional steam turbine; ST3=steam turbine with steam condenser (cogen); W=wind turbine;
Fuel Source: Biomass=biomass; Cgas=coal gas; Coal=coal or lignite; Cog=coal-oven gas; Oil=oil; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind



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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Dexter	Pleasant Valley	487	Great River Energy	2001-2002	GT	Gas
W. Faribault	West Faribault Navitas	275	Northern Alternative Energy	2002	GT	Gas
Burnsville	Black Dog	115	Northern States Power Co.	2002	GTS	Gas
Not yet located	S. W. Minnesota	100	Northern Alternative Energy	2002	W	Wind
Not yet located	Buffalo Ridge-3	80	enXco	2002	W	Wind
Not yet located	Murray County	51	Navitas Energy Inc.	2001	W	Wind
Benson	FibromInn	50	Fibrowatt LLC	2002	ST	Bmass
MISSISSIPPI						
McComb	Pike County	1,000	LS Power LLC	2003	GT	Gas
Lone Oak	Lone Oak	800	Calpine Corp.	2003	CC	Gas
Caledonia	Caledonia Cogentrix	800	Cogentrix Energy Inc.	2003	CC	Gas
Southaven	Southaven Cogentrix	800	Cogentrix Energy Inc.	2003	CC	Gas
Not yet located	Enterprise Dena	640	Duke Energy North America	2002	GT	Gas
Southaven	Southaven Dena	640	Duke Energy North America	2002	GT	Gas
McAdams	Meadams	600	Teco Power Services Corp.	2003	CC	Gas
Escawtapa	Moss Point	525	Mississippi Power Co.	2001	CC	Gas
Jackson	Hinds	520	Duke Energy North America	2001	CC	Gas
Kosciusko	Attala Energy	520	PG&E National Energy Group	2001	CC	Gas
Ackerman	Red Hills	490	Tractabel Power Inc.	2001	ST	Coal
Dekalb	Dekalb	340	Tennessee Valley Authority	2002	GT	Gas
Meridian	Meridian	340	Tennessee Valley Authority	2002	GT	Gas
Vicksburg	Warren	300	Entergy Wholesale Operations	2001	GT	Gas
Batesville	Batesville	279	LS Power LLC	2003	CC	Gas
Silver Creek	Silver Creek	251	South Mississippi Electric Power Co-op	2003-2005	GT	Gas
Sylvarena	Sylvarena	141	South Mississippi Electric Power Co-op	2002	GT	Gas
Hattiesburg	Moselle	84	South Mississippi Electric Power Co-op	2002	GT	Gas
MISSOURI						
Mexico	Audrain County	640	NRG Energy Inc.	2001	GT	Gas
Pleasant Hill	Aries	600	Aquila Inc.	2001	CC	Gas
Weston	Weston Bend	550	Great Plains Power	2005	ST	Coal
Kansas City	Hawthorn	550	Kansas City Power & Light Co.	2001	ST	Coal
Joplin	State Line	400	Empire District Electric Co.	2001	CC	Gas
Not yet located	Great Plains	400	Great Plains Power	2003	GT	Gas
Campbell	St. Francis	289	Associated Electric Co-op Inc.	2001	CC	Gas
Columbia	Columbia Substation	120	AmerenEnergy Resources	2001	GT	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTS=gas turbine with steam sendout (cogen); H=hydraulic turbine; ST=conventional steam turbine; STS=steam turbine with steam sendout (cogen); W=wind turbine;
 Fuel Source: Bmass=biomass; Cgas=coal gas; Coal=coal or lignite; Cog=coke-oven gas; Coke=petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind

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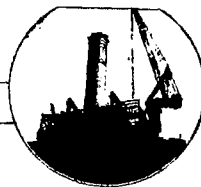
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NEW U.S. POWERPLANTS OVER 50 MW Recently Completed, Under Construction and Planned

LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Springfield	McCartney	50	Springfield Utilities	2002	GT	Gas
MONTANA						
Not yet located	Montana First	240	Northwestern Corp.	2001-2002	CC	Gas
NEBRASKA						
Not yet located	OPPD South	330	Omaha Public Power Dist.	2003	GT	Gas
Not yet located	Salt Valley	185	Lincoln Electric System	2003-2004	GT-CC	Gas
Lincoln	Rokey	88	Lincoln Electric System	2001	GT	Oil
NEVADA						
Las Vegas	Moapa Energy	1,200	Duke Energy North America	2003	CC	Gas
Las Vegas	Apex Mirant	1,100	Mirant Corp.	2003-2004	CC	Gas
Primm	Bighorn Energy	600	Reliant Energy	2002	GT	Gas
Las Vegas	Arrow Canyon	580	Reliant Energy	2003	CC	Gas
Las Vegas	Silverhawk	570	Pinnacle West Energy	2004	CC	Gas
Reno	Tri-Center	360	Nantwa Energy LLC	2001	GT	Gas
Not yet located	Nevada Test Site	280	MNS Wind Co.	2002-2003	W	Wind
N. Las Vegas	North Vegas	238	Southwest Power LLC	2002	CC	Gas
Las Vegas	Las Vegas Williams	124	Williams Energy Ventures	2001-2002	GT	Gas
NEW HAMPSHIRE						
Londonderry	AES Granite Ridge	730	AES Corp.	2002	CC	Gas
Newington	Newington	525	Consolidated Edison Development Inc.	2002	CC	Gas
NEW JERSEY						
Linden	Linden	1,186	PSE&G Power	2003	CC	Gas
Sayreville	AES Red Oak	800	AES Corp.	2002	CC	Gas
Lakewood	Lakewood	501	Consolidated Edison Development Inc.	2002	GT	Gas
Florence Twp.	Robling	500	Connectiv Energy Supply Inc.	2004	CC	Gas
Ridgefield	Bergen	500	PSE&G Power	2002	CC	Gas
Linden	Linden Cogen	181	Enron North America	2001	CC	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTS=gas turbine with steam sendout (cogen); H=hydraulic turbine; ST=conventional steam turbine; STS=steam turbine with steam sendout (cogen); W=wind turbine;
Fuel Source: B=biomass; C=coal; G=gas; L=liquefied natural gas; O=oil; W=water; Wind=wind

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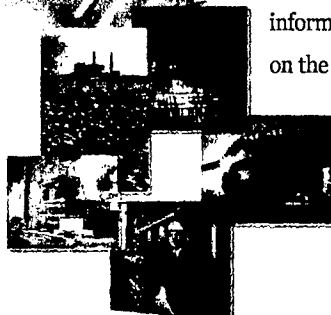
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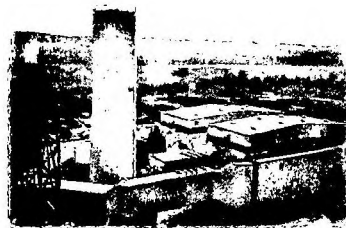


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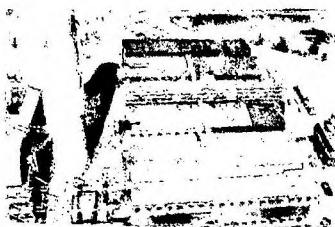
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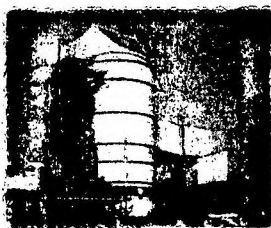


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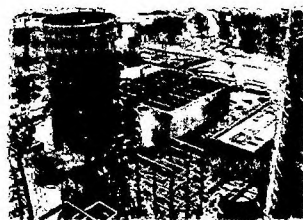


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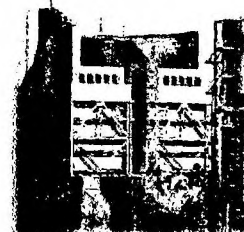
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- Wet FGD systems
- Dry scrubbing systems
- Dry injection systems
- Electrostatic precipitators
- Fabric filters
- Flue gas conditioning
- Rebuild/retrofit services



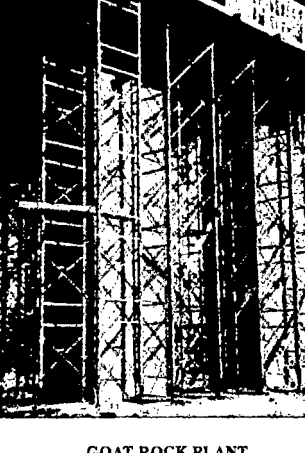
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Types of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTSt=gas turbine with steam sandout (oogen); H=hydraulic turbine; ST=conventional steam turbine; STSt=steam turbine with steam sandout (oogen); W=wind turbine

Fuel Source: Biomass=biomass; Coal=coal gas; Coal=coal or lignite; CCG=coke-oven gas; CCGP=coke-petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind

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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Cleveland	Rowan County	480	Carolina Power & Light Co.	2001-2004	GT	Gas
Rocky Mount	Rocky Mount	300	Enron North America	2003	CC	Gas
OHIO						
Hamilton	Hanging Rock	1,240	Duke Energy North America	2003	CC	Gas
Hamilton	Lawrence County	1,100	Calpine Corp.	2004	GT-CC	Gas
Franklin Twp.	Jackson County	1080	Cogentrix Energy Inc.	2003	CC	Gas
Waterford Twp.	Washington County	850	PSE&O Power	2002	CC	Gas
Wilkesville	Rolling Hills	800	Dynegy Power Corp.	2002	GT	Gas
Not yet located	Jackson	640	Entergy Power Generation	2003	GT	Gas
Waterford Twp.	Washington County	620	Duke Energy North America	2002	CC	Gas
Dresden	Dresden Energy	594	Dominion Energy Inc.	2002	CC	Gas
Lima	Lima Global	520	Global Energy Inc.	2005	CC	COgas
Luckey	Wood County Lemoine	516	Dominion Energy Inc.	2002	GT	Gas
Tully Twp.	Robert P Mone	510	Buckeye Power Co.	2002	GT	Gas
Mt. Sterling	Darby Township	480	DPL Energy	2001-2002	GT	Gas
Lorain	West Lorain	425	Ohio Edison Co.	2001	GT	Gas
Metamora	Metamora	400	Aquila Inc.	2003	GT	Gas
Fremont	Fremont Energy	370	Calpine Corp.	2003	CC	Gas
Norton	Norton CAES	300	CAES Development Co.	2003	GT	Gas
London	London	300	DPL Energy	2003	GT	Gas
Lancaster	West Lancaster Substation	200	DPL Energy	2001	GT	Gas
Cincinnati	West End Substation	90	Cincinnati Gas & Electric Co.	2002	GT	Gas
Moraine	F M Tait	80	DPL Energy	2003	GT	Gas
OKLAHOMA						
Coweta	Oneta	1,280	Calpine Corp.	2002	CC	Gas
Kiowa	Kiamichi	1,270	Tenaska Energy	2003	CC	Gas
Jonke	Green Country	810	Cogentrix Energy Inc.	2002	CC	Gas
Newcastle	McClain	520	NRG Energy Inc.	2001	CC	Gas
Oologah	Northeastern	315	Public Service Co. of Oklahoma	2001	CC	Gas
W. Edmond	Spring Creek	300	Okeok Corp.	2001	GT	Gas
Anadarko	Anadarko	90	Western Farmers Electric Co-op	2001	GT	Gas
OREGON						
Not yet located	Grizzly	900	Cogentrix Energy Inc.	2004	CC	Gas
Clatskanie	Clatskanie	650	Portland General Electric Co.	2003	CC	Gas

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTs=gas turbine with steam add-on (cogen); H=hydraulic turbine; ST=conventional steam turbine; STB=steam turbine with steam add-on (cogen); W=wind turbine; Fuel Source: Biomass=biomass; CGas=coal gas; Coal=coal or lignite; Cog=coal-oven gas; COG=petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind

