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April 9, 2021

ELECTRONIC FILING

Mr. Adam J. Teitzman, Commission Clerk
Office of Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket 20210034-EI, Petition for Rate Increase by Tampa Electric Company

Dear Mr. Teitzman:

Attached for filing on behalf of Tampa Electric Company in the above-referenced docket is the Direct Testimony and Exhibit of Lawrence J. Vogt.

Thank you for your assistance in connection with this matter.

(Document 13 of 34)

Sincerely,



J. Jeffry Wahlen

JJW/ne
Attachment

cc: Richard Gentry, Public Counsel
Jon Moyle, FIPUG

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 20210034-EI
IN RE: PETITION FOR BASE RATES INCREASE
BY TAMPA ELECTRIC COMPANY

DIRECT TESTIMONY AND EXHIBIT
OF
LAWRENCE J. VOGT
ON BEHALF OF TAMPA ELECTRIC COMPANY

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PUBLIC SERVICE COMMISSION

PREPARED DIRECT TESTIMONY

OF

LAWRENCE J. VOGT

ON BEHALF OF TAMPA ELECTRIC COMPANY

Q. Please state your name, business address, occupation, and employer.

A. My name is Lawrence J. Vogt. My business address is 21093 Pineville Road, Long Beach, Mississippi 39560. I am the President and Principal Consultant of Vogtage Engineering Corporation.

Q. Mr. Vogt, please summarize your educational background and professional experience.

A. I am a graduate of the University of Louisville with Bachelor of Science and Master of Engineering degrees in Electrical Engineering. Over the last 45 years, I have held various positions including Distribution Engineer, Senior Industrial Marketing Engineer, and Rate Engineer at Public Service Indiana (now known as Duke Energy - Indiana) in Plainfield, IN; Senior Rate Design Engineer and Principal Engineer - Rates & Regulation at Southern Company Services

1 ("SCS") in Atlanta, GA; Manager, Distribution Technologies
2 Center at ABB Power T&D Company in Raleigh, NC; Lead Product
3 Manager at Louisville Gas & Electric Company in Louisville,
4 KY; and Manager, Pricing Planning and Implementation, and
5 Director, Rates at Mississippi Power Company. In 2010, I
6 established Vogtage Engineering Corporation. I have
7 participated in numerous regulatory filings throughout my
8 career in Alabama, Florida, Georgia, Indiana, Kentucky, and
9 Mississippi and before the Federal Energy Regulatory
10 Commission ("FERC"). This includes providing sponsored
11 testimony and appearances as an expert witness in
12 Commission hearings.

13
14 I have been active in a variety of industry functions
15 throughout my career. I have conducted numerous industry
16 lectures and workshops under the sponsorships of EUCI, the
17 Electric League of Indiana, Inc., the University of South
18 Alabama, and the Wisconsin Public Utility Institute. I have
19 served as an Adjunct Professor in Pennsylvania State
20 University's International Power Engineering Program (1989
21 - 2011). I served as a representative on the Rate &
22 Regulatory Affairs Committee of the Edison Electric
23 Institute, where I also served as Committee Chairman (2012
24 - 2014). I have also served as a Principal Instructor in
25 the Committee-sponsored E-Forum Rate College and Electric

1 Rate Advanced Course. I also served as a representative on
2 the Rates & Regulation Section of the Southeastern Electric
3 Exchange. I am a Senior Life Member of the Institute of
4 Electrical and Electronics Engineers, and I am a Member of
5 the Association of Energy Engineers. I am a registered
6 Professional Engineer in several states. In addition, I am
7 the coauthor of several technical papers and reports as
8 well as the textbook Electrical Energy Management
9 (Lexington Books, 1977). I am also the author of the
10 textbook Electricity Pricing: Engineering Principles and
11 Methodologies (CRC Press, 2009) and of the "Engineering
12 Principles of Electricity Pricing," Chapter 21 in Power
13 Systems, 3rd ed. of The Electric Power Engineering
14 Handbook, CRC Press, 2012. Additional details are found in
15 my curriculum vitae attached as Appendix 1.

16
17 **Q.** Have you previously testified before the Florida Public
18 Service Commission ("Commission")?

19
20 **A.** No. I have not.

21
22 **Q.** Please state the purpose of your direct testimony.

23
24 **A.** The purpose of my direct testimony is to present and explain
25 the cost-of-service study filed by Tampa Electric Company

1 ("Tampa Electric" or "company") in this proceeding.

2 Specifically, I present the following information:

3 1) The Jurisdictional Separation Study and resultant
4 jurisdictional separation factors used for the 2020
5 historical period and the 2021 and 2022 projected
6 periods that determine the portion of Tampa Electric's
7 system rate base and operating expenses, which are
8 subject to the jurisdiction of the Commission and
9 form the basis for the company's proposed revenue
10 requirement for the 2022 test year.

11 2) The 2022 projected period Retail Class Allocated Cost
12 of Service and Rate of Return Studies that, for non-
13 solar facilities, uses a 12 Coincident Peak ("CP") and
14 1/13th Average Demand ("AD") production capacity cost
15 allocation methodology, which I will refer to as
16 12-CP & 1/13th AD. In addition, I will present the
17 company's proposed cost allocation methodology for its
18 utility-scale solar production facilities.

19 3) The company's proposed modifications to its Minimum
20 Distribution System ("MDS") analysis.

21 4) The methods employed, facts considered, and
22 principles upon which the Jurisdictional Separation
23 Study and Cost-of-Service Study were prepared.

24 5) Conclusions regarding the adequacy of these studies
25 and the reasonableness of the resulting costs being

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used to support the rate design effort.

Q. Have you prepared an exhibit to support your direct testimony?

A. Yes. I am sponsoring Exhibit No. LJV-1 consisting of one document, prepared under my direction and supervision:

Document No. 1 List Of Minimum Filing Requirements
 Schedules Sponsored Or Co-Sponsored
 By Lawrence J. Vogt

Q. Are Tampa Electric's Jurisdictional Separation Study and Cost-of-Service Study provided as part of the company's Minimum Filing Requirement ("MFR") schedules?

A. Yes, they are provided within the portion of the MFR schedules designated Section E, "Rate Schedules." I have provided the Jurisdictional Separation Study and the Cost-of-Service Study as well as work papers in separate bound volumes due to their voluminous size. Volume I contains the Jurisdictional Separation Study and the Cost-of-Service Study using the MFR-required 12-CP & 1/13th AD methodology with present and proposed rates.

1 Q. What are the company's primary goals for the proposed cost
2 of service in this case?

3
4 A. There are four primary goals that are reflected in the cost
5 of service of Tampa Electric in this case. The first goal
6 is the modification of the retail rate classes designated
7 in the cost-of-service study to accommodate the company's
8 proposal to develop two new commercial and industrial rate
9 classes. The second goal is the modification and refinement
10 of the cost classification methodology applicable to
11 distribution system facilities. The third goal is the use
12 of the 12-CP and 1/13th AD production capacity allocation
13 methodology for the non-solar generation capacity. The
14 fourth goal is the implementation of a new allocation
15 methodology for the company's solar-based production
16 capacity.

17
18 **JURISDICTIONAL SEPARATION STUDY**

19 Q. What is a Jurisdictional Separation Study?

20
21 A. A Jurisdictional Separation Study is an allocation of
22 costs between the company's wholesale and retail customers
23 or jurisdictions. While all costs are allocated, the
24 allocation of joint costs is the focal point of the study.
25 Joint or common costs are costs that are incurred to

1 serve multiple customers at the same time. A common
2 example is a generating plant that provides power to the
3 aggregate load requirements of all customers served by the
4 company's power system. The joint costs of the generating
5 plant are recorded on the company's books and records in
6 total, and the Jurisdictional Separation Study allocates
7 the joint costs between retail and wholesale customers.
8 Only the costs associated with retail customers are
9 applicable in this proceeding.

