

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF DUKE)	
ENERGY KENTUCKY, INC. FOR APPROVAL)	CASE NO.
OF A SPECIAL CONTRACT AND FOR WAIVER)	2021-00192
OF 807 KAR 5:041, SECTION 6(2)(C))	

ORDER

On May 5, 2021, Duke Energy Kentucky (Duke Kentucky) filed an Application with the Commission for approval of a special contract and waiver of 807 KAR 5:041, Section 6(2)(c). Duke Kentucky responded to two requests for information from Commission Staff on August 27, 2021, and January 14, 2022. This matter is now before the Commission for a decision on the merits.

BACKGROUND

Duke Kentucky is a Kentucky corporation that provides, among other things, electric service for the public in Boone, Campbell, Grant, Kenton, and Pendleton counties, Kentucky.¹ Northern Kentucky Water District (NKWD) is a water utility and a customer of Duke Kentucky that operates a pumping station consisting of six 1,250 HP pumps in Duke Kentucky's electric service territory on Mary Ingles Highway in Ft. Thomas, Kentucky (Mary Ingles Pumping Station).²

Duke Kentucky serves the Mary Ingles Pumping Station from its Wilder 46 circuit, which is a 12.47 kV electric distribution circuit that also provides service to other

¹ Application 1–2.

² *Id.* at 2.

businesses and residences in the area.³ NKWD currently takes service at the pumping station in accordance with Duke Kentucky's Commission-approved, Time-Of-Day Rate for Service at Distribution Voltage, Rate DT. Rate DT includes a summer on-peak demand charge of \$14.05 per kW, a winter on-peak demand charge of \$14.05 per kW, and an off-peak demand charge of \$1.34 per kW; and a summer on-peak energy charge of \$0.046825 per kWh, a winter on-peak energy charge of \$0.044698 per kWh, and an off-peak energy charge of 0.038345 per kWh. The off-peak hours under Rate DT are 8 p.m. to 11 a.m. in the summer and 9 p.m. to 9 a.m. and 2 p.m. to 5 p.m. in the winter.⁴

NKWD primarily operates the pumps at the Mary Ingles Pumping Station during off-peak hours to manage its energy costs, which results in NKWD operating more pumps and starting pumps more frequently than it would if the pumps could be operated continuously, 24 hours a day.⁵ Specifically, Duke Kentucky indicated that NKWD starts its pumps five to six times a day in the summer and 10 to 12 times a day in the winter to take advantage of the off-peak pricing and avoid the on-peak pricing.⁶

Duke Kentucky stated that when NKWD's pumps start that "they draw a large amount of power until they can reach normal operating levels."⁷ This power draw results in a voltage drop when each pump is started that is generally in the range of

³ *Id.*

⁴ *Id.* at 2, Attachment 1.

⁵ *Id.* at 2–3.

⁶ Duke Kentucky's Response to Commission Staff's First Request for Information (Staff's First Request) (filed Aug. 27, 2021), Item 3.

⁷ Application at 3.

6 to 8 percent.⁸ Each pump start causes a voltage drop of greater than 5 percent.⁹ The highest voltage drop that has been recorded is 8.8 percent.¹⁰

Duke Kentucky indicated that it became aware of the voltage drops on the Wilder 46 circuit in 2017 when it installed temporary and specialized monitoring equipment to investigate light flickers that were occurring for certain customers on the circuit.¹¹ Duke Kentucky contended that since discovering the issue it has been working with NKWD in good faith to find a solution to the voltage drops without adversely impacting NKWD's electric costs or necessitating significant capital investments or upgrades to NKWD's Mary Ingles Pumping Station or Duke Kentucky's distribution system.¹²

To mitigate the effects of pump starts at the Mary Ingles Pumping Station, Duke Kentucky and NKWD entered into the special contract for which Duke Kentucky requests approval in this matter (Agreement).¹³ The Agreement modifies the amounts NKWD is charged under Rate DT for service at the Mary Ingles Pumping Station by establishing a customer charge of \$138 per month, a fixed energy charge of \$0.038016 per kWh, and a fixed demand charge of \$3.38 per kW for all demand at 3,000 kW and below.¹⁴ The Agreement requires NKWD to pay all other charges and charges for demand in excess 3,000 kW at the tariffed rate. The Agreement also prohibits NKWD, under normal

⁸ See *id.*; see also Duke Kentucky's Response to Commission Staff's Second Request for Information (Staff's Second Request) (filed Jan. 14, 2022), Item 7.

