FILED
November 23, 2021
INDIANA UTILITY
REGULATORY COMMISSION

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF DUKE ENERGY INDIANA, INC. FOR; (1) APPROVAL OF PETITIONER'S 6-YEAR PLAN FOR ELIGIBLE TRANSMISSION, DISTRIBUTION AND STORAGE SYSTEM IMPROVEMENTS, PURSUANT TO IND. CODE § 8-1-39-10; (2) APPROVAL OF A TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE IMPROVEMENT COST RATE ADJUSTMENT AND DEFERRALS, PURSUANT TO IND. CODE §§ 8-1-2-10, 8-1-2-12, 8-1-2-14, AND 8-1-39-1 *ET SEQ*; AND (3) APPROVAL OF A TARGETED ECONOMIC DEVELOPMENT PROJECT AND RECOVERY OF COSTS ASSOCIATED WITH THE PROJECT, PURSUANT TO IND. CODE §§ 8-1-39-10 AND 8-1-39-11	)	**CAUSE NO. 45647**

VERIFIED DIRECT TESTIMONY
OF
JEREMY K. LEWIS

On Behalf of Petitioner,
DUKE ENERGY INDIANA, LLC

Petitioner's Exhibit 2

November 23, 2021

DIRECT TESTIMONY OF JEREMY K. LEWIS
DIRECTOR OF CUSTOMER DELIVERY PROJECT MANAGEMENT
DUKE ENERGY BUSINESS SERVICES, LLC
ON BEHALF OF DUKE ENERGY INDIANA, LLC
BEFORE THE INDIANA UTILITY REGULATORY COMMISSION

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jeremy K. Lewis, and my business address is 100 South Mill Creek Road, Noblesville, Indiana 46062.

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

A. I am employed as Director of Customer Delivery Project Management by Duke Energy Business Services, LLC, a service company subsidiary of Duke Energy Corporation, and a non-utility affiliate of Duke Energy Indiana, LLC ("Duke Energy Indiana" or "Company").

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I started my career at PSI Energy, Inc. (a predecessor to Duke Energy Indiana) in 2001 and have worked with increasing levels of responsibility in the Distribution group. I was promoted to my current position in June 2019. I received my Bachelor of Science Degree in Organizational Leadership and Supervision in 2003.

Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AND RESPONSIBILITIES AS DIRECTOR OF CUSTOMER DELIVERY PROJECT MANAGEMENT.

A. My current responsibilities include direction and project management for the portfolio of all major customer delivery or distribution projects for Duke Energy Indiana, including TDSIC and non-TDSIC projects.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony will provide an overview of Duke Energy Indiana's Transmission, Distribution, and Storage System Improvement Charge investment plan for 2023-2028 ("TDSIC 2.0"). Specifically, I will review the overall TDSIC 2.0 investment plan for Duke Energy Indiana for both transmission and distribution investments, as well as provide specific details regarding the distribution circuit portions of TDSIC 2.0. I will also highlight: (1) the customer benefits of TDSIC 2.0; (2) Duke Energy Indiana's rigorous cost estimating process used in TDSIC 2.0; (3) the transmission and distribution projects selected for TDSIC 2.0 and the basis for their selection; (4) the specific cost estimates for each of the distribution projects; (5) an overview of the Black & Veatch ("B&V") evaluations and results for this proceeding; and (6) how the projects selected for TDSIC 2.0 meet the statutory requirements of Indiana Code 8-1-39.

II. TDSIC 2.0 OVERVIEW

Q. PLEASE DESCRIBE DUKE ENERGY INDIANA'S HISTORY OF TRANSMISSION AND DISTRIBUTION INVESTMENTS THROUGH ITS FIRST TDSIC, WHICH WAS APPROVED BY THE COMMISSION IN CAUSE NO. 44720.

A. The Company's first TDSIC investment plan ("TDSIC 1.0") was approved by the Commission on June 29, 2016. Along with that initial approval, the Commission also approved semi-annual filings to update the TDSIC projects and cost estimates, as well as the TDSIC Rider. Currently, TDSIC 1.0 is in year six of the seven-year plan (2016-2022) and is on track to complete the committed scope within the $1.4 billion cap.

The rigor and scrutiny behind the Company's proposal and update filings in TDSIC 1.0 have led to positive insights and driven performance improvements across key segments of work plan execution. Duke Energy Indiana believes that TDSIC 1.0 has been very successful for both the Company and our customers. Since TDSIC 1.0 began, Duke Energy Indiana has achieved a 27% reduction in risk of grid asset failure, based on the last update from the B&V risk model. The initial TDSIC 1.0 plan targeted a significant number of transmission and distribution assets that were approaching or had exceeded their estimated physical service life. Project selections for TDSIC 1.0 were primarily based on asset condition, with goals of replacing aging infrastructure, improving functionality, and modernization of the grid. The project selections for TDSIC 2.0 not only evaluate risk as in TDSIC 1.0, but further extend a value to benefit proposition of each project emphasizing reliability prioritization, hardening and resiliency improvements, and enablement of distributed energy.

Q. PLEASE PROVIDE AN OVERVIEW OF THE COMPANY'S TDSIC 2.0 INVESTMENT PLAN.

A. As stated above, the TDSIC 2.0 Investment Plan analyzes risk and emphasizes value in the programs selected. The 2.0 strategy will help Duke Energy Indiana meet its customers' growing expectations. Those expectations include proactive communication, regarding service needs and outages, the expectation that restoration times will be minimized after major storms, and the reduction of momentary interruptions that are much more impactful to customers' lives and digital interfaces than when the system was originally built. TDSIC 2.0 is a six-year, $2.0 billion plan including an estimated $158 million of Targeted Economic Development ("TED") investments. The recommended capital transmission investments total approximately $815 million, while the distribution investments total $1 billion over TDSIC 2.0's six-year investment horizon. The TDSIC 2.0 Investment Plan is designed to achieve cost-effective improvements in grid reliability, safety, grid modernization, and economic development, as established in the TDSIC statute, Indiana Code 8-1-39.

Duke Energy Indiana's plan addresses our defined grid investment planning objectives, including the following areas of investment prioritization, which were introduced in the testimony of Mr. Pinegar:

- Improve reliability for Indiana customers
- Advance grid hardening and resiliency
- Enable expansion of renewable and distributed generation
- Facilitate economic development growth

The TDSIC 2.0 Investment Plan's distribution programs include: Circuit Backbone Uplift, Overhead Lateral Uplift, Underground System Uplift, 4kV

Conversions, Inspection Based Programs, and Substation investments. At a high level, these categories are focused on system capacity and technology designed to isolate faults and automatically reconfigure the system to reduce and shorten customer outages. In addition, these programs involve upgrading equipment to address the leading cause of outages, momentary interruptions, and enhancing controls around distribution lines and substation equipment to optimize power delivery to customers. An overview of each distribution line program can be found later in my testimony.

The TDSIC 2.0 Investment Plan's transmission investments include: 1) Line Hardening and Resiliency; and 2) Substation Hardening and Resiliency. The Line Hardening and Resiliency programs are targeted at hardening transmission circuits against interruptions from both internal (end of life failures) and external (storms and vegetation) sources, as well as reducing the duration and impact of customer outages. The Substation Hardening and Resiliency programs are targeted towards upgrades to transmission and distribution substations to improve reliability, resiliency, and technical functionality. These programs, including the specifics of the investment in distribution substations, are explained in greater detail in the testimony of witness Mr. Martin Dickey.

The targeted economic development projects are focused on building out infrastructure in areas that are of high interest to new and existing customers, and/or have been marketed by state and local economic development agencies.

These projects are explained in greater detail in the testimony of witness Ms. Erin Schneider.

Q. MR. LEWIS, YOU PREVIOUSLY MENTIONED THAT ONE OF THE OBJECTIVES ASSOCIATED WITH TDSIC 2.0 WAS IMPROVING RELIABILITY FOR INDIANA CUSTOMERS. PLEASE EXPLAIN.

A. Reliability can be defined as the ability of our power grid to deliver electric service to the consumer in the quantity and quality of system demand. This can be improved through proactively reducing the frequency and duration of outages via programs in TDSIC 2.0. Greater than 80% of TDSIC 2.0 programs will influence reliability. Looking retroactively at our past five-year average, if Duke Energy Indiana would have had all of the proposed TDSIC 2.0 investments in place, we would have avoided approximately 23% of Customer Interruptions ("CI") and approximately 28% of Customer Minutes Interrupted ("CMI").

The proposed TDSIC 2.0 investments will improve reliability. For example, circuit rebuilds and upgrading from aged infrastructure to newer standards helps maintain and improve reliability to our customers. The Company intends to improve reliability through the utilization of new programs in the TDSIC 2.0 Investment Plan that will help transform the system to a dynamic smart-thinking and self-healing grid that will reroute power around faults, help to quickly locate faults and restore power more quickly to our customers, thus avoiding CI and CMI both on Major Event Days ("MED") and non-MED. These programs and TDSIC 2.0 benefits will be discussed in greater detail further in my testimony.

It is important to state that variables outside of TDSIC projects have an impact on reliability. Major storms, vegetation management, cellular advancement, and vehicle accidents are examples of non-TDSIC variables that influence direct measurements of reliability and impact project performance metrics. These variables can fluctuate significantly from year to year and have a great impact to overall system performance. System needs and assets will mature through the duration of this program and as such, Duke Energy Indiana believes it is most appropriate to measure the success of TDSIC 2.0 following the full execution of the investment plan.

Q. ANOTHER OBJECTIVE OF TDSIC 2.0 IS TO ADVANCE GRID HARDENING AND RESILIENCY. WHAT DO THESE TERMS MEAN?

A. Duke Energy Indiana defines hardening as physically improving the durability and stability of energy infrastructure to make it less susceptible to and to better withstand damage from even extreme events. While hardening is making the asset or grid stronger, Duke Energy Indiana believes resiliency makes the grid smarter and better able to react to events. We define resiliency as the ability of a transmission and distribution grid system to recover quickly from damage to any of its components or to any of the external systems on which it depends. Resiliency measures do not prevent damage; rather, they enable grid systems to continue operating despite damage and/or promote a more rapid return to normal operations when damages or outages do occur. Twenty-four of the thirty-five sub-programs in the TDSIC 2.0 Investment Plan contribute to resiliency and hardening of the grid.

Duke Energy Indiana's proposed TDSIC 2.0 Investment Plan is designed to harden the grid and make it more resilient in several ways. Sub-programs related to hardening and resiliency will help eliminate outdated grid architectures, target vulnerable assets with high consequence of failure, solve asset conditions that contribute to extending outages, and maintain or improve customer safety. Inspection-based programs invest in the future performance of our system and are often examples of programs that harden the grid. Inspection-based programs are geared towards proactively replacing grid hardware and equipment based on their effective age, condition, and historical failure rates. Proactively targeting these assets reduces customer outages and improves customer satisfaction.

Q. TDSIC 2.0 WAS ALSO DESIGNED TO FACILITATE THE EXPANSION OF RENEWABLES AND DISTRIBUTED GENERATION. PLEASE EXPLAIN.

A. As described in the testimony of Mr. Pinegar, customers are venturing into distributed generation and are excited about new advancements in renewable energy. To properly balance energy supplies from distributed energy resources like roof-top solar, new technology and grid strategies must be deployed over the Duke Energy Indiana infrastructure. An optimal way of doing this is through building what is known as a self-optimizing grid. In the simplest of terms, a self-optimizing grid ties more circuits together and installs devices that allow power to be shared and rerouted as well as areas to be isolated to adapt for outage conditions. The self-optimizing grid essentially prepares the distribution backbone circuits to accommodate a two-way power flow capability needed for distributed energy resources. A self-optimizing grid also helps manage and accept customer-generated and stored energy resources, such as wind, solar, and battery storage from customer systems.

Another key component of enabling distributed energy resources is voltage control. Integrated Volt-Var Control ("IVVC") allows the distribution system to optimize voltage and react to power needs through remotely operated substation and distribution line devices such as voltage regulators and capacitors. Ultimately, this creates efficiencies that flatten the voltage which, allows generation resources to travel further on the grid while using less energy. Further aiding this objective are our TDSIC 2.0 programs such as SCADA communication, substation relay replacements, circuit visibility and control, and circuit rebuilds. Together, these help to create a future state more conducive to both sides of the meter, which will better integrate renewables.

Q. TDSIC 2.0 INCLUDES TARGETED ECONOMIC DEVELOPMENT PROJECTS. WHY IS THIS IMPORTANT TO DUKE ENERGY INDIANA?

A. Duke Energy Indiana has included in its proposal, targeted economic development projects at key sites that are of high interest to prospective customers and existing Indiana businesses looking to grow. Investing in our infrastructure now will help Indiana attract and retain companies and improve the lives of our customers through new jobs and local investment. These projects seek to make improvements in areas that have the greatest potential to attract economic growth to Indiana. Facilitating business growth leads to more job opportunities for Hoosiers and more investments in our local communities. These programs are further explained in the testimony of witness Ms. Erin Schneider.

Q. DUKE ENERGY INDIANA WITNESS MR. PINEGAR STATED THAT TDSIC 2.0 IS EXPECTED TO REDUCE AND SHORTEN OUTAGES. CAN YOU PLEASE PROVIDE MORE DETAIL?

A. Today's utility customers have higher expectations of electric service. With technology-infused lifestyles, they value outage communication and expect 24/7/365 power. A self-healing distribution system is the best strategy for satisfying these requirements. While not all outages can be prevented, new technology affords utilities with an opportunity to reduce many outages and shorten them when they inevitably occur. TDSIC 2.0 utilizes a target set of programs that advances our system allowing the grid to adjust the power flow to self-heal when an event occurs, thus avoiding CI and CMI. Hardening and resiliency programs are imperative to a strong sustainable grid, and they are the foundation for system integrity and automation improvements. TDSIC 1.0 and 80% of the 2.0 programs focus on maintaining or improving foundational components such as poles, transformers, conductors, etc. After ensuring a strong, hardened system for all our customers, Duke Energy Indiana expects the following programs will provide the most benefit to the customer interruptions and outage minutes avoided: Self Optimizing Grid ("SOG"), which will isolate faults on the backbones of circuits from approximately 1,000 customers per segment to 400 customers per segment, allowing service to be restored to other portions of the circuit; Targeted Underground ("TUG"), which places strategic infrastructure underground to eliminate the source of overhead outages; and Automated Lateral Device ("ALD"), which is targeted to the lateral lines of distribution systems to reclose on temporary faults and isolate those temporary faults to eliminate customer outages. I will discuss each of these programs in greater detail later in my testimony.

We expect these programs to improve the experience of Duke Energy Indiana's commercial and industrial customers. Currently, 11% of our Duke Energy Indiana customers are part of a circuit with automation. After the completion of the TDSIC 2.0 Investment Plan, the Company estimates that over 65% of customers will be served by automated circuits. These programs focus on fault isolation that will result in less customers impacted and enhanced troubleshooting efficiencies to improve restoration times. Through the planned investments within TDSIC 2.0, customers on these targeted circuits will experience fewer interruptions and reduced outage durations.

The TDSIC 2.0 Investment Plan also includes additional installation of technology with near real-time two-way data communication, data collection, and remote operations capability. This will improve Duke Energy Indiana's ability to acquire near real-time system status, pinpoint the location of system trouble, automatically isolate the trouble in many cases, and restore service to our customers more quickly.

Further, TDSIC 2.0 programs utilize an Investment Plan Analysis that focuses on project cost benefit ratio to select high value circuits and assets for proactive replacement, which directly correlates to improved system integrity and reduced risk of those assets causing an outage due to failure.

With these investments in our infrastructure, we expect that system performance will improve, customer satisfaction will increase, and Duke Energy Indiana will be able to effectively leverage future grid advancements, such as distributed energy resources and storage.

Q. DOES THE TDSIC 2.0 INVESTMENT PLAN BENEFIT FROM ANY LESSONS LEARNED FROM DUKE ENERGY INDIANA'S TDSIC 1.0 PLAN?

A. Yes. Every segment of our transmission and distribution business has improved with our TDSIC 1.0 execution. Even with that improvement, we intend to continue the advancement of our work efficiencies. As stated above, we value the rigor and scrutiny involved in TDSIC 1.0 as it has led to positive changes and maturity in both transmission and distribution planning and execution for Duke Energy Indiana. Duke Energy Indiana's supply chain partners have also improved due to the longer lead-time items being engineered in advance. Work planning groups have had the advantage of seeing planned projects and work in advance with greater detail, which is a great advantage when bundling work in the most efficient way for construction resources. Labor contracts have been improved with our ability to commit earlier and communicate longer project work plans for multiple years. Estimating has also improved by building a solid tracking history and a team that understands the impact of changes in standards, contracts, and work methods. Estimating and planning projects in advance also helps strengthen communications with customers and stakeholders. Proactive communications with our customers provide better insight as to when they can expect to see Duke Energy Indiana in the area making improvements to the system. If planned outages are necessary, the upfront communication allows customers the chance to adjust their busy schedules to minimize the temporary impacts of advancing our grid.

