STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

I/M/O THE PETITION OF ATLANTIC CITY ELECTRIC COMPANY FOR APPROVAL OF AN INFRASTRUCTURE INVESTMENT PROGRAM, AND RELATED COST RECOVERY MECHANISM, PURSUANT TO N.J.A.C. 14:3-2A.1 *et. seq.*	)))))))	**BPU DOCKET NO. EO18020196**

JOINT TESTIMONY OF CHARLES SALAMONE AND MAXIMILIAN CHANG ON BEHALF OF DIVISION OF RATE COUNSEL

STEFANIE A. BRAND, ESQ.
DIRECTOR, DIVISION OF RATE COUNSEL

DIVISION OF RATE COUNSEL
140 East Front Street, 4th Floor
P. O. Box 003
Trenton, New Jersey 08625
Phone: 609-984-1460
Email: njratepayer@rpa.nj.gov

FILED: September 4, 2018

PUBLIC VERSION

TABLE OF CONTENTS

Page No.

I. STATEMENT OF QUALIFICATIONS

Q. Would the members of the Engineering Panel Review ("Panel") please state your names, positions, and business address.

A. My name is Charles Salamone, PE. I am Owner of Cape Power Systems Consulting, LLC a power systems consulting Company with an address of 630 Cumberland Dr., Flagler Beach, Florida and I am a subcontractor of Synapse Energy Economics, Inc. ("Synapse").

My name is Maximilian Chang. I am a Principal Associate with Synapse Energy Economics, an energy consulting company located at 485 Massachusetts Avenue, Cambridge, Massachusetts.

Q. On whose behalf are you submitting testimony in this proceeding?

A. We are submitting testimony on behalf of the New Jersey Division of Rate Counsel ("Rate Counsel").

Q. Mr. Salamone, please describe your education and professional background.

1. I hold a Bachelor of Science Degree in Electrical Engineering from Gannon University. I joined the Engineering Department of Commonwealth Electric Company in 1973. At that time, I became a Junior Planning Engineer where my primary responsibilities were to assist in the planning, analysis, and design of the transmission and distribution systems of Commonwealth Electric Company, later known as NSTAR. I generally followed the normal progression of positions with increasing levels of responsibility within the planning area until taking the position of Director of System Planning at NSTAR in 2000. I held that position

until starting Cape Power Systems Consulting, LLC in 2005. During my career with NSTAR, in addition to the responsibilities associated with overseeing System Planning, I served as Chair of the New England Power Pool ("NEPOOL") Planning Policy Subcommittee (1997-1998), Chair of the NEPOOL Regional Transmission Planning Committee (1998-1999), and Vice Chair of the NEPOOL Reliability Committee (1999-2000). As a consultant, I have been providing consulting services to a number of power system industry clients since 2005. I am a Registered Professional Engineer with the Commonwealth of Massachusetts. I am also a senior member of the Power Engineering Society of the Institute of Electrical and Electronic Engineers. A copy of my resume is attached hereto as **Attachment RC-ENG-1**.

Q. Mr. Salamone, have you previously testified before utility regulatory agencies?

A. Yes. I have previously testified before the New Jersey Board of Public Utilities ("BPU" or "Board"), the Federal Energy Regulatory Commission ("FERC"), the Massachusetts Department of Public Utilities, and the Massachusetts Energy Facilities Siting Board on a number of technical matters relating to ratemaking and system planning.

Q. Mr. Chang, please describe your professional background at Synapse Energy Economics.

A. My experience is summarized in my resume, which is attached as **Attachment RC-ENG-2**. I am an environmental engineer and energy economics analyst who has analyzed energy industry issues for ten years. In my current position at

Synapse Energy Economics, I focus on economic and technical analysis of many aspects of the electric power industry, including: (1) utility mergers and acquisitions, (2) utility reliability performance and distribution investments, (3) nuclear power, (4) wholesale and retail electricity markets, and (5) energy efficiency and demand response alternatives. I have been an author and project coordinator for the last two biennial New England Avoided Energy Supply Component reports, which were used by energy efficiency program administrators in the six New England states to evaluate energy efficiency programs.

Q. Mr. Chang, please describe your educational background.

A. I hold a Master of Science degree from the Harvard School of Public Health in Environmental Health and Engineering Studies, and a Bachelor of Science degree from Cornell University in Biology and Classical Civilizations.

Q. Mr. Chang, have you previously submitted testimony before the Board of Public Utilities?

A. Yes. I filed testimony before the Board in dockets GO12050363 (South Jersey Gas Energy Efficiency), EM14060581 (Exelon-PHI Merger), ER14030250 (RECO Storm Resiliency), and GM15101196 (AGL Southern Company Merger), ER17030308 (ACE Rate Case), ER18010029 (PSEG Rate Case).

Q. Mr. Chang, have you previously testified before utility regulatory agencies?

A. Yes. I have previously testified before the District of Columbia Public Service Commission, the Hawaii Public Utilities Commission, the Illinois Property Tax Appeal Board, the Maine Public Utilities Commission, the Maryland Public Service Commission, and the Massachusetts Department of Public Utilities. I

have also filed testimony before the Delaware Public Utilities Commission, the Kansas Commerce Corporation, the Illinois Commerce Commission, and the United States District Court for the District of Maine.

II. PURPOSE AND SUMMARY OF RECOMMENDATIONS

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

A. The purpose of our testimony is to review aspects of Atlantic City Electric's (the "Company" or "ACE") petition ("Petition") to seek approval from the New Jersey Board of Public Utilities (the "Board") for the implementation of their Infrastructure Investment Program ("ACE IIP"). As filed, the ACE IIP spending proposal amounts to $338.2 million over the next four years.

Q. Please summarize your findings and recommendations.

A. We find numerous deficiencies in the filing that include:

- The lack of in-service dates for each of the proposed projects as required under N.J.A.C. 14:3-2A.5(b)3
- The lack of applicable benefit cost analysis for each of the proposed projects as required under N.J.A.C. 14:3-2A.5(b)3
- The lack of detailed engineering reports for each of the projects as required under N.J.A.C. 14:3-2A.5(b)3
- The Company's proposed baseline spending of $60 million per year based on depreciation expenses should be rejected, since that value ignores the Company's 2013-2017 five-year historical spending of $146 million per

year. We recommend that the $146 million is a more representative starting point for the Company's baseline annual spending level.

- If the Board were to proceed with approval of ACE's IIP, notwithstanding the identified deficiencies, we recommend that the Company approve of a four-year program of $20 million. The $20 million budget reflects our adjustments to the Company's proposal removing: (1) the Company's existing Reliability Improvement Program ("RIP") spending, (2) blanket spending that should not receive accelerated recovery, (3) retirement and replacement spending that should not receive accelerated recovery, (4) upgrade spending that should not receive accelerated recovery, and 5) facilities spending that should not receive accelerated recovery.

III. INFRASTRUCTURE INVESTMENT PLAN REGULATION

Q. What is your understanding of the Infrastructure Investment Program Regulation within New Jersey?

A. It is our understanding that the Board established the Infrastructure Investment regulation ("IIP Regulation") to support distribution investments that go above and beyond "business as usual" distribution system spending.[1] In broad terms, the Board has indicated that qualifying projects would be eligible for accelerated investment and must enhance the reliability, resiliency and safety of the grid.[2] The IIP Regulation does not supplant an EDC's responsibility to maintain adequate spending for normal distribution operations.

[1] N.J.A.C. 14:3-2A.1(a)
[2] N.J.A.C. 14:3-2A.1(a)

Q. Would this make any project eligible under the Infrastructure Investment Regulation?

A. No, the IIP Regulation "encourages and supports necessary accelerated construction, installation, and rehabilitation of certain utility plants and equipment."[3] The phrase "certain" does not include all or most. As a result, we believe that the IIP Regulation is intended for those investments that would not likely occur without an accelerated cost recovery mechanism. Additionally, the Board's IIP Regulation clearly states that qualifying investments must be well supported as per the Board's minimum filing requirements in the form of engineering evaluations and cost benefit analyses justifying both their cost effectiveness and impact on the reliability and resiliency goals as established by the Board.[4] If the projects are deemed eligible and they meet the requirements set forth in the IIP Regulation, once approved by the Board, the IIP mechanism would allow the utility to accelerate these qualifying capital investments and obtain accelerated recovery for these investments.

Q. As defined by the Board, what projects are eligible for accelerated cost recovery under the IIP Regulation?

A. Projects eligible under the accelerated cost recovery mechanism as established by the IIP Regulation must enhance safety, reliability and/or resiliency and must be

[3] N.J.A.C. 14:3-2A.1(b)
[4] N.J.A.C. 14:3-2A.5(b)3

non-revenue producing.[5] It is our understanding that program eligibility must be supported by engineering evaluations and cost benefit analyses to be provided by the utility.[6] Also, the projects eligible under the IIP must be incremental to the annual baseline spending levels established by the Board.[7]

Q. Please describe additional eligibility requirements of the regulation.

A. Another critical eligibility criterion of the IIP Regulation is the Board's requirement that:

> Only expenditures that are in excess of the annual baseline spending levels established by the Board and that meet the other requirements of this subchapter shall be eligible for accelerated recovery pursuant to N.J.A.C. 14:3-2A.6.

We believe that the Board incorporated this provision to ensure that eligible programs would not replace or supplant the Company's normal distribution spending to provide safe and reliable service to customers. We do not think that the Board intended the Company to reduce baseline distribution infrastructure budgets and to shift normal reliability projects to the proposed infrastructure investment program.