⁹ Duke Kentucky's Response to Staff's Second Request, Item 9.

¹⁰ *Id.*, Item 8.

¹¹ *Id.*, Item 12.

¹² Application at 3.

¹³ Application, Attachment 2 (Agreement).

¹⁴ Agreement at 1–2, Exhibit A.

operating conditions, from starting more than two pumps at the Mary Ingles Pumping Station per day and from having more than 50 pump starts in any calendar month, and requires NKWD to complete all pump starts between the hours of 12 a.m. and 4 a.m.¹⁵ The Agreement has an initial proposed term of five years from March 19, 2021, but the Agreement indicated that it would not become effective until approved by the Commission.¹⁶

Duke Kentucky contended that the Agreement will mitigate the adverse impacts caused by NKWD's pump starts by reducing the number of pump starts each day to two or three as opposed to the current five to six pump starts in the summer and 10 to 12 pump starts in the winter.¹⁷ Duke Kentucky also noted that pump starts during normal operations will only occur between the hours of 12 a.m. and 4 a.m. when Duke Kentucky argues that any voltage drop will have minimal effect on other customers served by the Wilder 46 circuit.¹⁸ However, Duke Kentucky acknowledged that scheduling changes allowed and required by the Agreement will not completely eliminate the voltage drops associated with NKWD's pump starts,¹⁹ because the voltage drops will still occur with each pump start.²⁰

¹⁵ *Id.* at 2.

¹⁶ *Id.* at 3.

¹⁷ Duke Kentucky's Response to Staff's First Request, Item 3.

¹⁸ *Id.*

¹⁹ See Application at 5.

²⁰ See Duke Kentucky's Response to Staff's First Request, Item 9 (noting that each start results in a voltage drop greater than 5%).

Duke Kentucky indicated that it believes motor soft start controls or voltage compensation mitigation would be necessary to prevent the voltage drops caused by each pump start-up.²¹ Duke Kentucky stated that soft start controls must be installed by the customer to each motor starting control and explained that they work by bringing the motor up to speed gradually, which thereby reduces the starting voltage for the equipment and the draw on the circuit.²² Duke Kentucky explained that voltage compensation refers to a device that can detect and react to rapid voltage fluctuations and inject reactive power to compensate for the voltage drop and asserted that voltage compensation must be installed by the customer to each voltage motor or the primary supply for the motors.²³ Duke Kentucky indicated that a detailed engineering analysis would be necessary to estimate the cost of motor soft start controls or voltage compensation mitigation and to confirm that they would eliminate the voltage drops.²⁴ Duke Kentucky indicated that it has not explored those options for alleviating the voltage drops on the Wilder 46 circuit, because it contends it is ultimately NKWD's responsibility to address the matter in accordance with 807 KAR 5:041 Section 6(2)(c).²⁵ NKWD did provide information, through Duke Kentucky, indicating that it had installed soft starters on two pumps and that it "has budgeted \$1,036,000 in its 5-year capital improvement budget to replace the other 4 existing motors starters with soft starters."²⁶

²¹ *Id.*, Item 4.

²² Duke Kentucky's Response to Staff's Second Request, Item 5.

²³ *Id.*

²⁴ *Id.*

²⁵ Duke Kentucky's Response to Staff's First Request, Item 2(a).

²⁶ Duke Kentucky's Response to Staff's Second Request, Item 2.

Duke Kentucky indicated that it investigated modifications to its equipment to alleviate the voltage drops associated with the pump starts, including building a new substation and reconductoring the circuit.²⁷ Duke argued that building a new substation is not viable due to the lack of suitable land in the area and the projected cost, estimated to be between \$13 million to \$20 million, and that the new substation would not solve the voltage drop 100 percent of the time because of the size of the starting current.²⁸ Duke Kentucky stated that reconductoring is not a viable solution, because it would not correct the issue.²⁹

Duke Kentucky specifically requested a deviation from 807 KAR 5:041, Section 6(2)(c). Duke Kentucky argued that the voltage variations caused by the pump starts are consistent with 807 KAR 5:041, Section 6(6), because they are in a limited area in and where NKWD conducts business.³⁰ Duke Kentucky also generally requested a deviation from 807 KAR 5:041 for pump starts made pursuant to the Agreement to the extent necessary.³¹

LEGAL STANDARDS

Each utility must file a copy of each special contract that establishes rates, charges, or conditions of service not contained in its tariff.³² The Commission reviews

²⁷ *Id.*

²⁸ Duke Kentucky's Response to Staff's First Request, Item 2(c); see also Duke Kentucky's Response to Staff's Second Request, Item 3(a) (indicating that a substation would likely cost \$13 million to \$20 million).

