Energy & Environmental Division
ASQ Excellence Through Quality™

SPRING 2020 | VOLUME 4, ISSUE 2

ENERGY & ENVIRONMENTAL DIVISION NEWSLETTER

Inside This Issue

FEATURED ARTICLES:

INTRODUCING

ANSI/ASQ E5 – Quality Principles and Practices for Nonnuclear Energy Facilities

by BW (Ben) Marguglio

The E5 Working Group of ASQ's Energy & Environmental Division (EED) is pleased to announce that ASQ is in the process of reviewing and approving a document which will become a new national standard, *American National Standards Institute/American Society for Quality ANSI/ASQ E5 – Quality Principles and Practices for Nonnuclear Energy Facilities*. This proposed standard will advance the quality body of knowledge and substantially fill an industry need.

This proposed standard will be redistributed by the ANSI for industry comments which are expected to be received by July 15 and resolved by July 31, 2020. Hopefully, the proposed standard will receive final approval by ASQ and proceed to the ANSI for publication by Fall, 2020. Upon its publication, EED will offer public training sessions to facilitate the adoption and implementation of the standard. Contact Ben Marguglio (contact info below) for details about the training.

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ASQ Quality Press has agreed to publish *The EED Nuclear Quality Assurance Handbook* with a release date in 2020.

ASQ Quality Management Division/Energy and Environmental Division

JOINT WEBINAR

Can Quality Save the Planet?

Speaker: Willy Vandenbrande, ASQ Fellow, ASQ Certified Six Sigma Black Belt
Date: June 25, 2020
Time: 1:00 pm ET | 12:00 noon CT | 11:00 am MT | 10:00 am PT
7:00 pm Central European Time (CET)
Duration: 45 minutes

EVENT ADDRESS FOR ATTENDEES:

https://asq.webex.com/asq/onstage/g.php?MTID=e20cf31688a48618ab75fc3e99be55cd4

Chair's Message | Karen M. Douglas

The US and world community are now struggling to respond to the coronavirus pandemic and protective measures have confined many residents worldwide to their homes. ASQ has likewise cancelled most in-person gatherings including the May 2020 World Conference on Quality and Improvement (WCQI) and adapted the Milwaukee, WI headquarters staff to telecommuting. This interruption has also delayed negotiations underway with ASQ Quality Press for spring 2020 publication of the ASQ Energy and Environmental Division (EED) *Nuclear Quality Assurance Auditor Training Handbook*. Travel has been severely restricted to promote containment of the virus. The EED will reschedule the semi-annual Council meeting for an alternate venue, probably a professional society conference scheduled for Summer 2020 addressing programs for the energy or environmental arena. EED members are always welcome to join the EED Council meeting.

The world is desperately in need of respirators, personal protective equipment, and qualified healthcare professionals resulting in equipment designers and manufacturers converting their facilities and workforce to production of these urgently needed products. Energy resource providers have adapted their operations in efforts to provide customers with continuation of the energy required, although most businesses and services have drastically scaled down operations and may also seek financial support to ensure that both compensation of the workforce and maintenance of the customer base will be available upon restart. As we do what must be done to protect our families and loved ones, it is certain that the quality profession will be essential to an effective reset of the American economy and the overall recovery that our great nation will eventually achieve.

Karen M. Douglas
Chair, ASQ Energy and Environmental Division

ANSI/ASQ E5

continued

ANSI/ASQ E5 will supersede *ANSI/ASQ E1, Quality Program Guidelines for Project Phase of Nonnuclear Power Generation Facilities* and *ANSI/ASQ E3, Quality Program Guidelines for Operations and Maintenance Phase of Nonnuclear Power Generation Facilities*. As noted above, *ANSI/ASQ E5* will be a completely **new** standard. It is **not** a rewrite. It is **not** a consolidation of *ANSI/ASQ E1* or *ANSI/ASQ E3*, each being outdated and having been withdrawn.

ANSI/ASQ E5 is intended to supplement existing management system standards, not replace them. The quality principles and practices in *ANSI/ASQ E5* are intended for incorporation into the enterprise business management system to enhance the definition, attainment, verification, and validation of quality for facilities in the nonnuclear energy industries, such as for the generation, transmission, distribution, and storage of electricity, gas, and steam.

The quality principles and practices in *ANSI/ASQ E5* may be applicable to a wide range of enterprises such as facility owners, architect engineers and constructors, prime contractors and subcontractors, and prime suppliers and sub-tier suppliers.

The principles and practices in this standard have extensive breadth of scope and great depth of specificity. Given its breadth of scope and depth of specificity, this standard easily can be adopted beyond the nonnuclear energy industry.

The application of this standard, in whole or in part, is voluntary. The enterprise may adopt specific topics/sections of the standard based on the nature and objectives of the enterprise business. These objectives could include the cost-effective quality of production, quality of public and employee safety and health, quality of environmental protection, quality of security, quality of emergency preparedness and response, and quality other such factors. Not all topics/sections of this standard will be applicable to all enterprises or to all levels in the supply chain.

The topics/sections of this standard are organized as follows. In the Table of Contents, under "GENERAL", the topics/sections are those that are potentially applicable in all phases from DESIGN through OPERATIONS. Under "DESIGN" the topics/sections are those applicable to the facility design phase. Under "PROCUREMENT" the topics/sections are those applicable to the procurement phase. Under "FABRICATION, ASSEMBLY, INSTALLATION, and CONSTRUCTION", the topics/sections are those applicable to the phases in which facility design is converted into the physical facility. "MAINTENANCE" topics/sections are provided sequentially before "OPERATIONS" given that some maintenance activities must be performed prior to turnover to operations.

One of the unique aspects of this standard is that it covers principles and practices applicable to various aspects of the business management system. In addition to quality of production, the standard covers quality of health and safety, quality of environmental protection, quality of security, and quality of emergency preparedness and response, as well. The standard reinforces the quality of the design of the management system for each of these business aspects. There should be the same level of concern for the quality of the design of the management systems for each of these business aspects.

Too often, the quality of facility design suffers because of its incompleteness.

The most unique part of this standard is in the "DESIGN" Phase. This part of the standard provides the greatest addition to the quality body of knowledge.This part of the standard provides a complete and comprehensive compilation of the facility elements for which design requirements must be established—lest the facility design be incomplete. Obviously, the standard does not call for a quantitative or qualitative value for each such design element, only that the design element should exist.