10
11 The Jurisdictional Separation Study allocates revenue, rate
12 base, and operating expense items, whether jointly or
13 specifically assigned to a single jurisdiction, to derive
14 the company's retail jurisdiction cost of service for the
15 test period. Costs are first functionalized, then
16 classified, and finally allocated between the wholesale
17 and retail jurisdictions. These allocations utilize load
18 and other factors that best represent each jurisdiction's
19 cost responsibility to achieve this purpose. A detailed
20 description of how costs are functionalized, classified,
21 and allocated is provided below. The overall methodology
22 is the same in both the Jurisdictional Separation Study
23 and the Retail Cost-of-Service Studies, which I will
24 discuss later.

25

1 Q. Why is it necessary to prepare a Jurisdictional Separation
2 Study for Tampa Electric?

3

4 A. Since early 1991, the company has provided wholesale
5 power sales and transmission service to some wholesale
6 power purchasers in Florida at rates that are under the
7 jurisdiction of the Federal Energy Regulatory Commission
8 ("FERC"). Although the company operates in two regulatory
9 jurisdictions, its investments, revenue, and expenses are
10 maintained on a total company basis in accordance with
11 the Uniform System of Accounts prescribed by the FERC and
12 the Commission. The Jurisdictional Separation Study is
13 designed to directly assign or allocate total system costs
14 to each jurisdiction for reporting purposes.

15

16 Q. Is the Jurisdictional Separation Study provided in this
17 proceeding consistent with Tampa Electric's previous
18 Commission filings and industry practice?

19

20 A. Yes. The company provided a Jurisdictional Separation
21 Study in its base rate proceeding in Docket No. 20080317-
22 EI that led to an approved methodology by the Commission.
23 That methodology has been used to produce separation
24 factors for the annual projected surveillance reports,
25 which are the same factors that have been used as

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separation factors for the 2020 and 2021 MFR schedules.

Q. What were the major steps followed in performing the Jurisdictional Separation Study?

A. There are several steps. First, the company's accounting information provided by FERC account, shown in the MFR Schedules B, C and D, is adjusted for the 2022 test period. The accounts are then functionalized into production, transmission, distribution, and general functions. Next, they are classified into demand, energy, or customer groups. After classification, the groupings are allocated into the retail and wholesale jurisdictions using allocation factors. The allocation factors are predominantly based on demand data for the retail and wholesale jurisdictions during the time of the company's projected system monthly peaks, although other factors are used that directly allocate certain costs to the specific jurisdiction for which the costs are incurred. In addition, other metrics such as energy sales and number of customers are used in the allocation process.

Q. Are any wholesale power sales customers included in the 2022 test year?

1 **A.** No. Currently and as forecasted for the 2022 test year, the
2 company is not providing long-term firm requirements
3 electric power service to any wholesale customers.

4
5 **Q.** Does Tampa Electric currently provide transmission service
6 to other Open Access Transmission Tariff ("OATT")
7 customers?

8
9 **A.** Yes. Tampa Electric is providing long-term firm
10 transmission service in the test year under the company's
11 OATT to Seminole Electric Cooperative, Inc. and Duke Energy
12 Florida, LLC.

13
14 **Q.** Please summarize the results of the Jurisdictional
15 Separation Study.

16
17 **A.** In 2022, the retail business represents the vast majority
18 of the electric service provided by Tampa Electric. As the
19 results show in Volume I, Jurisdictional Separation Study,
20 the retail business is responsible for 100 percent of
21 production and distribution plant and 93.32 percent of
22 transmission plant.

23
24 **COST OF SERVICE STUDY**

25 **Q.** What is a Retail Class Allocated Cost-of-Service and Rate-

1 of-Return Study ("Cost-of-Service Study" or "COSS")?

2

3 **A.** The retail Cost-of-Service Study is an extension of the
4 Jurisdictional Separation Study. It starts with the retail
5 portion of costs derived from the Jurisdictional Separation
6 Study and further allocates and assigns these costs to
7 individual retail rate classes. These rate classes
8 represent relatively homogeneous groups of customers having
9 similar service requirements and usage characteristics.
10 Allocations of costs to each of these groups, like the
11 Jurisdictional Separation Study, are based upon the
12 results of a detailed cost analysis. The study provides
13 class rates of return at present and proposed rates, class
14 revenue surplus or deficiency from full cost of service,
15 and functional unit cost information for use in rate
16 design. Thus, the study serves as an important guide in
17 determining the revenue requirement by rate class, as well
18 as the specific charges for each rate schedule.

19

20 **Q.** What retail rate classes were used in the preparation of
21 the Cost-of-Service Study?

22

23 **A.** Tampa Electric's current standard and time-of-day rate
24 schedules are grouped under the major retail
25 classifications of 1) Residential Service (RS), 2) General

1 Service - Non-Demand (GS), 3) General Service - Demand
2 (GSD), 4) Interruptible Service (IS), and 5) Lighting
3 Energy and Facilities. As discussed in Mr. Ashburn's direct
4 testimony, the Company proposes to restructure its demand
5 rate services by creating two new rate schedules: a)
6 General Service - Large Demand - Primary and b) General
7 Service - Large Demand - Subtransmission. Qualifying
8 customers currently served under the GSD rate would be
9 moved to one of these new rate schedules based on their
10 service voltages and demand levels. All of the customers
11 currently served under the IS rate schedule would be moved
12 to the appropriate GSLD rate. Thus, the retail rate classes
13 used in the preparation of the 2022 test year cost-of-
14 service study consist of 1) Residential Service (RS), 2)
15 General Service - Non-Demand (GS), 3) General Service -
16 Demand (GSD), 4) General Service - Large Demand Primary
17 (GSLD-Primary), 5) General Service - Large Demand Primary
18 (GSLD-Subtransmission), and 6) Lighting Energy and
19 Facilities.

20
21 **Q.** Why are there two columns of information presented under
22 the present and proposed rates in the Cost-of-Service
23 Studies for lighting service: Lighting Energy and Lighting
24 Facilities?
25

1 **A.** Dividing the lighting rate class into the two components,
2 Lighting Energy (power production and delivery) and
3 Lighting Facilities (fixtures and associated items),
4 provides better unit cost information for designing the
5 energy and facilities components of this rate class. The
6 two components are distinct types of services and are not
7 always provided as a bundled service by the company.

8

9 **Q.** After establishing the rate classes, what were the next
10 steps in the Cost-of-Service Study process?

11

12 **A.** Similar to the Jurisdictional Separation Study, the
13 development of a COSS consists of three major steps: 1)
14 grouping all costs by function (cost functionalization),
15 2) classifying the functionalized costs by cost-causation
16 service characteristics (cost classification), and 3)
17 apportioning the resulting classified costs to the retail
18 rate classes (cost allocation).

19

20 **Q.** How were Tampa Electric's costs functionalized?

21

22 **A.** The company functionalized costs in accordance with the
23 Uniform System of Accounts by dividing utility plant costs
24 into the broad functions of production, transmission,
25 distribution, and general. Operation and Maintenance

1 ("O&M") costs and other expenses were functionalized in a
2 comparable manner.

3
4 **Q.** How were Tampa Electric's costs classified after they were
5 functionalized?

6
7 **A.** The company's power system operations are classified into
8 three categories: demand, energy, and customer cost.
9 Demand cost is a function of the capacity of plant,
10 which in turn depends on the maximum kW for power
11 demanded by customers. Demand cost occurs in each of the
12 production, transmission, and distribution levels of the
13 system. Energy cost occurs in the production level, and it
14 is a function of the volume of kWh consumed by customers
15 over time. Customer costs, however, are independent of
16 customers' kW and kWh usage. Many of these costs vary with
17 the number of customers on the system. This generally
18 refers to the basic costs incurred by the utility to attach
19 a customer to the distribution system, which includes
20 metering, service lines, a portion of the system known as
21 the Minimum Distribution System ("MDS"), along with
22 customer billing and certain administrative costs.

23
24 Subsequently, Tampa Electric's cost of service is
25 measured by these same three cost categories: demand,

1 energy, and customer. The three categories are
2 appropriately called cost causations. The assignment of
3 costs to these cost-causation categories in the COSS is
4 called classification.

5
6 **Q.** Are all of the company's production plant facilities
7 classified as demand-related in the cost-of-service
8 studies?

