BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 20220051-EI

FLORIDA POWER & LIGHT COMPANY

2023-2032 STORM PROTECTION PLAN

REBUTTAL TESTIMONY OF

MICHAEL JARRO

Filed: June 21, 2022

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Michael Jarro. My business address is Florida Power & Light Company ("FPL" or the "Company"), 15430 Endeavor Drive, Jupiter, FL, 33478.

Q. Did you previously submit direct testimony?

A. Yes. I submitted written direct testimony on April 11, 2022, together with Exhibit MJ-1 – FPL's Storm Protection Plan 2023-2032. On May 6, 2022, FPL filed and served a Notice of Filing a Revised Appendix E to Exhibit MJ-1 to correct the completion dates, start dates, and amounts projected for certain Distribution Feeder Hardening Program projects included in the 2023 project level detail.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to certain portions of the direct testimonies of Lane Kollen and Kevin J. Mara submitted on behalf of the Office of Public Counsel ("OPC"). My rebuttal testimony will respond to the concerns, questions, and recommendations raised by these witnesses in opposition to FPL's 2023-2032 Storm Protection Plan ("2023 SPP") submitted as Exhibit MJ-1 and as corrected by the Notice of Filing a Revised Appendix E to Exhibit MJ-1 filed on May 6, 2022.

First, I will provide some context and general observations regarding OPC's concerns and criticisms of FPL's 2023 SPP.

Second, I will address OPC's recommendation that the Florida Public Service Commission (the "Commission") apply new cost-effectiveness criteria and standards to review and approve the SPP programs and projects proposed in this proceeding. In essence, OPC seeks to convert this matter into a rulemaking proceeding and asks the

Commission to adopt and apply new criteria and standards that are not currently required by Section 366.96, Florida Statutes (hereinafter referred to as the "SPP Statute"), or Rule 25-6.030, Florida Administrative Code (hereinafter referred to as the "SPP Rule"). As I will explain below, OPC's attempt to amend the requirements of the SPP Statute and SPP Rule as part of this proceeding is inappropriate and unnecessary.

Third, I will address OPC's contention that FPL did not provide an estimate of how the programs and projects included in the 2023 SPP will reduce restoration costs and outage times as required by the SPP Rule. As explained below, OPC's position is based on its incorrect interpretation of the SPP Statute and SPP Rule, and ignores the fact that SPP programs and projects provide both quantitative and qualitative benefits. I will further explain that FPL's 2023 SPP complies with the requirements of the SPP Statute and SPP Rule.

Fourth, I will address the incorrect contention of OPC witness Kollen that only new or expanded storm hardening programs are eligible to be included in the SPP. As explained below, OPC witness Kollen ignores the language of the SPP Statute and Rule 25-6.031, Florida Administrative Code (hereinafter referred to as the "SPPCRC Rule") that limits double-recovery, and misapplies the requirement for the Storm Protection Plan Cost Recovery Clause ("SPPCRC") to the SPP. Existing programs, together with new or expanded programs, are all eligible for approval as SPP programs under the SPP Statute. The issue of whether costs are recovered in base rates or the SPPCRC is a matter to be addressed in the applicable SPPCRC proceeding.

Finally, I will address and rebut OPC witness Mara's recommendations and adjustments to five out of the eleven programs included in FPL's 2023 SPP. Specifically, I will address the following recommendations by OPC: modify the Substation Storm Surge/Flood Mitigation Program; reduce the budget for the Distribution Lateral Hardening Program; reject the new Transmission and Distribution ("T&D") Winterization Programs; and reject the new Transmission Access Enhancement Program. As I explain below, each of these recommendations are inappropriate and unnecessary, and do not serve customers' best interests.

I note that FPL witness Liz Fuentes will also respond to OPC witness Kollen's concerns regarding FPL's calculation of the revenue requirements submitted with the 2023 SPP.

Q. Are you sponsoring any exhibits with your rebuttal testimony?

A. Yes. I am sponsoring the following exhibits with my rebuttal testimony:

- Exhibit MJ-2, FPL's Response to OPC's Fourth Set of Interrogatories No. 50;
- Exhibit MJ-3, FPL's response to OPC's Fourth Set of Interrogatories No. 40; and
- Exhibit MJ-4, FPL's response to OPC's Fifth Request for Production of Documents No. 33.

II. GENERAL RESPONSE TO OPC'S CONCERNS

Q. Before addressing the specific issues and recommendations raised by OPC, do you have any general observations?

A. Yes. The evaluation of FPL's 2023 SPP must be grounded in the fact that FPL has successfully been engaging in Commission-approved storm hardening for the last 16

years. During this time, the Commission has reviewed and had full transparency into all aspects of FPL's storm hardening activities, and interested parties and stakeholders had the opportunity to participate in these reviews. Indeed, in its report "Review of Florida's Electric Utility Hurricane Preparedness and Restoration Actions 2018", in Docket No. 20170215-EU, the Commission recognized the success of historical storm hardening efforts in Florida. Key findings by the Commission in that report included:

- Florida's aggressive storm hardening programs are working (Section V);
- The length of outages was reduced markedly from the 2004-2005 storm season (Section IV);
- The primary cause of power outages came from outside the utilities' rights of way including falling trees, displaced vegetation, and other debris (Section IV);
- Vegetation management outside the utilities' rights of way is typically not performed by utilities due to lack of legal access (Section IV);
- Hardened overhead distribution facilities performed better than non-hardened facilities (Section V);
- Very few transmission structure failures were reported (Section V); and
- Underground facilities performed much better compared to overhead facilities (Section V).

In response to Hurricanes Matthew and Irma, the Florida Legislature passed the SPP Statute "to mitigate restoration costs and outage times to utility customers" by "strengthen[ing] electric utility infrastructure to withstand extreme weather conditions by promoting the overhead hardening of electrical transmission and distribution facilities, the undergrounding of certain electrical distribution lines, and vegetation management." Section 366.96(1)(c)-(e), F.S. From these facts, one can logically and

reasonably conclude that the Legislature did not pass the SPP Statute to stop or limit storm hardening activity in Florida, nor can one assume that the passage of the SPP Statute was an indictment or criticism against storm hardening activity that has previously taken place in Florida. Rather, it is reasonable to assume that the Florida Legislature passed the SPP Statute to encourage, streamline, and advance storm hardening work in this state.

FPL's 2023 SPP outlines a comprehensive storm protection plan that meets the statutory objectives codified in the SPP Statute and complies with the requirements of the SPP Rule. The 2023 SPP is largely a continuation of the following programs included in the current 2020-2029 Storm Protection Plan (hereinafter, the "2020 SPP") that were agreed to by OPC in a Joint Motion for Approval of a Stipulation and Settlement Agreement ("2020 SPP Settlement"), approved by Commission Order No. PSC-2020-0293-AS-EI:

- Distribution Inspection Program
- Transmission Inspection Program
- Distribution Feeder Hardening Program
- Distribution Lateral Hardening Program
- Transmission Hardening Program
- Distribution Vegetation Management Program
- Transmission Vegetation Management Program
- Substation Storm Surge/Flood Mitigation Program

The majority of the existing SPP programs have been in place since 2007 and have already demonstrated that they have provided and will continue to provide increased T&D infrastructure resiliency, reduced restoration times, and reduced restoration costs

when FPL is impacted by extreme weather events. For certain existing SPP programs, FPL proposed limited modifications to further improve these programs and implement best practices as further described in my direct testimony and Exhibit MJ-1. Notably, OPC has not opposed or challenged any of these modifications to the existing SPP programs.

