DIRECT TESTIMONY OF JAMES S. NORTHRUP DIRECTOR, WHOLESALE AND RENEWABLES ANALYTICS DUKE ENERGY BUSINESS SERVICES LLC ON BEHALF OF DUKE ENERGY INDIANA, LLC CAUSE NO. 44953 BEFORE THE INDIANA UTILITY REGULATORY COMMISSION

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is James S. Northrup and my business address is 400 South Tryon Street, Charlotte, North Carolina 28202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as Director, Wholesale and Renewables Analytics by Duke Energy Business Services LLC. Duke Energy Business Services LLC is a service company affiliate of Duke Energy Indiana, LLC ("Duke Energy Indiana" or "Company"). Duke Energy Indiana is a wholly owned, indirect subsidiary of Duke Energy Corporation.

Q. WHAT ARE YOUR RESPONSIBILITIES AS DIRECTOR, WHOLESALE AND RENEWABLES ANALYTICS?

A. As Director, Wholesale & Renewables Analytics, I am responsible for developing specific strategies for Duke Energy Corp.'s operating utilities, including commercial support for Requests For Proposals ("RFPs") for renewable and supply side resources and major project/initiative business case analysis.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I am a registered professional engineer in the state of North Carolina, having received a Bachelor of Science in Civil Engineering from North Carolina State University and a Master's Degree in Business Administration from Queens University. I began my career at Duke Power Company in 1979 and have held a variety of responsibilities across Duke Energy in the areas of electric system distribution engineering, customer marketing, Demand-Side Management Program design and implementation, generation business planning, generation expansion planning, energy risk management, and Integrated Resource Planning. After coordinating the development of Demand-Side Customer Programs, I joined the Generation System Planning Group in 1994 and coordinated the development of the Integrated Resource Plan ("IRP") filings for state regulatory agencies. I was promoted to Manager, Generation Business Support in the Power Generation Group in 2000 to lead the business case development and asset strategy for fossil/hydro generation. In 2003, I was promoted to Director, System and Power Planning Group to guide major investments for generation assets and develop expansion plans to maintain system reliability. In 2006, I was promoted to Director, Regulated Economic Analysis where I worked in Integrated Resource Planning, new generation investments, and maintaining system reliability. In July 2012, I was promoted to my current position as Director, Wholesale and Renewables Analytics.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony will discuss the economics of the Staunton Solar Project and how Duke Energy Indiana personnel developed the pricing for the Staunton Solar Power Purchase Agreement ("PPA") entered into between Duke Energy Indiana and Staunton Solar, LLC ("Staunton"). I will review how the solar purchase is aligned with the Company's most recently submitted IRP. Finally, I will discuss the benefits of the Staunton Solar PPA to the customers of Duke Energy Indiana.

II. SOLAR ECONOMIC EVALUATION PROCESS

Q. PLEASE DESCRIBE HOW THE COMPANY UTILIZED AN ECONOMIC EVALUATION PROCESS TO DEVELOP COST EFFECTIVE STAUNTON PPA PRICING.

A. As described in Mr. Scott Tharp's Testimony, Staunton approached Duke Energy Indiana about a potential solar PPA. In evaluating this opportunity, Duke Energy Indiana performed an economic evaluation to determine the value or benefits of adding solar energy and capacity from the Staunton Solar Facility to the Duke Energy Indiana generation portfolio. By calculating the value of the expected additional solar capacity and energy from the Staunton facility, Company personnel established and negotiated a payment rate that would be fair and equitable for both Duke Energy Indiana customers and the owners of the Staunton Solar Facility.

The results of the energy and capacity economic modeling provided the basis for the development of the negotiated Staunton PPA pricing. The annual total value of the

solar energy and capacity additions were summarized and levelized over a ten-year contract life to determine a proposed levelized rate for the solar production.

Q. HOW WAS THE VALUE OF THE STAUNTON GENERATION DETERMINED?

A. Company personnel determined the value of the generation from the Staunton Solar Facility by performing detailed modeling of the specific energy and capacity expected to be produced by the facility.

To determine the energy rate, the value of the additional solar energy was estimated using IRP production simulation models. These models determine the value of additional energy by simulating the hourly dispatch of available generation resources to meet Duke Energy Indiana customer loads.

To determine the value of the additional capacity, Company personnel used the expected equivalent annual capacity value of the facility multiplied by the annualized cost of a combustion turbine. The expected equivalent annual capacity value was determined using methodology outlined by the Midcontinent Independent System Operator ("MISO") from its Resource Adequacy Business Practice Manual for new intermittent resources such as solar. Specifically, the hourly net output from the solar facility in MWs for hours 1500 – 1700 EST from June, July, and August are used to estimate the equivalent annual capacity value.

Q. PLEASE DESCRIBE PETITIONER'S CONFIDENTIAL EXHIBIT 2-A.

A. Petitioner's Confidential Exhibit 2-A contains a summary of the pricing for the Staunton Solar PPA and how such pricing is an economic addition to Duke Energy Indiana's portfolio.