III. TDSIC 2.0 INVESTMENT PLAN

Q. PLEASE PROVIDE AN OVERVIEW OF THE TDSIC 2.0 INVESTMENT PLAN.

A. TDSIC 2.0 consists of investments in our transmission and distribution systems with a focus on improving reliability, advancing grid hardening and resiliency, enabling expansion of renewable and distributed generation, facilitating economic development, and providing value to our customers. Following is a table that depicts the primary areas of investment and how those investments match up to the overall objectives of TDSIC 2.0.

Table 1 – TDSIC 2.0 Investment Plan Overview

Distribution Program Categories	Sub-Program	Reliability	Hardening Resiliency	DER Enablement
Circuit Backbone Reliability Uplift	Self Optimizing Grid (SOG)	✓	✓	✓
	Circuit Visibility & Control (CVC)	✓		✓
	Capacitor Automation	✓		✓
	Declared Protection Zone	✓	✓	
	Integrated Volt Var Control (IVVC)			✓
	Inaccessible Right of Way	✓	✓	
	Circuit Segmentation	✓		
	Limited Access Road Crossing		✓	
Overhead Lateral Reliability Uplift	Deteriorated Conductor	✓	✓	✓
	Automated Lateral Device (ALD)	✓		
	Targeted Undergrounding (TUG)	✓	✓	
	Circuit Sectionalization	✓		
Underground System Uplift	Underground System Uplift	✓		
4KV Conversion	4kV Conversion	✓	✓	
Inspection Based	GLT Pole Inspect & Replace		✓	
	Switchgear Inspect & Replace		✓	
	Surface Mounted Equipment Inspect & Replace (SMEI)		✓	
	Recloser Replacements	✓	✓	
Transmission Program Categories	**Sub-Program**	**Reliability**	**Hardening Resiliency**	**DER Enablement**
Substation Hardening & Resiliency	Upgrade T&D Transformers	✓	✓	
	SCADA Communications	✓	✓	✓
	Remote Line Sectionalizing - Looping Short Radials Through Existing	✓	✓	
	Transmission Relay Replacements	✓	✓	✓
	T&D Transformer Replacements	✓	✓	
	Substation Small Asset Replacements	✓	✓	
	Replace T&D Circuit Breakers	✓	✓	
	Substation Reconfiguration for Improved Reliability	✓	✓	
	Condition Based Monitoring - Transformers and Circuit Breakers	✓	✓	
Line Hardening & Resiliency	Wood Structures - Wood to Non-Wood	✓	✓	
	Circuit Rebuilds	✓	✓	✓
	Remote Line Sectionalizing - SCADA to Switches	✓	✓	
	356kV Towers - Install Intermediate Deadend Structures	✓	✓	
	Overhead Ground Wire Replacement	✓	✓	
	Towers - Cathodic Protection	✓	✓	
	Towers - Tower Replacement	✓	✓	
	Wood Structures - Cross Arm Replacement	✓	✓	

The transmission program categories above are represented by sub-programs for ease of understanding and alignment with TDSIC 2.0 objectives.

Please refer to testimony of witness Mr. Martin Dickey for further description of the transmission investment plan. In addition, Ms. Erin Schneider discusses the proposed TED projects.

IV. TDSIC 2.0 DISTRIBUTION INVESTMENTS

Q. CAN YOU COMMENT GENERALLY ON THE CHOSEN DISTRIBUTION CAPITAL INVESTMENTS AND THEIR BENEFIT TO INDIANA CUSTOMERS?

A. Yes. First, let me provide some background on Duke Energy Indiana's distribution system. Duke Energy Indiana's distribution system serves over 860,000 customers through approximately 22,000 miles of distribution lines, which includes 16,000 miles of overhead lines, 6,000 miles of underground lines, 600,000 distribution poles, and 240,000 distribution transformers. Nearly half of the Duke Energy Indiana system assets, such as poles, conductor, and transformers were constructed prior to 1980. This infrastructure is approaching its life expectancy and to sustain the Company's reliability, a portion of this infrastructure will be replaced or rebuilt through this plan. Additionally, there have been significant advancements in technology that can now be deployed to improve system monitoring, operations, and optimization.

Through TDSIC 2.0, we chose investments that focus on value to the customer through replacement of the aging assets and expansion of technology. As with most products on the market, the technology available today is simply better than the technology that was available 30-50 years ago. Replacing these first and second-generation technologies with today's advanced technology enables real-time, two-way communications with transmission and distribution assets. This allows Duke Energy Indiana to enable the Distribution Management System ("DMS") and leverage IVVC and Self-Optimizing Grid. It is our experience that these technologies increase the reliability of the system, while also giving Duke Energy Indiana operators visibility into current system conditions. These attributes were not available with older technologies.

Duke Energy Indiana will continue to invest in programs that improve the overall state of the grid through reliability, hardening, resiliency, and distributed energy resource enablement. These reliability improvements are designed to proactively reduce the number of outages, minimize the number of customers affected by an outage, improve outage response, as well as, expedite service restoration, all of which contribute to a reduction in the total number of customer minutes interrupted. Some examples of these investments include Self-Optimizing Grid, Targeted Undergrounding, Circuit Sectionalization, Circuit Segmentation, ALD and 4kV Conversion.

Q. HAVE YOU PROVIDED A WORKPLAN THAT SUMMARIZES THE DISTRIBUTION PROJECTS WITHIN TDSIC 2.0?

A. Yes. The TDISIC 2.0 Workplan is broken down into a hierarchy of several exhibits. My first exhibit, Petitioner's Exhibit 2-A (JKL), is the Duke Energy Indiana TDSIC 2.0 Plan Overview, which includes a six-year summary of the TDSIC 2.0 projects and their associated cost estimates. Summary descriptions of the distribution projects can be found later in my testimony. Additional cost detail for the distribution plan projects is found in Petitioner's Confidential Exhibits 2-B (JKL) and 2-C (JKL). I am also providing the distribution workplan in excel format as Confidential Workpaper 1-JKL.

Q. HOW DID DUKE ENERGY INDIANA DETERMINE WHAT PROJECTS TO INCLUDE IN ITS DISTRIBUTION WORKPLAN?

A. Projects were selected based on a variety of engineering analysis and asset data aligning with our TDSIC 2.0 objectives and focused on their improvement to system integrity, reliability, and benefit to our customers. Initial project analysis was developed by first reviewing, at a high-level, all current and future projects, programs, asset types, failure records, outage information, and engineering studies. This aggregation of detail is a result of our internal Asset Management department's ongoing evaluation of system characteristics and advancements in grid technology. A Class 5 estimate was assigned to each potential project. This initial list of investments was then provided to B&V to run through the Investment Plan Analysis and be scored through a cost to benefit ratio by substation. The investment plan in TDSIC 2.0 will be executed by substation and circuit to gain labor resource efficiencies. To align with the execution strategy, projects were evaluated through the Investment Plan Analysis, and with Asset and Project Management teams. Their efforts broke down the work plan model to spread work appropriately, while working to not saturate a given region with too many projects in a given year. This bundling of projects provides our distribution workplan as presented in Petitioner's Confidential Exhibit 2-C (JKL), as well as the excel version in Confidential Workpaper 1-JKL.

Q. YOU MENTIONED THE INVESTMENT PLAN ANALYSIS ABOVE, WHAT IS THAT AND HOW DOES THAT SUPPORT THE DISTRIBUTION PROJECTS INCLUDED IN THE TDSIC 2.0 INVESTMENT PLAN?

A. The Investment Plan Analysis is the accumulation of all Duke Energy, B&V, Copperleaf, value models, risk models, and optimization efforts together. Projects were identified by Duke Energy Indiana to address known conditions and performance issues on the system, which were then evaluated for consequence and likelihood of failure. Further, opportunities to improve these conditions and enhance functionality through proven automated technologies were also assimilated to put through the Investment Plan Analysis. The Investment Plan Analysis provides an advanced and mature study of Duke Energy Indiana projects. Leveraging system knowledge with the rigorous risk and value studies led us to selecting the projects that provide the most benefit for the cost. In selecting the TDSIC 2.0 investments, approximately $1.7 billion of potential distribution investments were analyzed through the Investment Plan Analysis, which returned $775 million of select distribution investments. The Investment Plan Analysis used two funding mechanisms: "optimized" and "reserved." A small portion of the distribution plan was reserved, which simply means subject matter experts held a portion of the funding specifically for these necessary subprojects. This accounts for projects within Inspection Based, 4kV Conversion, Underground Cable Rehab, and Capacitor Automation. These funding levels were selected using historical analysis of performance, value, and necessity to the TDSIC Objectives. All other projects were optimized in the model. Please refer to the testimony of Mr. James Shields, Petitioner's Exhibit 4 (JWS), along with Petitioner's Exhibit 4-A (the Investment Plan Report) for more information regarding reserved and optimized projects.

Q. MR. LEWIS, CAN YOU MORE SPECIFICALLY DISCUSS THE PROPOSED DISTRIBUTION PROGRAMS IN TDSIC 2.0?

A. The distribution programs are organized around five program categories and eighteen sub-programs, each with a specific program objective: Circuit Backbone Uplift, Overhead Lateral Uplift, Underground System Uplift, 4kV Conversions, and Inspection Based Programs. Please also see Table 1 – TDSIC 2.0 Investment Plan Overview above.

The **Circuit Backbone Uplift Category** includes eight sub-programs which target circuit enhancements to support circuit modernization, including automation, segmentation, and controlling circuit operations to enable self-optimization. These modernization investments reduce outage impacts with respect to their occurrence frequency, grid impact footprint, recovery time, and cost. Such improvements also have the added value of improving capability to better integrate distributed energy resources on to the grid.

The **Overhead Lateral Uplift Category** includes four sub-programs and is aimed at improving the lateral grid's reliability and resiliency. This program is primarily comprised of projects that add segmentation and automation of the circuit laterals to reduce the number of outages and customers impacted as well as reducing the duration of the outages themselves.

The **Underground System Uplift Category** targets cable rehabilitation for improved reliability.

4kV Conversion Category consists of the conversion of risk-prone, legacy standard, and dated architecture of lower operating voltage lines to a 12 kV system to address all three objectives of the Investment Plan.

The **Inspection-Based Program** includes four sub-programs and is a condition-based program geared towards proactively replacing grid hardware and equipment based on their effective age and historical failure rates.

Q. CAN YOU PLEASE EXPAND ON THE DISTRIBUTION SUB-PROGRAMS IN TDSIC 2.0?

A. To achieve the objectives established for TDSIC 2.0, Duke Energy Indiana aligned initiatives under the five distribution investment program categories, which are further divided into eighteen sub-programs, as elaborated below. Sub-Programs address specific initiatives within Program Categories. Below is a brief overview of each sub-program organized by Program Category. Please see Petitioner's Exhibit 4-A (JWS) (TDSIC 2.0 Investment Plan Report) for further detail.

<u>Circuit Backbone Uplift</u>

Self-Optimizing Grid ("SOG")

Advanced automation and intelligence are becoming a necessary requirement to manage an increasingly dynamic power delivery system. The Self-Optimizing Grid redesigns key portions of the distribution system and transforms it into a dynamic self-healing network that ensures issues on the grid can be isolated and customer impacts are limited. Self-healing technologies can reduce outage impacts on a circuit by as much as 75 percent. These grid capabilities are enabled by: (1) increasing system "connectivity" by building more circuit ties that allow for more flexibility in restoration options; (2) increasing "capacity" by installing larger wires, transformers, and system banks to be able to handle dynamic switching and expanding two-way power flow from adjacent circuits and renewable generation; and (3) increasing "control" through additional system automation and intelligence. SOG includes upgrades to the Advanced Distribution Management System head end systems and devices such as line sensors, which are used to measure voltage and/or current levels at targeted locations on the Duke Energy Indiana distribution system and transmit those measurements to the Distribution Control Center ("DCC").

Circuit Visibility and Control ("CVC")

The value to benefit ratio can be cost prohibitive to expand some substations and others sometimes lack physical space for standard enhancements. In some locations it's prudent and effective to install automated switching devices outside the substation to gain circuit visibility and control. This program modernizes the protection providing remote monitoring, control, data acquisition, and improved fault location to Duke Energy Indiana customers and wholesale customers, mostly in the rural areas of Indiana.

Inaccessible Right of Way ("IARW")

The Inaccessible Right of Way project identifies problematic sections of circuits that, if moved, could provide vast reliability improvement over the existing locations. That section of the circuit will be evaluated for relocation to an area that reduces impact to customers' land, reduces impact to environment, and improves accessibility for restoration and repair. The section of circuit will then be fully rebuilt using current construction standards in the new location. All equipment from the inaccessible right of way will be removed and land restored.

Declared Protection Zone ("DPZ")

Through outage tracking, a declared protection zone can be identified as a section of a circuit that is experiencing an above average number of specific types of faults, such as equipment failure, lightning strikes and wildlife. This project includes a visual inspection of all identified DPZs, which can range from the substation to the first protective device, from a recloser to the end of the line, or between reclosers on the main line. The DPZ program mitigates future outage events by identifying and correcting probable outage causes. The inspection looks at all aspects of the construction, including clearances and span lengths. Probable outage causes can include connections, arresters, switches, jumpers, system grounds, any damaged equipment, and inadequate Basic Insulation Level ("BIL").

Integrated Volt Var Control ("IVVC")

IVVC allows the distribution system to optimize voltage and reactive power needs through remotely operated substation and distribution line devices such as voltage regulators and capacitors. These controllable line devices are optimized and operated via a centralized distribution management system. IVVC capabilities enable a grid operator to levelize the voltage profile and then lower distribution voltage as a way of reducing demand, thereby reducing the need to generate or possibly purchase additional power at peak prices or protect the system from exceeding its load limitations. Benefits are achieved through circuit conditioning, which is the process of analyzing circuits and implementing recommended adjustments through optimizing the size and location of capacitor banks and voltage regulators, as well as verifying that the conductor is adequately sized, to sustain required voltage levels on a distribution circuit.

The investment in components that enable distribution automation and IVVC will result in customer savings on enabled circuits through a reduction in kWh usage and generation fuel consumed, which provides benefits to all customers, including commercial and industrial customers. All customers will potentially see this benefit through lower electric bills as the savings flow through the fuel adjustment clause rider. The lower fuel consumption will also result in lower generation emissions, thus reducing our environmental carbon footprint.

The reduction in kW demand can also result in extending the timeline for constructing future generation facilities. Customers will experience a more levelized voltage profile due to Duke Energy Indiana's ability to monitor the distribution grid in real-time.

Capacitor Automation

The project replaces legacy capacitor bank controls with modern digital control that is capable of two-way communications to a centralized DMS. Sensors are installed at each capacitor bank to measure current, voltage and power factor through the digital control. This communication capability enables IVVC to control the distribution system voltage profile, while the current and voltage sensors permit Duke Energy Indiana to capture system condition data for load management and service restoration plans. Capacitor Automation projects were not evaluated for scoring in the value framework as they are considered necessary to achieve automation and enablement of other programs such as IVVC.

Circuit Segmentation

Circuits that were not optimal SOG candidates were evaluated for circuit segmentation using the same segmentation criteria as SOG. Circuit Segmentation improves the reliability of distribution circuits by reducing the number of customers exposed to power outages associated with circuit faults such as cars hitting poles, trees falling into lines, and outages caused by storms. This reduction of exposure is accomplished by adding and/or re-configuring a number of protective devices on mainlines, circuit backbones, and branch circuits. The settings for these protective devices are coordinated to operate in a manner that isolates only the faulted section of a circuit.

Limited Access Road Crossings

This project ensures compliance with Indiana Department of Transportation ("INDOT") standards as Duke Energy engineers identify and review locations where overhead distribution circuits cross limited access roadways. A limited access road is defined as a road, or portion of a road, where the only access is through on and off ramps at designated entrances or exits, for example, Interstate entrance or exit ramps. It will also allow Duke Energy Indiana to reinforce line across highways to protect the traveling public from safety hazards, reduce the risk of conductor falling into major highways, reduce the risk of power outages, and increase integrity of the system by replacing aging assets.

<u>Overhead Lateral Uplift</u>

Circuit Sectionalization

This is a power outage mitigation project designed to improve the reliability of distribution circuits by adding and/or re-configuring a number of protective devices on overhead lateral circuits. Circuit Sectionalization is a systematic approach whereby additional fuses and protection devices are added to an existing circuit. This reduces the number of customers affected by an outage. Currently, a single set of fuses protect upstream customers from experiencing an outage, but with Circuit Sectionalization several additional protective devices are installed. This fuse coordinated approach keeps a circuit segment issue at the end of the circuit from affecting more customers upstream. This program also reduces outage duration because the length of the line that requires troubleshooting is reduced allowing for a more accurate pinpointing of the outage and more efficient restoration. Circuit sectionalization is vital to reliability targets as the Company continues to invest in programs to reduce customer minutes interrupted.

