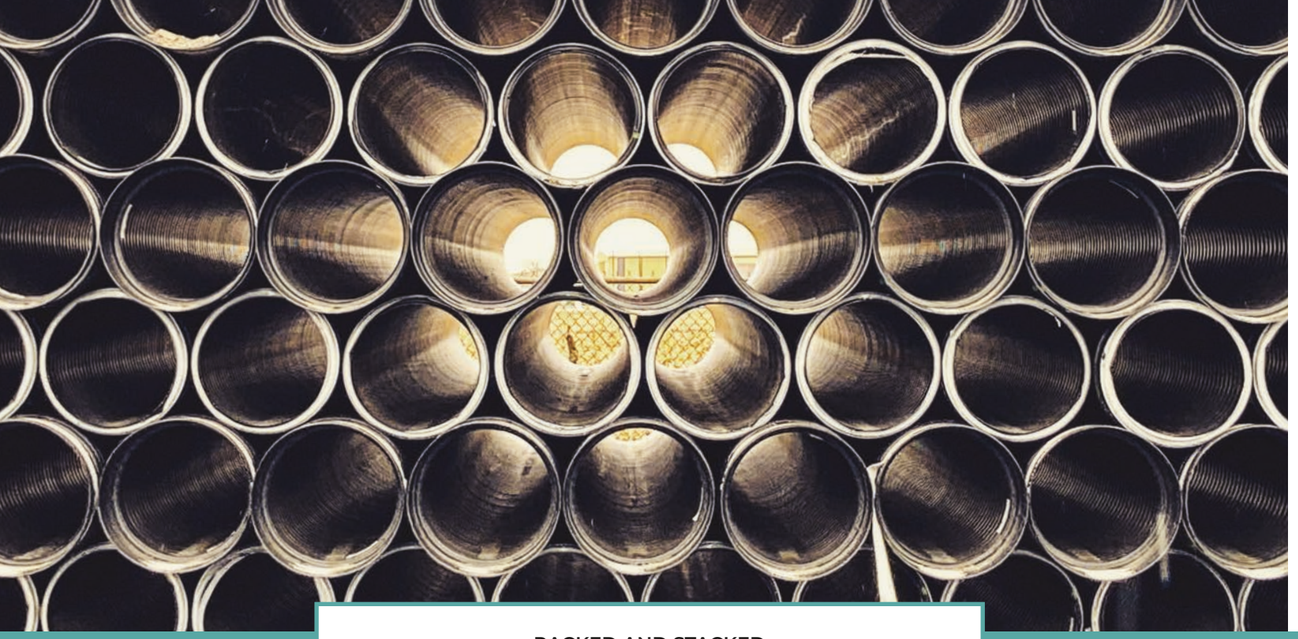
ELEMENTS

ON THE HORIZON

INSIDE: CEC ASSISTS OUR POWER INDUSTRY CLIENTS AS THEY MOVE INTO THE FUTURE

2022 Vol. 1



RACKED AND STACKED

Photo Credit: Fernando Camargo, Project Manager, Toledo office

CEC provided surveying and site civil design for a manufacturing building expansion in Napoleon, Ohio.

CEC sponsors a photo-of-the-month contest encouraging employees to submit photos from their work sites. Winning photos are published on CEC's internal website and social media pages. One is selected for Elements.

Elements is published by Civil & Environmental Consultants, Inc. for clients, business partners, and other associates.

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ON THE COVER: This is The SEFA Group's Winyah STAR beneficiation plant in Georgetown, S.C. It's one of the STAR facilities transforming Coal Combustion Residuals (CCR) into products used in the concrete industry. *Used with permission of The SEFA Group.*

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Civil & Environmental Consultants, Inc.

WELCOME

In this issue of Elements, we spotlight the services that we perform for the Power Industry to help our clients achieve their business objectives. We have been supporting the Power Industry since our first few months of operation in 1989 when we were servicing Ohio Edison and Allegheny Power, both of whom are part of First Energy, a current client. Our work with the Power Industry grew to the extent that in about 20% of the years of our operation, our volume of services to the industry exceeded any of the other markets that we serve.

We are honored to present an interview with Jamie Boyd, the Director of Solar Business Development for NJR Clean Energy Ventures Corp., a CEC client. Jamie shares her insights on the solar industry in general, and about the search for sites suitable for development. We also spotlight a project where we assisted with permitting and design of a solar park constructed on a closed landfill. That is truly an innovative and productive use of a brownfield site. In this issue, we also describe efforts to reuse, rather than dispose of Coal Combustion Residuals, and the use of Light Detection and Ranging (LiDAR) to monitor vegetation clearances along electric transmission lines to identify unsafe encroachments that would lead to public safety risks.

Two significant milestones for CEC are being spotlighted as well. First, we are celebrating our Cincinnati office's 30th anniversary. It was the second CEC office after our Pittsburgh headquarters office. The office has been a success since its early days thanks to our great employees and colleagues in the office. It has been our privilege to work with our Cincinnati folks for 30 years.

Finally, we are introducing you to Dustin Kuhlman, our new CEO. Having been in this industry for more than 40 years, I have seen where the changing of CEOs has led to cultural disruptions, poor service to clients, and employee defections, particularly at the senior level. None of those occurred when Dustin assumed the CEO role in January 2022. There was no drama because he was the obvious choice for that position. Our employees and clients respect Dustin for his character, technical expertise, and decision-making. More importantly, they also understand his genuine care for our clients as individuals, and our employees and their families. Dustin is the perfect person to lead CEC into the future.

Have some fun and be safe today.

Ken Miller, President

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Coal Combustion Residuals (CCR) are a by-product of the creation of electricity.