Q. ARE THERE CUSTOMER PROTECTIONS BUILT INTO THE PPA PRICING?

A. Yes. The PPA is performance based meaning that Staunton will only be paid for the production received by Duke Energy Indiana. This protects customers in the event of lower than expected solar production.

Q. ARE THERE RENEWABLE ENERGY CREDITS ("RECS") ASSOCIATED WITH THE STAUNTON SOLAR PROJECT?

A. Yes.

Q WHAT ARE RECS?

A. A REC is the tradable commodity unit that represents the generation of one MWh of renewable or environmentally-friendly generation. RECs are traded in the open market and are a widely used and accepted industry standard.

Q. PLEASE DESCRIBE THE EXPECTED VALUE OF THE RECS.

A. Although the rate will depend on the market at the time of sale, the value of solar RECs as of the end of May 2017 was approximately $5/REC reflecting valuation for open market REC trading.

Q. DID THE PROPOSED PRICING FOR THE STAUNTON SOLAR PROJECT EXPLICITLY INCLUDE THE VALUE OF THE RECS?

A. No, the proposed pricing did not explicitly include any consideration of the additional value attributed to the RECs, which would be the sole property of Duke Energy Indiana. Duke Energy Indiana proposes that the net retail value received from the sale of these RECs flow to benefit of retail customers through the fuel clause, as discussed in Ms. Suzanne E. Sieferman's Testimony.

III. ALIGNMENT WITH THE INTEGRATED RESOURCE PLAN ("IRP")

Q. WHAT IS THE PURPOSE OF AN IRP?

A. An IRP is Duke Energy Indiana's formal plan for meeting future utility load requirements that includes the assessment of demand-side and supply-side resources to reliably and cost-effectively meet customer electricity needs. The goal of the IRP process is to determine the preferred combination of resources that can be used to reliably and cost-effectively meet customers' future electric service requirements. By definition, an IRP is developed at a single point in time, and many assumptions and forecasts used in the process can and do change over time. Still, a utility needs to be able to rely upon the IRP to make real world decisions about resource needs.

Q. WHAT IS DUKE ENERGY INDIANA'S MOST RECENT IRP?

A. The Company submitted its most recent IRP in November 2015.

Q. HOW WERE RENEWABLE RESOURCES REFLECTED IN THE 2015 IRP?

A. The 2015 IRP outlined a potential need for about 40 MWs nameplate of solar resource additions by 2017.

Q. HOW DOES THE STAUNTON SOLAR PPA ALIGN WITH THE 2015 IRP?

A. The addition of the 4 MW from the Staunton Solar PPA into the Duke Energy Indiana generation portfolio accomplishes the near term plan for adding emission-free solar energy generation as identified in the 2015 IRP. The proposed Staunton 4 MW solar facility combined with the existing 17 MW Duke Energy Indiana Crane Solar Facility and the four solar PPA facilities approved in Cause No. 44578 (totaling 20 MWs) almost exactly meets the 40 MW IRP near-term solar resource requirements from the 2015 IRP.

The PPA between Duke Energy Indiana and Staunton serves to diversify the Company's generation portfolio and meets our customers' increasing desire to have renewable energy options available to serve their needs.

IV. CUSTOMER BENEFITS OF THE STAUNTON SOLAR PPA

Q. WHAT ARE THE BENEFITS OF THE SOLAR PPA TO DUKE ENERGY INDIANA AND ITS CUSTOMERS?

A. The solar PPA provides a number of benefits to Duke Energy Indiana and its customers. First, the ten-year negotiated purchased power price for the Staunton PPA represents a cost-effective rate for customers based on the expected value of energy and capacity provided by the addition of the 4 MW solar facility. Secondly, the time differentiated on-peak/off-peak rate in the Staunton PPA reflects performance based pricing with payments for energy and capacity tied directly to the actual production of the solar facility. Additionally, the RECs produced by the facility will be Company owned and sold into active REC trading markets with the retail jurisdictional portion of any net proceeds received from the sale of these RECs flowing to the benefit of retail customers through the fuel clause. Finally, the Staunton Solar PPA serves to diversify the Company's generation portfolio and meets our customers' increasing desire to have renewable energy options available to serve their needs.

V. CONCLUSION

Q. IN YOUR OPINION, IS THE SOLAR PPA BEING PROPOSED FOR THE COMMISSION'S CONSIDERATION REASONABLE AND NECESSARY?

A. Yes. Securing the Staunton PPA provides Duke Energy Indiana customers the opportunity to participate in the development and consumption of economical, clean solar energy produced locally.

Q. WAS PETITIONER'S CONFIDENTIAL EXHIBIT 2-A PREPARED BY YOU OR UNDER YOUR DIRECTION?

A. Yes, it was.

Q. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY AT THIS TIME?

A. Yes.

PETITIONER' S EXHIBIT 2 - A

IS CONFIDENTIAL

VERIFICATION

I hereby verify under the penalties of perjury that the foregoing representations are true to the best of my knowledge, information and belief.

Signed: James S. Northrup
James S. Northrup

Dated: 6-6-17