

ELEMENTS



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Client Saves with Innovative Coal Combustion Residuals (CCR) Management Solution



Phase 1 CCR Landfill Construction
Figure 1

Background

This brief article recaps the journey of a utility faced with a problem common to many older coal-fired power stations — namely, dramatically reduced wet pond capacities and a pressing need to create and implement a long-term, cost-effective, plan to manage their CCRs (coal combustion residuals). The recession of 2008 caused a significant reduction in the plant's ash sales further burdening the plant's wet ash handling system. In a parallel timeframe, the TVA Kingston ash impoundment failure occurred resulting in an uncontrolled release of over 5M tons of coal fly ash into the environment (December 2008) prompting the USEPA to issue new draft regulations (USEPA 2009/2010) focused on a two-track (Subtitle C or D) approach to future regulation/management of CCRs.

The convergence of these three events forced our client to reconsider their CCR management plans. In particular they asked CEC: "What is the most cost-effective solution to address our ongoing/future CCR disposal needs in a manner that would be compliant with the proposed Subtitle C or D regulations?"

Putting the Pieces of the Puzzle Together

With that question in hand, a team of the clients' corporate/plant staff along with CEC worked to create an onsite solution that would be cost-effective and compliant with the proposed USEPA CCR regulations. The team was faced with challenges for siting a new landfill which included constraints of developable space for new ash disposal facilities both onsite and on nearby Greenfield parcels. With these and other challenges,

the solution for the site needed to have a short permitting and development timeline due to the limited onsite capacity remaining in the facility's wet pond system.

Engineering studies included onsite subsurface investigations, ash chemical characterization and geotechnical testing along with a regulatory and siting review to ensure that all recommended solutions met minimum threshold criteria. More rigorous testing and geotechnical analysis were used to address the issues of seismic and static stability and pond liquefaction concerns associated with hyper-saturated ash deposits in the former pond. The client had already performed groundwater assessment studies (over the period of several years under a state-driven regulatory program) in the area surrounding the pond which facilitated the process. In addition, conveyance assessments were performed to evaluate the most efficient method for handling and getting CCRs into the new landfill. Cash flow and total capital costs were assessed for all options including current dollar per ton costs and projected future costs with matching project timelines and permitting summaries.

The Right Solution

After due process and analysis, the conclusion and recommendations from the feasibility study included onsite dry ash landfilling with 20 years of capacity in conjunction with the installation of pin mixers to pre-condition CCRs prior to landfilling. The landfill was designed to be constructed in four phases on top of an inactive 45-acre onsite ash pond. The recommended solution included

CEC Positioned to Serve Energy Clients in Pennsylvania's Northern Tier

Civil & Environmental Consultants, Inc. (CEC) celebrated the Grand Opening of their 12th branch location in Sayre, Pennsylvania on June 22, 2011. The North Central Pennsylvania office currently has 14 full-time and 7 part-time staff members who are committed to serving CEC's energy clients in the "Northern Tier."

Pennsylvania's "Northern Tier" consists of five counties in the picturesque north central part of the state. This region is at the heart of the Marcellus Shale natural gas play, one of the most productive gas plays in the world. Because of the surge in natural gas development, the Sayre area has become a hub for energy-related enterprise. The charming, rather rural, town of Sayre is experiencing rapid growth, not unlike the phenomenal growth it had experienced in 1904, when the Lehigh Valley Railroad expanded operations with the construction of the Lehigh Valley Railroad Works, one of the largest locomotive shops in the world.

The newly-renovated CEC North Central PA office is in the Sayre Enterprise Center building. A historic landmark itself, it was originally a garment factory. During World War II, the building housed The Bell Knitting Company, which won the prestigious "E" Award for support of the



war effort with its production of t-shirts and parachutes.

Terry S. Boomer, P.E. oversees the North Central PA office operations and manages the ongoing support of the permitting and construction of Marcellus Shale gas infrastructure, including surveying, ecological assessments and civil engineering. Long-term plans include offering civil engineering and site development, environmental and ecological studies, waste management facility design, geotechnical engineering, infor-

mation management and construction monitoring from the Sayre location. Terry Boomer can be reached at tboomer@cecinc.com or at 877-389-1852 (toll-free), 570-886-2007 (local).

