Cause No. 46038

On Behalf of Petitioner,
DUKE ENERGY INDIANA, LLC

VERIFIED DIRECT TESTIMONY OF
TIMOTHY A. ABBOTT

Petitioner's Exhibit 22

April 4, 2024

DIRECT TESTIMONY OF TIMOTHY A. ABBOTT
GENERAL MANAGER OF SYSTEM OPERATIONS
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 Timothy A. Abbott, and my business address is 8650 SW Parkway Harrison, Ohio.

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

A. I am employed as General Manager of System Operations by Duke Energy Business Services LLC, a service company subsidiary of Duke Energy Corporation ("Duke Energy"), and a non-utility affiliate of Duke Energy Indiana, LLC ("Duke Energy Indiana" or "Company").

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS GENERAL MANAGER OF SYSTEM OPERATIONS.

A. My primary responsibility as General Manager of System Operations is to provide leadership for the Transmission Control Centers of Duke Energy Indiana and Duke Energy Ohio/Kentucky.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I have a Bachelor of Science Degree from Miami University. I have over 33 years of experience with Duke Energy in a variety of roles of varying responsibility. I have spent the last 26 years in System Operations serving in various capacities related to control room operations, North American Electric Reliability Corporation ("NERC") Compliance, Regional Transmission Operator policy and governance, Tariff Administration, and Energy Accounting.

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

A. The purpose of this testimony is to describe the various aspects of the Duke Energy Indiana transmission system, including planning, operating, reliability, and the prudency of the related costs. I also describe and support the transmission capital and operations and maintenance ("O&M") expenditures reflected in the Forward-Looking Test Period.

II. DUKE ENERGY INDIANA'S TRANSMISSION SYSTEM

Q. PLEASE DESCRIBE DUKE ENERGY INDIANA'S TRANSMISSION SYSTEM.

A. Duke Energy Indiana's transmission system is jointly owned with Wabash Valley Power Alliance and Indiana Municipal Power Agency. It consists of 727 circuit miles of 345 kV, 654 circuit miles of 230 kV, 1,393 circuit miles of 138 kV, and 2,502 circuit miles of 69 kV owned by Duke Energy Indiana. The transmission system also consists of 481 substations owned by Duke Energy Indiana, which are interconnected with a variety of transmission and distribution circuits. The transmission system, particularly at voltages greater than 100 kV, acts to transfer power from sources to loads, including the distribution system. The Duke Energy

Indiana transmission system is under the functional control of the Midcontinent Independent System Operator, Inc. ("MISO"), and is part of the interconnected transmission system that safely, efficiently, and reliably transports power to customers in the Eastern United States.

Q. PLEASE EXPLAIN HOW THE TRANSMISSION SYSTEM HAS CHANGED SINCE DUKE ENERGY INDIANA'S LAST BASE RATE CASE.

A. Duke Energy Indiana continually seeks to improve the system to ensure adequate system voltage and capacity, based on projected system loading and contingency requirements related to providing safe and reliable service to our customers. Since 2018, the transmission system has improved through upgrades to 212 circuit breakers, 11 substation power transformers, more than 700 switches and circuit switchers, and the replacement of nearly 4,000 wood poles with steel as part of the Ground Line Treatment ("GLT"), line rebuilds, and switch pole replacement program.[1]

Q. PLEASE EXPLAIN HOW DUKE ENERGY INDIANA'S TRANSMISSION SYSTEM IS INTERCONNECTED WITH THE TRANSMISSION SYSTEM OF OTHER ELECTRIC UTILITIES.

A. Duke Energy Indiana's transmission system has a significant number of interconnections, with Ameren, CenterPoint Energy, AEP, LGE Energy, Hoosier Energy, NiSource, Duke Energy Ohio, and AES Indiana. These interconnections

[1] Upgrade counts exclusive to the TDSIC program and do not include upgrades performed as part of Transmission Planning and Emergency (non-planned) projects.

allow for the free flow of energy across the system, and contribute to the stability of all interconnected systems.

Q. PLEASE DESCRIBE THE OVERALL CONDITION OF DUKE ENERGY INDIANA'S TRANSMISSION PLANT.

A. The Duke Energy Indiana transmission system is comprised of a wide variety of equipment of varying vintage, as would be expected of a utility that is over 100 years old. Duke Energy Indiana maintains the transmission system utilizing good utility practice. The system operates as designed, and provides safe, reliable, and efficient service for the connected customers, including the various distribution systems. Considerable capital has been invested, and is continuing to be invested, into the transmission system as set forth in the Company's Transmission, Distribution, and Storage System Improvement Charge ("TDSIC") plans, which were approved by the Indiana Utility Regulatory Commission (the "Commission") in Cause No. 44720 ("TDSIC Plan") and Cause No. 45647 ("TDSIC 2.0 Plan").[2] These improvements consist of investments such as new substation equipment, rebuilt lines, and steel poles.

III. MISO

Q. WHAT IS MISO?

A. MISO is a Regional Transmission Organization, and Market Operator, that has functional control of Duke Energy Indiana's Bulk Electric System via the MISO

[2] The Office of Utility Consumer Counselor filed a notice of appeal in Cause No. 45647 with the Indiana Court of Appeals on July 15, 2022. On March 9, 2023, the Court of Appeals affirmed the Indiana Utility Regulatory Commission's approval of Duke Energy Indiana's TDSIC Plan in *Indiana Off. of Util. Consumer Couns. v. Duke Energy Indiana, LLC*, 205 N.E.3d 1026 (Ind. Ct. App.). The Indiana Supreme Court granted transfer on June 22, 2023 and the case is currently awaiting final decision at the Indiana Supreme Court.

Open Access Transmission Tariff.

Q. HOW DOES DUKE ENERGY INDIANA PARTICIPATE IN MISO?

A. Duke Energy Indiana is a Transmission Owner and market participant in MISO. Duke Energy Indiana has transferred functional control of its Bulk Electric facilities to MISO. Duke Energy Indiana is also a Generation Owner and Operator, and a Market Participant, and has load connected to the MISO system.

Q. DOES DUKE ENERGY INDIANA RECEIVE CHARGES FOR MISO PARTICIPATION? IF SO, PLEASE EXPLAIN.

A. Yes. Duke Energy Indiana is charged administrative fees for participating in MISO.

Q. DOES DUKE ENERGY INDIANA RECEIVE REVENUES FOR ITS MISO PARTICIPATION? IF SO, PLEASE EXPLAIN.

A. Yes. Duke Energy Indiana receives revenue associated with the use of the Duke Energy Indiana transmission system by other companies. The revenues are based on MISO tariffed rates, as approved by the Federal Energy Regulatory Commission (“FERC”).