For example, the standard provides all of the design elements that are applicable to piles and caissons. If piles and caissons are needed for a given facility, and if the "Piles and Caissons Design Requirements" Section is adopted, the designer must establish quantitative or qualitative values for each of the design elements listed in this section. Anything less would be incomplete design. To demonstrate, here's an excerpt from the "Piles and Caissons Design Requirements" Section of the standard.

The design requirements for each pile and caisson should be established and documented, and should include the:

- ***End State***
  - ***Load bearing capacity of piles***

Author

Ben Marguglio is an ASQ Fellow, and he's ASQ certified as a Reliability Engineer, Quality Engineer, Manager of Quality/Organizational Excellence, and Quality Auditor. Marguglio is renowned as a leading authority on human performance improvement through human error prevention, and he's well-recognized as an authority on many quality-related elements of a business management system. He has 65 years of industrial experience and has been a consultant and trainer for the past 20 years. He can be contacted at ben@HighTechnologySeminars.com or 845-265-0123.

- *Location of piles and permanent casings*

- *Pile and Casing Materials*
  - *Types of piles, casings, and casing supports*
  - *Dimensions of piles, casings, and casing supports*
  - *For cast-in-place piles and casings, reinforcing bar type, dimensions, and locations*
  - *Welding of reinforcing bar splices*
  - *Cleaning materials*
- *Pile and Casing Installation*
  - *Location of piles, casings and casing supports*
  - *Preparation of the surface for piles, casings, and casing supports*
  - *Plumbness/straightness of piles and casings*
  - *Reinforcement of casings to prevent displacement during concreting*
  - *Depth and top elevation of piles and casings*
  - *Pile driving equipment to be used*
  - *Sequence of pile installation as to avoid heave*
  - *Drilling*
  - *Jetting*
  - *Operation of the pile driving equipment, including hammer blow counts, hammer speed, and cushioning material between the hammer and the pile*
  - *Estimated volume of concrete to be used for cast-in-place concrete piles*
  - *Grouting pressure or compaction energy for cast-in-place concrete piles*
  - *Method of withdrawing cast-in-place, non-permanent concrete piles*
  - *Pile splicing, including temperature, interface cleanliness and interface alignment*
- *Inspections and tests for compliance with the foregoing requirements, including test piles, the inspection of previously installed piles for the effects of heave, and the inspection of nearby structures and concrete that is curing for any damage due to vibration*

Imagine this level of specificity for each of the other things that must be addressed in the design of a facility!

Another unique part of this standard is Appendix A in which approximately 200 quality-related types of records are identified.

This standard was prepared in accordance with procedures established by ASQ and accredited by the American National Standards Institute.

This standard was prepared by EED's ANSI/ASQ E5 Committee.

ANSI/ASQ E5 COMMITTEE MEMBERS:

GREG LILY
Committee Co-chair;
EON Climate and Renewables North America.

BENJAMIN W. MARGUGLIO
Committee Co-chair;
Originator of the initial draft of this standard; BW (Ben) Marguglio, LLC.

THOMAS BIERMAN
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MICHAEL GILMAN
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JOSEPH WENDLER, P.E. The Consolidated Edison Company of New York, Inc.

QUALITY COMMITTEE
American Wind Energy Association

EED OPEN POSITIONS

Student Intern

Do you want an ever-expanding space of learning from mentors leading the way in the energy and environmental domain? Volunteer to complement your formal learning with practical partnering in:

1. Programs and Learning
2. EED Standards
3. E-Standards
4. Communications and Newsletter
5. myASQ
6. Body of Knowledge
7. Membership

Excited about making a difference to your career? Passionate about Quality 4.0 and determined to leave your unique mark on future generations by leveraging technology to transform energy and environmental impacts in a connected world?

Send your resume with a three sentence brief to Karen Douglas, EED chair, at douglaskm@alumni.standford.edu and Abhijit Sengupta, communications chair, at senguptaa@hotmail.com for consideration.

Environmental Technical Committee Chairs (one open position)

EED members participating in "Environmental Technical Committees" areas coordinate and provide direction in applying the quality management principles and related education services to all business sectors engaged in addressing environmental concerns and programs. The following are descriptions of one open position.

If you are interested in becoming the chair of Environmental Management Committee, please feel free to send your resume with a three sentence brief to Karen Douglas, EED chair, at douglaskm@alumni.stanford.edu and Tom Koepp, environmental chair, at koeppt@aol.com.

HERE'S WHAT'S CURRENTLY HAPPENING WITH EED:

- Our 1,500+ member website is a great place to post questions, share project updates, and discuss best practices. Join the conversation!
- We are coming together with the Technical Communities. EED has a complete track of presenters covering many current aspects of this complex environment.
- Learn more about EED at **https://my.asq.org/communities/home/159**.

More open positions listed on next page.

EED OPEN POSITIONS

Environmental Management Committee Chair

The Environmental Management Committee participates in the U.S. Technical Advisory Group (TAG) to ISO Technical Committee 207 on Environmental Management which develops international consensus standards pertaining to environmental management systems (EMS), EMS auditing, environmental performance evaluation (EPE), environmental labeling (EL), life cycle assessment (LOCA), and greenhouse gases (GHG). Members participate in meetings to discuss issues important to U.S. interests, and provide input to official U.S. TAG matters such as ballots on international environmental standards. The committee provides updates to EED members at EED conferences on pertinent changes to ISO environmental standards (e.g., ISO-14001, ISO 14031, and others). In particular, EED has provided a key leadership role in the development of the ISO standard on auditing management systems, ISO-19011.

Members make work plan presentations on committee activities at scheduled EED council meetings. Present accomplishments at EED sponsored webinars and other ASQ conferences as well as conferences and workshops by other organizations.

Conventional/Oil and Gas Committee Chair

Mission:

1. Provide EED members with education, training, and networking opportunities specifically relating to the quality of production, safety, risk management, environmental protection, and related topics as it applies to the oil and gas industry.
2. Actively grow the membership base and increase the "brand recognition" of the EED Oil & Gas Committee in the Oil & Gas industry.
3. Provide the ASQ EED perspective for quality-related documents prepared for the oil and gas industry.

Implementation Plan:

1. To the extent legally permissible, provide to EED members copies of quality-related standards, protocols, good practices, and similar documents originated by the COS and API Subcommittee 18.
2. Within budget limitations, attend live and teleconference meetings and submit suggestions and comments to the COS and the API Subcommittee 18 relative to the development and maintenance of quality-related standards, protocols, good practices, and similar documents.
3. For conferences in which EED participates, provide speakers from the oil and gas industry.
4. Without the expenditure of any out-of-pocket cost, offer to EED members free and for-fee webinars and for-fee seminars on quality-related topics as they apply to the oil and gas industry.