Additionally, CEC is actively recruiting qualified individuals for open positions at the Sayre location; specifically experienced engineers, ecologists, surveyors, scientists and technicians. For more information about these positions and how to apply, please contact Michelle Flynn at mflynn@cecinc.com or visit www.cecinc.com.

(Ribbon cutting ceremony, left to right) Linda Murrelle, Greater Valley Chamber of Commerce Board member; Dave Rosenbloom, Greater Valley Chamber of Commerce President; Terry Boomer, Ken Miller, Jenny Bacorn, Welcome to the Neighborhood Rep from Caregivers America; Jessica Schillmoeller, Greater Valley Chamber of Commerce Board member

Client Saves *(continued)*

reconfiguring existing operational wet ash ponds to better handle all plant wastewater streams (Figure 1, page 1). The same 45-acre pond was viewed as requiring future closure under existing state-driven regulatory programs. Therefore the solution had the added benefit of providing dry disposal capacity and effectively addressed the future need to close the idle pond. A new revetment-lined reclamation bottom ash pond was also part of the overall solution as well.

This solution helped the client achieve multiple layers of compliance and a long-term CCR

management plan while achieving a net cost-avoidance of approximately \$45M; \$40M of that amount is in disposal avoidance over the 20 year life of the landfill, and an estimated \$5M in avoided pond closure costs. Permitting, construction level design and construction management were all performed by CEC. Construction of the new surface water/contact water pond and Phase 1 cell of the landfill was completed in late 2010. The project timeline from start to finish (ready to receive CCRs) was a little under 3 years (Figure 2, below).

CCR Management Services

CEC has over 20 years of CCR management experience and has helped clients develop and implement pond closure plans that incorporated millions of tons of beneficially reused CCRs and hundreds of acres of ponds and landfills on top of former or recently operated ash ponds where site conditions and economics support those type of solutions. Please Contact Steven Putrich, P.E., at sputrich@cecinc.com or 330-310-6800 to discuss the possibilities for innovative pond and landfill management at your power plant sites.

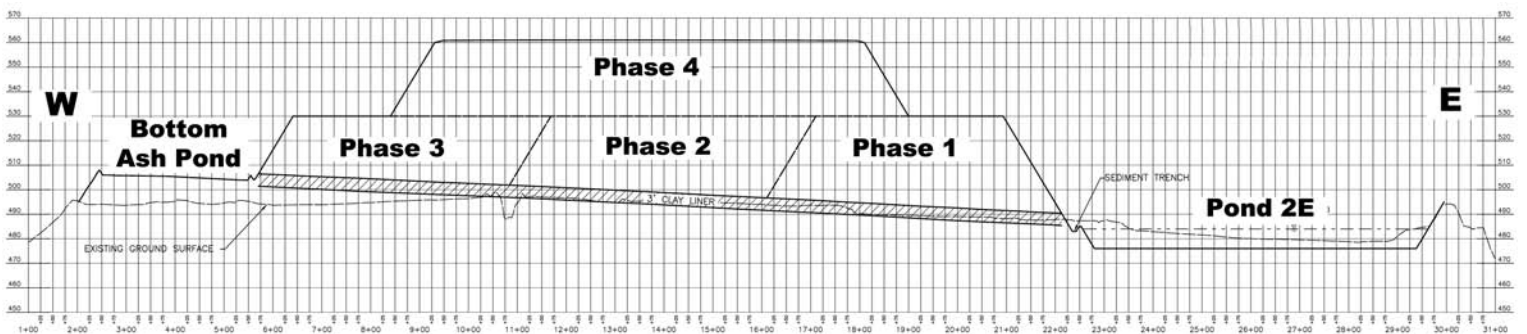


Figure 2

Environmental Liability Management of Retired Coal-Fired Power Plants

In 2005, CEC began providing assistance in assessing, quantifying and managing the environmental liabilities for FirstEnergy Generation Corp. a subsidiary of FirstEnergy Corp., a diversified energy company headquartered in Akron, Ohio. FirstEnergy is involved in the generation, transmission and distribution of electricity for portions of the eastern United States. CEC provided environmental investigations, development of initial hazardous materials inventories, and management of potential environmental liabilities during abatement and demolition of five retired coal-fired generating stations located throughout Ohio. The goal was to abate and demolish the retired coal-fired facilities and provide the owner with an attractive reusable property.