FOCUS ON THE FUTURE

FROM WASTE PRODUCT TO USEFUL COMMODITY

CEC'S EXPERTS CAN HELP WITH THE CCR REUSE PROCESS

The majority of the electricity powering your home or office right this very moment may have gotten its start in the ground many, many years ago as decomposing organic waste that today is burned as coal. In the simplest of terms, coal is burned to heat water to produce steam to spin turbines to generate electricity. So, what becomes of what is left of the coal after it's burned?

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Coal Combustion Residuals (CCR) are produced in the creation of electricity in coal-fired power plants and are the remnants from the burnt coal (i.e., ash) that is collected from the flue gases and boilers, as well as other by-products produced as part of air quality emission control systems. The primary CCR materials include:

Fly Ash, a very fine, powdery material composed mostly of silica collected prior to the flue gases emitting from the smoke stacks.

Bottom Ash, a coarse, angular ash particle that is too large to be carried up into the smoke stacks so it forms in the bottom of the coal furnace.

Flue Gas Desulfurization Material, a material leftover from the process of reducing sulfur dioxide emissions from a coal-fired boiler that can be a wet sludge consisting of calcium sulfite or calcium sulfate or a dry powered material that is a mixture of sulfites and sulfates.

CCR is one of the largest types of industrial waste generated in the United States. According to the American Coal Ash Association's Coal Combustion Product Production & Use Survey Report, nearly 79 million tons of coal ash were generated in 2019.

One of CEC's newest team members is an expert in the management of CCR. Bill Almes, P.E., is a Senior Principal in our Waste Management practice. He brings more than 30 years of experience as a consulting engineer specializing in civil, environmental, and geotechnical engineering.

His experience includes work in the Mining, Power, and Solid Waste industries. The majority of his project experience has been focused on municipal solid waste and industrial waste management facilities, renewable energy, CCR landfills and impoundments, and coal refuse disposal facilities. These projects required local, state, and federal environmental permitting, facility design, geo-environmental investigations, construction quality assurance, construction certification services, and environmental compliance.

Almes's broad expertise in CCR reuse is especially valuable to clients.

For many years, CCR was simply disposed of in landfills and surface impoundments. Landmark failures in Tennessee and North Carolina accelerated change to disposal practices.

On Dec. 22, 2008, a failure of a dike used to contain coal ash occurred at the dewatering area of the Tennessee Valley Authority (TVA) Kingston Fossil plant in Roane County, Tenn. During the dike failure, approximately 5.4 million cubic yards (1.1 billion gallons) of coal ash slurry was released into Swan Pond Embayment and three adjacent sloughs, eventually spilling into the Emory and Clinch Rivers.

To assist the TVA Office of the Inspector General (OIG) with technical aspects of the root cause analysis (RCA) report provided by others, Almes led a team of geotechnical experts to peer review the RCA findings and provide observations concerning ash management practices at TVA. The sole mission was to provide an independent review on behalf of the OIG and the U.S. Congress.

"We were tasked to make sure Congress knew the real reason [the failure] happened," Almes says.

On Feb. 2, 2014, a release of coal ash occurred at the Dan River Steam Station in Rockingham County, N.C. The estimated quantity of ash released was between 50,000 and 82,000 tons. Also, approximately 27 million gallons of ash pond wastewater was released. The released ash and water was discharged to the Dan River.

These events ushered in changes to U.S. EPA regulations to reduce the chances of future failures and releases.

Almes says many power companies have increased their efforts to beneficially reuse the CCR materials in order to reduce the volume of materials that require permanent disposal and are moving away from disposing of CCR in impoundments by placing the CCR materials in new lined landfills — monofills — which accept only the CCR and meet the latest regulatory requirements.

Typically, monofills are superior to unlined CCR landfills and impoundments since they are permitted (approved by state regulatory agencies) disposal facilities constructed with state-of-the-art composite liner and cover systems and leachate collection systems. Essentially, dedicated monofills are established to provide a safe long-term disposal means to protect the environment.

These are usually located adjacent to or very near the power plants, reducing the transportation costs and minimizing safety concerns as heavy truck traffic is reduced in roads. Some are sending the CCR to existing lined landfills, where it is separated from the other wastes.

For many years, CCR was added to landfills and retention ponds. Landmark failures in Tennessee and North Carolina started a change to disposal practices.

"The landfills that accept CCR are mostly owned by the power companies and other private waste disposal companies. The design, permitting, and approval process always takes time," he says.

That's where the expertise of CEC comes into play, guiding these power companies through the maze of regulatory changes when it comes to dealing with the CCR materials.

"We keep up with the frequently changing federal rules and decisions, as well as those of the states, which can have their own regulatory requirements, adding another layer of compliance," Almes says.

While getting these waste products safely disposed is of the utmost importance, the beneficial reuse of CCR offers an exciting second life for CCR that has been previously placed in impoundments and landfills.

The power company (and their subcontractors) can process, separate, and sell the CCR that is currently being produced or has been disposed of for beneficial use.

While millions of tons of buried CCR are being removed from disposal areas and transported to approved landfills, some of it is being recovered for use by the cement/concrete industry and for other beneficial uses.

The SEFA Group (SEFA) is a company that repurposes the ash. STAR® (Staged Turbulent Air Reactor) Technology is a patented thermal beneficiation process to transform harvested coal ash from surface impoundments or landfills into a high-quality, sustainable product for the concrete industry.

The process removes contaminants and provides a reliable raw material that meets or exceeds all specifications for additives in concrete.

> We want to be part of the process … to be on the leading edge of extracting those Rare Earth Elements."
>
> **BILL ALMES, P.E.**
> **Senior Principal,**
> **Waste Management,**
> **Pittsburgh Office**

The process is self-sustaining and exothermic, meaning no external fuel source is required for continuous treatment.

