

# THE **NEXT** GENERATION

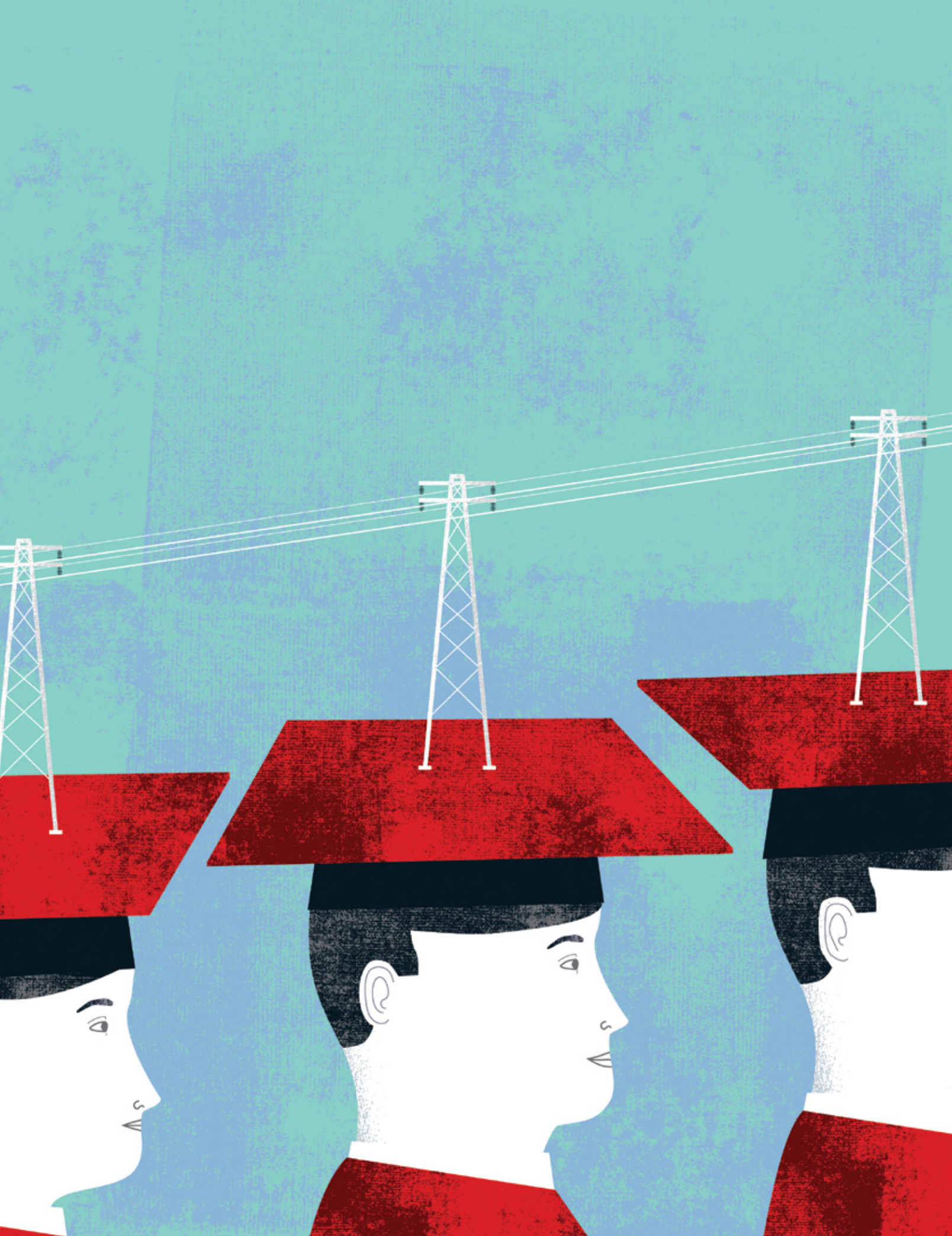


TRAINING A FUTURE WORKFORCE

BY WILLIAM OPALKA

ILLUSTRATION BY MICHAEL AUSTIN

**W**hen Al Zeits started a wind energy technology program at an Iowa community college in 2004, he optimistically expected 12 to 15 students per year to supply trained workers for a burgeoning local industry. **He was off, by a bit.** In the current term there are 60 students and for fall 2008 he's expecting 90 students in the two-year program, which is now one of a dozen like it throughout the United States. Even so, the wind industry is still wondering if it will have enough qualified workers to operate and maintain – let alone build – dozens of projects from coast to coast.