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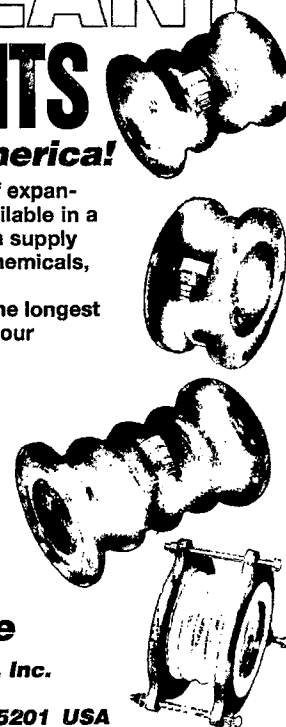
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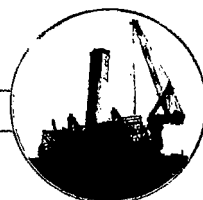
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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Umatilla	Umatilla	610	PG&E National Energy Group	2003	GT-CC	Gas
Klamath Falls	Klamath Cogen	600	City Of Klamath Falls	2001	GT-CC	Gas
Hermiston	Hermiston	536	Calpine Corp.	2002	CC	Gas
Boardman	Coyote Springs-2	265	Avista Power Inc.	2002	CC	Gas
Pendleton	Vansycle Ridge	99	FPL Energy	2002	W	Wind
OREGON-WASHINGTON						
Not yet located	State Line	300	FPL Energy	2001	W	Wind
PENNSYLVANIA						
Morrisville	Morrisville	1,100	Dominion Energy Inc.	2003-2004	CC	Gas
Straban Twp.	Hunterstown	898	Reliant Energy	2003	CC	Gas
Marcus Hook	Marcus Hook FPL	744	FPL Energy	2003	CC	Gas
Lebanon	AES Ironwood	710	AES Corp.	2001	CC	Gas
Martins Creek	Lower Mt. Bethel	600	PPL Global LLC	2003	CC	Gas
Springdale	Springdale	540	Allegheny Energy Supply Co.	2003	CC	Gas
New Florence	Seward	520	Reliant Energy	2004	ST	Coal
Bethlehem	Bethlehem Commerce	500	Connectiv Energy	2003	CC	Gas
Crum Lynne	Liberty Electric	500	Connectiv Energy	2002	CC	Gas
W. Earl Twp.	West Earl	450	PPL Global LLC	2003	GT	Gas
Ontelaunee	Ontelaunee	370	Calpine Corp.	2002	CC	Gas
Not yet located	Armstrong County	344	Dominion Energy Inc.	2002	GT	Gas
Rockland Twp.	Handsome Lake	250	Constellation Power Inc.	2001	GT	Gas
W. Hempfield Twp.	West Hempfield	180	PPL Global LLC	2003	GT	Gas
Warren	Warren	100	Foster Wheeler Power Systems Inc.	2003	ST	Coke
Hazelton	Hazelton Williams	100	Williams Energy Ventures	2001	GT	Gas
Eden Twp.	PPL Eden	80	PPL Global LLC	2003	GT	Gas
Hatfield Twp.	PPL Hatfield	90	PPL Global LLC	2003	GT	Gas
Upper Hanover Twp.	Upper Hanover	90	PPL Global LLC	2003	GT	Gas
Marion	Gulford Township	88	Allegheny Energy Supply Co.	2001	GT	Gas
Not yet located	Waymart (Moosic)	52	American National Power Inc.	2002	W	Wind
PUERTO RICO						
Guayama	AES Guayama	500	AES Corp.	2002	STS	Coal
San Juan	San Juan Repower	334	Puerto Rico Electric Power Authority	2001	CC	Oil
RHODE ISLAND						
Johnston	RI Hope Energy	572	FPL Energy	2002	CC	Gas
SOUTH CAROLINA						
Salisbury	Greenville County	900	Entergy Wholesale Operations	2003	CC	Gas
Blacksburg	Mill Creek	640	Duke Energy North America	2003	GT	Gas
Hardeeville	Jasper County	500	South Carolina Electric & Gas Co.	2004	CC	Gas
Iva	John S Rainey	340	Santee Cooper	2002	GT-CC	Oil
Gaffney	Broad River	320	SkyGen Energy LLC	2001	GT	Gas
Beech Island	Urquhart	300	South Carolina Electric & Gas Co.	2002-2004	GT	Gas
Pee Dee	Pee Dee	168	Santee Cooper	2005	GT	Oil
TENNESSEE						
Columbia	Maury County	800	CME North American Merchant Energy	2005	CC	Gas
Not yet located	Haywood County	770	Calpine Corp.	2004	CC	Gas
Nutbush	Lagoon Creek	680	Tennessee Valley Authority	2001	GT	Gas
Not yet located	Hickam County	600	Dominion Energy Inc.	2004	GT	Gas
Not yet located	Montgomery County	600	Dominion Energy Inc.	2004	GT	Gas
Arlington	Arlington	510	Enron North America	2003	GT	Gas
Memphis	Memphis Refinery	265	Williams Energy Ventures	2001-2003	GT-CC	Gas
TEXAS						
Kaufman	Forney	1,780	FPL Energy	2003	CC	Gas
Palestine	Anderson County	1,600	Newport Generation Inc.	2003	CC	Gas
Deer Park	Deer Park Calpine	1,500	Calpine Corp.	2003-2004	CC	Gas
Dewayville	Cottonwood Energy	1,200	InterGen North America	2003	CC	Gas
San Marcos	Hays County	1,100	American National Power Inc.	2001	CC	Gas
Venus	Midlothian	1,100	American National Power Inc.	2001	CC	Gas
Boonsville	Wise County	1,080	Tractebel Power Inc.	2003	CC	Gas
Santa Clara	Panda Guadalupe	1,028	Panda Energy International	2001	CC	Gas
Baytown	Baytown Bayer	800	Calpine Corp.	2001	CC	Gas
Seguin	Rio Nogales	800	Constellation Power Inc.	2002	CC	Gas
Channelview	Channelview	780	Reliant Energy	2002	CC	Gas
Three Rivers	Three Rivers Refinery	750	PG&E National Energy Group	2002	CC	Gas
Granbury	AES Wolf Hollow	730	AES Corp.	2002	CC	Gas
Fairview	Freestone	680	Calpine Corp.	2002	CC	Gas
Odessa	Panda Odessa	680	Panda Energy International	2001	CC	Gas
Not yet located	Brazos Valley	633	NRG Energy Inc.	2003	CC	Gas
Red Oak	Watermill	600	Avista Power Inc.	2004	CC	Gas
Houston	Channel Run	580	Calpine Corp.	2001-2002	CC	Gas
Bastrop	Lost Pines	545	Calpine Corp.	2001	CC	Gas
Austin	Bastrop Energy	500	FPL Energy	2002	CC	Gas
San Antonio	Spruce	500	San Antonio Public Service Bd.	2004	ST	Coal
Corpus Christi	Corpus Christi Energy	500	SkyGen Energy LLC	2002	CC	Gas
Edinburg	Magic Valley	480	Calpine Corp.	2001	CC	Gas
Henderson	Tenaska Gateway	465	Tenaska Energy	2001	CC	Gas
Longview	Longview Eastex	454	CSW Energy Inc.	2001	CC	Gas
Orange	Sabine River Works	432	Conoco Global Power Inc.	2001	CC	Gas

Type of technology: CC-combined cycle; GT-simple cycle gas turbine; GTS-gas turbine with steam sandout (cogen); H-hydraulic turbine; ST-conventional steam turbine; STS-steam turbine with steam sandout (cogen); W-wind turbines
 Fuel Source: Biomass-biomass; CGas-coal gas; Coal-coal or lignite; Cog-cog-oven gas; Coke-petroleum coke; Gas-natural gas; LNG-liquefied natural gas; Oil-oil; Water-water; Wind-wind

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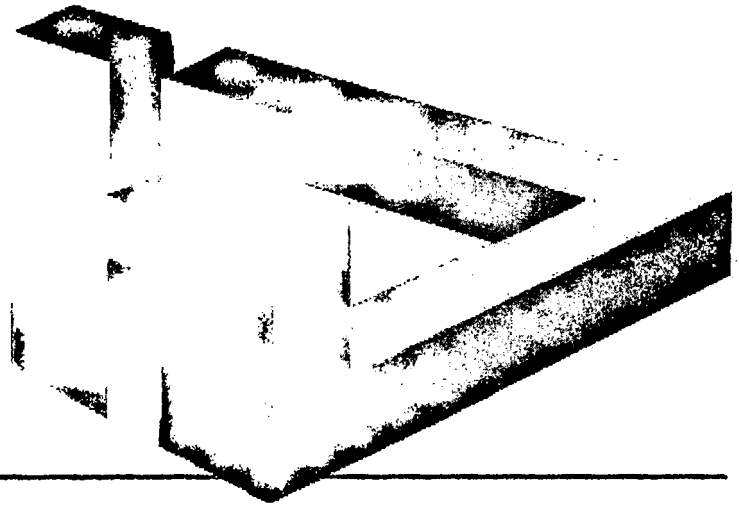
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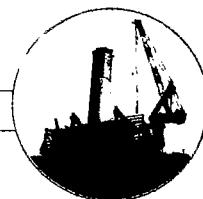
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LOCATION	PLANT NAME	RATING (MW)	PLANT OWNER	YEAR OF START-UP	TYPE	FUEL
Enns	Bardwell	350	Tractebel Power Inc.	2001	CC	Gas
McCamey	King Mountain	278	FPL Energy	2001	W	Wind
Odeasa	Woodward Mountain	180	FPL Energy	2001	W	Wind
Abilene	Trent Mesa	150	AEP Resources Inc.	2001	W	Wind
Iraan	Pecos County	135	Enron Wind Corp.	2001	W	Wind
Alvin	Chocolate Bayou	100	BP Chemicals	2002	CC	Gas
Nevada	Ray Olinger	85	Garland Power & Light System	2001	GT	Gas
Not yet located	Indian Mesa-1	83	American National Power Inc.	2001	W	Wind
UTAH						
W. Valley	West Valley	175	PacificCorp	2001	GT	Gas
Not yet located	Tooele County	70	DQ Holdings LLC	2002	GT	Gas
VIRGINIA						
Leesburg	Pleasant View	1,400	Tractebel Power Inc.	2004-2005	CC	Gas
Not yet located	Tenaska Buckingham	900	Tenaska Energy	2004	CC	Gas
Lawrenceville	Brunswick County	560	Kinder Morgan Inc.	2004	CC	Gas
Dumfries	Possum Point	540	Dominion Virginia Power	2003	CC	Gas
Not yet located	Cunningham Creek	520	Competitive Power Ventures	2005	CC	Gas
Not yet located	Tenaska Fluvanna	510	Tenaska Energy	2004	CC	Gas
Gordonsville	Gordonsville	485	Old Dominion Electric Co-op	2002	GT	Gas
Martinsville	Martinsville	330	Cinergy Capital & Trading Inc.	2003	GT	Gas
Not yet located	Ladysmith Substation	320	Dominion Virginia Power	2001	GT	Gas
Danville	Danville Mirant	320	Mirant Corp.	2004	GT	Gas
Bristol	Wolf Hills	250	Constellation Power Inc.	2001	GT	Gas
Not yet located	Prince William Dataport	226	Calpine Corp.	2003	CC	Gas
New Church	Oak Hall	180	Teco Power Services Corp.	2001	GT	Oil
Ashland	Doswell	171	FPL Energy	2001	GT	Gas
Not yet located	Buchanan County	88	Allegheny Energy Supply Co.	2002	GT	Gas
WASHINGTON						
Pasco	Wallula	1,100	Newport Generation Inc.	2004	CC	Gas
Starbuck	PPL Starbuck	1,100	PPL Global LLC	2004	CC	Gas
Creston	Northwest Power	936	Northwest Power Enterprises	2003	GT	Gas
Sumas	Sumas	660	Calpine Corp.	2004	CC	Gas
Satsop	Satsop	600	Duke Energy North America	2003	CC	Gas
Chehalis	Chehalis	540	Tractebel Power Inc.	2003	CC	Gas
Tacoma	Port Of Tacoma	324	Morgan Stanley Capital Group	2002	GT	Gas
Longview	Longview Mint Farm	288	Mirant Corp.	2003	CC	Gas
Goldendale	Goldendale Smelter	248	Calpine Corp.	2002	GT	Gas
Centralia	Big Hanford	248	TransAlta Energy Corp.	2002	CC	Gas
Frederickson	Frederickson Power	159	Westcoast Power Inc.	2002	CC	Gas
Not yet located	Malden Wind Farm	150	Washington Winds Inc.	2002	W	Wind
Mt. Vernon	Fredonia	106	Puget Sound Energy	2001	GT	Gas
Not yet located	Nine Canyon	50	Energy Northwest	2002	W	Wind
WEST VIRGINIA						
Culloden	Cabell County	1,100	Panda Energy International	2003	CC	Gas
Cersado	Cersado	498	Orion Power Holdings Inc.	2001	GT	Gas
Not yet located	Pleasants County	344	Dominion Energy Inc.	2002	GT	Gas
Kenova	Big Sandy Peaker	300	Constellation Power Inc.	2001	GT	Gas
Not yet located	Wayne County	300	Constellation Power Inc.	2002	GT	Gas
Not yet located	Two Elk	300	North American Power Group Ltd.	2005	ST	Coal
Summersville	Summersville	80	Catamount Energy Corp.	2001	H	Wat
WISCONSIN						
Pleasant Prairie	Badger Gen	1,080	PG&E National Energy Group	2003	CC	Gas
Arpin	Sherry Energy	900	Calpine Corp.	2003-2004	GT-CC	Gas
Arpin	Arpin	850	SkyGen Energy LLC	2003	CC	Gas
Rockdale	RockGen	519	SkyGen Energy LLC	2001	GT	Gas
Not yet located	Wopco CC	500	Wisconsin Electric Power Co.	2005	CC	Gas
Plover	Portage County	308	Mirant Corp.	2003	GT	Gas
Superior	Stinson Avenue	160	Rainy River Energy Corp.	2003	GT	Gas
Kaukauna	Fox Energy	105	CE Generation	2003	GT-CC	Gas
Manitowoc	Manitowoc Esom	99	Energy Services of Manitowoc	2004	STS	Coke
Wheaton Twp.	Elk Mound	96	Dairyland Power Co-op	2001	GT	Gas
Madison	West Campus	90	Madison Gas & Electric Co.	2004	CC	Gas
Superior	Superior	90	Minnesota Power	2002	GT	Oil
Ashland	Ashland	55	Northern Alternative Energy	2002	GT	Gas
Hurley	Hurley	55	Northern Alternative Energy	2002	GT	Gas
Depere	Depere Energy Center	53	SkyGen Energy LLC	2004	CC	Gas
WYOMING						
Gillette	Wygen	580	Black Hills Power & Light Co.	2003-2005	ST	Coal
Arlington	Rock River	50	Seawest Wind Power	2001	W	Wind

Type of technology: CC=combined cycle; GT=simple-cycle gas turbine; GTS=gas turbine with steam sendout (cogen); H=hydraulic turbine; ST=conventional steam turbine; STS=steam turbine with steam sendout (cogen); W=wind turbine;
Fuel Source: Btms=biomass; CGas=coal gas; Coal=coal or lignite; Cog=cogeneration; Coke=petroleum coke; Gas=natural gas; LNG=liquefied natural gas; Oil=oil; Water=water; Wind=wind