²⁹ Duke Kentucky's Response to Staff's First Request, Item 2(c).

³⁰ *Id.*

³¹ Application at 5.

³² 807 KAR 5:011, Section 13.

special contracts to determine whether they result in rates and conditions of service that are fair, just and reasonable pursuant to KRS 278.030(1) and whether they create unreasonable preferences or advantages prohibited by KRS 278.170(1).³³

KRS 278.030(2) requires every utility to furnish adequate, efficient and reasonable service. To enforce that requirement, the Commission has adopted, among other things, regulations regarding the voltage that must be delivered by regulated electric utilities. Specifically, 807 KAR 5:041, Section 6(1) requires an electric utility to adopt a standard nominal voltage for its distribution system or for distinct portions thereof. Section 6(2) of that regulation then states, in relevant part, that:

(2) Voltage at the customer's service entrance or connection shall be maintained as follows:

(a) For service rendered primarily for lighting purposes, variation in voltage between 5 p.m. and 11 p.m. shall not be more than five (5) percent plus or minus the nominal voltage adopted, and total variation of voltage from minimum to maximum shall not exceed six (6) percent of the nominal voltage.

(b) 1. For service rendered primarily for power purposes, voltage variation shall not at any time exceed ten (10) percent above or ten (10) percent below standard nominal voltage.

...

(c) Where utility distribution facilities supplying customers are reasonably adequate and of sufficient capacity to carry actual loads normally imposed, the utility may require that starting and operating characteristics of equipment on customer premises shall not cause an instantaneous voltage drop of more than four (4) percent of standard voltage nor cause objectionable flicker in other customer's lights.

³³ See, e.g. Case No. 2016-00287, *Petition of Kentucky Frontier Gas, LLC for a Declaratory Order* (Ky. PSC Dec. 14, 2016), final Order (finding that a rate in a special contract was unreasonable and violated KRS 278.170, because it required that the counterparty be charge a rate that was 95% lower than other customers).

Section 6(6) of 807 KAR 5:041 allows for “[g]reater variation of voltage than specified under [Section 6(2)] if in a limited or extended area in which customers are widely scattered or business done does not justify close voltage administrative regulation.” However, Section 6(6) still requires “the best voltage administrative regulation shall be provided that is practicable under the circumstances.” Section 22 of the regulation states that “[i]n special cases for good cause shown the commission may permit deviations from these rules.”

DISCUSSION

Duke Kentucky and NKWD structured the rate changes in the Agreement with the intent of making them revenue³⁴ and cost neutral and that appears to be the likely result.³⁵ However, assuming the on-peak charges in Rate DT reflect the appropriate costs for demand and energy during those periods, NKWD would not be covering all of the fixed costs associated with its electricity use and demand at the rates established in the Agreement. Duke Kentucky justifies the reduced rate in the Agreement as a way for it and NKWD to avoid incurring significant costs that would otherwise be necessary to correct the voltage drops and would ultimately be passed on to other customers in Northern Kentucky through electric or water rates.

Special contracts with rates that are lower than those of tariffed rates have been approved in circumstances where the terms of the contract prevent a utility from losing

³⁴ Agreement at 1.

³⁵ The energy charge in the Agreement is similar to the off-peak tariffed rate under which NKWD currently takes its service at the pumping station. The demand charge in the Agreement is a little over twice that of the demand charge during the off-peak periods during which NKWD currently takes service under the tariff. However, the Agreement anticipates that NKWD will be able to reduce its demand by about 50 percent by operating half of its pumps for all or most of the day at the fixed rates such that the increase in the demand charge will largely be offset by a decrease in NKWD’s peak demand.

significant load, which would shift fixed costs to other customers,³⁶ and in circumstances in which a customer agrees to limitations on its service that allow a utility to avoid costs that would otherwise be necessary to provide adequate service.³⁷ The Agreement here could potentially be construed as the later type of contract, because it places limits on the manner in which NKWD can take service to mitigate the voltage drops on the Wilder 46 circuit without requiring Duke Kentucky or NKWD to incur capital costs that may ultimately be passed along to other utility customers. The problem with Duke Kentucky's proposal is that the Agreement will not fully eliminate the issue with voltage drops on the Wilder 46 circuit and Duke Kentucky and NKWD have not fully investigated other potential solutions.