IV. ACE INFRASTRUCTURE INVESTMENT PLAN

Q. Please summarize the Company's proposed IIP spending.

A. The Company is seeking Board approval to spend $338 million between 2019 through 2022 for its IIP. Witness Bryan Clark's direct testimony provides a

[5] N.J.A.C. 14:3-2A.1(a)
[6] N.J.A.C. 14:3-2A.5(b)
[7] N.J.A.C. 14:3-2A.3(d)

summary of the Company's proposed IIP capital spending between 2019 - 2022. We have provided a graphical representation of the capital spending below:

Schedule 1 Proposed ACE IIP Budgets for 2019-2022[8]

	2019	2020	2021	2022
Targeted Reliability Improvement	$18.6	$19.7	$14.7	$13.4
Infrastructure Renewal	$26.9	$19.1	$23.8	$33.4
Facilities	$13.3	$14.7	$0.0	$1.4
Emergency	$16.9	$17.7	$5.6	$6.0
DA/Telecom	$32.9	$30.4	$17.0	$12.9
Total	$108.6	$101.6	$61.1	$67.1

The Company's proposed IIP spending is concentrated in five categories.

Q. What are the five budget categories of the Company's IIP spending?

A. The five categories of the Company's IIP plan are described below:

Targeted Reliability Improvements: The Company describes its Targeted Reliability Improvements as projects that will provide reliability improvements to the Company's distribution system. The Company cites priority feeder and comprehensive feeder improvement projects as significant drivers of this category. In addition, the Company includes recloser improvements and installation of capacitors and other substation infrastructure under this category.

[8] Direct Testimony of Bryan Clark. February 28, 2018. Table 5.

The Company proposes to spend $66.4 million on these projects over the four-year period.

Infrastructure Renewal: The Company's Infrastructure Renewal category includes projects that upgrade, replace or repair system infrastructure with a focus on equipment near substations—such as switchgear and transformers. This category would also include the retiring of substations. Additionally, the Company has included feeder conversions from 4 kV to 12 kV, the replacement of deteriorated underground residential distribution cable, and/or pole replacement work.[9] The Company proposes to spend $103.2 million on these projects over the four-year period.

Facilities: The Company's Facilities category includes projects that provide physical and logistical support facilities. These include vehicle fueling stations and a new operations center building. The Company is proposing to spend $29.4 million on facilities over the four-year period.

Emergency: Emergency category allocates spending for addressing unforeseen scenarios or emergencies on the Company's distribution system. The Company has indicated that the spending amounts are preliminary estimates and may vary from year to year depending upon events.[10] The Company proposes to allocate $46.2 million for emergencies over the four-year period.

Distribution Automation/ Telecom: The Company's proposed Distribution Automation ("DA") includes the continued deployment of smart grid technology

[9] Direct Testimony on Bryan Clark. February 28, 2018. Appendix page 7.
[10] Direct Testimony of Bryan Clark. Appendix page 9.

and includes automatic sectionalizing and restoration ("ASR") schemes that improve system reliability by automatically isolating faults and restoring unaffected portions of feeders through advanced sensors, controls, and communications systems. The Company has indicated that candidate ASR scheme feeders would be identified based on the frequency of permanent (substation and recloser level) lockout events.[11] This category also includes telecommunications investments to support DA equipment. The Company has indicated that the investments would entail ACE's wireless mesh communications network, on a private network from a broadband provider, or on a newly established private broadband network. The Company proposes to spend $93.2 million on this category over the four-year period.

Q. Did the IIP Regulation mandate minimum filing requirements for IIP petitions?

A. Yes, in addition to supplemental information that may be required by the Board detailed in N.J.A.C. 14:3 2A.5(b). The minimum filing requirements to be filed as part of an IIP petition include:

1. Projected annual capital expenditure budgets for a five-year period, identified by major categories of expenditures;
2. Actual annual capital expenditures for the previous five years, identified by major categories of expenditures;
3. An engineering evaluation and report identifying the specific projects to be included in the proposed Infrastructure Investment Program, with descriptions of project objectives-including the specific expected resilience benefits, detailed cost estimates, in service dates, and any applicable cost-benefit analysis for each project;

[11] Direct Testimony of Bryan Clark. Appendix page 5.

4. An Infrastructure Investment Program budget setting forth annual budget expenditures;
5. A proposal addressing when the utility intends to file its next base rate case, consistent with N.J.A.C. 14:3-2A.6(f);
6. Proposed annual baseline spending levels, consistent with N.J.A.C. 14:3-2A.3(a) and (b);
7. The maximum dollar amount, in aggregate, the utility seeks to recover through the Infrastructure Investment Program; and
8. The estimated rate impact of the proposed Infrastructure Investment Program on customers.[12]

The Company's Petition would thus need to conform to these requirements for the Board to consider the eligibility of the ACE IIP projects.

Q. Did ACE's IIP petition meet the minimum filing requirements as required by the Board?

A. No. The Company's petition was deficient in several respects. First, the Company's petition did not include an engineering evaluation and report identifying specific projects as required by N.J.A.C. 14:3-2A.5(b)3. The Company's petition included a 13-page appendix that provided annual spending budgets for each individual project for the period 2019-2022.[13] We do not believe that the appendix qualifies as an "engineering report" since there were no detailed analyses provided for any of the individual projects proposed. Second, the Company's petition lacked any applicable cost benefit analyses for each project as required under N.J.A.C. 14:3-2A.5 (b)3. Third, the Company's petition did not provide in-service dates for any of the individual projects as required under N.J.A.C. 14:3-2A.5 (b)3.

[12] N.J.A.C. 14:3-2A.5(b)
[13] Direct testimony of Bryan Clark. February 28, 2018. Appendix.

Q. What would an appropriate engineering report look like?

A. N.J.A.C. 14:3-2A.5(b)3 lists as a filing requirement engineering evaluation and report that would be part of an IIP Regulation petition. However, we recognize that the IIP Regulation is a new law with details yet to be determined by the Board. Therefore, for illustrative purposes, we have attached as **Attachment RC-ENG-3** a list of elements that should be included in any engineering report filed under the IIP for the Board's consideration. Ideally, the information should be provided in a form of a template that is uniform across all IIP filings. We believe that a standardized engineering report with full and complete information will provide practical benefits for the Board and the parties to any IIP proceeding. For petitioners, a standard template form provides certainty to what information should be included. For stakeholders, a template allows for a more expeditious review process since required information will be standardized. In addition, a standard report form will allow the Board to compare projects across utilities in a more systematic manner and allow the Board to better track projects.

Q. Please summarize your recommendations to the Board regarding the Company's IIP petition as submitted.

A. As we have noted above, we find that the Company's IIP petition was deficient in several respects that leaves the Board with insufficient evidence to grant ACE's request. We believe solely on that basis the Board should reject the filed petition. However, should the Board consider ACE's IIP Petition despite these

deficiencies, we recommend the Board adopt several adjustments described in the following sections of our testimony.

V. HISTORICAL DISTRIBUTION CAPITAL SPENDING TO ESTABLISH BASELINE SPENDING

Q. Please summarize your recommendations regarding the Company's proposed baseline spending.

A. We find that the Company's projected baseline spending of $60 million per year is well below historical trends. We recommend that the annual baseline spending levels should be established based on five years of historical capital and O&M spending which includes all previously proposed projects included in prior rate case filings and not part of a special infrastructure programs. Our analysis indicates that the Company's five-year historical spending (2013-2017) has averaged $146 million per year. The Board should use the historical spending as the starting point for baseline spending.

Q. Does the Regulation establish baseline spending requirements?

A. The IIP Regulation requires the establishment of baseline spending levels under N.J.A.C. 14:3-2A.3(b) and requires infrastructure program spending to be incremental to baseline spending in N.J.A.C. 14:3-2A.3 (d). The language of N.J.A.C. 14:3-2A.3(b) states:

> In proposing annual baseline spending levels, the utility shall provide appropriate data to justify the proposed annual baseline spending levels, which may include historical capital expenditure budgets, projected capital expenditure budgets, depreciation expenses, and/or any other data relevant to the utility's proposed baseline spending level.

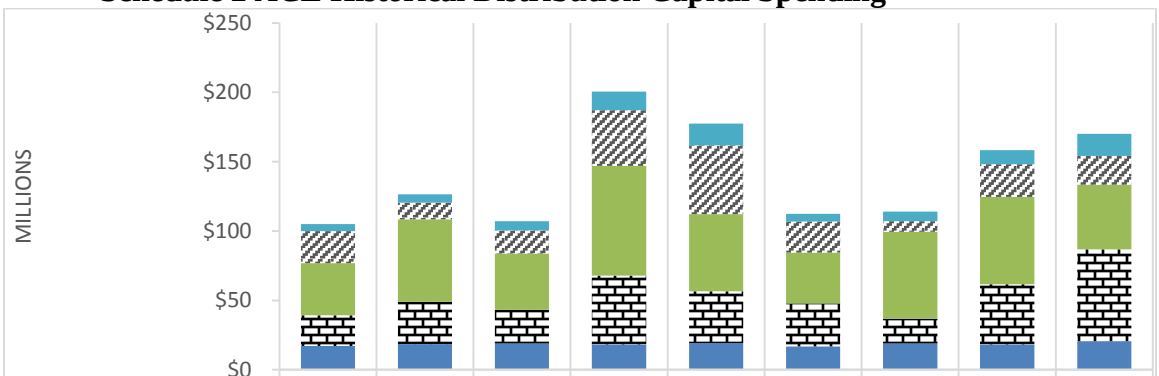
Additionally, the language of N.J.A.C. 14:3-2A.3(d) states:

> Only expenditures that are in excess of the annual baseline spending levels established by the Board and that meet the other requirements of this subchapter shall be eligible for accelerated recovery pursuant to N.J.A.C. 14:3-2A.6.

Q. Does the Company provide a summary of historical baseline spending in its Petition?

A. Yes, ACE Witness Mr. Kevin McGowan's direct testimony provides a summary of the Company's historical capital spending through 2017. The Company's overall distribution capital spending are presented below.