As part of the 2023 SPP, FPL also proposed to implement three new programs: Transmission Winterization Program, Distribution Winterization Program, and Transmission Access Enhancement Program. As detailed in my direct testimony and Exhibit MJ-1, the new T&D Winterization Programs will help mitigate the potential for power outages due to extreme cold weather events similar to the 1977, 1989, and 2010 winter events in Florida. The new Transmission Access Enhancement Program will help ensure that FPL and its contractors have reasonable access to FPL's transmission facilities for repair and restoration activities following an extreme weather event.

Q. Does OPC challenge all of the programs included in FPL's 2023 SPP?

A. No. OPC submitted the direct testimony of OPC witness Kollen in all four SPP dockets currently pending before the Commission. The vast majority of his direct testimony (pages 6-21) is dedicated to proposing that the Commission adopt new criteria standards that do not exist in the SPP Statute or SPP Rule today and apply those to reject all of the SPPs submitted by all four investor-owned utilities ("IOU") that do not meet his proposed new cost-effectiveness threshold. Thus, OPC witness Kollen is seeking to establish new standards, outside the SPP Statute and the SPP Rule, to review the SPP and does not oppose or challenge any specific program included in FPL's 2023

SPP. I will respond to OPC witness Kollen's proposed new criteria and standards later in my testimony and explain that his proposal is inappropriate and unnecessary.

On pages 13, and 17-34, OPC witness Mara proposes adjustments to two of the existing SPP programs and opposes the three new SPP programs. Based on the testimony of OPC witness Mara, it appears that OPC essentially agrees with eight out of the eleven programs included in FPL's 2023 SPP. I will respond to OPC's recommended adjustments to the existing SPP programs and criticisms of the new SPP programs later in my testimony.

Q. Do you have any additional general observations about the testimonies of OPC witnesses Kollen and Mara?

A. Yes. Other than the proposed adjustments to the Substation Storm Surge/Flood Mitigation Program and Distribution Lateral Hardening Program, and opposition to the three new proposed SPP programs, the OPC witnesses primarily make four general arguments in opposition to FPL's 2023 SPP.

First, OPC argues that the Commission should adopt and apply new formulaic cost-benefit and cost-effectiveness requirements for approval of SPP programs and projects. As explained below, the Florida Legislature and this Commission, through the SPP Rule, have already addressed the issue and declined to require either cost benefit analysis or a cost-effectiveness threshold in the review and approval of a SPP. FPL's 2023 SPP has fully complied with all the requirements of what must be included in a SPP pursuant to the SPP Statute and SPP Rule as explained in my direct testimony. For the reasons explained later in my testimony, OPC's proposal is inappropriate and unnecessary for several reasons.

Second, and related to its first argument, OPC contends that the benefits of the SPP programs must be quantified and monetized in order to meet the requirements of the SPP Rule. OPC's proposal again attempts to add new requirements to the SPP Statute and SPP Rule that do not exist today. As explained in my direct testimony, FPL has provided a description of how the 2023 SPP will reduce restoration costs and outage times associated with extreme weather events in compliance with express requirements of SPP Rule. As explained in greater detail below, storm hardening is not a simple cost-effective proposition and OPC's belief that outage times should be monetized ignores the very real and simple fact that the monetary value individual customers or communities place on reduced outage times cannot be accurately or uniformly estimated. Moreover, OPC's recommendation that FPL's SPP programs require further cost-justification before they can be approved is directly contrary to OPC's own testimony that requests the Commission reject only three of the eleven programs included in FPL's 2023 SPP as further explained in my rebuttal testimony.

Third, OPC argues that projects which displace base rate costs that would have been incurred during the normal course of business and that are not incurred on an incremental basis specifically to achieve the objectives of the SPP Rule are not eligible to be included in the SPP. As explained below, OPC's argument misconstrues the language of the SPP Statute and SPPCRC Rule, misapplies the requirement for the SPPCRC to the SPP, and disregards that the issue of whether SPP costs are recovered in base rates or the SPPCRC is a matter to be addressed in the annual SPPCRC proceedings.

Finally, OPC raises questions regarding FPL's calculation of the SPP revenue requirements that were used to estimate the rate impacts of the programs included in FPL's 2023 SPP. FPL witness Liz Fuentes will respond to these criticisms.

III. OPC's PROPOSED NEW COST-BENEFIT AND COST-EFFECTIVNESS STANDARDS ARE NOT APPROPRIATE OR NECESSARY

Q. OPC is proposing that the Commission apply new standards and criteria to review the IOUs' SPPs. Are these the same standards and criteria that FPL used to prepare its 2023 SPP?

A. No. FPL designed its SPP programs and prepared the 2023 SPP based on the requirements and standards prescribed in the SPP Statute and SPP Rule that were in effect at the time FPL filed the 2023 SPP on April 11, 2022, and which remain in effect today. OPC, on the other hand, is asking the Commission to adopt new criteria and standards that, as I further explain below, are not currently in either the SPP Statute or SPP Rule and then retroactively apply those new requirements to the IOUs' SPPs that were filed on April 11, 2022 to determine if they should be approved.

Q. Please summarize OPC's proposal to add new criteria and standards to the review of the IOUs' SPPs.

A. OPC witness Kollen is proposing that the Commission adopt a new requirement for the SPP's to include a cost-benefit analysis and establish a new cost-effectiveness test to determine if the SPP programs should be approved. OPC witness Kollen then recommends on page 9 of his testimony that the "Commission reject all proposed SPP projects that are not economic, meaning that they do not have a benefit-to-cost ratio of at least 100%." On page 14 of his direct testimony, OPC witness Kollen goes on to conclude that "FPL's programs and costs are not prudent and reasonable unless they

meet all of the requirements" proposed by OPC witness Kollen. Thus, OPC witness Kollen proposes that the Commission adopt a new cost-effectiveness threshold and apply that new standard to review and approve/reject the programs and projects included in FPL's 2023 SPP.

Q. Do you have concerns with OPC's proposal that the Commission adopt and apply a new cost-effectiveness test to review the IOUs' SPPs?

A. Yes. First, the SPP Statute and SPP Rule do not prescribe or require a traditional cost-benefit analysis or cost-effectiveness test for projects or programs to be included in the SPP. The Statute makes no mention of any such analysis or test and, instead, the Florida Legislature left that determination to the discretion of the Commission by directing it to adopt rules necessary to implement the statute. In adopting the SPP Rule, the Commission could have prescribed specific metrics, standards, and formulas to require the SPP programs to meet a cost-effective threshold, but it wisely did not because each program is different and, therefore, must be evaluated on its particular facts and merits. Indeed, Rule 25-6.030(3)(d)(4), F.A.C., requires the SPP to include a "comparison" of the estimated costs and described benefits for each SPP program, which is provided in the following portions of FPL's 2023 SPP: Section II; the "Comparison of Costs and Benefits" included in each SPP program description in Section IV; and Appendix A of Exhibit MJ-1. As such, a cost-benefit analysis or cost-effectiveness test for each major component of the SPP is not required under either the SPP Statute or SPP Rule. OPC is attempting to re-litigate the SPP Rule approved by this Commission.

Second, in the SPP Rule, the Commission prescribed specific information and data that must be included with each SPP, including, but not limited to, estimated costs,

description of the benefits, criteria to prioritize and select projects, and estimated rate impacts. As explained in my direct testimony, FPL provided this information in its 2023 SPP consistent with SPP Rule. The Commission can use and "compare" all of the information it specifically required FPL to provide in the SPP to determine if, pursuant to the SPP Statute, the programs and projects included in the SPP are in the public interest and should be approved, or if the SPP programs should be modified or denied. Each program is different and, therefore, the comparison of costs and benefits must be evaluated on its particular facts and merits.

