

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF DUKE)	
ENERGY KENTUCKY, INC. FOR A)	CASE NO.
CERTIFICATE OF PUBLIC CONVENIENCE)	2016-00268
AND NECESSITY FOR DRY BOTTOM ASH)	
CONVERSION OF THE EAST BEND)	
GENERATING STATION)	

ORDER

On July 28, 2016, Duke Energy Kentucky, Inc. ("Duke Kentucky") filed an application seeking a Certificate of Public Convenience and Necessity ("CPCN") to convert the handling of bottom ash at its East Bend Generating Station ("East Bend") from a wet process to a dry process. Duke Kentucky estimates that the cost to construct this conversion will be approximately \$24.9 million.¹ Duke Kentucky states that the dry bottom ash conversion project is needed to comply with certain recent federal environmental regulations impacting the operations at East Bend. On September 1, 2016, the Commission issued an Order establishing a procedural schedule for the processing of this matter. The procedural schedule provided for, among other things, a deadline for requesting intervention, two rounds of data requests upon Duke Kentucky's application, an opportunity for the filing of intervenor testimony, and a deadline for requesting a formal hearing or stating that the matter could be decided upon the record. There are no intervenors in this matter. Commission Staff

¹ Duke Kentucky's Response to Commission Staff's First Request for Information ("Staff's First Request"), Item 11.

issued, and Duke Kentucky responded to, two rounds of discovery. On November 18, 2016, Duke Kentucky filed a statement requesting that the matter be submitted for a decision based upon the existing record.

DRY BOTTOM ASH CONVERSION

East Bend is a coal-fired base load unit located in Boone County, Kentucky.² The unit was commissioned in 1981 and has a nameplate rating of 648 megawatts.³ Taking into account the internal load at the East Bend facilities, the unit has a net rating of 600 megawatts.⁴ East Bend is currently equipped with a high-efficiency hot-side electrostatic precipitator, a lime-based flue gas desulfurization system (“FGD”) and a selective catalytic reduction control system (“SCR”).⁵ The FGD system was upgraded in 2005 to increase the removal of sulfur dioxide emissions to an average of 97 percent.⁶ The SCR system is designed to reduce nitrogen oxide emissions by 85 percent.⁷ The East Bend facilities also contain two landfills—the existing East Landfill and a new West Landfill that is currently under construction—as well as an ash pond.⁸ The coal

² Direct Testimony of Joseph A. Miller, Jr. (“Miller Testimony”), at 1. The Commission notes that the Miller Testimony contains two pages that are identified as page 1. The citation referenced here is the second page 1.

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ *Id.*

⁸ Miller Testimony at 2. The Commission notes that the Miller Testimony contains two pages that are identified as page 2. The citation referenced here is the second page 2.

combustion byproducts⁹ from East Bend, primarily fly ash, are currently disposed of in the East Landfill, and wet bottom ash is stored in the ash pond.

According to Duke Kentucky, approximately 80 percent of the ash produced at East Bend is dry fly ash and 20 percent is bottom ash.¹⁰ The fly ash is mixed with the spent scrubber slurry and lime to make a stable material called Poz-O-Tec, which sets up like concrete once it is placed in the East Landfill.¹¹ Duke Kentucky states that the Poz-O-Tec is necessary to stabilize and solidify the slurry for proper waste disposal.¹² Currently, the bottom ash is collected in a wet bottom ash hopper at the base of the boiler and then sluiced to the ash pond.¹³ The ash pond is used to separate bottom ash from the water used to convey the ash before the water is discharged to the Ohio River in compliance with existing permits.¹⁴ The ash pond is also used to treat other plant wastewater streams, such as coal pile runoff and landfill leachate, before they are discharged.¹⁵ Duke Kentucky notes that the presence of the ash pond and the current landfill has enabled it to manage its costs of providing safe and reliable electric service by eliminating the need to transport and pay for disposal of the CCR in commercial landfills.¹⁶

⁹ Coal combustion residuals (“CCR”) primarily include fly ash, bottom ash, and FGD byproducts such as calcium sulfate, or gypsum, and calcium sulfite.