Jimmy Knowles, SEFA Vice President of Government & Environmental Relations, says there is not enough surplus ash being produced in power plants now to meet the existing demand. "Ash is a desired commodity. It doesn't matter if the ash is five months old or 50 years old. The embodied energy is in the ash."

SEFA has recycled more than 25 million tons of fly ash that would have otherwise gone into landfills or ponds and was the first company in the world reclaiming and recycling coal ash from ponds for concrete on a commercial scale. The company operates five STAR plants in the Carolinas.

"We take previously disposed, legacy ash and make it suitable for use," Knowles says. The material is there for the taking in disposal ponds and monofills; however, additional state and federal permitting is required before the excavation can begin.

"We'd like to think of the coal ash disposal sites as 'storage stockpiles' and shift the focus to beneficial use."

"That's why we love working with firms like CEC who help us think outside the box," Knowles adds. "We are looking to create a paradigm of beneficial use from the get go, rather than disposing of it and then having to dig it back up."

"The use of fly ash in Portland cement concrete has many benefits and improves concrete performance and the strength and durability of hardened concrete. Fly ash use is also cost-effective. When it is added to concrete, the amount of Portland cement may be reduced," Almes says. The chemical properties of all fly ash vary widely and some materials, when mixed with water, make the concrete stronger.

Another benefit of some CCR materials is the recovery of Rare Earth Elements (REEs), which are comprised of only 17 elements from the periodic table.

REEs are used extensively in the manufacture of microchips, which are an essential part of many sectors of the U.S. economy, including health care, transportation, power generation, petroleum refining, and consumer electronics (everything from cars and trucks to cellular phones and TVs). Because of this critical role, interest and research into the recovery of REEs from coal, coal refuse, and CCRs has recently increased. These minerals can be isolated, processed, and sold to the chip manufacturing industry, here and abroad, he adds. "Our federal and state governments are funding ongoing research for this process."

"We want to be part of the process … to be on the leading edge of extracting those elements," Almes says. "It's a cool takeaway. We are letting people know CCR can be a good thing." ■

Workers smooth concrete during the reconstruction of Pennsylvania's Highway 219. The concrete contains CCR treated in one of SEFA's STAR plants.

Photo used with permission from The SEFA Group

GUIDING LIGHT

CEC IS INSTRUMENTAL IN PLANS TO TURN A CLOSED OHIO LANDFILL INTO A SOLAR PARK

Think of the proposed Columbus Solar Park as the ultimate upcycling project — on the grandest of scales.

The parcel in Jackson Township, Ohio, was permitted as the Model Landfill in 1969. In 1985, the landfill stopped accepting waste and was closed.

Fast forward 13 years, and the site was permitted as a golf course. The Phoenix Golf Links opened in 2000 and operated for the next 14 years.

CEC is now involved as the site begins its next transformation.

> Solar development **projects on landfills** present numerous opportunities for CEC to help our clients by providing multi-**office, multi-**discipline **support,** including geotechnical **engineering, water resources, waste management, ecological, cultural resource, and** survey services."
>
> **ABIGAIL POLLOCK**
> **Project Manager I,**
> **Waste Management,**
> **Pittsburgh Office**

A solar power generation system producing approximately 49.5 MW is proposed to be installed over approximately 154 acres of existing landfill cap. It is slated to be one of the biggest solar developments of its kind in the country.

Owned by Solid Waste Authority of Central Ohio (SWACO), the location is being developed by BQ Energy, LLC., a New York company specializing in developing wind and solar projects on closed landfills, former mine sites, and other brownfield sites. The Columbus Solar Park is among more than 20 BQ Energy solar projects currently under development.

Abigail Pollock, a project manager in CEC's Waste Management Practice, is at the helm of this latest project. The CEC

team brings together multiple disciplines to provide project management and support for the Columbus Solar Park with aspects such as Solid Waste Rule 513 authorization, cultural resource management, threatened and endangered species, geotechnical engineering, and survey.

In addition to working with SWACO and BQ Energy, Pollock is also coordinating efforts with design engineering consultant Crawford & Associates Engineering & Land Surveying, electrical engineering consultant Barr Engineering, and legal consultant Bricker & Eckler.

WITH BENEFITS COME CHALLENGES

Landfills often have existing infrastructure in place, including access roads, fencing, surface water controls, and, importantly, electric transmission infrastructure. In addition, solar parks on landfills protect other open lands like farms, which is generally gaining public support. Of course, there are also unique challenges that come with these benefits. Pollock points to some specific design and permitting challenges for this particular site:

Existing landfill cap system: Closed landfills have regulated cap systems that are necessary to reduce stormwater infiltration into the waste. The solar arrays require foundations that must be designed to not negatively impact the cap system. The Model Landfill has a soil cap that allows the use of a proposed driven-post racking foundation, which is common for landfills of that age. CEC has worked with the design engineer to develop a construction detail for the driven post that includes a bentonite mound around the post and sloped soil to reduce infiltration at the post. This design was approved by the Ohio EPA.

Steep slopes of greater than 15%: Solar racking suppliers have design limitations that require that ground slopes be less than 15-20%. CEC has prepared a grading plan for the Columbus Solar Park that reduces steep areas while improving drainage and minimizing ground disturbance and impact to the existing facility infrastructure. In areas of grading, the soil cap system will be maintained or replaced with a minimum 2-foot thickness.

BQ Energy has worked on multiple solar parks across the country, including this one in Annapolis, Maryland.

Existing facility infrastructure: Landfills require infrastructure in order to operate and to continue to be safe following closure. The Model Landfill has an extensive landfill gas collection and control system (GCCS), as well as leachate collection, management, and transport systems and structures that will need to continue to operate throughout the life of the facility. The GCCS and leachate collection systems were constructed and modified over the years with somewhat limited records available. CEC has worked with the site owners to review all available information and compare to survey data in order to more accurately identify the location of above- and below-ground components to be incorporated into the design. The panel layout is designed to avoid above-ground features that need to be preserved.