Gorge Plant, Akron, Ohio

The five sites included a partially-abated and demolished two boiler facility in Springfield known as the Rockaway Plant; a two boiler facility in Akron known as the Gorge Plant; an eleven boiler facility in Toronto known as the Toronto Plant; a four boiler facility in Springfield known as the Mad River Plant; and a seven boiler facility in Lorain, Ohio known as the Edgewater Plant. Some of these facilities were constructed as early as the 1910s. Coal-fired power plants of this era typically produced up to a couple hundred megawatts of electricity, while newer more modern coal-fired power plants can generate in the thousands of megawatts of electricity. After the plants reached their maximum lifetime use, FirstEnergy began to retire, or mothball, the facilities in the 1980s. After the five plants were ultimately retired, the Mad River and Edgewater sites continued to operate diesel-fired combustion turbines (CTs) needed for maintaining peak usage.

FirstEnergy contracted with CEC in 2005 to conduct site investigations at these five facilities in order to assess and develop preliminary cost estimates on overall environmental liabilities associated with the site such as soil and groundwater quality, and the costs to abate regulated materials such as asbestos and polychlorinated biphenyls (PCB). Based on our 2005 investigations, the most significant cost at each plant was associated with abatement of asbestos containing materials (ACM).

Beginning in 2007, FirstEnergy initiated abatement and demolition of the first of five sites. Abatement and demolition of the final site was completed in 2011. Prior to beginning the

abatement/demolition phases, a detailed preliminary plan was completed for known characteristics and volumes of regulated materials and chemicals to be inventoried and incorporated into the site-specific specifications and bid forms. FirstEnergy selected a general contractor to perform the site work at all five sites. CEC provided abatement and demolition oversight, engineering support, and oversight of the independent third party air monitoring company. The abatement and demolition services included coordination; construction quality assurance; project oversight; air monitoring; abatement and transportation & disposal (T&D) of asbestos and lead-based paint contaminated debris; waste manifest management; abatement and T&D of regulated materials; T&D of construction and demolition (C&D) debris; field engineering support and surveying; disposal/management of coal combustion byproducts (CCB); demolition of plant structures; closing and backfilling of onsite ponds; recycling of ferrous and non-ferrous metals; preparation of backfilling plans and specifications; laboratory testing of backfill materials, and final site restoration.

After abatement and demolition of the structures were completed, the building footprints were prepared to receive backfill material to bring the site to final grade. Processed C&D generated during demolition activities

was used as the primary source of material to backfill the basement voids, while engineered backfill was used on several sites due to its planned use. After all of the available onsite C&D was used, clean offsite borrow material was imported to complete backfilling. Those costs were significantly offset at the Toronto site by working through Ohio's beneficial use requirements to gain approval to use coal bottom ash and blast furnace slag as approved backfill material. Soil compaction testing was performed to verify soil density and moisture content to satisfy specifications. After the building basements were completely backfilled, they were topped off with topsoil and hydro-seeded. Erosion and sedimentation control measures were maintained at the sites until vegetation was established.

Final site walks were conducted between representatives of FirstEnergy, CEC and the general contractor to assess the project completion and identify any remaining post demolition items. Now that the sites have been remediated, FirstEnergy can investigate possible future uses of these real estate assets.

Please contact James R. Salyer Jr., P.G. (jsalyer@cecinc.com), Earl H. Brown, Jr. (ebrown@cecinc.com) or James P. Nairn, P.G. (jnairn@cecinc.com) at 800-365-2324 for additional information regarding environmental liability management during abatement and demolition of retired coal-fired power plants or other commercial/industrial related facilities.



Mad River Plant, Springfield, Ohio

Expanding Interest in Unconventional Shale Gas in Michigan

The oil and gas industry is no stranger to Michigan. Since the discovery of the Saginaw field during the 1920s, over 56,000 permits for oil and gas wells in formations across the Michigan Basin have been issued by the state, some 12,200 of which produce natural gas. According to the Michigan Oil & Gas Producers Education Foundation, Michigan produced 150 billion cubic feet of natural gas in 2009 or roughly 30% of the gas it uses.