Duke Kentucky and NKWD recognized that the Agreement would not eliminate the voltage drops associated with pump starts, and therefore, made the Agreement contingent on Duke Kentucky receiving any necessary deviation from 807 KAR 5:041.³⁸ In its application, Duke Kentucky specifically requests a deviation from 807 KAR 5:041, Section 6(2)(c), but that subsection does not impose a limit on utilities. Rather, Section 6(2)(c), by its plain language, allows a utility to place limits on its customers' equipment, which, in turn, allows the utility to meet its obligations to limit variations at other customers

³⁶ See Case No. 2017-00035, *Filing of Special Industrial Contracts by Atmos Energy Corporation* (Ky. PSC Apr. 12, 2017), final Order (where a special contracts for large industrial customers were approved, in part, based on the unique competitive circumstances for the customers and a finding that the rates in the special contract would cover any variable costs associated with the customers service and a portion of the utility's fixed costs); see also Case No. 2001-00099, *SPIS.net v. BellSouth Telecommunications, Inc.* (Ky. PSC Dec. 19, 2002), Order at 6 ("We have, however, permitted non-telecommunications utilities to enter into lower-than-tariffed rate special contracts with customers who realistically could obtain service from another supplier.").

³⁷ Case No. 2010-00429, *Application of East Kentucky Power Cooperative, Inc. for the Approval of A Special Contract* (Ky. PSC Nov. 30, 2010), Order (where a special contract that permitted the utility, among other things, to curtail a portion of the customers' load to addressed reliability issues and additional costs arising from significant fluctuations in the customer's large load was approved).

³⁸ Agreement at 3.

connections as required by other provisions of 807 KAR 5:041, including Section 6(2)(a) and (b).

As indicated above, for service rendered primarily for lighting purposes, Section 6(2)(a) prohibits voltage drops at a customer's service connection from exceeding 5 percent of the nominal voltage during the hours of 5 p.m. to 11 p.m. and prohibits total variation in voltage from minimum to maximum from exceeding 6 percent of the nominal voltage. Duke Kentucky recorded voltage drops in the vicinity of the pump starts of 8.8 percent and indicated that voltage drops were generally in the range of 6 to 8 percent.³⁹ Those significant drops likely cause voltage drops at other customers service connections in excess of those permitted by Section 6(2)(a).⁴⁰

The Agreement will move pump starts under normal operating conditions to between 12 a.m. and 4 a.m., and thereby, would eliminate any potential violations of the first part of Section 6(2)(a) for starts under normal conditions. The Agreement would also significantly reduce the number of voltage drops that occur each day by limiting the number of pump starts that can occur each day. However, pump starts under emergency conditions and for maintenance would likely violate both limitations in Section 6(2)(a) based on the size of the voltage drops caused by even a single pump start.⁴¹ Moreover, the pump starts under normal operating conditions would also likely result in voltage variations in excess of those allowed by the second part of Section 6(2)(a), which prohibits total variations in voltage in excess of 6 percent, because that limitation is not limited in

³⁹ Duke Kentucky's Response to Staff's Second Request, Items 6 and 7; *see also* Duke Kentucky's Response to Staff's First Request, Item 1.

⁴⁰ *See* Duke Kentucky's Response to Staff's First Request, Item 1 (noting that voltage drops occurred at customers premises when Duke Kentucky conducted coordinated monitoring with pump starts).

⁴¹ *See id.*

its applicability to the hours of 5 p.m. to 11 p.m.⁴² Thus, Duke Kentucky would likely need a deviation from Section 6(2)(a) to implement the Agreement.⁴³

Duke Kentucky argued that the limited area in which the voltage drops occur and the area in which the circuit is located justifies less regulation of the voltage pursuant to 807 KAR 5:041, Section 6(6). However, even if Duke Kentucky could establish that less voltage regulation is justified for other customers effected by the voltage drops on the Wilder 46 circuit, Section 6(6) still requires the best voltage regulation that is practical under the circumstances. While Duke Kentucky contended that NKWD is ultimately responsible for correcting the issue, Duke Kentucky acknowledged that there likely are projects that would eliminate or reduce the voltage drops, but neither Duke Kentucky nor NKWD have performed the engineering analysis necessary to determine the effectiveness or potential cost for the projects. Thus, the record does not currently support reducing the voltage regulation on the Wilder 46 circuit or in the area of the Mary Ingles Pumping Station indefinitely pursuant to Section 6(6).

