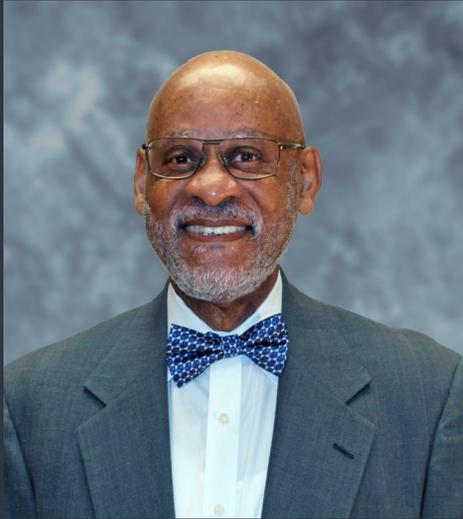


Issue 1

January, 2019



Lawrence P King
Publisher

Curiosity, new legislation, new materials, market fluctuations, lifestyle, and serendipity all contribute to energy advancement. Along the way new careers have opened and opportunity expanded.

Lawrence King
P.O BOX 2028
Mableton, Ga. 30126
E-MAIL: larry4475@gmail.com
PHONE: 770.262-9186

STEM NEWS CHRONICLE™

STEM NEWS CHRONICLE

Energy and Our Future

Traditional Energy and Energy Efficiency sectors in 2017 employed approximately 6.5 million Americans. Employment in the field is in four sectors.

Electric Power Generation and Fuels;

Transmission, Distribution and Storage;

Energy Efficiency; and

Transportation Vehicles

With expected shortfalls of 1-2 million unfilled jobs in science-, technology-, engineering- and math- (STEM-) related industries over the next decade, it will be imperative to attract and retain more people – including underrepresented populations – to join the STEM workforce as a priority.

There is demand for skilled workers across our energy sector including oil and natural gas, electricity generation, renewables, efficiency, and carbon capture.

This issue offers a few perspectives from energy professionals on emerging and existing technologies and how their work relates to a sustained engineering/science workforce pipeline. Our articles are intended to identify gaps in the energy workforce pipeline, and provide insights to achieve diversity and inclusion as new technology is incorporated.

SNChronicle is a quarterly newsletter with a global readership.

IN THIS ISSUE

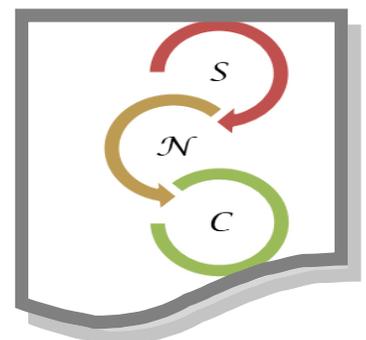
Report from Chilean Electric Busses

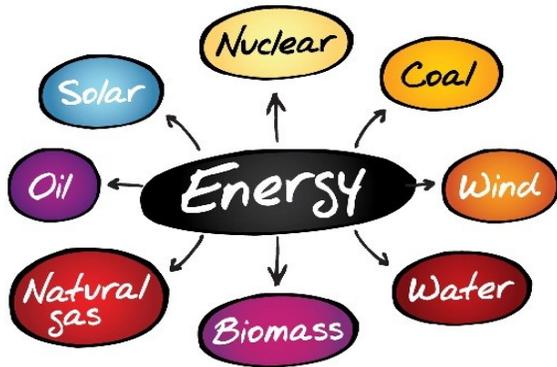
Aging Nuclear Power Workforce

CleanTech, Jobs and Technology

Boosting Diversity

SE Michigan STEM Summit





If we continue to make the permitting and licensing process for nuclear energy prohibitively expensive and continue the move away from fossil fuel sources where are we going to get energy from?

Renewables, Solar, and wind are currently under deployed and underfunded sources in the US and don't have the same hurdles. While protecting our health and environment is as important to me as it is to others, we need to use our passions to

move policies and investment strategies to be less reactive and more supportive of alternatives to fossil which includes nuclear. The upfront costs, safety systems redundancy are expensive in nuclear energy and the technologies associated with them are complicated.

A large problem with nuclear energy is the disposal of radioactive wastes and hazards linked to it, but on the fossil side Southern Company, TVA and others are maintaining large coal ash waste ponds which also represent a looming present environmental danger. In total, advantages of nuclear in my opinion outweigh the disadvantages because nuclear energy as an effective strategy to combat climate change.

Nuclear is safe and proven in our defense, medicine, and space exploration strategies and should be supported rather than feared because poor policy decisions, corporate mismanagement, and permitting barriers have given this energy source a bad rap.