9
10 **A.** No. For purposes of jurisdictional separation, all
11 production plant facilities are classified as demand
12 related consistent with prior jurisdictional separation
13 practices. However, there are portions of two production
14 facilities that are classified as energy-related for
15 purposes of allocating the Commission jurisdictional
16 component of these facilities on an energy basis. These
17 facilities consist of the gasifier train equipment
18 ("gasifier") for Polk Unit 1 and the flue gas
19 desulfurization, or scrubber, portion of the
20 environmental equipment for Big Bend Unit 4.

21
22 Polk Unit 1 is an Integrated Gasified Combined Cycle
23 ("IGCC") plant which has two main sections - the power
24 block, which produces the electric power through gas
25 turbines and heat recovery steam generators, and the

1 gasifier, which converts coal as the feedstock into a
2 combustible gas, which then becomes the fuel used in the
3 power block. Thus, the gasifier performs a fuel conversion
4 function that is completely associated with the provision
5 of fuel to the unit and not the supply of capacity. The
6 classification of the gasifier as energy-related was
7 applied in Tampa Electric's last three cost of service
8 studies.

9
10 The classification of the Big Bend Unit 4 scrubber as
11 energy-related was applied in the company's last four cost
12 of service studies. This treatment remains appropriate
13 because the main purpose of the plant investment is related
14 to energy output. Since the decision to classify the
15 scrubber investment as energy-related, additional
16 scrubber and Selective Catalytic Reduction ("SCR")
17 investments made by the company have been recovered
18 through the Environmental Cost Recovery Clause ("ECRC")
19 where they have been classified and allocated on an energy
20 basis.

21
22 **Q.** How are costs classified to the customer function?
23

24 **A.** Costs classified to the customer function are those
25 generally independent of kW and kWh consumption. They have

1 traditionally included the costs of service lines, meters,
2 meter reading, billing, and customer information. In
3 addition, the company has employed a costing methodology
4 in this case that is described in the industry as the MDS
5 method. This method determines the minimum size and
6 respective cost of distribution transformers, poles, and
7 conductors that would be required to connect customers to
8 the company's power grid and provide an appropriate
9 utilization voltage. This minimum cost is also classified
10 as customer-related, and the remaining cost of these
11 facilities is then classified as capacity or demand
12 related. The methodology is described in the NARUC Cost
13 Allocation Manual and has recently been accepted by the
14 Commission in the settlement of rate and cost of service
15 matters in the company's 2013 retail rate case.

16
17 **Q.** Please describe what is meant by a Minimum Distribution
18 System?

19
20 **A.** The MDS is that portion of the total costs of facilities
21 that make up the primary voltage lines, the line
22 transformers, and the secondary voltage lines, which is
23 independent of customers' load requirements. An MDS study
24 separates the costs of these distribution facilities into
25 their respective demand-related cost components and

1 customer-related cost components on the basis of cost
2 causation.

3
4 MDS represents the readiness to serve a customer, not the
5 capacity needed to meet a customer's peak demand
6 requirements. MDS is only about providing an appropriate
7 utilization voltage at the point at which a customer
8 connects to the distribution system, and costs are incurred
9 to provide a customer with such access. The readiness to
10 serve costs is independent of how much electricity a
11 customer consumes; thus, MDS costs are classified as
12 customer-related cost components. MDS does not represent
13 the costs of capacity necessary to meet a customer's peak
14 load requirements. That portion of the total costs of
15 facilities that make up the primary voltage lines, the line
16 transformers, and the secondary voltage lines that provide
17 capacity to meet customers' peak load requirements is
18 classified as a demand-related cost component.

19
20 **Q.** How is an MDS study performed?

21
22 **A.** Quantifying the costs of MDS is accomplished by evaluating
23 the cost causation aspects of all distribution system
24 equipment and facilities, including the primary and
25 secondary lines, line transformers, and other distribution

1 line equipment. This approach requires an understanding of
2 the functional application of each distribution item. In so
3 doing, some items are found to be related directly to peak
4 load requirements (100% demand related), some items are
5 found to be independent of peak load requirements (100
6 percent customer related), and other items are found to be
7 functionally associated with both readiness to serve and
8 capacity.

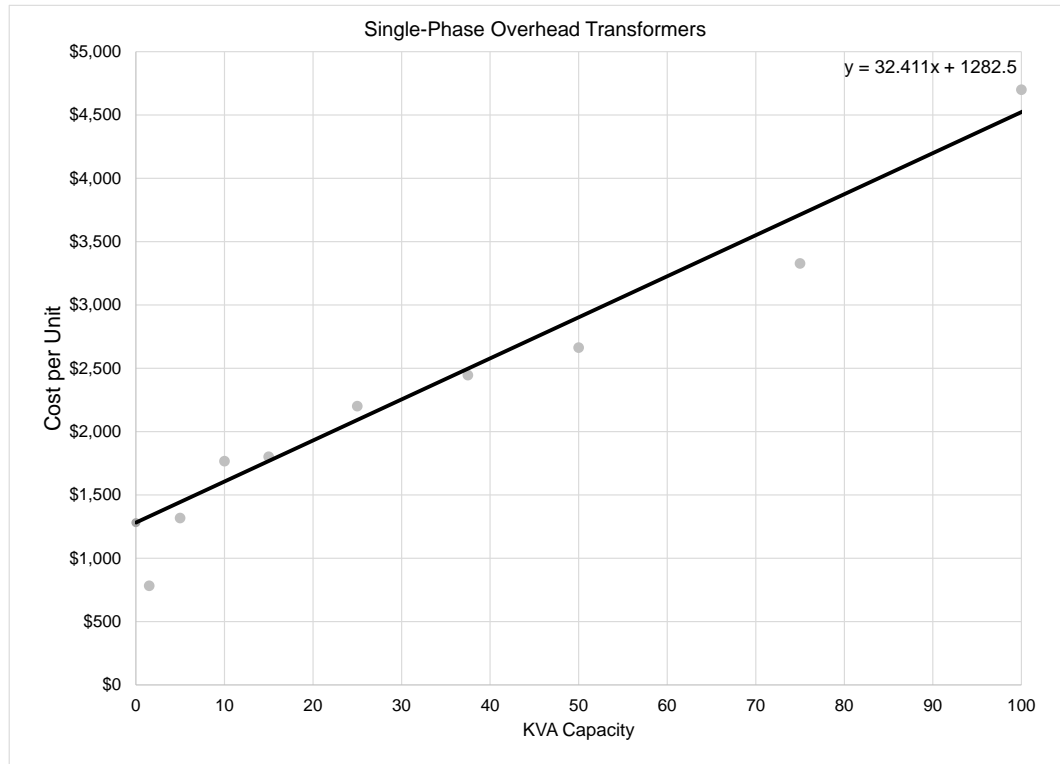
9
10 The costs of items having attributes of both customer-
11 related and demand-related functions must be analyzed in
12 order to separate the total item cost into these two cost
13 components. These items include overhead conductors and
14 poles, underground conductors and conduit, and overhead and
15 underground line transformers. They all provide both a
16 readiness to serve function and a capacity function.

17
18 To accomplish this cost separation, the company applies a
19 zero-intercept cost analysis for each of these distribution
20 items. The zero-intercept method is a linear regression
21 analysis that relates a distribution item's unit costs
22 (dependent variable) to its associated capacity values
23 (independent variable). An example of the regression
24 analysis results is illustrated below for single-phase
25 overhead line transformers.

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The data plots shown in the chart represent the current unit costs of transformers having standard size capacity ratings, e.g., 10, 15, 25, 37.5, 50, 75, and 100 kVA. The regression analysis was conducted using current unit costs because average unit costs calculated from the company's embedded plant account data represent a mix of transformers having a variety of input and output voltages. Some of these transformers have higher voltages, compared to the basic 120/240 volt used for small single-phase customers, and the higher voltage transformers generally have a higher unit cost. To refine the analysis to basic single-phase transformers, the company's distribution mapping system was queried to determine the number of in-service overhead single-phase transformers for each kVA size by voltage ratings. In addition, the linear regression formula includes weights (i.e., the number of transformers for each kVA size) since the count of transformers for each size is not a uniform distribution.

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The resulting regression line intersects the unit cost y-axis where the value of transformer capacity is equal to zero, thus defining the per unit customer component cost, which in this example is \$1,282.50. This zero-intercept value is multiplied by the total number of single-phase overhead transformers to determine that amount of the total cost of single-phase overhead transformers that is classified as customer related. The difference between the total cost of the transformers and the customer-related cost amount represents the demand-related transformer cost amount.