Schedule 2 ACE Historical Distribution Capital Spending[14]



	2009	2010	2011	2012	2013	2014	2015	2016	2017
General Plant	$5.2	$6.2	$6.7	$13.5	$15.7	$5.6	$6.9	$10.2	$15.9
Load Growth	$23.0	$12.0	$16.7	$40.1	$49.6	$22.3	$7.5	$23.6	$20.8
Reliability Emergency	$37.7	$59.5	$40.6	$79.2	$55.6	$36.7	$62.8	$62.9	$46.5
Reliability Planned	$22.0	$30.3	$24.1	$49.6	$37.5	$30.8	$17.9	$43.3	$66.4
Customer Driven	$17.2	$18.6	$19.1	$18.2	$19.2	$17.0	$18.9	$18.4	$20.50
Total	$105.1	$126.6	$107.2	$200.6	$177.6	$112.4	$114.0	$158.4	$170.1

Schedule 2 shows the breakdown of the five capital spending categories as defined by the Company. Overall, the Company's distribution capital spending has generally increased from 2009 and 2011 levels. These expenditures are inclusive of the 2011 Reliability Improvement Program ("RIP") program as

[14] Direct Testimony of Kevin McGowan. February 28, 2018. Table 1

discussed below. The Company's five-year (2013-2017) annual distribution capital spending average is $146.5 million.

Q. Does the Company provide a projected baseline spending amount in its Petition?

A. Yes, the Company has asserted that its baseline spending is equal to its annual depreciation expense.[15] The Company has determined its annual depreciation expense to be $60 million per year based on 2017 calendar year results.[16] For the purposes of our testimony, we do not specifically comment on the appropriateness of the Company's $60 million depreciation expense.

Q. Are depreciation expenses one of the components identified by the Board when establishing baseline spending amounts?

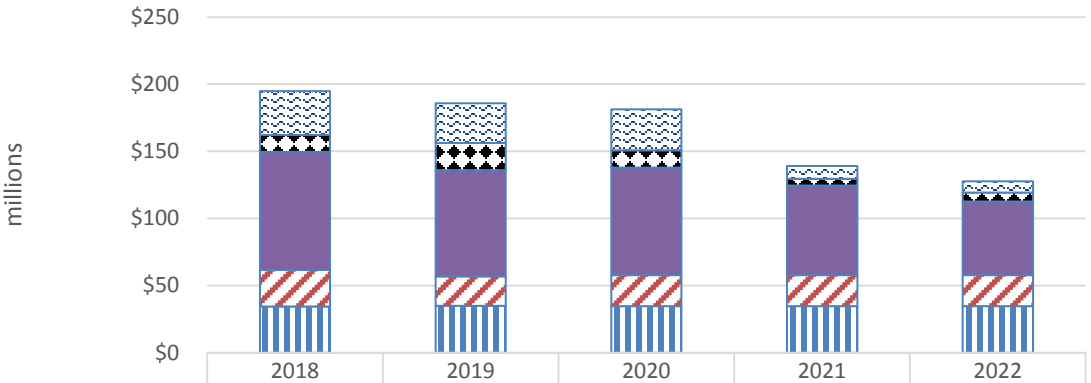
A. While the Board did identify depreciation expenses as a factor in establishing baseline spending levels, the important distinction is that the Board also included historical capital expenditure budgets, projected capital expenditure budgets, and/or any other data relevant to the utility's proposed baseline spending level. We do not believe that the Board intended that depreciation expenses be the sole determinant for establishing the Company's baseline spending. The depreciation expenses are not the same as past spending levels and are not reflective of the actual costs required by the Company to maintain its distribution system.

[15] Direct Testimony of Kevin McGowan. February 28, 2018. Page 9, lines 6-10.
[16] Ibid. Page 11, lines 21-23.

Q. Does the Company's Petition include an overall distribution capital budget projection inclusive of ACE's IIP costs and baseline spending?

A. Yes, the Company provides an overall projected distribution spending summary for 2018-2022. We have provided a summary of the Company's projected budget in the following figure that include both baseline and IIP spending.

Schedule 3 ACE's Forecasted Distribution Spending Categories[17]



	2018	2019	2020	2021	2022
General Plant	$32.5	$29.5	$30.5	$9.5	$8.4
Load Growth	$12.8	$20.3	$12.8	$5.1	$6.7
Rel. Planned	$87.9	$79.2	$80.2	$66.8	$54.7
Customer Driven	$27.0	$21.9	$23.0	$23.0	$23.1
Emergency	$34.6	$34.9	$34.8	$34.8	$34.8
Total	$194.8	$185.8	$181.3	$139.2	$127.7

We present both the five-year (2018-2022) and four-year (2019-2022) budgets since we are in September 2018, with almost three quarters of the year already passed. ACE's five-year (2018-2022) and four-year (2019-2022) total projected distribution capital spending amounts are $828 and $634 million respectively. The annual average for the five-year and four-year periods are $165.8 and $158.5 million per year. We also note that under the Exelon-Pepco Holdings merger

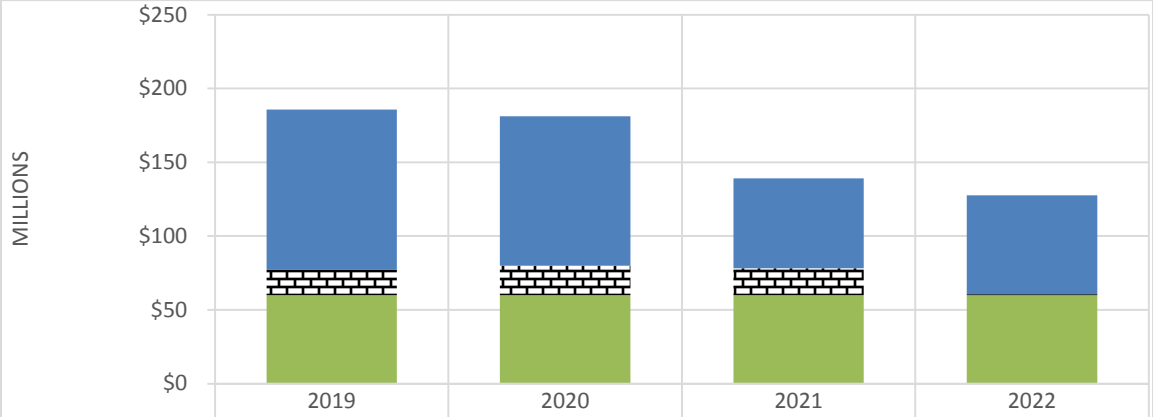
[17] Direct Testimony of Witness Clark, Table 4, Pg. 7

commitments, Exelon committed to spend $52.9 million in 2018, and $48.1 million in 2019 for the Company's Reliability Improvement Plan.[18]

Q. Does the Company provide projected distribution capital spending categorized by baseline and IIP spending?

A. Yes, the Company does provide a summary of its projected spending that we presented in Schedule 3, but recategorized based on both baseline, IIP, and RIP spending. We present the 2019-2022 projected spending based on the Company's recategorization in the following figure.

Schedule 4 ACE's 2019-2022 Total Distribution Spending Budgets Categorized by Proposed Baseline, Proposed ACE IIP, and PowerAhead[19]



	2019	2020	2021	2022
IIP Spend	$108.6	$101.4	$61.1	$67.1
PowerAhead	$17.2	$19.9	$18.1	$0.6
Baseline Spend	$60.0	$60.0	$60.0	$60.0
TOTAL	$185.8	$181.3	$139.2	$127.7

Schedule 4 shows the total distribution spending split among the Company's proposed annual baseline spending, the ACE IIP spending proposal and the

[18] I/M/O Merger of Exelon Corporation and Pepco Holdings. BPU Docket EM14060581. Order March 6, 2015.
[19] Direct Testimony of McGowan, Table 2, Pg. 9

Company's PowerAhead program that was the subject of BPU Docket ER16030252.[20] The schedule shows that ACE's proposed IIP would comprise 44 to 58 percent of the Company's projected annual distribution capital spending depending on the year. Over the entire 2019-2022 period, the Company's IIP program would represent 53 percent of the Company's total distribution capital spending. We do not believe that the Board intended the IIP program to comprise over one half of the Company's total distribution spending. The language of the IIP Regulation seeks to "enhance the reliability, resiliency and safety of the grid" and "encourages and supports necessary accelerated construction, installation, and rehabilitation of certain utility plants and equipment."[21] The IIP Regulation was not intended to replace the normal treatment of distribution spending required to provide safe and reliable service.[22] By including 53 percent of the projected distribution in its proposed IIP, ACE has transformed a program designed to enhance spending on "certain utility plant and equipment" into a cost recovery mechanism for most of the Company's distribution capital spending. This was not the intent of the IIP Regulation.

[20] BPU No. ER16030252. Under the stipulation, the Company will spend $79 million over a five-year period on projects to improve storm resiliency. We understand that the Company has excluded PowerAhead spending from its proposed IIP (RCR-E-8). In addition, we understand the Company has not filed an recovery adjustment filing for its PowerAhead program.
[21] N.J.A.C. 14:3-2A.1(b)
[22] N.J.A.C. 14:3-2A.1(a)

Q. Are there other components to the Company's distribution budget that the Board should consider as part of baseline spending in its review of ACE's IIP petition?

A. Yes, we believe that the Company's RIP should be considered as part of the Company's baseline spending since the RIP predates and is independent of the IIP petition.

Q. Please describe the background of the Reliability Improvement Program.

ACE's reliability performance was cited as a concern in the Company's 2009 base rate case.[23] In that proceeding, the parties (Board Staff, Rate Counsel, and the Company) agreed to enter a Phase II proceeding to address reliability concerns among other matters.[24] The resulting 2011 stipulation that forms the basis of the RIP requires the Company to improve two key performance metrics - SAIDI (System Average Interruption Duration Index), and SAIFI (System Average Interruption Frequency Index).[25]

The primary goals of the RIP were to achieve:

- A SAIDI of 160 minutes from a 2009 baseline of 211 minutes (a 25 percent reduction), and

[23] I/M/O ACE, BPU Docket No. ER09080664. Order May 22, 2010.
[24] I/M/) ACE, BPU Docket Nos. EO09010049 and EO09010054. Order May 16, 2011.
[25] SAIDI is the metric that represents the average duration of sustained interruptions for the system during the year (in minutes). SAIFI represents the average frequency of sustained interruptions per customer during the year. CAIDI represents the average duration of sustained interruptions experienced by customers. Lower values for SAIDI, SAIFI, and CAIDI indicate improved reliability.