Third, the analysis of whether the benefits of a SPP program or project justify the estimated costs is not a one-size-fits-all proposition as suggested by OPC. This is clearly demonstrated by the fact that, as OPC witness Kollen acknowledges on page 14 of his direct testimony, each of the electric utilities took very different approaches to comparing the estimated costs and benefits of their SPP programs. Further, such analyses are necessarily dependent on several highly variable factors that, in large part, are beyond the utility's control and cannot be accurately predicted, including, but not limited to: the number of annual extreme weather events; the path of each storm; the intensity or category of each storm; the speed or duration of each storm; the availability of resources to respond to and provide storm restoration services for each storm; and the extent to which the infrastructure has been storm hardened at the time of each projected storm. Moreover, the benefits to be included in such analyses should not be limited to only avoided utility costs as I will explain further.

IV. FPL'S 2023 SPP WILL REDUCE RESTORATION COSTS AND OUTAGE TIMES AS REQUIRED BY RULE 25-6.030, F.A.C.

Q. Both OPC witnesses Kollen and Mara argue that FPL's 2023 SPP did not meet the requirements of the SPP Rule because it did not quantify and monetize the benefits of the proposed SPP Programs. Do you have a response?

A. Yes. I disagree with OPC witnesses Kollen and Mara that further cost-justification of FPL's 2023 SPP programs is needed or appropriate. On pages 17-19 of his testimony, OPC witness Kollen states that FPL did not provide any quantitative benefits for the proposed SPP programs and that it is not enough under the SPP Rule to simply say there will be benefits without quantifying those benefits. OPC witness Mara likewise states on pages 10-11 of his testimony that FPL only provided written descriptions of SPP program benefits and did not quantify the estimated cost reductions or monetize the reduction of outage times for each program. OPC witness Mara goes on to suggest on page 11 of his testimony that FPL should be required to file an amended SPP that provides this data. OPC's contention that FPL failed to comply with the SPP Rule because it did not quantify the benefits of the SPP programs is misplaced for several reasons.

First, OPC's contention that the SPP must include quantifiable and monetized benefits for each SPP program is a fallout of OPC's proposal that the Commission adopt and apply a new cost benefit analysis and new cost-effectiveness threshold for the SPP programs. As I explained above, OPC's proposed new criteria and standards to review the SPPs are contrary to the requirements of both the SPP Statute and SPP Rule and should be rejected.

Second, there is nothing in either the SPP Statute or SPP Rule that prescribes that the benefits of SPP programs must be quantified or monetized as suggested by the OPC witnesses. Rather, the SPP Rule expressly provides that the SPP must include a "description" of the benefits of the SPP programs. See Rule 25-6.030(3)(b), F.A.C. ("For each Storm Protection Plan, the following information must be included…. (b) A *description* of how the proposed Storm Protection Plan will reduce restoration costs and outage times associated with extreme weather conditions" (emphasis added)); see also Rule 25-6.030(3)(d)(1), F.A.C. ("A *description* of each proposed storm protection program that includes: (1) A description of how each proposed storm protection program is designed to enhance the utility's existing transmission and distribution facilities including an estimate of the resulting reduction in outage times and restoration costs due to extreme weather events" (emphasis added)).

Third, storm hardening is not a simple cost-effective proposition as suggested by OPC. OPC's approach focuses only on program costs and savings in restoration costs associated with extreme weather conditions (*i.e.*, a strictly quantitative analysis), and completely ignores the qualitative component required by both the SPP Statute and SPP Rule. Stated differently, OPC's proposed cost-benefit and cost-effectiveness approach ignores half of the benefits side of the equation. It cannot be reasonably disputed that customers want the extended outage times associated with extreme weather events to be reduced. Indeed, the Florida Legislature concluded that reducing outage times for utility customers, as well as restoration costs, is in the public interest. The Commission can and should compare these factors and determine whether the estimated benefits of the storm hardening programs are justified by the estimated rate impacts.

Fourth, OPC witness Mara's belief that outage times should be monetized, ignores the very real and simple fact that the monetary value individual customers or communities place on reduced outage times cannot be accurately or uniformly estimated. Indeed, some customers may be willing to pay a premium to never have a power outage, while others may be willing to tolerate a few short outages. Moreover, the SPP Rule does not require the outage times to be monetized as explained above, and there is no uniform Commission or industry method to do so. Such analyses are necessarily dependent on several highly variable factors (such as the intensity, path, and duration of the extreme weather event and extent that the system has been hardened) and could include a very wide range of subjective economic factors, including, but not limited to: individual and different customer value on reduced outage times, including comfort, health, and convenience; economic impact to individual customers due to spoilage, loss or disruption of business, and loss of equipment or supplies; and impact to the local and state economy. Thus, even if the SPP Statute and Rule did require the reduction in outage times to be monetized, which they do not, there is significant uncertainty and variability in how that should be done.

Finally, OPC's recommendation that FPL's SPP programs require further cost-benefit analysis or cost-justification before they can be approved is directly contrary to OPC witness Mara's testimony on pages 13 and 17-34 that requests the Commission only reject three of the eleven programs included in FPL's 2023 SPP. Stated differently, OPC witness Mara does not dispute that it would be reasonable for the Commission to allow FPL to implement the eight programs included in the 2023 SPP as further explained below. Either these SPP programs are in the public interest and should be approved, or they are not. The fact that OPC witness Mara has essentially agreed that

most of these programs should be approved without further cost-justification clearly suggests that OPC believes FPL has provided sufficient information about each of the SPP programs for the Commission to determine if they are in the public interest.

Q. On page 18 of his direct testimony, OPC witness Kollen recommends that FPL should be directed to use its storm damage assessment model to model and quantify the estimated benefits and savings from the programs included in FPL's 2023 SPP. Please describe FPL's Storm Damage Model.

A. FPL's Storm Damage Model is a very important proprietary tool developed by FPL to prepare for major storms that threaten FPL's service area. The Storm Damage Model is used for major storms with a forecast track provided by the National Hurricane Center to estimate the number of construction man-hours ("CMH") required to restore power to customers based on the forecasted intensity, speed, path of the storm, and the condition (hardened vs. non-hardened) of the infrastructure at the time of the storm. The Storm Damage Model is a planning tool used by the Company to estimate the extent of damage expected from a projected storm, and the number and location of resources that will be needed to quickly and safely restore power outages to the greatest number of customers in the shortest amount of time.

Q. Do you agree with OPC witness Kollen's recommendation that FPL should use the Storm Damage Model to model to quantify the benefits and savings associated with the programs included in FPL's 2023 SPP?

A. No, FPL's Storm Damage Model was not intended to be used to quantify individual SPP programs or projects. As provided in Appendix A to Exhibit MJ-1, FPL used its Storm Damage Model to analyze Hurricanes Matthew and Irma and estimate the reduction in CMH, days to restore, and storm restoration costs that were attributable to the storm hardening projects that were completed and in place at the time of the

hurricanes. This analysis was based mainly on the feeders that FPL knew had been hardened versus non-hardened at the times Hurricanes Matthew and Irma occurred, and included the distribution inspection and vegetation management that had been completed at the times Hurricanes Matthew and Irma occurred. OPC witness Kollen proposes something different.

OPC witness Kollen proposes that FPL use the Storm Damage Model to model the future system with the proposed 2023 SPP programs in place for the entire 2023-2032 SPP period to quantify the costs that could be avoided due to the SPP programs. The problem with this approach is that, beyond year one of the SPP (2023), the project level detail has not been determined; meaning FPL does not at this time know which specific projects will be completed each year or where they will be located for the entire 2023-2032 SPP period. The scope and location of the storm hardening projects used in the Storm Damage Model for each year of the SPP will have a significant impact on the results of the analysis. For example, if FPL assumes a storm hardening project in a densely populated urban area as opposed to a rural area, or vice versa, this could change the damage estimated by the Storm Damage Model. Also illustrative is the fact that the estimated length, number of poles, location, and accessibility of the laterals used in the model would change the damage estimated by the Storm Damage Model. Each of these factors, which cannot be reasonably predicted for the entire 2023-2032 SPP period, would impact the estimated CMH, days to restore, and storm restoration costs predicted by the Storm Damage Model. For these reasons, the Storm Damage Model does not readily lend itself to model future SPP programs as proposed by OPC witness Kollen.

