SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC.
AND
INDIANA GAS COMPANY, INC.
D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC.
(TOGETHER "VECTREN")

IURC CAUSE NO. 45401

DIRECT TESTIMONY
OF
JOHN R. MURPHY
DIRECTOR, GAS ENGINEERING

ON

EXTENDED SCHEDULE FOR GAS METER REPLACEMENT

SPONSORING PETITIONER'S EXHIBIT NO. 2,
ATTACHMENTS JRM-1 THROUGH JRM-3

DIRECT TESTIMONY OF JOHN R. MURPHY

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is John R. Murphy. My business address is 1111 Louisiana Street. Houston, TX 77002.

Q. By whom are you employed and in what capacity?

A. I am a Director for Gas Engineering for CenterPoint Energy Company, Inc. ("CenterPoint").

Q. What are your duties and responsibilities as a Director for Gas Engineering for CenterPoint?

A. I oversee the Technical Field Operations and Measurement Services departments. Technical Field Operations includes primarily compliance-based activities focused around cathodic protection, leak survey and meters and regulators. Measurement Services includes meter shop activities, Supervisory Control and Data Acquisition engineers and a gas measurement analyst group.

Q. Please describe your educational and professional background.

A. I obtained a Bachelor of Science degree in Mechanical Engineering from Mississippi State University in 2007. I have been a licensed Professional Engineer in Mississippi since December of 2012. I began my career with CenterPoint in 2008 as a Graduate Engineer in Pearl, Mississippi, supporting the Mississippi district in gas engineering projects. I was promoted to an Engineer II with primary duties expanding to cover our South Louisiana District. I was later rotated into a Supervisor of Technical Field Operations role. From there I took a position of Supervising Engineer in Lawton, Oklahoma and was responsible for engineering and technical field operations for the Oklahoma district. I held additional roles in operations management and operations support management before moving to Houston, Texas for an Investor Relations Manager position in our finance department. I moved into my current position in February 2019.

Q. Have you previously testified before the Indiana Utility Regulatory Commission (the "Commission") or other public utility commissions?

A. No, I have not.

Q. What is the purpose of your testimony in this proceeding?

A. My testimony explains the gas meter testing protocol for Southern Indiana Gas and Electric Company ("Vectren South") and Indiana Gas Company, Inc. ("Vectren North") (collectively "Vectren" or "Petitioner") pursuant to 170 Indiana Administrative Code ("IAC") 5-1-9. Specifically, I will describe the outcome of population sample testing in 2019 and provide detail on the four (4) groups of meters that fell outside the regulated accuracy threshold. I will then provide context for Vectren's meter replacement activities and the challenges posed by the need to replace all the meters from these four (4) groups by December 31, 2020 (as required by 170 IAC 5-1-9.1(f)). I will then explain Vectren's proposals for an extended and graduated replacement schedule and virtual calibration. The Direct Testimony of Petitioner's witness Richard C. Leger (Petitioner's Exhibit No. 1) will explain how Vectren's Alternative Regulatory Plan ("ARP") meets the requirements of Ind. Code § 8-1-2.5 (the "Alternative Utility Regulation Act" or "AUR Statute") and describe additional challenges posed by COVID-19.

Q. Are you sponsoring any exhibits in this proceeding?

A. Yes. I am sponsoring the following exhibits in this proceeding:

- Petitioner's Exhibit No. 2, **Attachment JRM-1**: Accuracy and Standard Deviation of Meter Groups
- Petitioner's Exhibit No. 2, **Attachment JRM-2**: Projected Replacement Schedule for Four Meter Groups
- Petitioner's Exhibit No. 2, **Attachment JRM-3**: Projected Replacement Schedule (including 2005 and 2006 AC-250 meters)

II. Meter Testing Requirements and 2019 Testing Results

Q. Please describe Vectren's regulatory requirements related to periodic testing of gas meters.

A. Vectren uses statistical quality control sampling (in accordance with the approved statistical quality control sampling program prescribed in 170 IAC 5-1-9.1) to test the gas meters in the fifteenth year in service, and in each succeeding year the meter is allowed to remain in service, to ensure the meter in the population sampled does not exceed an average accuracy figure of one hundred two percent (102%) when tested at the meter's check and open rates with an acceptable quality level ("AQL") equal to ten (10.0). Per IAC 5-1-9.2 (g), "Any meter tested which exceeds an average accuracy figure of one hundred two percent (102%) or two percent (2%) above absolute accuracy of one hundred percent (100%) when tested at check and open rates shall be classed as rejected. The entire meter group from which the sample was taken shall be classed as rejected when the number of sample meters rejected equals or exceeds the appropriate reject number for that sample quantity . . . ."