“One of the key things about the industry is that it’s growing so fast, all these programs combined from all these community colleges still won’t provide enough trained workers,” Zeits said.

And that’s just one sliver of the overall utility industry that many characterize as in crisis mode due to its rapidly aging workforce. Utilities are trying to replace a workforce that could shrink by half through retirements over the next decade while simultaneously entering a boom phase in building needed generation, transmission and distribution infrastructure. The acute labor shortage is recognized throughout the industry, which has led to innovative training and recruitment programs that enlist not just utilities and community colleges, but labor unions, government agencies and community-based organizations from coast-to-coast.

The unique demands of utility work, which include the basics of electronics, math, hydraulics, engineering, the requirement to work outdoors in all kinds of weather, climb poles and towers — wind towers often exceed 200 feet — present a daunting challenge for some utility recruiters.

Even some innovative programs are planned not just to retrain existing workers for more duties but to recruit and train new workers for thousands of jobs that will build, operate and maintain utility networks during the anticipated

building boom. After deregulation of the electric industry started in earnest a decade ago, the relentless pressure to cut costs led to cost-cutting, reduced hiring and the dismantling of in-house training programs. Unions say a wave of buyouts of experienced workers continued in recent years, leading to an epidemic of forced overtime for those who remained. The industry is now addressing that challenge.

The International Brotherhood of Electrical Workers is collaborating with utilities to jump-start training of a new generation of workers.

Jim Hunter, IBEW’s director of the 200,000-member utility branch, said final details are being worked out to create a joint union-utility trust fund to finance training of new workers and sharpen skills of existing employees. “This is something we’ve done for quite a long time on the construction side with contractors contributing 1 percent of payroll,” he said. The union even envisions former workers imparting a lifetime of knowledge through these programs.

IBEW is proposing five centers set up in Arizona, Florida, Kansas, Michigan and Washington by the summer at former utility facilities. These training facilities would not only serve the host utilities but other companies in surrounding areas and states, and also would be available in fee-for-service contracts for individual training courses. Not only would the courses provide

# Wanted: Nuclear Engineers

STAFFING THE FUTURE FLEET

BY MARK A. PRELAS (GUEST OPINION)

## As a professional

nuclear engineer who has worked in the field for many years, I find myself wishing that I were 30 years younger because the demand for nuclear engineers is great and it will only get better. I am not the only mature nuclear engineering professional harboring this wish because there is currently a global shortage of nuclear engineers. This shortage is nothing like the shortage of computer science graduates during the dot-com era about 10 years ago. One important difference is that there are not many universities in the world that offer degree programs in nuclear engineering, whereas the shortage of computer scientists during dot-com era was localized to the

United States and there were a lot of degree-granting programs worldwide capable of graduating computer scientists. Thus other countries were able to supply the competent computer science professionals needed to keep the Internet revolution going.

With nuclear engineering the situation isn’t going to get better soon because the world’s institutions of higher learning simply do not have the capacity or resources to keep up with the current demand much less projected future demand for professionals. New degree programs in nuclear engineering will not be able to start up quickly because of a shortage of qualified faculty and the cost of the infrastructure required to start a program. Additionally, employ-

ment in nuclear engineering will be a long-term proposition because energy is a component of the world’s basic needs. Nuclear engineers also play an important role in the national security of the United States including contributions to the military and defense structure.

So it would be wonderful to be 30 years younger because students who graduate with a nuclear engineering degree today are widely coveted by the nuclear industry.