Even assuming the Storm Damage Model was appropriate to provide an estimate of CMH, days to restore, and storm restoration costs for future SPP programs, FPL's Storm Damage Model is only used for major storms with a forecast track provided by the National Hurricane Center. Thus, the Model would not account for any other types of extreme weather conditions, as well as any associated reductions in restoration costs and outage times. Florida remains the most hurricane-prone state in the nation and, with the significant coast-line exposure of FPL's system and the fact that the vast majority of FPL's customers live within 20 miles of the coast, FPL's service area has a high probability of being impacted by multiple extreme weather events every year. Although no one is in a position to know for sure how frequently FPL's service area will be impacted by extreme weather conditions, the Storm Damage Model estimate of cumulative reductions in restoration costs and outage times associated with the SPP programs will be directly affected by frequency, strength, speed, and path of storms that impact FPL's service area. As required by the SPP Rule, FPL has provided a description of the benefits and estimated cost for all the programs in FPL's 2023 SPP, in some cases these benefits are qualitative and in others they are quantitative, as provided in Sections II and IV and Appendix A to Exhibit MJ-1.

Q. Has FPL provided descriptions of how the programs included in its 2023 SPP will reduce restoration costs and outage times associated with extreme weather conditions?

A. Yes. In compliance with Rules 25-6.030(3)(b) and 25-6.030(3)(d)(1), F.A.C., the benefits expected from the proposed SPP programs were provided in the following portions of FPL's 2023 SPP: Section II; the "Description of the Program and Benefits" included in each SPP program description in Section IV; and Appendix A of Exhibit MJ-1. The existing SPP programs have already demonstrated that they will both reduce

restoration costs and outage times associated with extreme weather conditions, and were previously approved as part of the 2020 SPP. Although FPL has proposed limited modifications to certain of these existing SPP programs, these modifications will further improve these programs and implement best practices where applicable as explained in my direct testimony and Exhibit MJ-1. And, OPC has not opposed or challenged any of these limited modifications to the existing SPP programs.

The Commission can review the benefits of the SPP programs described in my direct testimony and Exhibit MJ-1, together with the prioritization, feasibility, estimated costs, and estimated rate impacts, and determine whether the programs included in the 2023 SPP are in the public interest.

V. OPC'S CLAIM THAT ONLY NEW OR EXPANDED STORM HARDENING PROGRAMS QUALIFY FOR INCLUSION IN THE SPP IS INAPPROPRIATE

Q. On pages 13-15 of his direct testimony, OPC witness Kollen asserts that FPL has included programs and projects that are within the scope of its existing base rate programs and base rate recoveries in the normal course of business, and he recommends that these programs and projects should be excluded from the SPPs. Do you have a response?

A. Yes. It appears that OPC witness Kollen is recommending that only new or expanded storm hardening programs qualify for inclusion in the SPP, and that any programs that have previously been recovered in base rates are not eligible to be included in the SPP. Indeed, on page 7 of his testimony, OPC witness Kollen states that to be included in the SPP, "the projects and the costs of the projects must be incremental, not simply displacements of base rate costs that would have been incurred during the normal

course of business." OPC witness Kollen's recommendation is misplaced for several reasons.

First, OPC witness Kollen is again attempting to re-litigate the Commission's approval of the SPP Rule and add a new requirement that is clearly not prescribed in either the SPP Statute or SPP Rule. The SPP Statute and SPP Rule define the type of programs eligible to be included in the SPP as programs for the overhead hardening and increased resilience of T&D facilities, undergrounding of electric distribution facilities, and vegetation management that will mitigate restoration costs and outage times due to extreme weather events. Contrary to OPC witness Kollen's assertion, there is nothing in either the SPP Statute or SPP Rule that limit SPP programs to only new or expanded storm hardening programs.

Second, OPC witness Kollen's recommendation misconstrues and seeks to expand the limitation in the SPP Statute and SPPCRC Rule that SPP costs cannot be recovered in both base and clause rates. The SPP Statute provides that the "annual transmission and distribution storm protection plan costs may not include costs recovered through the public utility's base rates." See Section 366.96(8), F.S. Similarly, the SPPCRC Rule provides that costs recoverable through the SPPCRC "shall not include costs recovered through the utility's base rates or any other cost recovery mechanisms." See Rule 25-6.031(6)(b), F.A.C. Simply stated, the limitation proscribed in the SPP Statute and SPPCRC Rule ensures that there is no double recovery of SPP costs in both base and clause rates. It does not limit SPP programs to only new or expanded storm hardening programs that have not previously been recovered in base rates as suggested by OPC witness Kollen.

Third, the issue of whether SPP costs are incremental or being recovered in base rates is irrelevant to this SPP proceeding. As stated in Commission Order No. PSC-2020-0162-PCO-EI in Docket No. 20200071-EI, this is an issue to be addressed in the SPPCRC proceedings. Relatedly, OPC witness Kollen's recommendation overlooks the fact that SPP costs can be recovered through either the SPPCRC or base rates – just not both. See Rule 25-6.031(8), F.A.C. ("Recovery of costs under this rule does not preclude a utility from proposing inclusion of unrecovered Storm Protection Plan implementation costs in base rates in a subsequent rate proceeding").

Fourth, OPC witness Kollen's recommendation would lead to nonsensical results. Under OPC witness Kollen's approach, none of the pole inspection, vegetation management, transmission pole replacement, feeder hardening, or other long-standing storm hardening programs that existed prior to the effective date of the SPP Statute would be eligible to be included in the SPP unless they are expanded and, even then, only the costs associated with the expanded portion of those programs could be included in the SPP. See Direct Testimony of OPC witness Kollen, page 15. The flaw with this approach is that these programs have largely been in place since 2007 and approved as part of the Storm Hardening Plan, which has now been replaced with the SPP. Moreover, the existing eight SPP programs were approved in FPL's and former Gulf Power Company's (Gulf) 2020 SPPs. The purpose and policy of the SPP Statute is to mitigate restoration costs and outage times by encouraging the IOUs to continue and accelerate their storm hardening efforts by reducing regulatory lag and allowing the IOUs to recover the associated costs through an annual clause proceeding. OPC witness Kollen's new proposal, however, would defeat this legislative objective by

disallowing longstanding and proven storm hardening measures from being included in the SPP.

Finally, although OPC witness Kollen alleges on page 13 of his testimony that FPL included programs and projects in its 2023 SPP that are base rate programs recovered in base rates in the normal course of business, neither OPC witness identifies any specific FPL program that they believe are currently in FPL's base rates. While OPC may attempt to raise this as an issue in the SPPCRC proceeding, it is important to remember that, effective January 1, 2022, all SPP operations and maintenance expenses and capital expenditures, with the exception of the cost of removal for assets existing prior to 2021, have been recovered or will be requested for recovery through the SPPCRC and, therefore, are incremental to and not being recovered in base rates. See Direct Testimony of FPL witness Liz Fuentes filed in Docket No. 20210015-EI on March 12, 2021; see Direct Testimony of FPL witnesses Liz Fuentes and Michael Jarro filed in Docket No. 20200092-EI on July 24, 2020.