The Commission does recognize that the pump starts present a complicated engineering problem and that Duke Kentucky and NKWD have been seeking to resolve it in the most cost effective means since it was discovered. Further, the Commission finds

⁴² See *id.*

⁴³ Duke Kentucky did not address the applicability of Section 6(2)(a) in its application, and in response to questions in this matter, Duke Kentucky indicated that it did not believe Section 6(2)(a) applies to the voltage fluctuations caused by the pump starts, because they were instantaneous voltage fluctuations and Section 6(2)(a) applies to steady state supply voltage ranges. However, the language of Section 6(2)(a) does not indicate that the prohibitions on voltage variations therein are limited in the manner describe by Duke Kentucky. Moreover, the only relevant exceptions would not apply. See 807 KAR 5:041, Section 6(4) (“The following shall not be considered a violation of this section: Voltage variations in excess of those caused by operation of power apparatus on customer premises which require large starting currents and *affect only the user of such apparatus*, by action of the elements and *infrequent and unavoidable* fluctuations of short duration *due to system operation.*”) (emphasis added).

that the Agreement is a reasonable way to reduce the number of voltage drops associated with pump starts while Duke Kentucky and NKWD investigate all practical solutions to the voltage drops. Thus, the Commission will approve the Agreement for three years and will grant Duke Kentucky waivers from 807 KAR 5:041, Section 6(2)(a) and (c), to the extent necessary, for the same three-year period for any voltage variations arising from pump starts at the Mary Ingles Pumping Station made pursuant to the terms of the Agreement.

However, the Commission is approving the Agreement and granting the deviations to give Duke Kentucky and NKWD time to investigate potential solutions to the voltage drops. Further, while Duke Kentucky is ultimately responsible for ensuring customers do not experience excessive voltage drops,⁴⁴ the Commission notes that Duke Kentucky can seek to meet that responsibility by placing limits on the starting characteristics of other customers' equipment pursuant to 807 KAR 5:041, Section 6(2)(c), so both Duke Kentucky and NKWD have some responsibility in resolving this matter. Thus, the Commission finds that its approval of the Agreement and the deviations above must be subject to the conditions discussed below to ensure Duke Kentucky and NKWD continue to work to resolve the voltage drops to the extent possible.⁴⁵

First, both Duke Kentucky and NKWD must investigate all potential solutions to the voltage drops, including conducting any engineering analysis necessary to determine the effectiveness and cost of motor soft start controls and voltage compensation mitigation. Second, within two years of the date of this Order, Duke Kentucky and NKWD must file a

⁴⁴ See 807 KAR 5:041, Section 6(2)(a), (b) and (d).

⁴⁵ This Order should not be construed as determining who is ultimately responsible for the voltage drops. The Commission is hopeful that Duke Kentucky and NKWD can continue to work together on this issue in good faith.

report, either jointly or separately, discussing potential solutions or combinations of solutions that were investigated, explaining whether the solutions are expected to be effective, detailing the expected cost of the solutions, and identifying the solution that Duke Kentucky and NKWD contend would be most practical and why. Third, Duke Kentucky must continue voltage monitoring on the Wilder 46 circuit pursuant to 807 KAR 5:041.

IT IS THEREFORE ORDERED that:

1. The Agreement is approved, subject to conditions established herein, effective as of the date of this Order for a period of 3 years from the entry of this Order.

2. Duke Kentucky's is granted a waiver of the requirements of 807 KAR 5:041, Section 6(2)(a) and (c) for any voltage variations arising from pump starts at the Mary Ingles Pumping Station made pursuant to the terms of the Agreement for a period of three years from the entry of this Order.

3. Within two years of the entry of this Order, Duke Kentucky and NKWD shall:
a. Investigate all potential solutions to the voltage drops, including conducting any engineering analysis necessary to determine the effectiveness and cost of motor soft start controls and voltage compensation mitigation, and

b. File a report, either jointly or separately, in this matter or in a new matter requesting an extension or modification of the Agreement and waivers granted herein, discussing each potential solution or combination of solutions that was investigated, explaining whether the solutions are expected to be effective, detailing the expected cost of the solutions, and identifying the solution that Duke Kentucky and NKWD contend would be most practical and why.

4. Duke Kentucky shall continue voltage monitoring on the Wilder 46 circuit pursuant to 807 KAR 5:041.
5. The Executive Director is directed to serve a copy of this Order on NKWD.
6. This matter is closed and removed from the Commission's docket.

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By the Commission

ENTERED
MAR 04 2022 rcs
KENTUCKY PUBLIC
SERVICE COMMISSION

ATTEST:

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Executive Director

Case No. 2021-00192

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