If you are interested in becoming the chair of one of these committees, Send your resume with a three sentence brief to Karen Douglas, EED chair, at douglaskm@alumni.stanford.edu and Benjamin Marguglio at ben@HighTechnologySeminars.com.

More open positions listed on next page.

EED OPEN POSITIONS

Member Leader Position—Body of Knowledge

Work with Division leadership committee to determine, maintain, and leverage division Body of Knowledge for refreshed content, events, and programs that will add value to members.

Specific Duties and Responsibilities

- Work with the division leadership committee to set goals/metrics to support the division's management process as they relate to the Body of Knowledge (BoK).
- Communicate/report to division leadership committee activities performed and status of performance against goals/metrics set.
- Solicit content from community authors and webinar/event speakers.
- Work with division leadership committee and sub-committee chairs, if applicable, to provide/receive appropriate content for consumer need.
- Work with newsletter editor and the myASQ website coordinator to publish/socialize updates.
- Attend division leadership committee and general membership meetings to collect and analyze feedback from attendees for content enhancement.

Qualifications

- Be a Full, Senior, or Fellow ASQ member in good standing and associated with the relevant division.
- Strong organization, communication, delegation, and negotiation skills.
- Preferably will have understanding of needs assessment tools.
- Preferably will have some digital platform analytics experience.

Time Commitment

Average three hours per month (outside division and executive committee meetings).

Resources

The following resources can be found on www.asq.org (login required).

- ASQ Bylaws, Policies, and Procedures.
- Member Leader Community of Practice.
- Member Unit Operating Agreement (MUOA)

ASQ Energy and Environmental Division members work in the fields of energy and environment, including technology and construction, power production, resource extraction and processing, environmental operations, decontamination and decommissioning, waste minimization and pollution prevention, sampling and analysis, and research and development.

BY ADVERTISING WITH US you reach our 1500+ members on myASQ and have the opportunity to connect your company with a leading association of energy and environmental quality professionals. Go to https://my.asq.org/communities/files/159/4394 for further information about EED.

ADVERTISING RATES for the ASQ Energy and Environmental Division	Three issues	Single issue
Half page (4.75"h × 7.5"w)	$300	$125
Quarter page (4.75"h × 3.25"w)	$200	$75

Contact Abhijit Sengupta senguptaa@hotmail.com or Arthur Richard arichard365@gmail.com for additional information. Advertisements for the newsletter must be sized as specified in an MS Word, PDF, or digital image format.

An Educational Discussion About New Nuclear Technology

The views expressed in this article are the author's, and not representative of the views of the Energy and Environmental Division.

Our mission is grassroots education about new nuclear technology developments and rebranding nuclear power. This article is about nuclear power transitioning from large power installations to single small modular reactors, (SMRs). These designs call for a new era in clean nuclear energy development. Small in size, they are 76 feet tall and about 15 feet in diameter. One unit provides about 60,000 megawatts of power, equal to servicing 55,000 homes. They are safer because they sit in a permanent one-time water fill, used as a permanent heat sink. They are housed in a category one seismic building, and all these units are designed to shut down without any computer or human intervention provided by gravity driven controls.

These new reactor types will be able to provide electrical power for remote communities, power for remote exploration, and power for third-world installations. In order to play a fair game of power production we have to educate the public to renewable nuclear to be accepted by the industries. Some of the companies working on these new types of units are researching the possibility of converting our current inventory of nuclear waste (spent nuclear fuel) to power these new SMR reactors. When we are able to accomplish this research, we will be able to REDUCE, REUSE, and RECYCLE our nuclear power fuel generation capacity.

In 1983, University of Pittsburgh physicist Dr. Bernard Cohen, author of *The Nuclear Energy Option*, proposed that uranium is effectively inexhaustible and could therefore be considered a renewable source of energy. He claimed that fast breeder reactors, fueled by naturally replenished uranium extracted from seawater, could supply energy at least as long as the sun's expected lifespan of five billion years. Following the common definition of renewable resources being inexhaustible or "practically inexhaustible" as Dr. Cohen stated, nuclear energy should be categorized as renewable.

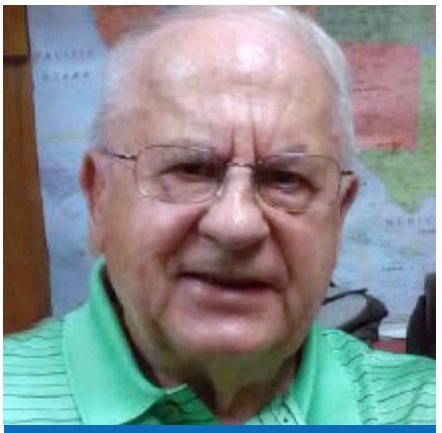
Science has proven that our planet has an unlimited supply of uranium—and eventually thorium—to support nuclear power as a renewable source of power. It is critical that what science has proven must somehow be transferred to the public platform. Without this, the dialogue is left to other sources who may neglect the science behind the discussion. Questions can be addressed to comments@usnuclearenergy.org.

Author

Gary J. Duarte, executive director of the US nuclear energy foundation.

Upon retirement from the casino industry as an Audio Video Technician, Gary Duarte established the US Nuclear Energy Foundation, a non-profit Nevada Corporation in February 2013. Duarte is not employed by any nuclear company or have investments in any nuclear company. His work is educational information about the industry and rebranding nuclear technology.

https://www.usnuclearenergy.org/rack-cards.html



Status of Oak Ridge, TN, Cleanup Sites

The EED Remediation and Decommissioning Committee has been tracking the status of the DOE environmental cleanup sites at Oak Ridge, Tennessee.

Oak Ridge has three primary cleanup sites within the Oak Ridge Reservation—East Tennessee Technology Park (ETTP), Y-12 National Security Complex (Y-12), and the Oak Ridge National Laboratory (ORNL). Even though these are all cleanup areas, Oak Ridge is unique because each of the areas also has other ongoing missions and a large number of on-site staff.

Since 1989, when the Office of Environmental Management (DOE-EM) was formed, the Department of Energy has made excellent progress remediating contaminated soil and water and demolishing radioactively contaminated facilities. DOE-EM workers have contained or removed contaminated areas that posed potential threats to residents and have worked to disposition radioactive and hazardous wastes and portions of nuclear material inventories.