VI. THE PROGRAMS AND PROJECTS INCLUDED IN FPL'S 2023 SPP ARE IN THE PUBLIC INTEREST AND SHOULD BE APPROVED

A. OPC Essentially Agrees with Eight of the Eleven Programs Included in FPL's SPP

Q. You have stated that OPC essentially agrees with eight of the eleven programs included in FPL's 2023 SPP. Can you please explain how you arrived at that conclusion?

A. Yes. As explained above, FPL's 2023 SPP includes a total of eleven SPP programs: eight existing programs included in the 2020 SPP approved by Commission Order No.

PSC-2020-0293-AS-EI, and three new programs. OPC witness Mara proposes adjustments to two of the existing SPP programs: the existing Substation Storm Surge/Flood Mitigation Program and the existing Distribution Lateral Hardening Program. OPC witness Mara also opposes the three new SPP programs: Transmission Winterization Program, Distribution Winterization Program, and Transmission Access Enhancement Program. Therefore, OPC witness Mara essentially agrees that six out of the eleven programs included in FPL's 2023 SPP should be approved as submitted.

Further, with respect to the Substation Storm Surge/Flood Mitigation Program, OPC witness Mara does not oppose the program but, rather, asserts on pages 16-17 of his direct testimony that the Storm Surge/Flood Mitigation Program should exclude substations that have alternate feeds available and do not have a history of flooding. Therefore, OPC essentially agrees with FPL's proposed Substation Storm Surge/Flood Mitigation Program but recommends additional selection criteria be considered, which I will further address later in my testimony.

Similarly, OPC witness Mara does not oppose the Distribution Lateral Hardening Program. Rather, OPC witness Mara recommends on pages 33-34 of his direct testimony that the annual budget for the Distribution Lateral Hardening Program be capped at $606 million for the years 2025-2032. Therefore, OPC essentially agrees with FPL's proposed Distribution Lateral Hardening Program but recommends a reduction in the number of laterals that may be completed each year, which will delay when customers will receive the direct benefits of the Distribution Lateral Hardening Program. I will respond to OPC witness Mara's recommended adjustment below.

Based on the testimony of OPC witness Mara, it appears that OPC essentially agrees with eight out of the eleven programs included in FPL's 2023 SPP. It further appears that the only truly contested programs are the three new programs proposed in FPL's 2023 SPP. I will respond to OPC criticisms of these new SPP programs below.

B. OPC's Recommended Adjustment to the Storm Surge/Flood Mitigation Program is not Reasonable or Appropriate

Q. OPC witness Mara recommends adjustments to the Storm Surge/Flood Mitigation Program. Before responding to his specific recommendations, do you have any general observations about his proposal?

A. Yes. OPC witness Mara's recommendations regarding FPL's Storm Surge/Flood Mitigation Program are inconsistent. On page 13 of his testimony, OPC witness Mara appears to recommend that the entire budget for the Storm Surge/Flood Mitigation Program should be rejected. However, on pages 16-18 of his testimony, OPC witness Mara recommends that substations with alternate feeds or no history of flooding should be excluded from the Storm Surge/Flood Mitigation Program. Notably, OPC witness Mara does not identify any specific substation that would be excluded by his proposal, nor does he explain or demonstrate how such exclusions would result in the elimination of the entire budget for the Storm Surge/Flood Mitigation Program.

Q. Do you have a response to OPC witness Mara's recommendation that the entire budget for the Storm Surge/Flood Mitigation Program should be rejected?

A. Yes. OPC witness Mara's recommendation overlooks that the Storm Surge/Flood Mitigation Program included in FPL's 2023 SPP is the same program that was included in FPL's 2020 SPP previously approved by Commission Order No. PSC-2020-0293-AS-EI. In the 2020 SPP, FPL originally projected it would complete the Storm

Surge/Flood Mitigation Program by 2022. However, as explained in my direct testimony and in Exhibit MJ-1, due to field conditions and permitting delays that were largely beyond FPL's control, FPL was unable to complete the storm surge/mitigation measures at all of the identified substations by year-end 2022 as originally projected. As a result, FPL is proposing to continue the program to address the remaining four substations originally identified in the 2020 SPP, which are currently expected to be completed by year-end 2024. FPL has not added new or additional substations to the Storm Surge/Flood Mitigation Program approved as part of the 2020 SPP. The new exclusions proposed by OPC witness Mara were not part of either the 2020 SPP or the 2020 SPP Settlement that OPC joined. OPC witness Mara has not offered any reason why it was in the public interest to complete the storm surge/mitigation measures at these substations as part of the 2020 SPP, but not as part of the 2023 SPP.

Q. Do you agree with OPC witness Mara's recommendation that substations with alternate feeds should be excluded from the Storm Surge/Flood Mitigation Program?

A. No. Rather than installing measures to mitigate the potential for storm surge and flood at these four substations, OPC witness Mara recommends that any of these substations that have an alternative feed should be de-energized and the load served by the de-energized substation should be transferred to an adjacent substation via the alternate feed. OPC witness Mara's recommendation is not practical.

All of the four substations identified for the Storm Surge/Flood Mitigation Program have alternative feeder ties to nearby substations. However, de-energizing one substation due to storm surge or flooding does not mean an adjacently tied substation can necessarily pick up and support the entire electric load from the de-energized

substation. For example, the St. Augustine Substation, which has an alternate feed, was de-energized during Hurricanes Matthew and Irma and the majority of the customers served by this substation experienced outages. Similarly, the South Daytona Substation, which has an alternate feed, was de-energized during Hurricane Irma and the majority of the customers served by this substation experienced outages. Further, OPC witness Mara overlooks that the mitigation measures under the Storm Surge/Flood Mitigation Program will not only reduce outages but will reduce restoration costs associated with the need to repair and replace substation equipment that is damaged due to storm surge or flooding following an extreme weather event.

Q. Do you have a response to OPC witness Mara's recommendation that substations with no history of flooding should be excluded from the Storm Surge/Flood Mitigation Program?

A. Yes. All four substations remaining to be completed under the Storm Surge/Flood Mitigation Program have, in fact, experienced floods or storm surges in the past. Most recently, the flood alarm monitor went off at the Dumfoundling Substation during Tropical Cyclone One that impacted South Florida on June 2, 2022. With respect to future potential flooding at these substations, FPL explained in its response to OPC's Fourth Set of Interrogatories No. 50(d), which is attached to my rebuttal testimony as Exhibit MJ-2, that each of the four substations remaining to be completed under the program has projected flood levels that are higher than the current elevation of these substations. Therefore, all four substations included in the Substation Storm Surge/Flood Mitigation Program as part of the 2023 SPP have had a history of flooding and remain susceptible to flooding.

C. OPC's Recommended Adjustments to the Distribution Lateral Hardening Program are not Reasonable or Appropriate

Q. Does OPC oppose the Distribution Lateral Hardening Program included in FPL's 2023 SPP?

A. No. OPC witness Mara does not oppose FPL's Distribution Lateral Hardening Program. Rather, OPC witness Mara recommends a reduction in the annual budget for the Distribution Lateral Hardening Program, which will reduce the number of laterals to be completed each year and delay when customers will receive the direct benefits of the Distribution Lateral Hardening Program.

Q. In the 2023 SPP, FPL proposed to establish protocols for determining when a lateral may be evaluated for overhead hardening as opposed to being placed underground. Does OPC oppose these new overhead hardening protocols?

A. No. Although OPC witness Mara asserts on pages 29-30 of his testimony that the overhead program is vague and not well defined, he does not oppose any of the protocols proposed by FPL for evaluating when a lateral may be overhead hardened as opposed to being placed underground. Rather, OPC witness Mara simply notes that the overhead hardening protocols appear similar to the standards used in FPL's Feeder Hardening Program. Notably, OPC does not oppose, criticize, or otherwise take any issue with FPL's Feeder Hardening Program.