Existing stormwater management facilities: CEC is preparing a post-construction stormwater design that will maintain the function of existing stormwater management structures (channels, catch basins, culverts, and a pond) to the extent possible, improve drainage in areas with the potential to pond water on the landfill cap, and ensure no increase to peak flows leaving the facility.

Post-construction vegetation: The goals of post-construction vegetation include protecting soils from erosion. Low-height, low-maintenance species are used to reduce the potential for shading of the solar panels and reduce the cost associated with mowing. Soil scientists at CEC have also worked to develop seed mixes that include native species and pollinators.

Flood zone designation: The Federal Emergency Management Agency (FEMA) identified a Special Flood Hazard Area located on a sizable portion of the project area. CEC was able to perform a floodplain elevation survey and submit a Letter of Map Change request to have the property removed from the Special Flood Hazard Area.

Wetlands identification: CEC performed an assessment-level investigation of the proposed Columbus Solar Park in April 2021 and identified one acre that would meet the three specific criteria necessary to be classified as a wetland. The Ohio EPA Division of Surface Water initially informed CEC that any impact to these areas would need to be permitted, most likely as isolated wetlands. CEC presented information to the Ohio EPA Divisions of Surface Water and Waste Management.

The Ohio EPA agreed with CEC and issued a regulatory clarification stating that isolated wetlands that have established on landfill caps will lack junction with subsurface groundwater and consequently are considered by Ohio EPA as private water (i.e., not a regulated water of the State). Avoiding the need to obtain wetland permits for these areas was a big win for the project.

Existing gas extraction system: The decomposing waste in the landfill continually produces methane gas that must be removed. This is performed through a piping and gas well system that collects and combusts the gas. Designing around the existing gas extraction system was another significant challenge at this site, as it is at other solar facilities constructed on landfills, according to Pollock.

Rick Buffalini, a CEC Vice President and a solid waste engineer, said the Model Landfill has a soil cap, so the project is using driven-post foundations. This presents challenges for a site with a gas extraction system like the Model Landfill. There is about one gas well per acre, with an extensive piping system beneath the ground. "There is a lot of piping, and we must locate that piping before the installation of the solar panel foundations," Buffalini says. "We may use subsurface utility engineering survey or isolated test pits to locate the underground piping."

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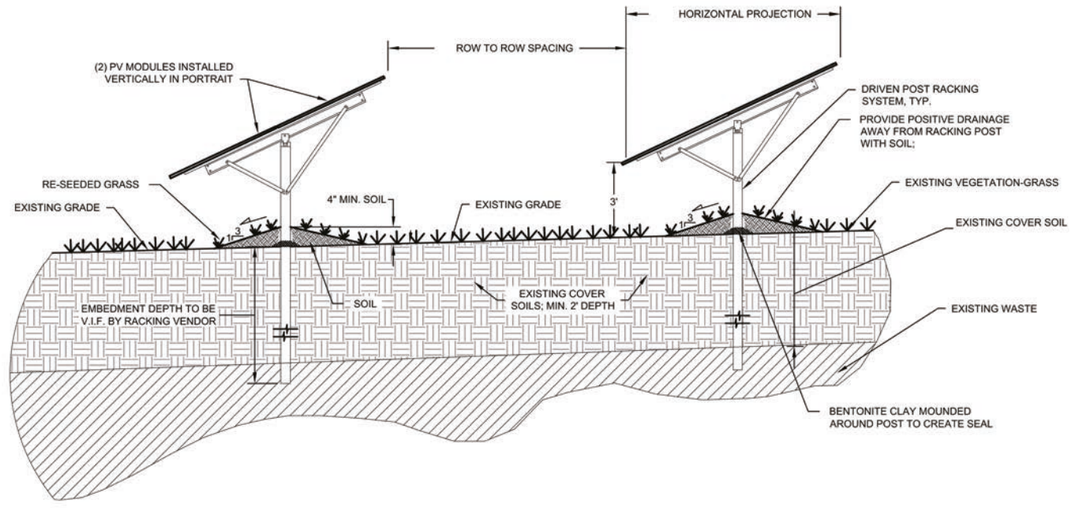
"Solar development projects on landfills present numerous opportunities for CEC to help our clients by providing multi-office, multi-discipline support, including geotechnical engineering, water resources, waste management, ecological, cultural resource, and survey services," Pollock says.

Buffalini adds that "though constructing a solar project on a closed landfill presents many challenges, we have been able to work through these with our client, BQ Energy, and the landfill owner, SWACO."

Solar is a natural fit for closed landfills thanks to their existing infrastructure and the large, open areas they provide without the challenges of competing existing land uses. CEC is a natural fit for clients seeking support with solar farm development on closed landfills. ■

> "Though constructing a solar project on a closed **landfill** presents many **challenges,** we have been able to work through these with **our client, BQ Energy,** and the **landfill owner,** SWACO."
>
> **RICK BUFFALINI**
> **Vice President, Waste Management, Pittsburgh Office**



Crawford & Associates Engineering & Land Surveying, PC provided this graphic showing how the solar panels are installed atop a closed landfill with driven-post foundations. BQ Energy hopes to have electricity flowing from the Columbus Solar Park by 2024.