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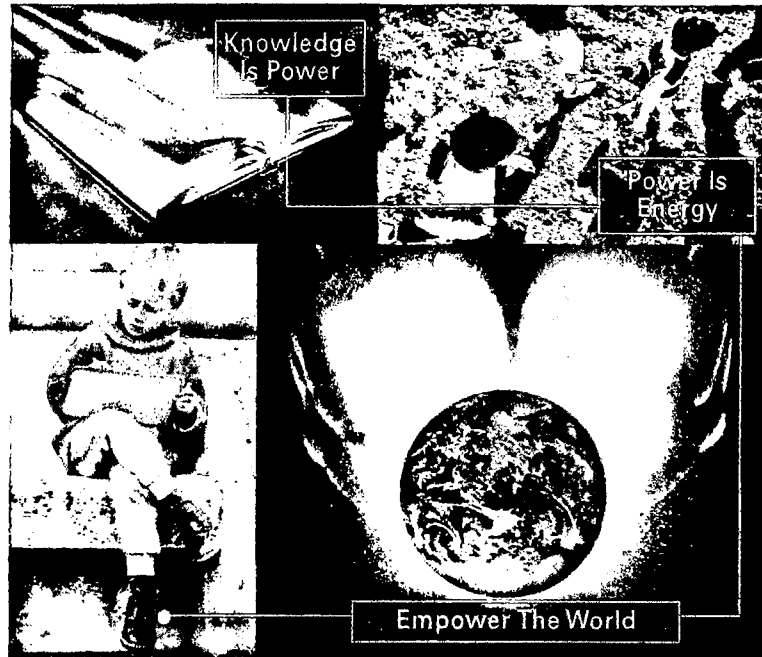
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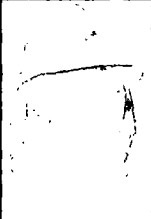
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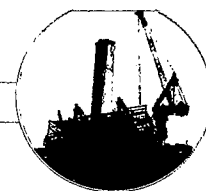
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ECONOMICS

PETER RIGBY

Generation Credit Weakens

As the U.S. recovers from the Sept. 11 terrorist attacks and faces the threat of recession, the electricity industry is still wrestling with deregulation and competition. How the nation's new focus on security and terrorism will affect the economy and electricity demand is an open question, while Washington, waging the most unconventional of wars, hopes to stimulate the economy with a mixture of fiscal and monetary efforts that may produce little—or unintended—results. What can industry observers anticipate?

GLOBALIZATION. Over the past 10 years, economic globalization has created many diverse and strong trade and financial links among the world's economies, industrialized and emerging. Because the links are integrated, a U.S. downturn will echo abroad. As U.S. imports decline, exporting countries will suffer and will then cut their imports from the U.S. and other countries. That, in turn, will cause the U.S. to cut imports, creating a demand-reducing spiral. In such a scenario, electricity consumption would have to decline.

Much of the U.S. boom in the past decade resulted from an extraordinary confidence in the economy that supported a tremendous investment in production capacity, including electricity generation. Low interest rates encouraged debt financing in lieu of more expensive equity. If the U.S. economy goes into recession, the combination of excess industrial capacity and high debt may require some time to work out. Lower interest rates and low inflation may not help restore the economy as much as time will.

Standard & Poor's already

has seen a significant decline in credit quality in the U.S. industrial sector, including Bethlehem Steel's October Chapter 11 filing and Standard & Poor's lowering of credit ratings for Ford Motor Co. and General Motors Corp. But if confidence in the economy rebuilds, particularly if investors perceive solid long-term economic fundamentals and the country's ability to manage the costs of terrorism, the economy could rebound with little or no effect on credit for power generation. Still, a prolonged recession would affect electricity demand.

Regardless of whether the economy enters recession, it seems certain that U.S. industrial electricity demand could soon drop significantly, eroding credit in the power sector. Industrial demand accounts for about one-third of utility retail sales. In October, the U.S. Federal Reserve announced that the 12-month consecutive fall in U.S. industrial output was the longest since 1945. The actual decline of 5.8% since September 2000 was the largest in nearly two decades. In addition, industry capacity utilization has fallen about 7%, to 75.5%, since September 2000.

For the competitive generation business, such numbers indicate shrinking demand for power and drops in power prices and credit quality. The recent surge in U.S. powerplant construction may exacerbate a near-term supply-demand imbalance. Before Sept. 11, for example, Texas'

ERCOT region had a reserve margin of nearly 35%.

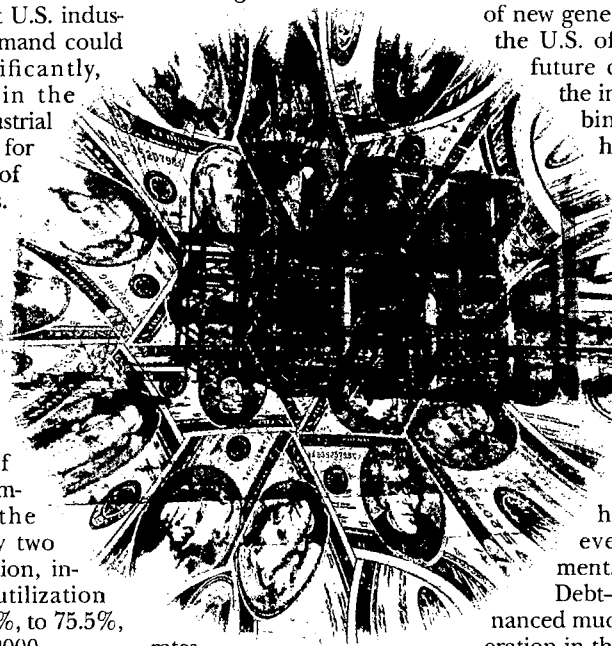
WASHINGTON WAYS. The Bush administration and Congress face a unique challenge—simultaneously fighting a first-of-its-kind war on global terrorism and a looming recession. What emerges from various fiscal and monetary policies will directly affect power generation. Some policies should favor credit, but others may do the opposite.

The Federal Reserve has cut the federal funds rate to 2.5%, from 6.5%, this year. If rate cuts continue, borrowing costs should fall for power generators. If lower interest rates help stimulate the economy, that should support electricity demand. In theory, a larger money supply should ease consumer worries and rebuild confidence. However, power generators that choose to take advantage of lower interest

part of a stimulus package designed to head off recession. Indeed, few dispute the need for increased spending on national security needs and a war effort. Unfortunately, the Keynesian approach probably will do little to stimulate or support GNP growth and, with it, electricity demand. In fact, the opposite could happen. More government projects, particularly against the backdrop of the disappearing budget surplus, will likely result in increased government borrowing. According to economist Milton Friedman, that will give individuals and industry less money to spend; when government grows and spending increases, less productive government projects replace those of the more productive private sector. Such a scenario does not bode well for electricity demand.

CREDIT. The explosive growth of new generation capacity in the U.S. offers insight into future credit quality for the industry. The combination of record-high electricity prices and skyrocketing demand that followed the country's impressive GNP growth of late spurred a record boom in new plant construction. Forecasts of power shortages have encouraged even more investment.

Debt—lots of it—has financed much of the new generation in this country, as well as acquisitions of existing generation that have come with industry restructuring. Optimistic forecasts and scenarios of success have pushed leverage levels higher than current or near-term forecast power prices can support. Indeed, syndicated bank loans in the past three years or so have pro-



rates by refinancing—and increasing their leverage—may find that the resulting higher fixed costs in the face of declining power prices and falling asset values will undermine their credit.

Some Washington circles are proposing major government spending increases as

ILLUSTRATION BY GUY LAWRENCE FOR ENR/PHOTO COURTESY OF BLACK & VEATCH



vided nearly \$50 billion of construction or bridge financing to the generation industry, in the hope that the capital markets will be ready and able to replace bank loans with permanent financing. A recession could find many banks holding on to debt longer than they anticipated, especially if power prices and electricity demand cannot comfortably support investment-grade bonds. The bank loans that Standard & Poor's has already evaluated—particularly loans to merchant power projects—bear this out. Even if the capital markets are deep enough for such an amount, they will not be interested in less than investment-grade debt.

The events of Sept. 11 may directly affect existing generation credit in ways never contemplated. The cost of providing security at plant sites will likely increase, but probably not enough to materially affect

profitability because such cost increases uniformly affect the industry. Similarly, property insurance costs will likely increase, but they will also increase for the industry at large. The bigger issue for credit is that many new and renewed policies will likely exclude acts of terrorism as a basis for claims. As a result, lenders will have to assume *force majeure* risk, something that will definitely lower credit quality for single-asset, project-financed powerplants.

For generation companies, diversity in location will become more important than it already is. Security costs also

may increase for electricity transmission systems, which by their nature are quite vulnerable to sabotage. Even though transmission will likely remain a regulated, cost-of-service business, someone will

have to absorb the additional security costs. Insofar as generation picks up part of the tab, plants sited closer to load centers will pay less than those sited more remotely; location will make a competitive difference.

In short, the economy and the markets are still sorting out the implications of the Sept. 11 attacks. Nonetheless, those events may push an

already weakened economy into recession, particularly if consumer confidence does not rebound. Any recession will hurt overall credit quality in the competitive U.S. power generation sector.

Lower power prices and weakening electricity demand have already begun to erode credit strength. If government-directed stimulus programs backfire, economic recovery could stall for some time. If that happens, credit quality will fall for all but the most efficient and competitive producers. Standard & Poor's expects those who have relied too heavily upon debt financing may be some of the first casualties. Those that can diversify their generation portfolios geographically and keep costs down will fare the best.

Peter Rigby is a director of Standard & Poor's in New York. S&P, ENR and Power are all units of the McGraw-Hill Cos.

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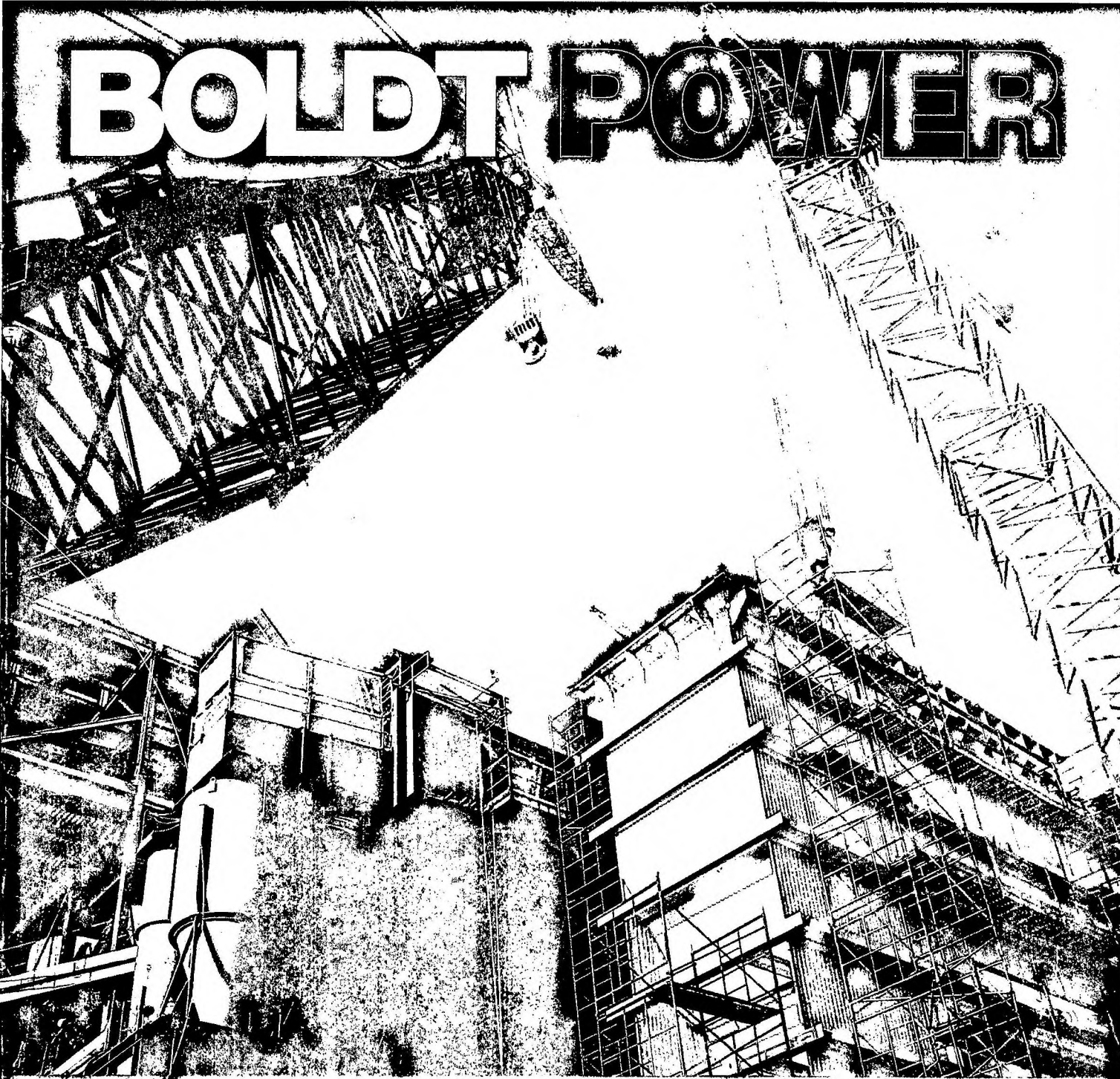
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INFORMATION TECHNOLOGY

TRAINING

INTELLIGENT TRAFFIC TAKES AN EDUCATION

With intelligent transportation systems beginning to proliferate, systems engineering is becoming a hot skill in transportation planning—and online educators are right behind.

An online course offered by the Consortium for ITS Training and Education called Applied Systems Engineering for Advanced Transportation Projects, was new in June, upgraded in September, and only requires a browser and a \$325 fee.