1 Since the analysis was based on current unit costs, the
2 resulting total customer cost and total demand cost are
3 represented as percentages, which are then applied to the
4 embedded plant account total for overhead transformers to
5 determine the embedded customer-related and demand-related
6 cost components to be used in the COSS.

7
8 Separate regression analyses were also conducted for
9 underground pad mounted transformers and for primary and
10 secondary overhead conductors, underground conductors, and
11 distribution poles to separate the total costs of these
12 items into their respective customer and demand cost
13 components.

14
15 **Q.** Aside from the MDS-related equipment and facilities that
16 you discussed, how are the other distribution system
17 equipment and facilities classified?

18
19 **A.** Distribution property that is classified as 100% demand-
20 related components include voltage regulators and
21 capacitors. This equipment is installed on the primary
22 voltage lines and is utilized to maintain circuit voltages
23 within an acceptable operating range during heavy loading
24 conditions. If there was no load current flowing on the
25 energized system, line voltage would not sag, and voltage

1 regulation equipment would not be required. Thus, these
2 devices are classified as demand related.

3
4 Distribution property that is independent of load and is
5 thus classified as 100 percent customer-related components
6 include reclosers, sectionalizers, and fused cutouts. This
7 equipment is installed on the primary voltage lines and
8 function together to provide distribution system protection
9 under fault (short circuit) conditions. These devices work
10 in a coordinated fashion to isolate a fault location and
11 maintain a voltage connection to as many customers as
12 possible during the fault event. Without their intended
13 intervention during a fault, line conductors and equipment
14 would be damaged from the fault current flows that occur
15 and many, if not all, customers on the affected circuit
16 could experience a major power outage. The protection
17 equipment functions the same with or without load connected
18 to the energized circuit because it responds to the severe
19 overcurrent situation caused by a fault. Thus, these
20 devices are classified as customer related.

21
22 In addition, lightning arresters are installed on the
23 primary lines to abate damaging overvoltage conditions that
24 occur during electrical storms. These lightning arresters
25 function the same with or without load connected to the

1 circuit. Thus, these devices are classified as customer
2 related.

3
4 While cutouts and arresters are utilized for line
5 protection, they are also applied to provide protection
6 from overcurrent and overvoltage conditions for specific
7 equipment, e.g., each overhead transformer. Cutouts and
8 arresters used for this purpose are classified in the same
9 manner as the equipment they protect was classified.

10

11 **Q.** Please summarize the resultant classifications of
12 distribution facilities that you have derived under the
13 refined MDS concept

14

15 **A.** The refined MDS study results are summarized by voltage
16 level and cost component.

17

		<u>Cost Component</u>	
<u>FERC Account</u>	<u>Voltage Level</u>	<u>Customer</u>	<u>Demand</u>
364 Poles	Secondary	68%	32%
	Primary	60%	40%
365 OH Lines	Secondary	44%	56%
	Primary	49%	51%
366/367 UG Lines	Secondary	16%	84%
	Primary	47%	53%

25

1	368 Transformers	Secondary	58%	42%
2		Primary	17%	83%

3

4 Supporting workpapers for the MDS analysis are provided in
5 MFR Schedule E - Rate Schedules, Class Cost-of-Service
6 Studies, Volume II.

7

8 **Q.** How were the MDS study results incorporated into the cost-
9 of-service study?

10

11 **A.** The MDS customer and demand cost component percentages were
12 applied to separate the costs of the plant in service for
13 the primary and secondary voltage distribution FERC
14 Accounts, including FERC 364, FERC 365, FERC 366, FERC 367,
15 and FERC 368. Then an assessment was made of the subsequent
16 Derivation of Unit Cost report that is shown on page 28 of
17 the Cost-of-Service Study. Specifically, the monthly
18 amounts of the customer-related costs for each rate class
19 were evaluated in comparison to the comparable results of
20 the cost-of-service study approved in the 2013 rate case
21 filing. The customer-related cost component consists of
22 MDS, meters, meter reading, billing, and customer services.
23 The combined increases of these cost components moved the
24 total customer cost amount materially higher than the total
25 customer cost determined in the previous rate case filing.

1 While some state jurisdictions utilize the cost-of-service
2 study as a general reference for rate design purposes, the
3 establishment of rate components in Florida is more
4 directly coupled with cost-of-service study results.
5 Subsequently, the company proposes gradualism in
6 implementation of the refined MDS analysis while consenting
7 the full cost amounts for meters, meter reading, billing,
8 and customer service, in order to mitigate the otherwise
9 higher rate impact due to a full cost-based ratemaking
10 approach.

11
12 Thus, in this filing, the company further proposes to
13 incorporate one half of the MDS customer cost percentage
14 results in this filing. While this proposal would then
15 shift one half of the quantified customer-related costs to
16 the demand-related cost component for ratemaking purposes,
17 the refined MDS analysis stands on its own merits for full
18 cost causation acknowledgement.

19
20 **Q.** After costs were functionalized and classified, how were
21 they allocated?

22
23 **A.** After determining the functionalization and classification
24 of costs based upon causation principles, the
25 methodologies for cost apportionment to classes were

1 determined. The resulting methodologies produce allocation
2 factors, which are then used to apportion the demand,
3 energy, and customer cost responsibilities to the rate
4 classes. The derivation of the allocation factors used in
5 the 2022 Cost of Service Study is shown in MFR Schedule E-
6 10.

7
8 **Q.** What are the principal considerations when allocating
9 demand costs?

10
11 **A.** The principal considerations in allocating demand costs
12 include 1) customer demand usage characteristics and their
13 related responsibility for system coincident and non-
14 coincident peaks, 2) the design and configuration of
15 production, transmission, and distribution facilities, and
16 3) unique customer service or reliability requirements and
17 system operating data. These considerations provide
18 guidance in determining what components should be used
19 to derive the demand allocation factors for each of the
20 functional levels of the power system. CP demands, non-
21 coincident peak demands ("NCP"), customer peak (maximum)
22 demands, and percentage of energy have been used to best
23 represent those considerations.

24
25 **Q.** Please explain CP, NCP, and customer peak demand.

1 **A.** CP demand reflects the contribution to the total system
2 monthly peak demand for each of the rate classes. For
3 example, at the hour of the system peak in a particular
4 month, the CP demand for the residential class would be
5 that class's proportion of that hour's system peak demand.
6
7 NCP demand reflects the monthly peak demand of a rate class
8 on its own, regardless of when the system peak occurs. For
9 example, while the system may peak in the late afternoon,
10 a class may peak during a nighttime hour. The class NCP
11 would then be its demand during that nighttime hour.
12
13 For each rate class, the customer peak demand is the
14 aggregation of all individual customers' monthly maximum
15 demands, regardless of when they occur.
16
17 Each of these different measures of demand capture the
18 unique load diversity characteristics of customers' usage
19 throughout the power system. To produce a cost-causation
20 based allocation of the cost elements at each functional
21 level of the system, these different measurements of demand
22 are applied objectively in accordance with the load
23 diversity characteristics exhibited at each of those
24 levels. The CP demand reflects a high load diversity, which
25 is prevalent at the generators and the transmission voltage

1 portion of the system. The NCP demand reflects a medium
2 load diversity, which is prevalent at the primary
3 distribution voltage level. The customer peak demand
4 reflects a low load diversity, which is prevalent at the
5 secondary distribution voltage level.

6
7 **Q.** Please describe the company's proposed cost allocation
8 methodology for its non-solar production facilities.

9
10 **A.** For its non-solar production facilities, the company has
11 proposed to allocate these costs to the retail rate classes
12 by utilizing the 12-CP and 1/13th AD method. With this
13 method, 12/13ths of the production cost is allocated by
14 means of the 12-CP demands while the remaining 1/13th of
15 the production cost is allocated based on the average
16 demand. This method was utilized in the settlement of the
17 2013 rate case and thus is proposed in this proceeding.

18
19 **Q.** Please describe the company's proposed cost allocation
20 methodology for its utility-scale solar production
21 facilities.