¹⁰ Miller Testimony at 3.

¹¹ *Id.*

¹² Direct Testimony of Brandon Delis (“Delis Testimony”) at 3.

¹³ Miller Testimony at 5.

¹⁴ Miller Testimony at 7.

¹⁵ Delis Testimony at 3.

¹⁶ *Id.*

Duke Kentucky asserts that the recent U.S. Environmental Protection Agency regulations, the Coal Combustion Residuals Rule (“CCR Rule”) and the Steam Electric Effluent Limitation Guidelines (“ELG Rule”), require Duke Kentucky to convert East Bend’s bottom ash-handling system from a wet process to a dry process.¹⁷ Duke Kentucky states that the CCR Rule imposes more stringent requirements for the handling of CCR and may require the conversion to dry handling of ash.¹⁸ Duke Kentucky contends that compliance with the CCR Rule would require implementation of an altered groundwater-monitoring program for the landfills and the ash pond.¹⁹ The groundwater-monitoring program may require additional compliance actions, including but not limited to, lining or closing the ash pond, installing balance-of-plant wastewater treatment systems; and otherwise higher operations and maintenance (“O&M”) costs for managing CCR under more stringent disposal requirements.²⁰ Duke Kentucky notes that compliance with some aspects of the CCR Rule began within 6 to 12 months after publication, while other actions will require five years or more.²¹

With respect to the ELG Rule, Duke Kentucky states that the rule sets new or additional requirements for wastewater streams from several processes and byproducts at steam electric generating plants.²² The wastewater streams generated at East Bend

¹⁷ Direct Testimony of Tammy Jett (“Jett Testimony”) at 14.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ *Id.*

²¹ Jett Testimony at 13–14.

²² Jett Testimony at 13.

includes fly-ash and bottom-ash wastewaters.²³ Duke Kentucky contends that the ELG Rule will require East Bend to convert the existing wet ash system to a dry-ash handling system.²⁴ As part of converting to dry-ash handling, Duke Kentucky will need to install new wastewater treatment systems at East Bend.²⁵ Duke Kentucky states that the ash pond can no longer be used in its current form as an ash transport water treatment system.²⁶ Duke Kentucky points out that the ELG Rule has a zero-discharge provision for ash transport/slucice water, which effectively prohibits the discharge of bottom-ash transport water.²⁷ Duke Kentucky states that compliance with the ELG Rule will begin as early as November 1, 2018, but no later than December 31, 2023.²⁸ Duke Kentucky contends that the proposed system for handling dry ash will permit it to comply with the CCR Rule and the ELG Rule in the most reasonable and cost-effective manner.²⁹

Duke Kentucky states that its proposed project would convert the existing ash pond to a complete dry-ash handling system that would enable direct bottom-ash disposal in the landfills, currently into the East Landfill and in the future into the West Landfill.³⁰ The scope of the dry-ash conversion project would include converting the existing sluicing system for wet bottom ash to a Submerged Flight Conveyor (“SFC”)

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.*

²⁷ Jett Testimony at 14–15.

²⁸ Jett Testimony at 14.

²⁹ Jett Testimony at 15.

³⁰ Direct Testimony of Daniel Hartman (“Hartman Testimony”) at 2.

bottom-ash removal system.³¹ This would require demolition of the existing bottom-ash sluicing system and installation of a new SFC for dewatering of bottom ash, economizer ash, and pyrites.³² The project will also require construction of a dewatered bottom-ash storage area and a loading area for trucking the dry bottom ash to the onsite landfill for final disposal.³³

The new under-boiler SFC will be installed in the existing boiler building.³⁴ The existing wet bottom-ash hoppers and wet economizer ash hopper will be demolished and replaced by the new under-boiler SFC.³⁵ The project will also include interconnecting piping for the under-boiler SFC, new pyrites piping, and dry economizer ash handling.³⁶ Duke Kentucky states that the project will also include additional interconnects with existing plant piping systems such as service water and compressed air required to support the new facility.³⁷ The construction will also include other balance-of-plant work, including a new loading area; improvements to existing access roads; and relocation of existing soot blowing air receivers, soot blowing air dryers, and the carbon dioxide fire-protection system.³⁸ In addition to the conversion project, Duke Kentucky states that it will plan to start excavation of the bottom ash currently being

³¹ Hartman Testimony at 3.

