# Transformers Aren't the Only Aging Utility Assets

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## Executive Summary

The issue of an aging and retiring workforce has become an unprecedented problem in the electric power industry. Up to 50 percent of electric utility employees in North America will be eligible to retire in the next five years. As a result, many utilities are concerned about the loss of a significant knowledge base. Recruiting and retaining employees is becoming a huge challenge. The number of undergraduate engineering students in the US continues to decline. In China and India those graduating with an engineering degree number 40 percent whereas in the United States, only four percent are graduating with engineering degrees. What's more, retirements are happening at a record pace.

In the winter 2005-2006 issue of *NETA World*, I wrote an article titled: *Knowledge Loss: Our Aging Work Force*. The situation is becoming even more dire, and many feel that this is the most serious issue to ever confront the electric power industry.

This 2009 update discusses programs to handle knowledge transfer, how to capture both documented and undocumented (tacit) knowledge due to retirements and the shrinking workforce, and utility partnerships set up with local colleges and universities. If this issue of "brain drain" is not addressed, there will be huge financial consequences to the electric utility industry. It is important to point out that even though I mention the word "utility" throughout this article, the issue affects all aspects of our industry--- testing and maintenance organizations, manufacturers, suppliers, etc. The recommendations can be applied to most any organization in our industry.

To prepare for the wave of retirements coming and the consequential loss of knowledge, electric utility managers should make preparations. These include taking an assessment of their existing talent pool and identifying those who will be leaving in the next three-to-five years, identify where the utility may have worker shortages, and decide how these shortages will be filled. It is crucial that an organization identify its critical skill areas. For most utilities the jobs that will experience the most retirements during the next five years are also those that will be the most difficult to replace. Managers should also identify which knowledge is most critical to their business and whether cross-training positions could assist in the knowledge gap. One of the most important actions to take to prepare for the knowledge loss is communication. This includes having dialogue with younger employees about their career development plans and with baby boomers about their retirement plans. Career paths should not be a mystery, and employees should receive honest and regular feedback on their strengths and weaknesses.

Another important recommendation for all organizations is identification of must critical job functions and documentation of them. It is most beneficial to involve not only those who are performing the job function but also those younger workers. Involving the younger workers will result in a learning experience with some unofficial "knowledge transfer" taking place. Remember also that younger employees can also provide a fresh look at processes, methods and systems. Succession planning and knowledge transfer are key elements of an organization avoiding the "brain drain."

## Summary of Recommendations:

- Assign a key person to address the issue of "brain drain" and to implement a plan to address it.
- Conduct a workforce analysis and assessment.
- Document all knowledge, especially the tacit knowledge.
- Develop a succession plan.
- Create a better image for a career in power engineering in order to attract young talent.
- Implement leadership development programs.
- Conduct knowledge transfer programs.

## Background and Situation

The aging of the workforce is becoming an alarming problem for our industry as the 78 million baby boomers are beginning to retire. The baby boomer group represents 44 percent of America's workforce. If people continue to retire in their early 60s this could result in a variety of problems, including labor shortages and — even worse — a loss of knowledge and expertise. This problem is particularly prevalent in the electric utility industry with up to 50 percent of electric utility employees in North America being eligible to retire in the next five years. By 2010, the majority of our workforce in the utility industry will be over the age of 50. Recruiting and retaining employees is becoming a huge challenge. Since 1990, the level of the workforce in the electric utility industry has dropped more than 23 percent, while power generation has increased more than 30 percent, according to a Carnegie Mellon University electricity industry survey. This same survey also reported that demand for line workers is expected to grow by nine percent each year, with 10,000 new jobs opening up in 2010. What's more, approximately 1,000 power plant operators will be needed each year for the next 10 years. For example, Lakeland Electric, a municipal utility in Florida reported that 53 percent of its 248 power plant employees are eligible for retirement in the next five years.