Deteriorated Conductor Replacements

Duke Energy Indiana has many miles of overhead distribution conductors greater than 50 years old that are showing signs of deterioration. Most of these conductors are small diameter Copper Wire ("CW") or small diameter Aluminum Conductor Steel Reinforced ("ACSR") that have a higher failure rate than other conductors. This project replaces targeted unreliable conductors with more reliable heavier gage industry standard aluminum wire. Replacing smaller and older technology wire with larger newer technology wire provides greater reliability in both current carrying ability and life expectancy of the conductor. The most commonly replaced wires are # 8 CW, # 4 ACSR, and # 2 ACSR.

Automated Lateral Device (ALD)

This program focuses on selectively replacing protective tap line fuses with small electronic reclosing devices on segments that can eliminate a significant number of sustained interruptions for customers on these taps. These devices serve to prevent customer outages by allowing temporary power line faults time to clear before reclosing, resulting in a targeted momentary interruption instead of a sustained outage, thus eliminating unnecessary use of resources (inventory, time, gasoline, etc.).

Targeted Underground ("TUG")

This is a strategic program that targets outage-prone rear-lot, heavily vegetated lines for conversion to underground service. TUG projects typically target "end of feeder" customers who are often low on the priority list for restoration during storm events. TUG lines are selected by reviewing 10 year outage history and identifying line segments that meet TUG criteria, which include (1) approximately two times worse reliability than average, (2) mostly residential areas, and (3) heavily vegetated rear-lot overhead lines which are difficult to access and maintain.

The goal of the TUG selection process is to maximize the number of outage events eliminated. Converting outage prone parts of the system from overhead to underground enables Duke Energy Indiana to restore service more quickly and cost effectively for all customers. Addressing areas with outlier outage performance improves service while lowering maintenance and restoration costs for all customers.

Underground System Uplift

The underground system uplift program targets cable rehabilitation for improved reliability. Duke Energy Indiana currently has approximately 8,000 miles of underground cable installed. The cable assessment/cable replacement project identifies medium voltage underground cables nearing end of life, at least

25 years or older. Using a complete list of Duke Energy Indiana circuits, our engineers used historical Geospatial Information System ("GIS") data to identify these segments. These segments will undergo a third-party cable assessment which identifies cable and components in pre-failure conditions. When the cable assessment results show the cable or cable splice is in pre-failure condition the cable or components will be replaced to restore reliability to the circuit. The assessment allows for the identification of cable sections that have the same level of integrity as new cable and will perform as new cable for a 25-year period. Assessing older cable is a cost efficient and reliable option helping to extend the life and reliability of the Company's cable systems.

4kV Conversion

The 4kV Conversion program is an important component of TDSIC 2.0, which is proposing to replace aging and obsolete infrastructure with Company-standard 12kV equipment. There are 43 4kV circuits on the Duke Energy Indiana system with aged equipment ranging from the substation transformer to the customer. 27 of the 43 4kV circuits are being converted with this TDSIC investment. Benefits of the 4kV conversion program include:

1) Increased reliability by installing additional line recloser
2) Elimination of aged end of life equipment, which has become less reliable and is difficult to replace because the equipment is no longer manufactured.

3) Upgraded circuits can join in with neighboring standard 12kv circuits to create a more networked grid with self-healing capabilities, instead of being constrained to only adjacent 4kv circuit pairs. With upgraded equipment and lines, the Company has an increasingly more resilient system with greater flexibility in restoration options.
4) Currently, 4kv substations and circuits have a limited ability to accept distributed energy resources, such as solar. By upgrading the circuits to current standards, the infrastructure will be able to support the two-way power flow; a requirement for increasing distributed energy resources.

<u>Inspection Based Programs</u>

Ground Line Treatment ("GLT") Pole Inspect and Replace

This project replaces or structurally modifies defective distribution poles and pole components identified during annual pole inspections. This involves the inspection of distribution wood poles, cross arms, insulators, and minor equipment for ground line decay, above ground decay, pole top damage, or other defects that threaten the structural integrity and reliable condition of the pole location.

Surface Mount Equipment Inspect and Replace ("SMEI")

This project is specifically focused on examining the external enclosure integrity, pad integrity, safety/clearance signage, locking mechanism integrity, and general safe operations of pad mounted equipment. The equipment includes pad mounted transformers, switchgear, meter panels, and switching cabinets. Further this program will proactively replace live-front transformers with the newer standard, dead front transformers.

Switchgear Inspect and Replace

The General Switchgear Replacement project proactively inspects and replaces aged equipment, prior to failure. There are approximately 1,100 switchgears in Duke Energy Indiana's service territory. On average, 54 switchgears are inspected per year looking for signs of wear and functionality of the equipment, such as bad terminations, non-operative parts, deteriorated cabinets, possible hazards, and targeted replacement of older switchgear such as Malton and live-front switchgear. An infrared/thermal scan is also used to identify potential failures that are not visible to the naked eye. Historically, an average of fifteen units are identified per year as needing replacement. The work is performed in a planned manner to minimize customer impact and extensive outages.

Recloser Replacements

As a recloser operates over a period of time, its gaskets degrade and allow moisture and other pollutants to contaminate oil or degrade functionality. Climate, use, and operating conditions also impact a recloser's electrical and mechanical components, contributing to its rate of decline. Proactively inspecting and replacing hydraulic reclosers enhances the system by ensuring devices perform properly, rapidly, and reliably to clear faults. This project replaces aged electrical and oil filled reclosers with new or refurbished units to ensure proper operation of the equipment.

Q. PLEASE DISCUSS THE DISTRIBUTION PROGRAMS THAT WILL FACILITATE EXPANSION OF SOLAR AND RENEWABLES AND HOW THIS WILL BENEFIT DUKE ENERGY INDIANA CUSTOMERS.

A. Distribution has five main programs that contribute to the enablement of expanding solar. These programs are SOG, CVC, Capacitor Automation, IVVC, and Deteriorated Conductor.

SOG allows reconfiguring of circuits to match load to production, and it supports two-way power flow that is associated with significant penetration of distributed energy resources on a circuit. In particular, during shoulder seasons which have more temperate weather and light load demand, high adoption circuits can produce more power than is locally needed. SOG automation and rerouting capability will allow the company to match load to that production. This has several benefits, one of which is locally produced power can be quickly rerouted to local neighborhoods on adjacent circuits, which reduces line losses. This also reduces localized high voltage issues during periods of overproduction. These renewable benefits from SOG are created by (1) increasing system "connectivity" by building more circuit ties that allow for more flexibility in restoration options, (2) increasing "capacity" by installing larger wires, transformers, and system banks to be able to handle dynamic switching and expanding two-way power flow from adjacent circuits and renewable generation, and (3) increasing "control" through additional system automation and intelligence.

Circuit Visibility and Control also plays a role in the greater distributed generation picture by providing remote and/or automated grid operation and real time situational awareness. These factors combined with existing DMS infrastructure enhances distributed energy resource readiness and provides a positive cost benefit analysis.

Automating capacitor banks helps to dynamically manage voltage and VAR conditions, minimizing line losses. These investments complete our eight-year capacitor automation effort which facilitates us to perform IVVC.

IVVC is the primary renewable and distributed energy resource benefit driver as it adapts well to the on and off nature of solar power systems due to overproduction concerns in shoulder seasons as well as intermittent cloud cover. IVVC circuits target operation in the middle of the voltage band, providing more headroom for voltage rise during those shoulder seasons while at the same time minimizing line losses, maximizing the value of locally produced power from distributed generation.

The deteriorated conductor sub-program also supports distributed energy resource enablement as it improves line connectivity and upgrading the wire size conforms to that latest standards which transmits more power upstream in support of distributed energy resources.

Collectively, the TDSIC 2.0 Plan distribution capital investments leverage grid automation, data management and automated grid sensors, and communication and response capability to effectively integrate a greater proportion of renewable and distributed energy resources across its distribution grid network, while improving grid reliability, economic performance and customer choice. As distributed generation grows on the system, a strong, reliable and increasingly resilient distribution system is needed to efficiently integrate those resources.

Q. PLEASE DISCUSS HOW THE DISTRIBUTION PROGRAMS ABOVE SUPPORT THE OBJECTIVE OF HARDENING AND RESILIENCY AND BENEFIT DUKE ENERGY INDIANA CUSTOMERS AS A WHOLE?

A. Eleven of the sub-programs improve grid hardening and resiliency; SOG, Declared Circuits, IARW, Limited Access, Deteriorated Conductor, TUG, 4kV, GLT, SMEI, Switchgear, and Recloser Replacements. These efforts replace or upgrade aged infrastructure with modern materials and new technology that strengthen the distribution system to better withstand extreme weather events, enable better monitoring and control, and lead to future support of more distributed energy resources, all of which allow the system to recovery quickly from the inevitable fault event. Because many of the programs included in the TDSIC 2.0 Plan will be implemented throughout the Company's service territory, ultimately every customer will benefit from efficiencies and system hardening. The TDSIC 2.0 Plan programs allow Duke Energy Indiana to take a holistic, coordinated approach to addressing these identified areas of concern, in contrast to a reactive strategy.

Q. PLEASE DISCUSS THE DISTRIBUTION PROGRAMS THAT WILL IMPROVE RELIABILITY AND HOW THIS WILL BENEFIT DUKE ENERGY INDIANA CUSTOMERS.

A. Thirteen of the eighteen sub-programs contribute to reliability benefits. In summary, these sub-programs are SOG, CVC, Capacitor Automation, Declared Protection Zone, Inaccessible Right of Way, Circuit Segmentation, Deteriorated Conductor, ALD, TUG, Circuit Sectionalization, Underground System Uplift, 4kV Conversion, Recloser Replacements. As stated above, the Company intends to improve reliability through the utilization of these programs in the TDSIC 2.0 Investment Plan that will help transform the system to a dynamic smart-thinking and self-healing grid that will reroute power around faults, help to quickly locate faults and restore power more quickly to our customers, thus avoiding CI and CMI both on MED and non-MED.

V. <u>OVERALL TDSIC 2.0 INVESTMENT PLAN COST ESTIMATES</u>

Q. HAS DUKE ENERGY INDIANA PROVIDED A DETAILED COST ESTIMATE FOR EVERY PROJECT IN THE TDSIC 2.0 INVESTMENT PLAN?

A. Yes. The high-level cost information for the TDSIC 2.0 Investment Plan can be found in Petitioner's Exhibit 2-A (JKL). Petitioner's Confidential Exhibit 2-B (JKL) contains additional detail related to the Distribution Circuit Upgrade project costs, with the complete Distribution Circuit Project Workplan presented in Petitioner's Confidential Exhibit 2-C (JKL) and Petitioner's Confidential Workpaper 1-JKL. Specific detail down to the year and cost driver for substation and transmission line work can be found in Petitioner's Confidential Exhibit 3-A (MDD), and Petitioner's Confidential Workpapers 1-MDD and 2-MDD. Economic Development estimates can be found in Petitioner's Confidential Exhibit 5-E (ENS).

Duke Energy Indiana - TDSIC 2.0 System Improvement Plan				
Line No.	Project Category	2023 - 2028		
		Capital	Project O&M	Cap & O&M Total
1	Distribution System Circuit Improvements	$704,060,933	$108,273,358	$812,334,291
2	Distribution System Substation Improvements	$176,965,506	$41,837	$177,007,344
3	Total Distribution - Contingency	$155,475,254	$0	$155,475,254
4	**Total Distribution System Improvements**	**$1,036,501,694**	**$108,315,195**	**$1,144,816,889**
5	Transmission System Line Improvements	$494,662,048	$22,610,931	$517,272,980
6	Transmission System Substation Improvements	$198,038,203	$0	$198,038,203
7	Total Transmission - Contingency	$122,241,221	$0	$122,241,221
8	**Total Transmission System Improvements**	**$814,941,472**	**$22,610,931**	**$837,552,403**
9	**Total TDSIC 2.0 Improvements**	**$1,851,443,166**	**$130,926,126**	**$1,982,369,292**
10	Targeted Economic Development - Identified Projects	$44,143,497	$0	$44,143,497
11	Targeted Economic Development - Potential Transmission Improvements	$90,000,000	$0	$90,000,000
12	Total Targeted Economic Development - Contingency	$23,672,382	$0	$23,672,382
13	**Total Improvement Plan**	**$2,009,259,044**	**$130,926,126**	**$2,140,185,171**

Q. HOW DID DUKE ENERGY INDIANA DERIVE THE COST ESTIMATES FOR TDSIC 2.0?

A. Duke Energy Indiana has spent significant time and resources putting together cost estimates for every project identified within TDSIC 2.0. We utilized the Association for the Advancement of Cost Engineering International ("AACE") standards and our own Duke Energy Project Management Center of Excellence guidelines for developing TDSIC 2.0 cost estimates. At a high level, cost estimates are derived utilizing either engineered work, built up estimates, or parametric modeling.

Each project identified in TDSIC 2.0 is estimated based on asset or compatible unit using historical values, subject matter expertise and reviewed by B&V. We have high confidence in our estimating process through utilizing the AACE standards and through Duke Energy's experience estimating similar projects. AACE is recognized internationally as the technical authority in cost and schedule management for programs, projects, products, assets, and services. The following is a brief definition of each Class of estimate:

- Class 2 - Engineering 30% to 70% complete, detailed unit cost, -15% to +20% estimating accuracy
- Class 3 – Engineering 10% to 40% complete, semi-detailed unit cost, -20% to +30% estimating accuracy
- Class 4 – Engineering 1% to 15% complete, parametric models from historical cost estimates, -30% to +50% estimating accuracy

Q. CAN YOU EXPLAIN THE COST ESTIMATING PROCESS IN DETAIL?

A. Yes. As part of the of the initial TDSIC 2.0 Workplan described above, a Class 5 estimate was assigned to each potential project. This is the initial list of investments that ran through the Investment Plan Analysis and was scored through a cost benefit ratio by substation. Once projects were evaluated through the Value Framework, Asset and Project Management teams then studied the work plan model to spread work appropriately, while working to not saturate a given region with too many projects in a given year. This provided our Annual Work Plan.

Utilizing the Annual Work Plan and the AACE guidelines mentioned above, engineering was performed and the majority of years one and two achieved Class 2 status for the projects within TDSIC 2.0. Outer years are considered Class 3 or Class 4. Note that a few projects were identified as Class 3 in 2023/2024 for distribution. This is due to the nature of inspection based or work that requires cable testing. We have well-supported parametric and historical models to substantiate a AACE Class 3 estimate for these programs.

Figure 1. Estimating Approach – AACE Standards

Class of Estimate	Class 5	Class 4	Class 3	Class 2	Class 1
% Design Complete (Level of Scope Definition)	0% to 2%	1% to 15%	10% to 40%	30% to 70%	50% to 100%
Typical Cost Estimate Methodology	Capacity Factored, Parametric Models, Judgement, or Analogy	Equipment Factored or Parametric Models	Semi-Detailed Unit Costs with Assembly Level Line Items	Detailed Unit Cost with Contract Expected Cost	Detailed Unit Cost with Detailed Invoice Forecast
Expected Range Boundaries	H: +30% to +100%	H: +20% to +50%	H: +10% to +30%	H: +5% to +20%	H: +3% to +15%
(Variation in Estimate to Complete - $)	L: -20% to -50%	L: -15% to -30%	L: -10% to -20%	L: -5% to -15%	L: -3% to -10%

Distribution Program Categories	Sub-Program	2023	2024	2025	2026	2027	2028
Circuit Backbone Reliability Uplift	Self Optimizing Grid (SOG)	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Circuit Visibility & Control (CVC)	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Capacitor Automation	Class 2	Class 2				
	Declared Protection Zone	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Integrated Volt Var Control (IVVC)	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Inaccessible Right of Way			Class 4	Class 4		Class 4
	Circuit Segmentation - Backbone	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Limited Access Road Crossing		Class 2	Class 4	Class 4	Class 4	Class 4
Overhead Lateral Reliability Uplift	Deteriorated Conductor	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Automated Lateral Device (ALD)	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Targeted Undergrounding (TUG)	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
	Circuit Sectionalization - Lateral	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
Underground System Uplift	Underground System Uplift	Class 3	Class 3	Class 4	Class 4	Class 4	Class 4
4KV Conversion	4kV Conversion	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
Inspection Based	GLT Pole Inspect & Replace	Class 3	Class 3	Class 4	Class 4	Class 4	Class 4
	Switchgear Inspect & Replace	Class 3	Class 3	Class 4	Class 4	Class 4	Class 4
	Surface Mounted Equipment Inspect & Replace (SMEI)	Class 3	Class 3	Class 4	Class 4	Class 4	Class 4
	Recloser Replacements	Class 2	Class 2	Class 4	Class 4	Class 4	Class 4
Transmission Program Categories	**Sub-Program**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Substation Hardening & Resiliency	Upgrade T&D Transformers	Class 2	Class 2	Class 4			
	SCADA Communications						
	Remote Line Sectionalizing - Looping Short Radials Through Existing Substations						
	Transmission Relay Replacements						
	T&D Transformer Replacements						
	Substation Small Asset Replacements						
	Replace T&D Circuit Breakers						
	Substation Reconfiguration for Improved Reliability						
	Condition Based Monitoring - Transformers and Circuit Breakers						
Line Hardening & Resiliency	Wood Structures - Wood to Non-Wood Replacement	Class 2	Class 2	Class 4			
	Circuit Rebuilds						
	Remote Line Sectionalizing - SCADA to Switches						
	356kV Towers - Install Intermediate Deadend Structures						
	Overhead Ground Wire Replacement						
	Towers - Cathodic Protection						
	Towers - Tower Replacement						
	Wood Structures - Cross Arm Replacement						

Our cost estimates are also informed by historical experience with similar projects and performed in accordance with industry standards. They are the best estimate of costs, as required under the TDSIC statute.