Lawrence P King

Report from Our Readers in Chile

America's urban centers wrestling with mass transit are watching with interest the accommodation of electric busses in the Chilean capital of Santiago. Chile's ambitious plan includes along with buses, the rollout of electric scooters, cars and taxis, as well as trucks for use in the mining industry.

The first 100 electric buses from China that Chileans hope will revolutionize their public transport system have arrived. The operation and maintenance costs of an electric bus are also around 70 per cent less than those of a diesel engine, according to Chile's Ministry of Transport.



Charging Station



"Chile will be second only to China as a nation with the greatest quantity of electric buses in the world," according to Chilean President Sebastian Pinera. Studies by McKinsey and Bloomberg bear his claims out – of the 385,000 electric buses on the road worldwide last year, 99 per cent are in China.

Electric vehicle research and development represents a current opportunity landscape for students planning to enter university or who may be currently enrolled in an engineering or science discipline.

Arab American Association of Engineers and Architects

AAAEA is hosting the Engineer Poster/Essay Competition Do you know any Chicago area 3rd – 8th grade students interested in writing an essay/creating poster on a famed engineer?

Details at: <https://bit.ly/2PH92oc> Top students to be honored at Chicago EWEEK Banquet – February 22nd. <https://lnkd.in/esBCx9X>

Aging Nuclear Power Workforce

Every sector of the energy industry is expected to lose a large share of its workforce as thousands of experienced professionals become eligible for retirement over the next few years. The Nuclear Energy Institute estimates that 39 % of the nuclear workforce will be eligible for retirement by 2019/20, which means the industry must hire nearly 20,000 new workers over the next few years. Our electric and gas utilities are also experiencing their own future shortages of engineers and technicians.



In response to the industry's nuclear workforce need, several organizations have established action strategies to address imminent shortages of highly trained and skilled operators. In the US as well as the UK, groups are implementing strategies to proactively bring together private and governmental employers, educational institutions and economic development entities to work as partners. These groups are focused on the single-minded goal of ensuring that an adequately trained workforce is ready to meet the challenges posed by demand for a new nuclear workforce. But will the new workings be available when needed without the participation of underrepresented minorities?

Diversity is an important driver of innovation, creativity and financial performance of plant managers. Diversity impacts the foundation of productivity and will slow the outflow of our intellectual capital. The most obvious opportunity comes from the area of increased gender and racial diversity.

Traditional word of mouth and on the job training of utility workers is not a sufficient remedy for recruitment of minorities and women. South Carolina State University is the only Undergraduate Nuclear Engineering program in the state of South Carolina, and it is the only Nuclear Engineering program at an HBCU. In general, however graduation rates from all universities will not meet demand.

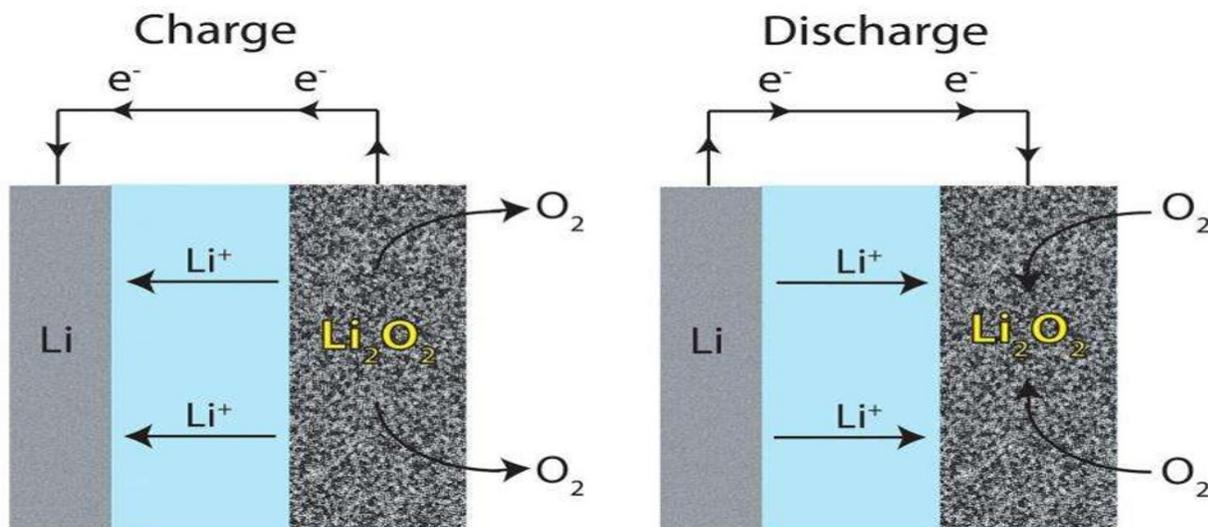
Not all Nuclear Jobs are technical

In additions to shortages in technically skilled operational categories, the largest US nuclear construction in Georgia,, Vogtle, has experiences persistent shortfall of nearly 350 electricians, pipefitters and related trade jobs.