Q. On page 33 of his testimony, OPC witness Mara recommends that overhead hardened laterals and undergrounded laterals should be separated and tracked as two individual SPP programs. Do you agree with his recommendation?

A. I do not agree that there should be separate overhead and underground lateral SPP programs. The overhead protocols were established and incorporated into the Distribution Lateral Hardening Program pursuant to the 2020 SPP Settlement approved

by Commission Order No. PSC-2020-0293-AS-EI. FPL did not commit to create separate overhead and underground lateral programs. Moreover, the underground and overhead components of the Distribution Lateral Hardening Program are symbiotic, and the work will be part of the same overall lateral project. As explained in my direct testimony and Exhibit MJ-1, the selection and prioritization criteria for the Distribution Lateral Hardening Program ranks each feeder based on actual historical experience of all the overhead laterals on the feeder in order to address the worst performing circuits first. All laterals on the feeders are then hardened according to the ranking of each feeder. As explained in Exhibit MJ-1, constructing at the feeder level significantly improves the efficiency and timing of construction because all of the work takes place in the same location (feeder) on a set of laterals as opposed to being spread out over multiple individual laterals across the entire service area. It also allows for a more efficient design to reduce overall cable footage and the number of transformers needed to serve an area by interconnecting existing laterals and using alternate cable paths to reduce the total number of laterals in the area. When FPL performs the engineering evaluation of all laterals on a feeder, it will apply the overhead protocols to evaluate whether each lateral should be overhead hardened or converted to underground based on the actual field conditions and limitations at the time. Thus, the overhead and underground work is completed as part of a single conceptual design across all laterals on an entire feeder under the Distribution Lateral Hardening Program. To treat and separately manage the overhead hardening and underground lateral work as separate programs, as suggested by OPC witness Mara, would reduce efficiencies and increase costs. For these reasons, I believe it is appropriate and reasonable that the overhead protocols should be included and part of the overall Distribution Lateral Hardening Program and should not be a standalone SPP program.

Q. On page 31 of his testimony, OPC witness Mara claims that the Distribution Lateral Hardening Program does not meet the requirements of the SPP Rule because FPL did not provide any estimate of the cost reductions to be realized from the program. Do you have a response?

A. I disagree with OPC witness Mara. First, his claim that FPL did not provide cost reductions associated with the Distribution Lateral Hardening Program is a fallout of OPC's proposal that the Commission should adopt and apply a new cost benefit analysis requirement and new cost-effectiveness threshold for the SPP programs. As I explained above, OPC's proposed cost benefit analysis and new cost-effectiveness threshold should be rejected.

Second, as I explained above, there is nothing in either the SPP Statute or SPP Rule that prescribes that the benefits of SPP programs must be quantified, and storm hardening is not a simple cost-effective calculation as suggested by OPC.

Third, in compliance with Rules 25-6.030(3)(b) and 25-6.030(3)(d)(1), F.A.C., the benefits expected from the Distribution Lateral Hardening Program were provided in the following portions of FPL's 2023 SPP: Section II; Section IV(D)(1)(b); and Appendix A of Exhibit MJ-1. In fact, on page 31 of his testimony, OPC witness Mara relies on the 40-year net present value analysis of the reduction in storm restoration costs provided by FPL in Appendix A of Exhibit MJ-1. Further, on page 34 of his testimony, OPC witness Mara acknowledges that "[i]t is apparent from experiences in Florida that undergrounding and hardening poles will reduce outage costs and outage times."

Finally, OPC witness Mara does not propose that the Distribution Lateral Hardening Program be rejected; rather, he proposes an adjustment to the annual budget beginning in 2025. Either the Distribution Lateral Hardening Program meets the requirements of the SPP Rule and is eligible to be included in the SPP or it does not. OPC witness Mara cannot have it both ways.

Q. Does OPC agree with FPL's prioritization and selection criteria for the Distribution Lateral Hardening Program?

A. No. Although OPC does not take issue with any specific selection and prioritization criteria for the Distribution Lateral Hardening Program, OPC witness Mara nonetheless states on page 32 of his testimony that he does not agree with FPL's selection and prioritization methodology. Apparently, OPC witness Mara believes that FPL needs to do more so that lateral hardening and undergrounding and their associated benefits are spread to more customers and communities:

> My point is that the dollars are concentrated such that only a few customers will see a reduction in customer outage minutes and enjoy the aesthetics and other benefits of an undergrounded system. The remaining customers only see a benefit cost ratio that is upside down meaning more costs than benefits.
>
> This is a significant investment in a small portion of the system (one feeder) and in a single community. *There needs to be a mechanism to help spread the undergrounding and hardening to more communities*, which is important since all customers will be contributing to the cost of undergrounding.

See Direct Testimony of OPC witness Mara, pp. 32-33 (emphasis added). As I address later in my testimony, this statement is at odds with his recommendation of reducing the budget for the Distribution Lateral Hardening Program.

Q. Please describe OPC's proposed adjustment to the Distribution Lateral Hardening Program.

A. Despite the many pages of OPC's testimony dedicated to recommending that the Commission adopt and apply a new cost-effectiveness test, on pages 33-34 of his testimony OPC witness Mara recommends a qualitative adjustment to the annual budget for the Distribution Lateral Hardening Program starting in 2025 and continuing through 2032. Specifically, OPC witness Mara recommends that the annual budget for the Distribution Lateral Hardening Program be capped at $606 million per year for the years 2025 to 2032, which results in a total ten-year budget reduction of approximately $3.4 billion.

Q. Does OPC witness Mara describe how he calculated his proposed reduction to the Distribution Lateral Hardening Program budget?

A. No. His adjustment appears to be completely qualitative and, together with his other proposed adjustments, is simply intended to reduce the ten-year capital cost per customer to remain similar to the ten-year capital cost per customer for the combined FPL and Gulf's 2020 SPPs. See Direct Testimony of OPC witness Mara, pp. 13 and 34.

Q. Do you agree with OPC witness Mara's proposed adjustment to the Distribution Lateral Hardening Program budget?

A. No, I disagree for multiple reasons. It is important to understand OPC witness Mara's proposed adjustment will reduce the number of laterals to be completed each year and delay when customers will receive the direct benefits of the Distribution Lateral Hardening Program. This adjustment directly contradicts his position on pages 32-33 that FPL needs to expand its efforts so that lateral hardening and undergrounding, and their associated benefits, are spread to more customers and communities.

Although OPC witness Mara apparently seeks to simply maintain the status quo, he overlooks that the Distribution Lateral Hardening Program was initially deployed as a limited pilot, which was continued through 2022 as OPC agreed in the 2020 SPP Settlement. As part of the 2023 SPP, FPL is seeking to deploy the Distribution Lateral Hardening Program as a full-scale permanent SPP program and, as such, is ramping up the program in order to provide the benefits of underground lateral hardening throughout its system, including in the former Gulf service area. I note that OPC does not object to the Distribution Lateral Hardening Program becoming a permanent SPP program.