Q. HOW IS DUKE ENERGY INDIANA’S TRANSMISSION SYSTEM PLANNED AND OPERATED?

A. Duke Energy Indiana is a transmission owning member of MISO. MISO is largely responsible for planning the Duke Energy Indiana transmission system using processes that are compliant with FERC Order 890. As a matter of compliance with FERC Order 890, Duke Energy Indiana participates in MISO stakeholder forums that provide transparency and facilitate customer feedback as a normal part of planning. Duke Energy Indiana also provides for stakeholder feedback in the development of supplemental projects (*i.e.* those not assigned by MISO), such as those being undertaken as part of the Company's TDSIC Plan.

Duke Energy Indiana, in conjunction with MISO, operates the transmission system in accordance with NERC Reliability Standards and requirements, and good utility practice. This allows us to provide all customers with safe, efficient, and reliable service.

Q. DOES DUKE ENERGY INDIANA CURRENTLY TRACK FOR RECOVERY FROM ITS RETAIL ELECTRIC CUSTOMERS CERTAIN COSTS AND TRANSMISSION REVENUES RELATED TO MISO?

A. Yes. These costs are tracked through Standard Contract Rider No. 68 ("RTO Rider"). Adjustments under the RTO Rider are made on an annual basis in Cause No. 42736.

Q. WHAT COSTS ARE RECOVERED THROUGH THE RTO RIDER?

A. Costs collected through the RTO Rider generally include MISO management costs, certain MISO transmission revenues, and other RTO related costs.

IV. FIVE PILLARS

Q. PLEASE DESCRIBE WHICH OF THE FIVE PILLARS DESCRIBED IN WITNESS PINEGAR'S TESTIMONY ARE MOST AFFECTED BY TRANSMISSION INVESTMENTS INCLUDED IN THIS PROCEEDING?

A. Electric system **reliability** is the adequacy and operational reliability of electric utility service. The first concept, adequacy, includes the ability of the electric system to supply electrical demand and energy requirements of its end users, taking into account scheduled and reasonably expected unscheduled outages. The second concept, operational reliability, is the electric system's ability to withstand sudden disturbances, such as electric short circuits or unanticipated loss of system components.

Electric system **resiliency** describes the ability of a system or its components to adapt to changing conditions, withstand disruptions and off-nominal events, and rapidly recover.

Stability encompasses the ability of the electric system or its components to maintain a state of equilibrium during normal or abnormal conditions or disturbances.

As described in my testimony, the TDSIC and non-TDSIC investments the Company is making directly contribute to the reliability, resiliency, and stability of Duke Energy Indiana's transmission system. The investments that Duke Energy Indiana is making as part of its TDSIC 2.0 Plan not only evaluate risk but further extend a cost-to-benefit proposition for each investment emphasizing reliability prioritization, hardening and resiliency improvements, stability and enablement of distributed energy.

Non-TDSIC investments are more reactive, and they support mainly emergent equipment conditions, customer load growth and expansion, outage restoration, vegetation management, and system modifications and highway projects.

V. RELIABILITY

Q. PLEASE GENERALLY DESCRIBE YOUR UNDERSTANDING OF THE RELIABILITY OF DUKE ENERGY INDIANA'S TRANSMISSION SYSTEM IN SERVING ITS RETAIL ELECTRIC CUSTOMERS.

A. Duke Energy Indiana's transmission system is reliable. The highest voltages (138 kV and above) would be best described as very reliable, while the 69 kV system has had more challenges from a reliability standpoint. We are addressing those challenges through the TDSIC Plan reliability work, as described earlier in my testimony, replacing assets to harden the system as well as reduce outages when they occur. The Brownstown Switching Station Reliability Upgrade project, for example, rebuilt the existing 4-switch deteriorated wood structure switching station, located near Brownstown IN, with a 4-breaker ring bus in addition to rebuilding a long section of 69kV line from 1 circuit to 4. Through line and substation upgrades such as this one, we have seen reductions in customer impacts from sustained outages.

Q. WHAT ARE THE PRIMARY CAUSES OF TRANSMISSION OUTAGES IN DUKE ENERGY INDIANA'S SERVICE TERRITORY?

A. Over the last four years, the three major causes of outages have been equipment failure, wildlife, and vegetation related outages. For example, in 2023, 46.99% of all transmission outages were related to equipment failure and 16.87% to wildlife.

Table 1:

Outage Cause	% of Total Number of Outages Excluding Planned Outages & MEDs			
	2020	**2021**	**2022**	**2023**
Vegetation	16.14%	17.12%	14.04%	15.06%
Wildlife	19.89%	10.16%	18.10%	16.87%
Public Accident/Damage	6.99%	5.35%	8.14%	6.02%
Unknown Cause	6.99%	11.76%	9.50%	4.22%
Lightning Strike	0.54%	1.60%	1.81%	3.61%
Equipment Failure	39.78%	41.18%	38.46%	46.99%
Other Cause	8.06%	10.16%	9.50%	7.23%
Weather	1.61%	2.67%	0.45%	0.00%

Q. WHAT IS DUKE ENERGY INDIANA'S MAIN GOAL FOR ITS TRANSMISSION SYSTEM?

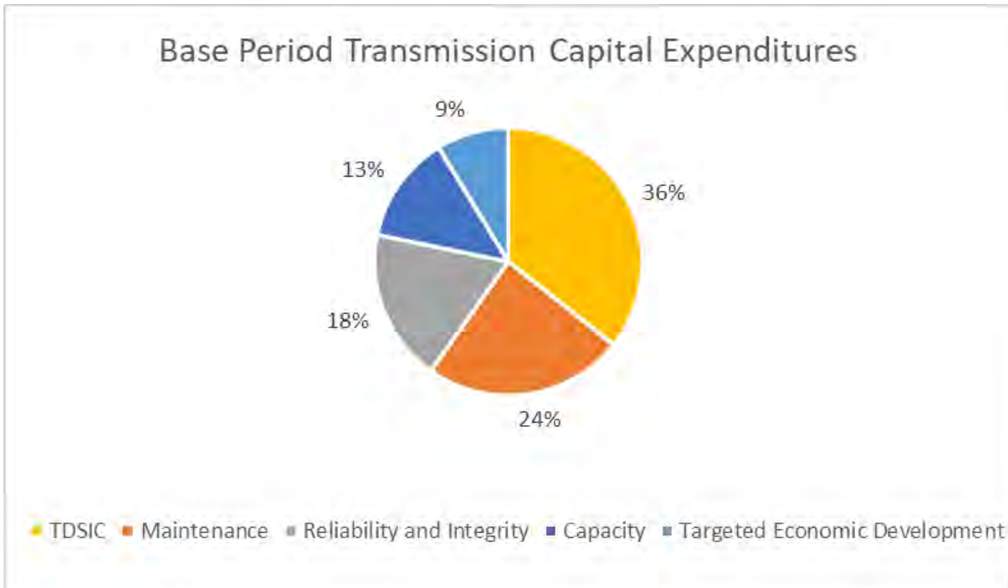
A. The main goal of Duke Energy Indiana's transmission system is to provide safe, efficient, and reliable power to satisfy our customers' needs.