There are three primary risks throughout the 33,500-acre Oak Ridge Reservation. Site risks include all regulator, stakeholder, and mission priorities. First are "lifecycle cost risks." This is often associated with DOE-EM cleanup work at ETTP. It refers to the increasing demolition and maintenance costs as buildings deteriorate from extended schedules due to limited funding. Secondly, we address and prioritize "environmental risks." This is directly tied to DOE-EM cleanup goals at Y-12, where there are high levels of mercury in the environment. Finally, DOE-EM is working to address "nuclear/radiological risks." These risks are found at ORNL from legacy waste and material containing significant levels of radio-nuclides, which DOE-EM is working to disposition.

Learn more about the following specific work and projects at each DOE-EM-Oak Ridge cleanup sites:

Author

Tom Koepp is a mechanical engineer with 45 years of experience with the Department of Energy (DoE) and private industry in the areas of quality assurance management/engineering, project management, and environmental remediation/decontamination and decommissioning (D&D). Koepp is the current vice chair for the Energy and Environmental Division.

East Tennessee Technology Park (ETTP)

For 40 years, the 2,200-acre East Tennessee Technology Park was home to a complex of facilities that enriched uranium. The site dates back to the World War II Manhattan Project. In addition to defense missions, the plant produced enriched uranium for the commercial nuclear power industry from 1945 to 1985. In 1987, DOE terminated uranium enrichment operations in Oak Ridge and closed the site. As a result of these operations, ETTP has a legacy of contaminated buildings, soil, sediment, and groundwater that require remediation for the protection of human health and the environment.

The goal of EM is to remove these structures and legacy contamination and transfer the property to become a private sector industrial park. ETTP cleanup began in 1989; since then, the EM program has achieved considerable progress. However, several major projects remain to achieve Vision 2020, a goal to complete cleanup at the site by the end of 2020.

To achieve the DOE-EM vision for ETTP, EM is executing a portfolio of cleanup projects that demolish facilities, dispose legacy waste, and remediate soil and groundwater. Upon completing remediation, the EM remaining responsibilities at the site are limited to performing long-term stewardship activities such as maintaining land-use controls and long-term monitoring. ETTP will be a revitalized site that is populated with private sustainable commercial businesses with all of the utilities and roads transferred and maintained by municipalities.

First, however, EM must complete its cleanup portfolio at the site. Oak Ridge's EM program has already achieved Vision 2016 at the site, which was the goal to remove all five former gaseous diffusion plants by the end of 2016 (K-25, K-27, K-29, K-31, and K-33). It marked the first time in the world that a former uranium enrichment complex has been cleaned and removed. To achieve Vision 2020, EM will also remove K-1037, the Poplar Creek Facilities, the Central Neutralization Facility, the TSCA Incinerator, and the centrifuge facilities.

In addition to demolition, EM must address soil and groundwater at ETTP. The area is separated into two zones. In Zone 1, the majority of remediation is complete, and a final decision on groundwater is being developed. When complete, nearly 1,400 acres will be available for reindustrialization. In Zone 2, only a portion of the remediation is completed, and most of the remediation will occur after all of the buildings are demolished. EM will evaluate the extent of contamination, and groundwater will be addressed following soil remediation.

The DOE-EM GOALS for **ETTP** are to:

- Reduce risks to human health and the environment posed by contaminated facilities and legacy waste.
- Reduce environmental liabilities.
- Return the land to a beneficial reuse—a private sector industrial park.
- Commemorate the contributions of the men and women who worked at the former K-25 site.

The Jack Case Center at the Y-12 National Security Complex

The Y-12 National Security Complex is one of the nation's most important national security assets. The 811-acre site contains the nation's stockpile of highly enriched uranium and also performs nuclear non-proliferation missions. Historically, Y-12's operations focused on a uranium enrichment method that used vast amounts of mercury. Over the years, nearly 700,000 pounds of mercury leaked from machines and pipes into the buildings and surrounding environment.

Oak Ridge's EM program is working to contain and remediate the mercury that migrated into the environment. It is the highest environmental cleanup priority at Y-12 and the Oak Ridge Reservation because levels currently exceed regulatory standards. The levels are caused by mercury lost during decades of operations and the deteriorating conditions of large former mercury-use buildings. Mercury removal is the highest cleanup priority at Y-12 because all other tasks hinge on its success—lowering environmental contamination levels and eventually paving the way for building demolition. Mercury levels are also an urgent priority because Y-12 is the closest site to the city of Oak Ridge.

Y-12's construction began in 1943 as part of the World War II-era Manhattan Project. Early missions at the Y-12 site included uranium and lithium separations and manufacturing nuclear weapons components. Past processes and waste management practices contaminated soil, surface water, sediment, and groundwater. EM is working to remove the historical legacies left by previous operations, and employees plan and execute projects aimed at site cleanup and protecting human health and the environment.

The DOE-EM cleanup plan for the site includes demolishing more than 90 excess contaminated facilities and completing environmental cleanup in the Upper East Fork Poplar Creek and Bear Creek Valley watersheds. EM is working to reduce risks to human health and the environment posed by contaminated sites, facilities, and legacy waste, supporting the Energy Department's multi-billion dollar investments at the site.

The cleanup portfolio for Y-12 includes removing mercury-contaminated soils contributing to surface water contamination and contaminant migration off-site via the Upper East Fork Poplar Creek. Additionally, EM will address Bear Creek Valley sites contributing to surface water contamination.

The DOE-EM GOALS for **Y-12** are to:

- Remove and dispose remaining legacy waste
- Reduce the site's high security footprint
- Demolish excess facilities
- Complete remediation of soil, groundwater, and surface water

Oak Ridge National Laboratory

The U.S. Department of Energy's (DOE) Oak Ridge National Laboratory (ORNL) is the nation's largest multi-program science and technology laboratory. The mission of ORNL is to deliver scientific discoveries and technical breakthroughs that will accelerate the development and deployment of solutions in clean energy and global security. Today, ORNL pioneers the development of new energy sources, technologies, and materials and the advancement of knowledge in the biological, chemical, computational, engineering, environmental, physical, and social sciences.

Originally known as Clinton Laboratories, ORNL was established in 1943 to carry out a single, well-defined mission: the pilot-scale production and separation of plutonium for the World War II Manhattan Project. The laboratory was also highly involved in isotope research and production. From this foundation, ORNL has evolved into a unique resource for addressing important national and global energy and environmental issues. However, amid the modern infrastructure are numerous old, contaminated buildings and areas remaining from past operations and waste practices.