Q. IS CONTINGENCY INCLUDED IN THE PROJECT COST ESTIMATES?

A. Yes. Contingency is included in the total project category estimates as per the Association for the Advancement of Cost Engineering ("AACE") recommended practices. Contingency is added to the base cost estimates of the project to cover estimate uncertainty and risk.

AACE defines contingency as an amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows that it will likely result in aggregate, additional costs.

For projects that extend over multiple years, such as in our proposed TDSIC 2.0 investment plan, there are many possible risks and uncertainties that could trigger and cause project cost increases. This likelihood must be recognized in a fully transparent cost estimate for TDSIC 2.0.

Q. WHAT IS THE PROJECT CONTINGENCY AMOUNT IN TDSIC 2.0?

A. TDSIC 2.0 contingency amount was determined to be 15% based on the detailed risk analysis; TDSIC 1.0 was 11% of the seven-year cost. In TDSIC 1.0 all the contingency is forecasted to be allocated due to discrete project risks that triggered as well as price increases for labor and material that exceeded the 3% escalation per year assumption. Due to the length of time between the TDSIC 2.0 estimates, 2021 and the end of the program in 2028, many uncertainties exist.

Changes in work processes along with labor and material price uncertainty could result in project actuals greater than expected 2021 values.

Q. HOW IS CONTINGENCY ALLOCATED ACROSS THE PROJECTS?

A. Contingency is broken out for each year and separated by distribution and transmission FERC account as shown in Petitioner's Exhibit 2-A (JKL).

Q. HOW WAS CONTINGENCY CALCULATED?

A. Contingency includes risk and estimate uncertainty. The contingency is the result of the Monte Carlo simulation. Risks and uncertainty events were identified by the project teams and subject matter experts. Each risk/project was assigned a probability and cost impact for best-case, most likely, and worst-case scenarios. The model runs for 1,000 iterations. The resulting value was then selected for the contingency.

Q. WHAT HAPPENS TO CONTINGENCY IF IT IS NOT USED?

A. Since projects go into service each year, contingency is broken out for each year. However, contingency is a six-year plan value. For example, if contingency is found to be needed to a lesser extent than expected in year one the remaining amount would extend to future years to account for ongoing risk that are more backend loaded to a plan of this scale.

Q. WHAT IS THE DIFFERENCE BETWEEN CONTINGENCY AND THE AACE CLASS ESTIMATE RANGES?

Contingency is added to the base cost estimate of the project to cover estimate uncertainty and risk. Contingency is part of the expected case value at P50. The

AACE class estimate ranges are applied to the expected case estimate including contingency based on the level of project definition. As the level of project definition rises, an example would be an increase in the level of engineering complete, the estimate class changes, and the expected accuracy range applied to the single point estimate is tightened. The ranges for estimate classes represent P10 (90% chance that the cost will be exceeded) to P90 (90% chance that cost will not be exceeded). Typically, the P50 value that includes the single point estimate with contingency is selected as the expected value.

Q. IS IT COMMON ESTIMATING PRACTICE TO INCLUDE BOTH CONTINGENCY AND THE APPLICATION OF CLASS ESTIMATE RANGES?

A. Yes. This is addressed in the AACE International Recommended Practice No. 18R-97, it states, "typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this represents about 80% confidence that the actual cost will fall within the bounds of the low and high ranges. The estimate confidence interval or accuracy range is driven by the reliability of the scope information available at the time of the estimate in addition to the other variables and risk identified above."

Q. IS DUKE ENERGY INDIANA REQUESTING THE RECOVERY OF O&M EXPENSE RELATED TO ITS DISTRIBUTION INVESTMENTS?

A. Yes. There is direct, project O&M related to some of the capital projects in TDSIC 2.0. This is the O&M that is incurred while the capital project is under construction. These estimates are included in Petitioner's Exhibit 2-A (JKL). It is my understanding that inclusion of this type of project-related O&M is provided for in the TDSIC Statute.

Q. IS THIS O&M INCLUDED IN THE COST ESTIMATE FOR EACH PROJECT?

A. Yes. Any direct project O&M related to a capital project is included in the cost estimate. This is standard practice in the utility industry.

Q. IS DUKE ENERGY INDIANA REQUESTING THE RECOVERY OF ANY VEGETATION REMOVAL ASSOCIATED WITH TDSIC 2.0?

A. Yes. There is direct, project-related vegetation removal related to some of the capital projects in TDSIC 2.0. This is the vegetation removal necessary to perform the capital project construction. These costs are included in the estimate and are provided for in the TDSIC Statute. Further, these costs are not being recovered elsewhere through rates.

Q. DID ANY THIRD PARTY VERIFY DUKE ENERGY INDIANA'S COST ESTIMATING PROCESS?

A. Yes. The B&V team and their AACE Certified Engineer conducted an independent review of Duke Energy Indiana's TDSIC 2.0 investment plan cost estimates and estimating process. The details of their review are included with the testimony of B&V's witness, Mr. Jim Shields.

VI. B&V REVIEW

Q. WHAT WAS B&V's ROLE IN THIS TDSIC 2.0 FILING?

A. B&V was brought in as a third party to further evaluate and validate Duke Energy's transmission and distribution project selections, estimates, and economic impact.

Q. PLEASE EXPAND ON HOW B&V HELPED WITH VALIDATION OF THE ESTIMATED PROJECTS IN THE TDSIC INVESTMENT PLAN.

A. As stated above, B&V evaluated our estimating strategy by reviewing cost estimates and verifying class estimates are in alignment with AACE standards. B&V concluded that the process Duke Energy Indiana used for TDSIC 2.0 project cost estimating was reasonable and within the typical band of uncertainty seen across the industry for capital planning and cost forecasting purposes. For the review, B&V selected projects and Duke Energy Indiana provided the detailed material and labor estimates for specific planned projects that provide a line-item breakdown of costs that include quantities, materials, and labor costs. For these estimates, B&V independently developed similar detailed cost estimates, using B&V estimating tools and historical labor and material costs and the same detailed scope breakdown used by Duke Energy Indiana. After the line-item estimates were developed, B&V compared the total estimate to Duke Energy Indiana's estimate to calculate a percent difference and assess the reasonableness of the estimate. In reviewing Duke Energy Indiana's cost estimating process, B&V held detailed discussions reviewing the different transmission and distribution cost estimating models and approach used to the develop TDSIC 2.0 cost estimates. More detail on the B&V cost estimating review can be found in the testimony of Mr. James Shields and Confidential Exhibit 4-B (JWS). For all of the reviewed sample projects, the cost estimate workbooks, backup documentation, and detail of these documents are consistent with the AACE class level that Duke Energy Indiana states in TDSIC 2.0.

Q. PLEASE DESCRIBE THE INVESTMENT PLAN ANALYSIS AND B&V INVOLVEMENT IN SCORING AND EVALUATING PROJECTS.

A. Duke Energy Indiana set forth a goal in the TDSIC 2.0 Investment Plan to assess project value and select projects that provide a positive cost benefit ratio. B&V helped by combining Copperleaf's Decision Analytics, their Value Model and the B&V proprietary RAPP model. This comprehensive and rigorous process produced a calculated net value, benefits mapping, and value measures that ultimately provides a cost benefit ratio by project. This led to selecting the programs and projects best suited and most cost effective in reaching the TDSIC 2.0 Investment Plan objectives. The overall process is referred to as the Investment Plan Analysis and is described in detail by Mr. Shields testimony and Petitioner's Exhibit 4-A, The Investment Plan report.

Q. PLEASE EXPLAIN THE ECONOMIC IMPACT STUDY PERFORMED ON THE TDSIC 2.0 INVESTMENT PLAN?

A. Along with the benefits discussed to improve and modernize the Duke Energy Indiana grid systems, TDSIC 2.0 is also expected to provide secondary benefits to the state by generating additional economic activity. An economic impact study was performed by the Indiana Business Research Center ("IBRC") at Indiana

University's Kelley School of Business to assess the secondary economic impacts to Indiana from the proposed TDSIC 2.0 investments. To summarize, IBRC found that for the six-year duration of the TDSIC 2.0 Investment Plan, excluding TED and contingency, Duke Energy Indiana will contribute an estimated $1.04 billion in compensation in Indiana and approximately $1.29 billion in gross domestic product.

Studies like this are widely used by the electric sector to measure such benefits in the areas of employment, income, value added, wages, federal taxes, and state/local taxes. Inputs of the TDSIC 2.0 plan such as project types, locations, and spending levels help IBRC to analyze the full employment footprint of the TDSIC 2.0 plan. Using aggregated production, employment, and trade data from local, regional, and national sources along with the Duke Energy Indiana project inputs gives IBRC insight into economic factors such as supply chain, construction, and engineering jobs in the area to support the TDSIC 2.0 plan. The results of the IBRC economic impact study are described in Petitioner's Exhibit 2-D (JKL).

VII. TDSIC 2.0 INVESTMENT PLAN UPDATES AND FLEXIBILITY

Q. PLEASE DESCRIBE HOW TDSIC 2.0 WILL BE UPDATED.

A. Any long-term plan will need to be updated as time proceeds. The TDSIC statute provided for this by requiring updates in the TDSIC rider proceedings. At this point, Duke Energy Indiana plans to continue filing its TDSIC rider on a semi-annual basis, so we would be updating the TDSIC 2.0 Workplan in the Fall and filing recovery in the Spring. The work plan is created based on today's best information of future locations and identified for all six years of the TDSIC 2.0 plan. The work plan will be progressively expounded, based on system conditions, and communicated annually to the Commission. Units in the project may be susceptible to change, especially in outer years, due to the most current evaluations of system needs. Change order processes and internal approval requirements are in place to ensure both system requirements and customer benefits are validated for any change request. As with TDSIC 1.0, in addition to updating project costs, schedule, and benefits, there could be a need to move projects forward and back in TDSIC 2.0 and, to a lesser extent, even to move some projects in to or out of the Active Plan (*i.e.* the TDSIC 2.0 projects previously identified) to an Alternate list of projects. New governance, standards, technology, load/system changes, and reliability can change over a six-year period. As these change, Duke Energy Indiana understands the value of continuously evaluating the benefit of projects to the customer and the system.

One way we have mitigated the likelihood of change is by including an Alternate List of projects in several categories of work. The Alternate List, as in TDSIC 1.0, is a list of projects that were analyzed in the Investment Plan Analysis but were not selected for inclusion of the current TDSIC 2.0 Active Plan. As you may expect, many projects have very close scores and there are variety of system conditions that can lead to a project's score improving or decreasing over time. Having these alternate projects available for continuous study allows the project team to evaluate the appropriate projects for customer and system needs in a given year. For instance, a Declared Circuit project scheduled for the year three execution in the Active Plan could be evaluated prior to execution and determined to be of lessor value compared to a Declared Protection Zone on the Alternate List. In this case, the project team would submit an internal change order justifying the exchange of the projects from the Active Plan to the Alternate List and vice versa. Petitioner's Confidential Exhibit 2-C (JKL) and Confidential Workpapers 1-MDD and 2-MDD include these Alternate List projects, which are identified by Substation and Circuit.

The Company would like the Commission to designate the projects on the Alternate List as eligible projects, so that in future TDSIC rider filings, the Company would have the option of moving projects on to and off of the Alternate List and the Active Plan as necessary for the greatest benefit to the system and customers. This flexibility was extremely beneficial in the TDSIC 1.0 plan, as it allowed us to meet the contemplated scope of the overall plan, even if certain projects fell out to the alternate list because their scope was expanded, an outage was not available, or the costs increased substantially. Duke Energy Indiana commits that the overall costs of TDSIC 2.0 would not be substantially changed by substituting these alternate plans. The Company suggests that if the overall investment plan is tracking under its expected cost, it is prudent and beneficial to customers to insert projects off the Alternate List into the Active Plan to create additional customer value while staying under the overall cost estimate and within the 1% customer annual rate increase.

Finally, there could arise a major project category addition or major shift in priorities in the six-year period; in that event, the Company would work with the Commission, the Office of the Utility Consumer Counselor and the intervening parties to develop an acceptable review procedure or changes to the TDSIC 2.0 plan as provided for in the statute.

VIII. OVERALL TDSIC 2.0 INVESTMENT PLAN SUMMARY

Q. PLEASE ADDRESS ANY QUANTIFIABLE BENEFITS TO THE OVERALL TDSIC 2.0 INVESTMENT PLAN?

A. At the completion of the TDSIC 2.0 period, the reliability of the Duke Energy Indiana system will improve with the full implementation of the programs described above. We are quantifying reliability performance through Customer Interruptions avoided and Customer Minutes Interrupted avoided. Duke Energy Indiana estimates there is an 80% probability we will avoid between 22 and 45 million Customer Minutes Interrupted and avoid between 149k and 249k Customer Interruptions upon the conclusion of our TDSIC 2.0 investments. Based on a historical five-year average, all things being equal, we expect TDSIC 2.0 to produce a minimum 19% improvement to System Average Interruption Duration Index ("SAIDI"), and a minimum 17% improvement to System Average Interruption Frequency Index ("SAIFI"). The 80% probability factor is based on variables outside of TDSIC 2.0 such as increased vehicle accidents, invasive vegetation species, weather events, etc.

Duke Energy Indiana commits to tracking CI/CMI of the self-optimizing grid based on its automation savings and contribution to SAIDI/SAIFI. Duke Energy Indiana is proposing to track our progress by reviewing total savings by annum for minimum and maximum CI/CMI, inclusive of the target, and the impact of MED and Non-MEDs. The table below is a representation of what we expect to produce following the execution of the TDSIC 2.0 Workplan.

Table 2 – TDSIC 2.0 Reliability Impact Tracking Proposal

TDSIC 2.0 Reliability Impact				
Total Savings	Min CI	Max CI	Min CMI	Max CMI
2029 Target	X	X	X	X
2029 Actuals - Non MED	X		X	
2029 Actuals - MED	X		X	
2029 Actuals - Total	X		X	
2029 Variance	X	X	X	X
Impact from TDSIC	SAIFI		SAIDI	
Without MEDs	X%		X%	
Including MEDs	X%		X%	
Percent Customers fed by Automation	X%			

Q. HOW DID DUKE ENERGY INDIANA DEVELOP THE QUANTITATIVE CUSTOMER BENEFITS OUTLINED IN YOUR TESTIMONY?

A. Duke Energy subject matter experts utilized the most recent complete five-year historical reliability data in conjunction with the scope of the TDSIC 2.0 programs checked against similar work in other jurisdictions. Those effects are then calculated on the expected future reliability performance of the Indiana system.

Q. ARE THERE ANY OTHER EXPECTED BENEFITS FROM THE TDSIC 2.0 INVESTMENT PLAN?

A. Yes. Aside from the benefits stated throughout this testimony, an additional benefit is the Value of Lost Load calculated by B&V utilizing the Department of Energy Interruption Cost Estimator ("ICE") calculator. See Petitioner's Exhibit 4-A, Appendix B.

Q. DID DUKE ENERGY INDIANA INCLUDE ALL OF ITS ANNUAL TRANSMISSION AND DISTRIBUTION SPENDING IN TDSIC 2.0?

A. No. Duke Energy Indiana has a multitude of projects and programs that are not included in TDSIC 2.0. These include, but are not limited to, projects such as new customer growth, customer expansion, emergent corrective maintenance, emergent power quality issues, outage restoration, vegetation management, INDOT relocation projects, telecommunications make-ready, projects required by local, state or federal governmental authorities, projects required by the Midcontinent Independent System Operation ("MISO"), distribution and transmission buildings, vehicles, and warehouses, among others.

Q. PLEASE DESCRIBE HOW THE APPROACH FOR IDENTIFYING ASSETS FOR REPLACEMENT IS APPROPRIATE IN THE TDSIC 2.0 INVESTMENT PLAN.

A. As described earlier in my testimony, the Company believes that the rigorous Investment Plan Analysis performed, particularly the new methodology of evaluating projects methodically, with benefit to cost ratio sets a new bar for

TDSIC project identification. This methodology takes into account the risk strategies that are still very important to the goals of any TDSIC deployment and adds a value scoring process to ensure investments hold appropriate customer and system value.

Q. ARE THERE DUPLICATIVE ITEMS IN THE TDSIC 2.0 INVESTMENT PLAN?

A. No. All projects scopes are unique to a specific goal outlined in TDSIC 2.0. It should be understood that there are certain items, such as transformers, regulators, capacitors, reclosers and switches, that are common to both transmission and distribution projects. Duke Energy Indiana's project summaries detail precisely what materials are included in each project. Further, the detailed designs and engineering specifications completed to date are available for review in discovery. Any intervenor will have access to the engineering specifications for each project in the TDSIC 2.0 plan.