You probably are wondering if my optimism about the nuclear engineering profession is misplaced. To answer this question, let’s start by looking at the age demographics of nuclear workers in the industry, which encompasses utilities, vendors



the skills needed by prospective employees who would go work for a utility, the centers also would screen applicants for their appropriate fit in different roles. Before mistakes might be made in placing an employee who is ill suited for working in harsh weather, for instance, that person may have skills for power plant operations. There are also high failure rates in some entry-level screenings that many hope the programs would alleviate.

An industry-led consortium, the Center for Energy Workforce Development, has just celebrated its second anniversary. It serves the electric, gas and nuclear industries. “Our focus is on the skilled crafts that our companies are telling us will become a critical need in the short term,” said Mary Miller, the organization’s president.

To that end the organization is identifying best practices, training methods and courses that can be replicated through apprenticeships, community colleges courses and other employment programs. It has started outreach efforts and was ready to launch a branding campaign. It holds regional meetings with member companies to share its experiences, which it did in March with Pacific Gas & Electric.

PG&E and its 20,000 employees mirror industry trends – 42 percent of union workers and 50 percent of management employees are eligible to retire within the next five years.

“We’re beginning to put candidates in the pipeline as

we are developing strategies to bring more workers into the skilled crafts and trades,” said Van Ton-Quinlivan, director of workforce strategy and diversity at PG&E. A pilot program, Power Pathway, started in mid-March with its first 100 students, chosen from a pool of 3,700 applicants.

Ton-Quinlivan said the program is unique in that it will rely equally on three segments to help create qualified workers. The utility provides the expertise and training, with the potential of employment at the end. Community colleges provide facilities and knowledge in operating an educational program with candidates that need assistance in English and math. Community-based organizations, like workforce investment boards funded by government programs, identify qualified candidates and help shepherd them through the process.

Part of the community focus is to have the organization function as job coaches for the candidates. “With the three legs working together, there is a better chance of job retention. The health care industry has tried this with companies and community colleges, but it has been less successful without the third component,” Ton-Quinlivan said.

Depending on the economic circumstances of the applicants, candidates may be responsible only for purchasing their own boots. People who complete the 12-week course are considered “job-ready candidates” ready to be hired by the company.

and government. The Nuclear Energy Institute (NEI) did a survey of the U.S. nuclear workforce in 2007, which illuminates the problems that the industry faces. Between 2007 and 2012 about 35 percent or 19,600 current nuclear utility workers will be eligible to retire. Over the same five-year period it is projected that an additional 11 percent or 6,300 nuclear workers will leave the workforce due to attrition. If you further examine the numbers in the NEI survey for vendors or if you look at the nuclear workforce projections for the government, the story is basically the same – the age demographics problem is universal to the entire nuclear industry and it is specifically true for nuclear engineers.

Another piece of the puzzle can be found by examining how the ages of nuclear workers are distributed. The nuclear workforce age distribution has two peaks – one smaller than the other. The highest peak

occurs for workers between the ages of 45 and 65. There is a valley for workers between the ages of 32 and 45 and a small peak for workers between the ages of 20 and 32. This distribution tells us that the retirements over the next five years are only the beginning of the workforce problems in that a lot more of the workforce will be eligible for retirement in 10 to 20 years. The age demographics for the nuclear workforce alone point to a pretty good demand for new nuclear engineering graduates. But since the nuclear industry is not stagnant, there are other factors that will magnify the workforce problems of the global nuclear industry and will assure good careers for nuclear engineering graduates.

First and foremost of these factors is the world’s demand for energy. The U.S. Census Bureau has projected that the world population will increase to 9 billion people by

2042 from approximately 6.6 billion people today. It is well known that high-quality energy sources such as electricity and oil are directly linked to economic growth and access to food, medicine, housing and education. For example, in the past decade, two of the world’s most populous countries, China and India, have had unprecedented economic growth and this has played a major role in the price of oil climbing to more than \$100 per barrel.

The future holds more uncertainty. The competition for scarce energy resources will only accelerate as more people in the world participate in the economic benefits of globalization and as world population grows. Governments will face many problems – one of the most pressing being energy. As they face daunting energy concerns, countries are getting serious about building a new generation of nuclear power plants. According to the Nuclear

IBEW members, tree cutters who are not employed by the utility but are seeking skills to qualify themselves for positions at PG&E, are among the first participants.