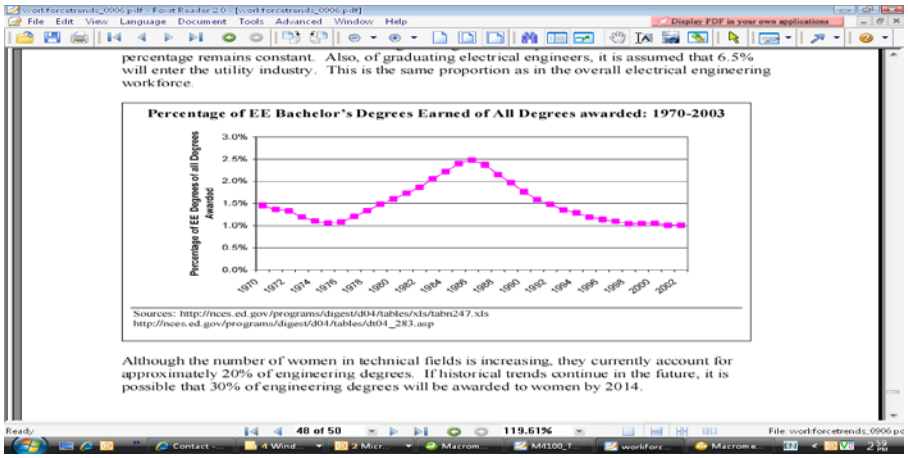
As mentioned previously, the electric power industry has been known as a stable employer; however, the average age of employees in the electric power industry is the highest in the world. According to data obtained from the U.S. Department of Labor and U.S. Department of Energy, the median age of electric utility workers is 3.5 years higher than the median age of all other workers from all other US industries. Because of this, the electric utilities are some of the first to see a shortage of workers in the near future.

The International Journal of Human Resource Management recently conducted a survey of 100 electric utilities in the United States. Seventy-three percent of those responding to the survey identified the aging workforce as the number one HR-related issue facing the electric power industry today. Fifty-seven percent of the respondents stated their average age of an engineer is 47 to 49 years old and that 16 percent of their current employees are now eligible for retirement. They also reported that most of those approaching retirement are not interested in staying at the utility past retirement. The survey also concluded that there will be a particular shortage of engineers in the 35-to-45 year range with practical electric power experience. Those who attend the Annual Doble Client Conference would agree that there are very few engineers in attendance in the 35-to-45 year range. Most would estimate this age group of attending engineers to be as low as five percent. Many utilities may be forced to hire managers in this age group who are experienced managers and leaders but have little or no practical utility or power experience. This puts a particular emphasis on the need to document knowledge—specifically tacit knowledge. The later will be discussed further in this article.

According to the Bureau of Labor Statistics, electric power industry workers are already older than the national average. For example, the average employee is 48 years old at National Grid in Westborough Massachusetts, one of the largest utilities in the world. At the same time, the number of undergraduate engineering students in US continues to decline.

University Power Engineering programs are essential if we are to have future workers in the electric utility industry. According to the January 2003 Issue of *IEEE Power & Energy* magazine, in the 1970s approximately 10.5 percent of electrical engineering students concentrated in power engineering, whereas in 2001 this dropped in half to only 5.9 percent. Many top-tier colleges and universities have either discontinued their power engineering programs or scaled them back significantly. At the current rate there are only approximately 680 new electrical engineering graduates entering the utility industry each year. If this continues, demand will surely exceed supply.

## Table 1
### Percentage Earning a Bachelor's Degree in Electrical Engineering




Source: US Department of Energy

Table 1 shows the percentage of electrical engineering bachelor degrees awarded from 1970-2003. One can easily see that there continues to be a drastic decrease in the amount of these degrees being awarded in the United States.

Adding to this problem is the fact that many highly regarded professors in electrical engineering have retired with no one at the university to take their place. Yet while the number of faculty members teaching electrical engineering in the US has decreased, outside the United States the number has increased.

Fewer graduating engineers have electric power backgrounds, and first-year enrollments for engineers have declined 2.5 percent since 2002. Part-time enrollments have declined 16 percent. Declines are expected to continue. In recent years, only around one percent of the bachelor degrees awarded in the United States has been in the field of electrical engineering. The Department of Energy has reported that on average only about 6.5 percent of electrical engineering graduates actually enter the utility industry. The other change that has occurred in electrical engineering at universities is that the majority of students in the programs are from outside the United States. According to IEEE, 50-70 percent of electrical engineering students in the US come from abroad. Many of these students, after receiving their engineering degrees, return to their native countries rather than entering the US utility workforce.

Many in the industry agree that in the 1990s when there was a huge push for deregulation and competition, many utilities cut back their payrolls and training programs and also offered attractive severance packages for those wishing to take an early retirement. Thousands of experienced engineers (many with 30 + years of experience) opted for the financially attractive early retirement packages. The downfall was a tremendous loss of knowledge -- very quickly. This was all further fueled by the desire for electric utilities to improve their financial statements (expenses in this case) as much as possible so they could either be merged or acquired. Many in the industry remember the tremendous amount of mergers and acquisitions that occurred in the electric power industry in the 1990s. There was also a boom in telecommunications in the 1990s, and many engineers left the electric utilities to work in that industry. Electrical engineering college graduates were also attracted to the "coolness" of telecommunications and often viewed utilities as too stable or boring.