- A SAIFI of 1.3 events from a 2009 baseline of 1.61 events (20 percent reduction).[26]

Q. Did the Company achieve the Reliability Goals stated in the RIP?

A. The goals laid out in the 2011 RIP stipulation were achieved in 2016. The Company achieved a 2016 SAIFI of 1.18 events and a 2016 SAIDI of 125 minutes. It is self-evident that a SAIDI of 125 minutes is lower than the RIP target of 160 minutes, and a SAIFI of 1.18 events is lower than the RIP target of 1.3 events.[27] Moreover, these reported reliability metrics meet the Company's minimum reliability standards set forth under N.J.A.C. 14:5-8.2.[28] For the Company, the minimum reliability level for SAIFI is 1.71 and for CAIDI is 144 minutes.[29]

Q. Has the Company extended its RIP reliability commitments beyond the 2011 Stipulation that would affect any consideration of an infrastructure investment program?

A. Yes, as part of the Exelon/Pepco Holdings merger ("Merger") settlement of 2015, Exelon made reliability commitments for ACE to continue to spend on RIP projects upon completion of the merger and for ACE to meet specified reliability targets by 2020.[30] These commitments are 1.05 for SAIFI and 100 minutes for

[26] Ibid. Page 7.
[27] RCR-E-111 Attachment 1
[28] N.J.A.C. 14:5-8.2
[29] RCR-E-111 Attachment 1. The CAIDI of 144 minutes is equal to a SAIDI of 246 minutes since SAIDI is equal to SAIFI times CAIDI.
[30] *Order Approving Stipulation of Merger Settlement.* BPU Docket No. EM14060581. February 11, 2015. Page 12. The calculations for the 2020 reliability commitments is based on a three-year historical average.

CAIDI on a three-year moving average. The 2020 Merger reliability commitments are more stringent than the 2011 RIP commitments.[31] Because these commitments were made prior to ACE's IIP filing, we do not consider the spending needed to meet the Merger reliability commitments to be incremental to the Company's current baseline spending.

Q. Has the Company met its Merger reliability commitments ahead of schedule?

A. Yes. The Company's 2017 three-year average SAIFI was 1.02, and three-year average CAIDI was 88.[32] Both are below the Merger reliability commitments for 2020. We consider the Company's improvements in reliability performance to lessen any urgent need to accelerate distribution spending.

Q. What were the commitments on RIP spending made as part of the Merger?

A. Exelon made a commitment that it would continue the RIP and would maintain the levels of spending on the RIP that are described generally in Mr. McGowan's direct testimony.[33] The spending commitments from the Merger Stipulation are provided below:

[31] Direct Testimony of Bryan Clark, Page 4, lines 1-2.
[32] RCR-E-5
[33] Direct Testimony of Kevin McGowan. Page 17, lines 14-22.

Schedule 5 Merger RIP Commitments (millions)

Categories	2014	2015	2016	2017	2018	2019	2017-2019
Priority Feeders	$7.8	$5.0	$10.0	$10.0	$10.0	$5.0	$25.0
Load Growth	$20.1	$7.4	$23.2	$19.4	$23.5	$30.8	$73.7
Distribution Automation	$3.3	$3.3	$10.6	$8.6	$8.6	$6.1	$23.3
Feeder Improvement Plan	$6.7	$4.7	$7.5	$8.0	$8.5	$5.5	$22.0
Substation Improvement	$3.6	$1.5	$3.8	$4.6	$2.3	$0.7	$7.6
Total	$41.5	$21.9	$55.1	$50.6	$52.9	$48.1	$151.6
Vegetation Management	$14.4	$14.6	$14.6	$14.6	$14.6	$14.6	$43.8
Notes							
Exelon Merger Stipulation. Docket EM14060581, February 11, 2015							

We have accordingly incorporated the Company's RIP spending in our estimates of baseline spending and recommend that future RIP spending be included as part of baseline spending, not part of ACE's IIP.

Q. What is your recommendation on how to determine baseline spending levels?

A. We recommend that the Board require the Company to establish a baseline spending level that approximates the Company's historical annual spending of approximately $146 million for the last five years.

VI. RATE COUNSEL ADJUSTMENTS TO IIP

Q. What are your recommended adjustments to the ACE IIP?

A. As detailed below, we recommend that the Board approve a four-year $20 million infrastructure investment program for the Company. Our adjustments to the Company's proposed $338 million program exclude many projects that should be considered regular and routine distribution spending.

Q. Please describe the process you followed to determine what projects should be excluded in the ACE IIP.

A. Our process for determining qualifying projects is detailed below. First, qualifying projects must be incremental to baseline spending amounts. We recommend that approved programs be incremental to the calculated historical capital budget and O&M budget spending before being included in the program. As noted, based on historical capital and O&M spending for the past five years, the baseline spending should be $146 million. Second, we would consider the replacement of facilities or retirement of facilities that have reached their end of life to be normal reliability spending that should be done as part of baseline spending, not IIP spending through a clause. Third, there must be an engineering report for each proposed project. The engineering report must identify specific benefits and an applicable cost benefit analysis. Additionally, the engineering report should include project objectives, expected resiliency benefits, detailed cost estimates, and in-service dates. The Company's brief project summaries do not meet this requirement. Fourth, we interpret the regulation's language to only include those facilities that are not directly connected to customers to be non-revenue producing. This would exclude equipment such as meters, down-drops, line extensions, etc. Because these projects ultimately result in increased revenues for the Company through additional customers consuming electricity, we consider them revenue generating.

Q. Based on these recommendations, do you have an adjusted infrastructure investment program?

A. Yes, we recommend a number of adjustments to the Company's proposed infrastructure investment program that fall into five specific categories of projects. These categories are: RIP, blankets, retirements, upgrades, and facilities and are described in detail below. As we have noted previously, the IIP Regulation was not intended to replace normal distribution capital spending; it was meant to enhance and accelerate certain projects. Nor was the IIP Regulation designed to provide accelerated cost recovery for prior reliability spending commitments.

Q. Please describe your adjustments for RIP projects.

A. We have identified $73 million in RIP spending that should not be considered part of the Company's proposed IIP. As we have noted earlier, the Company has made a commitment in stipulations to continue its RIP program separate from and prior to the IIP petition. This $73 million represents RIP-related projects included in the Company's IIP Petition in the following three categories: Load Growth, Distribution Automation, and Feeder Improvements. The Load Growth category includes $6.1 million of projects between 2019-2022 that were identified under both the RIP and IIP Petition.[34] The Feeder Improvement category includes $16.1

[34] RCR-E-11 Attachment 2

million of RIP projects between 2019-2022.[35] The Distribution Automation category includes $51.1 million of RIP projects between 2019-2022.[36]

Q. Please describe your adjustments for Blanket projects.

A. We have identified approximately $126 million of capital spending that we categorize as blanket spending, which should be undertaken in the normal course of utility operations. We define "Blankets" as general spending categories that involve multiple small projects. Excluded Blanket projects include the following example projects:

- ACE Emergency Overhead Restoration Blanket: $45 million
- ACE Comprehensive Feeder Improvement Blanket: $21.8 million
- ACE Dispatch radio improvement Blanket: $311,909.

Moreover, the Company did not provide the supporting information under N.J.A.C. 14:3-2A.5(b) for these projects.

Q. Please describe your adjustments for Replace/Retire projects.

A. We have identified approximately $86 million of capital spending for what we would categorize as "Replace/Retire" spending, which should be undertaken as the normal course of utility operations. We would define Replace/Retire as those projects that are retiring facilities that are at the end of their service life. For example, these include the following projects:

- Gibbstown Substation: retire 34/4KV substation: $640,000

[35] RCR-E-9 Attachment 2
[36] RCR-E-10 Attachment 2

- Distribution Pole Replacements: $18 million
- Install and replace automatic circuit reclosers (SCR) controls: $36 million
- Retire River Substation: $100,000.

Moreover, the Company did not provide the supporting information under N.J.A.C. 14:3-2A.5(b) for these projects.

Q. Please describe your adjustments for Upgrade projects.

A. We have identified approximately $63 million of capital spending for what we would categorize as "Upgrade" spending, which should be undertaken in the normal course of utility operations. We would define Upgrades as those projects that either are system upgrades or the result of meeting new business. For example, these include the following projects:

- Motts Farm- distribution line upgrades: $350,000
- Terrace Substation install switchgear and upgrade transformers: $13.8 million
- Newport Substation establish new 69/12 kV substation: $6.2 million.

Moreover, the Company did not provide the supporting information under N.J.A.C. 14:3-2A.5(b) for these projects.

Q. Please describe your adjustments for Facilities projects.

A. We have identified approximately $29 million of capital spending for what we would categorize as "Facilities" spending, which should be undertaken as the normal course of utility operations. We would define Facilities as those projects that result in the replacement or construction of new distribution facilities. These include the following three projects:

- Pleasantville Fuel Island upgrade: $1.4 million
- Bridgeton Fuel Island Replacement: $1.4 million
- New operations building: $26.5 million

[Begin Confidential]

[End Confidential] The Company's new operations building is a project that had been proposed, but was not approved, as part of the original PowerAhead petition. We believe that the Company can elect to proceed with the project under normal base rates, not under this clause mechanism. Moreover, the Company did not provide the supporting information under N.J.A.C. 14:3-2A.5(b) for these projects.