Natural gas was discovered in the Antrim Shale at the north end of the Michigan Basin in the 1940s, but due to the inability to effectively extract the gas, production was not economically viable and classified as “unconventional.” It wasn’t until technological advancements in both completion and production of gas wells during the 1970s and 80s that the Antrim became a feasible drilling objective. Now, the Antrim Shale is the 13th largest natural gas reservoir in the nation.

The key technological advancement was the development of the hydraulic fracturing process, commonly known as fracking. During fracking, water and sand are mixed with a small amount of additives (typically less than 2%) and injected into the shale through the well bore under high pressure. The pressurized mixture forces open cracks (fractures) in the shale and the sand props the fractures open. The gas is then free to flow to the well bore for extraction. Since the 1970s, it is estimated that more than 12,000 wells have been fracked in Michigan.

The history of fracking in Michigan has been environmentally benign. According to a Michigan Department of Environmental Quality (MDEQ) press release in May 2011, the MDEQ has not identified any cases where hydraulic fracturing has caused adverse impacts to the environment or public health in Michigan. However, issues being raised in other states have heightened the awareness of Michigan’s regulators and oil and gas producers.

Currently, Michigan has some of the tightest regulations in the country on gas well construction and water disposal. Michigan is viewed as a model by many states seeking to improve protection of their natural resources in light of new shale gas activity. Recently, to address public concern and increase environmental protection, the MDEQ Office of Geological Survey (OGS) added new requirements for fracking and groundwater withdrawal. On June 22, 2011, Supervisor of Wells Instruction 1-2011 took effect, which

improves preventative measures and fosters greater transparency.

To ensure the protection of nearby surface waters and fresh water wells, Instruction 1-2011 requires that a water withdrawal evaluation be supplied to the OGS for any operation involving the withdrawal of more than 100,000 gallons per day of fresh groundwater. Additionally, specific information regarding the withdrawal volumes, rates, wells, and aquifer data must be submitted along with a supplemental plat showing the proposed withdrawal wells, fresh water pits, and any fresh-water wells within 1,320 feet.

If any freshwater wells are present within 1,320 feet of the withdrawal, Instruction 1-2011 requires the installation of a groundwater monitoring well between the withdrawal and the closest freshwater well. The water levels must be monitored daily and reported to the OGS weekly. This will allow for a withdrawal to be stopped prior to affecting nearby freshwater wells. After the withdrawal, the monitoring well must be measured daily until the water level stabilizes.

Freshwater pits must not become site hazards during operations and cannot be left behind after operations are completed. In some instances, Instruction 1-2011 will require soil erosion protective measures and fencing.

Finally, Instruction 1-2011 requires that Material Safety Data Sheets (MSDS) and volumes for fracking additives, fracking records and charts showing volumes, rates, and pressures (including annulus pressures), and the total volume of flowback water be reported to the OGS for all fracking operations using more than a total of 100,000 gallons of water.

Combined with Michigan’s existing progressive requirements for primary and intermediate casings, well spacing, and flowback water disposal, Instruction 1-2011 will help keep Michigan as a model for the responsible production of oil and gas.

If you have any questions about Instruction 1-2011 and whether your operation is subject to these regulations, please contact Ryan Dunning in CEC’s Detroit office at rdunning@cecinc.com or 866-380-2324. More information can be found on the MDEQ OGS website.

CEC Improves Standing in the 2011 ENR Top 200

Civil & Environmental Consultants, Inc. improved its position in Engineering News Record’s listings of the Top 200 Environmental Firms and the Top 500 Design Engineering Firms. CEC ranked #145 in the Environmental Firms category, and #192 in the Design Engineering Firms category.

Upcoming Events

CEC will be exhibiting at the following upcoming industry events. Be sure to visit our booth if you plan to attend!