22
23 **A.** Prior to this filing, the cost of the company's solar
24 facilities was embedded with the costs of all of its
25 conventional generation resources. Thus, the cost of the

1 solar facilities was allocated to the rate classes in accord
2 with the non-solar resources, i.e., using the 12-CP and
3 1/13th AD allocation. With the company's expansion of PV as
4 a material utility-scale resource, the company believes
5 that allocation of solar generation should be based on its
6 unique characteristics. The company's current and planned
7 renewable generation resources portfolio includes utility-
8 scale, single-axis tracking PV and battery storage. These
9 methods provide an improvement in the generation output
10 characteristics of an otherwise static PV resource.

11
12 The daily generation output of a fixed-tilt solar PV system
13 has a shape very much like a normal distribution curve
14 between sunrise and sunset and which ramps up to its peak
15 kW output at noontime and then begins ramping down shortly
16 thereafter. The daily energy output can be increased by
17 using a single-axis tracking system that allows the solar
18 panels to rotate from an east facing position each morning
19 to a west facing position each evening as the sun moves
20 from horizon to horizon. Compared to a fixed-tilt PV panel,
21 the annual energy output of a single-axis tracking panel
22 may be increased by as much as 27 percent.¹ The resulting
23 shape of the daily generation output approaches that of a

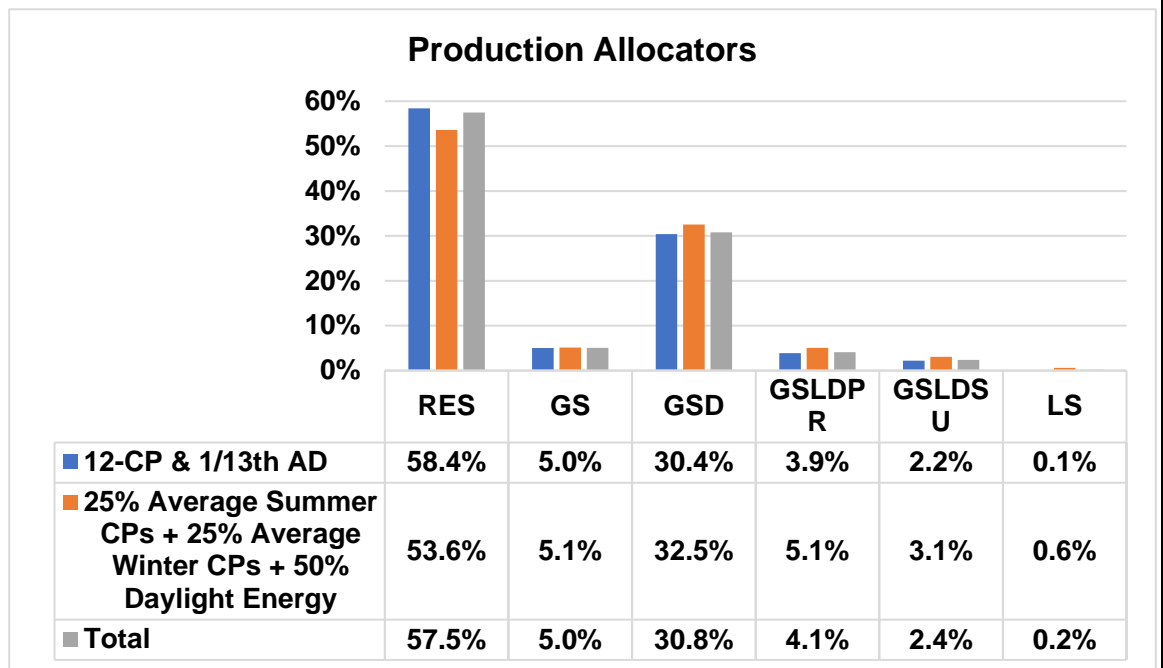
¹ "Utility-Scale Solar Photovoltaic Power Plants: A Project Developer's Guide'" International Finance Corporation, Washington, D.C., 2015, p. 34.

1 trapezoid with steep side legs. Thus, the panel's peak kW
2 output period is reached much earlier than noon and extends
3 to well past noon. This allows the solar panel to contribute
4 more effectively to meeting late afternoon summer loads
5 driven by air conditioning.

6
7 "Coupling" storage batteries with PV systems has a benefit
8 of mitigating some of the intermittency aspect of solar
9 resources. Batteries provide a means for storing
10 electricity from PV units as a reserve for use at times
11 when the PV output is intermittent or even zero. For
12 example, charged batteries could help meet the energy
13 requirements of a pre-dawn heating load.

14
15 The company's renewable resource expansion strategy yields
16 both peak capacity and energy output merits. Thus, a cost
17 allocator which encompasses both demand and energy metrics
18 is appropriate. The company proposes to base its PV resource
19 cost allocator on a 50 percent/50 percent weight with
20 respect to demand and energy. The demand portion of the
21 allocation is based on 25 percent of the average of the ten
22 highest monthly CPs in the summer plus 25 percent of the
23 average of the ten highest monthly CPs in the winter. The
24 energy portion of the allocation is based on 50 percent of
25 the annual daylight kWh.

1 The chart below compares the rate class allocation factors
 2 for the 12-CP and 1/13th methodology and the proposed demand
 3 and energy-weighted solar allocation methodology. The chart
 4 also illustrates the resulting total production allocation
 5 by rate class.



17

18 **Q.** Please explain the treatment of demand allocated
 19 transmission and distribution costs in the Cost-of-Service
 20 Study.

21

22 **A.** The transmission demand-classified costs are allocated on
 23 a 12-CP basis while distribution demand-classified costs
 24 are allocated on a mixture of rate class NCPs and customer
 25 maximum demands. This is the same allocation methodology

1 as was adopted and relied on in the company's base rate
2 proceeding in Docket No. 20080317-EI.
3

4 **SUMMARY**

5 **Q.** Please provide a summary of the company's proposed Cost-
6 of-Service Studies in this proceeding.
7

8 **A.** In line with the cost-of-service study goals stated
9 previously, the company successfully modified the model to
10 create two new commercial and industrial rate schedule
11 classes for larger customers that are served at primary and
12 subtransmission voltages, which were then incorporated in
13 the retail cost allocation process.
14

15 The company refined its minimum distribution system
16 methodology to analyze distribution costs at a
17 comprehensive level of detail. The results were
18 successfully employed in the cost-of-service study to
19 classify the costs of the primary and secondary
20 distribution voltage levels.
21

22 The company employed the following cost allocation factors
23 to apportion the functional costs of capacity to the
24 customer rate classes:
25

1	Production - Non-Solar	12-CP and 1/13 th AD
2	Production - Solar	25 percent of the 10 highest
3		Summer CPs plus 25 percent of the
4		10 highest
5		Winter CPs plus 50 percent of
6		Daylight Energy
7	Transmission	12-CP
8	Substations	Class NCPs
9	Primary Distribution	Class NCPs
10	Secondary Distribution	Customer Maximum Demands

11

12 Prior to this filing, solar production was allocated along
13 with all other production.

14

15 The modifications made to the company's cost-of-service
16 methodologies and applications, which have been employed
17 in this filing, strive to capture and enhance cost-
18 causation principles to the benefit of electric service
19 customers. The cost-of-service study results are fair and
20 equitable, and it serves as a practical resource in support
21 of the rate design process.

22

23 **Q.** Does this conclude your direct testimony?

24

25 **A.** Yes, it does.

Appendix 1

Lawrence J. Vogt
President and Principal Consultant
Vogtage Engineering Corporation

Summary Of Utility Industry Experience

- B.S. & M.Eng Degrees in EE
- Licensed Professional Engineer
- Expert Witness
- Published Author
- Professional Instructor
- Project Manager
- Business Unit Manager
- Utility Consultant

WORK EXPERIENCE

Rates Engineering

Pricing Strategy – Development and implementation of long-term plans for retail tariff restructuring and rate structure modifications based on projected industry contingencies.

Cost-of-Service Studies – Design and construction of a comprehensive Excel-based electric cost-of-service model; development of a GIS-based minimum distribution system methodology for customer–demand cost classification; design of a comprehensive system electric loss study methodology for use in energy and demand allocation factor development; development of rate schedule functional cost components for use in rate design.