Q. Are there possible infrastructure investment program projects that you would recommend the Board to approve?

A. Yes. Notwithstanding the identified deficiencies of the ACE IIP in meeting the requirements set forth under N.J.A.C. 14:3-2A.5(b), we have identified $21 million of proposed projects over the four-year period that may meet our criteria for the infrastructure investment program, if supported by documentation. This translates to an annual ACE IIP spend of $5 million. These projects are predominantly distribution automation projects that incorporate elements of advanced communications to enable remote control and operation. Example projects include:

- Replace SSN Access Points and repeater batteries- Cape May: $18,566

[37] RCR-E-24, and RCR-E-26.

- Install Radio Controls for ACE capacitors: $13.3 million
- Add Recloser control capability: $713,218

The Company will also need to demonstrate the reasonableness and prudency of these selected projects in a future rate case. Moreover, these ACE IIP projects require the Company to invest a baseline spending amount of $146 million per year before recovering the incremental $5 million per year under the IIP Regulation cost recovery mechanism.

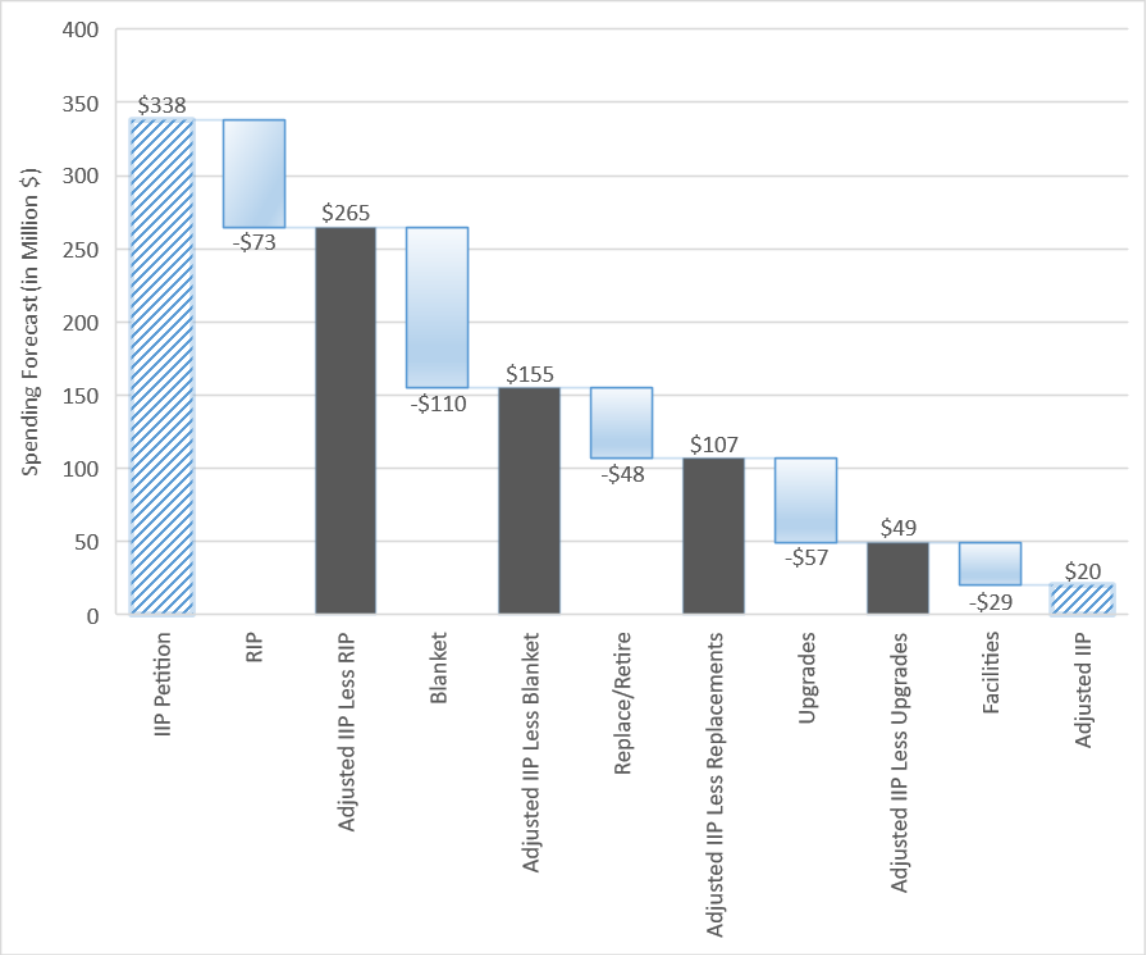
Q. Please describe why you included Distribution Automation projects in your adjusted ACE IIP recommendations.

A. We include distribution automation projects that are incremental to baseline spending since Distribution Automation projects are specifically referenced in the IIP Regulation. However, distribution automation projects must also be integral to the distribution automation system itself and not a normal protection system or routine customer reliability expenditure. For example, a project to install an intelligent recloser that can operate in coordination with other distribution automation equipment and under the control of a distribution automation system would be included. On the other hand, a simple recloser or relay that operates independently from other devices should be excluded from the ACE IIP.

Q. Please summarize your adjustments to the Company's petition.

A. Our adjustments to the Company's petition are shown below.

Schedule 6 Rate Counsel Adjustments to IIP.[38]



Our adjustments reduce the Company's four-year $338 million petition to $20 million and focuses the IIP to concentrate on incremental Distribution Automation spending.

[38] Direct Testimony on Witness Clark. Appendix page 3-12

Q. How do your adjustments conform to the five budget categories identified in the Company's petition and described earlier in your testimony?

A. Our adjustments would be applied to each of the Company's five spending categories identified in the petition and described earlier in our testimony. For example, within the Company's proposed $103 million spending for the Infrastructure Renewal category, we have categorized the following as ineligible for IIP cost recovery: 1) blanket spending (e.g. UDLACHOCX Facilities Highway relocations and UDSARD8B Atlantic Distribution substation relay blanket); 2) retirements (e.g. UDSARD8R7 Gibbstown Substation: Retire 34/4 kV substation and UDSARD8R Valley- Retire 34/12 kV substation); and 3) upgrades (e.g. UDLALMS2 Moss Mill/ CN Distribution Upgrades and UDLARWN3 Mantua substation line work).

Q. Do you find the proposed IIP projects to be imprudent?

A. The determination whether the excluded projects are prudent should be addressed in the Company's next base rate case proceeding. In this proceeding, we do not assess the reasonableness or prudency of these projects. We are strictly determining whether these projects should be included in the ACE IIP, and therefore subject to the special cost recovery provisions allowed under the Board's IIP Regulation.

Q. How do your adjustments compare with the Company's overall historical distribution budgets.

A. Our adjustments to the ACE IIP results in a total $20 million program, or about $5 million per year over the 2019-2022 period. If we take the five-year historical average of $146 million and add our recommended $5 million per year, this would result in an overall budget of $151 million per year. As we have noted earlier in our direct testimony, the Company's projected annual average spending for 2019-2022 shown in Schedules 3 and 4 is $158 million.

VII. CONCLUSIONS AND RECOMMENDATIONS

Q. What are your recommendations?

A. Our findings and recommendations are summarized as follows:

- The lack of in-service dates as required under N.J.A.C. 14:3-2A.5(b)3 renders ACE's petition insufficient.
- The lack of applicable benefit cost analyses as required under N.J.A.C. 14:3-2A.5(b)3 renders ACE's petition insufficient.
- The lack of detailed engineering reports as required under N.J.A.C. 14:3-2A.5(b)3 renders ACE's petition insufficient.
- The Company's proposed baseline spending of $60 million per year based on depreciation expenses understates its baseline expenditures. The Company's five-year historical spending of $146 million is a more accurate baseline spending level that should be used in this proceeding.

Notwithstanding the deficiencies of the ACE IIP petition, if the Board were to proceed with approval of the ACE IIP, we recommend that only $20 million of the ACE IIP be approved. The $20 million IIP budget reflects our adjustments to the Company's proposal removing: (1) the Company's existing Reliability Improvement Program ("RIP"), (2) blanket spending that should not receive accelerated recovery, (3) retirement and replacement spending that should not receive accelerated recovery, (4) upgrade spending that should not receive accelerated recovery, and 5) facilities spending that should not receive accelerated recovery. The $20 million for distribution automation projects would still need to meet the IIP Regulation filing requirements to provide adequate supporting documentation consistent with N.J.A.C. 14:3-2A.5.

Q. Does this conclude your testimony?

A. Yes. However, we reserve our right to modify our testimony based on additional information provided by the Company.

ATTACHMENTS

Charles P. Salamone P.E.

Profession: Power systems analysis and assessment, with a special emphasis on transmission planning, performance and design

Nationality: U.S. Citizen

Years of Experience: 40 years

Education B.S.E.E, Power System Engineering, 1973
Gannon University, Erie, PA

Position: Owner/Manager, Cape Power Systems Consulting

Web/Email: www.CapePowerSystems.com csalamone@capepowersystems.com

Contact Number: 774-271-0383

Summary: Mr. Salamone provides professional services based on 40 years of electric utility industry experience in the areas of Transmission Planning, Substation Planning, Distribution Planning, ISO-New England Planning Procedures, New England Power Pool Procedures, Congestion Management, Generator Interconnections, Planning/Capital Budget Management, Meter Engineering, and State (Mass DPU and New Jersey Rate Council) and Federal (FERC) Regulatory Agency Filing Development and Expert Witness Testimony

Experience:

2005- Pres. **Cape Power Systems Consulting**
Established a power system design, analysis, planning and assessment consulting company to work directly with diverse power system stakeholders.