The EM program has numerous missions and responsibilities at the ORNL campus, and EM employees are focused on removing past legacies and improving environmental health and employee safety.

The main ORNL site occupies approximately 4,470 acres and includes facilities in two valleys—Bethel Valley and Melton Valley. For site cleanup purposes, EM has divided ORNL by these two major valleys. Bethel Valley, which includes the central campus area of ORNL, includes reactor facilities, isotope production facilities, waste treatment facilities, and research facilities. Melton Valley includes reactor facilities, research facilities, waste treatment facilities, and waste management areas.

EM is also responsible for de-inventorying uranium-233 materials housed at Building 3019, completing processing of transuranic waste inventories generated from past operations, completing demolition on excess and contaminated facilities, disposition of legacy waste, transitioning operational infrastructure, and remediating soil and groundwater at ORNL. Ultimately, the end state of the DOE-EM work at the site is to meet regulatory commitments and support revitalization efforts for expanding science missions. However, to accomplish the DOE-EM vision EM must demolish more than 260 facilities (including hot cells and eight reactor facilities), remove thousands of feet of contaminated underground piping, remove radioactive and organic contaminants in the soil and groundwater, and process or transport large quantities of nuclear materials and waste.

Today, EM conducts surveillance and maintenance responsibilities for hundreds of buildings at ORNL until they are scheduled for demolition. Many of these facilities require intensive evaluations to monitor their conditions, including the Molten Salt Reactor Experiment facility and facilities that contain heavily shielded rooms that conducted radiological and isotope research, known as "hot cells." The Molten Salt Reactor facility alone contains nine metric tons of salt that surrounded the experimental nuclear reactor. In addition, EM manages and operates Building 3019 (the world's oldest operating nuclear facility) and oversees the Liquid Gaseous Waste Operations that involve active low-level liquid waste and process waste waters generated by the laboratory.

The DOE-EM ultimate GOALS for **ORNL** are to:

- Protect human health and the environment—ORNL will be remediated to protect the public, laboratory workers, terrestrial and aquatic organisms, and groundwater.
- Disposition facilities through activities involving legacy material disposition, decontamination, demolition, and/or transfer for future use.
- Remediate soil and groundwater, allowing EM to only conduct long-term monitoring required and possibly a minor amount of treatment.
- Disposition all waste.
- Release acreage for future redevelopment.

The National Carbon Capture Center: Advancing Fossil Energy Technology Solutions

The National Carbon Capture Center, managed and operated by Southern Company, is the primary carbon capture research facility for the U.S. Department of Energy (DOE). Through its research, the center is advancing technologies to reduce greenhouse gas emissions from natural gas- and coal-fueled power plants.

Southern Company realizes that carbon capture, use, and storage (CCUS) will be a critical factor for achieving our goal of low- to no-carbon operations by 2050. The technology captures up to 90% of the carbon dioxide (CO_2) emissions created from fossil fuel electricity generation. When it is stored and transported, it can be used for enhanced oil recovery, producing additional domestic oil from existing fields, after which the CO_2 is safely and permanently stored geologically. In addition, the captured CO_2 can be used to create valuable products in the growing field of CO_2 utilization.

Author

John Northington is Director of the National Carbon Capture Center, a U.S. Department of Energy-sponsored research facility managed and operated by Southern Company. Northington has served in several roles at the center, including technical lead specializing in high-pressure coal feeding and preparation technology, process and project engineering manager, and operations and maintenance manager. He was appointed assistant director of the facility in 2013 and assumed his current role in 2017. In 2019, Northington began serving as chair of the Technical Subcommittee for the Carbon Utilization Research Council, an industry coalition focused on technology solutions for the responsible use of fossil energy resources in a balanced portfolio to support the nation's need for reliable, affordable energy.

DOE's fossil energy research and development (R&D) program seeks to leverage public-private partnerships to support the goal of broad, cost-effective carbon capture deployment. DOE's activities focus on advanced CCUS technologies that have the potential to provide step-change reductions in both cost and energy penalties as compared to currently available technologies. (Energy penalties represent the amount of fuel required to maintain a power plant's output when using carbon capture technologies.)

The National Carbon Capture Center supports this objective through technology development of a wide range of CO_2 capture processes. The facility has tested more than 60 technologies since its establishment in 2009 and has completed more than 110,000 hours of testing for carbon capture innovators from the U.S. and six other countries.

The center is a unique R&D facility. Large enough to produce commercially representative data, it is also small enough for economic operation. The technology development includes post-combustion carbon capture testing of innovative solvents, sorbents, membranes, and other processes designed to remove CO_2 from power plant flue gas streams. The testing system is housed at an 880-megawatt pulverized coal-based unit at Alabama Power's Plant Gaston.

Since its original installation, the National Carbon Capture Center's post-combustion facility has undergone significant modifications to enhance testing capabilities. For example, changes to the site more than doubled the flue gas capacity, a bench-scale slipstream solvent test unit was installed, a lab-scale test unit was added, and upgrades to instrumentation, sampling, and controls systems were made based on operating experience. These upgrades will enable the center to respond to an increasing demand for post-combustion carbon capture options.

The center is also significantly expanding carbon capture testing under actual natural gas-fired conditions—research that will support the continued role of natural gas as a reliable and affordable power generation resource.

With this new infrastructure, the National Carbon Capture Center is the first R&D facility in the U.S. to offer comprehensive testing of carbon capture technologies for natural gas power plants. Construction of the new system is in progress and is expected to begin operation in mid-2020.

The center is also broadening its testing to include emerging carbon utilization technologies. Testing will evaluate advanced catalysts, reactor systems, and processes to develop technologies that will efficiently, economically, and cleanly convert CO_2 into value-added products—partially offsetting CO_2 capture costs from power generation and providing an alternative to conventional manufacturing processes. In one exciting project, the site will host a Carbon XPRIZE finalist.

The center also provides worldwide leadership to promote readiness for CCUS. In collaboration with DOE's Office of Fossil Energy, we co-founded the International Test Center Network, a global coalition of facilities that have a shared goal of assisting developers in proving cost-effective, commercial CCUS technologies.

As with many early-stage R&D projects, the center's research funding is highly leveraged through public-private cost-sharing. The majority of the facility's funding is provided by DOE and its National Energy Technology Laboratory, and the remaining costs are provided through partnerships with energy industry leaders and industrial participants. These project partners currently include the Electric Power Research Institute, American Electric Power, ClearPath, ExxonMobil, National Rural Electric Cooperative Association, Peabody, Tennessee Valley Authority, Total, and Wyoming Infrastructure Authority.