Despite collaborations between the unions, plant construction leadership, community colleges, and economic development interests, this problem has persisted along with the availability of a workforce ready for training and certification.

Where Energy Job Growth and Economic Opportunity Exist

The technologies below related to energy under three key areas of accelerating change represent lesser-known career paths: Storage, Smart grid and Electricity generation. Storage - Lithium-air batteries: Advances in materials technology is enabling the advance of high energy Li-air batteries that promise an energy density that rivals gasoline, offering a five-fold increase compared to traditional Li-Ion batteries. More investment in universities expanding our critical mass of minorities and women in outreach and recruitment is required to sustain progress against our rivals in China.



Thermal storage: Often accumulated from active solar collector or from combined heat and power plants, and transferred to insulated repositories for use later in various applications, such as space heating, domestic or process water heating.

Distributed generation- Generates electricity from many small energy sources instead of large centralized facilities. Centralized power plants offer economies of scale, but waste power during transmission, and are inefficient in rapidly adapting to grid needs.

Electricity Generation - Micro Stirling engines: Micrometer sized power generators that transform energy into compression and expansion strokes. Could hypothetically be 3D-printed on the fly and cover entire heat-generating sur-

Boosting Diversity in Clean Energy (HBCUs)

The Historically Black Colleges and Universities Community Development Action Coalition and the Solar Energy Industries Association (SEIA) have agreed to start a new initiative to increase recruitment of African-Americans to the solar energy industry. This new effort will include hosting national job fairs, hosting individual job fairs at HBCU schools, and bringing solar companies to campuses for recruitment events.

The new recruitment effort is one of SEIA's many efforts to foster diversity and inclusion. This includes a best practices guide for promoting diversity in the solar workforce, as well as its Women's Empowerment Initiative, which provides networking, training and other development opportunities. These initiatives are part of an overall effort to prepare a cadre of trained minorities as essential to the workforce employed in industry jobs emerging in the next 12—15 years.



Power generation from Fuel Cells

There are exciting renewable energy career fields. One with potential in research, testing, and systems deployment is fuel cells.

Fuel cells can be used in a wide range of applications, including transportation, material handling, stationary, portable, and emergency backup power applications. Fuel cells have several benefits over conventional combustion-based technologies currently used in many power plants and passenger vehicles. Fuel cells are a promising technology for use as a source of heat and electricity for buildings, and as an electrical power source for electric motors propelling vehicles.

Why Study Fuel Cells

Hydrogen fuel cells emit only water, so there are no carbon dioxide emissions and no air pollutants that create smog and cause health problems at the point of operation. Fuel cells operate best on pure hydrogen. But fuels like natural gas, methanol, or even gasoline can be reformed to produce the hydrogen required for fuel cells. Two sites where evaluation of hydrogen fuel cell systems to generation power are;

- ◆ The Stark Area Regional Transit Authority (SARTA) in Ohio is deploying a small fleet of hydrogen fuel cell powered vans in its paratransit service, which provides transport for disabled people.
- ◆ Pennsylvania-based companies Peoples Gas and WATT Fuel Cell Corporation installed the first Imperium™ solid oxide fuel cell system at a residence in Westmoreland County at the end of September, kicking off the first field trial of a WATT SOFC system by Peoples Gas.

The Cleantech Industry - Economy, Jobs and Technology

Technologies related to clean energy are among the greatest contributors of American jobs, and a key contributor to the growth of our economy. For the last several years, jobs in renewable energy, storage, efficiency, EV and other cleantech markets have outpaced the National average by 15%. The industry now employs over 3.3 million Americans, which is around 3 times more than Americans employed in fossil fuel industry. For example, there are less than 60,000 people employed in the coal industry, and those jobs are declining. Some of the fastest growing jobs in the Cleantech industry include Wind Turbine Technicians, PV Installers, Project and Construction Managers, Software and Electrical Engineers. The growth of the cleantech market over the last decade has been largely attributed to economics and not technology.

The drastic decline of PV and turbine costs over the last decade changed the energy generation landscape; renewables are now cheaper than fossil fuels. PV prices dropped 73% since 2000 with no major advances in efficiency. PV efficiency of commercial products still stands at around 20%, and turbine improvements have come from better blade design and especially size.

While turbines and panels become more efficient, seemingly at a slow pace, there are areas where technology is advancing. Software and the IoT are tightly tied to the energy generation, efficiency and EV markets. Modeling software helps to find the best locations and to better predict future plant performance, and the IoT has become a staple of the energy efficiency market. There is one technology that is advancing faster than the others - energy storage. Li-ion capacity is increasing, charge times are decreasing, and new materials and superconductors are being developed - all while prices drop towards the \$100/kWh range. While economics have driven much of the cleantech industry's growth, the future of the industry will be driven by further advances in technology.