- Worked with a number of clients for the development of analysis, reports and presentations in support of regulatory and technical review/approval process for transmission and distribution projects
- Provided technical assistance for transmission planning activities for an Independent System Operator including support for major transmission system expansion programs and development of a 10 year transmission plan
- Worked with a large Massachusetts Utility as an expert witness in support of State regulatory reviews for the siting of a major transmission system upgrade plan

- Worked with state regulatory agencies in support of electric utility rate case proceedings including expert witness testimony and assessment of electric utility performance
- Worked with multiple state regulatory agencies in support of review of electric utility smart grid initiatives including review of the technical performance, system benefits and viability of proposed electric utility programs
- Developed and conducted a comprehensive training program for implementation of an Energy Management System (EMS) based transmission system security assessment application for a large Massachusetts utility
- Worked with clients to conduct load flow assessment of transmission system performance for feasibility and reliability performance studies across New England and New York

1979-2005 NSTAR (Previously Boston Edison and Commonwealth Electric)

2000-2005 ***Director System Planning***

NSTAR (Previously Boston Edison and Commonwealth Electric) Boston, MA

- Responsible for long term planning of Company transmission, substation and distribution systems
- Successfully managed the studies, design, internal and external review and regulatory approval for a $250M 345 kV underground transmission expansion project serving the greater Boston area
- Managed numerous generator interconnection studies, design and approvals
- Successfully managed studies, design and approval for congestion mitigation plans and expansion project
- Oversaw transmission and distribution planning efforts to establish a comprehensive 10 year $300 million system expansion plan
- Served as Company representative on NEPOOL Reliability Committee and the New England Transmission Expansion Advisory Committee
- Served as Company expert witness for system planning related regulatory proceedings at both the state and federal levels.
- Supervised a staff of 10 senior engineers

1989-1999 ***Manager, System Planning and Meter Services***

Commonwealth Electric Company, Wareham, MA

- Develop risk based prioritized $10 million construction budget procedures
- Supervise a staff of 6 professional engineers and 4 analysts
- Served as chair of the NEPOOL Regional Transmission Planning Committee (currently the NEPOOL Reliability Committee)
- Process billing determinant and interval data for all major system customers
- Lead implementation of first MV90 meter data processing system
- Develop annual performance analysis reports for all transmission and major distribution systems

- Manage multiple FERC tariff based transmission customer and generation developer system impact studies
- Served as expert Company witness in State and FERC regulatory proceedings
- Implemented a risk index for prioritization of all transmission and major distribution construction projects
- Implemented automated electronic processing of major customer billing data, which significantly reduced time needed to generate bills
- Served as lead member on information technology company merger team
- Implemented process and equipment to perform all tie line, generator and wholesale customer meter testing
- Served as chair of the NEPOOL Planning Process Subcommittee, which established numerous NEPOOL policies for transmission/generator owners
- Served as Vice-Chair of the NEPOOL Reliability Committee

1984-1989 ***Meter Engineer***

Commonwealth Electric Company, Plymouth, MA

- Designed and supervised installation of 15 generator meter data recorders
- Developed customer load plotting and analysis software
- Developed meter equipment order data processing system for four remote offices
- Implemented PC control of meter test boards, which significantly reduced processing and record keeping time
- Managed programming of all electronic meter registers to insure accurate data registration

1979-1984 ***Computer Application Engineer***

Commonwealth Electric Company, Wareham, MA

- Implemented numerous technical and analytical software applications for engineering analysis
- Served as member of decision team for implementation of a new SCADA system

1978-1979 **San Diego Gas & Electric, *Planning Engineer***

San Diego Gas & Electric Company, San Diego, CA

- Performed extensive stability analysis for a new 230 kV transmission interconnection with Mexico
- Performed transmission design and performance analysis for a new 250 mile 500 kV line from San Diego to Arizona

1973-1978 **New England Gas & Electric Association, *Planning Engineer***

New England Gas & Electric Association, Cambridge, MA

- Performed extensive stability analysis for a new 560 MW generating plant on Cape Cod
- Developed transmission plan for a new 345 kV transmission line on Cape Cod
- Developed plans for design and sighting of new 115 / 23 kV substations on Cape Cod

Maximilian Chang, Principal Associate

Synapse Energy Economics I 485 Massachusetts Avenue, Suite 2 I Cambridge, MA 02139 I 617-453-7027
mchang@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Principal Associate*, 2013 – present, *Associate*, 2008 – 2013.

Consults and provides analysis of technologies and policies, electric policy modeling, evaluation of air emissions of electricity generation, and other topics including energy efficiency, consumer advocacy, environmental compliance, and technology strategy within the energy industry. Conducts analysis in utility rate-cases focusing on reliability metrics and infrastructure issues and analyzes the benefits and costs of electric and natural gas energy efficiency measures and programs.

Environmental Health and Engineering, Newton, MA. *Senior Scientist*, 2001 – 2008.

Managed complex EPA-mandated abatement projects involving polychlorinated biphenyls (PCBs) in building-related materials. Provided green building assessment services for new and existing construction projects. Communicated and interpreted environmental data for clients and building occupants. Initiated and implemented web-based health and safety awareness training system used by laboratories and property management companies.

The Penobscot Group, Inc., Boston, MA. *Analyst*, 1994 – 2000.

Authored investment reports on Real Estate Investment Trusts (REITs) for buy-side research boutique. Advised institutional clients on REIT investment strategies and real estate asset exchanges for public equity transactions. Wrote and edited monthly publications of statistical and graphical comparison of coverage universe.

Harvard University Extension School, Cambridge, MA. *Teaching Assistant*, 1995 – 2002.

Teaching Assistant for Environmental Management I and Ocean Environments.

Brigham and Women's Hospital, Boston, MA. *Cancer Laboratory Technician*, 1992 – 1994.

Studied the biological mechanism of tumor eradication in mouse and human models. Organized and performed immunotherapy experiments for experimental cancer therapy. Analyzed and authored results in peer-reviewed scientific journals.

EDUCATION

Harvard University, Cambridge, MA
Master of Science in Environmental Science and Engineering, 2000

Cornell University, Ithaca, NY
Bachelor of Arts in Biology and Classics, 1992

REPORTS

Knight, P., Chang, M., White, D., Peluso, N., Ackerman, F., Hall, J., Chernick, P., Harper, S., Geller, S., Griffiths, B., Deman, L., Rosenkranz, J., Gifford, J., Yuen, P.Y., Snook, E., Shoesmith, J. 2018. *Avoided Energy Supply Costs in New England: 2018 Report.* Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Fagan, B., M. Chang, S. Fields. 2017. *Fair and Non-Discriminatory Transmission Access on Prince Edward Island: Compliance of Maritime Electric Company Ltd. (MECL) Open Access Transmission Tariff with US Federal Energy Regulatory Commission Standards*. Prepared by Synapse Energy Economics for Carr, Stevenson and Mackay (CSM), Counsel to the Prince Edward Island Regulatory and Appeals Commission.

Horowitz, A., A. Allison, N. Peluso, B. Fagan, M. Chang, D. Hurley, P. Peterson. 2017. *Comments on the United States Department of Energy's Proposed Grid Resiliency Pricing Rules (FERC Docket RM18-1-000)*. Prepared for Earthjustice.

Kallay, J., A. Napoleon, M. Chang. 2016. *Opportunities to Ramp Up Low-Income Energy Efficiency to Meet States and National Climate Policy Goals*. Synapse Energy Economics.

Malone, E., W. Ong, M. Chang. 2015. *State Net-to-Gross Ratios: Research Results and Analysis for Average State Net-to-Gross Ratios Used in Energy Efficiency Savings Estimates*. Synapse Energy Economics for the United States Environmental Protection Agency.

Vitolo, T., M. Chang, T. Comings, A. Allison. 2015. *Economic Benefits of the Proposed Coolidge Solar I Solar Project*. Synapse Energy Economics for Coolidge Solar I, LLC.

Chang, M. 2014. *Making the Grid More Resilient within Reason: Case Study in Public Service Electric and Gas "Energy Strong" Petition.*

White, D. E., M. Chang, B. Biewald. 2013. *State Energy Efficiency Embedded in Annual Energy Outlook Forecasts: 2013 Update*. Synapse Energy Economics for U.S. Environmental Protection Agency.

Hornby, R., P. Chernick, D. White, J. Rosenkranz, R. Denhardt, E. A. Stanton, J. Glifford, B. Grace, M. Chang, P. Luckow, T. Vitolo, P. Knight, B. Griffiths, B. Biewald. 2013. *Avoided Energy Supply Costs in New England: 2013 Report.* Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Nogee, A., M. Chang, P. Knight, E.A. Stanton. 2013. *Electricity Market Restructuring and the Nuclear Industry.* Synapse Energy Economics for Whitt Law.

Koplow, D., M. Chang. 2013. *Vogtle 3 and 4 Conditional Loan Guarantee: Review of Documents Pertaining to Department of Energy Conditional Loan Guarantees for Vogtle 3 & 4.* Synapse Energy Economics and Earth Track.

Chang, M., D. White, E. Hausman. 2012. *Risks to Ratepayers: An Examination of the Proposed William States Lee III Nuclear Generation Station, and the Implications of "Early Cost Recovery" Legislation.* Synapse Energy Economics for Consumers Against Rate Hikes.

Fagan, R., M. Chang, P. Knight, M. Schultz, T. Comings, E. Hausman, R. Wilson. 2012. *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region.* Synapse Energy Economics for Energy Future Coalition.

Chang, M., D. White, P. Knight, B. Biewald. 2012. *Energy Benefits Resulting from the Investment of 2010 RGGI Auction Revenues in Energy Efficiency*. Synapse Energy Economics for Regulatory Assistance Project.

Chang, M., D. White, E. Hausman, N. Hughes, B. Biewald. 2011. *Big Risks, Better Alternatives: An Examination of Two Nuclear Energy Projects in the US.* Synapse Energy Economics for Union of Concerned Scientists.

Hornby, R., P. Chernick, C. Swanson, D. White, J. Gifford, M. Chang, N. Hughes, M. Wittenstein, R. Wilson, B. Biewald. 2011. *Avoided Energy Supply Costs in New England: 2011 Report.* Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Chang, M., D. White, L. Johnston, B. Biewald. 2010. *Electricity Energy Efficiency Benefits of RGGI Proceeds: An Initial Analysis*. Synapse Energy Economics for Regulatory Assistance Project.