³² *Id.*

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

³⁸ Hartman Testimony at 3–4.

stored in the ash pond for ultimate disposal in the on-site landfills in order to comply with the ELG Rule.³⁹

Duke Kentucky states that it retained Burns & McDonnell to assist in developing the scope, design, schedule, and cost estimates to bring East Bend into compliance with the CCR and ELG Rules.⁴⁰ In evaluating compliance options, Duke Kentucky avers that it investigated installing new CCR Rule compliant impoundments as well as under-boiler solutions and remote systems in which bottom ash would still be sluiced into a remote dewatering device.⁴¹ The under-boiler solutions considered were the SFC technology and a pneumatic conveying technology.⁴² The remote systems evaluated included SFC technology and dewatering bins.⁴³ Duke Kentucky developed conceptual construction and O&M costs of all options evaluated and determined that the proposed under-boiler SFC was the most economical option.⁴⁴ Duke Kentucky estimates the annual O&M expenses of the proposed SFC project to be \$790,000.⁴⁵ Based on a 20-year net present value (“NPV”) analysis, the proposed SFC was \$9.5 million less than the option of using a near remote drag-chain conveyor,⁴⁶ and \$28.75 million less than

³⁹ Hartman Testimony at 5.

⁴⁰ Delis Testimony at 4.

⁴¹ Delis Testimony at 5.

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ Delis Testimony at 6. *See also* Duke Kentucky’s Response to Staff’s First Request, Item 1.

⁴⁶ The near remote drag-chain conveyor used a single conveyor system located close to the boiler building to reduce piping. The equipment would be located inside a new enclosure. *See*, Duke Kentucky’s Response to Staff’s First Request, Item 5.

the far remote drag-chain conveyor⁴⁷ option.⁴⁸ The capital costs associated with the near remote drag-chain conveyor and the far remote drag chain conveyor options were substantially more than the proposed SFC.⁴⁹ Although the pneumatic system⁵⁰ was \$37,736 less expensive than the proposed SFC, Duke Kentucky states that on a 20-year NPV basis, this difference was not significant and made both acceptable options from an economic point of view.⁵¹ Duke Kentucky selected the SFC system, reasoning that the SFC option has been in service for decades and is a more proven technology, compared with the pneumatic option, which is relatively new; the East Bend forced draft air system is already utilized at capacity, and diverting some of this air to the pneumatic system would limit generating load on East Bend; and efforts to increase forced draft air would require significant additional cost to the pneumatic system and might introduce New Source Review considerations to the project, which would jeopardize the compliance schedule.⁵²

DISCUSSION

The Commission's standard of review of a request for a CPCN is well settled. No utility may construct or acquire any facility to be used in providing utility service to the

⁴⁷ The far remote drag chain conveyor utilized a single conveyor system located far from the boiler building to reduce haul truck drive distance. The equipment would be located inside a new enclosure. See Duke Kentucky's Response to Staff's First Request, Item 5.

⁴⁸ Duke Kentucky's Response to Staff's First Request, Item 5.

⁴⁹ *Id.*

⁵⁰ The pneumatic bottom-ash system utilized vacuum exhausters to pull ash to a new bottom ash silo. See Duke Kentucky's Response to Staff's First Request, Item 5.

⁵¹ Duke Kentucky's Response to Staff's First Request, Item 5.

⁵² *Id.*

public until it has obtained a CPCN from this Commission.⁵³ To obtain a CPCN, the utility must demonstrate a need for such facilities and an absence of wasteful duplication.⁵⁴

“Need” requires:

[A] showing of a substantial inadequacy of existing service, involving a consumer market sufficiently large to make it economically feasible for the new system or facility to be constructed or operated.