CEC PARTNERS WITH SOLAR INDUSTRY LEADERS

JAMIE BOYD OF NJR CLEAN ENERGY VENTURES SHINES A LIGHT ON THE EVOLVING BUSINESS OF TURNING SUNLIGHT INTO ELECTRICITY

For decades, CEC has delivered conventional and mission-critical services to the power industry. We're a provider of choice due to our in-depth, long-term engagements with some of the nation's largest, most complex power-related projects. Electric utilities, independent power producers and developers, and EPC organizations rely on us to manage risk, regulatory requirements, and financial expectations.

Jamie Boyd has seen many changes in the solar industry.

CEC has become a trusted partner to electric utilities, independent power producers and developers, and EPC organizations.

CEC is constantly evolving to meet the needs of our clients in the ever-changing power industry. One of the hottest developments in the past few years is solar energy — converting the rays of the sun into electricity.

Jamie Boyd, Director of Solar Business Development with NJR Clean Energy Ventures Corp. and a CEC client, answered a few questions from Kris Macoskey, CEC's Renewables Lead, about her work in the solar industry.

QUESTION: Would you tell us about your career path?

ANSWER: I accepted a position with Iberdrola Renewables (now Avangrid Renewables) in January 2007.

Iberdrola Renewables had just entered the U.S. market, and I was fortunate to begin my career as the true growth was happening. I was exposed to a dynamic industry, and I volunteered for every opportunity that came up. Iberdrola Renewables was later integrated with PPM Energy, and that opened the door for even more opportunities, including representing Iberdrola Renewables on due diligence activities for two financing portfolios in excess of $450 million. My final position with Iberdrola Renewables was Supervisor, Development Projects and Leases. Overall, I spent eight and a half years with Iberdrola. After Iberdrola Renewables, I worked with some leading solar companies, including SunEdison, GE Current, and Sunpin Solar. I initially focused only on solar interconnection, but eventually branched into project development. Before joining NJR Clean Energy Ventures, I worked as a Business Development Manager at Sunpin with projects across the country.

NJR Clean Energy Ventures is the clean energy subsidiary of New Jersey Resources (NJR) and a leader in the solar industry. NJR Clean Energy Ventures has an extensive commercial solar portfolio with more than $1 billion invested. What attracted me to Clean Energy Ventures (CEV) was the ability to work for a company that had financing in house. The uncertain nature of external financing can be difficult when looking at potential investments that are years away from construction. Plus, this position gives me an opportunity to make a difference in helping to revitalize areas that have been economically depressed.

NJR is a Fortune 1000 company that provides natural gas and clean energy services, including transportation, distribution, asset management, and home services. The company is composed of five core businesses: New Jersey Natural Gas (NJNG) is the principal subsidiary of NJR; NJR Energy Services (NJRES) is NJR's natural gas marketing business; Storage & Transportation serves local distributors and producers, electric generators, and wholesale marketers; NJR Home Services is NJR's appliance service business; and NJR Clean Energy Ventures invests in, owns, and operates solar projects in New Jersey and surrounding states with a total installed capacity of nearly 370 megawatts.

QUESTION: Can you give our readers your 10,000-foot perspective on what has been happening in recent years in the solar market?

ANSWER: Solar installations have increased dramatically over the past 10 years due to continuous declines in material and installation costs coupled with increases in panel efficiency and energy output.

Per Solar Energy Industries Association (SEIA), there are 121.4 gigawatts of installed capacity in the U.S. alone. Additionally, as of March 2022, nearly 4% of the electricity used in the U.S. comes from solar energy, which is more than 80 times its share a decade ago. This is a considerable increase in a fairly short period of time.

QUESTION: Are there certain geographic areas that NJR focuses on?

ANSWER: NJR Clean Energy Ventures has grown tremendously since it was founded in 2010 through disciplined capital allocation in projects that meet its investment criteria.

Today, CEV is one of the largest solar owners and operators in New Jersey, and our team has recently applied its expertise and strategic investments to diversify and expand its portfolio outside the state. I was brought into CEV to help grow its commercial solar footprint in and beyond New Jersey. We currently have six projects (140 MWdc) sited across Pennsylvania that have been submitted into the PJM Interconnection queue. (PJM is a regional transmission organization.) We are actively looking within various states across the Mid-Atlantic and Northeast for targeted investment.

QUESTION: It seems that there is a bit of a land grab to find sites for solar development. Are sites hard to find? What makes a site suitable or unsuitable?

ANSWER: With the continued growth of the solar industry, developers are focused on identifying investment opportunities across the United States, and more recently, Pennsylvania. Each company determines its core focus — some prefer brownfields, others prefer rooftops. At CEV, we have a talented team with extensive experience and who understands the complexities of developing, constructing, owning, and operating large commercial solar projects from landfills and brownfields to floating solar. In fact, we recently began construction on our second floating solar project in Millburn, N.J. When complete, this 8.9 MW project will be the largest floating solar array in the United States.

> "The solar marketplace is a constantly evolving and growing industry. Every market is completely different from the next."
>
> **JAMIE BOYD**
> **Director Solar Business Development with NJR Clean Energy Ventures Corp.**

CEV also made a decision to look strategically at Pennsylvania as an upcoming market.

With key partnerships, such as CEC, we are able to look at remediated coal sites, for example, with confidence that the project will be designed properly.

QUESTION: What makes a site suitable?

ANSWER: From a project development perspective, I review the local and state permitting regulations and requirements against the site's conditions. Also, the steepness of the slopes, as well as if the site faces south. This is important to ensure maximum exposure to the sun. Proximity to interconnection is another critical consideration. For example, some rural locations may have large voltage lines running through the area, which can make it challenging. These items are among the most crucial to consider for ensuring a successful project.

In this industry, changes can happen in an instant. You have to adapt and adjust.

Legislative or regulatory delays can happen, as well as other factors that are beyond your control.

As a solar developer, you want to be prepared and positioned to respond when changes occur. The solar marketplace is a constantly evolving and growing industry. Every market is completely different from the next.