Intended to complement the Federal Highway Administration's "Introduction to Systems Engineering," the course is designed to lead students through a logical sequence of operations; discuss planning, design and implementation processes; and integrate with legacy systems. It includes a mix of participatory activities such as simulations, self-study quizzes and exercises. CITE is composed of universities, associations and private firms providing comprehensive ITS training and education. Visit www.cite-consortium.org to register on line or get further information.

HANDHELDS

CUSTOM TOOLS FOR THE JOBSITE

Competition among vendors selling data acquisition products for handheld devices is intense, but one product introduced at November's Computers for Construction trade show in Philadelphia had an unusual sidekick in a product line for building and deploying custom mobile applications.

Kinectivity is a mobile data application platform and workshop from Pencil Corp., Overland Park, Kan., for drag-and-drop developing of applications for the Palm system. The studio product sells

A TEAM FROM Texas Tech University, Lubock, is processing data collected in late summer from laser scans of the Statue of Liberty to create the monument's first as-built drawings of the exterior, even as experts worry about security for the high-profile structure.

Lady Liberty was still closed in late November, almost three months after the Sept. 11 attacks. During the assault on the World Trade Center, the second of the two hijacked airliners passed over the statue on its way into the south tower, witnesses report. "It went right over the statue," says Diana Pardue, chief of the museum service division on the island. The event has raised the significance of the project.

"There was a dedication before, but now the sense is there will be more funding," says Glenn Hill, director of Tech's environmental visualization program in the College of Architecture,

for an introductory \$99, but requires a server module and licenses for the system that will bring the tab to about \$2,500 for a functioning set-up. It is the platform for Pencil's own Job Tracker, which was introduced at the show. Job Tracker has formats for reports on daily activities, timecards, equipment usage, installed quantities and job progress. Price is based on number of users. Information is at www.pencil.com.

LASER SCANNING

MODELING THE LADY

which is doing the work for the park service's Historic American Buildings Survey project.

Hill says the 110-ft-tall statue and its 150-ft pedestal was shot with 48 scans from 13 stations. Now the team is merging the

point clouds around surveyed references to create a 3-D model, eight elevation line drawings and sample cross sections at 1-ft intervals. The accuracy of the model is within 1/4 in.

Without scaffolding, and with a budget of only \$60,000, the team had to work from the base. Areas that could not be scanned will be filled in by airborne scanners or cameras. Scanners were provided by Cyra Technologies Inc., Oakland, Calif., and surveying equipment was provided by Cyra's parent company, Leica Geosystems, Norcross, Ga. A project Website can be found at http://www.arch.ttu.edu/digital_liberty.

By Tom Sawyer

SOFTWARE

DUCT SIZING PROGRAM FITS NICHE

Software that calculates duct sizes for HVAC design and interfaces with Autodesk's Building Mechanical product, but also works as a stand-alone product in Windows, is now available on the Web as a free 30-day trial, with a purchase price of \$29.

"We're going for volume," explains Allen Preger, vice

president of marketing for Marinsoft Inc., San Rafael, Calif. Preger says he and his partners helped plan Autodesk's building mechanical product, saw the niche and filled it. "It's clearly not required to have a Windows calculator when you can get a cardboard one for \$6, but the way it interfaces with the Autodesk products makes it unique," Preger says. Details are at www.marinsoft.com.

HARDWARE

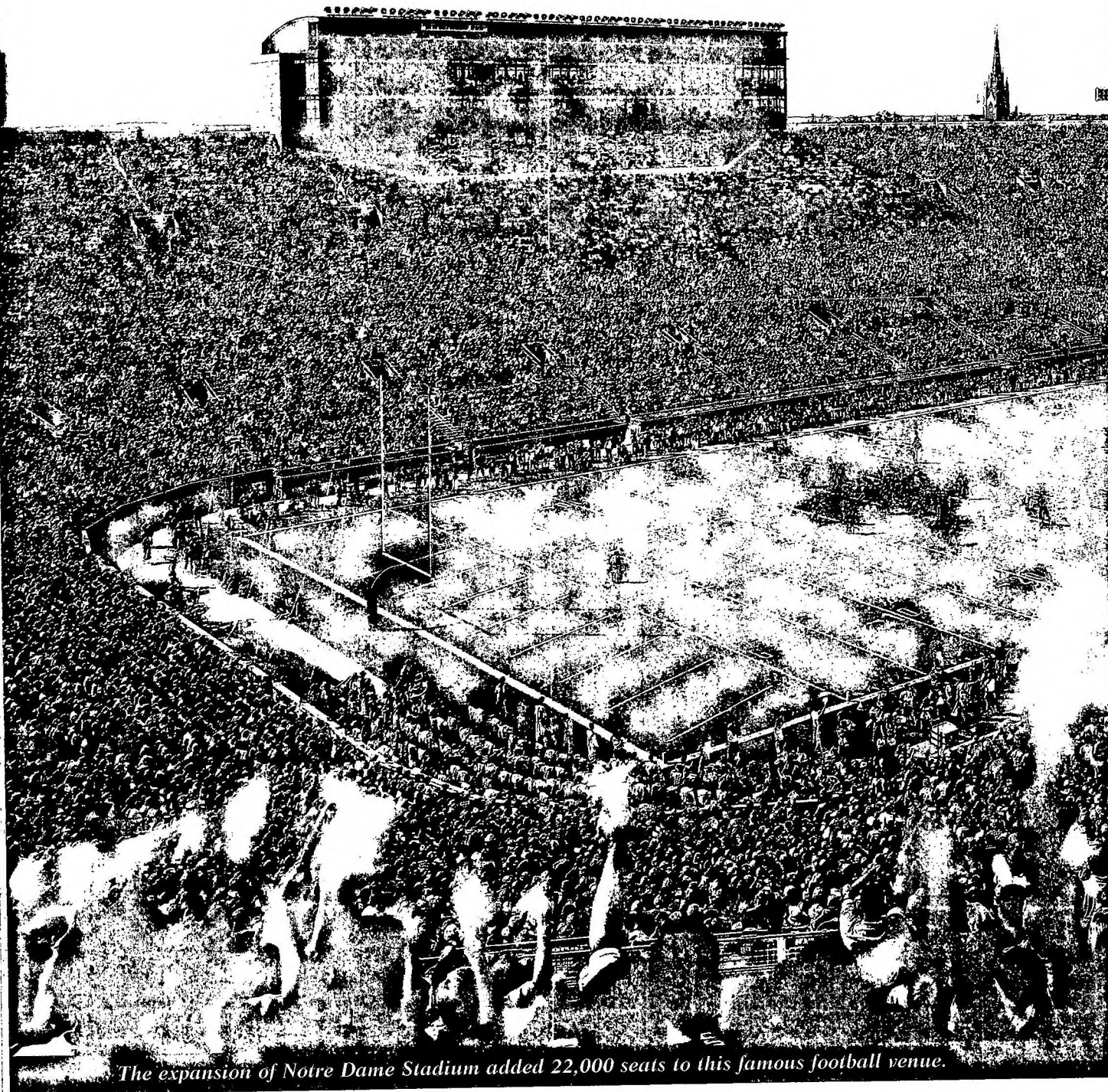
TOUGH NOTEBOOK GRABS ATTENTION

One of the happier vendors at the Computers for Construction trade show in Philadelphia in mid-November had to be Bill Patterson, a sales director whose rugged notebooks were not only drawing attention, but buyers as well.

The Hammerhead, which WalkAbout Computers Inc. has been selling to utilities and municipalities, costs \$5,000. It is wireless-ready, has a 10.4-in. touchscreen, 256 MB SDRAM and up to 20 GB hard drive. It is offered with vehicle-mounted or desktop docks and is built in cases milled from blocks of aluminum in the WalkAbout's own Singer Island, Fla., shop.

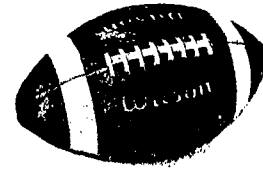
The company only recently approached the construction market, but response has been strong. One customer was at the plant the day after the show ended to buy 10 units, which it plans to lease to construction customers. See www.walkabout-comp.com for more information.

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CONSTRUCTION ECONOMICS

COST INDEXES



CONSTRUCTION COST INDEX

The CCI ended 2001 with a 1.7% gain. This is down from year-end increases of 2.6% for 2000 and 2.3% for 1999.

20-CITY: 1913=100	DEC. 2001 INDEX VALUE	% CHG. MONTH	% CHG. YEAR
CONSTRUCTION COST	6390.21	-0.3	+1.7
COMMON LABOR	13461.32	0.0	+3.1
WAGE \$/HR.	25.58	0.0	+3.1

BUILDING COST INDEX

The recent collapse in lumber prices slashed the BCI's annual inflation rate from 1.5% last month to just 0.8%.



20-CITY: 1913=100	DEC. 2001 INDEX VALUE	% CHG. MONTH	% CHG. YEAR
BUILDING COST	3577.30	-0.5	+0.8
SKILLED LABOR	6086.76	0.0	+3.3
WAGE \$/HR.	33.67	0.0	+3.3

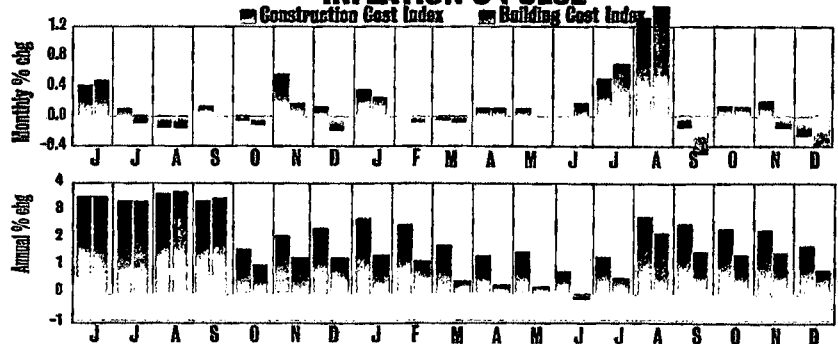


MATERIALS COST INDEX

Lumber prices have fallen 6.7% in the last two months, dragging the MCI 3.3% below 2000.

20-CITY: 1913=100	DEC. 2001 INDEX/PRICE	% CHG. MONTH	% CHG. YEAR
MATERIALS	2058.31	-1.5	-3.3
CEMENT \$/TON	81.83	0.0	+1.9
STEEL \$/CWT	27.58	+0.3	-1.4
LUMBER \$/MBF	453.22	-5.3	-6.8

INFLATION'S PULSE



Source: ENR Construction Economics Dept.

INDEX REVIEW

BASE YEAR	CONSTRUCTION COST		BUILDING COST		SKILLED WAGES		COMMON WAGES	
	1913	1997	1913	1997	1913	1997	1913	1997
2001 SEPTEMBER	6223.87	579.42	3539.44	523.90	5769.73	578.33	12826.84	628.93
OCTOBER	6258.89	582.68	3546.96	525.01	5812.04	582.57	12941.18	634.54
NOVEMBER	6265.63	583.30	3541.26	524.17	5816.87	583.03	12978.55	636.37
DECEMBER	6282.76	584.90	3547.61	525.11	5873.00	588.68	13063.16	640.52
2000 AVERAGE	6221.17	579.16	3539.39	523.89	5739.83	575.33	12789.74	627.11
2001 JANUARY	6280.85	584.72	3544.91	524.71	5874.20	588.80	13066.45	640.68
FEBRUARY	6272.29	583.92	3536.36	523.44	5874.20	588.80	13066.45	640.68
MARCH	6279.45	584.59	3541.01	524.13	5874.20	588.80	13073.03	641.00
APRIL	6286.09	585.21	3540.68	524.09	5882.34	590.62	13109.47	642.79
MAY	6288.22	585.41	3548.59	524.98	5906.22	592.01	13113.42	642.88
JUNE	6318.20	588.20	3571.76	528.68	5947.72	596.17	13187.50	645.63
JULY	6404.03	596.19	3625.45	536.63	5977.63	599.17	13281.97	651.25
AUGUST	6388.64	594.75	3605.43	533.67	5983.87	599.79	13300.39	652.15
SEPTEMBER	6390.89	594.96	3598.58	532.36	6051.74	606.60	13397.37	656.80
OCTOBER	6396.50	595.49	3601.73	533.12	6064.50	607.87	13411.32	657.59
NOVEMBER	6409.59	596.70	3595.82	532.25	6084.50	607.87	13461.32	660.04
DECEMBER	6390.21	594.90	3577.30	529.50	6066.76	608.10	13461.32	660.04

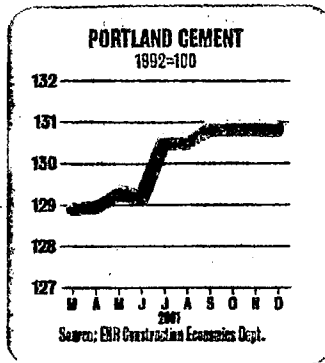
For a complete history of cost indexes, visit our Website, enr.com.