IX. CONCLUSION

Q. HAS DUKE ENERGY INDIANA PROVIDED THE BEST ESTIMATE OF THE COSTS OF THE ELIGIBLE IMPROVEMENTS?

A. Yes. As mentioned earlier in my testimony, Duke Energy Indiana has spent significant time and resources putting together cost estimates for every project identified within TDSIC 2.0 for all six years. We utilized the AACE standards for developing TDSIC 2.0 cost estimates. We have high confidence in our estimating process through utilizing the AACE standards and our historic experience. Each asset identified in TDSIC 2.0 is estimated based on replacement of that specific asset. No high-level budgetary estimates were utilized in creating TDSIC 2.0. Further, B&V has validated that the projects provided by Duke Energy Indiana are the best estimate of the cost of the eligible improvements.

Q. DOES PUBLIC CONVENIENCE AND NECESSITY REQUIRE EACH COMPONENT OF TDSIC 2.0?

A. Yes. TDSIC 2.0 supports a significant reduction of operational risk through replacement of aging infrastructure and by modernizing the distribution grid. The risk profile analysis demonstrates that TDSIC 2.0 results in tangible risk reduction and reliability benefits. Additionally, TDSIC 2.0 improves the operational efficiency of Duke Energy Indiana's transmission and distribution system. Finally, TDSIC 2.0 addresses and improves upon the overall customer experience and will enable a number of customer benefits and programs in this filing and in future years.

Q. DO THE ESTIMATED COSTS OF TDSIC 2.0 JUSTIFY THE INCREMENTAL BENEFITS OF THE PLAN?

A. Yes. The Company has described both quantitative and qualitative benefits of the TDSIC 2.0 Plan, as detailed in the TDSIC 2.0 Investment Plan Report, my testimony and the testimonies of Mr. James Shields and Mr. Martin Dickey.

For example, the Investment Plan Report demonstrates that for the combined transmission and distribution investments of $1.57 billion, excluding TED, O&M, and contingency, the overall transmission result has a cost to benefit ratio of 3.5 and overall program value of $2.8 billion for the $800 million core project planned investment. The overall distribution plan result has a positive cost to benefit ratio of 2.1 and overall program value of $1.6 billion for the $775 million core project planned investment. Even with the full allocation of contingency, the overall plan continues to show a benefit to cost ratio of 2.4.

As described in the Investment Plan Analysis and mentioned above, the overall cost benefit ratio from TDSIC 2.0's proposed distribution investments is 2.1. There are several distribution programs that have less benefits to Duke Energy Indiana customers as a whole, but have a significant benefit to a smaller subset of our customers located in more rural, remote locations. Switchgear Inspection and Replacement, Circuit Visibility and Control, and the 4 kV conversion programs are all important investments in our system and will positively impact those customers located in the areas in which we invest. The Company believes it is important to improve and support the reliability of these areas, just in the same way that it's important to the state to ensure broadband is not only provided to densely populated areas, but also to rural areas.

By executing the combined TDSIC 2.0 Investment Plan at $1.57 billion, the program value is estimated at $4.4 billion. All this combined demonstrates that the projects and programs included in the TDSIC 2.0 Plan are reasonable, necessary, and justified by significant reliability, hardening and resiliency, and modernization benefits.

Q. WERE PETITIONER'S EXHIBITS 2-A (JKL), 2-D (JKL), AND CONFIDENTIAL EXHIBITS 2-B (JKL) AND 2-C (JKL) PREPARED BY YOU OR AT YOUR DIRECTION?

A. Yes, they were.

Q. DOES THIS CONCLUDE YOUR PREFILED TESTIMONY?

A. Yes, it does. Thank you.

Duke Energy Indiana - TDSIC 2.0 Infrastructure Improvement Plan

6 Year Summary

Distribution System Improvements

Line No.	Project Category	2023-2028 Capital Additions	2023-2028 O&M	2023-2028 Capital & O&M Total
1	**Distribution System Circuit Improvements**	$704,060,933	$108,273,358	$812,334,291
2	**Distribution System Substation Improvements**	$176,965,506	$41,837	$177,007,344
3	**Total Distribution - Contingency**	$155,475,254	$0	$155,475,254
4	**Total Distribution Improvements**	**$1,036,501,694**	**$108,315,195**	**$1,144,816,889**

Transmission System Improvements

Line No.	Project Category	2023-2028 Capital Additions	2023-2028 O&M	2023-2028 Capital & O&M Total
5	**Transmission System Line Improvements**	$494,662,048	$22,610,931	$517,272,980
6	**Transmission System Substation Improvements**	$198,038,203	$0	$198,038,203
7	**Total Transmission - Contingency**	$122,241,221	$0	$122,241,221
8	**Total Transmission Improvements**	**$814,941,472**	**$22,610,931**	**$837,552,403**
9	**Total TDSIC 2.0 Improvements**	**$1,851,443,166**	**$130,926,126**	**$1,982,369,292**
10	**Targeted Economic Development - Identified Projects**	$44,143,497	$0	$44,143,497
11	**Targeted Economic Development - Potential Transmission Improvements**	$90,000,000	$0	$90,000,000
12	**Total Targeted Economic Development - Contingency**	$23,672,382	$0	$23,672,382
13	**Total Investment Plan**	**$2,009,259,044**	**$130,926,126**	**$2,140,185,171**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Summary By Year

Distribution System Improvements

Line No.	Project Category	2023 Capital Additions	2023 O&M	2023 Capital & O&M Total	2024 Capital Additions	2024 O&M	2024 Capital & O&M Total
1	**Distribution System Circuit Improvements - TDSIC 2.0**	$86,070,023	$17,975,406	$104,045,429	$95,838,470	$14,658,664	$110,497,134
2	**Distribution System Substation Improvements - TDSIC 2.0**	$14,493,107	$41,837	$14,534,945	$18,052,441	$0	$18,052,441
3	**Total Distribution - Contingency - TDSIC 2.0**	$17,746,435	$0	$17,746,435	$20,098,396	$0	$20,098,396
4	**Total Distribution Improvements - TDSIC 2.0**	**$118,309,565**	**$18,017,244**	**$136,326,809**	**$133,989,307**	**$14,658,664**	**$148,647,971**
5	**Cumulative Distribution Improvements - TDSIC 2.0**	**$118,309,565**	**$18,017,244**	**$136,326,809**	**$252,298,872**	**$32,675,908**	**$284,974,779**
	Transmission System Improvements						
6	**Transmission System Line Improvements - TDSIC 2.0**	$35,900,449	$2,862,794	$38,763,243	$58,015,946	$2,661,355	$60,677,301
7	**Transmission System Substation Improvements - TDSIC 2.0**	$26,046,227	$0	$26,046,227	$47,816,638	$0	$47,816,638
8	**Total Transmission - Contingency - TDSIC 2.0**	$10,931,766	$0	$10,931,766	$18,676,338	$0	$18,676,338
9	**Total Transmission Improvements - TDSIC 2.0**	**$72,878,442**	**$2,862,794**	**$75,741,236**	**$124,508,922**	**$2,661,355**	**$127,170,277**
10	**Cumulative Transmission Improvements - TDSIC 2.0**	**$72,878,442**	**$2,862,794**	**$75,741,236**	**$197,387,364**	**$5,524,149**	**$202,911,513**
11	**Total T & D Improvements - TDSIC 2.0**	**$191,188,007**	**$20,880,038**	**$212,068,044**	**$258,498,229**	**$17,320,019**	**$275,818,248**
12	**Cumulative T & D Improvements - TDSIC 2.0**	**$191,188,007**	**$20,880,038**	**$212,068,044**	**$449,686,235**	**$38,200,057**	**$487,886,292**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Summary By Year

Distribution System Improvements

Line No.	Project Category	2025 Capital Additions	2025 O&M	2025 Capital & O&M Total	2026 Capital Additions	2026 O&M	2026 Capital & O&M Total
1	**Distribution System Circuit Improvements - TDSIC 2.0**	$119,415,156	$16,548,331	$135,963,487	$126,131,284	$17,941,286	$144,072,570
2	**Distribution System Substation Improvements - TDSIC 2.0**	$67,758,300	$0	$67,758,300	$40,531,401	$0	$40,531,401
3	**Total Distribution - Contingency - TDSIC 2.0**	$33,030,610	$0	$33,030,610	$29,411,062	$0	$29,411,062
4	**Total Distribution Improvements - TDSIC 2.0**	**$220,204,066**	**$16,548,331**	**$236,752,397**	**$196,073,747**	**$17,941,286**	**$214,015,033**
5	**Cumulative Distribution Improvements - TDSIC 2.0**	**$472,502,938**	**$49,224,238**	**$521,727,176**	**$668,576,685**	**$67,165,525**	**$735,742,209**
	Transmission System Improvements						
6	**Transmission System Line Improvements - TDSIC 2.0**	$141,075,955	$3,704,375	$144,780,330	$107,008,432	$3,097,939	$110,106,371
7	**Transmission System Substation Improvements - TDSIC 2.0**	$19,402,294	$0	$19,402,294	$38,242,832	$0	$38,242,832
8	**Total Transmission - Contingency - TDSIC 2.0**	$28,319,691	$0	$28,319,691	$25,632,576	$0	$25,632,576
9	**Total Transmission Improvements - TDSIC 2.0**	**$188,797,941**	**$3,704,375**	**$192,502,315**	**$170,883,840**	**$3,097,939**	**$173,981,779**
10	**Cumulative Transmission Improvements - TDSIC 2.0**	**$386,185,305**	**$9,228,524**	**$395,413,828**	**$557,069,144**	**$12,326,463**	**$569,395,607**
11	**Total T & D Improvements - TDSIC 2.0**	**$409,002,007**	**$20,252,705**	**$429,254,712**	**$366,957,587**	**$21,039,225**	**$387,996,812**
12	**Cumulative T & D Improvements - TDSIC 2.0**	**$858,688,242**	**$58,452,762**	**$917,141,004**	**$1,225,645,829**	**$79,491,987**	**$1,305,137,816**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Summary By Year

Distribution System Improvements

Line No.	Project Category	2027 Capital Additions	2027 O&M	2027 Capital & O&M Total	2028 Capital Additions	2028 O&M	2028 Capital & O&M Total
1	**Distribution System Circuit Improvements - TDSIC 2.0**	$132,418,981	$19,685,394	$152,104,375	$144,187,021	$21,464,276	$165,651,297
2	**Distribution System Substation Improvements - TDSIC 2.0**	$20,911,112	$0	$20,911,112	$15,219,145	$0	$15,219,145
3	**Total Distribution - Contingency - TDSIC 2.0**	$27,058,252	$0	$27,058,252	$28,130,500	$0	$28,130,500
4	**Total Distribution Improvements - TDSIC 2.0**	**$180,388,344**	**$19,685,394**	**$200,073,738**	**$187,536,665**	**$21,464,276**	**$209,000,941**
5	**Cumulative Distribution Improvements - TDSIC 2.0**	**$848,965,029**	**$86,850,919**	**$935,815,948**	**$1,036,501,694**	**$108,315,195**	**$1,144,816,889**
	Transmission System Improvements						
6	**Transmission System Line Improvements - TDSIC 2.0**	$85,638,312	$7,895,606	$93,533,918	$67,022,954	$2,388,862	$69,411,816
7	**Transmission System Substation Improvements - TDSIC 2.0**	$26,363,501	$0	$26,363,501	$40,166,711	$0	$40,166,711
8	**Total Transmission - Contingency - TDSIC 2.0**	$19,765,026	$0	$19,765,026	$18,915,823	$0	$18,915,823
9	**Total Transmission Improvements - TDSIC 2.0**	**$131,766,839**	**$7,895,606**	**$139,662,445**	**$126,105,489**	**$2,388,862**	**$128,494,351**
10	**Cumulative Transmission Improvements - TDSIC 2.0**	**$688,835,983**	**$20,222,069**	**$709,058,052**	**$814,941,472**	**$22,610,931**	**$837,552,403**
11	**Total T & D Improvements - TDSIC 2.0**	**$312,155,183**	**$27,581,001**	**$339,736,183**	**$313,642,154**	**$23,853,138**	**$337,495,292**
12	**Cumulative T & D Improvements - TDSIC 2.0**	**$1,537,801,012**	**$107,072,988**	**$1,644,874,000**	**$1,851,443,166**	**$130,926,126**	**$1,982,369,292**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Summary By Year

Line No.	Project Category	6 Year Capital Additions	6 Year O&M	6 Year Capital & O&M Total
	Distribution System Improvements			
1	**Distribution System Circuit Improvements - TDSIC 2.0**	$704,060,933	$108,273,358	$812,334,291
2	**Distribution System Substation Improvements - TDSIC 2.0**	$176,965,506	$41,837	$177,007,344
3	**Total Distribution - Contingency - TDSIC 2.0**	$155,475,254	$0	$155,475,254
4	**Total Distribution Improvements - TDSIC 2.0**	**$1,036,501,694**	**$108,315,195**	**$1,144,816,889**
5	**Cumulative Distribution Improvements - TDSIC 2.0**	**$1,036,501,694**	**$108,315,195**	**$1,144,816,889**
	Transmission System Improvements			
6	**Transmission System Line Improvements - TDSIC 2.0**	$494,662,048	$22,610,931	$517,272,980
7	**Transmission System Substation Improvements - TDSIC 2.0**	$198,038,203	$0	$198,038,203
8	**Total Transmission - Contingency - TDSIC 2.0**	$122,241,221	$0	$122,241,221
9	**Total Transmission Improvements - TDSIC 2.0**	**$814,941,472**	**$22,610,931**	**$837,552,403**
10	**Cumulative Transmission Improvements - TDSIC 2.0**	**$814,941,472**	**$22,610,931**	**$837,552,403**
11	**Total T & D Improvements - TDSIC 2.0**	**$1,851,443,166**	**$130,926,126**	**$1,982,369,292**
12	**Cumulative T & D Improvements - TDSIC 2.0**	**$1,851,443,166**	**$130,926,126**	**$1,982,369,292**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Distribution System Improvements

Line No.	Project Category	2023 Material	2023 Labor	2023 Indirects	2023 AFUDC	2023 Total Capital Additions	2023 O&M	2023 Capital and O&M	2023 Retirements	2023 Total Project
1	**Distribution System Circuit Improvements**	$21,611,814	$41,675,052	$20,455,932	$2,327,224	$86,070,023	$17,975,406	$104,045,429	$19,215,447	$123,260,876
2	**Distribution System Substation Improvements**	$4,985,306	$6,790,365	$2,101,254	$616,182	$14,493,107	$41,837	$14,534,945	$2,359,223	$16,894,168
3	**Total Distribution Improvements**	**$26,597,120**	**$48,465,418**	**$22,557,186**	**$2,943,406**	**$100,563,130**	**$18,017,244**	**$118,580,374**	**$21,574,670**	**$140,155,044**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$8,213,869	$20,891,917	$5,863,430	$931,233	$35,900,449	$2,862,794	$38,763,243	$3,429,486	$42,192,728
5	**Transmission System Substation Improvements**	$8,330,976	$13,440,251	$4,013,037	$1,217,027	$26,046,227	$0	$26,046,227	$2,866,589	$28,912,816
6	**Total Transmission Improvements**	**$16,544,845**	**$34,332,168**	**$9,876,467**	**$2,148,261**	**$61,946,675**	**$2,862,794**	**$64,809,469**	**$6,296,075**	**$71,105,544**
7	**Total T & D Improvements**	**$43,141,965**	**$82,797,586**	**$32,433,653**	**$5,091,666**	**$162,509,806**	**$20,880,038**	**$183,389,843**	**$27,870,745**	**$211,260,588**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Distribution System Improvements