VI. TRANSMISSION EXPENDITURES

Q. WHAT WERE THE TOTAL AMOUNTS OF TRANSMISSION O&M EXPENSE AND CAPITAL EXPENDITURES AS OF THE 12 MONTHS ENDED AUGUST 31, 2023 (THE "BASE PERIOD")?

A. Total transmission Operations and Maintenance ("O&M") expenditures for the Base Period were approximately $93 million. Total capital expenditures in the transmission system totaled approximately $177 million for the Base Period. The figure below and Attachment 22-A (TAA) Transmission Capital Expenditures 2023-2025, provide a breakdown of Duke Energy Indiana's transmission related capital expenditures for the Base Period.

<u>Chart 1</u>:

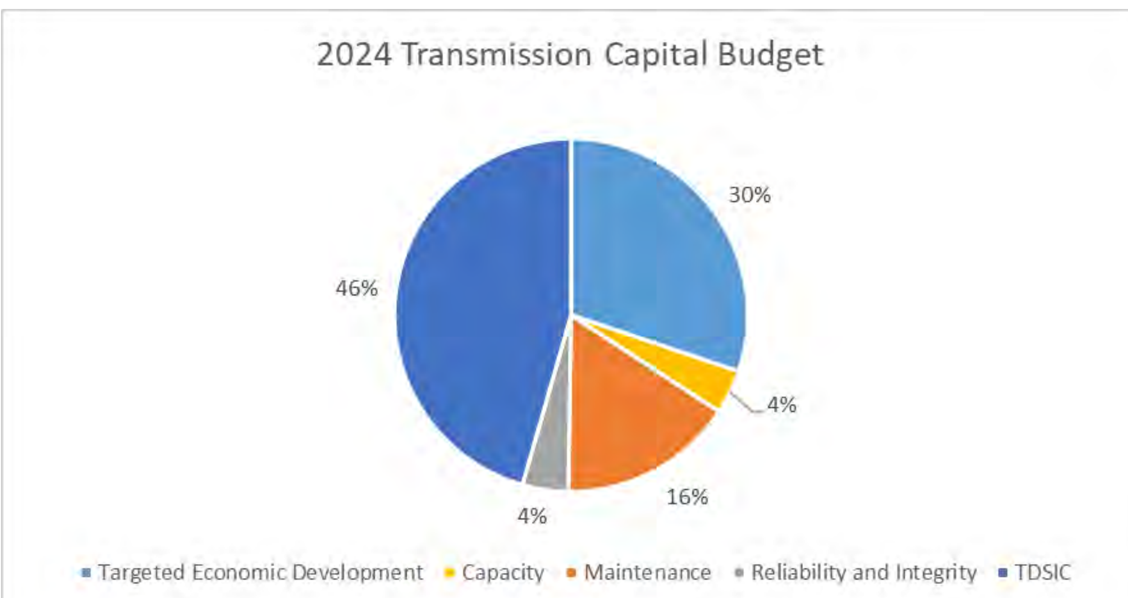


In the transmission system, approximately 36% of investment was driven by the TDSIC program, which consists of transmission substation and transmission line improvements. Examples of this investment include the replacement of deteriorated wood poles and replacement of obsolete substation and line equipment. Approximately 24% of investment was driven by Maintenance projects. Examples of this type of investment include Vegetation Management, Reactive Asset Replacements, and Storm Restoration. Approximately 18% of investment was driven by reliability improvement programs (excluding TDSIC). Examples of this type of investment include system reliability work to replace obsolete substation and line equipment that are not part of TDSIC. Approximately 13% of investment was driven by capacity requirements to serve load and to meet the NERC Planning Standards. Approximately 9% of investment was driven by Targeted Economic Development ("TED") to support local and economic development efforts. I will discuss these individual categories of investment and the projects that make up each category in greater detail later in my testimony.

Q. WHAT IS DUKE ENERGY INDIANA'S FORECASTED AMOUNT OF TRANSMISSION O&M EXPENSE AND CAPITAL EXPENDITURES IN 2024?

A. Duke Energy Indiana forecasts approximately $105 million in O&M transmission expense in 2024. Total capital investment in the transmission system is projected at approximately $244 million in 2024. The figure below and Attachment 22-A (TAA) Transmission Capital Expenditures 2023-2025, provide a breakdown of Duke Energy Indiana's 2024 transmission related capital expenditures.

<u>Chart 2</u>:



Approximately 46% of investment is driven by the TDSIC program, which consists of transmission substation and transmission line improvements.

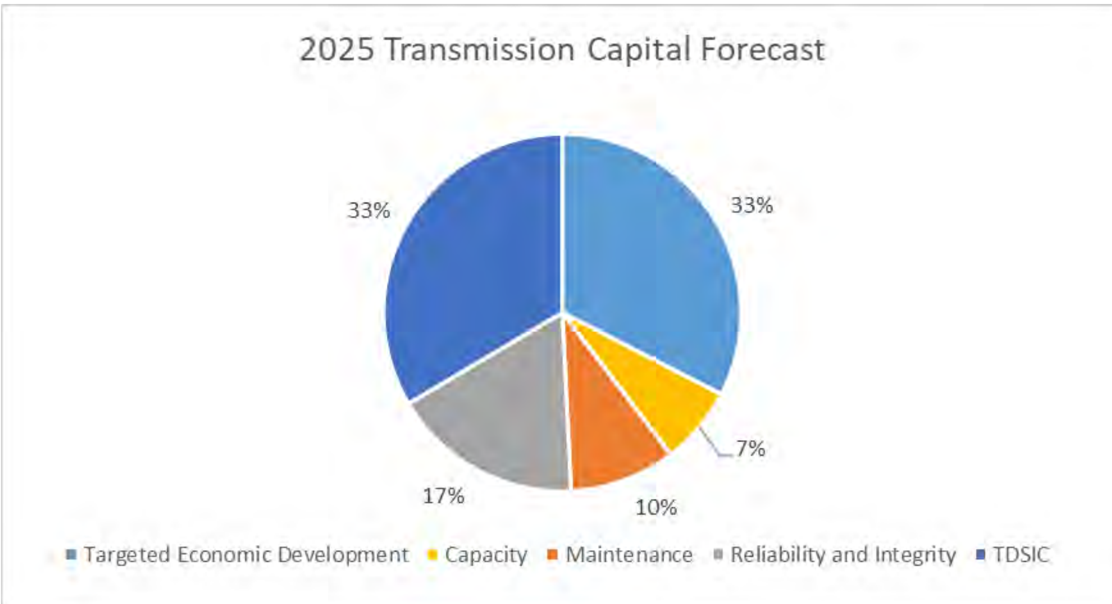
Examples of this investment include the replacement of deteriorated wood poles and replacement of obsolete substation and line equipment. Approximately 30% of investment is driven by TED projects to support local and economic development efforts.