ASPHALT, CEMENT, AGGREGATE, CONCRETE, BRICK, BLOCK, LIME

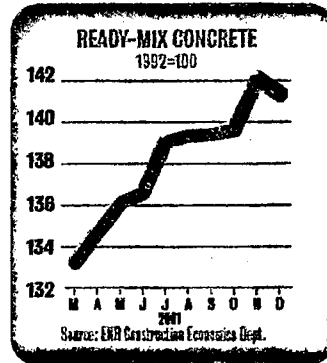
ITEM	UNIT	ATLANTA	BALTIMORE	BIRMINGHAM	BOSTON	CHICAGO	CINCINNATI	CLEVELAND	DALLAS	DENVER	DETROIT	KANSAS CITY
ASPHALT paving, PG 58	ton	137.87	141.25	160.00	-185.00	158.62	-127.50	151.00	138.80	133.00	-125.00	180.00
cutback, MC800	ton	171.55	—	230.00	-306.07	200.00	192.50	204.85	185.78	178.10	216.80	230.00
emulsion, rapid set	ton	160.82	165.00	145.00	-238.59	—	—	187.98	162.72	+165.00	144.60	175.00
slow set	ton	160.10	165.00	150.00	-231.36	175.20	—	187.98	158.78	+163.00	156.65	175.00
PORTLAND CEMENT type one	ton	75.00	93.50	87.00	83.20	95.00	78.00	76.75	88.00	-85.00	86.40	83.50
MASONRY CEMENT 70 lb. bag	bag	4.55	4.85	6.68	5.89	5.90	3.80	4.72	5.80	5.75	3.92	7.08
GRAVEL 1 1/2" down to 3/4"	ton	8.80	—	—	11.75	5.90	9.00	10.00	11.00	10.60	8.55	25.00
3/4" down to 3/8"	ton	7.60	—	12.80	12.50	5.75	6.65	10.00	11.00	10.60	8.35	—
CRUSHED STONE base course	ton	10.00	8.75	6.00	9.80	5.60	8.35	7.70	11.00	10.00	4.25	6.75
concrete course	ton	8.00	8.65	6.00	9.00	5.75	—	8.95	11.00	8.75	6.25	6.75
asphalt course	ton	8.12	-8.70	6.00	8.50	8.75	—	8.85	12.00	10.70	7.44	6.75
SAND concrete	ton	6.50	9.35	9.00	7.50	5.85	6.40	5.75	9.80	8.20	4.30	4.60
masonry	ton	7.25	+11.25	9.00	12.00	6.80	10.50	6.75	12.00	8.75	6.50	5.95
CONCRETE READY-MIX 3,000 psi	cy	72.50	87.00	97.00	81.00	84.00	43.50	72.00	85.00	65.50	83.75	59.50
4,000 psi	cy	76.50	90.00	81.00	84.75	89.00	47.00	76.00	86.55	68.70	88.25	63.90
5,000 psi	cy	80.50	97.00	85.00	87.00	94.00	51.50	80.00	87.20	72.00	93.25	67.00
STANDARD MODULAR BRICK	M	265.00	320.00	240.00	413.00	304.00	320.00	390.00	280.00	302.00	275.00	260.00
CONCRETE BLOCK												
heavyweight 8" x 8" x 16"	C	95.00	—	80.00	156.00	117.00	90.00	109.00	98.00	120.00	120.00	110.00
lightweight 8" x 8" x 16"	C	95.00	115.00	98.00	138.00	117.00	127.00	124.00	98.00	120.00	120.00	127.00
12" x 8" x 16"	C	137.00	130.00	136.00	201.00	140.00	169.00	171.00	140.00	142.00	167.00	162.00
MASON'S LIME	ton	160.00	172.80	—	191.00	185.00	-160.00	210.00	200.00	186.20	164.00	—

+ or - denotes price has risen or fallen since previous report; —not available. Monthly market quotations by ENR field reporters Dec. 3, 2001. All prices are spot prices quoted from a single source. Quotes are delivered prices for portland and masonry cement, concrete block and ready-mix concrete. Prices for gravel, crushed stone and sand are FOB plant. Other prices are quoted FOB city unless noted. Some prices may include taxes or discounts for prompt payment, etc. Further product specifications include rapid-set emulsion, CRS2; slow-set emulsion, CSS1H; gravel, washed; base course, 1 1/2" down to dust, unwashed; concrete course, 1 1/2" through #4.

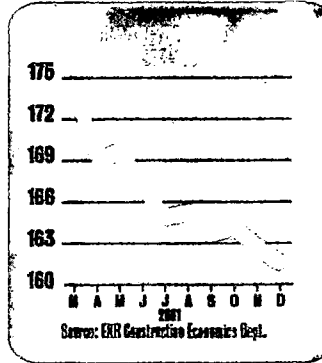
ENR'S MATERIALS PRICE INDEXES



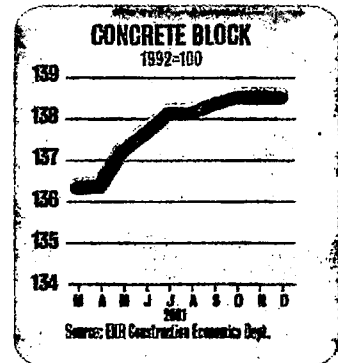
After jumping in July, prices have remained flat.



A year-end decline left prices 7% above a year ago.



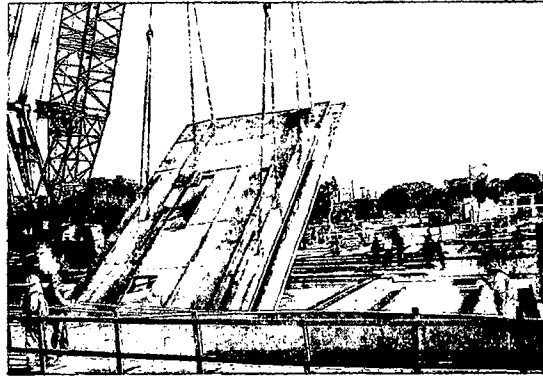
Falling for most of 2001, prices are down 10% for the year.



Prices ended the year 2% above December 2000's level.

Concrete Prices Jump 7% During 2001

Ready-mix concrete prices ended the year with modest declines, ranging from 0.9% for 3,000-psi concrete to just 0.1% for higher strength concrete. December's adjustment capped a long series of increases that left prices nearly 7% above last year's level (see chart above). Concrete prices received a boost from higher aggregate prices. The price for sand used in concrete is up 9% for the year, while the price for crushed stone for concrete is up 5%. Portland cement prices showed a more moderate 2% increase in 2001 and heavyweight concrete block prices also were up 2% for the year.



20-CITY AVERAGE

ITEM	UNIT	PRICE	% CHG. MO.	% CHG. YEAR
ASPHALT PAVING, PG 58	ton	143.27	-0.7	-9.6
cutback, MC800	ton	208.98	-0.4	+0.3
emulsion, rapid set	ton	169.91	-0.5	-3.9
slow set	ton	170.84	-0.6	-1.5
PORTLAND CEMENT type one	ton	81.81	0.0	+1.8
MASONRY CEMENT 70 lb. bag	bag	5.30	0.0	+5.8
GRAVEL 1 1/2" down to 3/4"	ton	10.71	0.0	+3.6
3/4" down to 3/8"	ton	9.91	0.0	+3.3
CRUSHED STONE base course	ton	7.82	0.0	+14.9
concrete course	ton	8.06	0.0	+5.3
asphalt course	ton	8.76	-0.8	+4.8
SAND concrete	ton	7.18	0.0	+9.0
masonry	ton	8.63	+1.8	+7.4
CONCRETE READY-MIX 3,000 psi	cy	71.30	-0.9	+6.6
4,000 psi	cy	75.12	-0.1	+6.1
5,000 psi	cy	78.99	-0.1	+5.6
STANDARD MODULAR BRICK	M	328.01	+0.5	+2.4
CONCRETE BLOCK				
heavyweight 8" x 8" x 16"	C	110.34	0.0	+1.7
lightweight 8" x 8" x 16"	C	120.37	0.0	+0.2
12" x 8" x 16"	C	161.02	0.0	-1.6
MASONS LIME	ton	176.66	-0.4	-2.5

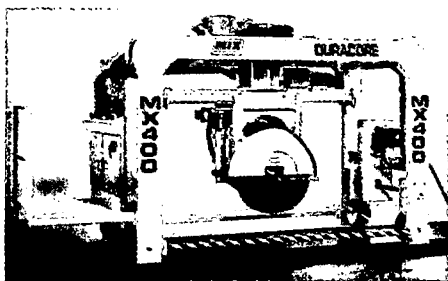
CANADA

ITEM	UNIT	LOS ANGELES	MINNEAPOLIS	NEW ORLEANS	NEW YORK	PHILADELPHIA	PITTSBURGH	ST. LOUIS	SAN FRANCISCO	SEATTLE	MONTREAL	TORONTO
ASPHALT paving, PG 58	ton	146.80	140.00	135.20	125.00	-130.00	140.00	130.00	147.26	133.38	322.00	285.00
cutback, MC800	ton	204.38	204.85	189.00	218.90	-253.05	200.03	221.72	208.62	158.42	345.00	390.00
emulsion, rapid set	ton	178.28	158.85	155.00	192.80	-204.85	180.75	156.65	178.82	112.80	400.20	315.00
slow set	ton	172.86	168.70	180.00	192.80	-204.85	180.75	156.65	173.58	112.80	452.39	315.00
PORTLAND CEMENT type one	ton	80.02	77.30	80.00	77.00	77.00	83.61	74.00	80.47	75.00	178.25	168.00
MASONRY CEMENT 70 lb. bag	bag	5.01	4.45	5.10	5.80	5.20	4.82	5.95	5.08	5.70	7.25	8.60
GRAVEL 1 1/2" down to 3/4"	ton	9.35	14.80	10.52	8.25	13.00	11.75	6.50	9.98	8.40	9.49	10.28
3/4" down to 3/8"	ton	8.88	15.50	10.52	8.25	13.00	12.50	6.50	9.01	8.92	10.64	10.50
CRUSHED STONE base course	ton	7.20	5.50	10.52	7.20	7.90	9.50	4.00	7.35	8.92	9.49	10.75
concrete course	ton	7.91	9.50	8.55	7.20	9.10	8.00	6.90	8.03	8.92	-9.49	19.40
asphalt course	ton	8.51	9.50	9.30	7.20	11.05	9.00	7.00	8.74	9.20	9.49	11.00
SAND concrete	ton	6.96	6.00	8.85	6.25	5.75	7.50	10.75	7.25	7.30	18.40	8.20
masonry	ton	7.90	8.50	9.10	6.25	6.00	12.00	10.80	7.98	7.30	20.70	5.70
CONCRETE READY-MIX 3,000 psi	cy	66.38	+78.50	67.40	77.00	-60.00	+85.00	+70.00	67.42	72.00	174.80	88.50
4,000 psi	cy	71.38	+81.50	68.82	85.00	-64.00	+77.50	+73.00	72.02	78.00	189.75	92.50
5,000 psi	cy	72.41	+87.50	70.42	92.00	-68.00	+83.50	+76.00	73.51	84.00	—	108.00
STANDARD MODULAR BRICK	M	318.80	450.00	275.00	460.00	350.00	245.00	350.00	320.46	402.00	471.50	412.00
CONCRETE BLOCK												
heavyweight 8" x 8" x 16"	C	108.40	128.00	90.00	105.00	81.00	115.00	129.00	109.02	135.00	188.60	142.00
lightweight 8" x 8" x 16"	C	118.48	158.00	90.00	118.00	98.00	153.00	141.00	119.02	135.00	340.40	154.00
12" x 8" x 16"	C	162.70	197.00	128.00	139.00	148.00	187.00	198.00	183.78	208.00	512.75	232.00
MASONS LIME	ton	178.11	198.00	188.50	190.00	206.00	140.00	160.00	177.20	115.00	232.00	188.15

washed; asphalt course, 1/2" through #4, unwashed; concrete sand, 2NS medium clean; masonry sand, 2NS fine clean; brick, local, SW, C216; concrete block, 2 core. All quantities are truckloads unless noted. Quotes for Montreal and Toronto are in Canadian dollars and metric units (tonne, cu m). Montreal prices include 15% value added tax. The above prices are not intended to represent the prevailing or average price in a city but are designed to track price movement from a single source for a given product quantity and specification over time.

PHOTO COURTESY OF HEERY INTERNATIONAL, INC.