At the National Carbon Capture Center, our role in providing a neutral test site, evaluating new technologies, and supporting business cases for CCUS has already enabled the reduction of carbon capture costs by one-third. Southern Company, with a more than 50-year commitment to R&D, looks forward to building on that success as we commit to finding solutions for a low- to no-carbon future by 2050.

HELP! The Environment Is Changing

> *Can we manage the tiger we are riding? Is there a way to love our globally interconnected neighbours as ourselves? Look how friendly competition breeds innovation, expands the economy, and saves the environment.*

The XPRIZE Foundation certainly believes that it's possible!

"A vision without a task is but a dream;
A task without a vision is drudgery;
A vision with a task is the hope of the world."

—*Anonymous*

Incredible convictions define their mission: To clearly articulate a vision of a preferred and positive future across a set of domains, identify a roadmap of breakthroughs needed to get there, and establish the incentive competitions that will focus the resources, talent, and technology required to enable those breakthroughs and accelerate that future. To realize breakthroughs enabling a world of abundance—a world where every man, woman, and child can access all the energy, clean drinking water, shelter, education, and healthcare they require. Do those words sound familiar? They are part of the Sustainable Development Goals (SDGs) adopted by all the member states of the United Nations—access to affordable and clean energy (SDG7), access to clean drinking water and sanitation (SDG6), access to quality education (SDG4), access to good health and well-being (SDG3).

A nonprofit 501(c)(3) since 1994, the XPRIZE Foundation has designed and operated seventeen competitions in the domain areas of Space, Oceans, Learning, Health, Energy, Environment, Transportation, Safety, and Robotics.

Author

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The first XPRIZE, the $10 million Ansari XPRIZE for private spaceflight, spurred an industry and created exponential breakthroughs. Since then they have launched over $140 million in prize purses, including the $15 million Global Learning XPRIZE, the $10 million Qualcomm Tricorder XPRIZE, and the $1.4 million Wendy Schmidt Oil Cleanup XPRIZE.

> *Each of these prizes has created an industry-changing technology that brings us closer to a better, safer, more sustainable world.*

Everybody likes to compete for a big prize. The incentive prize contest has existed for centuries. From the inception of the Longitude prize in 1714 through the Orteig prize that compelled Charles Lindbergh to fly across the Atlantic, prizes have ignited passions and brought about breakthroughs that no one thought possible.

The belief that solutions can come from anyone, anywhere drives XPRIZE. Scientists, engineers, academics, entrepreneurs, and other innovators with new ideas from all over the world are invited to form teams and compete to win the prize. Rather than throw just money at a problem, they incentivize the solution and challenge the world to solve it.

What strikes me as the most exciting initiative for the environment is the $20 million NRG COSIA Carbon XPRIZE—a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into valuable products like building materials, alternative fuels, and other items that we use every day. Certainly, the development of new and emerging CO_2 conversion technologies would help decrease this contributor to climate change. Competing teams are trying to make everything from carbon fiber to fish food to toothpaste to building blocks. The winning team will convert the most CO_2 into products with the highest value as determined by how much CO_2 they convert and the net value of their products. The competition began on September 30, 2015 and ends on June 30, 2020. The winners will be announced this fall.

From 38 teams that accepted the challenge, the 10 teams currently in the race include four from the United States, three from Canada, and one each from the United Kingdom, India, and China.

Each year, the world uses four billion tons of concrete. The cement involved in this concrete accounts for 7% of global CO_2 emissions. CarbonCure has a novel process to inject CO_2 through the mixing process to create a stronger and greener concrete. The CO_2 savings to date is more than 50,000 acres of forest absorbing CO_2 over a year. CO_2Concrete (formerly Carbon Upcycling UCLA) uses a different approach, introducing a new material that absorbs CO_2 to produce concrete building materials for the home, buildings, and infrastructure. If all concrete were made this way, there would be a CO_2 savings of more than two billion tons each year.

Foam is in many everyday objects, including the soles of our shoes, coffee cups, car and plane interiors, and food packaging. C4X out of Suzhou, China has a process that bubbles CO_2 from industrial emissions and air into plastic to create foam, so it stays there. By making foam this way, we could help green a market worth $100 – 120 billion. Impossible Labs has a process to extract CO_2 from the air and capture it into a material that can be used for a range of products as diverse as coffee cups, bracelets, and slippers that are carbon negative.

> *The consequence? A CO_2 savings of more than 2 billion tons each year or the equivalent of 50,000 acres of forest absorbing CO_2 over a year.*

A final thought on a continual process for a systemic change comes from Psalm 78:5b-6 "...he commanded our fathers, that they should make them known to their children: that the generation to come might know them, even the children which should be born; who should arise and declare them to their children."

The Effect of COVID-19 on the Nuclear Power Industry

As the COVID-19 pandemic spans the globe, we want to first and foremost send well wishes to all our subscribers and hope everyone remains safe and healthy. These are trying times, but we are confident the current situation will improve in due course. For obvious reasons, the pandemic's effects will be felt in many ways throughout the nuclear industry and fuel markets. This is a rapidly evolving situation, so it is far too early to definitively predict the ramifications of this health crisis. At the same time, the effects of some of the initial reactions are starting to resonate throughout this industry. Impacts are clearly going to be felt in terms of demand and supply as well as nuclear fuel market operations.

As the global macroeconomic picture has worsened severely over the past month, beginning with the economic slowdown in China and now expanding to all the major economies of the world, there is clear evidence that demand for goods and services is falling, and the near-term outlook is for additional contraction. As factories reduce output or go idle, offices empty of their workers, and hosts of other commercial enterprises go dark, the demand for electricity will clearly fall. Power companies are already describing daily load factors that are similar to lower demand weekends than typical weekdays. Nuclear power is generally used for baseload power, so most reactors are expected to remain operating. However, some curtailments, such as in highly nuclear reliant countries like France, are certainly not out of the question. Moreover, power prices are likely to decrease as demand drops, which will make it even more difficult for nuclear operators in deregulated markets. Some of these effects could be short-lived, but 2020 nuclear power generation is surely going to take a hit.