Rate Design Studies – Development of coincidence factor–load factor curves using interval data and hours use of demand based bill frequency distributions for intra-rate electric cost allocation and production of rate schedule cost curves for supporting demand-based rate structures; development of alternative rate structures for all customer classes, including block energy, demand, hours use of demand, and time of use; development of outdoor lighting and facilities lease rates; development of special electric rates, including economic development, generation standby, purchase of excess customer generation energy, and interruptible rates; development of various cost recovery clauses; administration of rates and associated policies.

Rate Analysis – Development of mathematical and graphical techniques for evaluation of electric rates and rate relationships; development of unique rate analysis methodologies, e.g., contour-based differential rate charts; conceptual outline of a rate design and analysis tool (*RateManager*, coded and commercialized by Goodcents Solutions).

Electric Service Revenue Forecasting – Development of historical and projected billing determinant databases using average rate and ogive forecasting methodologies for residential and small commercial customer classes and a discrete bill forecasting methodology for large commercial and industrial customers; development of projected customer rate

Regulatory Support – Preparation of retail and wholesale regulatory filing documents, including testimony, exhibits, and responses to interrogatories; appearance as an expert witness in regulatory docket proceedings; participation in special regulatory meetings, such as collaborative interest groups; design and implementation of formulary performance-based ratemaking methods. Development and presentation of instructional courses in ratemaking principles and methodologies.

Power Distribution Engineering

Distribution Planning – Development of load-bearing land use databases calibrated to substation peak loads and service areas; spatial allocation of projected customer class loads; optimization of substation capacity sizing and siting; forecasting and outage contingency analyses.

Integrated Resource Planning – Development of DSM-based customer class load models; spatial analysis of DSM impacts on T&D loads and substation capacity expansion using distribution planning software.

Distribution Design and Analysis – Routing and specification of primary feeder lines and equipment; specification of electric service facilities; feeder protection coordination studies; capacitor sizing and siting studies.

Distribution System Restoration – Field engineering support of distribution system restoration efforts due to tornados and hurricanes.

Marketing

Industrial Marketing – Engineering assistance to commercial and industrial customers for new load additions, demand and energy management project evaluations, power factor correction projects, electric service invoices, and rate schedule selection; development and presentation of customer education programs.

Products and Services Marketing – Development of optional products and services proposals for large C&I customers, including distribution engineering, line construction, and maintenance services; coal procurement; development of a standard service criterion.

Business Unit Management

Electric Rates Function – Management of a team of engineers, accountants, economists, and computer scientists responsible for:

- Development of jurisdictional and customer and rate class cost-of-service studies.
- Design of electric rates for all categories of retail and wholesale electric services.
- Application and governance of the electric tariff.

Power Distribution Function – Management of a team of engineers and geographers responsible for:

- Digitizing distribution electric circuit maps and construction of geographical load databases for use in distribution system planning and analysis.
- Production of spatial electric load forecasts.
- Development of least-cost distribution system expansion plans, including the effects of demand-side management and energy efficiency programs.

COMPANY AND POSITION HISTORY

Vogtage Engineering Corporation

Long Beach, Mississippi

Position: President and Principal Consultant

July 2010 – Present

Mississippi Power company, A Southern company

Gulfport, Mississippi

Positions: Director, Rates
Manager, Rates
Manager, Pricing Planning & Implementation
Principal Rate Research Analyst

April 1997 – May 2018

August 2014 – May 2018
August 2005 – July 2014
June 1998 – July 2005
March 1997 – June 1998

Louisville Gas and Electric company

Louisville, Kentucky

Positions: Lead Product Manager
Rates and Regulatory Coordinator

September 1994 – March 1997

November 1996 – March 1997
September 1994 – October 1996

ABB Power T&D company

August 1989 - September 1994

Pittsburgh, Pennsylvania and Raleigh, North Carolina	
Positions: Manager, Distribution Technologies Center	January 1994 - September 1994
Manager, Consulting Studies	June 1992 - December 1993
Consulting Engineer	August 1989 - May 1992
Southern company Services, Inc., A Southern company	March 1980 – July 1989
Atlanta, Georgia	
Positions: Principal Engineer – Rates & Regulation	June 1987 – July 1989
Assistant to the Assistant Vice President	May 1984 – May 1987
Senior Rate Design Engineer	April 1983 – April 1984
Rate Design Engineer	March 1980 – March 1983
Public Service company of Indiana, Inc.	May 1976 – February 1980
(Now known as Duke Energy – Indiana)	
Plainfield, Indiana	
Positions: Rate Engineer	February 1979 – February 1980
Senior Industrial Marketing Engineer	May 1977 – January 1979
Engineer	May 1976 – April 1977
Student Engineer (Co-op and Part Time)	Prior to May 1976

EDUCATION

University of Louisville , Louisville, Kentucky	
Bachelor of Science (Electrical Engineering)	May 1975
Master of Engineering (Electrical Engineering)	May 1976 Thesis: “Electrical Energy Management”

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers	Senior Member, ID: 07062771 (Since 1974)
▪ Power Engineering Society:	Customer Products and Services Subcommittee Power Systems Planning and Implementation Subcommittee
▪ Industry Applications Society	
Association of Energy Engineers	Member, ID: 01969 (Since 1978)
Edison Electric Institute	Member, Rate Committee (2005 - 2018)
▪ Committee Chairman, 2012 - 2014	
▪ Committee Vice Chairman, 2010 - 2012	
Southeastern Electric Exchange	Member, Rates & Regulation Section (2010 - 2018)
Registered Professional Engineer:	
Alabama, ID: 13650-PE, December 1981	Georgia, ID: PE012852, April 1981
Indiana, ID: PE60018668, January 1980	Mississippi, ID: 08429, September 1981
Voltage Engineering Corporate License:	Mississippi Certificate of Authority: E-2258

REGULATORY FILINGS AND TESTIMONY

Georgia Public Service Commission

Testimony and appearances on behalf of Georgia Power company.

- Docket No. 42516: 2019 Georgia Power company Retail Rate Case; prefiled testimony on retail cost-of-service study; public hearings held; order issued.

Mississippi Public Service Commission

Testimony and appearances on behalf of Mississippi Power company.

- Docket 2017-AD-112, 2017: Encouraging Stipulation of Matters in Connection with the Kemper County IGCC Project; prefiled testimony on test period rate revenues; public hearing held; order issued.
- Docket 2016-UA-230, 2016: Jurisdictional Cost-of-Service Study as of December 31, 2015; prefiled testimony on cost assignment methodologies; order issued without a hearing.
- Docket 2015-UN-80, 2015: A Change in Rates Related to the Kemper County IGCC Project; prefiled testimony on cost recovery methodology and rate schedule revisions; public hearing held; order issued.
- Docket 2014-UN-10, 2014: Establishment of an Energy Efficiency Quick Start Plan and Cost Recovery Rate; prefiled testimony on cost recovery methodology; order issued without a hearing.
- Docket 2013-UN-14, 2013: A Change in Rates Related to the Kemper County IGCC Project; prefiled testimony on cost recovery methodology and rate schedule revisions; public hearing held; order issued.
- Docket 2011-UN-0135, 2011: Establishment of a Certificated New Plant Rate Schedule; prefiled testimony on cost recovery methodology and rate schedule revisions; public hearing held; order issued.
- Docket 2011-AD-2, 2011: Investigation of the Development and Implementation of Net Metering Programs and Standards; prefiled comments on specific issues that should be addressed in a possible rule; public hearing held; order issued.
- Docket 1992-UN-0059, 2011: Environmental Compliance Overview Plan; prefiled testimony on modification of the cost recovery mechanism and change in billing factors; public hearing held: order issued.
- Docket 2010-AD-2, 2010: Investigation of the Development and Implementation of Energy Efficiency Programs and Standards; prefiled comments on decoupling and lost sales, incentives, and program cost recovery; collaborative meetings; prefiled testimony on cost recovery; rulemaking order issued without a hearing.
- Docket 1992-UN-0059, 2010: Environmental Compliance Overview Plan; prefiled testimony on change in billing factors; public hearing held: order issued.
- Docket 1992-UN-0059, 2009: Environmental Compliance Overview Plan; prefiled testimony on change in billing factors; public hearing held.
- Docket 2008-AD-0477, 2008: Energy Independence and Security Act of 2007; prefiled comments on “Rate Design Modifications to Promote Energy Efficiency Investments”; public hearing held: order issued.
- Docket 2007-UN-0398. 2007: Establishment of a Formulary Lighting Charge Rate Schedule; order issued without a hearing.
- Docket 2007-UN-0395. 2007: Revision of the Cogeneration and Small Power Purchase Rate Schedule; order issued without a hearing.
- Docket 2007-AD-0201, 2007: Energy Policy Act of 2005 -- Proposed PURPA Standards; prefiled comments on "Net Metering;" public hearing held: order issued.
- Docket 2006-UN-0511, 2006: Establishment of a System Restoration Rider Schedule; prefiled testimony on cost recovery methodology; order issued without a hearing.
- Docket 2005-UA-0555, 2006: Hurricane Katrina System Restoration Cost Recovery; pre-filed testimony on cost recovery methodology; public hearing held: order issued.
- Docket 2006-AD-0362, 2006: Energy Policy Act of 2005 -- Proposed PURPA Standards; prefiled comments on "Smart Metering and Interconnection"; public hearing held: order issued.