PRODUCTS

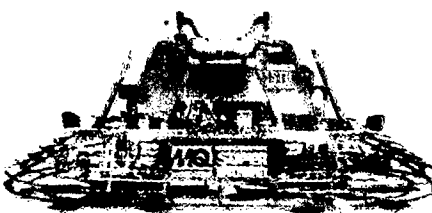


MULTI-ANGLE SAW Runs on a Casting Bed

Designed exclusively to cut hollow core panels, the new DuraCore MX400 saw is a self-propelled unit and offers a travel speed of 90 ft per minute between cuts. It is capable of making accurate rip cuts, crosscuts and angle cuts to 45° in either direction and features automatic saw angle positioning. The cutting blade is powered by a 60-hp TEFC motor and allows the model to cut panels 48 in. wide x 12 in. thick. The entire cutting process is controlled with a programmable logic controller from the console. MIXER SYSTEMS INC.; 262/691-3100; www.mixer.com

RIDE-ON POWER TROWELS Hydrostatic Models

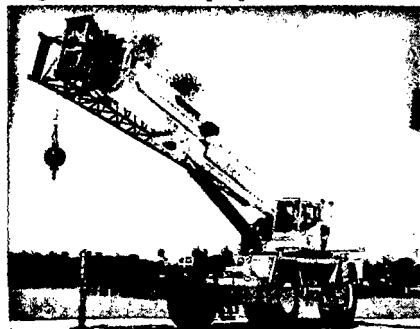
Manufacturer introduces three hydrostatic ride-on power trowels that include the STH-Supertrowel and the two-model HTH-Series. Each is equipped with one John Deere or Kubota diesel engine, tandem-mounted hydrostatic pumps, two hydraulic-drive motors and two hydraulic steering assemblies. The units have 46-in. and 60-in. nonoverlapping rotors and dual joystick controls. The STH-Supertrowel model has a six-blade spider and a 10-ft path width for larger coverage and the flattest floors. It comes with patented



proportional hydraulic steering and hydroelectric twin-pitch control. MULTIQUIP; 800/421-1244; www.multiquip.com

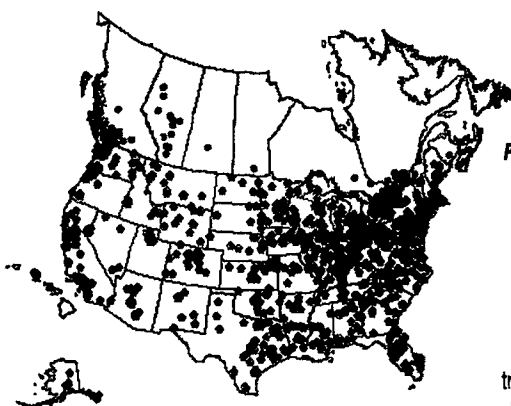
ROUGH TERRAIN CRANE Twenty-Degree Tilttable Cab

Model RT9000E, a 130-ton rough-terrain crane, the company's largest unit available, is best suited for bridge jobs, work in power and chemical plants and any other large construction projects. It features a



five-section, full-power 42-ft to 160-ft Megaform boom that provides 169-ft maximum tip height on the main boom and a 140-ft maximum radius with 3,700 lb capacity. Also, the cab provides 20° tilt and comes with tinted safety glass. GROVE; 717/597-8121; www.groveworldwide.com

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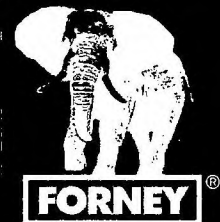
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PULSE

PLANNING

CALIFORNIA The Watry Design Group is the architect selected by Community Hospital of the Monterey Peninsula to design a two-story, 222,100-sq-ft **parking garage** with 292 stalls on Community Hospital campus in Monterey. Schematic plans are under way for this estimated \$16-million project. Construction is targeted for June 2002. *The Watry Design Group, 815 Hamilton St., Redwood City 94063; Community Hospital of the Monterey Peninsula, 23625 W. R. Holman Highway, Monterey 93940. DR #01-820957.*

CALIFORNIA Architectural International is in schematic planning stage for the 1160 Mission Street Apartments, a 23-story, 250-unit **apartment building** with total floor area of 500,000 sq ft, in San Francisco. Further advancement pending local approvals. Construction targeted for fall 2002. *Architectural International, 225 Miller Ave., Mill Valley 94941-2817. DR #01-853148.*

FLORIDA Coastal Engineering Consultants has been chosen by the Charlotte County

Board of Commissioners as part of a team to implement the **Stump Pass Sand Transfer Project**. The contract calls for the relocation of the inlet along a channel alignment to improve navigation, protect environmental resources and reduce future maintenance costs. The sand excavated to create the channel will be used to restore nearby eroded beaches, providing habitat for sea turtles and shore birds, as well as storm protection for upland residential homes and public infrastructure. The \$4-million project includes dredging 500,000 cu yd of sand with placement along three miles of shoreline. *Coastal Engineering Consultants, 3106 Horseshoe Dr. S., Naples 34104.*

GEORGIA Kim King Associates has selected Smallwood Reynolds Stewart Stewart & Associates Inc. to design **Midtown Park**, a 1.2-million-sq-ft office and residential complex located in the area of Peachtree and 14th St. in Atlanta. The project, estimated to cost between \$100 million and \$150 million, will include office space and 955 apartments. Design is scheduled to

start pending finalization of approvals. *Smallwood Reynolds Stewart Stewart & Associates Inc., One Piedmont Center N.E., Suite 303, Atlanta 30305-1501; Kim King Associates, 2931 Paces Ferry Rd. N.W., Atlanta 30339-5728. DR #01-857569.*

NEW JERSEY Barrett Cos. is planning to build the **Half Moon Harbor**, a 331-unit apartment building at 7011-8603 River Rd. in North Bergen. Cybul & Cybul is the architect selected to design the 12-story, 600,000-sq-ft building, estimated to cost \$50 million. *Cybul & Cybul, 1064 River Rd., Edgewater 07020; Barrett Cos., 2115 Linwood Ave., Fort Lee 07024. DR #01-836226.*

NEW YORK New York University Medical Center and School of Medicine has announced plans to build a 200,000-sq-ft **biomedical research building** on NYU School of Medicine campus in New York City. Financing is being finalized and construction is targeted to start in summer 2002. *New York University Medical Center and School of Medicine, Facilities Dept., 550 First Ave., New York City 10016. DR #01-854807.*

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Nina Laden
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CONTRACTS/BIDS/PROPOSALS

DISTRICT OF COLUMBIA The Huntwood Preservation LLC has awarded a contract to William C. Smith Construction Inc. for the **renovation** of Huntwood Apartments, a 214-unit housing complex located in the district. The \$12.6-million renovation project involves the complete overhaul of the complex's 17 buildings, including replacing exterior windows, hardwood flooring, and kitchen and bathroom appliances; upgrading the plumbing and electrical systems; and installing air conditioning units, iron fencing and a new playground. *William C. Smith Construction Inc., 1220 L St. N.W., Suite 300, Washington, D.C. 20005-4053.*

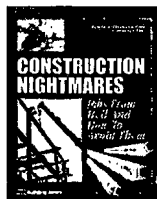
FLORIDA Finrock has signed a contract with Jefferson & Young LP to provide design-manufacture-construction services for their new five-level, 641-space **parking garage** in Hollywood. The new garage will provide parking for and direct access to the new apartment complex, as well as additional public parking. Construction was to start in mid-November. *Finrock Design-Manufacture-Construct Inc., 2400 Apopka Blvd., Apopka 32703-7743.*

IOWA A new seven-story, 486,000-sq-ft **office building** for Allied Insurance is being built by a joint venture of J.E. Dunn Construction and Taylor-Ball Construction. Located in the Gateway development in Des Moines, the new \$100-million corporate headquarters will feature glass curtain wall and brick veneer precast panels. A skywalk will connect the office building to a planned 10-story parking garage that will be constructed of precast concrete. Completion is scheduled for 2003. *J.E. Dunn Construction, 929 Holmes, Kansas City, Mo. 64106; Taylor-Ball Construction, 6100 Thornton Ave., Des Moines 50321.*

NEW YORK VRH Construction Corp. has been awarded a \$52-million contract to build four **office-cargo buildings** for International Airport Centers. The 530,000-sq-ft project is located on a 23-acre site on International Airport Center Blvd., across from JFK International Airport in Jamaica. Construction is under way and is scheduled for completion in spring 2003. *VRH Construction Corp., 320 Grand Ave., Englewood, N.J. 07634-4355.*

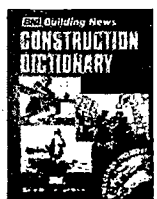
Much information for Pulse is derived from F.W. Dodge, a Division of the McGraw-Hill Companies. For more information on a project in Pulse, which denotes a DR#, please call 1-800-FW DODGE (1-800-393-6343). For general information about Dodge products and services, call 1-800-FW DODGE or visit our Website at www.fwdodge.com.

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BID/PROPOSAL DATES

ALASKA 12/10 U.S. Army Corps of Engineers, Building 21-700, P.O. Box 898, Elmendorf Air Force Base 99506, phase 2 of Fort Wainwright Bassett Army hospital replacement at Fort Wainwright. The new five-story, 259,000-sq-ft building is estimated to cost between \$125 million and \$160 million. *HKS Inc., architect-structural engineer, 1919 McKinney Ave., Dallas 75201; Wingler & Sharp, architect, 1717 10th St., Wichita Falls, Texas 76301. Point of contact: Dan Werkmeister, (907) 753-2555. DR #00-759049.*

CALIFORNIA 12/11 City of San Diego, Engineering and Capital Project Dept., Contract Services Division, 1010 Second Ave., Suite 500, San Diego 92101-4998, phase A of water department central operations facility at Kearny, Mesa, Interstate 805 and State Rte. 52 in San Diego. The estimated \$37-million project includes of a four-story, 198,171-sq-ft administration building with cafe and daycare. Phase A of the construction will consist of a building shell only. *Conwell Shonkwiler Associates, architect, 3160 Camino Del Rio St., Suite 217, San Diego 92108-3834. DR #98-775088.*

GEORGIA 12/11 Georgia State Financing & Investment Commission, Two Martin Luther King Jr. Dr. S.E., Room 1002, Atlanta 30334, Darton College physical education building in Albany. \$10.2 million to \$11.2 million. Phase 1 of a two-phase project includes 84,000 sq ft of new construction and phase 2 includes 14,000 sq ft of renovation work. *Flynn Findenup Architects, 1355 Terrell Mill Rd. S.E., Marietta 30067. DR #00-766632.*

WEST VIRGINIA 12/11 Kanawha County Board of Education, 3300 Pennsylvania Ave., Charleston 25302, addition and renovation of St. Albans High School at 2100 Kanawha Terrace in St. Albans. The estimated \$18-million project includes complete renovation and reconstruction and multiple additions to an existing 122,000-sq-ft high school. *ZMM Inc., architect, 222 Lee St., Charleston 25302; G&G Builders Inc., 500 Corporate Center Dr., Suite 550, Scott Depot 25560, is construction manager. DR #99-766356.*

LOUISIANA 12/12 State of Louisiana, Facility Planning & Control, 1051 N. Third St., Room B56, Baton Rouge 70802, new Dept. of Justice office building at

Louisiana State Capital Park in Baton Rouge. \$16 million. *Washer-Hill & Lipscomb, An Architectural Corp., 1744 Oakdale Dr., Baton Rouge 70810. DR #00-622002.*

NEW YORK 12/12 (general contract-HVAC-plumbing-electrical bids)—Dormitory Authority of the State of New York, One Penn Plaza, 52nd Floor, New York City 10119-5299, facade restoration of Comp-ton-Goethals Building at City College of New York in New York City. The project, estimated to cost between \$18.1 million and \$20.5 million, consists of the removal and replacement of the terra cotta stones, window frames, corner quoins, buttress quoins, lighting protection, and all other related items. *Fuller and D'Angelo PC, architect, 45 Knollwood Rd., Fourth Floor, Knollwood Tower, Elmsford 10523-2815. DR #99-819463.*

TEXAS 12/12 Dallas Area Rapid Transit (DART) Board, 1401 Pacific Ave., Suite 4102, Dallas 75202-2732, Northwest Corridor light rail transit line, section NW-1A, from Houston to Turtle St. in Dallas. \$40 million. The project consists of construction of approximately 7,700 ft of light rail transit roadbed, five new LRT and railroad bridges, rehabilitation of existing railroad bridge, four at-grade station platforms, and a pedestrian walkway to serve American Airlines Center. *Paragon Project Resource Inc., architect, 11811 Preston Rd., Suite 100, Dallas 75230. DR #01-833088.*

CALIFORNIA 12/13 San Ysidro School District, Purchasing Dept., 4350 Otay Mesa Rd., San Ysidro 92173, two-building Sunset elementary school at 3825 Sunset Lane in San Ysidro. The two-story buildings with total floor area of 72,000 sq ft are estimated to cost \$12.5-million. *Coup-Smith-Diaz Architects, 400 Mary Ave., Suite A, Calexico 92231. DR #01-853628.*

IOWA 12/13 City of Davenport, 226 W. Fourth St., Davenport 52801, two municipal parking garages. Estimated to cost between \$15 million and \$18 million, the 455-space West River Drive parking garage #46 is located on the south half of the block bounded by River Dr., Main St. and Brady; and the 620-space West Second Street Parking Garage #32 is located on the south half of the block bounded by Second St., Ripley St. and Harrison Sts. *Neumann Monson PC, architect, 111 E. College, Iowa City 52240. DR #00-835480.*

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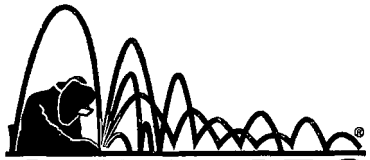
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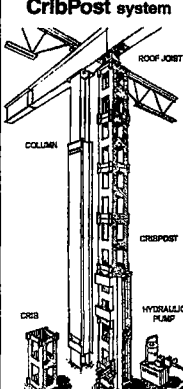
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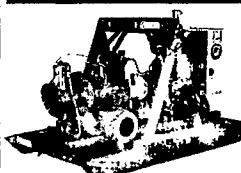
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This Contract is subject to a financial assistance Contract between the MBTA and the Federal Transit Administration of U.S. Department of Transportation.

Each prospective bidder proposing to bid on this project must be prequalified in accordance with the Authority's "Procedures Governing Classification and Rating of Prospective Bidders." Copies may be obtained from the Contract Administration Office at the above address. Requests for prequalification for this Project will not be accepted by the Authority after the tenth (10th) day preceding the date set for the opening of bids.

Prequalified bidders may obtain from the Contract Administration Office a "Request for Bid Form" which must be properly filled out and submitted for approval.

Bidding documents may be obtained from the Contract Administration Office at the address above from 8:30 a.m. to 4:00 p.m., beginning on November 20, 2001, Monday through Friday, at a charge of \$100.00 per copy. The Authority's STANDARD SPECIFICATIONS, BIDDING AND CONTRACT

REQUIREMENTS AND DIVISION 1 - GENERAL REQUIREMENTS dated November, 1983, is available at a charge of \$5.00 per copy. Authority's STANDARD SPECIFICATION, CONSTRUCTION, dated January 1980, is available at a charge of \$15.00 per copy. The MBTA's Standard Plan entitled "MBTA Railroad Operations - Book of Standard Plans - Track and Roadway" is available at a charge of \$30.00 per copy, payable by separate check. Also, the MBTA's Standard Plan entitled "MBTA Railroad Operations - Commuter Rail Design Standards Manual," is available at a charge of \$35.00 per copy, payable by separate check. Bidding documents will be sent upon request and receipt of an additional fee of \$15.00, payable by separate check. Bidding documents will be forwarded by AirFreight, where such service is available, at the expense of the plan holder. NONE OF THESE CHARGES ARE REFUNDABLE.