A recent report published by UTC Research stated that while 90 percent of the utilities surveyed recognized that there is a problem with aging workforces and loss of expertise, only half of them had programs to minimize the loss of expertise. Of all the major issues confronting utilities today including deregulation, industry mergers and consolidation, the need to build more transmission and generation, and reduction of expenses — the aging workforce and loss of expertise is the greatest and what many are calling an unprecedented challenge for our industry.

The issue of an aging workforce involves the entire utility—from the linemen to the CEO. The average lineman is over 50 years old, and by 2010, as many as 60 percent of electric utility linemen will retire. Some have estimated that the shortage of linemen in our industry could amount to 10,000. In the next four years, nearly 50 percent of all utility CEOs will be eligible for retirement. At a recent CEO conference hosted by the National Rural Electric Cooperative Association (NRECA) a survey was made of CEOs present, and only 29 percent strongly agreed that they have a successor in place to become the next CEO of their Coop.

Electrical utilities are losing not only "explicit knowledge" from retiring workers — knowledge from books and manuals, but also "tacit knowledge"—tricks of the trade (experience).

Al Marrocco, President of United Power Group in Brockton, Massachusetts recently told me that all of us in the industry "need to be encouraging young people to go into power engineering" as a career. He went on to say that maybe state schools should provide more engineering programs and consider funding power programs for those students who might need financial aid.

## Summary of Recommendations:

1. Increase interest in the electric utility industry profession; improve awareness and value of electric power engineering as a career. This includes changing the perception of the power engineering profession so the public realizes that it is not old-fashioned, stagnant, or obsolete. The US Department of Energy has recommended that students in high school and even grade school be given more math, physics, and chemistry courses so they are encouraged to pursue engineering at the college level. To attract younger power engineers we need to create greater appeal and interest in the electric power profession.

2. Develop leadership development programs and career paths for existing utility employees. These programs are also an excellent retention tool for your workforce. Retention plans should also be developed — reward your high performers. It's a lot easier and less costly to keep your current high performing employees than it is to recruit new ones.

3. Conduct a workforce analysis and overall assessment. This assessment of your workforce should include identifying all critical positions and any gaps. Many utilities have assigned "ratings" to each of their key employees on a scale of 1-to-5 for least difficult to replace to extremely difficult to replace. Those workers who are extremely difficult to replace would be those who possess critical and unique knowledge to the organization and whose knowledge is not documented. After doing this assessment, your organization should be able to answer the following questions:

- Who will be leaving in the next five years?
- What is the strategy to address worker shortages?
- What knowledge is most critical?
- Have we documented our most critical knowledge?
- Have we discussed career paths with our key employees?
- Are there programs in place for succession planning?

4. Encourage retirement-eligible workers to remain in their positions. One suggestion might be a 20-hour work week for retirees or job sharing among two or three retirees. Many older knowledge workers would like to stay employed on a reduced schedule. A reduced schedule also allows employees to better transition to retirement.

5. Develop formal knowledge transfer programs along with implementing mentor programs. Make sure all intellectual knowledge is documented, bearing in mind that there is tacit and explicit knowledge.

6. Document procedures with the most crucial first. The documentation should include the often forgotten, but more important—tacit knowledge. These "tricks of the trade" are most valuable. The Electric Power Research Institute (EPRI) has estimated that as much as 80 percent of the knowledge that a person uses to carry out his or her job is undocumented. Ask the question "What are you most worried about your company not knowing when you retire?"

7. Open up conversations and have dialogue with your workers about retirement and also succession planning. This dialogue is critical for proper planning especially in the area of knowledge transfer. Succession planning is not just for "C" level executives; succession plans should be developed for all positions and high performers.

8. Form "multigenerational teams." Those with gray hair are not the only ones who have good ideas. In fact many Generation Xers will have a new fresh outlook on how something can be done. Those on the team should include the employees actually doing the job and not just their managers. Involving the multiple generations on the team assists in the process of knowledge transfer and helps make the process much more effective and even a little fun.

The impact of knowledge loss in the electric utility industry can be mitigated by implementing the foregoing recommendations.

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