Impacts on individual power plant operations are also not out of the question as workers may fall ill or require quarantine. All

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nuclear power plants in affected areas are being asked to institute their emergency staffing protocols in the event that the pandemic limits available critical staff. For example, while EDF has reported that three of its nuclear plant workers have tested positive for the virus, the company has affirmatively stated that, "In the event of a pandemic, electricity production and the safety of installations will be ensured at all times." As of Monday, March 16, however, EDF reported that it is reducing staff to around 100 from 800 at its Flamanville nuclear power plant in northern France due to infections in the region, leaving only safety and security personnel on site to watch over the plant. If similar actions are taken at other nuclear plants in affected areas, this could have various implications, including delays to maintenance and upgrade projects.

It remains far too early to forecast the impact on new reactor projects, but with any potential downgrades to the future power load outlooks in key countries, such as China, we certainly could expect to see consequent reductions in the number of new reactor projects, or at least delays to projects that had plans to break ground in the next six to 12 months. Notably, Chinese companies have recently made several announcements that active construction projects have slowly returned to near normal staffing levels. However, UxC has already heard that Chinese regulatory reviews for other new projects are being slowed due to staffing constraints. In other countries, new reactors are also seeing initial effects. For example, the Vogtle expansion project in Georgia, USA reported that at least two of the 9,000 construction workers at the site are being tested for COVID-19.

Similar to nuclear plants, nuclear fuel cycle facilities could also see reductions in human resources or other limitations that affect production levels.

As long as uncertainty remains due to the pandemic, we cannot rule out transportation and supply chain issues filtering down into the nuclear fuel sector. The longer that borders are closed and movements are restricted, it is hard to imagine that logistics will not see additional challenges, including shipment delays and possible quarantines. Nuclear fuel-related logistics are already complicated enough, so adding new hurdles will not be helpful to say the least. Ultimately, concerns over supply chain disruptions may heighten utilities' focus on security of supply and result in various risk mitigation strategies, but it remains difficult to predict at this time.

Shifting to the financial world, the turmoil in global equity, bond, and credit markets that has resulted from the pandemic will have long-lasting ramifications even for the nuclear sector. In the immediate term, share prices of nearly all publicly traded companies, including utilities, miners, banks, etc., that are active in this market, have fallen substantially in the course of only a few days. As the credit markets tighten and risk reduction on the part of lenders increases, nuclear-related companies, especially less robust companies like some uranium exploration firms or small reactor developers, could certainly experience financing pinch points. The current flight to safety within the financial community may just be temporary, but it could also have effects on the uranium spot market if holders of physical uranium move to liquidate some of their assets. The turmoil in the financial markets will likely test the resolve of recent uranium market entrants, although these players have generally indicated their long-term commitment to the sector. Moreover, credit risk factors could limit the ability of some entities to engage in carry-trades or inventory financing even as interest rates have fallen precipitously.

The Saudi-Russian oil war that had its genesis in the sharp dropin oil demand in Asia following the COVID-19 outbreak will also likely create unintended consequences. Although oil is usually not a substitute for nuclear-generated electricity, liquified natural gas (LNG) prices have also fallen to record lows given the hit to Asian demand. Thus, as the relative cost of natural gas and LNG-supplied power falls, nuclear power will likely suffer. In addition, Russia's ruble has taken a beating, and the country's oil-dependent economy could see further impacts. This brings into question Russia's ability to finance multiple nuclear plant projects around the world.

Another immediate, micro-level impact on our industry is the near complete halt to travel by most nuclear market participants. Major conferences have been cancelled, such as the Nuclear Regulatory Commission's (NRC's) annual Regulatory Information Conference, the World Nuclear Fuel Cycle (WNFC) scheduled for late April in Stockholm, Sweden, and the Nuclear Energy Institute's Used Fuel Management Conference that was planned for early May. A number of NRC meetings have been cancelled, such as one scheduled for March 19 in San Luis Obispo, California to discuss Pacific Gas & Electric's plans to permanently cease power operations at Diablo Canyon in 2024/2045 and the Post-Shutdown Decommissioning Activities Report. Other meetings have been changed to teleconference format.

On March 20, the NRC held a teleconference with representatives from NEI, NextEra, Entergy, and members of the public who called in to discuss the regulatory impacts due to COVID-19. The meeting occurred after this publication went to press.

Reuters reported on March 20 that the US electric industry may ask essential staff to live on site at power plants to keep operations running if the situation worsens. The article quoted Maria Korsnick, president of NEI, as saying that some of the nation's nuclear power plants are also "considering measures to isolate a core group to run the plant, stockpiling ready-to-eat meals and disposable tableware, laundry supplies and personal care items." Electric power plants are considered "critical infrastructure" by the federal government.

The NRC stated on its Facebook page that the agency "continues to maintain regular contact with the nuclear plants it regulates, and the regulations allow plants to defer less-significant activities to focus on safe day-to-day operations. Meanwhile, our resident inspectors continue to do their jobs being our 'eyes and ears' on the ground, even as they take some precautions, including social distancing."

The *Brattleboro Reformer* reported March 20 that work decommissioning the Vermont Yankee Nuclear Power Plant is continuing. NorthStar chief executive officer, Scott State, said that workers always wear protective gear while working at the site, but the company has implemented additional precautions as well. And Joy Russell, senior vice president and chief strategy and communications officer at Holtec International, told *SpentFUEL*, "We are working in full force, as we consider ourselves essential to supporting the nuclear industry."

Some of our readers may think that the global response to the COVID-19 pandemic may be a bit of an overreaction, but it is impossible to deny that it has already had some of the most far-reaching global impacts on daily life and commercial activity of any event since World War II. Ultimately, we will only know the full impacts until after the storm has passed. Still, as an industry that has demonstrated remarkable resilience and capacity to withstand numerous hits over the past few decades, including the September 11 terrorist attacks, the global financial crisis, and the Fukushima accident, we are confident that this pandemic will also be handled with the same sort of grace and determination as before, and that we will emerge stronger and better prepared for what else may come in the future.

ASQ UPDATES on COVID-19

ASQ, like the general public, is concerned about the growing spread of COVID-19 (coronavirus). This is an emerging, rapidly evolving situation. The health and safety of our members, customers, instructors, and staff is of utmost importance.

Our staff will continue to monitor and evaluate this ever-changing situation and provide updates on scheduled events and services on:

https://asq.realmagnet.land/covid19

Consolidated Interim Storage Facility for Spent Nuclear Fuel Status

PART 1

There are two proposals for Consolidated Interim Storage Facilities (CISF) for Spent Nuclear Fuel (SNF) from the 99 US commercial nuclear power plants with license applications pending before the US NRC. The Interim Storage Partners (consortium of AREVA/ORANO, Waste Control Specialists, and NAC) located in West Texas on the Texas/New Mexico border five miles from the URENCO facility and 15 miles from Hobbs, NM; and the HOLTEC International CISF located midway between Hobbs and Carlsbad in southeast New Mexico.