Bidders attention is directed to Appendix 1, Notice of Requirement for Affirmative Action to Insure Equal Employment Opportunity; and to Appendix 2, Supplemental Equal Employment Opportunity, Anti-Discrimination, and Affirmative Action Program in the specifications. In addition, pursuant to the requirements of Appendix 3, Disadvantaged Business Enterprise (DBE) Participation Provision, Bidders must submit an assurance with their Bids that they will make sufficient and reasonable efforts to meet the stated DBE goal of 16 percent.

Bidders will affirmatively ensure that in regard to any contract entered into pursuant to this solicitation, minority and female construction contractors will be afforded full opportunity to submit Bids and will not be discriminated against on the grounds of race, color, religion, sex, age, or national origin in consideration for an award.

Bidders will be required to comply with Federal Equal Employment Opportunity Regulations and the President's Executive Order No. 11246 and any amendments or supplements thereto.

Authorization for the Bidders to view the site of the work on the MBTA's property shall be obtained from the Project Manager, Mr. James Eng, MBTA, 500 Arborway, Jamaica Plain, MA 02130, Telephone No. (617) 222-5754. The Authority will conduct an inspection tour of the site on December 4, 2001. Bidders are requested to be present at the Amtrak Maintenance of Way Base on Royal Little Drive, Providence, Rhode Island, at 10:00 a.m. to participate in the tour. Bidders are advised that they should have representation at this tour as no extra visits are planned.

A prebid conference will be held concurrent with the site inspection tour on December 4, 2001 at 10:00 a.m. at the Amtrak Maintenance of Way Base on Royal Little Drive, Providence, Rhode Island. Any request for interpretation of the Plans and Specifications should be submitted in writing at the same time.

Bidders will be required to certify as part of their bids that they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

This Contract is subject to Federal wage and hourly laws and minimum State wage rates as well as all other applicable labor laws.

Bidders are advised that the "Buy America" provisions of the Surface Transportation Assistance Act of 1982 (Pub. L-97-424) as amended, apply to any Contract, procurement or agreement which results from this solicitation.

Bid Guaranty shall consist of a bid deposit in the amount of five (5) percent of the value of the bid, in the form of a bid bond, cash, certified check, treasurer's or cashier's check.

The successful Bidder shall be required to furnish a Performance Bond and a Labor and Materials Payment Bond each for the full amount of the Contract price.

The Authority reserves the right to reject any or all Bids, to waive informalities, to advertise for new Bids or proceed to do the work otherwise, as may be deemed to be in the best interests of the Authority.

This information may be viewed at the MBTA website:

<http://www.mbt.com/newsinfo/geninfo/projects/contractadmin/solicitations/>

Plans and specifications may also be viewed at the following locations:

Massachusetts Alliance for Small Contractors
One South Station - 3rd. Fl.
Mail Stop 01302
Boston, MA 02110
Women's Business Enterprise Alliance
P.O. Box 132
385 Blue Hill Drive
Westwood, MA 02090

The Port Authority Of New York And New Jersey Request For Qualification Information

The Port Authority of New York and New Jersey intends to prequalify prospective bidders for the contract listed below. The qualification information for the contract is contained in a separate document that is available by contacting the person listed below.

Contract JFK-700.824 - John F. Kennedy International Airport - General Aviation Terminal Operations Control Center Renovation & Expansion; contact Kim Nguyen at (718) 751-8746, fax (718) 751-8791. Work generally involves addition to and renovation of the existing general aviation terminal operations control center building at John F. Kennedy International Airport. Work includes general construction, plumbing, mechanical, electrical and telecommunication, data voice and imaging network systems and is presently estimated to be in the range of \$5M - \$10M. Qualification information is presently to be submitted by December 31, 2001, and it is anticipated that bid documents will be available to prequalified bidders on or about February 12, 2002.

Port Authority Trans-Hudson Corporation

Sealed proposals for the following contract will be received by the Chief Engineer of The Port Authority of New York and New Jersey, in Room 230, at 241 Erie Street, Jersey City, NJ 07310, until 2:30 P.M. on the date indicated and will then be opened and read in Conference Room B. Contract documents may be seen in Room 230 and may be

obtained upon receipt of a non-refundable payment of \$100.00 per set. Only company checks or money orders payable to the order of The Port Authority of New York and New Jersey will be accepted. If checks or money orders for documents are mailed, they should be addressed to The Port Authority of New York and New Jersey, Room 230 - Contract Desk, 241 Erie Street, Jersey City, NJ 07310. For availability of contract documents, call (201) 216-2746. Questions by prospective bidders concerning the contract should be directed only to the person whose name and phone number is listed.

Contract PAT-526 - Port Authority Trans-Hudson Corporation - Harrison Car Maintenance Facility - Miscellaneous Improvements. Estimate Range: \$500K - \$1M. Bids Due Thursday, December 20, 2001. The work under this contract consists generally of a new metal shed, repairs to glass curtain wall panels, repairs to steel catwalks, platforms and railings, repair and replacement of concrete decks and pads, RPZ system piping, pumps and motors and replace lighting. For questions, call Norman Price at (201) 216-2919.

Contract PAT-526 was previously advertised on May 28, 2001. At present we are not sure we have been able to identify everyone who requested contract documents at the World Trade Center address. Contractors who requested documents in response to the May 28, 2001 advertisement and are interested in receiving updated information on this contract should contact Mr. Norman Price at (201) 216-2919.

State of New York Office of General Services Advertisement for Bids

Sealed bids for Project No. 41879-C for Tank Modification Program, Executive Department Office of General Services, Regions 5 (Albany, Columbia, Delaware, Fulton, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie) and Regions 6 (Clinton, Essex, Franklin, Hamilton, Saratoga, Warren and Washington Counties), will be received by the Office of General Services (OGS), Design & Construction Group (D&C), Contract Administration, 35th Fl., Corning Tower, Empire State Plaza, Albany, NY 12242, on behalf of the Office of General Service, until 2:00 p.m. on Wednesday, January 9, 2002, when they will be publicly opened and read. Each bid must be prepared and submitted in accordance with the Instructions to Bidders and must be accompanied by a certified check, bank check, or bid bond in the amount of \$130,300 for C.

The successful bidder will be required to furnish a Performance Bond and a Labor and Material Bond in the statutory form of public bonds required by Sections 136 and 137 of the State Finance Law, each for 100% of the amount of the Contract estimated to be between \$5,000,000 and \$6,000,000.

As a condition of award, within 48 hours of receipt of the proposed Contract Agreement from the State, the low bidder shall return the Contract Agreement to the State, properly executed, along with the

REQUEST FOR BIDS

The New York Power Authority (Authority) plans to construct a 500 Megawatt Combined Cycle Power Plant to be located at the Authority's Charles Poletti Power Plant in Astoria, New York. The Authority is currently requesting bids for a GWC Contractor who will perform general construction, mechanical and electrical work to install the "Power Island", construct associated structures, and supporting mechanical and utility systems. The Authority has already contracted for the supply of the Project "Power Island" equipment with the exception of the fuel storage tanks, which will be supplied by the Authority under a separate contract. The "Power Island" consists of two GE Frame 7 FA combustion turbines and generators (CTG), two heat recovery steam generators (HRSG) and one steam turbine generator (STG) arranged in a two on one layout. The general description of the work is as follows. The Contractor will install all supplied equipment and perform all structural, mechanical, electrical and architectural work required. The general work items will include but not be limited to: site work, paving, foundations, structural steel, masonry, metal siding and roofing, metal stud framing, doors and frames, aluminum windows, gypsum drywall, ceramic and resilient tile, acoustic ceiling, toilet partitions, painting and elevator. In addition, the GWC Contractor will construct the sanitary waste collection and discharge system, fire protection system, fire detection and alarm system, domestic (potable) water system, HVAC system, wastewater collection and discharge system, fuel and industrial gas system, lube oil and hydraulic oil system, overhead bridge crane and plant electrical distribution system.

The scheduled bid availability date for the General Work Contract (GWC) is December 17, 2001. There will be a \$250 fee for each bid package requested, which is non-refundable.

Inquires regarding this work may be made by contacting the New York Power Authority in writing or by phone at: 123 Main Street, White Plains, NY 10601, Attention Ms. Patricia A. Leto, C.P.M. (914) 681-6623.



Bonds if required by said Agreement. Low bidders who cannot meet these provisions may be subject to disqualification and forfeiture of the bid security.

The State intends to expedite award of this Contract and the Contractor shall be prepared to proceed with the Work accordingly. Bidders are warned that time is of the essence of the Contract and completion of the Work must be within 730 days after the Agreement is approved by the Comptroller.

The Office of General Services reserves the right to reject any or all bids.

The Bidding and Contract Documents may be obtained for \$49.00 deposit per set, plus \$6.00 per set shipping and handling fee, by calling the following toll free number (877) OGS-PLAN (647-7526) or by mail from the Plan Sales Unit, 35th Fl., Corning Tower, Empire State Plaza, Albany, NY 12242. Make check payable to the Office of General Services and write Fed. ID# and phone # on check.

William F. O'Connor, AIA
Deputy Commissioner

**REQUEST FOR PROPOSALS
WASTEWATER, WATER, STORM WATER AND UTILITY BILLING
MOUNTAIN HOUSE COMMUNITY SERVICES DISTRICT**

In San Joaquin County, California, invites proposals to provide operation and maintenance services for a new planned community with a projected buildout of approximately 16,000 dwelling units and a mix of commercial and industrial uses. Construction completion of phase 1 utility facilities is scheduled for August 2002. An initial 3-5 year O&M contract is anticipated for a wastewater facility of .45mgd, water with a capacity of 1.2mgd avg. daily demand, and 8.3 miles of storm water lines and associated detention ponds. With all new automated facilities, emphasis will be on minimal staffing, costs within currently available revenue, contractor experience in startup along with the ability to provide short notice backup to contractor assigned personnel on site. Proposals are due January 18, 2002 with a contract start date of May 1, 2002. For additional information, contact Dwane Milnes, Citygate Associates, 559-591-2638. For an RFP package, contact Virginia Johnson, Mt House CSD, 222 E. Weber Ave. Room 3, Stockton, CA 95202, phone 209-468-9997.

**Massachusetts Bay
Transportation Authority
Transportation Building
10 Park Plaza
Boston, Massachusetts
02116-3975
Notice To Bidders**

Sealed bids for MBTA Contract No. E02CN22, SILVER LINE MAINTENANCE FACILITY, SOUTHAMPTON STREET - BOSTON, MASSACHUSETTS, (CLASS 7, BUILDINGS, PROJECT VALUE - 400.00) will be received by the Deputy Director of Design and Construction, Contracts, at the Contract Administration Office, 5th Floor, Room 5610, Transportation Building, 10 Park Plaza, Boston, Massachusetts, 02116-3975, until two o'clock (2:00 p.m.) on December 18, 2001. Immediately thereafter, in a designated room, the Bids will be opened and read publicly.

The work consists of the construction of the Silver Line Maintenance Facility, Southampton Street in two phases. Phase 1 consists of the construction of the fueling building and supporting utilities for CNG fueling and fare retrieval, construction of the bus wash/degrease building to be used as a temporary maintenance building and a temporary outdoor bus wash facility. Phase 2 consists of the completion of the fueling and bus wash/degrease buildings; construction of the maintenance, parking garage and transportation buildings in their final configuration; construction of the bus storage area; the installation of all remaining permanent drainage, sanitary sewer, water, gas, electric and telephone utilities within the facility site; completion of the facility site paving including lighting, fencing, barriers and pavement marking.

This Contract is subject to a financial assistance Contract between the MBTA and the Federal Transit Administration of U.S. Department of Transportation.

Each prospective bidder proposing to bid on this project must be prequalified in accordance with the Authority's "Procedures Governing Classification and Rating of Prospective

Bidders." Copies may be obtained from the Contract Administration Office at the above address. Requests for prequalification for this Project will not be accepted by the Authority after the tenth (10th) day preceding the date set for the opening of bids.

Prequalified bidders may obtain from the Contract Administration Office a "Request for Bid Form" which must be properly filled out and submitted for approval.

Bidding documents may be obtained from the Contract Administration Office at the address above from 8:30 a.m. to 4:00 p.m., on November 19, 2001, Monday through Friday, at a charge of \$300 per copy. The Authority's STANDARD SPECIFICATIONS, BIDDING AND CONTRACT REQUIREMENTS AND DIVISION 1 - GENERAL REQUIREMENTS dated November, 1983, is available at a charge of \$5.00 per copy. Authority's STANDARD SPECIFICATION, CONSTRUCTION, dated January 1980, is available at a charge of \$15.00 per copy. The MBTA Controlled Insurance Program (Wrap-up Insurance) Manual is available in one (1) separate volume at a charge of \$10.00 per copy, payable by separate check. Reference environmental and geotechnical data is available in one (1) separate volume at a charge of \$50.00 per copy, payable by separate check. Bidding documents will be sent upon request and receipt of an additional fee of \$15.00, payable by separate check. Bidding documents will be forwarded by AirFreight, where such service is available, at the expense of the plan holder. **NONE OF THESE CHARGES ARE REFUNDABLE.**

Bidders attention is directed to Appendix 1, Notice of Requirement for Affirmative Action to Insure Equal Employment Opportunity; and to Appendix 2, Supplemental Equal Employment Opportunity, Anti-Discrimination, and Affirmative Action Program in the specifications. In addition, pursuant to the requirements of Appendix 3, Disadvantaged Business Enterprise (DBE) Participation Provision, Bidders must submit an assurance with their Bids that they will make sufficient and reasonable efforts to meet the stated DBE goal of 16 percent.