FPL's Distribution Lateral Hardening Program was designed to achieve the objectives and goals of the SPP Statute. Therein, the Florida Legislature expressly found that "[i]t is in the state's interest to strengthen electric utility infrastructure to withstand extreme weather conditions by promoting the overhead hardening of electrical transmission and distribution facilities, the undergrounding of certain electrical distribution lines, and vegetation management" and "[p]rotecting and strengthening transmission and distribution electric utility infrastructure from extreme weather conditions can effectively reduce restoration costs and outage times to customers." See Sections 366.96(1)(c), (d), F.S. FPL's underground lateral program is an impactful and crucial tool to achieve these legislative objectives and is appropriately designed to address the worst performing circuits and areas first based on actual historical experience. Indeed,

as shown in FPL's Hurricane Irma Forensic Report, underground laterals performed 6.6 times (85%) better during Hurricane Irma than overhead laterals.[1]

The ramp up in the number of laterals to be completed each year under the Distribution Lateral Hardening Program is due primarily to the inclusion of the former Gulf service area and the significant number of laterals that remain to be hardened, the strong local support and interest in the program, as well as the addition of the Management Region selection approach in 2025 as explained in my direct testimony and Exhibit MJ-1. Notably, the OPC does not criticize or challenge the proposed addition of the Management Region selection approach.

The annual budget for the Distribution Lateral Hardening Program is a product of the number of estimated projects to be completed throughout FPL's system as provided in Appendix C to Exhibit MJ-1. Although all customers indirectly benefit from overhead hardened and underground laterals through reduced restoration costs, the direct benefits for customers of overhead hardened and underground laterals, including both reduced outage times and aesthetics (as recognized by OPC witness Mara on page 32 of his testimony), will be facilitated and realized more quickly through the expanded number of underground projects contemplated by FPL's SPP. How fast and how many lateral projects are completed under the Distribution Lateral Hardening Program, and how quickly customers realize the direct and indirect benefits therefrom, is ultimately a regulatory decision for the Commission to be made in the context of the policy and objectives of the SPP Statute.

[1] Refer to Page 7 of FPL's Hurricane Irma Forensic Report in Docket No. 20180049, which is available at: http://www.psc.state.fl.us/library/filings/2019/05615-2019/Support/Exhibit%2036/POD%20No.%202/20180049%20-%20OPC's%201st%20POD%20No.%202%20-%20Attachment%20No.%201.pdf

D. FPL's New Transmission Access Enhancement Program is Consistent with the Objectives of the SPP Statute and Should be Approved

Q. Does the OPC agree with FPL's proposal to add the new Transmission Access Enhancement Program to the 2023 SPP?

A. No. On pages 26-29 of his testimony, OPC witness Mara contends that maintenance of bridges, roads, and culverts are ordinary base rate activities and FPL failed to demonstrate how its proposed Transmission Access Enhancement Program will meet the objectives of the SPP statute to reduce restoration costs and outage times associated with extreme weather events.

Q. Do you agree that projects to be completed under the Transmission Access Enhancement Program should be maintained as part of FPL's ordinary base rate activities?

A. No. OPC witness Mara appears to misunderstand the scope and purpose of the Transmission Access Enhancement Program. FPL is not proposing to simply maintain roads, rights of way, bridges, and culverts for purposes of accessing transmission facilities for day-to-day maintenance and vegetation management activities, which activities are typically scheduled and conducted during drier times of the year and within the existing transmission rights-of-way. Rather, as explained in my direct testimony and Exhibit MJ-1, the purpose of the Transmission Access Enhancement Program is to ensure that FPL has access to its transmission facilities following an extreme weather event by targeting and addressing areas that become inaccessible due to flooding or saturated soils. Notably, the peak of the Atlantic Hurricane Season coincides with Florida's wet season when increased rainfall will exacerbate the inaccessibility of many of these low-lying, saturated, and wetland areas. As explained in my direct testimony and Exhibit MJ-1, and as acknowledged by OPC witness Mara

on page 27 of his testimony, these low-lying areas may not be accessible following an extreme weather event without specialized equipment and vehicles, which has limited availability during and immediately following storm events.

Q. Do you have a response to OPC witness Mara's contention on pages 27-28 of his testimony that FPL did not demonstrate that the Transmission Access Enhancement Program will reduce restoration costs and outage times associated with extreme weather events?

A. Yes. OPC witness Mara's argument is, again, a fallout of OPC's proposal that the Commission should adopt and apply a new cost benefit analysis requirement and new cost-effectiveness threshold for the SPP programs. As I explained above, OPC's proposed new criteria and standards to review the SPPs are contrary to the requirements of both the SPP Statute and SPP Rule and should be rejected.

My direct testimony and Section IV(K)(1) of Exhibit MJ-1 explained that the Transmission Access Enhancement Program will ensure that FPL and its contractors have access to FPL's transmission facilities following an extreme weather event, which will reduce the need and associated costs for specialized equipment and will help expedite restoration activities and thereby reduce customer outage times. Importantly, a transmission-related outage can result in an outage affecting tens of thousands of customers and may cause a cascading event that could result in loss of service for hundreds of thousands of customers. The Transmission Access Enhancement Program will allow FPL and its contractors to quickly address such outages following an extreme weather event, which would result in a reduction of outage times for tens of thousands to hundreds of thousands of customers following an extreme weather event.

Q. Do you have any other observations regarding OPC's opposition to the Transmission Access Enhancement Program?

A. Yes. OPC witness Mara appears to overlook that the Commission's SPP Rule defines a storm protection project to include enhancement of T&D areas and not just the T&D facilities themselves: "a specific activity within a storm protection program designed for the enhancement of an identified portion *or area of existing electric or distribution facilities* for the purpose of reduction restoration costs and reduction outage times associated with extreme weather conditions therefore improving overall service reliability." See Rule 25-6.030(2)(b), F.A.C. (emphasis added). I also note that FPL's proposed program was modeled after the Transmission Access Enhancement Program included in Tampa Electric Company's ("TECO") 2020-2029 SPP that was previously agreed to in a Stipulation and Settlement Agreement, which OPC joined, that was approved by Commission Order No. PSC-2020-0293-AS-EI.[2]

Q. On page 27 of his testimony, OPC witness Mara states that, as an alternative, FPL should consider simply purchasing the specialized equipment necessary to access its transmission facilities located in low-lying and saturated areas following an extreme weather event. Do you have a response to his alternative proposal?

A. Yes. FPL has evaluated large tire equipment used in other industries. However, FPL has not been able to locate large tire vehicles readily available for purchase that are capable of working within Florida's unique topography, terrain, and hydrology while still meeting the necessary technical loading and reach specifications required to perform transmission line restoration work following an extreme weather event. Although floating equipment, such as barges, are utilized for construction of

[2] FPL acknowledges that, despite agreeing to the program in the TECO 2020-2029 SPP, OPC witness Mara filed testimony in Docket No. 20220048-EI opposing the continuation of TECO's previously approved Transmission Enhancement Program.

transmission line river crossings, this floating equipment cannot be used to access the low-lying and saturated areas to be addressed by the Transmission Access Enhancement Program.

Even if this specialized equipment was readily available on the market for purchase, FPL would need a large fleet of specialized equipment because the Company's service area encompasses more than 35,000 square miles across 43 counties with more than 9,000 miles of transmission lines. Purchasing a large fleet of specialty vehicles would also require ongoing specialized maintenance and specialized resources trained and familiar with operating and maintaining the specialized equipment. Lastly, external resources that perform restoration work following an extreme weather event may not be able to utilize the specialized equipment, resulting in potential delays to restoration of transmission structures and equipment.

E. FPL's New Transmission and Distribution Winterization Programs Would Reduce Restoration Costs and Outage Times Associated with Extreme Winter Events

Q. Does OPC agree with FPL's proposed new T&D Winterization Programs?

A. No. On page 19 of his testimony, OPC witness Mara contends that an extreme weather event must be wind driven under the SPP Statute and, therefore, projects to address extreme cold temperatures are not eligible to be included in the SPP. On pages 20-21 of his testimony, OPC witness Mara contends that changes to planning criteria and increasing capacity of the system to meet forecasted load is a standard base rate activity. Finally, on pages 20 and 21-24 of his testimony, OPC witness Mara contends that FPL has made no attempt to estimate the probability of an extreme weather event and has

failed to demonstrate that the T&D Winterization Programs will reduce restoration costs and outage times as required by the SPP Statute and SPP Rule.