Line No.	Project Category	2024 Material	2024 Labor	2024 Indirects	2024 AFUDC	2024 Total Capital Additions	2024 O&M	2024 Capital and O&M	2024 Retirements	2024 Total Project
1	**Distribution System Circuit Improvements**	$24,400,105	$46,786,550	$21,609,669	$3,042,146	$95,838,470	$14,658,664	$110,497,134	$20,983,652	$131,480,786
2	**Distribution System Substation Improvements**	$6,342,343	$8,096,259	$2,800,538	$813,300	$18,052,441	$0	$18,052,441	$981,149	$19,033,589
3	**Total Distribution Improvements**	**$30,742,449**	**$54,882,809**	**$24,410,206**	**$3,855,447**	**$113,890,911**	**$14,658,664**	**$128,549,575**	**$21,964,801**	**$150,514,375**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$12,371,231	$34,799,480	$9,247,730	$1,597,506	$58,015,946	$2,661,355	$60,677,301	$8,244,755	$68,922,056
5	**Transmission System Substation Improvements**	$17,216,557	$21,963,154	$6,958,181	$1,678,746	$47,816,638	$0	$47,816,638	$2,617,636	$50,434,273
6	**Total Transmission Improvements**	**$29,587,787**	**$56,762,634**	**$16,205,911**	**$3,276,252**	**$105,832,584**	**$2,661,355**	**$108,493,939**	**$10,862,391**	**$119,356,330**
7	**Total T & D Improvements**	**$60,330,236**	**$111,645,443**	**$40,616,117**	**$7,131,698**	**$219,723,494**	**$17,320,019**	**$237,043,513**	**$32,827,191**	**$269,870,705**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Line No.	Project Category	2025 Material	2025 Labor	2025 Indirects	2025 AFUDC	2025 Total Capital Additions	2025 O&M	2025 Capital and O&M	2025 Retirements	2025 Total Project
	Distribution System Improvements									
1	**Distribution System Circuit Improvements**	$31,931,771	$56,847,172	$27,049,867	$3,586,346	$119,415,156	$16,548,331	$135,963,487	$23,920,905	$159,884,392
2	**Distribution System Substation Improvements**	$20,670,588	$33,115,809	$10,887,924	$3,083,979	$67,758,300	$0	$67,758,300	$3,200,811	$70,959,112
3	**Total Distribution Improvements**	**$52,602,358**	**$89,962,981**	**$37,937,791**	**$6,670,325**	**$187,173,456**	**$16,548,331**	**$203,721,787**	**$27,121,716**	**$230,843,504**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$20,239,503	$92,369,757	$24,159,173	$4,307,522	$141,075,955	$3,704,375	$144,780,330	$12,387,550	$157,167,880
5	**Transmission System Substation Improvements**	$5,736,954	$9,878,242	$3,112,939	$674,160	$19,402,294	$0	$19,402,294	$1,125,311	$20,527,606
6	**Total Transmission Improvements**	**$25,976,457**	**$102,247,999**	**$27,272,111**	**$4,981,681**	**$160,478,250**	**$3,704,375**	**$164,182,624**	**$13,512,861**	**$177,695,485**
7	**Total T & D Improvements**	**$78,578,816**	**$192,210,981**	**$65,209,903**	**$11,652,007**	**$347,651,706**	**$20,252,705**	**$367,904,411**	**$40,634,578**	**$408,538,989**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Line No.	Project Category	2026 Material	2026 Labor	2026 Indirects	2026 AFUDC	2026 Total Capital Additions	2026 O&M	2026 Capital and O&M	2026 Retirements	2026 Total Project
	Distribution System Improvements									
1	**Distribution System Circuit Improvements**	$37,015,298	$54,287,933	$30,841,467	$3,986,586	$126,131,284	$17,941,286	$144,072,570	$27,899,702	$171,972,272
2	**Distribution System Substation Improvements**	$13,952,670	$19,131,397	$6,245,354	$1,201,980	$40,531,401	$0	$40,531,401	$1,825,252	$42,356,653
3	**Total Distribution Improvements**	**$50,967,968**	**$73,419,330**	**$37,086,821**	**$5,188,566**	**$166,662,685**	**$17,941,286**	**$184,603,971**	**$29,724,954**	**$214,328,925**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$6,750,653	$71,930,140	$24,892,902	$3,434,737	$107,008,432	$3,097,939	$110,106,371	$11,450,880	$121,557,252
5	**Transmission System Substation Improvements**	$13,960,263	$17,010,487	$5,943,877	$1,328,205	$38,242,832	$0	$38,242,832	$1,603,854	$39,846,686
6	**Total Transmission Improvements**	**$20,710,916**	**$88,940,627**	**$30,836,779**	**$4,762,942**	**$145,251,264**	**$3,097,939**	**$148,349,203**	**$13,054,734**	**$161,403,937**
7	**Total T & D Improvements**	**$71,678,884**	**$162,359,957**	**$67,923,600**	**$9,951,508**	**$311,913,949**	**$21,039,225**	**$332,953,174**	**$42,779,688**	**$375,732,862**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Distribution System Improvements

Line No.	Project Category	2027 Material	2027 Labor	2027 Indirects	2027 AFUDC	2027 Total Capital Additions	2027 O&M	2027 Capital and O&M	2027 Retirements	2027 Total Project
1	**Distribution System Circuit Improvements**	$35,559,859	$59,413,169	$33,126,208	$4,319,744	$132,418,981	$19,685,394	$152,104,375	$32,467,153	$184,571,528
2	**Distribution System Substation Improvements**	$6,462,560	$10,166,928	$3,323,352	$958,272	$20,911,112	$0	$20,911,112	$870,902	$21,782,014
3	**Total Distribution Improvements**	**$42,022,420**	**$69,580,097**	**$36,449,560**	**$5,278,016**	**$153,330,092**	**$19,685,394**	**$173,015,487**	**$33,338,055**	**$206,353,542**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$4,730,528	$57,755,763	$20,686,112	$2,465,910	$85,638,312	$7,895,606	$93,533,918	$9,561,994	$103,095,912
5	**Transmission System Substation Improvements**	$8,580,200	$13,055,961	$3,843,439	$883,902	$26,363,501	$0	$26,363,501	$1,622,803	$27,986,304
6	**Total Transmission Improvements**	**$13,310,727**	**$70,811,723**	**$24,529,551**	**$3,349,811**	**$112,001,813**	**$7,895,606**	**$119,897,419**	**$11,184,797**	**$131,082,217**
7	**Total T & D Improvements**	**$55,333,147**	**$140,391,820**	**$60,979,110**	**$8,627,828**	**$265,331,906**	**$27,581,001**	**$292,912,906**	**$44,522,852**	**$337,435,758**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Distribution System Improvements

Line No.	Project Category	2028 Material	2028 Labor	2028 Indirects	2028 AFUDC	2028 Total Capital Additions	2028 O&M	2028 Capital and O&M	2028 Retirements	2028 Total Project
1	**Distribution System Circuit Improvements**	$40,150,414	$63,168,349	$36,139,148	$4,729,110	$144,187,021	$21,464,276	$165,651,297	$35,573,960	$201,225,256
2	**Distribution System Substation Improvements**	$5,399,879	$7,109,073	$2,252,107	$458,085	$15,219,145	$0	$15,219,145	$761,310	$15,980,455
3	**Total Distribution Improvements**	**$45,550,293**	**$70,277,422**	**$38,391,255**	**$5,187,195**	**$159,406,165**	**$21,464,276**	**$180,870,441**	**$36,335,270**	**$217,205,711**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$1,225,822	$47,830,418	$16,235,784	$1,730,930	$67,022,954	$2,388,862	$66,911,816	$6,575,512	$73,487,328
5	**Transmission System Substation Improvements**	$13,555,397	$19,169,042	$6,032,246	$1,410,027	$40,166,711	$0	$40,166,711	$1,756,266	$41,922,978
6	**Total Transmission Improvements**	**$14,781,219**	**$66,999,460**	**$22,268,030**	**$3,140,957**	**$107,189,665**	**$2,388,862**	**$109,578,528**	**$8,331,778**	**$117,910,306**
7	**Total T & D Improvements**	**$60,331,512**	**$137,276,881**	**$60,659,285**	**$8,328,152**	**$266,595,831**	**$23,853,138**	**$290,448,969**	**$44,667,048**	**$335,116,017**

Duke Energy Indiana - T & D Infrastructure Improvement Plan

6 Year Detailed Summary By Year

Distribution System Improvements

Line No.	Project Category	6 Year Total Material	6 Year Total Labor	6 Year Total Indirects	6 Year Total AFUDC	6 Year Total Capital Additions	6 Year Total O&M	6 Year Total Capital and O&M	6 Year Total Retirements	6 Year Total Project
1	**Distribution System Circuit Improvements**	$190,669,261	$322,178,225	$169,222,291	$21,991,157	$704,060,933	$108,273,358	$812,334,291	$160,060,819	$972,395,110
2	**Distribution System Substation Improvements**	$57,813,347	$84,409,831	$27,610,529	$7,131,799	$176,965,506	$41,837	$177,007,344	$9,998,648	$187,005,992
3	**Total Distribution Improvements**	**$248,482,608**	**$406,588,056**	**$196,832,819**	**$29,122,956**	**$881,026,440**	**$108,315,195**	**$989,341,635**	**$170,059,466**	**$1,159,401,101**
	Transmission System Improvements									
4	**Transmission System Line Improvements**	$53,531,606	$325,577,475	$101,085,130	$14,467,837	$494,662,048	$22,610,931	$517,272,980	$51,650,177	$566,423,156
5	**Transmission System Substation Improvements**	$67,380,346	$94,517,136	$29,903,718	$7,192,067	$198,038,203	$0	$198,038,203	$11,592,460	$209,630,662
6	**Total Transmission Improvements**	**$120,911,952**	**$420,094,611**	**$130,988,849**	**$21,659,904**	**$692,700,251**	**$22,610,931**	**$715,311,182**	**$63,242,636**	**$776,053,819**
7	**Total T & D Improvements**	**$369,394,560**	**$826,682,667**	**$327,821,668**	**$50,782,860**	**$1,573,726,691**	**$130,926,126**	**$1,704,652,817**	**$233,302,103**	**$1,935,454,920**

Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2023 Material	2023 Labor	2023 Indirects	2023 AFUDC	2023 Total Capital Additions	2023 Project O&M	2023 Capital & O&M Total	2023 Retirements	2023 Total Project
1	4kV Conversion	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	Automated Lateral Device (ALD)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	Capacitor Automation	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
4	Circuit Sectionalization	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
5	Circuit Segmentation	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6	Circuit Visibility & Control	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	Declared Circuits	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
8	Deteriorated Conductor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	General Switchgear	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
10	GLT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	Inaccessible R/W	$0	$0	$0	$0	$0		$0		$0
12	Limited Access Road Crossing	$0	$0	$0	$0	$0		$0		$0
13	Recloser Replacement Program	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	SMEI	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	SOG - Circuit Connectivity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	SOG - Recloser	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	Targeted Undergrounding (TUG)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	Underground Cable Rehabilitation	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	IVVC									
20	IVVC Circuit Conditioning Capacitor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	IVVC Circuit Conditioning Reconductor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	IVVC Circuit Conditioning Regulator	$0	$0	$0	$0	$0		$0		$0
23	IVVC EOL Voltage Sensors	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	IVVC Line Voltage Regulator Control Replacement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
25		$20,818,109	$39,515,827	$19,804,414	$2,266,957	$82,405,306	$15,826,276	$98,231,582	$16,806,216	$115,037,798

Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2024 Material	2024 Labor	2024 Indirects	2024 AFUDC	2024 Total Capital Additions	2024 Project O&M	2024 Capital & O&M Total	2024 Retirements	2024 Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)	[redacted]								
3	Capacitor Automation	[redacted]								
4	Circuit Sectionalization	[redacted]								
5	Circuit Segmentation	[redacted]								
6	Circuit Visibility & Control	[redacted]								
7	Declared Circuits	[redacted]								
8	Deteriorated Conductor	[redacted]								
9	General Switchgear	[redacted]								
10	GLT	[redacted]								
11	Inaccessible R/W	$0	$0	$0	$0	$0		$0		$0
12	Limited Access Road Crossing	[redacted]								
13	Recloser Replacement Program	[redacted]								
14	SMEI	[redacted]								
15	SOG - Circuit Connectivity	[redacted]								
16	SOG - Recloser	[redacted]								
17	Targeted Undergrounding (TUG)	[redacted]								
18	Underground Cable Rehabilitation	[redacted]								
19	IVVC	[redacted]								
20	IVVC Circuit Conditioning Capacitor	[redacted]								
21	IVVC Circuit Conditioning Reconductor	[redacted]								
22	IVVC Circuit Conditioning Regulator	$0	$0	$0	$0	$0		$0		$0
23	IVVC EOL Voltage Sensors	$[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	IVVC Line Voltage Regulator Control Replacement	$0	$0	$0	$0	$0		$0		$0
25		$24,298,220	$46,652,097	$21,518,029	$3,017,219	$95,485,564	$14,607,463	$110,093,028	$20,908,340	$131,001,368

Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2025 Material	2025 Labor	2025 Indirects	2025 AFUDC	2025 Total Capital Additions	2025 Project O&M	2025 Capital & O&M Total	2025 Retirements	2025 Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)									
3	Capacitor Automation	$0	$0	$0	$0	$0		$0		$0
4	Circuit Sectionalization	[redacted]								
5	Circuit Segmentation									
6	Circuit Visibility & Control									
7	Declared Circuits									
8	Deteriorated Conductor									
9	General Switchgear									
10	GLT									
11	Inaccessible R/W									
12	Limited Access Road Crossing									
13	Recloser Replacement Program									
14	SMEI									
15	SOG - Circuit Connectivity									
16	SOG - Recloser									
17	Targeted Undergrounding (TUG)									
18	Underground Cable Rehabilitation									
19	IVVC									
20	IVVC Circuit Conditioning Capacitor									
21	IVVC Circuit Conditioning Reconductor									
22	IVVC Circuit Conditioning Regulator									
23	IVVC EOL Voltage Sensors									
24	IVVC Line Voltage Regulator Control Replacement									
25		$29,860,855	$51,516,720	$25,572,474	$3,263,092	$110,213,140	$16,120,247	$126,333,387	$23,268,851	$149,602,239

Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2026 Material	2026 Labor	2026 Indirects	2026 AFUDC	2026 Total Capital Additions	2026 Project O&M	2026 Capital & O&M Total	2026 Retirements	2026 Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)									
3	Capacitor Automation	$0	$0	$0	$0	$0		$0		$0
4	Circuit Sectionalization	[redacted]								
5	Circuit Segmentation									
6	Circuit Visibility & Control									
7	Declared Circuits									
8	Deteriorated Conductor									
9	General Switchgear									
10	GLT									
11	Inaccessible R/W									
12	Limited Access Road Crossing									
13	Recloser Replacement Program									
14	SMEI									
15	SOG - Circuit Connectivity									
16	SOG - Recloser									
17	Targeted Undergrounding (TUG)									
18	Underground Cable Rehabilitation									
19	IVVC									
20	IVVC Circuit Conditioning Capacitor	[redacted]								
21	IVVC Circuit Conditioning Reconductor									
22	IVVC Circuit Conditioning Regulator									
23	IVVC EOL Voltage Sensors									
24	IVVC Line Voltage Regulator Control Replacement									
25		$35,880,787	$52,952,231	$30,206,326	$3,971,934	$123,011,278	$17,754,669	$140,765,947	$27,579,670	$168,345,617

Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2027 Material	2027 Labor	2027 Indirects	2027 AFUDC	2027 Total Capital Additions	2027 Project O&M	2027 Capital & O&M Total	2027 Retirements	2027 Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)									
3	Capacitor Automation	$0	$0	$0	$0	$0		$0		$0
4	Circuit Sectionalization	[redacted]								
5	Circuit Segmentation									
6	Circuit Visibility & Control									
7	Declared Circuits									
8	Deteriorated Conductor									
9	General Switchgear									
10	GLT									
11	Inaccessible R/W	$0	$0	$0	$0	$0		$0		$0
12	Limited Access Road Crossing	[redacted]								
13	Recloser Replacement Program									
14	SMEI									
15	SOG - Circuit Connectivity									
16	SOG - Recloser									
17	Targeted Undergrounding (TUG)									
18	Underground Cable Rehabilitation									
19	IVVC									
20	IVVC Circuit Conditioning Capacitor									
21	IVVC Circuit Conditioning Reconductor									
22	IVVC Circuit Conditioning Regulator									
23	IVVC EOL Voltage Sensors									
24	IVVC Line Voltage Regulator Control Replacement									
25		$35,022,655	$58,135,166	$32,555,683	$4,261,529	$129,975,034	$19,513,025	$149,488,058	$32,130,399	$181,618,458