Q. Does Vectren test meters prior to their fifteenth year in service?

A. Yes. However, those meters are not evaluated as samples or for any specific performance criteria related to 170 IAC 5-1-9.1 because there is typically not enough statistical significance in the quantity of results to make advanced determinations.

Q. Please describe the outcome of Vectren's population sampling in 2019.

A. In 2019, Vectren's meter population sampling yielded four (4) groups that were classed as rejected and totaled fifty-four thousand six hundred and fifty-two (54,652) residential meters. See Table JRM-1 below.

Table JRM-1

	Group 1	Group 2	Group 3	Group 4
Quantity	4,029	9,333	11,841	29,449
Manufacturer	American Meter Company	Equimeter	Invensys	American Meter Company
Model	AL-175 TC	R-275 TC	R-275 TC	AC-250 TC
Install Date	1980	1987	1999	2004
Location	Vectren North	Vectren North	Vectren North	Vectren North / South
Cause of Inaccuracy	frictional / physical wear	frictional / physical wear	frictional / physical wear	material defect

Q. Please describe the first population sample.

A. The first group was installed in 1980 and consists of four thousand and twenty-nine (4,029) model AL-175 TC meters manufactured by American Meter Company. The meters are located within the Vectren North service territory.

Q. Please describe the second population sample.

A. The second group was installed in 1987 and consists of nine thousand three-hundred and thirty-three (9,333) model R-275 TC meters manufactured by Equimeter. The meters are located within the Vectren North service territory.

Q. Please describe the third population sample.

A. The third group was installed in 1999 and consists of eleven thousand eight-hundred and forty-one (11,841) model R-275 TC meters manufactured by Invensys. The meters are located within the Vectren North service territory.

Q. Please describe the fourth population sample.

A. The fourth group was installed in 2004, consists of twenty-nine thousand four-hundred and forty-nine (29,449) model AC-250 TC meters manufactured by American Meter Company. The meters are located across the service territories of Vectren South and

Vectren North.

Q. What is the cause of the inaccuracy in the four groups of meters?

A. For the first three (3) groups, the primary cause of non-compliance is frictional and physical wear affecting the mechanical components of the meter. These first three (3) groups have a higher standard deviation (1.322 to 1.545), meaning their performance (relative to accuracy) is rather inconsistent. For the fourth group, non-compliance is caused by a material defect that affected the accuracy of the meter across the entire group. This fourth group has a lower standard deviation (0.936), meaning, despite their inaccuracy, the group is performing within close tolerance of the average accuracy. Petitioner's Exhibit No. 2, Attachment JRM-1 provides detail on the average accuracies and standard deviations of the four (4) groups.

Q. Is there a reason the fourth group of meters has a larger volume than the other three groups?

A. The fourth group of meters were sourced from a single manufacturer. Additionally, due to the relative age of the meters in the fourth group, fewer meters have been removed from the field for reasons not related to accuracy (i.e. damage or other types of failure).

Q. What is the average service life for the fourth group of meters (AC-250s)?

A. Despite their material defect, Vectren has generally found AC-250 meters to be quality, high-performing devices with a service life of thirty (30) or more years.

Q. Has CenterPoint Energy experienced similar accuracy issues with AC-250 meters installed in 2004?

A. Yes. CenterPoint Energy has observed similar accuracy issues with AC-250 meters installed in 2004 across the eight (8) states where CenterPoint provides natural gas service.

Q. Is the material defect found in the fourth group likely to be present in meters installed in subsequent years by Vectren?

A. Yes. The material defect found in the fourth group (installed in 2004) is potentially existent in the AC-250 meters that Vectren installed in 2005 and 2006 in its service

territories (representing an additional forty-three thousand and ninety-one (43,091) meters).