Approximately 16% is driven by maintenance programs. Examples of this type of investment include vegetation management, replacement of deteriorated wood poles and replacement of obsolete, and failed, substation and line equipment. Approximately 4% of investment is driven by capacity requirements to serve load and to meet the NERC Planning Standards. The remaining 4% of investment is driven by reliability and integrity projects (excluding TDSIC). Examples of this type of investment include system reliability work, physical security, and the purchase of mobile substations.

Q. WHAT IS DUKE ENERGY INDIANA'S FORECASTED AMOUNT OF TRANSMISSION O&M EXPENSE AND CAPITAL EXPENDITURES FOR THE CALENDAR YEAR ENDED 2025 (THE "FORWARD-LOOKING TEST PERIOD")?

A. Duke Energy Indiana projects approximately $111 million in O&M transmission expense in the Forward-Looking Test Period. Total capital investment in the transmission system is projected at approximately $415 million in the Forward-Looking Test Period. The figure below and Attachment 22-A (TAA) Transmission Capital Expenditures 2023-2025, provide a breakdown of Duke Energy Indiana's 2025 transmission related capital expenditures.

Chart 3:



For the 2025 forecast, approximately 33% of investment is driven by the TDSIC program, which consists of transmission substation and transmission line improvements. Examples of this investment include the replacement of deteriorated wood poles and replacement of obsolete substation and line equipment. Approximately 33% of investment is driven by TED projects to support local and economic development efforts. Approximately 17% of investment is driven by reliability improvement (excluding TDSIC). Examples of this type of investment include system reliability work, physical security, and the purchase of mobile substations. Approximately 10% of investment is driven by maintenance programs. Examples of this type of investment include the vegetation management and the replacement of deteriorated wood poles and replacement of obsolete, and failed, substation and line equipment. Approximately 7% of investment is driven by capacity requirements to serve load and to meet the NERC Planning Standards.

Q. PLEASE EXPLAIN HOW DUKE ENERGY INDIANA'S TRANSMISSION O&M AND CAPITAL COSTS ARE FORECASTED TO CHANGE FROM THE BASE PERIOD THROUGH THE FORWARD-LOOKING TEST PERIOD.

A. As can be seen in Table 2 below, there is a $12 million increase in O&M expense from the Base Period to the forecast for 2024. This is caused by a TDSIC deferral amortization true up in the Base Period. The TDSIC deferral is discussed in greater detail in witness Ms. Suzanne Sieferman's testimony. The forecasted $6 million increase between 2024 and 2025 is the result of increased vegetation mileage as discussed later in my testimony.

Table 2:

$ in Millions	Base Period A	2024 F	2025 F
Transmission O&M	$93	$105	$111[3]
Increase / (Decrease)		$12	$6

The difference in transmission capital expenditures between the Base Period and 2024, as seen in Table 3, is the result of an increase in TDSIC and TED projects. The forecasted $171M increase between 2024 and 2025 is driven by the Company's enhanced physical security program and TED projects. I will discuss these specific categories of investment in greater depth later in my testimony.

[3] As described later in my testimony, there is a vegetation pro forma adjustment to decrease this number to $108 million.

Table 3:

$ in Millions	Base Period A	2024 F	2025 F
Transmission Capital Expenditures	$177	$244	$415
Increase / (Decrease)		$67	$171

Q. DID YOU PROVIDE THE 2025 TRANSMISSION O&M AND CAPITAL EXPENDITURES REFLECTED IN ATTACHMENT 22-A (TAA) AND IN THE CHARTS ABOVE TO WITNESS MR. JOEL RUTLEDGE FOR INCLUSION IN THE DUKE ENERGY INDIANA FORWARD-LOOKING TEST PERIOD PROPOSED IN THIS CASE?

A. Yes, I did.

Q. PLEASE BRIEFLY EXPLAIN ANY COST SAVING EFFORTS UNDERTAKEN TO MANAGE COSTS.

A. Duke Energy Indiana seeks to control costs on a continuing basis from project identification to project execution. Consistently managing project scope and properly scheduling work to maximize outage opportunities also contribute to more efficient use of capital and O&M dollars. Lastly, in addition to competitively bidding nearly all work that is performed externally, Duke Energy Supply Chain, in collaboration with the Construction and Maintenance Departments, Sourcing Specialists, Engineering Standards, and Analytics team, has notably expanded the number of companies that are on the approved bidders list as well as increased the number of vendors to order materials through. These efforts have combined to create what we believe is a very competitive environment that is resulting in cost control.

Q. HOW IS DUKE ENERGY INDIANA SEEKING TO LEVERAGE TECHNOLOGY TO MORE EFFICIENTLY MANAGE TRANSMISSION SYSTEM ASSETS?

A. Duke Energy Indiana has previously implemented a Health and Risk Management ("HRM") program for its transmission system specific to transformers and breakers. HRM utilizes machine learning and artificial intelligence, allowing equipment to be managed based on a statistically driven program and schedule, rather than a time and failure driven schedule. Through its collection of information, HRM has allowed us to more efficiently deploy financial and human resources to address equipment failure, while also providing a mechanism to intelligently predict and respond to probable asset end of life, rather than react to its failure.

Further, based on recent physical attacks targeting Duke Energy's substation assets in North Carolina, as well as physical attacks on other utilities, the Company has re-evaluated the existing physical security measures at its substation and other critical assets. In light of the evolving threats to its substations and critical assets, the Company has determined to implement additional physical security measures at these assets. The additional physical security measures will implement new technologies to proactively deter threat actors and will enhance the physical barriers already in place.