- Docket 2003-UN-0898, 2005: Performance Evaluation Plan General Increase in Rates; prefiled testimony on rate schedule revisions; public hearing held; order issued.

Kentucky Public Service Commission

Filings on behalf of Louisville Gas & Electric company.

- Case 95-239, 1995: Small Power Production and Cogeneration Purchase Schedule; filed revised schedule SPPC-II; order issued without a hearing.
- Case 95-276, 1995: Establishment of an Excess Facilities Rider; filed new schedule; order issued without a hearing.
- Case 93-150, 1995 and 1996: Quarterly filing of exhibits and rates for Demand-Side Management Cost Recovery Mechanism; orders issued without a hearing.
- Case 73-146, 1995 and 1996: Annual filing of exhibit and rate for Differential Underground Charge for New Residential Subdivisions; orders issued without a hearing.

Indiana Utility Regulatory Commission

Testimony and appearances on behalf of Public Service Indiana.

- Cause No. 35755, 1979: Joint Petition of Public Service company of Indiana, Inc. and United Rural Electric Membership Corporation; prefiled testimony addressing the rate impacts associated with the exchange of properties and customers; public hearing held; order issued.
- Cause No. 35756, 1979: Joint Petition of Public Service company of Indiana, Inc. and Morgan County Rural Electric Membership Corporation; prefiled testimony addressing the rate impacts associated with the exchange of properties and customers; public hearing held; order issued.
- Cause No. 35954, 1979: Joint Petition of Public Service company of Indiana, Inc. and Parke County Rural Electric Membership Corporation; prefiled testimony addressing the rate impacts associated with the exchange of properties and customers; public hearing held; order issued.

Federal Energy Regulatory Commission

Testimony on behalf of Mississippi Power company.

- Docket ER11-1871, 2010: Wholesale Rate Case
Prefiled testimony on rate design; case settled and order issued without a hearing.
- Docket ER08-1467, 2008: Wholesale Rate Case
Prefiled testimony on rate design; case settled and order issued without a hearing.

PUBLICATIONS

Books

Lawrence J. Vogt, "Engineering Principles of Electricity Pricing," Chapter 21 in *Power Systems*, 3rd ed. Edited by Leonard L. Grigsby, CRC Press, 2012.

Lawrence J. Vogt, *Electricity Pricing: Engineering Principles and Methodologies*, CRC Press, 2009.

Lawrence J. Vogt and David A. Conner, *Electrical Energy Management*, Lexington Books, 1977.

Reports and Papers

- H. L. Willis, L. J. Vogt, R. G. Huff, and W. R. Pettyjohn, "DSM: Transmission and Distribution Impacts, Volume 1: Analysis Framework and Test Case," EPRI Final Report CU-6924, Vol. 1, August 1990.
- H. L. Willis, L. J. Vogt, H. N. Tram, and J. M. Fredley, "DSM: Transmission and Distribution Impacts, Volume 2: Application on Spatial Frequency Analysis," EPRI Final Report CU-6924, Vol. 2, August 1990.
- J. Flory, J. Peters, L. Vogt, K. Keating, B. Hopkins, and N. R. Friedman, "Evaluating DSM: Can An Engineer Count On It?" IEEE Transactions on Power Systems, Vol. 9, No. 4, pp. 1752 – 1758, February 1994.
- Lawrence J. Vogt and H. Lee Willis, "Optimizing the Power System Impacts of Demand-Side Management," IEE Conference Publication No. 373, CIRED 12th International Conference on Electricity Distribution, Birmingham, UK, pp. 6.4.1 – 6.4.5, May 1993.
- Lawrence J. Vogt, H. Lee Willis, and Lynn C. Ribar, "DSM and the T&D System: A Complicated Interaction," EPRI CU-7394; Proceedings of the 5th National Demand-Side Management Conference, Boston, MA, pp. 305 - 309, August 1991.
- Lawrence J. Vogt, H. Lee Willis, and Michael J. Buri, "Distribution Planning and DSM Assessment Using Satellite Imagery and Pattern Recognition," Proceedings of the Pennsylvania Electric Association's System Planning Committee Meeting, Wilkes-Barre, PA; May 1991.
- Timothy S. Yau, William M. Smith, R. Gary Huff, Lawrence J. Vogt, and H. Lee Willis, "Demand-Side Management Impact on the Transmission and Distribution System," IEEE Transactions on Power Systems, Vol. 5, No. 2, pp. 506 – 512, May 1990.
- Lawrence J. Vogt, "History of the AEIC Load Research Committee: 1944 – 1985, June 1985.

INDUSTRY PRESENTATIONS

Institute of Electrical and Electronics Engineers

- "Engineering in Customer Service Planning – Utility Products and Services," IEEE Power Engineering Society Meeting, Seattle, WA; July 2000.
- "Evaluating DSM: Can an Engineer Count On It? – Verifying DSM Load Reduction: T&D Engineering Perspectives," IEEE Power Engineering Society Meeting, Seattle, WA; July 1992.

Edison Electric Institute

- "Formulary Methodology for Pricing Lighting Facilities," EEI Rate and Regulatory Affairs Committee Meeting, Chicago, IL; September 2013.
- "Minimum Distribution System: Concepts and Applications," EEI Rate and Regulatory Affairs Committee Meeting, Louisville, KY; March 2013.
- "Trends in Riders: What's Out There?" EEI Rate and Regulatory Affairs Committee Meeting, Clearwater, FL; March 2012.
- "Transition to Forecast Test Years: Mississippi Power Perspective" and "Performance-Based Ratemaking for New Generation," EEI Rate and Regulatory Affairs Committee Meeting, Alexandria, VA; September 2011.
- "Mississippi Power's Retail Pricing Mechanisms," EEI Rate and Regulatory Affairs Committee Meeting, Jersey City, NJ; March 2010.

“Rate Design Transition at Mississippi Power,” EEI Rate and Regulatory Affairs Committee Meeting, New Orleans, LA; March 2009.

“Ratemaking With Bary Curves,” EEI Rate Analysts Meeting, Louisville, KY; April 2008.

“Ratemaking With Bary Curves,” EEI Rate and Regulatory Affairs Committee Meeting, San Francisco, CA; September 2007.

“Hurricane Katrina: Impacts and Cost Recovery Issues” and “Mississippi Power’s Performance Evaluation Plan,” EEI Rate and Regulatory Affairs Committee Meeting, Savannah, GA; March 2006.

Southeastern Electric Exchange

“Impacts of PV on Distribution Systems,” S.E.E. Rates and Regulation Section Meeting, Lexington, KY; April 2019.

“Demand and Energy Loss Factors Used in the Cost-of-Service Study,” S.E.E. Rates and Regulation Section Meeting, Charlotte, NC; April 2018.

“Model-Based Approach to Rate Design: Exploring Rate Relationships,” S.E.E. Rates and Regulation Section Meeting, Williamsburg, VA; April 2016.