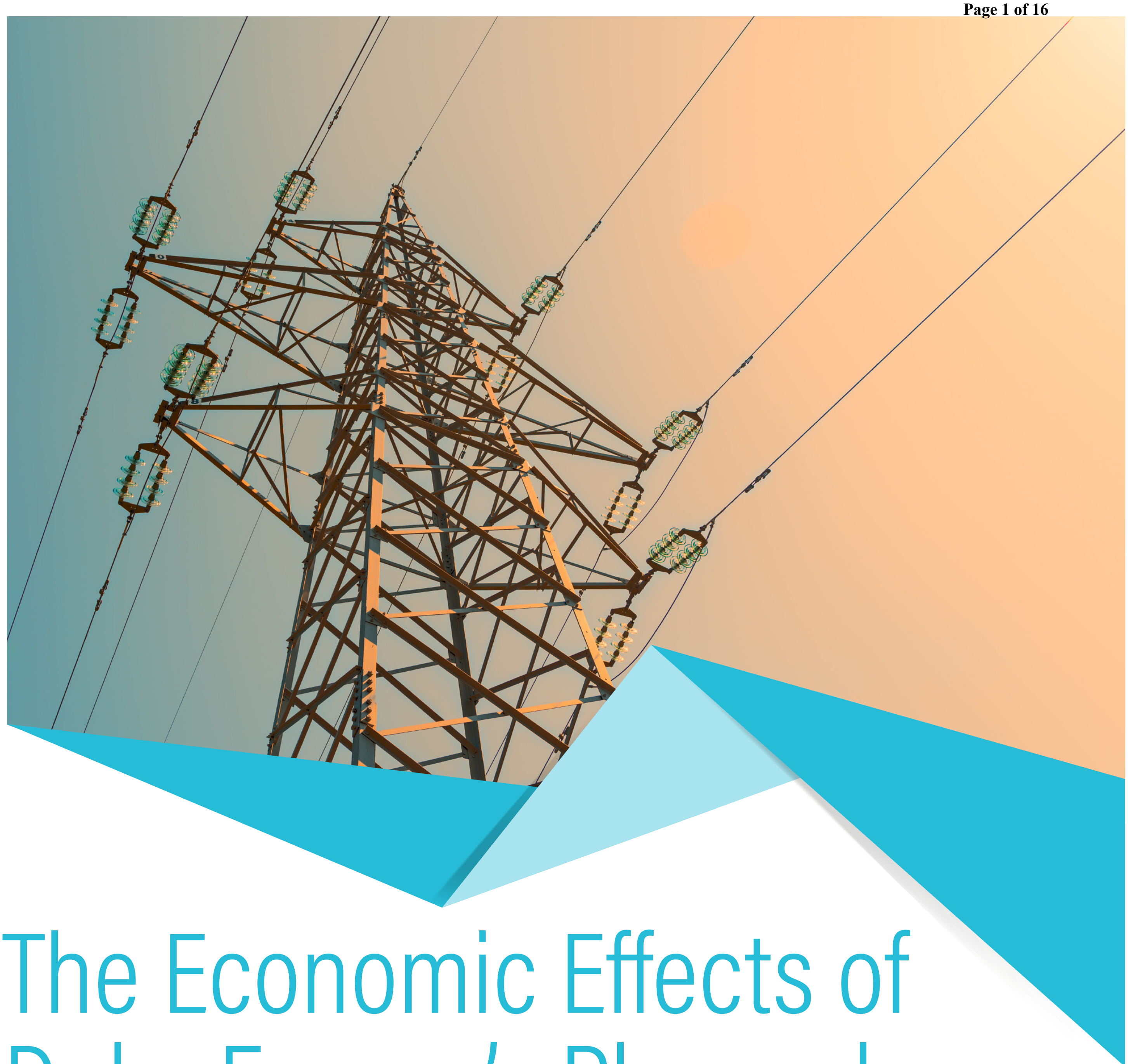
Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements

Line No.	Distribution Circuit Upgrade Projects	2028 Material	2028 Labor	2028 Indirects	2028 AFUDC	2028 Total Capital Additions	2028 Project O&M	2028 Capital & O&M Total	2028 Retirements	2028 Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)									
3	Capacitor Automation	$0	$0	$0	$0	$0		$0		$0
4	Circuit Sectionalization	[redacted]								
5	Circuit Segmentation									
6	Circuit Visibility & Control									
7	Declared Circuits									
8	Deteriorated Conductor									
9	General Switchgear									
10	GLT									
11	Inaccessible R/W									
12	Limited Access Road Crossing									
13	Recloser Replacement Program									
14	SMEI									
15	SOG - Circuit Connectivity									
16	SOG - Recloser									
17	Targeted Undergrounding (TUG)									
18	Underground Cable Rehabilitation									
19	IVVC									
20	IVVC Circuit Conditioning Capacitor									
21	IVVC Circuit Conditioning Reconductor									
22	IVVC Circuit Conditioning Regulator									
23	IVVC EOL Voltage Sensors									
24	IVVC Line Voltage Regulator Control Replacement									
25		$40,150,414	$63,168,349	$36,139,148	$4,729,110	$144,187,021	$21,464,276	$165,651,297	$35,573,960	$201,225,256

	Duke Energy Indiana - T & D Infrastructure Improvement Plan, Distribution System Capital Improvements									
Line No.	Distribution Circuit Upgrade Projects	6 Year Total Material	6 Year Total Labor	6 Year Total Indirects	6 Year Total AFUDC	6 Year Total Capital Additions	6 Year Total Project O&M	6 Year Total Capital & O&M Total	6 Year Total Retirements	6 Year Total Project
1	4kV Conversion	[redacted]								
2	Automated Lateral Device (ALD)									
3	Capacitor Automation									
4	Circuit Sectionalization									
5	Circuit Segmentation									
6	Circuit Visibility & Control									
7	Declared Circuits									
8	Deteriorated Conductor									
9	General Switchgear									
10	GLT									
11	Inaccessible R/W									
12	Limited Access Road Crossing									
13	Recloser Replacement Program									
14	SMEI									
15	SOG - Circuit Connectivity									
16	SOG - Recloser									
17	Targeted Undergrounding (TUG)									
18	Underground Cable Rehabilitation									
19	IVVC									
20	IVVC Circuit Conditioning Capacitor									
21	IVVC Circuit Conditioning Reconductor									
22	IVVC Circuit Conditioning Regulator									
23	IVVC EOL Voltage Sensors									
24	IVVC Line Voltage Regulator Control Replacement									
25		$186,031,040	$311,940,390	$165,796,073	$21,509,841	$685,277,343	$105,285,956	$790,563,299	$156,267,436	$946,830,735

PETITIONER'S EXHIBIT 2-C IS FILED SEPARATELY ON CD-ROM DUE TO SIZE

THE CD ROM IS AVAILABLE FOR VIEWING BY THE PUBLIC BY CONTACTING THE COMMISSION



The Economic Effects of Duke Energy's Planned Transmission and Distribution System Investments

KELLEY SCHOOL OF BUSINESS
INDIANA UNIVERSITY
Indiana Business Research Center

Prepared for
DUKE ENERGY®

The Economic Effects of Duke Energy's Planned Transmission and Distribution System Investments

November 2021

Prepared for
Duke Energy

By
Indiana Business Research Center,
Kelley School of Business, Indiana University

Table of Contents

Index of Figures

Index of Tables

Executive Summary

Duke Energy has prepared a plan to invest more than $1.7 billion over the next six years to upgrade the electric transmission and distribution (T&D) system throughout its Indiana service area. These investments are designed to modernize the T&D system and provide a more reliable, efficient, and safe service for Duke Energy customers. In addition to these core benefits, Duke Energy's investments will also have secondary effects by generating additional economic activity in the state.

To estimate the economic effects of this plan, Duke Energy partnered with the Indiana Business Research Center (IBRC) at Indiana University's Kelley School of Business to conduct an analysis of these activities and measure the economic ripple effects that this investment will generate both within Duke Energy's service area as well as throughout the state of Indiana.

The headline findings from this analysis show that Duke Energy's approximately $1.7 billion investment over this six-year period will support an estimated 1,270 jobs annually in Indiana worth $172.9 million in compensation (i.e., pay and benefits) per year (see **Table 1**). In terms of the broader economy, Duke Energy's activities will contribute an estimated average of $215.0 million to the state's gross domestic product (GDP) annually over the life of the plan. This increased economic activity will also generate roughly $4.3 million per year in state and local government revenues.

Over the duration of this project, Duke Energy's investments will contribute roughly $1.04 billion in compensation in Indiana and nearly $1.29 billion in GDP.

Table 1: Indiana—Average Annual Economic Contributions of Duke Energy T&D System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (FTE)	770	500	1,270	1.65
Employee Compensation (millions, 2021 $)	$148.3	$24.6	$172.9	1.17
GDP (millions, 2021 $)	$173.8	$41.2	$215.0	1.24
State and Local Tax Revenue (millions, 2021 $)			$4.3	

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

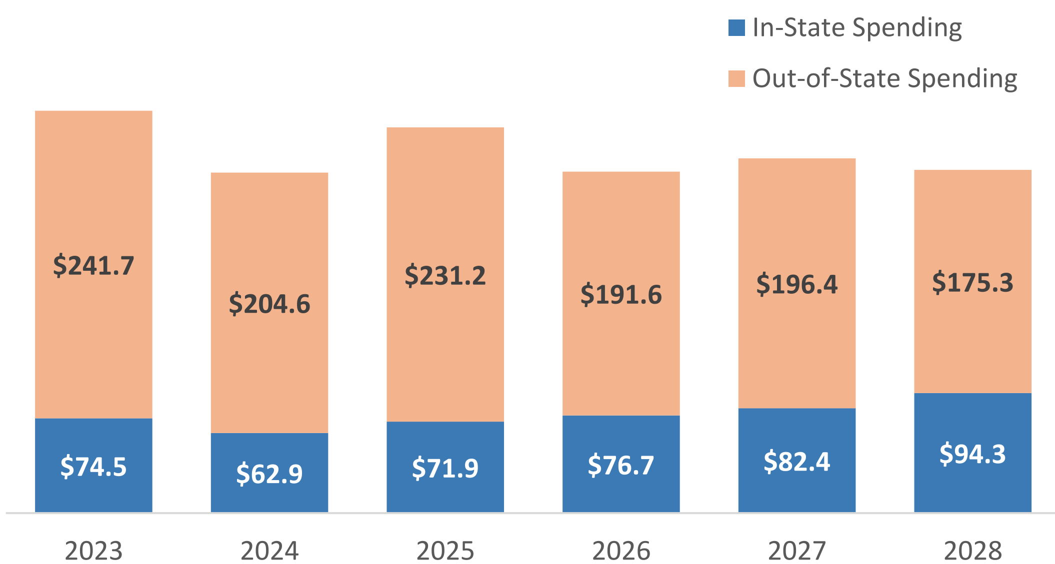
When we narrow our focus to Duke Energy's service area in Indiana, these average annual economic effects amount to a total of 1,040 jobs, approximately $159 million in compensation and more than $190 million in GDP.

The report that follows will provide more detail on these findings, as well as outline the methodology used to produce these estimates.

Estimates of Economic Effects

Figure 1 outlines Duke Energy's expected spending over the next six years to upgrade and modernize its electric T&D system in Indiana. Duke Energy plans to invest an average of $284 million per year over this period, with peak spending in 2023 when expenditures will reach $316 million. In all, Duke Energy's investment plan calls for slightly more than $1.7 billion in capital investment over this span.

Figure 1: Duke Energy's Projected Annual Spending for Electric Transmission and Distribution System Upgrades



Source: Duke Energy

Duke Energy's investments will take place throughout its Indiana service area, which covers 69 of the state's 92 counties (see **Figure 2**). As with any economic activity, some portion of supply-chain spending associated with Duke Energy's investments will leak outside of the local economy to contractors, manufacturers and service providers that are located elsewhere.

Given that upgrading and modernizing an electric T&D system requires a great deal of highly specialized equipment and material, as well as a specialized labor force, Duke Energy estimates that roughly 73 percent of its investment dollars—or $1.24 billion over the six-year period—will go to contractors and vendors outside of Indiana. Within the framework of economic impact analysis, this "non-local" spending is considered a leakage and much of it does not factor into the economic contributions of Duke Energy's investments discussed in this report.

One exception to this rule involves the spending of workers who reside outside of the region of analysis (whether it be Indiana or the Duke Energy service area). The compensation of these workers cannot be treated as new household income since most of their spending will occur back in their local communities. However, their income while working on these projects is not a total economic leakage since they will spend some their earnings in the local area when they are on the job. Therefore, the research team treats the economic activity generated by out-of-region workers as something akin to visitor spending for the purposes of this analysis (see the methodology for a detailed description).

Figure 2: Duke Energy Service Area in Indiana

In terms of local expenditures, Duke Energy expects to spend an average of $77.1 million per year in Indiana over the life of this plan. In the terminology of economic impact analysis, these local expenditures and the associated employment describe the "direct effects" of Duke Energy's investments on the local economy. The benefits of these investments do not end there, however. The additional economic activity generated by these direct effects—the supply chain purchases from other businesses in the area along with the household spending of workers engaged in these T&D system improvements—cascade throughout the local economy.

To estimate these so-called economic "ripple effects," the IBRC used the IMPLAN economic modeling software to conduct an input-output analysis for Duke Energy's investment plan. This widely used software relies on a variety of secondary data sources to build economic models that are tailored to reflect the unique industry mix of any given geographic area (the IBRC constructed separate models for the Duke Energy service area and Indiana for this study). The ripple effect estimates derived from this analysis combine with the direct effects to describe the full economic contributions of Duke Energy's investments.

It is important to point out that the findings presented in this report only describe the ways in which Duke Energy's investments will affect the state or regional economies. This analysis does not constitute a cost-benefit analysis or net economic impact statement that balances the economic effects presented here against any effects caused by potential rate increases.

Economic Effects of Duke Energy's Investments in Indiana

Of Duke Energy's $1.7 billion total investment, roughly $711.1 million will be dedicated to improvements in its transmission system while the remaining $992.4 million will go towards upgrading its distribution infrastructure. The following tables will show the estimated economic effects in Indiana of each of these components, as well as for the project as a whole.

Economic Effects of Transmission System Investments

The spending associated with the transmission system improvements will support an estimated 370 direct jobs per year in the state over the life of the project. Along with these direct employment effects, this increased economic activity will support an additional 220 local ripple effect jobs per year resulting from supply chain purchases and the household spending associated with these direct jobs (see **Table 2**). This brings the full employment footprint of Duke Energy's planned transmission system investments to an estimated 590 jobs per year on average between 2023 and 2028. This total employment impact will combine to produce an estimated $81.4 million annually in total compensation.

A helpful way to interpret these impacts is to look at the multipliers. The ratio of direct jobs to total jobs, for instance, gives a ratio of 1.59, meaning that every job directly tied to these transmission system improvements support another 0.59 jobs with other employers in the area (or every 10 direct jobs support nearly 6 additional jobs elsewhere in the state). The compensation multiplier of 1.14 suggests that every dollar of direct payroll generates an additional $0.14 in compensation with other local employers.

In terms of total economic activity, the effect of these transmission system investments will combine to contribute an estimated $100.5 million per year to the state's gross domestic product (GDP) over the six-year period. The multiplier of 1.20 indicates that every dollar of GDP directly generated by these investments will trigger an additional $0.20 in economic activity in the state.

Duke Energy's transmission system investments will also generate state and local government revenues. The IMPLAN model estimates the tax revenues from business profits, indirect business taxes (e.g., sales, property and excise taxes), personal taxes (e.g., income and property taxes), and employer and employee contributions to social insurance. Fueled primarily by sales and property taxes, this economic activity will generate an estimated $1.8 million per year in state and local government revenue.

Table 2: Indiana—Average Annual Economic Contributions of Duke Energy's Transmission System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment	370	220	590	1.59
Compensation (millions, 2021 $)	$71.4	$10.0	$81.4	1.14
GDP (millions, 2021 $)	$83.6	$16.9	$100.5	1.20
State and Local Tax Revenue (millions, 2021 $)	—	—	$1.8	—

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Economic Effects of Distribution System Investments

Switching our view to Duke Energy's planned distribution system upgrades, the spending tied to these activities will create an average of 400 direct jobs per year over the course of the project while also supporting an additional 280 ripple effect jobs annually, which brings the full employment effect to a total of 680 jobs per year (see **Table 3**). Furthermore, the average annual GDP impact of these investments will be an estimated $114.5 million.

Table 3: Indiana—Average Annual Economic Contributions of Duke Energy's Distribution System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment	400	280	680	1.70
Compensation (millions, 2021 $)	$76.9	$14.5	$91.5	1.19
GDP (millions, 2021 $)	$90.2	$24.3	$114.5	1.27
State and Local Tax Revenue (millions, 2021 $)			$3.4	

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Total Effects of Duke Energy's Transmission and Distribution System Investments

Looking at Duke Energy's T&D system investments as a whole, the average annual total employment effect in Indiana rises to 1,270 jobs worth nearly $173 million in compensation per year (see **Table 4**). The employment multiplier of 1.65 indicates that every 10 jobs directly created by Duke Energy's investments support nearly seven additional jobs in the state. This activity will also contribute an average of $215 million per year to the state's GDP

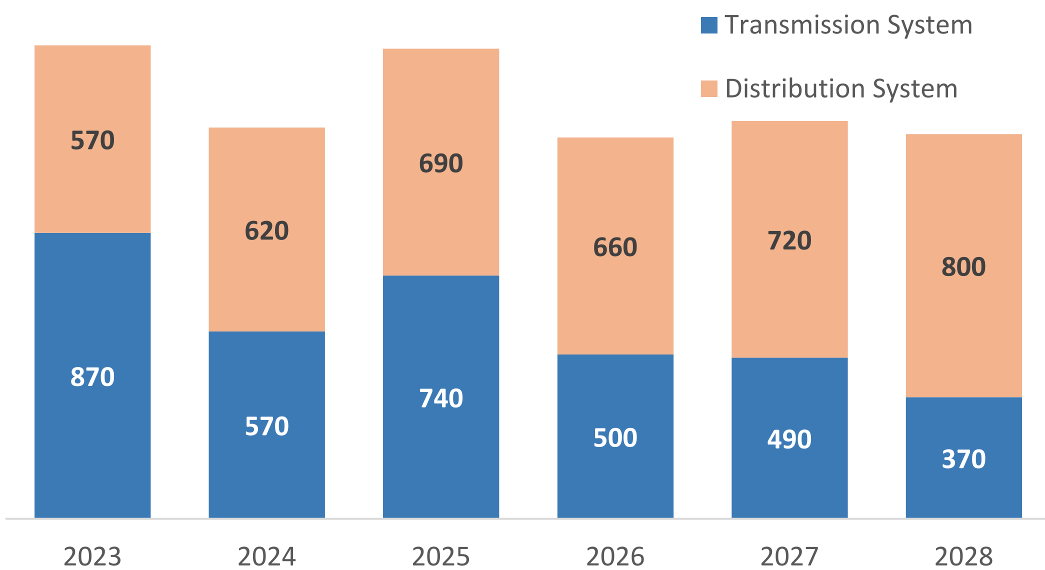
Table 4: Indiana—Average Annual Economic Contributions of Duke Energy's Total T&D System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (FTE)	770	500	1,270	1.65
Employee Compensation (millions, 2021 $)	$148.3	$24.6	$172.9	1.17
GDP (millions, 2021 $)	$173.8	$41.2	$215.0	1.24
State and Local Tax Revenue (millions, 2021 $)			$4.3	

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

On a year-by-year basis, the largest economic effects will be seen right out of the gate with a total employment footprint estimated at 1,440 jobs in the state in 2023 (see **Figure 3**). The employment effect in 2025 will be nearly as large with an estimated total of 1,430 jobs. The employment effects will be slightly smaller in the second half of the project timeline.