III. CHALLENGES ASSOCIATED WITH METER REPLACEMENT BY YEAR END

Q. When a group of meters is found to exceed the regulated average accuracy threshold, when are such meters required to be replaced?

A. Pursuant to 170 IAC Section 5-1-9.1(f), "[r]ejected groups, or subgroups, [of gas meters] shall be scheduled for removal from service during the next calendar year and shall be adjusted to meet the limits established under section 8 of this rule before being returned to service."

Q. Based on this replacement requirement, when do the four groups of meters need to be replaced?

A. The four groups of meters need to be replaced no later than December 31, 2020.

Q. On average, what is the baseline number of meters that Vectren replaces each year

A. On average over the last five years, Vectren has replaced approximately twenty-seven thousand six hundred and eighty-seven (27,687) meters per year. Of those twenty-seven thousand six hundred and eighty-seven (27,687) meters replaced, on average, five thousand two hundred (5,200) have been part of rejected groups.

Q. Of the four groups, have any meters been replaced to date, either for accuracy or other reasons?

A. No meters in the fourth group have been replaced for accuracy reasons. 519 meters have been replaced for reasons not related to accuracy.

Q. What challenges will Vectren face in replacing meters from all four groups (in addition to baseline number of meter replacements)?

A. Meter replacement has historically been performed by Vectren's employees. Replacing the four groups of meters would be in addition to the average baseline meter

replacement of over twenty-seven thousand (27,000) per year. That said, the volume of meters to be replaced by end of calendar year 2020 is unprecedented for Vectren and would require adherence to procurement processes and negotiation of sourcing and labor contracts to source and install meters above and beyond baseline requirements.

Q. Will other utilities be facing the need to replace AC-250 meters installed in 2004?

A. Yes. Other natural gas utilities that have AC-250 meters (with the same material defect and resulting accuracy issues) deployed in the field may be facing similar labor supply issues which could further impact Vectren's ability to timely source labor for replacing the non-compliant meters.

IV. METER REPLACEMENT AND BILLING ADJUSTMENT METHODOLOGY

Q. Please describe Vectren's plan for the replacement of the first three groups of meters.

A. Despite the challenges previously described in my testimony, the first three (3) groups will be replaced by December 31, 2021.

Q. Please describe Vectren's plan for the replacement of the fourth group of meters.

A. For the fourth group, due to the volume as well as the previously described challenges Vectren proposes a five (5) year period to schedule and replace the affected meters (with all replaced by December 31, 2024). This five (5) year replacement schedule would provide operational flexibility, enable efficient and levelized resource management, and allow Vectren to implement replacement in a cost-effective manner given the additional issues previously described in my testimony. Moreover, once social distancing limitations are lifted, Vectren will be able to more effectively, efficiently, and economically replace the meters.

Q. Will this five-year replacement period apply to AC-250 meters installed after 2004?

A. Yes. Meters which are part of a population sample which is tested and found to fall outside the accuracy threshold (as prescribed by 170 IAC 5-1-9(2)) will be replaced by the end of the fifth calendar year, following the year the sample population was tested. For example, meters installed in 2005 and tested in 2020 will be replaced by December 31, 2025.

Q. Can you please provide a projected schedule for how many meters from each of the four groups will be replaced over the next five years?

A. Petitioner's Exhibit No. 2, Attachment JRM-2 provides a schedule of the projected number of meters from each of the four groups to be replaced over the next five (5) years.

Q. Can you please provide a projected schedule to include the AC-250 meters installed in 2005 and 2006?

A. Petitioner's Exhibit No. 2, Attachment JRM-3 provides a schedule of the projected number of meters to replaced over the next seven (7) years, including the AC-250 meters installed in 2005 and 2006 (and tested in 2020 and 2021, respectively).

Q. Can you provide an estimated cost to replace the four groups of meters by December 31, 2020?

A. Vectren anticipates completing two thousand (2,000) exchanges with company personnel in 2020. To procure field contract labor necessary to replace the four groups of meters by December 31, 2020 would cost approximately $9,116,000.

Q. Alternatively, can you provide an estimated cost to replace the first three groups by December 31, 2021 and the fourth group over a five-year period?