Fisher, J., J. Levy, P. Kirshen, R. Wilson, M. Chang, J. Kallay, C. James. 2010. *Co-Benefits of Energy Efficiency and Renewable Energy in Utah*. Synapse Energy Economics for the State of Utah Energy Office.

Napoleon, A., W. Steinhurst, M. Chang, K. Takahashi, R. Fagan. 2010. *Assessing the Multiple Benefits of Clean Energy: A Resource for States*. Synapse Energy Economics for US Environmental Protection Agency.

Hornby, R., P. Chernick, C. Swanson, D. White, I. Goodman, B. Grace, B. Biewald, C. James, B. Warfield, J. Gifford, M. Chang. 2009. *Avoided Energy Supply Costs in New England: 2009 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Biewald, B., D. White, J. Fisher, M. Chang, L. Johnston. 2009. Incorporating Carbon Dioxide Emissions Reductions in Benefit Calculations for Energy Efficiency: Comments on the Department of Energy's Methodology for Analysis of the Proposed Lighting Standard. Synapse Energy Economics for New York State Attorney General.

ABSTRACTS

Koehler, D., M. Chang. 1999. "Search and Disclosure: Corporate Environmental Reports." *Environment* 41 (2): 3.

Makoto, N., P. S. Goedegebuure, U. L. Burger, M. Chang, T. J. Eberlein. 1995. “Successful adoptive immunotherapy (AIT) is dependent on the infiltration of host CD8+ and CD4+ T cells into tumor.” *Surgical Forum* 66:528–531.

Burger, U.L., M. Chang, P. S. Goedegebuure, T. J. Eberlein. 1994. “Changes in host T-cell concentrations but not in donor TIL concentrations at the tumor site following adoptive immunotherapy.” *Surgical Forum* 45 (0): 513–515.

Burger, U.L., M. Chang, S. L. Adams, D. D. Schoof, T. J. Eberlein. 1993. “The role of CD4+ and CD8+ T-cells during TIL+ rIL-2 treatment in cancer immunotherapy.” *Surgical Forum* 64:467–469.

Zuber, M., D. L. Leonard-Vidal, A. L. Rubinstein,A. F. Massaro, M. Chang, D. D. Schoof, T. J. Eberlein. 1990. “In vivo efficacy of murine tumor-infiltrating lymphocytes (TIL) reactivated by anti-CD3.” *Journal of Cancer Research and Clinical Oncology* 116; A3.112.28.

Eberlein, T.J., A. F. Massaro, S. Jung, A. L. Rubinstein, U. L. Burger, M. Chang, D. D. Schoof. 1989. “Cyclophosphamide (Cy) immunosuppression potentiates tumor-infiltrating lymphocytes (TIL) therapy in the mouse.” Proceedings Annual Meeting: American Association Cancer Research. A30.A1472.

TESTIMONY

New Jersey Board of Public Utilities (Docket No. ER18010029 and GR18010030): Direct testimony on Public Service Electric and Gas’ petition for base rate adjustments. On behalf of the New Jersey Division of Rate Counsel. August 6, 2018.

Illinois Commerce Commission (Docket No. 18-0211): Direct Testimony regarding Ameren Illinois Company's voltage optimization plan and the importance of prioritizing low-income communities. On behalf of the People of the State of Illinois, represented by the Office of the Illinois Attorney General. March 7, 2018.

Maryland Public Service Commission (Docket No. 9431): Direct testimony on the applications of US Wind and Skipjack Wind for the development of offshore wind projects pursuant to the Maryland Offshore Wind Energy Act of 2013. On behalf of Maryland Office of People’s Counsel. February 15, 2017.

Kansas Corporation Commission (Docket No. 16-KCPE-593-ACQ): Direct testimony on clean energy and coal fleet retirement concerns related to the petition of Great Plains Energy Inc., Kansas City Power and Light, and Westar Energy, Inc. for the acquisition of Westar by Great Plains Energy. On behalf of Sierra Club. December 16, 2016.

Maryland Public Service Commission (Docket No. 9424): Direct testimony on Delmarva Power and Light Company’s application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People’s Counsel. October 7, 2016.

Maryland Public Service Commission (Docket No. 9418): Direct testimony on Potomac Electric Power Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. July 6, 2016.

Illinois Commerce Commission (Docket No. 16-0259): Direct and rebuttal testimony on Commonwealth Edison Company's annual formula rate update and revenue requirement reconciliation on distribution and business intelligence investments. On behalf of the Office of Illinois Attorney General. June 29, 2016 and August 11, 2016.

Illinois Property Tax Appeal Board (Case Nos. 12-02297, 12-01248) Direct testimony on history of nuclear deregulation in Illinois and the impact of deregulation on Exelon nuclear units. On behalf of Byron Community School District. April 2016.

Maryland Public Service Commission (Docket No. 9406): Direct testimony on Baltimore Gas and Electric Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. February 8, 2016.

New Jersey Board of Public Utilities (Docket No. ER14030250): Direct testimony on Rockland Electric Company's petition for investments in storm hardening measures. On behalf of the New Jersey Division of Rate Counsel. September 4, 2015.

Hawaii Public Utilities Commission (Docket No. 2015-0022): Direct testimony on reliability, clean energy, competition, and management and performance concerns related to the petition of NextEra Corporation and Hawaiian Electric Companies (HECO) for the acquisition of HECO by NextEra. On behalf of the Hawaii Division of Consumer Advocacy. August 10, 2015.

Delaware Public Service Commission (Docket No. 14-193): Direct testimony evaluating the benefits and commitments of the proposed Exelon-Pepco merger. On behalf of the Delaware Department of Natural Resources. December 12, 2014.

State of New Jersey Board of Public Utilities (Docket No. EM14060581): Direct testimony on the reliability commitments filed by Exelon Corporation and Pepco Holdings, Inc. in their joint petition for the merger of the two entities. On behalf of the New Jersey Division of Rate Counsel. November 14, 2014.

District of Columbia Public Service Commission (Formal Case No. 1119): Direct and answer testimony on the reliability, risk, and environmental impacts of the proposed Exelon-Pepco merger. On behalf of the District of Columbia Government. November 3, 2014 and March 20, 2015.

United States District Court District of Maine (C.A. No. 1:11-cv-00038-GZS): Declaration regarding the ability of the New England electric grid to absorb the impact of a spring seasonal turbine shutdown at four hydroelectric facilities. On behalf of Friends of Merrymeeting Bay and Environment Maine. March 4, 2013.

State of Maine Public Utilities Commission (Docket 2012-00449): Testimony regarding the Request for Approval of Review of Second Triennial Plan Pertaining to Efficiency Maine Trust. On behalf of the Maine Efficiency Trust. January 8, 2013.

New Jersey Board of Public Utilities (Docket No. GO12050363): Testimony regarding the petition of South Jersey Gas Company for approval of the extension of energy efficiency programs and the associated cost recovery mechanism pursuant to N.J.S.A 48:3-98:1. On behalf of the New Jersey Division of Rate Counsel. November 9, 2012.

Attachment RC-ENG-3

1. Executive Summary
    a. Problem Statement
    b. Proposed Project
2. Engineering Evaluation Results Summary
    a. Introduction
    b. Engineering Evaluation Review
    c. Year of Need
3. Engineering Evaluation Assumptions
    a. Analysis Description
    b. System Condition Assumptions
        i. Study Assumptions
        ii. Distribution System Changes
        iii. Explanation of Future Changes Not Included
        iv. Forecasted Load
4. Evaluation Methodology
    a. Engineering Evaluation Criteria
        i. Project Evaluation Criteria
        ii. Reliability Performance Criteria
        iii. Performance Objectives
5. Proposed Project Performance Summary
    a. Alternative Projects Considered
    b. Performance Results
        i. Reliability Performance Summary
        ii. Operational Performance Summary
        iii. Cost-Benefit Performance Summary
6. Proposed Project Summary
    a. Proposed Project Description
    b. Proposed Project In-service Year
    c. Schedule for Implementation, Lead Times, and Cost Summary
7. Cost-Benefit Analysis
    a. Cost-benefit results
    b. Cost-benefit methodology description
    c. Cost-benefit input assumptions
    d. Cost-benefit calculations

DISCOVERY RESPONSES

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196
Response to DRC Data Requests – Set 2
6/05/2018

Question No: RCR-E-5
With reference to Table 2 of Mr. Clark's testimony on line 4, please restate Table 2 by providing the three-year average of the Company's reliability performance.

RESPONSE:
The following table restates Table 2 by providing the three-year average of the Company's reliability performance.

Reliability Performance	**2009 3-Yr Avg.**	**2010 3-Yr Avg.**	**2011 3-Yr Avg.**	**2012 3-Yr Avg.**	**2013 3-Yr Avg.**	**2014 3-Yr Avg.**	**2015 3-Yr Avg.**	**2016 3-Yr Avg.**	**2017 3-Yr Avg.**
SAIDI	196	203	196	178	161	133	110	107	92
SAIFI	1.58	1.60	1.64	1.59	1.55	1.34	1.20	1.11	1.02
CAIDI	124	126	119	112	103	99	91	96	88

Witness: Bryan L. Clark

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196
Response to DRC Data Requests – Set 2
6/05/2018

Question No: RCR-E-8

With reference to page 9, lines 5 through 7 of Mr. Clark's Direct Testimony:

d. Please indicate if the Company's PowerAhead program are included in the forecasted spending provided in Table 4;

e. Please provide a table of forecasted annual spending for the Company's PowerAhead program that matches the categories provided in Table 4; and

f. Please provide the response to part b in electronic format as an Excel file with all formulae intact.

RESPONSE:

(d) There are two projects that were included in the forecasted spending Table 4 and these will be removed from the list of projects.

(e-f) *See* RCR-ROR-3,Attachment 1 for the Company's forecasted annual spending in the PowerAhead program that matches the categories provided in Table 4. The projects are highlighted in peach color on each tab.