In the following sections, I will discuss the Company's TDSIC and non-

TDSIC investments included in the forecast in greater detail, including these physical security investments.

A. TDSIC

Q. WHAT IS TDSIC?

A. TDSIC is an acronym that stands for Transmission Distribution and Storage System Improvement Charge, which is a legislatively enacted recovery mechanism codified in Indiana Code ch. 8-1-39.

Q. HOW MUCH OF DUKE ENERGY INDIANA'S TRANSMISSION CAPITAL EXPENDITURES ARE RELATED TO ITS TDSIC PLAN?

A. The amount of Duke Energy Indiana's transmission capital expenditures related to TDSIC is approximately $63 million in the Base Period, $111 million in the 2024 Forecast and $139 million in the 2025 forecast. Please see Attachment 22-B (TAA) Transmission TDSIC Capital Expenditures for support for TDSIC investments.

Q. PLEASE PROVIDE AN UPDATE ON DUKE ENERGY INDIANA'S TRANSMISSION TDSIC 1.0 PLAN.

A. Duke Energy Indiana's TDSIC 1.0 Plan, which was approved in 2016 in IURC Cause No. 44720 covering the period 2016-2022, is now complete.

Q. PLEASE DESCRIBE DUKE ENERGY INDIANA'S TRANSMISSION TDSIC 2.0 PLAN THAT WAS APPROVED IN IURC CAUSE NO. 45647.

A. Duke Energy Indiana's TDSIC 2.0 plan addresses grid investment with the following objectives:

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

The TDSIC 2.0 transmission programs are divided into two main categories: Line Hardening and Resiliency and Substation Hardening and Resiliency. This excludes the TED projects for the TDSIC 2.0 plan. The Line Hardening and Resiliency sub-programs include Wood to Non-Wood Replacements, Cross Arm Replacements, Cathodic Protection Installation, Tower Replacements, Install Intermediate Dead-End Structures, Supervisory Control and Data Acquisition ("SCADA") to Switches, Looping Short Radials through existing Substations, Replacing Overhead Ground Wires, and Line Rebuilds. The Substation Hardening and Resiliency sub-programs include Transmission Relay Upgrades, Replace Transmission and Distribution ("T&D") Circuit Breakers, Replace T&D Transformers, Condition Based Monitoring for Transformers and Circuit Breakers, Upgrade T&D Transformers, Substation reconfiguration for improved Reliability, SCADA communications, and Ancillary Equipment. These investments will improve the reliability and operability of the system for years to come. Although customers benefit from all reliability improvements being pursued via the TDSIC 2.0 Plan, some of the more noticeable benefits will be related to Pole and Cross Arm replacements and reconductoring of the 69 kV system, the reconfiguration of certain substations to contain a "ring bus" configuration, which allows for more easily maintaining multiple energy sources into that substation, and the implementation of automatic sectionalizing schemes and equipment on transmission lines which allow for line faults to be isolated, and customers automatically restored.

Q. PLEASE PROVIDE AN UPDATE ON DUKE ENERGY INDIANA'S TRANSMISSION TDSIC 2.0 PLAN.

A. TDSIC 2.0 was approved in 2022 in IURC Cause No. 45647 covering the period 2023-2028. Duke Energy Indiana completed year one of TDSIC 2.0 by completing 49 projects. Highlights of Line Hardening and Resiliency projects include:

- The replacement of 640 Wood to Non-Wood poles
- The replacement of 223 Cross Arms
- The installation of 348 Cathodic Protection Anodes
- The replacement of 6 Towers
- The Line Rebuild of 19.3 miles of 69kV with an additional 325 poles replaced

Highlights of the Substation Hardening and Resiliency projects include:

- The replacement of 31 Arresters
- Replacement of 5 Electromechanical and First-Generation Digital Relays
- Replacement of 2 Transmission Oil Breakers
- Replacement of 3 Distribution Transformers

- The installation of 4 Condition Based Monitoring for Transformers and Circuit Breakers

Please see Confidential Attachment 22-C (TAA) for more information on the projects included in the Company's TDSIC 2.0 Plan.

Q. WHAT TRANSMISSION LINE AND T&D SUBSTATION PROJECTS ARE INCLUDED IN THE TDSIC 2.0 PLAN?

A. Duke Energy Indiana identified, scoped, and estimated a total of 478 potential Projects – 263 projects supporting the Line Hardening and Resiliency sub-programs and 215 projects supporting the Substation Hardening and Resiliency sub-programs – for inclusion into the TDSIC 2.0 Plan. From that investment portfolio, Duke Energy Indiana selected, with the support of Black and Veatch, 360 projects to be included in TDSIC 2.0 through the analysis of the benefits and cost summary. Of the 360 projects selected for inclusion into TDSIC 2.0, 241 projects supported the Line Hardening and Resiliency sub-programs and 119 projects supported the Substation and Resiliency sub-programs (103 T&D Substations and 204 Transmission Lines).

Of the remaining 118 projects, 22 projects supporting the Line Hardening Resiliency sub-programs and 96 projects supporting Substation Hardening and Resiliency sub-programs at 82 T&D Substations and on 17 Transmission Lines were not included in the initial cut of the 6-year T&D Plan. Rather, we have identified these projects as "Alternate" projects, which are available to substitute into the TDSIC Plan at a later date if system conditions were to elevate these projects' priority to be higher than other work that is currently included in the plan, or if actual project costs are lower than originally estimated and would therefore allow additional work to be performed within the same approved total plan cost.

B. OTHER INVESTMENTS (OUTSIDE OF TDSIC)

Q. HOW MUCH OF DUKE ENERGY INDIANA'S TRANSMISSION CAPITAL EXPENDITURES ARE RELATED TO NON-TDSIC INVESTMENTS?

A. The amount of Duke Energy Indiana's transmission capital expenditures related to non-TDSIC investments is approximately $114.2 million in the Base Period, $132.9 million in the 2024 Forecast, and $276.1 million in the 2025 Forecast. Please see Attachment 22-A (TAA) for a break-down of the non-TDSIC Base Period and forecasted capital expenditures.

Q. PLEASE DESCRIBE THE NON-TDSIC INVESTMENTS AND HOW THEY DIFFER FROM THOSE INCLUDED IN EITHER THE TDSIC OR TDSIC 2.0 PLAN.

A. The non-TDSIC investments include projects to support the large economic growth in Indiana, compliance obligations as demand grows, reliability and integrity upgrades above and beyond TDSIC, hardening the grid against physical attack, vegetation management, and reactive asset replacements. Each of the investments in the TDSIC or TDSIC 2.0 Plan proactively support enhancing the safety, reliability, or modernization of the transmission system.