A. Vectren then expects to complete approximately five thousand (5,000) exchanges per year with company personnel, in line with the five (5) year average of five thousand two hundred (5,200) failed meter changes per year. To procure contract labor necessary to replace the first three groups of meters by December 31, 2021 and the fourth group over a five-year period would cost approximately $3,956,000. This extended replacement program will result in a savings of approximately $5,160,000. See the Table JRM-2 below.

Table JRM-2

Completion Year	Company Labor Exchanges	Contractor Labor Exchanges	Contractor Costs ($172 per exchange)
2020	2,000	53,000	$9,116,000
2024	22,000	23,000	$3,956,000

Q. Will a billing adjust be applied for the first three groups of meters?

A. Yes. In accordance with IAC 170 IAC 5-1-14, bills for customers with meters from the first three groups will be adjusted from the known date of error for a period equal to one-half (1/2) of the time elapsed since the previous test, or one (1) year, whichever period is shorter.

Q. What measures will Vectren take related to the billing of customers in the interim while meters from the fourth group are being replaced?

A. To reduce waste and mitigate financial impact to customers given the inaccuracy, with its extended plan for the fourth group, Vectren proposes to perform a virtual calibration to the non-compliant meter population. Applying virtual calibration consists of applying a correction factor (or multiplier) to customer bills associated with the fourth group (and other similarly situated, i.e. AC-250 meters with the same material defect, groups) such that the accuracy of the meters is corrected to one hundred percent (100%).

Q. Please provide an example of the impact of the virtual calibration for a Vectren customer.

A. As an example, a typical Vectren North customer with an average usage of 838 therms per year has an average annual bill of $702.49. After the virtual calibration is performed the average customer annual bill will be adjusted to $694.49 resulting in a difference of $8.00.

Q. Will this billing adjustment be communicated to customers and will the multiplier be displayed on customer's bills?

A. Yes. The virtual calibration will be communicated to customers and the multiplier will be displayed on customer's bills.

Q. How does Vectren plan to ensure that the virtual calibration is allowing customers with meters in the fourth group to be accurately billed?

A. Vectren commits to monitor the meters in the fourth group (and other similarly situated, i.e. AC-250 meters with the same manufacturing defect, groups) on an annual basis prior to replacement and expedite replacement for those meters which (with correction described previously in my testimony) fall outside the acceptable accuracy threshold of one hundred and two percent (102%), as prescribed by 170 IAC 5-1-9(2).

V. CONCLUSION

Q. Does this conclude your prepared direct testimony in this proceeding?

Yes, it does.

VERIFICATION

I, John R. Murphy, Director, Gas Engineering at CenterPoint Energy Company, Inc., affirm under penalties of perjury that the statements and representations in my foregoing Direct Testimony are true to the best of my knowledge, information and belief.

John R. Murphy

Date: July 2, 2020

Attachment JRM-1: Accuracy and Standard Deviation of Four Meter Groups

	1980	1987	1999	2004
Meter Type	AL175	R275	R275	AC250
Quantity Installed	4,029	9,333	11,841	29,449
Average Accuracy of Meters Tested in Sample	101.1%	101.2%	101.7%	101.8%
Standard Deviation of Meters Tested in Sample*	1.63	2.08	1.05	0.87

* all meters were tested in calendar year 2019

Attachment JRM-2: Projected Replacement Schedule

Proposed Schedule for Removals						
	Installed Quantity	**2020**	**2021**	**2022**	**2023**	**2024**
2019 Failure Groups 1980, 1987, 1999	25,203	15,000	10,203			
2019 Failure Group 2004	29,449		7,362	7,362	7,362	7,363
	Removals Per Year	15,000	17,565	7,362	7,362	7,363

Attachment JRM-3: Projected Replacement Schedule

Proposed Schedule for Removals								
	Installed Quantity	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
2019 Failure Groups 1980, 1987, 1999	25,203	15,000	10,203					
2019 Failure Group 2004	29,449		7,362	7,362	7,362	7,363		
Potential 2020 Failure Group 2005	18,904		3,781	3,781	3,781	3,781	3,780	
Potential 2021 Failure Group 2006	25,110			5,022	5,022	5,022	5,022	5,022
	Removals Per Year	**15,000**	**21,346**	**16,165**	**16,165**	**16,166**	**8,802**	**5,022**