Witness: Bryan L. Clark

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196
Response to DRC Data Requests – Set 2
6/05/2018

Question No: RCR-E-9

With reference to Table 6 of Mr. Clark's Direct Testimony on page 9:

g. Please describe the distinction between the Company's proposed Target Reliability Improvement subprogram and the Company's current program to address the worst performing feeders including the Company's Priority Feeder program under the Reliability Improvement Plan. Please provide all supporting documentation and analyses.

h. Please provide the annual spending associated with addressing the Company's worst performing feeders and for the Company's Priority Feeder Program under the Reliability Improvement Plan for the years 2007 through 2017; and

i. Please provide the annual forecasted spending associated with addressing the Company's worst performing feeders and for the Company's Priority Feeder Program under the Reliability Improvement Plan for the years 2018 through 2022.

RESPONSE:

(g) ACE's proposed Targeted Reliability Improvement subprogram and the Priority Feeder Program under the Reliability Improvement Plan ("RIP") have related work. Targeted Reliability Improvement feature projects that once installed will provide reliability improvements to ACE's distribution system. The subprogram is inclusive of the Priority Feeder Program work, but also includes comprehensive feeder reliability work, comprehensive reliability improvements, and other infrastructure upgrades.

(h) *See* RCR-E-9, Attachment 1 for annual Priority Feeder Program spending associated with the RIP from 2011 through 2017.

(i) *See* RCR-E-9, Attachment 2 for the annual forecasted spending associated with the Company's Priority Feeder Program under the RIP for the years 2018 through 2022.

Witness: Bryan L. Clark

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196
Response to DRC Data Requests – Set 2
6/05/2018

Question No: RCR-E-10
With reference to Table 6 of Mr. Clark's Direct Testimony on page 9:
j. Please describe the distinction between the Company's proposed Distribution Automation/ Telecommunications subprogram and the Company's current Distribution Automation program under the current Reliability Improvement Plan. Please provide all supporting documentation and analyses.
k. Please provide the annual Distribution Automation spending associated with the Company's Reliability Improvement Plan for the years 2011 through 2017; and
l. Please provide the annual forecasted spending associated with Distribution Automation under the Company's Reliability Improvement Plan for the years 2018 through 2022.

RESPONSE:

(j) ACE's proposed Distribution Automation/ Telecommunications ("DA/Telecomm") subprogram and the Company's current Distribution Automation ("DA") program under the current Reliability Improvement Plan ("RIP") contain related work. The proposed DA/Telecomm subprogram is part of ACE's overall effort to deploy smart grid technology and infrastructure in order to modernize the distribution system. The telecommunications portion of this subprogram supports DA equipment operations, which communicates via ACE's DA communications network. Further modernizing the grid with distribution automation improvements also serves to improve public safety throughout the grid. For example, areas with a high number of traffic signals that would otherwise endure outages from an upstream fault could receive power from another feeder where power is uninterrupted. This filing will allow for timely recovery of these investments. The DA program under the RIP is also designed to deploy the DA infrastructure with the objective of improving reliability performance indices by modernizing the distribution system with this infrastructure.

(k) *See* RCR-E-10, Attachment 1 for annual DA spending associated with the RIP from 2011 through 2017.

(l) *See* RCR-E-10, Attachment 2 for the annual forecasted spending associated with DA under the RIP for the years 2018 through 2022.

Witness: Bryan L. Clark

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196
Response to DRC Data Requests – Set 2
6/05/2018

Question No: RCR-E-11

With reference to Table 6 of Mr. Clark's Direct Testimony on page 9:

m. Please describe the distinction between the Company's proposed Infrastructure Renewal subprogram and the Company's current Load Growth program under the current Reliability Improvement Plan. Please provide all supporting documentation and analyses.

n. Please provide the annual Load Growth program spending associated with the Company's Reliability Improvement Plan for the years 2011 through 2017; and

o. Please provide the annual forecasted spending associated with the Load Growth program under the Company's Reliability Improvement Plan for the years 2018 through 2022.

RESPONSE:

(m) ACE's proposed Infrastructure Renewal subprogram and the Capacity Expansion program under the Reliability Improvement Plan (RIP) do not contain related work. Infrastructure Renewal includes an array of projects to upgrade, replace or repair system infrastructure based on an assessment of its material condition. Spending will focus on the replacement or repair of infrastructure at or near substations—such as switchgear and transformers—or in some cases, retiring the substation itself. This filing will allow for timely recovery of these investments. The Capacity Expansion program under the RIP replaces infrastructure at or near substation with the objective of meeting the capacity demands of feeders or substations.

(n) *See* RCR-E-11, Attachment 1 for annual Capacity Expansion spending associated with the RIP from 2011 through 2017.

(o) *See* RCR-E-11, Attachment 2 for the annual forecasted spending associated with Capacity Expansion under the RIP for the years 2018 through 2022.

Witness: Bryan L. Clark

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196

Response to DRC Data Requests – Set 2

07/11/18

Question No: RCR-E-24 (Confidential)
Reference the Appendix to the Direct Testimony of Bryan L. Clark, page 12, and the response to RCR-E-19, Attachment 1 Confidential, project CMP 138 Pleasantville- Upgrade Fuel Island:
[begin confidential]

[end confidential]

RESPONSE:

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196

Response to DRC Data Requests – Set 2

07/11/18

Question No: RCR-E-26 (Confidential)
Reference the Appendix to the Direct Testimony of Bryan L. Clark, page 12, and the response to RCR-E-19, Attachment 1 Confidential, project CMP 191 Bridgeton Fuel Island Replacement:
[begin confidential]

[end confidential]

RESPONSE:

EXCERPT

In the Matter of Petition of Atlantic City Electric Company for
Approval of an Infrastructure Investment Program, and Related Cost Recovery Mechanism,
Pursuant to N.J.A.C. 14:3-2A.1 *et seq.*

BPU Docket No.: EO18020196

Response to DRC Data Requests – Set 2

7/10/18

Question No: RCR-E-111
Please update RCR-E-3 to include the Company's 2017 Annual System Performance report.

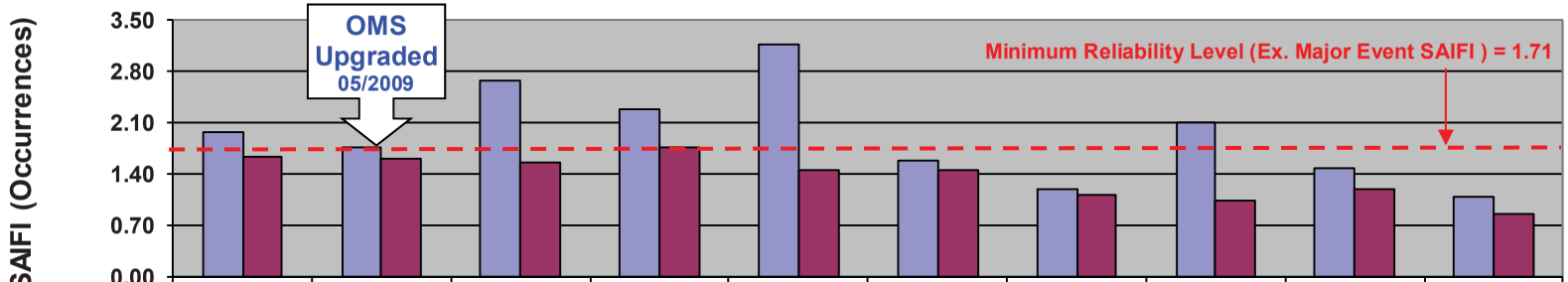
RESPONSE:

See RCR-E-111, Attachment 1, provided in electronic format only, for a copy of the Company's 2017 Annual System Performance Report.

ATLANTIC CITY ELECTRIC - ALL DISTRICTS

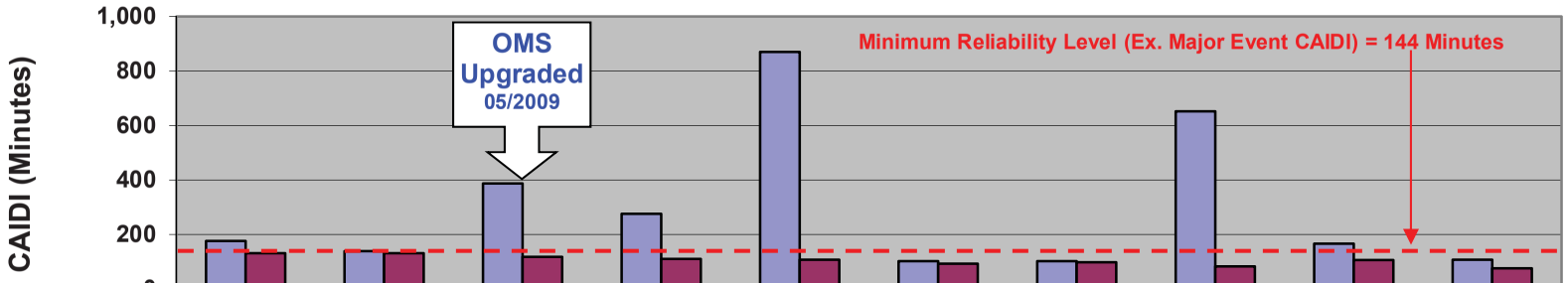
Major Reliability Indices (All Event and Major Event Exclusive)

System Average Interuption Frequency Index (SAIFI) 2008 - 2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All Event	1.97	1.77	2.67	2.28	3.16	1.57	1.20	2.10	1.48	1.09
Ex. Maj. E.	1.64	1.61	1.56	1.76	1.45	1.45	1.11	1.03	1.18	0.86

Customer Average Interuption Duration Index (CAIDI) 2008 - 2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All Event	176	139	387	276	870	102	102	652	166	107
Ex. Maj. E.	131	131	118	110	107	93	98	83	106	76

EXCERPT