“Cost-Based Rate Design: A Deeper Dive,” S.E.E. Rates and Regulation Section Meeting, Mobile, AL, April 2015.

“Straight Fixed–Variable Rate Design,” S.E.E. Rates and Regulation Section Meeting, Atlanta, GA; October 2014.

“Update on Kemper County IGCC Energy Facility,” S.E.E. Rates and Regulation Section Meeting, Charleston, SC; October 2013.

“Minimum Distribution System: Concepts and Applications,” S.E.E. Rates and Regulation Section Meeting, Savannah, GA; October 2012.

“Formulary Lighting Pricing,” S.E.E. Rates and Regulation Section Meeting, New Orleans, LA; November 2011.

“Mississippi Power’s Revenue Neutral Adjustment Clause,” S.E.E. Rates and Regulation Section Meeting, Atlanta, GA; May 2011.

“Fundamentals of Rate Design Workshop,” S.E.E., Rates and Regulation Section Meeting, St. Petersburg, FL; May 8, 2003.

“Cost Analysis and Rate Design: Outdoor Lighting,” S.E.E. Rates and Regulation Section Meeting, Richmond, VA; October 1981.

EUCI Conferences

“Experiences With Formulary Ratemaking,” EUCI’s 10th Annual Electricity Pricing Conference, New Orleans, LA; September, 2012.

“Mississippi Power’s Success: Hurricane Katrina Impacts and Response” and “Hurricane Katrina: Cost Recovery Issues,” EUCI’s Disaster Management and Cost Recovery for Utilities and Energy Companies Conference, New Orleans, LA; June 2006.

“Planning DSM to Optimize T&D Benefits,” EUCI’s Integrated Resource Planning Conference, Denver, CO; March 1993; Co-presenter – Lee Willis

Other Industry Conferences

“Employing a Minimum Distribution System Methodology for the Cost-of-Service Study,” Marcus Evans Electric Utility Ratemaking Conference, Atlanta, GA; July 2013.

“Bridging the Gap Between Cost of Service and Rate Design Structure,” The Prime Group’s Electric Cooperative Rate Conference, Louisville, KY; September 2007.

“Developing Pricing Structures to Market Reliability-Based Service Options” (pre-conference workshop), The Center for Business Intelligence’s “Electric Distribution Reliability” Conference, Houston, TX; February 2001; Co instructor – Arlan W. Chenault.

“Spatially Differentiated Pricing,” INFOCAST’s “Pricing Strategies for the Competitive Era” Seminar, Chicago, IL; January 1997.

"DSM and the T&D System: A Complicated Interaction," The 5th National Demand-Side Management Conference, Boston, MA, August 1991.

“Distribution Planning and DSM Assessment Using Satellite Imagery and Pattern Recognition,” Pennsylvania Electric Association’s System Planning Committee Meeting, Wilkes-Barre, PA; May 1991.

"DSM: Transmission and Distribution Impacts," Electric Power Research Institute Workshops, Hartford, CT, November 1987; San Diego, CA, December 1987; Chattanooga, TN, March 1988; Minneapolis, MN, March 1988; Denver, CO, March 1988.

"Purchased Energy Analysis and Energy Accounting," Open Pit Mining Association Meeting, New Orleans, LA; June 1979.

The Energy Council

“Ratemaking 101,” Oklahoma City, OK, September 2018

Mississippi State Legislature Committee Sessions

“Net Metering: Issues and Solutions,” Joint Legislative Hearing on Energy Efficient Homes and Buildings, Jackson, MS; November 16, 2009.

“Net Metering Concerns,” House Agricultural Committee, Jackson, MS; November 12, 2008.

AFFILIATED TRAINING PROGRAMS: Power Systems and Utility Ratemaking Programs

Webinar Courses

EUCI Electric Cost of Service and Rate Design Series, Instructor

Session 1: "Electric Cost of Service Concepts and Methodologies," March 21, 2012.

Session 2: "Electric Rate Design Concepts and Methodologies," March 28, 2012.

Session 3: "Risk Mitigation in Electric Rate Design," April 4, 2012.

Edison Electric Institute E-Forum Lecture Series, Instructor

Sponsored by the EEI Rate and Regulatory Affairs Committee:

Introduction to Alternative Regulation Series:

Session I: “Rate Design to Ensure Fixed Cost Recovery: Rate Reform,” March 30, 2010.

Rate College Series:

Session 16: “Managing Risk Through Rate Schedule Billing and Service Provisions,” September 22, 2009.

Session 13: “Rate Design for the Rate Case,” May 13, 2009.

Session 11: “Rate Design: Translating Costs to Rates,” February 25, 2009.

Session 8: “The Embedded Cost-of-Service Study: Allocation Methodologies and Results,” August 26, 2008.
Session 7: “The Embedded Cost-of-Service Study: Functionalization and Classification Methodologies,” June 18, 2008.

Classroom Courses

EUCI, Instructor

“An Introduction to Electric Utility Power Systems” (1½ and 2 day courses).
“Understanding Electric Utilities” (1½ day course).

Open Enrollment Courses: Multiple venues, 2013 - Present.

In-House Courses:

- Liberia Electricity Regulatory Commission, Monrovia, Liberia, November 2020
- New York Power Authority, White Plains, NY, April 2020
- innogy Consulting, Boston MA, December 2019
- Southern California Public Power Association, Glendora, CA, September 2018
- Hawaiian Electric, Waikiki, HI, June 2018
- Belize Electricity Limited, Belize City, November 2016.
- California Public Service Commission, San Francisco, August 2014.

Wisconsin Public Utility Institute, Instructor

Sponsored Programs:

Annual EEI Advanced Rate Design Course:

- “An In-depth View of the Customer Charge,” July 2016 – Present.
- “A Distribution Engineer’s View of a Minimum Distribution System Methodology,” 2013 -2015.
- “Demand Rate Design Methodology,” July 2012.

Market Inflection Drivers for Service Utilities: Tracking the Trends Series:

- “Economics and Engineering in a New Partnership: Cost of Service,” June 2017.
- “Roll of Engineering in Distribution System Cost Recovery,” August 2016.

Large Public Power Council Roundtable:

- “Impact of Distributed Resources on Cost-of-Service and Rate Design,” August 2016.
- “Minimum Distribution System Methodology,” May 2013.

California Public Utility Commission Staff:

“Minimum Distribution System Methodology,” October 2014.

Penn State University, Adjunct Professor

Sponsored Programs:

Electric Cost-of-Service and Rate Design Courses; 1989 - 2011

- Advanced School of Power Engineering, Pittsburgh, PA; (Annual 4-day course).

In-House Courses:

- Provincial Electric Authority, Bangkok, Thailand; February 2005 (2-week course).
- Panamanian Public Service Commission Staff, Panama City, Panama; April 2001 (1-week course).
- Power Finance Corporation/State Electric Boards, New Delhi, India; February - March 1996 (3-week course).
- Empressas Publicas de Medellin, Medellin, Colombia; November 1993 (1-week course).
- Jamaica Public Service company, Kingston, Jamaica; June 1993 (2-week course).

University of South Alabama, Instructor

Sponsored Programs:

Electric Cost-of-Service and Rate Design Courses; Mobile, AL, 1989 – 1996.

- Utility Rate Fundamentals Course (2½ day course).
- Strategic Utility Pricing Course (1½ day course).

In-House Courses:

- Oklahoma Gas & Electric Co., Public Service of Oklahoma, and Oklahoma Public Service Commission, Oklahoma City, OK; April 1990 (1-week course).

Electric League of Indiana, Inc., Instructor

Sponsored Programs:

The Electrification Council Series:

- “Energy Management Action Course,” Indianapolis, IN; April - May 1979 (6 session course).
- “Electric Power Distribution for Industrial Plants and Commercial Buildings Course,” Clarksville, Indianapolis, and Wabash IN; September - November 1978 (10 session course).

Professional Development Seminars, Inc., Instructor

“Fossil-Fired Power Plant Technologies,” New Orleans, LA, September 2015 and Birmingham, AL, October 2015.

EXHIBIT

OF

LAWRENCE J. VOGT

ON BEHALF OF TAMPA ELECTRIC COMPANY

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LIST OF MINIMUM FILING REQUIREMENT SCHEDULES
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