The HOLTEC CISF currently progresses toward approval of the initial phase of construction and operation with the US Nuclear Regulatory Commission (NRC) release of the Draft Environmental Impact Statement March 2020 for the 60-day public comment period closing 5/22/20. The public comment period was extended due to Social Distancing precautions for the Coronavirus pandemic which would impact required Public Meeting schedule. Following evaluation of public comments in 2020 (both written comments and those received during Public Meetings), issuance of the final EIS 2021 followed by NRC license approval is probable unless unanticipated omissions in the draft EIS are identified. Excerpts from the NRC Draft EIS Abstract indicate that:

"Holtec International (Holtec) license application to construct and operate a CISF for SNF and Greater-Than-Class C waste, along with a small quantity of mixed oxide fuel … Based on its environmental review, the preliminary NRC staff recommendation is issuance of a license to Holtec authorizing the initial phase of the project, unless safety issues mandate otherwise. The NRC staff based its recommendation on the following:

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Karen M. Douglas, Nuclear Committee Chair and EED Chair.

- the environmental report submitted by Holtec.
- the NRC staff's consultation with Federal, State, Tribal, and local government agencies.
- the NRC staff's independent environmental review.
- the NRC staff's consideration of public comments received during the scoping process."

There is currently heightened public concern in both New Mexico and Texas regarding approval of either CISF license application by the US NRC as the current federal administration has halted efforts toward approval of the license application for the Yucca Mountain permanent geologic repository for SNF disposal. The Nuclear Waste Policy Act of 1987 stipulated that a Monitored Retrievable Storage Facility (MSRF, similar in operation to CISF but co-located with Yucca Mountain Repository) could not operate until Yucca Mountain Repository was approved to receive SNF. This has resulted in both legal concerns and public questioning of the "interim" status of both CISFs as this may indicate possible permanent SNF "storage" in New Mexico and Texas.

MEMBERSHIP UPGRADE INFORMATION

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- Meet any one of these professional criteria:
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  - Have been a Senior member or comparable type in a recognized professional organization.
  - Have taught quality or related arts or sciences at an accredited institution for at least two years.
  - Have conducted quality-related engineering, inspection or audit, or statistical work, or applied the methods and principles of quality on the job for at least two years.

Fellow nominations are available at:
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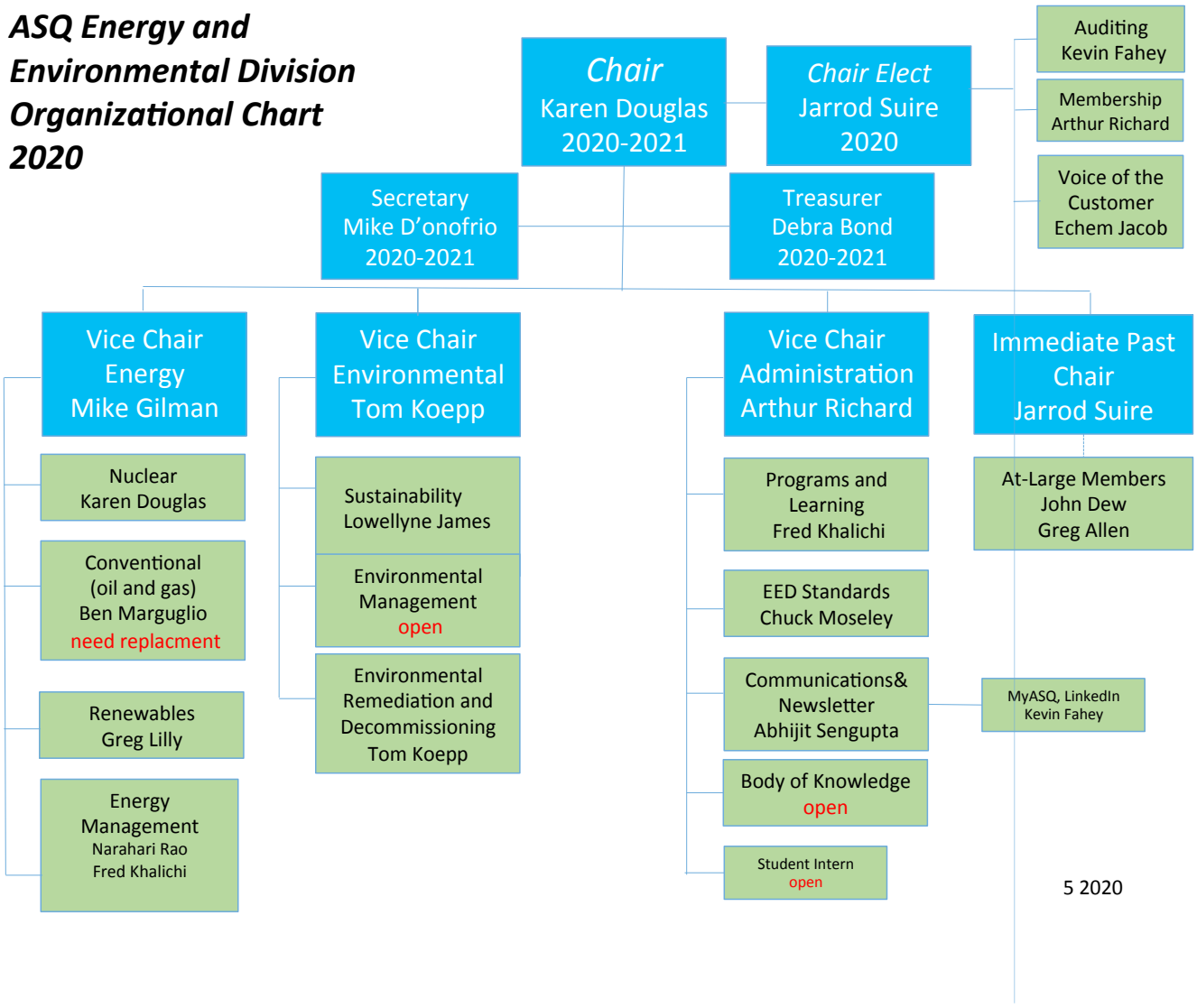
ASQ Energy and Environmental Division Organizational Chart 2020



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