Remember a working knowledge from one state, county, or region might not be applicable to another.

Utility tariffs, permitting entities/agencies, and siting regulations have operating procedures that are far different from one state to the next, so it is imperative to have a firm understanding of the playing field. ■

DUSTIN KUHLMAN

CHIEF EXECUTIVE OFFICER

At the start of 2022, Dustin J. Kuhlman, P.E., was promoted to CEO after 15 years with CEC. He is the first non-founder CEO in the company's 33-year history. The knowledge gleaned in his time at CEC and from the firm's four founders contributed to Kuhlman's ascent to this leadership role. These responses are from an interview with Kuhlman earlier this year — on his career, his plans as CEO, and more.

QUESTION: WHEN YOU FIRST STARTED AT CEC, DID YOU EXPECT TO BECOME CEO ONE DAY?

ANSWER: I don't think at that time I thought I would be CEO. When I moved to Pittsburgh, I found a job at CEC very quickly. I was happy to be here and a part of this organization. I liked everyone right away. Their perspective and how they ran the business was refreshing.

QUESTION: HOW DID YOU TRANSITION FROM A PROJECT MANAGER TO A CORPORATE LEADERSHIP ROLE?

ANSWER: It was gradual. As we grew, it became apparent that additional leadership was needed inside the Civil Engineering practice. Within a year or two, they asked me to lead the practice here in Pittsburgh. They saw something in me at the time, and I thought I was well suited for that job. I really enjoyed interacting with the whole team, while continuing to focus on project work and our clients.

Around that time, our region was seeing tremendous movement in the energy industry's oil and gas exploration and production due to our office location within the Marcellus Shale play. I was one of the people in some of the initial meetings with new clients. We realized quickly the significance of what was happening. A few of us ran with it, and it ended up being a huge part of my career. We got really busy really fast and hired a lot of new people into the organization. That was a springboard for me in a way because it gave me the opportunity to work on large projects with large groups of people and interact with different practices. All the while, I was still actively engaged with clients, managing projects, and developing business. Those were always top of mind.

QUESTION: COULD YOU SPEAK MORE ABOUT PUTTING CLIENTS AND EMPLOYEES FIRST?

ANSWER: I've always had the belief that we're a service industry. If you're not taking care of your clients, you're not going to be successful. It's been ingrained in me throughout my whole career. When I got to CEC, I noticed that it was ingrained in everyone here as well. That made CEC different to me. It was very apparent that the emphasis on service was amped up from what I'd experienced in the past.

As I grew in this company, I started to learn more about how it originated and what the four founders wanted to achieve when they built it. The theme is clients and employees. We want to take care of them both. Without either one of those, this doesn't work. So, they need to be the focus.

QUESTION: BEYOND CLIENT CARE AND EMPLOYEE FOCUS, WHAT OTHER KNOWLEDGE HAVE YOU PICKED UP FROM THE FOUR FOUNDERS?

ANSWER: A never-ending emphasis on quality is another thing that really left an impression on me. People live by our quality policies; they're part of our culture, and it's important that they are. A part of client service is that you must do good work, you have to make sure your work is checked, and you have to take pride in what you do.

It also has always been emphasized that it's essential to be able to tackle issues in a way that you can go home at the end of the day, have dinner with your family, and be happy. Family has to be first. We as leaders have to live by that. Otherwise, I think it sets an unrealistic example and expectation.

QUESTION: HOW WILL YOU CONTINUE TO PROMOTE GROWTH AND DEVELOPMENT WITHIN CEC?

ANSWER: As an organization, we have processes and programs in place that encourage the focus on development so people are getting a rewarding experience out of working here. If you're not developing, it's not very rewarding

As part of the strategic plan, we're looking to implement leadership development programs at various levels of the organization. One of those programs is for managers, so they have the tools that they need and they understand the concepts surrounding the development of their personnel. It's an essential part of our professional strategy. That's going to be a lasting theme at CEC and will have a special focus over the next couple of years. If we're sharing that knowledge and sharing that wisdom, we're in a better position to grow and have a sustainable organization. ■

Dustin Kuhlman, CEO, guided the company into its new headquarters in Moon Township, Pa.

A MILESTONE

CELEBRATING 30 YEARS OF CLIENT-FIRST SERVICE

CINCINNATI WAS THE SECOND OFFICE OPENED BY CEC

For 30 years, CEC has been a leader in expertise, engineering solutions, and client-first service in Cincinnati, Ohio.

As the second office of CEC, opened in 1992, it originally focused exclusively on environmental and solid waste projects. Now the Cincinnati office provides a full complement of engineering, survey, ecological, and environmental services under the deft watch of Tony Amicon, the Office Lead since July 2021 and a geotechnical engineer with more than 30 years of experience.

The office's capabilities include civil engineering/ site development, land surveying, GIS, geotechnical and environmental engineering, ecological services, water resources, and solid waste management. That expertise builds with each passing year and each new project.

"We are well-rounded. We are notable for our ability to handle the significant and difficult projects across the board in the Cincinnati area and throughout the country," Amicon says. "We have senior-level experienced engineers, scientists, and project managers in all of our practices."

> We are well-rounded. We are notable for our ability to handle **the significant** projects across the board."
>
> **TONY AMICON**
> **Cincinnati Office Lead**

The 30+ CEC employees in Cincinnati have navigated market changes and evolving rules and regulations. "We are nimble enough to do so, thanks to our senior leadership," Amicon adds.

BUILDING RELATIONSHIPS

In addition to developing technical expertise, building relationships is another key priority at CEC Cincinnati. One such relationship spans 23 years. CEC is a trusted advisor to Costco Wholesale, one of the nation's largest retailers, having collaborated on numerous new site developments across the Midwest.