As shown in the charts provided earlier in this section of my testimony and on Attachment 22-A (TAA), the non-TDSIC investments include categories such as Capacity, TED, Maintenance and Reliability and Integrity. Each of these categories are described in more detail below.

Q. PLEASE SUMMARIZE THE COMPANY'S CAPACITY INVESTMENTS REFLECTED IN THE 2024 CAPITAL FORECAST AND FORWARD-LOOKING TEST PERIOD.

A. The Capacity investments contemplated in the forecast include approximately $9.9 million for the 2024 Forecast and $29.2 million for the 2025 Forecast. Capacity investments include upgrading equipment such as line conductors, transformers, breakers, and switches to a higher capacity. Relocation projects are also included in this investment category and they focus on relocating transmission assets in support of external infrastructure projects to continue service.

Q. PLEASE EXPLAIN THE NEED FOR CAPACITY PROJECT EXPENDITURES.

A. As customer demand grows or shifts over time, this translates to increasing demands on transmission equipment, including lines and transformers, resulting in a decline in voltages on the transmission grid over time. Generator stability margins can decline as well, and the magnitude of fault current that circuit breakers must interrupt can increase over time. In addition, as the customer demand on retail and wholesale distribution systems grows and spreads over time, those distribution systems require increased deliveries from the transmission system. Grid investment adds capacity to the system to address these demands.

Q. WHAT ARE THE BENEFITS OF THE PLANNED CAPACITY PROJECTS?

A. The Capacity projects provide benefits to the customer because they are mitigating future compliance threats, adding additional capacity, and proactively upgrading equipment prior to reliability concerns being realized through customer impact.

Q. PLEASE SUMMARIZE THE COMPANY'S TED INVESTMENTS REFLECTED IN THE 2024 CAPITAL FORECAST AND FORWARD-LOOKING TEST PERIOD AND EXPLAIN WHY THE COMPANY IS FORECASTING AN INCREASE IN CAPITAL EXPENDITURES FOR THIS TYPE OF WORK.

A. The TED investments contemplated in the forecast include system upgrades that allow for additional capacity and account for approximately $73.7 million for the 2024 Forecast and $135.3 million for the 2025 Forecast. These investments can be further broken down into three subcategories: (1) Projects that have already been approved by this Commission, (2) Projects that will go before this Commission for approval in 2024, and (3) Unidentified projects. Economic growth in Indiana is driving the need for an increase in TED capital expenditures. Companies looking to locate and expand in the state expect Duke Energy Indiana to have ample energy capacity in place at their chosen sites in a much more immediate fashion than in the past.

Q. PLEASE PROVIDE ADDITIONAL DETAIL ON THE PROJECTS THAT HAVE ALREADY BEEN APPROVED.

A. The 2024 and 2025 Forecast includes approximately $61.6 million and $54.0 million for the three projects that Duke Energy Indiana has brought forward before this Commission. The first project involves expanding capacity at the River Ridge Commerce Park in Jeffersonville, a 6,000-acre business and manufacturing park, that has been growing rapidly since the initial filing in 2021 (45647 S1).[4] The second project supports Rolls-Royce and the $170 million investment to expand their facility to provide testing capabilities for a large number of current and future engines that will create 45 new jobs in West Lafayette (45647 TDSIC-1).[5] The third project supports StarPlus Energy and their new $2.5 billion electric vehicle battery manufacturing facility that will create 1,400 jobs in Kokomo (45647 TDSIC-2 S1).[6]

Q. PLEASE PROVIDE ADDITIONAL DETAIL ON THE PROJECTS THAT WILL GO BEFORE THE COMMISSION FOR APPROVAL IN 2024.

A. The 2024 and 2025 Forecast includes approximately $5.4 million and $31.6 million for three projects that Duke Energy Indiana will bring for approval before this Commission in 2024. For 2024 and 2025, Project 1 is estimated to cost $31.5 million; Project 2 is estimated to cost $3.5 million; and Project 3 is estimated to

[4] Cause No. 45647 S1
[5] Cause No. 45647 TDSIC-1
[6] Cause No. 45647 TDSIC-2 S1

cost $2 million. The Company anticipates filing for approval of these projects in a separate docket in 2024 and specific details related to these projects will be provided in that docket.

Q. PLEASE PROVIDE ADDITIONAL DETAIL ON THE UNIDENTIFIED PROJECTS.

A. The 2024 and 2025 Forecast includes approximately $6.7 million and $49.7 million for the projects that Duke Energy Indiana has not yet identified but anticipates a need. Businesses seeking new locations have numerous options, bringing jobs and tax dollars to build thriving communities. Reliable utilities are crucial for economic success. The forecast for these unidentified TED projects empower Duke Energy Indiana to meet tight timelines, attract businesses and grow our communities. Although these projects are not yet identified, we anticipate economic development activity will continue at a high level, such that additional TED projects will be forthcoming.

Q. HOW DOES THE COMPANY PRIORITIZE ITS TED PROJECTS?

A. Duke Energy Indiana works closely with the customers to prioritize the TED projects based on the customers requested in-service date and the transmission upgrades required to meet the customer's load needs.

Q. PLEASE SUMMARIZE THE COMPANY’S MAINTENANCE INVESTMENTS REFLECTED IN THE 2024 CAPITAL FORECAST AND FORWARD-LOOKING TEST PERIOD AND EXPLAIN WHAT THOSE INVESTMENTS ENTAIL.

A. The Maintenance category of investments is comprised of Vegetation Management and Reactive Asset Replacements.

Vegetation Management. Investments in the Company's Vegetation Management Program include approximately $23.6 million for the 2024 Forecast and $25.8 million for the 2025 Forecast. I discuss the Company's Vegetation Management and the need for these investments in greater detail in Section VII of my testimony.

Reactive Asset Replacements. Investments in this area include approximately $15.6 million for the 2024 Forecast and $14.1 million for the 2025 Forecast. The asset replacements in this area are typically "found in the field" damaged or decayed and require a like for like replacement.

Q. WHAT ARE THE DRIVERS OF THE REACTIVE ASSET REPLACEMENTS?

A. The drivers are the failed equipment and equipment that has reached the end of its useful life.

Q. WHAT ARE THE BENEFITS OF THE REACTIVE ASSET REPLACEMENTS?

A. Duke Energy Indiana's Reactive Asset Replacements help maintain assets and improve the overall reliability of the system.

