COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A GENERAL ADJUSTMENT OF RATES, APPROVAL OF DEPRECIATION STUDY, AMORTIZATION OF CERTAIN REGULATORY ASSETS AND OTHER GENERAL RELIEF	))))))	Case No. 2021-00103

REBUTTAL TESTIMONY OF CRAIG A. JOHNSON

SENIOR VICE PRESIDENT OF POWER PRODUCTION

ON BEHALF OF EAST KENTUCKY POWER COOPERATIVE, INC.

Filed: July 27, 2021

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND OCCUPATION.

A. My name is Craig A. Johnson and my business address is East Kentucky Power Cooperative, Inc. ("EKPC"), 4775 Lexington Road, Winchester, Kentucky 40391. I am the Senior Vice President of Power Production of EKPC.

Q. PLEASE STATE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I received a Bachelor's degree in Engineering from West Virginia Institute of Technology and a Master's of Science degree in Engineering from the University of Kentucky. I am a licensed professional engineer in the Commonwealth of Kentucky. I have been employed by EKPC since September 1989 and have occupied my current position within the EKPC organization since January 2010.

Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF YOUR DUTIES AT EKPC.

A. I am responsible for all operational and maintenance functions at EKPC's two coal fired power plants, two combustion turbine plants, six landfill gas plants and one community solar facility. I report to the Chief Operating Officer.

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. I will address some of the issues raised by AG/Nucor witness Lane Kollen in his testimony regarding the appropriate life span for EKPC's combustion turbine ("CT") generation units.

Q. HAVE YOU REVIEWED MR. KOLLEN'S TESTIMONY?

A. I have. Among other things, he states that combustion turbines should be expected to reach an operational life of up to seventy years.

Q. WHAT IS YOUR IMPRESSION OF IT?

A. Mr. Kollen presents a one-sided perspective on the likely useful life span of EKPC's CTs. In particular, he overlooks several key factors that affect the useful life of these assets and, therefore, comes to an incorrect conclusion that the units could be in service for up to 70 years.

Q. WHAT IS EKPC'S CURRENT EXPECTED USEFUL LIFE FOR THESE ASSETS?

A. No firm retirement date(s) have been set for any of the units. However, for depreciation purposes, I understand that it is assumed that the Smith Units 1-3 are projected to have a useful life of 35 years and the Smith Units 4-10 and the Bluegrass Units have a useful life of 40 years.

Q. FROM YOUR PERSPECTIVE AS AN ENGINEER, IS THAT ESTIMATE REASONABLE?

A. Yes. While the number could fluctuate a few years one way or the other, based upon their current configuration and economic conditions, the estimate is appropriate from an engineering perspective.

Q. ARE EKPC'S CTS ALL ALIKE?

A. No. The Smith Units 1-3 are different from the other units.

Q. PLEASE DESCRIBE EKPC'S CT UNITS?

A. Response 14a of the AG/NUCOR Supplemental Request For Information lists the technical characteristics for the EKPC combustion turbine units. As described in the table, Smith Units 1 – 7 and the Bluegrass Units are heavy frame units. Smith Units 9 and 10 are aero derivative units. As outlined in the table, Smith Units 1-7 are dual fuel capable, Smith Units 9 and 10 are natural gas fired only, and the Bluegrass Units are dual fuel capable. All of EKPC's units are dispatched by PJM in a cyclic peaking operating mode. All Smith

Units and Bluegrass generators are air-cooled by either a totally enclosed water to air cooler or an open loop design. Smith Units 1-3 use a single silo combustion system, where all of the other units use an annular combustion system, making them unique in the world of gas turbines.

Q. WHY IS THE LIFE SPAN FOR SMITH UNITS 1-3 DIFFERENT FROM THE OTHER CTS?

A. Smith Units 1-3 were originally purchased from ABB. ABB sold its combustion turbine line to Alstom, which was in turn purchased by General Electric. Smith Units 1-3 are model 11N2. There are only seven like-kind 11N2s operating in the world to the best of EKPC's knowledge. EKPC purchased a very early vintage of the 11N2 model. ABB stated at the time that EKPC purchased serial numbers 2, 3 and 4. These units were originally intended to go into commercial operation during 1995. The units required extensive testing and modification by ABB in order for those units to be accepted by EKPC for commercial operation. Typically, it takes about a three-month commissioning window from first fire to commercial operation. In the case for Smith Units 1-3, the commissioning took approximately four years to complete. During this extensive commissioning, the units had several starts and stops. Smith Units 1, 2 and 3 went into commercial operation on March 1, 1999, February 1, 1999 and April 1, 1999, respectively. EKPC began depreciation of the assets based upon each unit's commercial operation date. The extensive commissioning required was not considered when estimating the useful life of the units. Comparatively, the other units in EKPC's fleet went through a normal commissioning cycle before declaring those units commercially operational signaling the start of their depreciable life.