Wastecon 2011

(Solid Waste Association of North America)
Nashville, TN | [August 23-25, 2011](#)
www.wastecon.org

PIOGA Eastern Oil & Gas Conference

(Pennsylvania Independent Oil and Gas Association)

Monroeville, PA | [August 30-31, 2011](#)
www.pioga.org

Shale Gas Insight 2011

(Marcellus Shale Coalition)
Philadelphia, PA | [Sept. 7-8, 2011](#)
www.shalegasinsight.com

GreenBuild 2011

(U.S. Green Building Council)
Toronto, ONT, Canada | [Oct. 4-6, 2011](#)
www.greenbuildexpo.org

ENERGY INC 2011

(Pittsburgh Business Times)
Pittsburgh, PA | [Oct. 6, 2011](#)

19th NAEM EHS Management Forum

(National Association for Environmental Management)

Tucson, AZ | [Oct. 19-20, 2011](#)
ehsforum2011.naem.org

Welcome New Employees

Austin

Rachel Dorman, *Administrative Assistant*
Timothy Holland, *Project Manager I*
Gregory Lewis, *Vice President*
Adam Mehevec, *Project Manager III*
Brian Olson, *Project Manager II*
Ray Shull, *Vice President*

Chicago

Benjamin Dykema, *Staff Consultant*
Ann Marie Johnson, *Senior Project Manager*
Nicholas Silva, *Technician II*

Cincinnati

Sean McIntosh, *Staff Consultant*

Cleveland

Carol Johnson, *Administrative Assistant*

Columbus

Thomas Covrett, *Principal*
Andrew Kielaszek, *Project Scientist*
Jamie VanDusen, *Project Scientist*
Joseph Walker, *Staff Consultant*

Export Pennsylvania

Joshua Magargee, *Staff Consultant*
Heather Martz, *Project Scientist*
Mallory Matthews, *Assistant Project Manager*
Robert Phillips, *CADD Technician*
McKenzie Stock, *Staff Scientist*

North Central Pennsylvania

Terry Boomer, *Vice President*
Christopher Borne, *Staff Scientist*
Scott Collenburg, *Project Scientist*
Matthew Hourihan, *Project Manager I*
Gordon Innes, *Survey Technician I*
Michael Major, *Project Consultant*
John Sienerth, *Technician I*
Michael Sopinski, *Staff Consultant*
Adam White, *Staff Scientist*

Nashville

Robert Howard, *Project Manager I*
Jeffrey Shaver, *Project Manager I*

Phoenix

David Pounders, *Staff Consultant*

Pittsburgh

Wayne Alford, *Designer*
Michael Bender, *Project Manager I*
Geff Bottomley, *Chief Marketing Officer*
Trevor Conlow, *Assistant Project Manager*
Michelle Flynn, *Corporate Recruiter*
Matthew Foltz, *Staff Consultant*
Jacqueline Fury, *Staff Scientist*
Matthew Geary, *Staff Consultant*
Shawn Gill, *Assistant Project Manager*
Andrew Gullone, *Assistant Project Manager*
Angela Heinzman, *Assistant Project Manager*
Brian Lantz, *Project Consultant*
Keri Lynn, *Staff Scientist*
Mark Maguire, *Project Manager III*
Steven Menoff, *Vice President*
Charles Modro, *Technician I*
Matthew Phillips, *Project Manager III*
Tiffany Reed, *Project Consultant*
Jason Shamrock, *Staff Consultant*
William Trimbath, *Assistant Project Manager*
Jochen Wiese, *Principal*
Barry Wolfe, *Corporate Director of Human Resources*

Strategic CEC Staff Additions

Geff Bottomley has joined CEC as CEC's first Chief Marketing Officer (CMO). Geff brings over 28 years of diverse marketing and business development experience in the architectural, engineering and construction industries. Since 2009 Geff operated Gfb Consulting where he provided marketing and business development consulting services to clients in the architectural and engineering industries. Prior to Gfb, Geff was the Vice President and Corporate Director of Marketing with Gilbane, Inc., a national general construction and construction management company. Geff was an Associate Principal at Ballinger, an AE firm, and a Senior Associate at The Hillier Group, the nation's fourth largest architecture and interior design firm. Geff's hiring as CEC's first CMO is an important step in our transition to a market-sector focused consulting firm.

Barry Wolfe has joined CEC as the Corporate Director of Human Resources. He has over 20 years of experience including senior HR positions in public and private manufacturing companies such as Thermal Product Solutions, Argos Consulting, and Windfall Products/Mascotech Inc. He provided HR leadership for facilities in the United States, China and Malaysia, and participated in strategic planning and business operations. Mr. Wolfe has successfully developed and marketed a Human Resources Information System for small business, implemented progressive leadership practices, and delivered consistent communication.