Q. PLEASE SUMMARIZE THE COMPANY'S RELIABILITY AND INTEGRITY (R&I) PROGRAMS AND THE INVESTMENTS REFLECTED IN THE 2024 CAPITAL FORECAST AND FORWARD-

LOOKING TEST PERIOD.

A. The R&I category of investments is comprised of the following types of investments: (1) Physical Security, (2) System Reliability, and (3) Mobile Substations.

Physical Security. Investments in this area include approximately $0.9 million for the 2024 Forecast and $56.9 million for the 2025 Forecast. I will discuss these investments in detail, as they are driving a significant portion of the increase in the Company's capital expenditures between 2024 and 2025. In addition to these capital expenditures, the Company is also forecasting approximately $175,000 of O&M expense in the forward-looking test period for monitoring the new sites with these enhanced physical security measures.

System Reliability. Investments in this area include approximately $5.2 million for the 2024 Forecast and $9.1 million for the 2025 Forecast. These investments include proactive age, condition, and obsolescence-based replacements not included in TDSIC.

Mobile Substation. Investments in this area include approximately $4.2 million for the 2024 Forecast and $5.7 million for the 2025 Forecast. The purchase of Mobile Substations ensures an adequate supply so that future work can be executed while minimizing impacts to customers.

Q. YOU INDICATED THE INCREASE IN FORECASTED CAPITAL EXPENDITURES FROM 2024 TO 2025 IS DRIVEN, IN PART, BY THE COMPANY'S ENHANCED PHYSICAL SECURITY PROGRAMS.

PLEASE PROVIDE FURTHER DETAIL ON THE SCOPE OF THE NEW PHYSICAL SECURITY PROGRAM.

A. Upgraded physical security measures are being implemented at 37 substations using a threat and vulnerability-based approach, which considers the potential impacts to customers served from those stations. The new physical security work addresses the threat of individuals attacking a substation from beyond its perimeter and provides an increased level of remote monitoring to a larger number of substations across the Duke Energy Indiana system. These new technologies, which I will describe in more detail, will help Duke Energy Indiana proactively identify threats and potential issues before a bad actor is able to damage the Company’s critical assets. In addition to the upgraded physical security measures being implemented at these 37 substations, there are an additional 367 substations that will have security cameras added to the perimeter.

Q. WHY IS THE COMPANY PLANNING TO INCREASE THE INVESTMENTS IT IS MAKING IN ENHANCED PHYSICAL SECURITY MEASURES IN THE FORWARD-LOOKING TEST PERIOD?

A. The threat to Duke Energy Indiana’s substation assets has evolved in recent years. Previously, the threat was related to people entering the substation and causing damage, but now the threat has evolved to people attacking the substation from the outside, as well. As a result of these new threats and of recent attacks on Duke Energy’s and other utilities’ substations, the new focus for substation physical security is on how to deter, delay, and respond quicker to these new types of attacks. In addition to the substation's physical security measures, the assets need enhanced technologies and increased capabilities to protect against these new threats. The bad actors seeking to attack utility critical assets are much more educated on utility systems and infrastructure than they have been in the past, thus requiring the Company to take a new approach and focus on intelligence driven threat controls at its substations.

Q. WHY IS THE COMPANY MAKING THESE INVESTMENTS NOW WHEN THEY HAVE NOT BEEN UNDERTAKEN IN THE PAST?

A. As I have previously discussed, the frequency of physical attacks on the electric grid, specifically at utility substations, has increased in the past few years. A notable attack happened in Moore County, North Carolina to a Duke Energy Carolinas substation in December 2022. Two substations were shot at causing transformer damage that left more than 40,000 people without electricity for multiple days.

Q. CAN YOU FURTHER DESCRIBE THE RISKS OF AN OUTSIDE PHYSICAL ATTACK OR AN UNAUTHORIZED ENTRY INTO A SUBSTATION?

A. Attacks on substations, whether from outside the fence or via unauthorized entry into the substation, pose a myriad of risks. Either of these malicious acts could result in damage to critical substation equipment resulting in a service outage. As we have experienced in Duke Energy Carolinas and other utilities across the country, customers are at risk when a direct result of these acts causes an outage, as well as potentially bearing the cost of repairs to damaged equipment. Even in cases where these malicious acts do not cause an immediate outage, any damaged equipment very likely degrades the ability of the system to withstand subsequent equipment failure or damage from less nefarious means, such as storms or public interference (e.g., car hits pole).

Q. WHAT PHYSICAL SECURITY INVESTMENTS IS THE COMPANY PLANNING TO MAKE IN THE FORWARD-LOOKING TEST PERIOD?

A. As mentioned earlier in my testimony, the physical security investments forecasted to be made in 2025 are for upgrading physical security measures at 37 of Duke Energy Indiana's substations for **<BEGIN CONFIDENTIAL>** [redacted] **<END CONFIDENTIAL>**

Q. PLEASE EXPLAIN THE FACTORS USED TO DETERMINE <BEGIN CONFIDENTIAL> [redacted]

A. [redacted]

[redacted] **<END CONFIDENTIAL>**

Q. WHAT ARE THE BENEFITS OF THE SYSTEM RELIABILITY PROJECTS?

A. Reliable power is a critical component of customer well-being and satisfaction. The System Reliability projects leverage the latest grid improvement practices to invest in both infrastructure upgrades (e.g., transformers and breakers) and grid hardening initiatives (e.g., substation and line hardening & resiliency) making the grid less vulnerable to both environmental and human threats. Grid hardening leads to several key customer and community benefits. It minimizes the frequency and duration of outages and helps reduce outage costs, especially after severe weather events which tend to have more widespread damage and longer repair times.

Q. WHAT ARE THE BENEFITS OF THE MOBILE SUBSTATION PROJECTS?

A. As part of project work, mobile substations are installed temporarily. This allows us to perform work safely and continue to serve customers when existing substation equipment needs to be taken out of service or replaced as part of a planned project. Mobile substations also perform a critical role in our emergency response to failed equipment such as transformers.

VII. VEGETATION MANAGEMENT

Q. PLEASE EXPLAIN HOW DUKE ENERGY INDIANA'S APPROACH TO TRANSMISSION VEGETATION MANAGEMENT AFFECTS OPERATIONS.

A. The transmission Integrated Vegetation Management ("IVM") program is focused on ensuring the safe and reliable operation of the transmission system by minimizing vegetation-related interruptions and maintaining adequate conductor-to-vegetation clearances, all while maintaining compliance with regulatory, environmental, and safety requirements and standards. The program activities focus on the removal and/or control of incompatible vegetation within and along the right of way to minimize the risk of vegetation related outages and ensure necessary access within all transmission line corridors.