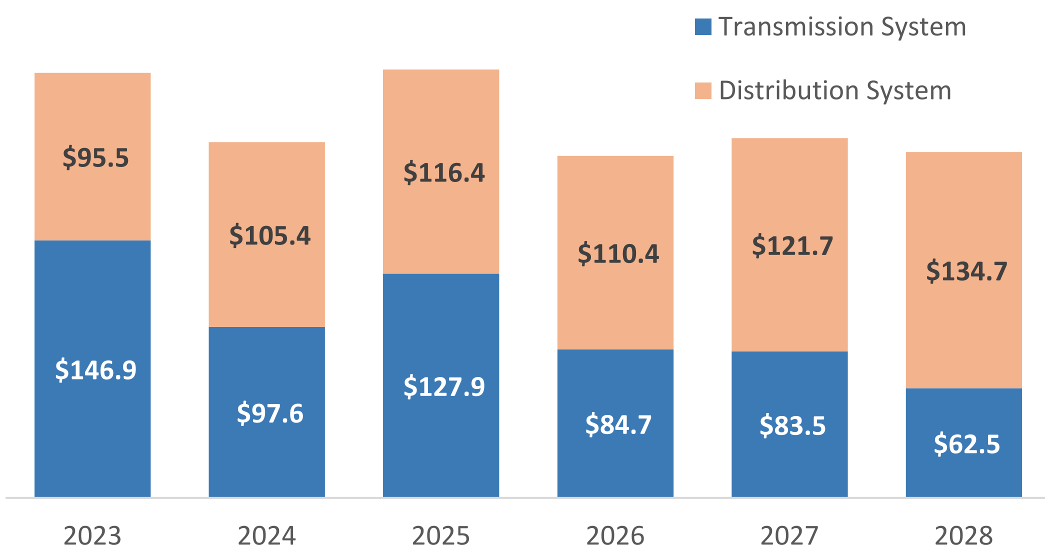
Figure 3: Indiana—Annual Total Employment Effects of Duke Energy Spending by Investment Type



Note: Total effects are the sum of direct effects and ripple effects
Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

GDP effects in the state will follow a similar path with the largest contributions seen in 2023 and 2025 (see **Figure 4**). All told, Duke Energy's investments will generate an estimated total of $1.29 billion in GDP in Indiana over the life of the project.

Figure 4: Indiana—Annual Total GDP Effects of Duke Energy Spending by Investment Type



Note: Total effects are the sum of direct effects and ripple effects
Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Economic Effects of Investment Plan in Duke Energy's Service Area

All numbers presented to this point reflect the estimated economic effects of Duke Energy's investments on the entire state of Indiana. As referenced in **Figure 2**, however, Duke Energy's service area covers 69 of the state's 92 counties, and all the work associated with this investment plan will occur in that service area. The following tables and graphics will highlight the economic effects of these investments in this service area alone.

Note that because these investments will engage contractors and vendors that are based in Indiana but outside of the Duke Energy service area, the economic ripple effects for the state are always greater than the ripple effects in the smaller service area. Also note that the following effects are a subset of the statewide effects and are not to be added to the numbers for Indiana.

Economic Effects of Transmission System Investments

With employment ripple effects estimated at 130 jobs, Duke Energy's planned transmission system investments will have a total employment effect of 500 jobs per year on average in its service area (see **Table 5**). Furthermore, these investments will generate an annual average of nearly $76 million in employee compensation and more than $90 million in GDP over the life of the project.

Table 5: Duke Energy Service Area—Average Annual Economic Contributions of Duke Energy's Transmission System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (FTE)	370	130	500	1.35
Compensation (millions, 2021 $)	$71.4	$4.6	$75.9	1.06
GDP (millions, 2021 $)	$82.2	$8.2	$90.4	1.10
State and Local Tax Revenue (millions, 2021 $)	—	—	$1.0	—

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Economic Effects of Distribution System Investments

Regarding Duke Energy's planned distribution system upgrades, the spending tied to these activities will create an average of 540 jobs per year in its service area between 2023 and 2028 (see **Table 6**). Furthermore, the average annual GDP impact of these investments will be nearly $100 million.

Table 6: Duke Energy Service Area—Average Annual Economic Contributions of Duke Energy's Distribution System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment	400	140	540	1.35
Compensation (millions, 2021 $)	$76.9	$6.3	$83.3	1.08
GDP (millions, 2021 $)	$88.6	$11.0	$99.6	1.12
State and Local Tax Revenue (millions, 2021 $)			$1.4	

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Total Effects of Duke Energy's Transmission and Distribution System Investments

All told, Duke Energy's T&D system investments will have an estimated average annual employment effect in this region of approximately 1,040 jobs per year along with nearly $159 million in compensation per year (see **Table 7**). The employment multiplier of 1.35 indicates that every 10 jobs directly created by Duke Energy's investments will support 3.5 additional jobs in the region. This activity will also contribute an average of $190 million per year to the region's GDP.

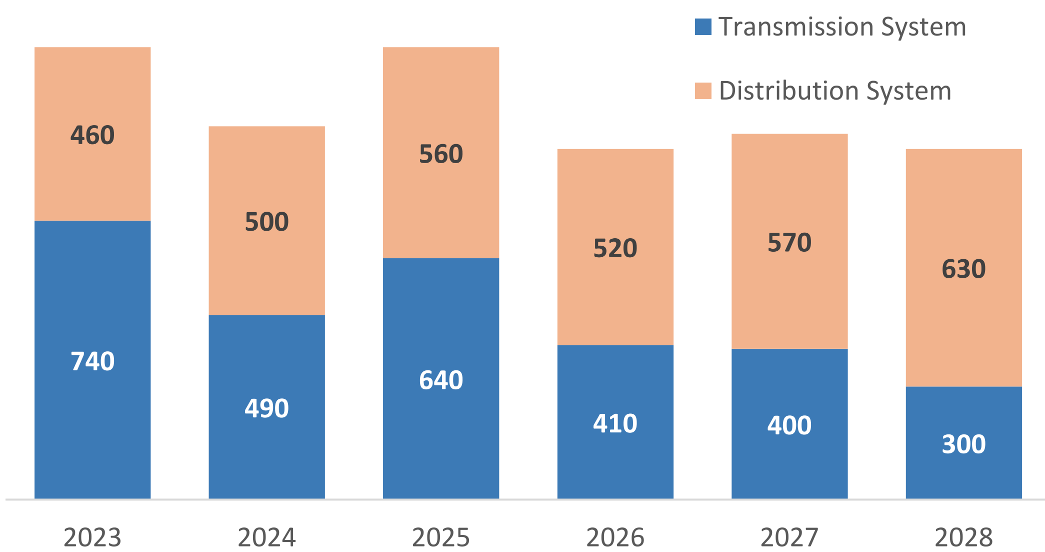
Table 7: Duke Energy Service Area—Average Annual Economic Contributions of Duke Energy's Total T&D System Investments, 2023 to 2028

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Employment (FTE)	770	270	1,040	1.35
Employee Compensation (millions, 2021 $)	$148.3	$10.9	$159.2	1.07
GDP (millions, 2021 $)	$170.8	$19.2	$190.0	1.11
State and Local Tax Revenue (millions, 2021 $)			$2.4	

Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Figure 5 highlights the total estimated employment effects in the service area for each year of the investment plan. The peak employment effect will be in 2023 and 2025 at an estimated 1,200 jobs in the region while 2026 and 2028 represents the lows at 930 jobs.

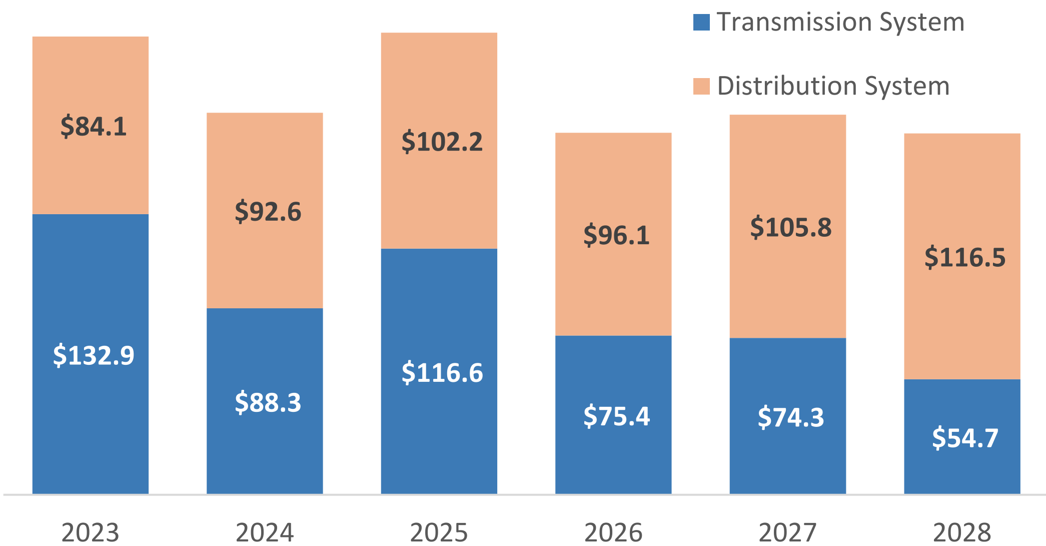
Figure 5: Duke Energy Service Area—Annual Total Employment Effects of Duke Energy Spending by Investment Type



Note: Total effects are the sum of direct effects and ripple effects
Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

The total GDP effects in the region will range from roughly $219 million in 2025 to $171 million in 2026 and 2028 (see **Figure 6**). In all, Duke Energy's investments will generate an estimated total of $1.14 billion in GDP in its service area over the life of the project.

Figure 6: Duke Energy Service Area—Annual Total GDP Effects of Duke Energy Spending by Investment Type



Note: Total effects are the sum of direct effects and ripple effects
Source: IBRC, using data from Duke Energy and the IMPLAN economic modeling software

Appendix

Methodology and Assumptions

Duke Energy provided the research team with estimated annual expenditures for the years 2023 through 2028. For each category of spending, Duke Energy provided detail on the share of the total spending that will be dedicated to equipment and materials, services, and labor. Duke Energy also provided the research team with assumptions on the geographic location of vendors and contractors. This type of detail helps to improve the accuracy of these estimates. For instance, if Duke Energy knows that some of the equipment and materials they will purchase for this project will be supplied by out of state vendors, then researchers can treat this spending as an economic leakage from the geographic area of analysis, and therefore not include it in the estimates of economic effects. This same approach is applied to the compensation earned by the labor that Duke Energy expects to engage in this project. For the share of the labor force on this project that is expected to reside in the region of analysis, researchers modeled this amount of compensation as typical household income since workers who live in the region will spend most of their earnings locally.

The spending of workers from outside the region, however, is more akin to visitor spending. Workers who live in Indiana but outside of a Duke Energy service area may commute to the work site on a daily basis but only purchase lunch and gasoline in the region (for these workers, the estimated effects of their typical household spending are captured in the statewide numbers but not in the figures for the service area). Out-of-state workers may stay in a local motel and will spend more on food and other purchases. However, most of their income is a considered a leakage since it will be spent in another state.

For out-of-region workers, the research team estimated the average annual number of person-days they will spend in the region of analysis. To these person-day totals, the research team applied the daily dollar amounts for purchases that are listed below. Researchers assumed that workers who lived in Indiana but outside of the relevant region of analysis did not spend any money on lodging and spent half of all other listed dollar amounts in the relevant region on a daily basis.

- Lodging - $48/day
- Restaurants - $25.27/day
- Food Stores - $25.27/day
- General Merchandise Stores - $4.23/day
- Gas Stations - $4.23/day

Researchers derived these spending amounts by reviewing lodging rates and the U.S. General Services Administration's per diem rates for Indiana.

Key Terms

Direct Effects: Refers to the increase in final demand or employment in a given area that can be attributed specifically to Duke Energy's investment plan.

Ripple Effects: A combination of the indirect and induced effects generated by the direct effects. Indirect effects measure the change in dollars or employment caused when Duke Energy increases its purchase of goods and services from suppliers and, in turn, those suppliers purchase more inputs and so on throughout the economy. Induced effects reflect the changes—whether in dollars or employment— that result from the household spending of direct workers, along with the employees in the supply chain.

Total Effects: The total of all economic effects is the sum of the direct and ripple effects. The IMPLAN model also tracks the tax effects associated with all the transactions and economic activity associated with the direct and ripple effects. For example, household spending at retailers generates state sales tax. In addition, those retailers also pay property taxes to local governments. As a result, this analysis was also able to estimate the state and local government tax flows.

Multiplier: The multiplier is the magnitude of the economic response in a particular geographic area associated with a change in the direct effects. The multiplier equals the total effect divided by the direct effect.

GDP: Also known as value added, GDP is a measure of the economic activity generated by a company, industry, state, nation, etc. GDP is the difference between total output (i.e., sales) and the cost of production inputs. GDP consists of four components: employee compensation, proprietor income, other property income and indirect business tax.

About IMPLAN Economic Modeling Software

IMPLAN is built on a mathematical input-output (I-O) model that expresses relationships between sectors of the economy in a chosen geographic location. In expressing the flow of dollars through a regional economy, the input-output model assumes fixed relationships between producers and their suppliers based on demand. It also omits any dollars spent outside of the regional economy—say, by producers who import raw goods from another area, or by employees who commute and do their household spending elsewhere.

The idea behind input-output modeling is that the inter-industry relationships within a region largely determine how that economy will respond to economic changes. In an I-O model, the increase in demand for a certain product or service causes a multiplier effect, layers of effect that come in a chain reaction. Increased demand for a product affects the producer of the product, the producer's employees, the producer's suppliers, the supplier's employees, and so on—ultimately generating a total effect in the economy that is greater than the initial change in demand. For instance, say demand for Andersen Windows' wood window products increases. Sales grow, so Andersen has to hire more people, and the company may buy more from local vendors, and those vendors in turn have to hire more people … who in turn buy more groceries. The ratio of that overall effect to the initial change is called a regional multiplier and can be expressed like this:

(Direct Effect + Indirect Effects + Induced Effects) / (Direct Effect) = Multiplier

Multipliers are industry- and region-specific. Each industry has a unique output multiplier, because each industry has a different pattern of purchases from firms inside and outside of the regional economy. (The output multiplier is in turn used to calculate income and employment multipliers.)

Estimating a multiplier is not the end goal of IMPLAN users. Most wish to estimate other numbers and get answers to questions such as: How many jobs will this new firm produce? How much will the local economy be affected by this plant closing? What will the effects be of an increase in product demand? Based on those user choices, IMPLAN software constructs "social accounts" to measure the flow of dollars from purchasers to producers within the region. The data in those social accounts will set up the precise equations needed to finally answer those questions users have—about the impact of a new company, a plant closing or greater product demand—and yield the answers.

IMPLAN constructs its input-output model using aggregated production, employment and trade data from local, regional and national sources, such as the U.S. Census Bureau's annual *County Business Patterns* report and the U.S. Bureau of Labor Statistics' annual report called *Covered Employment and Wages*. In addition to gathering enormous amounts of data from government sources, the company also estimates some data where they haven't been reported at the level of detail needed (county-level production data, for instance), or where detail is omitted in government reports to protect the confidentiality of individual companies whose data would be easily recognized due to a sparse population of businesses in the area.

The IBRC's analysts have attended advanced training in the use of the IMPLAN modeling software. The estimates that the IBRC analysts generate are scrutinized closely to ensure that they are accurate and reflect the most trustworthy application of the modeling software. In all instances, the most conservative estimation assumptions and procedures are used to produce the IMPLAN results.

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: ______________________________ Dated: November 23, 2021
Jeremy K. Lewis