Terry Boomer, P.E. has joined CEC as the North Central PA Office Lead/Vice President. Terry comes to CEC with over 20 years of industry experience, having served at BH&D Engineering Inc., LAI Engineering, Inc. and Wolverton & Associates Inc. His land development experience includes commercial, residential, and industrial clients. He has managed major multi-faceted development projects from conceptual design through final design and construction. His project range and scope span single lot outparcels to large mixed use tract developments. Mr. Boomer is well versed in "Big-Box" development and has successfully operated retail roll out programs for national clients and tenants alike.

Jon Wiese has joined CEC as a Principal in the Ecological Services practice. Jon has over 30 years of environmental consulting experience, including Project Manager/Sr. Environmental Specialist at POWER Engineers, Inc. in Hailey, Idaho; Sr. Environmental Consultant at Conectiv Energy in Newark, Delaware, and Project Manager/Principal Scientist at ECT/ESE in Gainesville,

Florida. Jon's primary focus has been the siting, licensing, and permitting of transmission lines, fossil fuel and geothermal powerplants, and various other industrial and institutional facilities in the mid-Atlantic region and southern U.S. Jon will oversee complex biological monitoring and ecological permitting projects for CEC.

Steve Menoff has joined CEC as a Principal in the Waste Management Services practice. He has over 30 years of experience in the solid waste management industry, holding senior technical and managerial positions with both solid waste management companies and environmental consultants. Steve served as Vice President of Environmental Management for Chambers Development Company, Assistant Director of Engineering for Waste Management, Inc. and Vice President of Corporate Development and Technical Services for Sexton Disposal. In the environmental consulting field, Steve was a Senior Vice President and managed the solid waste engineering and field services groups for EMCON/ IT Group and was Northeast Region Vice President for Shaw Environmental and Infrastructure and a Senior Associate. At CEC, Steve will be involved in growing and broadening the waste services practice.

Ann Marie Johnson has joined CEC's Chicago office as a Senior Project Manager for the Environmental Services practice. Ms. Johnson most recently held a Senior Project Manager position at Golder Associates, Inc. and has over 19 years of public and private sector experience in providing environmental, health, and safety services. She has handled significant projects involving real estate due diligence, multi-media compliance, permitting, remediation, site closure, regulatory interaction, emergency response, and development and implementation of health and safety programs. At CEC, Ms. Johnson will focus on providing environmental compliance, permitting, remediation, due diligence, litigation support, process safety management, and health and safety services to existing and new clientele in the Midwest and nationwide.

Michael Thompson, P.E. has joined the Indianapolis office as a Project Manager in the Civil/Site Engineering Practice. Mr. Thompson, a registered Professional Engineer in Indiana, worked for the City of West Lafayette as an Assistant City Engineer/Stormwater Coordinator. At CEC, Mr. Thompson will focus on expanding CEC's civil/site services in Indiana and will develop and manage client relationships nationwide.

CEC Acquires Associated Consulting Engineers (ACE) of Austin, Texas

CEC is pleased to announce the acquisition of Associated Consulting Engineers (ACE) of Austin, Texas from which CEC will provide services in Texas and other southwestern states. The Austin office will be CEC's 13th office and its 2nd office in the southwestern United States.

ACE, established in 1997, provides services to industrial, commercial, and municipal clients with an emphasis on solid waste facilities, private and commercial land development, water and wastewater treatment, distribution and collection systems, and parks and recreation facilities. The combined regulatory and consulting experience of the ACE personnel provide ACE clients with the diverse perspective and understanding needed to develop effective solutions for environmental, waste management, and civil engineering projects.

The fusion of ACE and CEC in the Austin, Texas office will allow us to better serve both ACE and CEC clients in Texas and other southwestern states. ACE clients will benefit from an expanded service offering in the environmental and ecological disciplines. CEC clients will benefit from ACE's extensive knowledge of the regulatory processes in the southwestern United States

and by having a CEC office location closer to their southwestern United States operations. CEC plans to expand the services offered by the Austin office to include the full breadth of CEC capabilities. ACE and CEC have several common clients that provide a good base for the successful integration of the two firms.

For more information about CEC's services, please contact Ray L. Shull, P.E. at rshull@aceaustin.com, 855-365-2324 (toll-free) or 512-329-0006 (local). CEC's Austin office is located at: 206 Wild Basin Road, Wild Basin A, Suite 240, Austin, Texas 78746.



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