[T]he inadequacy must be due either to a substantial deficiency of service facilities, beyond what could be supplied by normal improvements in the ordinary course of business; or to indifference, poor management or disregard of the rights of consumers, persisting over such a period of time as to establish an inability or unwillingness to render adequate service.⁵⁵

“Wasteful duplication” is defined as “an excess of capacity over need” and “an excessive investment in relation to productivity or efficiency, and an unnecessary multiplicity of physical properties.”⁵⁶ To demonstrate that a proposed facility does not result in wasteful duplication, we have held that the applicant must demonstrate that a thorough review of all reasonable alternatives has been performed.⁵⁷ Selection of a

⁵³ KRS 278.020(1). Although the statute exempts certain types of projects from the requirement to obtain a CPCN, the exemptions are not applicable.

⁵⁴ *Kentucky Utilities Co. v. Pub. Serv. Comm’n*, 252 S.W.2d 885 (Ky. 1952).

⁵⁵ *Id.* at 890.

⁵⁶ *Id.*

⁵⁷ Case No. 2005-00142, *Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for a Certificate of Public Convenience and Necessity for the Construction of Transmission Facilities in Jefferson, Bullitt, Meade, and Hardin Counties, Kentucky* (Ky. PSC Sept. 8, 2005).

proposal that ultimately costs more than an alternative does not necessarily result in wasteful duplication.⁵⁸ All relevant factors must be balanced.⁵⁹

Having reviewed the record and being otherwise sufficiently advised, the Commission finds that Duke Kentucky has established that there is a need to address how CCR and wastewater produced by East Bend will be treated and disposed of. These needs are particularly heightened under the CCR Rule and the ELG Rule. The CCR Rule establishes national regulations for the management and disposal of CCR, which includes fly ash, bottom ash, boiler slag, and FGD gypsum, by electric utilities in landfills and surface impoundments under Subtitle D of the Resource Conservation and Recovery Act. The ELG Rule regulates process wastewater discharges from power plants operating as utilities. The need to manage, treat, and dispose of CCR and wastewater in order to comply with the requirements of the CCR and ELG Rules is critical to the continued operation of East Bend, which is the only baseload unit in Duke Kentucky's generation portfolio. The Commission further finds that there is sufficient evidence in the record to support the conclusion that the proposed SFC project to convert East Bend's handling of bottom ash from a wet process to a dry process is the most reasonable least-cost alternative for complying with the CCR Rule and the ELG Rule. We note that of the four alternatives that Duke Kentucky evaluated, the proposed SFC system was substantially less costly than the two remote systems considered. Although the pneumatic system was slightly less costly than the proposed

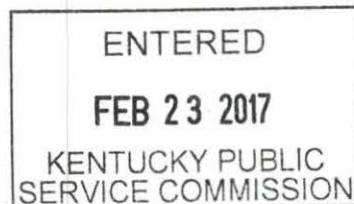
⁵⁸ See *Kentucky Utilities Co. v. Pub. Serv. Comm'n*, 390 S.W.2d 168, 175 (Ky. 1965). See also Case No. 2005-00089, *Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity for the Construction of a 138 kV Electric Transmission Line in Rowan County, Kentucky* (Ky. PSC Aug. 19, 2005), Final Order.

⁵⁹ Case No. 2005-00089, *East Kentucky Power Cooperative, Inc.* (Ky. PSC Aug. 19, 2005), Final Order at 6.

SFC project by a margin of \$37,736 over a 20-year period, Duke Kentucky contends that the slight differential in favor of the pneumatic option is outweighed by the fact that the pneumatic technology is newer and less proven than the SFC technology. Combined with the operational impact that a pneumatic system would have on East Bend due to the forced-air capability at the plant, which could cause additional expenses to be incurred, Duke Kentucky states that it opted for the SFC system. The Commission finds Duke Kentucky's selection to be reasonable. Accordingly, based on the foregoing reasons, the Commission will approve Duke Kentucky's application.

IT IS THEREFORE ORDERED that Duke Kentucky's request for a CPCN to construct a dry bottom ash conversion at the East Bend station as described in its application is granted.

By the Commission



ATTEST:


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