The IVM program includes the following annual activities:

- Planned corridor work that is threat and condition-based
- Reactive work identified through inspections
- Floor management (herbicide, mowing, and hand cutting) within the corridor

Planned work for Duke Energy Indiana is prioritized and scheduled using a threat and condition-based approach identified through remote sensing, inspections, and field assessments, while also considering other factors such as the date of previous work and outage history. The reactive work is identified through remote sensing and periodic inspections. The floor management work is focused on managing the floor of the corridor on a periodic schedule.

Q. IS THE COMPANY PROJECTING AN INCREASE IN FUNDING FOR TRANSMISSION VEGETATION MANAGEMENT?

A. Yes. Duke Energy Indiana is projecting an increase in O&M and Capital for Transmission vegetation management as demonstrated in Table 4. The increased funding will be strategically used to increase the annual planned corridor work mileage, from approximately 463 miles in 2023 to approximately 857 miles by 2025, and strategically target tree removals to reduce both non-MED (reference Table 1 earlier in my testimony) and MED vegetation related events. This will be done by employing our threat and condition-based approach for all voltages (69 to 345kV), in an effort to improve reliability and grid resiliency for the future.

The O&M expense for transmission vegetation management in 2023 was $10.92 million, the forecast for 2024 O&M is $12.09 million, and the forecast for 2025 O&M is $15.33 million. The additional O&M expense will be utilized to maintain the integrity of the corridor inside the right-of-way. The 2023 capital spend was $19.25 million, the 2024 capital forecast is $23.60 million, and the 2025 capital forecast is $25.89 million. Prior to 2024, a significant portion of the capital expenditures were associated with the Emerald Ash Borer program. As noted in Section V of my testimony, vegetation outages made up 14-17% of the total Non-MED outages over the last 4 years. In 2023, vegetation related outages made up approximately 62% of the total sustained MED outages. The capital investments in the forecast are strategically targeted to continue Duke Energy Indiana's focus on the removal of off right-of-way trees to improve reliability and grid resiliency.

Table 4

$ in millions	2020 Actuals	2021 Actuals	2022 Actuals	2023 Actuals	2024 Forecast	2025 Forecast
Miles	352	401	273	463	572	857
O&M Total	$9.91	$12.06	$10.97	$10.92	$12.09	$15.33
Capital Total	$14.82	$17.58	$14.93	$19.25	$23.60	$25.89

Q. DOES THE COMPANY PROPOSE A PRO FORMA ADJUSTMENT FOR VEGETATION MANAGEMENT AND WHAT ACCOUNTING TREATMENT IS THE COMPANY PROPOSING TO RECOVER THESE COSTS?

A. Yes. Transmission has recalculated the cost per mile that will be managed in 2025. Based on this revision, the Company is proposing a pro forma adjustment to reduce O&M expense from $18 million to $15.33 million in the test year for the Transmission vegetation management program, as discussed in Ms. Graft's testimony. Ms. Graft also discusses the Company's proposal to include transmission vegetation management costs in the reserve accounting approach previously approved by the Commission for distribution vegetation management costs in Cause No. 45253.

Q. PLEASE SUMMARIZE DUKE ENERGY'S INDIANA'S EMERALD ASH BORER PROGRAM.

A. The Indiana Emerald Ash Borer ("EAB") Program was created in 2018 with a focus on ash trees along the 69 kV and 138 kV power lines. This program was an addition to the Company's other vegetation management programs, such as maintenance, reactive, herbicide, and mowing. Hazard tree threats, which include ash tree threats, along high voltage lines are addressed through the routine maintenance program. The low-voltage transmission circuits are first aerial surveyed with fixed wing Light Detection and Ranging ("LiDAR") technology to capture the proximity of the tree threat to the power lines. LiDAR identifies the height, striking distance, tree segments, and proximity of the vegetation to the line. A second flight collects hyperspectral imagery that allows for identification of different tree species and tree health based on spectral signatures.

Q. PLEASE PROVIDE AN UPDATE ON DUKE ENERGY INDIANA'S EMERALD ASH BORER PROGRAM.

A. Duke Energy Indiana Transmission vegetation management completed the EAB program in 2023. It was originally estimated that there were approximately 18,000 dead, dying and living ash trees within striking distance of Duke Energy Indiana's 69 kV and 138 kV transmission lines, however, during the duration of the program Duke Energy Indiana actually removed approximately 28,000 trees.

VIII. CONCLUSION

Q. WERE ATTACHMENTS 22-A (TAA) THROUGH CONFIDENTIAL ATTACHMENT 22-E (TAA) PREPARED BY YOU OR AT YOUR DIRECTION?

A. Yes, they were.

Q. DOES THIS CONCLUDE YOUR PREFILED DIRECT TESTIMONY?

A. Yes, it does.

Cause No. 46038

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: April 4, 2024
Timothy A. Abbott

Pie Chart Category	Category Detail	Base Period	2024 F	2025 F
TDSIC	TDSIC	$63,236,581	$111,271,013	$139,168,836
Capacity	Capacity	$20,586,427	$6,473,473	$24,372,616
	Relocation	$2,551,210	$3,384,765	$4,873,346
Targeted Economic Development (TED)	Targeted Economic Development (TED)	$15,494,796	$73,677,000	$135,268,411
Maintenance	Vegetation Management	$16,228,561	$23,603,158	$25,814,254
	Storm Restoration[1]	$7,845,212	-	-
	Reactive Asset Replacements	$18,869,584	$15,567,230	$14,063,586
Reliability and Integrity	System Reliability	$32,588,438	$5,214,648	$9,063,140
	Physical Security	-	$875,112	$56,931,999
	Mobile Substation	-	$4,151,980	$5,702,356
Total		**$177,400,809**	**$244,218,379**	**$415,258,576**

Notes:

1. Duke Energy Indiana does not budget for unforeseen storm costs.

$ in millions

TDSIC 2 Program Categories *	Base	FY 2024	FY 2025
Transmission System Substation Improvements	5.8	40.6	43.7
Transmission System Line Improvements	47.5	70.7	95.4
TDSIC 1	9.9		
Total TDSIC	**63.2**	**111.3**	**139.2**

*Dollars reported are Capex, where TDSIC filings are reported as In Service dollars. Dollars are not reflective of updates submitted in the TDSIC-2 Plan Update filed in Oct 2023.

Public Attachment 22-C (TAA)

[Filed Separately]

Confidential Attachment 22-D (TAA)

[Confidential Attachment]

Confidential Attachment 22-E (TAA)

[Confidential Attachment]