Tom DeRosa Founder, Renewable Search, [Linkedin.com/in/tomderosa](https://www.linkedin.com/in/tomderosa),

New addition to SN Chronicle Editorial Review Board

Frank Jenkins has over 30 years of experience in the automotive industry with an expertise in marketing, sales, strategic and product development. Jenkins most recent role was Senior Manager/Director Denso Commercial and Heavy-Duty Division in Long Beach CA. Denso is one of the largest global automotive parts companies with \$48 billion in annual revenue.

As VP Sales at Motiv, Frank Jenkins established detailed sales "go to market strategy" defining segments, customer behavior, and implementation plan. The Motiv electric Powertrain Control System enabled a commercial chassis to be equipped with an electric drive power train but also the Motiv ePCS allowed for remote telemetry to reinforce product reliability. As Vice President of Sales and Marketing at Electric Vehicles International Frank Jenkins developed, manufactured and sold a portfolio including all-electric, class 4 to 6, medium duty trucks and walk-in vans, as well as a light duty neighborhood electric vehicle.



Frank was President at Electric Motors Corporation - a manufacturer of hybrid pickups. Electric Motors Corporation goal was to develop and manufactured "Plug in Electric Hybrid" (PHEV) power drive systems for EMC brand and other various manufacturer brand light duty trucks.

At General Motors, Frank Jenkins was a key leader responsible for B to B sales, marketing, and product development. He managed a \$300M incentive/marketing budget, as well as multiple field sales/mkt teams responsible for the largest GM fleet customers that represented over 500,000-unit sales yearly. Frank attended Kalamazoo College and Michigan State University where he was a student athlete playing football. Frank graduated from MSU with a BA in Business Administration.

Energy Production

Rodney Porter talks about his job with us and in **Minority Engineer** (Fall, 2018). Porter's group at Shell monitors crude transfers between manufacturing sites producing a range of clean energy, fuels, chemical, and lubricants.

He has been with Shell Oil Company for 14 years and with other oil and gas companies prior. Like others, Porter suggests minority students seek summer programs and camps focusing on science and math because the experiences will make a difference in helping to stretch their capabilities and help their career preparation and growth.

"Today in my position, I continue to draw upon my previous training and job assignments that led me to the position I have today". I have a BS degree in chemistry from southern University and a second BS degree along with a Master of Science in engineering science from LSU". There have been many ways this education has provided Porter the knowledge to be successful in the many multifaceted disciplines associated with his jobs at Shell.

Porter puts back into communities through his outreach as a liaison for the National Action Council for Minorities in Engineering. (NACME).





The **Southeast Michigan STEM Summit** is designed to bring a cross-section of stakeholders together to examine the needs and status in the region. The focus will be on making connections between and among the business and education communities.

The event will be held at the Oakland Center, Oakland University, March 8—8, 2019. The summit is hosted by the SE Michigan STEM Alliance, The Michigan STEM Partnership, and the Mobile Technology Association of Michigan. Inquiries may be contacting: Gary Farina, Executive Director, Phone: 248-563-9902, GaryMISTEM@gmail.com , or Linda Daichendt, Mobile Technology Assn. of Michigan, Phone: 248-470-3257

Energy Education Outreach

One of the bright initiatives in STEM education from the energy sector is Mobil Exxon. Education is the fundamental building block of individual opportunity and economic growth, and STEM skills, in particular, and is critical to ensuring today's students are prepared for the jobs of the 21st century.

ExxonMobil focuses its U.S. education programs to help address the STEM challenge and is investing in those with the potential to make a meaningful national impact. For them the primary areas of investment are:

Supporting highly qualified teachers in math and science;

Encouraging students from all backgrounds to pursue math and science; and,

Graduating more students from high school ready for success in college and careers.

The Johnsonville Connection

Teachers like Anthony Johnson in cities like New Orleans, Chicago, and Detroit are examples of STEM educators who have stepped away from old school approaches to science learning and are making a difference.

Check this out.

<https://www.youtube.com/watch?v=auRI9gBSwgc>



The **STEM Education Coalition** would like your help providing feedback to the Department of Education regarding the Education Innovation and Research (EIR) grant program and its impacts to STEM education.

They have compiled a survey for you to provide feedback on how well aligned the Department's latest round of roughly \$100 million in discretionary STEM grants is with the needs of our STEM community. The survey contains a lot of explanatory instructions and links to additional background materials on the awards.

All responses will be anonymous. Please click [here](#) to take the survey. We look forward to sharing your valuable feedback with the Department!