Bidders will affirmatively ensure that in regard to any contract entered into pursuant to this solicitation, minority and female con-

struction contractors will be afforded full opportunity to submit Bids and will not be discriminated against on the grounds of race, color, religion, sex, age, or national origin in consideration for an award.

Bidders will be required to comply with Federal Equal Employment Opportunity Regulations and the President's Executive Order No. 11246 and any amendments or supplements thereto.

Authorization for the Bidders to view the site of the work on the MBTA's property shall be obtained from the Project Manager, Ms. Marjorie B. Madden, 500 Arborway, Jamaica Plain, Massachusetts, 02130, Telephone No. (617) 222-3797. The Authority will conduct an inspection tour of the site on December 3, 2001. Bidders are requested to be present in front of the MBTA Police Headquarters Building, 240 Southampton Street, Boston, Massachusetts, at 2:00 p.m. to participate in the tour. Bidders are advised that they should have representation at this tour as no extra visits are planned.

A prebid conference will be held on December 7, 2001 at 10:00 a.m. at Conference Room 2, Massachusetts Bay Transportation Authority, Design and Construction Department, 500 Arborway, Jamaica Plain Massachusetts. Any request for interpretation of the Plans and Specifications should be submitted in writing at the same time.

Bidders will be required to certify as part of their bids that they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

This Contract is subject to Federal wage and hourly laws and minimum State wage rates as well as all other applicable labor laws.

Bidders are advised that the "Buy America" provisions of the Surface Transportation Assistance Act of 1982 (Pub. L. 97-424) as amended, apply to any Contract, procurement or agreement which results from this solicitation.

Bid Guaranty shall consist of a bid deposit in the amount of five (5) percent of the value of the bid, in the form of a bid bond, cash, certified check, treasurer's or cashier's check.

The successful Bidder shall be required to furnish a Performance Bond and a Labor and Materials Payment Bond each for the full amount of the Contract price.

The Authority reserves the right to reject any or all Bids, to waive informalities, to advertise for new Bids or proceed to do the work otherwise, as may be deemed to be in the best interests of the Authority.

This information may be viewed at the MBTA website:

<http://www.mbta.com/newsinfo/geninfo/projects/contractadmin/solicitations/>

Slattery Skanska Inc.

Is Seeking participation From Certified M/WBE Subcontractors To Bid On The Following Contract:

New York Power Authority Poletti 500 MW Power Plant Project

Contract No. Q-02-2830PL - Send quotes to: 16-16 Whitestone Expressway, Whitestone, NY 11357

Attention: Mr. Gene Lempicki or call Roi Smith @ (718)632-4880. An EEO/AA Employer

POLLS

INFORMATION TECHNOLOGY

Digital Blueprints Are Worth It

THE INFORMATION TECHNOLOGY revolution in U.S. commerce is prompting more construction professionals to rethink a long-enduring industry symbol—the paper blueprint. This week's *enr.com* poll seeks viewer opinions on whether project blueprints should be brought into the electronic age. More than one-third of the 320 poll respondents support digitizing blueprints but with access limited to industry professionals and emergency personnel. Others believe the conversion may be too difficult or expensive (see chart).

"This information should not be available to the public for obvious reasons," says one respondent. "For existing structures, make the digitized

drawings part of the emergency management plan. This could be submitted and held by the insurance carrier and

local emergency response teams." He adds that "the important thing is to phase the process in on existing structures to avoid a scramble and drain on resources."

Frank Kaylor, engineering technician at the Virginia Transportation Dept., agrees,

noting that digital blueprints would allow faster access to plans and would benefit historic building renovation. "But we should restrict access on key government buildings and large public use structures," he adds. "Basically it's a good idea, but it would take years and an obscene amount of money to complete."

But Dianne Kilwein, a principal of Dudek & Associates, Encinitas, Calif., believes the effort is worth it. "I was surprised that the 'maybe' answer rated the lowest [response]," she says. "That led me to believe that digital copies weren't worth the time and cost, which I don't believe." Kilwein says "there is a middle ground. One way is to start a digital library of all new jobs. This would keep costs low. Then you can determine which past projects are worth digitizing."

By William J. Angelo

SHOULD ALL PROJECT BLUEPRINTS BE DIGITIZED TO EXPEDITE PERMITTING AND EMERGENCY NEEDS?

37% YES—but only made available to construction and emergency personnel.

25% NO—this is not realistic because many documents are missing or incomplete.

23% YES—blueprints should be distributed as soon and as widely as possible.

15% MAYBE—the task could take years and cost millions.

Sound off on industry issues! Vote and comment in ENR's biweekly poll located on our Website, enr.com.

ADVERTISERS

ABB Automation	*37
AC Dellovade Inc	*67
Accord Development Group	*17
ACIPCO/American Ductile Iron Pipe	*26-27
Adecco Technical Energy Division	*82
AGATE Inc	*58
Aldridge Electric	*39
Aluma Systems	*23
American Institute of Architects, The	*116
Angelo Iafate Construction Co	*120
Applied Bolting Technology	*57
ARB	*15
AW Hutchison & Assoc LLC	*32
Babcock & Wilcox	*82
Ballast Nedam Construction Inc	*120
Bechtel Corporation	*33
Bentley Systems Inc	*2nd Cover-1
Big Top Manufacturing	*17
BNi Books	*117
BOLDT	*3rd Cover
Brasfield & Gorrie	*71
Butler Heavy Structures	*66
C/S Group	*61
Cajun Constructors	*79
Carter & Burgess	*25
CertifiedPower Systems	*72
CH2M HILL	*4th Cover
Chemical Company, The	*17
Chevrolet Truck	*4
Cives Steel	*30
Conesco Industries Ltd	*121
CONEXPO-CON/AGG 2002	*3rd Cover
Densification Inc	*17
design components inc	*71
DMJM+Harris	*10

DYWIDAG-Systems International	*64
ecology and environment inc	*47
ECS Ltd	*120
EMCOR Group Inc	*12
ENR Website	*72
Formwork Exchange	*76
Forney Inc	*115
Foster Wheeler	*82
Graycor	*39, 84, 118
Greenman-Pedersen Inc	*121
H&S Tool Inc	*31
Hardhatjobs.com	*84
Harmon Limited	*19
HB Zachry	*69
HCSS/Heavy Const Sys Spec	*114
Helbling & Associates Inc	*84
Henwood Energy Services	*65
Holnam	*10
Hooper Corporation	*62
Horizon Group International	*80
Kelly Klosure Systems	*29, 114
Maxim Crane Works	*19
MC ² /Mgmt Computer Controls Inc	*8
Michael Latas & Assoc	*114
MJ Electric Inc	*36
Naylor Pipe Company	*31
NEPCO	*2-3
NLMCC/NECA-IBEW	*2-3
Northeast Generation Services Company	*38
Northwest Pipe Company	*67
Nucor Corporation	*110-111
Onsite Energy Services	*56
Parsons Brinckerhoff	*6
Parsons Energy & Chemicals Group	*84
Poly Hi Solidur	*59

Primavera Systems Inc	*50, 4th Cover
Primesouth Inc	*14
Proco Products Inc	*77
PS International Inc	*76
PSI	*117
Ragnar Benson Inc	*46
RCI Construction Group	*60
Reliant Energy	*16
Safway	*41
Santos CMI	*40
Sargent & Lundy LLC	*42
Shaw Group, The	*9
Sheehy Drayage Co	*46
Siemens Westinghouse Power Corp	*83
Skanska USA Inc	*70
SM Electric	*4
Sprung Instant Structures Inc	*18
Stewart & Stevenson	*48-49
Structural Preservation Systems	*34
Sunbelt Rentals	*44-45, *82
Swing-Lo Suspended Scaffolding Co	*52
Teton Industrial Group Inc	*68
TIC Inc	*55
United Technologies Research Center	*121, 122
Unitex	*83
Utility Engineering	*74
Victaulic Company of America	*20
Voss Engineering Inc	*73
Walhonde Tools Inc	*86
Wheelabrator Air Pollution Control Inc	*75
ZRC Worldwide	*72

*Indicates Powerplant Construction Section

EDITORIALS

Industry Should Gear Up Now For Guide to Risk Assessment

Since the world as we knew it changed on Sept. 11, many construction industry groups have organized conferences and meetings to consider how potential changes in design and construction can mitigate the impact of such acts of terrorism on structures. But how far should we go? Should we be designing for blast resistance, security, bioterrorism or hazards of all kinds? So far, it has been just a lot of talk, with few conclusions except that there might be a problem.



But we must start putting some of the talk, ideas and musings to work in order to help owners make necessary decisions about security upgrades for their existing and planned facilities and to help calm an understandably jittery general public.

Not all buildings, facilities and infrastructure are potential targets and devising a meaningful risk assessment guide is the key to determining how far they should be hardened against attack. For example, what is the likelihood of a car bomb attack against a particular building or facility? A plane attack? A bioterrorist attack? Or, how about the risks associated with an otherwise unremarkable building in close proximity to a signature building, train station, arena or bridge?

Once the risk is determined, the industry also should suggest what kind of remedial action needs to be taken in order to meet that risk. Does the building at risk really need concrete planters to keep truck and car bombs at bay? How about laminated glass near the base? How about battery-powered lights in stairwells? Is there a real need for blast-resistant concrete or structural redundancy? How much money should be spent?

It's time for the industry to step forward and produce a comprehensive tool to help owners and others trying to make those decisions. It should give them ways to evaluate and rank how their specific facility would likely perform in an emergency, based on the physical attributes of the building, its components and materials, and life safety, security, air handling and management systems.

With its new Anthrax Matrix, the U.S. Occupational Safety and Health Administration is on the right track, but too narrow of a gauge: The guide is designed only to help employers assess the risk of exposure to anthrax in the workplace and guide them in taking precautions against the hazard.

Buildings might be ranked in a manner similar to the Energy Star ratings for products, or the Building Energy Per-

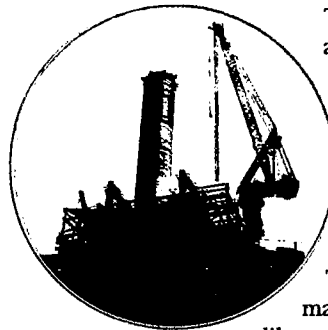
formance Standards developed during the energy crisis of the 1980s. Such rankings not only would help in decision-making but also could be used in marketing buildings.

One logical candidate to take the lead in developing such a scorecard system is the Council on Tall Buildings and Urban Habitat, whose interdisciplinary task force on how to improve the emergency performance of buildings is meeting for the second time on Dec. 9 in London. Another possibility is the National Institute of Building Sciences. They could work with specific interest groups—fire, security, controls, air-handling systems, building products and materials, structures and the like to develop the criteria for the rankings and the required matrices.

Support for this initiative should come from the federal Office of Homeland Security, U.S. General Services Administration, Building Owners and Managers Association and other public and private owner organizations. The scorecards should be developed as soon as possible—not in a year but in six months or sooner. There's no time to waste.

Power Market Shows Signs Of Traditional Boom, Bust

Some market events can be planned for and others cannot, but the construction industry and government are notorious for making the wrong decisions that contribute to boom-bust cycles. This is counterproductive to the efficient mobilization of people, equipment and materials and contributes to loss of productivity.



The power market is showing all of the symptoms of this disease. Uncertainty in the 1990s over deregulation of power in the U.S. slowed powerplant construction while owners sorted out what the new rules would be and how to make money. The resulting pent-up demand for electricity hit the U.S.

like a ton of bricks. Between 1999 and 2001, about 83,000 Mw of new capacity has come on line and there are projections of another 300,000 Mw to 400,000 Mw in the pipeline. Much of the proposed capacity will never be built, to the relief of many. But there is enough moving forward to tax the manpower and other resources in the industry. In the last three years, for example, demand for union boilermakers has risen 54%. Some crews are working seven 12-hour-a-day shifts at powerplant projects.

The crunch is being exacerbated by arbitrary Environmental Protection Agency deadlines for tightening up emissions at certain coal-fired powerplants. Owners would like a short one-year extension of those deadlines to gain some breathing room. New powerplant work is projected to drop in a year or so and the feds can help ease the blow to the industry and the public with such an extension.



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Joe Wesley, CEO-President, AmQuip Corp., Bensalem, PA

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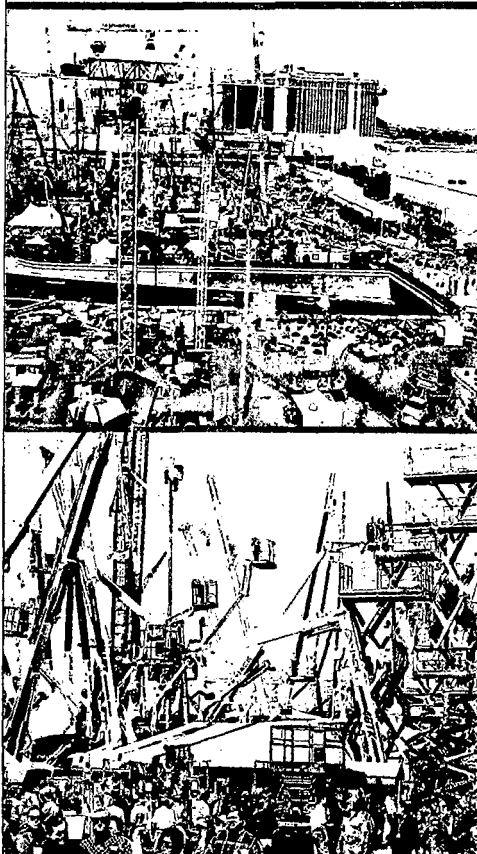
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The guy next door thinks Rudy's CIA.

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