Technical support and parts supply of the major gas turbine components is limited to GE where the other heavy frame units enjoy support from multiple vendors and parts suppliers. In comparison, Smith Units 4 -7 are GE model 7EAs. There are reportedly over 1,100 instances of this model in service today. The Bluegrass Units are Siemens model 501FD2s. There are reportedly over 360 instances of this model in service today. Finding replacement parts and technical support for the 11N2s is a high risk we live with today and could become very costly, if not impossible, if the Original Equipment Manufacturer ("OEM") decides to discontinue its support for this model. The turbine casing and turbine rotor for each Smith Units 1 -3 have already required modification and repair to ensure continued serviceability. It is EKPC's understanding that there are no places in the world that have the manufacturing capability to make a new turbine casing and rotor for the model 11N2.

Q. WHAT WOULD BE REQURIED TO EXTEND THE USEFUL LIVES OF THE CTS TO AS LONG AS 70 YEARS AS MR. KOLLEN SUGGESTS?

A. EKPC follows the OEM recommendations for operating and maintaining its combustion turbine fleet. All of the CTs in EKPC's fleet operate in a simple cycle mode and are used for peaking duty. The OEM recommends for a peaking operation that the maintenance intervals be based upon the number of operating hours and the number of starts. The heavy frame units generally follow a cyclic maintenance interval involving annual inspections, and after so many operating hours or starts EKPC performs a combustion inspection and then finally ending the maintenance cycle by performing a major turbine overhaul. The aero derivative units' maintenance is based upon operating hours. The components are inspected, cleaned, refurbished or replaced during these maintenance cycles. Peakers endure a thermal cycle during startup. The predominant wear on a peaking unit due to thermal cycling is through mechanical fatigue. Maintenance of a gas turbine component cannot reverse the effects of mechanical fatigue. A simple cycle peaking mode of operation is the severest operating modes of any generating unit. The fast start of a peaker results in components going from ambient temperature to over 2,000 degrees in a matter of minutes. This thermal cycling impacts the life of each component of a simple cycle peaker. The less starts on a peaking unit means a longer life of the peaking unit. EKPC's peaking units are utilized extensively by PJM, sometimes starting twice per day. Smith Units 1-3 have the most starts of any 11N2 in the world. A great maintenance plan cannot overcome the effects of mechanical fatigue resulting from thermal cycling. Change-out of major components at the end of their design life is not typically economical to do. Turbine casings, and turbine rotors would not be economical to replace even if possible.

Q. IS THAT LIKELY, IN YOUR OPINION?

A. The amount of capital required to achieve a 70-year operating life – as Mr. Kollen suggests is possible – does not appear to be economical or feasible. A major investment in an old gas turbine would have to be weighed against other options for power supply prior to making such a large investment. In my opinion, the only way for EKPC to achieve a 70-year operating life on a simple cycle gas turbine is to remove the unit from dispatch, which is not a feasible solution. A unit that sees very little operation cannot be relied upon when there is a critical need for power. The environmental challenges of operating a unit for 70 years without some type of major modification or addition of pollution control equipment seems very unlikely given the climate we are in today. It is very unlikely that any of the

EKPC simple cycle gas turbines, operating the same way we operate today, could ever see a 70-year life span.

Q. DOES THIS CONCLUDE YOUR TESITMONY?

A. Yes it does.

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR A GENERAL ADJUSTMENT OF RATES, APPROVAL OF DEPRECIATION STUDY, AMORTIZATION OF CERTAIN REGULATORY ASSETS, AND OTHER GENERAL RELIEF	))))))	CASE NO. 2021-00103

VERIFICATION OF CRAIG A. JOHNSON

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF CLARK)

Craig A. Johnson, being duly sworn, states that he has supervised the preparation of his Rebuttal Testimony in the above-referenced case and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Craig A. Johnson
Craig A. Johnson

The foregoing Verification was signed, acknowledged and sworn to before me this 27th day of July 2021, by Craig A. Johnson.

Gwyn M. Willoughby

Notary Commission No.: 590567
Commission expiration: 11/30/2021

GWYN M. WILLOUGHBY
Notary Public
Kentucky – State at Large
My Commission Expires Nov 30, 2021