"We've been the civil engineer-of-record for about 30 ground-up warehouse developments and have assisted Costco with improvements at more than 100 retail sites. Improvement projects include warehouse and fuel facility expansions and ADA (Americans with Disabilities Act) compliance upgrades — to name a few," says John Imbus, the senior member of the Cincinnati team. Imbus is a Vice President with more than 25 years of service to CEC. He was the Cincinnati Office Lead for 15 years and currently serves as Real Estate Market Group Lead and a national client manager.

"Our first opportunity to work with Costco was in 1999, when they were opening stores in Pittsburgh and Cincinnati concurrently. They gave us a shot and that has led to long-standing relationships that we truly value. CEC is a trusted member of the Costco development team," noted Imbus.

GOOD TIMES, GOOD DEEDS

CEC Cincinnati not only is invested in its clients, but wholly in its staff, as well.

Amanda Clark, Administrative Manager of the Cincinnati office, sees the positivity of the supportive environment and family values being a priority at CEC. In her 17 years with the company — almost half of her life — she has witnessed the ability to adapt to change while keeping those core values intact.

The Cincinnati team works hard and still manages to have some fun. Here, staffers tested their strategy and throwing skills with a few games of lawn tic-tac-toe.

Those family values and positivity have been on display this year with the 30th anniversary celebration in full swing. Staffers kicked off 2022 and got together to bowl a few games and socialize. They took to the lawn for some heated games of tic-tac-toe. A T-shirt design contest garnered a number entries, with the winning one created by Eric Gerard, an intern in the Water Resources Practice at the time and now a full-time staff consultant.

The Cincinnati office's goodwill is not just limited to clients. The staff recognizes the civic responsibility it has to use its collective talents to give back to the communities in which staffers live and work. In that spirit, the office staff worked with the Salvation Army to "adopt" a single mother with four children who was experiencing hard times by providing housewares, bedding, clothing, and food for each family member.

Anniversary activities will continue throughout 2022, and include a celebratory event at Cincinnati's Rhinegeist Brewery in September.

NOTABLE POWER MARKET PROJECTS

The Cincinnati office of CEC has helped clients tackle many challenges over the past 30 years.

A few of the most significant projects have been for power industry clients, according to Cincinnati Office Lead Tony Amicon.

LANDFILL ENGINEERING

When a power client needed to develop a landfill facility that would accept fly ash produced at its power plant, CEC Cincinnati employees, among others, provided solid waste permitting, landfill design, ecological studies, archaeological studies, Clean Water Act permitting, hydrologic and hydraulic analyses, geotechnical engineering, and slope stability analyses.

The landfill site was a deeply incised, steeply sloped valley situated above an abandoned underground coal mine,

"This was a big project for us, involving many different practices and staff throughout the course of the permitting, design, and construction stages," Amicon says.

The new 100-acre landfill contains a 58-acre waste facility that has the capacity to store 10 million cubic yards of Coal Combustion Residuals (CCR), providing 24 years of CCR disposal life for the power plant.

COAL COMBUSTION RESIDUAL MANAGEMENT

An energy producer sought assistance from CEC to get its coal-fired power generation station flue gas desulfurization (FGD) pond in compliance with the state environmental agency permit and the U.S. Environmental Protection Agency's Coal Combustion Residual Rule requirements. To achieve this, modifications were needed to improve the seismic stability of the perimeter containment dikes of the pond.

Amicon says CEC handled all aspects of this complex and fast-paced project including permitting and construction management. After six months of work with a Cincinnati field employee on site, the project was completed at the end of 2021.

CEC's services helped improve the structural stability of the FGD pond perimeter berms and meet state and federal permitting requirements by the deadline without impacting the power plant's operations.

TEAMING WITH POWER

CEC has the latest equipment to inspect lines across the country.

CEC'S INNOVATION HELPS KEEP THE NATION'S POWER LINES UP AND RUNNING RELIABLY & SAFELY

You're almost home on a balmy summer evening and hit the button on the garage door opener as you approach the driveway.

The door goes up, the light turns on and you pull in. Hit the button again and the door click clacks down to its original position. You make your way into the comfortably air-conditioned kitchen, flip on the light switch, and decide a snack is in order ... popcorn it is.

Hit a few buttons on the microwave, the bag begins to expand. You grab a cold beverage from the fridge, dump your popcorn into a bowl, and flip on the TV as you plop on the couch.

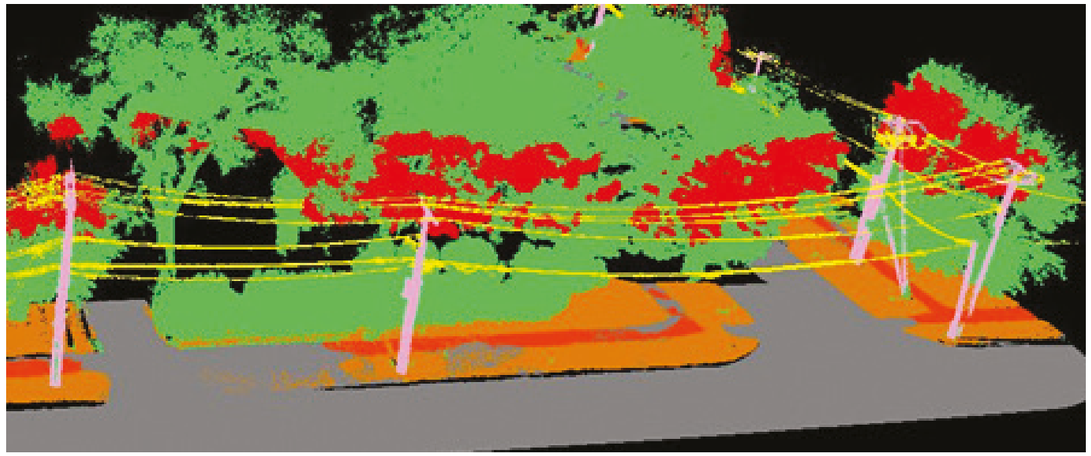
So, what is the common thread in this scenario?