The Progress Energy Foundation, benefiting programs of the southeastern utility, distributed \$1.6 million last year to continue existing programs at educational institutions throughout North Carolina and to develop new programs. It has had long-standing relationships to encourage students to pursue careers in nuclear engineering at universities, or to learn trades at community colleges, said Woodie Dicus, manager of corporate community relations for the Raleigh-based Foundation.

The Foundation and the human resources department at Progress Energy are currently planning high school programs to encourage students to pursue technical careers that could lead to a utility job, not necessarily at Progress. "And we already have a program at a community college in the northern part of the state training prospective linemen, so we are considering adding another one in the southern part. We're also thinking about expanding this into Florida," she said.

Government institutions have gotten into the act. The U.S. Department of Labor's Employment and Training Administration recently announced grant funds under the President's High

Growth Job Training Initiative for the Energy Industry and for Construction and Skilled Trades in the Energy Industry.

The recent interest in expanding these programs seems to mirror recent industry trends. Training that was available a decade ago fell by the wayside, only to be revived in the last couple years as the need for ready workers became acute. That certainly appears to be the case with Iowa's Zeits.

He went through a similar wind energy program in Minnesota over a decade ago, a program that soon after disbanded due to lack of enrollment. By 2004, interest in wind technology returned and the program in Iowa became the first in this new breed. The Iowa Lakes Community College offers an associate degree in wind energy and turbine technology, and currently has students from Vermont to California enrolled. The first class lost a few students along the way, but 11 are now working in the wind industry. "We moved into our own building and we're already looking to double our space," said Zeits, who also has seen his program grow from one faculty member — himself — to four.

Programs that offer two-year community college degrees or certificate programs have sprouted up throughout the Corn Belt and western states from Texas to Washington, attracting members of farm families and ex-military men and women near their hometowns. ☺

Energy Institute "some 17 companies and consortia are pursuing licenses for more than 30 nuclear power plants in the U.S. The U.S. Nuclear Regulatory Commission has begun reviewing the first wave of applications." South and East Asia have been very aggressive in developing nuclear power. In this region there are more than 109 nuclear power reactors currently in operation, 18 under construction, and there are plans to build about 110 more primarily in China, Japan, South Korea and India. In Europe, there are a total of 197 nuclear plants in operation and 13 units under construction in six countries.

The other factor that will impact the growth of nuclear power is the general consensus among nations that humankind has directly impacted climate change by carbon emissions. At some point carbon emissions may be limited by global agreements using mechanisms

such as a carbon tax. If carbon emission reductions occur, then this too could add to the global growth of nuclear power.

Putting together the infrastructure and workforce to begin the large-scale construction of new nuclear power plants is challenging. However, as an academic involved in the education of nuclear engineers, I believe that the academic sector receives the least amount of attention but may be the most critical driver of the whole nuclear enterprise. Nuclear engineering programs are losing faculty. Some of the losses are predatory where programs raid faculty from one another. But, some losses are to the nuclear industry, which drains the pool of qualified faculty. This is a serious problem because the few remaining nuclear engineering programs are responsible for educating the future generation of nuclear engineers including future faculty. Without a

well-oiled pipeline of future faculty, the academic enterprise is in danger of withering.

How do we assure a healthy nuclear engineering academic enterprise? I believe that it is important for the nuclear industry to take ownership of the problem by becoming a strong advocate for the academic enterprise. The nuclear industry can be effective by cultivating and educating the leadership of universities and state governments and by emphasizing the importance of nuclear engineering education to economic development. It is also imperative that the nuclear industry invest in the few remaining academic programs to assure their health and survival. For nuclear engineers, as the Pat McDonald song goes, "The Future's So Bright, I Gotta Wear Shades."

*Mark A. Prelas is professor and director of research at the University of Missouri-Columbia Nuclear Science and Engineering Institute.*