Clean Energy Trends on the Radar for 2024:

And what that means for your workforce.

What you can Expect in 2024

1. The Commercialization of Carbon Capture

With almost 200 carbon capture and storage projects either in operation, under construction or in development around the globe, the concept of carbon capture is no longer novel. As these projects progress and energy requirements and processing costs for carbon capture decrease, watch for much movement in the marketplace as the work actually begins to contribute to corporate bottom lines.

Late in 2023, oil companies started drilling their first wells to advance CO2 storage for external customers. One of the first rigs, which extended nearly the length of 30 Statues of Liberty, was gathering key information to confirm the site could safely store CO2. Efforts like this will play a key role in helping companies like CF Industries, the world's largest manufacturer of ammonia, and Nucor, America's largest steel producer, decarbonize their operations. In Canada, Pathways Alliance, a collaboration of several key players in the country's energy sector, is working on a $16.5-billion carbon capture project in northern Alberta that is planned to be operational by 2030.

It's long been recognized that a highly skilled workforce will be required to support carbon capture efforts like these as they become more mainstream. Twenty years ago, the U.S. Department of Energy took the proactive step of sponsoring a Research Experience in Carbon Sequestration program with the goal of developing a skilled carbon capture, utilization, and storage workforce that could support the transition to clean energy.

In a nod to the critical role that talent will play in carbon capture execution, one of the five federal priorities in the Government of Canada's Carbon Management Strategy, released in the fall of 2023, is to grow a diverse and inclusive workforce that can contribute to a competitive natural resources labor force.

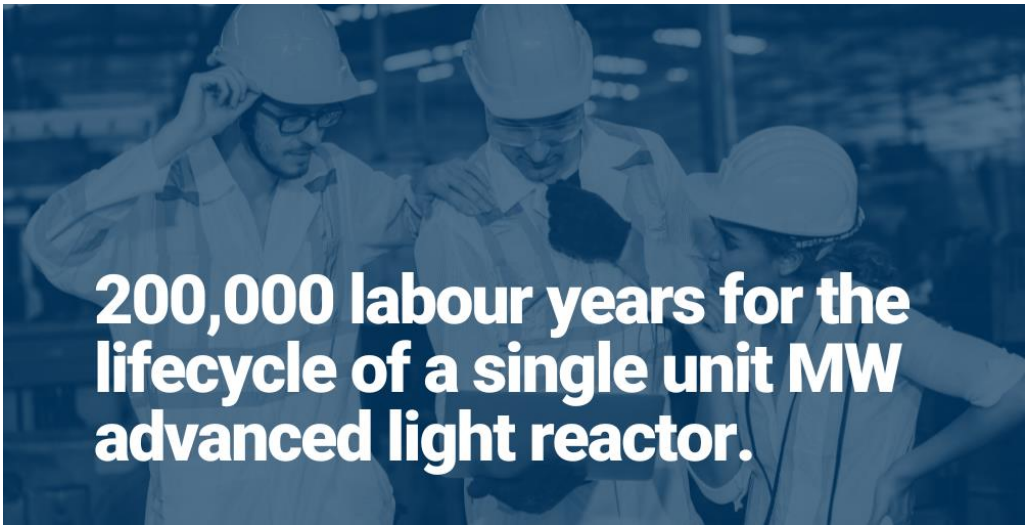
2. Momentum Builds For Nuclear Power

To learn more about carbon capture, check out this Raise blog post.

U.S. President Joe Biden's signing of the Inflation Reduction Act into law introduced a number of incentives that will pave the way for more nuclear power projects. These incentives include a tax credit to help preserve existing reactors, several incentives for clean energy technologies that include advanced reactors, and an investment to support the development of a domestic supply chain for high-assay low-enriched uranium (HALEU).

North of the border, Canada has also doubled down on its commitment to nuclear power, with Ontario recently announcing it will proceed with a $2 billion refurbishment of its nuclear-generating stations in Pickering. The project, with a target completion date in the mid-2030s, will create about 11,000 jobs per year.

Skilled labor is particularly important in the nuclear industry, representing a significant share of the costs associated with updating and building plants. In one study by the OECD Nuclear Energy Agency, estimated direct employment for the lifecycle of a single unit MW advanced light reactor, which includes ten years of site preparation and construction, 50 years of operation, a decade of decommissioning, and continued future management of nuclear waste, was roughly 200,000 labor years.



Recognizing that a skilled labor shortage could hold important projects back, companies like Sellafield Ltd. are already tapping into the power of robotics and artificial intelligence to decommission nuclear sites safely, efficiently, and economically. The company has developed and deployed a wide range of robotic technologies to perform tasks such as remote inspection, waste handling, and demolition at the UK's largest nuclear site.

3. Vehicle Manufacturing Prepares For A Big Makeover

As more and more drivers turn to electric vehicles, the workforce required to make these vehicles and their components is experiencing shifts. Manufacturers like Ford and Stellantis have already made staffing cuts as they eagerly try to find funds to help pay for their transition to EVs. While there are conflicting calculations as to whether the shift to EVs will ultimately increase or decrease overall automotive jobs, there is a common consensus that these workers will need new skills. The EV battery industry offers an excellent illustration. With the number of global gigafactories growing from just three in 2015 to more than 285 built or planned today, the massive skills gap has fueled a dramatic talent war, with some senior battery engineers reportedly earning as much as the CFO.

From 3 to 285 EV battery gigafactories since 2015.

One recent study, focused on the skills needed for zero-emissions vehicle and battery manufacturing, predicts that electrical engineers and battery process engineers will become the most in-demand occupations in the automotive and electric battery manufacturing sectors between now and 2030. Software developers, industrial electricians, and material assemblers are also expected to be in high demand. Given that the manufacturing process for EVs will have greater requirements related to circuit boards, processors, chips, electronic equipment, and programming, priority skills expected to be at the highest risk of future workforce shortages across the sector include critical thinking, production and processing knowledge, and communications.

Skills that will be needed to support:

- Electrical Engineers
- Battery Process Engineers
- Software Developers
- Industrial Electricians
- Material Assemblers
- Chemical Engineers

As more and more automation, robotics, and digital technologies are adopted into automotive manufacturing processes, positions will require increased skill specialization. For example, electrical and chemical engineers may need coding or battery management expertise, and machinists with programming and software knowledge will become extremely valuable to organizations.

4. Paving The Road To Pollution-Free Electric Power

The U.S. government's goal to have a 100% carbon pollution-free electricity system by 2035 will drive rapid and significant change. New transmission, distribution, and storage infrastructure will be needed to maintain and improve grid reliability, including adapting the electric grid to be flexible to changing supply and demand. The incorporation of smart grid technologies and Internet of Things solutions into the electric grid will drive the need for a highly skilled workforce that can design, operate, and maintain these systems.

Deloitte Research Center for Energy and Industrials warns that the record build-out of renewables and the domestic supply chain requires growing and (re)training the workforce with the right skills in the right places. Promising initiatives are already underway to unlock the talent bottleneck.

The Center for Grid Engineering Education, a workforce development initiative bringing together universities and utility and industry sponsors, is using electric industry research to educate the next generation of power engineers and data scientists to help shape the electric grid of the future. Its "GREAT with Data" initiative (GREAT is an acronym for Grid-Ready Energy Analytics Training) is addressing workforce skills in five critical technical areas:

- Power system fundamentals
- Data science, including descriptive, prescriptive, and predictive analytics, and machine learning
- Cyber security
- Information and communication technologies, with an emphasis on interoperability and standardization technologies
- Integration of solar photovoltaic and other distributed energy resources, such as energy storage, electric vehicles, and demand response