It's electricity.

Without it, none of these everyday, day-in and day-out activities would be possible.

Keeping electrical lines safe and reliable is a big job. The risk of fire and power outages is omnipresent. Helping power companies in their efforts is a job CEC is proud to do.

Matt Bainbridge of CEC's Bridgeport, West Virginia, office and his team handle the extensive workload in securing data aimed at keeping that power up and running. Bainbridge started and manages the LiDAR (Light Detection and Ranging) Mapping and UAV (unmanned aerial vehicle) Services in the Bridgeport office.



Images like this allow the power companies to see where vegetation and buildings may be encroaching on the lines.

HOW DOES IT WORK?

LiDAR utilizes a laser light and reflected light to measure distances. The equipment can be used on drones, vehicles, and standalone terrestrial equipment, such as a tripod.

CEC gathers and interprets data from all over the country while mapping lines in Chicago and Philadelphia, as well as across the states of California, Texas, Delaware, Maryland, and Tennessee.

CEC works with several of the largest power companies throughout the continental U.S., providing a range of services from As-Built PLS-CADD models to National Electrical Safety Code's (NESC) Clearance Validation, and Minimum Vegetation Clearance Distance (MVCD) Vegetation Encroachment Analysis.

Among the power companies is Exelon Clearsight and its direct client contacts, including South Plains Electric Cooperative, a small utility serving the Lubbock, Texas, region.

Transmission and distribution utilities operating in Texas must file annual line inspections and safety reports for transmission lines to comply with Texas House Bill 4150.

> "The importance of the work is reduction of risk to the public. All of the professionals at CEC have as **their first duty the** protection of the public."
>
> **DENNIS MILLER**
> **Vice President, Bridgeport Office**

Every five years, utilities must report compliance with the NESC's requirements for vertical clearances.

To support South Plains in this effort, Exelon Clearsight teamed with CEC to provide the UAV imagery and Near-Infrared analysis, as well as pole condition assessments across Lubbock city limits and surrounding rural areas.

CEC utilized mobile LiDAR where possible and supplemented with UAV LiDAR when necessary (spans crossing plowed farmlands or water bodies). The team efficiently captured LiDAR for 110 miles of power lines through this hybrid approach of Vehicle-based Mobile Laser Scanning and Unmanned Aerial System LiDAR. Astonishingly, the investigation revealed vegetation encroachments within NESC thresholds amidst desert-like terrain.

"Results from this (transmissions) inspection will help our cooperative manage assets in a new way. The amount of detailed data provided from inspections such as IR, Groundline, RGB, and UDAR will assist in the efforts of maintaining a safe and reliable power system for our membership," says Jeffrey Groenewold, South Plains system planning analyst.

CEC assisted Exelon Clearsight with the LiDAR collection, classification of data, and its reduction into a tabulated format that could be easily digested within the Clearsight customer portal.

A JOB WELL DONE

South Plains was extremely happy with the result of this project and provided a letter of commendation stating "The inspection process was handled with the utmost detail and accuracy. The team assembled did a great job with planning, managing, and processing the inspection project."

"The importance of the work is reduction of risk to the public. All of the professionals at CEC have as their first duty the protection of the public. I am very proud of the innovation that folks like Matt and his team have developed," says Dennis Miller, a CEC vice president.

"We provide hi-res inspections and LiDAR assessments of conductors, poles, insulators, vegetation, ground, and buildings," Bainbridge says. "We find and identify the encroachments ... the vegetation and the structures that are too close to the lines."

USING THE MODELS

That data is used to create 3D models of the structures and wires. Weather information during the mapping is built into the models at designated intervals.

The models can show what happens at times of high wind, high heat, or high usage ... or all three together. "The transmission lines can move many, many feet during any of those conditions. It really gives the client a chance to see the worst-case scenario," Bainbridge says.

Other situations that could affect the lines are bending and falling trees in storms, lines blowing into buildings, and the lines blowing into each other.

And by CEC modeling the worst situations that can happen, power companies can proactively take corrective actions in areas of immediate need.

"We provide analysis, and we target areas to address now. We are serving as a type of preventative health care for the power industry," Bainbridge says.

One of the most common corrective actions to prevent fire and power outages is a simple, yet effective one.

It's a good, old-fashioned tree trimming. CEC helps out with that, too.

"When the power companies are cutting vegetation from along their lines, CEC staff can follow behind gathering data to ensure enough clearance is achieved based on the established NESC thresholds," he says.

It's that start-to-finish commitment to its clients that sets CEC apart. ■

> We provide **analysis, and** we target areas to address now. We are serving as a type of preventative health care for the power industry."

MATTHEW BAINBRIDGE
Senior Project Manager, Survey/Geospatial, Bridgeport Office

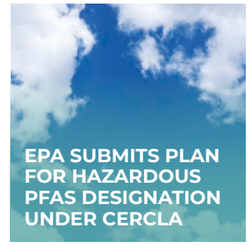
In case you missed it ...

A look back at regulatory and government-related updates

We're always monitoring the regulatory landscape so we can keep you up to speed on important changes and their effects.

Here is a collection of recent posts from our blog, in which we update you on some of the more pertinent topics from the regulatory world.

cecinc.com/blog



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Senior Leadership
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30 YEARS: It's a year of celebration for CEC Cincinnati. Our second office location, Cincinnati has been an important geographic market for the firm since 1992. **Story, page 14.**