Q. Do you agree that SPP Statute and SPP Rule limit extreme weather events to only wind driven events as suggested by OPC witness Mara?

A. No. Although the Legislature found that during extreme weather conditions high winds can cause vegetation and debris to blow into and damage electrical transmission and distribution facilities, resulting in power outages, the statutory findings do not limit SPPs only to programs designed to address damage due to high winds. Indeed, the Legislature went on to conclude that "[i]t is in the state's interest to strengthen electric utility infrastructure to withstand extreme weather conditions by promoting the overhead hardening of electrical transmission and distribution facilities, the undergrounding of certain electrical distribution lines, and vegetation management" and that "[p]rotecting and strengthening transmission and distribution electric utility infrastructure from extreme weather conditions can effectively reduce restoration costs and outage times to customers and improve overall service reliability for customers." See Sections 366.96(1)(c) and (d), F.S. Therefore, the intent and purpose of the SPP Statute is to protect and strengthen the existing transmission and distribution system from all extreme weather events in order to reduce restoration costs and outage times associated with extreme weather events. Consistent with this intent and purpose, FPL notes that its previously approved Substation Storm Surge/Flood Mitigation Program and its proposed Transmission Access Enhancement Program are designed to mitigate flooding and storm surge conditions that occur in conjunction with extreme weather events and are unrelated to vegetation blown by wind.

Q. Do you have a response to OPC witness Mara's contention that FPL did not demonstrate that the T&D Winterization Programs will reduce restoration costs and outage times?

A. Yes. An extreme cold weather event can have significant consequences for areas typically unaccustomed to such conditions. This was clearly demonstrated by the Texas February 2021 winter event which left millions without electricity for days. The Texas February 2021 winter event was a region-wide reminder for all utilities in the Southeast more familiar with summer peaking events, such as FPL, that extreme weather is now a year-round concern and not limited only to vegetation and debris blown by the wind. My direct testimony and Sections II(B), IV(I)(1), and IV(J)(1), clearly explain that the T&D Winterization Programs will enable FPL to better serve forecasted peak loads during extreme winter events and will help mitigate restoration costs and outage times associated with extreme cold weather events similar to the 1977, 1989, and 2010 winter events in Florida.

Q. On pages 22-24 of his direct testimony, OPC witness Mara contends that FPL did not provide any evidence of outages on the distribution system due to extreme cold weather events. Do you agree?

A. No. In response to OPC's First Request for Production of Documents No. 1, which is provided on page 1 of Exhibit KJM-3 attached to the testimony of OPC witness Mara, FPL provided eight documents regarding the potential impact of an extreme cold weather event, including its T&D winterization analysis of a 1989 winter-type of event that was used by FPL in its evaluation and development of the proposed T&D Winterization Programs. As summarized in my direct testimony and Exhibit MJ-1, these documents project that certain T&D facilities could become overloaded and result

in outages due to an extreme cold weather event similar to the 1977, 1989, and 2010 winter events in Florida.

Q. On pages 22-25 of his testimony, OPC witness Mara is critical of FPL's "January 2010 Winter Analysis." Before addressing his specific concerns, do you have a comment about his use of the "January 2010 Winter Analysis"?

A. Yes. In support of his contention that FPL's proposed T&D Winterization Programs are not needed, OPC witness Mara appears to rely on the information included in the "January 2010 Winter Analysis," which is provided on pages 3-30 of his Exhibit KJM-3. The flaw with this approach is that the "January 2010 Winter Analysis" was not the final analysis for the proposed T&D Winterization Programs but, rather, the "January 2010 Winter Analysis" was a report on the actual impacts and outages on FPL's T&D system due to the 2010 winter event. As noted therein, further analysis was required to identify the potential impacts of extreme cold weather events similar to the 1977, 1989, and 2010 winter events in Florida and to develop proposed mitigating measures. See page 3 of Exhibit KJM-3 attached to the testimony of OPC witness Mara. The analysis actually used by FPL to identify the potential impacts that a 1989 winter-type of event could have on FPL's T&D system, which was used to design and support its proposed T&D Winterization Programs, was provided to OPC in response to discovery.

Q. On page 22 of his testimony, OPC witness Mara asserts that 69% of the outages from the January 2010 winter event did not result in the need to replace the distribution transformer? Do you have a response?

A. Yes. OPC witness Mara's statement mischaracterizes the FPL "January 2010 Winter Analysis." This statement is not included in the "January 2010 Winter Analysis" and FPL assumes that OPC witness Mara reached this simple conclusion by reviewing the pie chart on page 11 of the "January 2010 Winter Analysis" (see OPC witness Mara

Exhibit KJM-3, p. 12) that shows that 31% of the tickets were for transformers. This conclusion is inaccurate as the pie chart on page 11 of the "January 2010 Winter Analysis" refers to only over-head equipment failure. The eight segments in the pie-chart are the eight "outage codes" noted by the line crews based on their preliminary review. Any of these eight "outage codes" in the pie-chart could also have resulted in a transformer replacement. More accurately, as provided on page 3 of the "January 2010 Winter Analysis" (see OPC witness Mara Exhibit KJM-3, p. 4), 62% of the total Customer Minutes Impacted (CMI) (or, 71% of the total tickets) during the 2010 January winter event for FPL were due to transformer-related outages. Furthermore, a list of all transformers damaged and subsequently replaced from FPL's January 2010 winter event was provided in FPL's response to OPC's Fourth Set of Interrogatories No. 40, which is attached to my rebuttal testimony as Exhibit MJ-3. Additionally, FPL's forensic analysis of the January 2010 winter event identified that overloading was the primary driver of the transformer failures during the January 2010 winter event. A copy of FPL's forensic analysis was produced in FPL's response to OPC's Fifth Request for Production of Documents No. 33, which is attached as Exhibit MJ-4 to my rebuttal testimony.

Q. On page 23 of his testimony, OPC witness Mara states that FPL's use of a 1.35 multiplier of the summer peak to predict the winter peak for the replacement of transformers under the Distribution Winterization Program is too simplistic for prudent engineering practice. Do you have a response?

A. Yes. The 1.35 multiplier used in the "January 2010 Winter Analysis" is the system average winter/summer peak ratio that was derived based on actual feeder winter-summer peak ratios measured during the 2010 extreme cold event. While the specific ratio may vary at individual transformers, the 1.35 average multiplier offers FPL a

comprehensive and uniform approach to develop a company-wide standard to help mitigate overload risks that could lead to outages. OPC witness Mara suggests that FPL should research overloading on each individual transformer and only replace those distribution transformers that could become overloaded. FPL serves 5.7 million customers across 43 counties in Florida, and currently has more than one million distribution transformers. It would be inefficient and costly to evaluate each individual distribution transformer and develop and apply individual loading criteria for each transformer as suggested by OPC witness Mara. Therefore, FPL developed a standardized winter overloading criteria that could be applied consistently across its entire service area to ensure that its system can withstand the risk of an extreme weather event, reduce restoration costs, and reduce customer outage times. However, FPL did review the individual transformers on the system to ensure that they complied with both the summer and winter overload criteria. Those individual transformers that did not meet the winter overload criteria are targeted for replacement as part of the SPP Distribution Winterization Program.

Q. On pages 24-25 of his testimony, OPC witness Mara cites to the "January 2010 Winter Analysis" and states that there were only a few transmission outages associated with the January 2010 winter event and the proposed Transmission Winterization Program will not correct 70% of the customer minutes interrupted (CMI) that occurred during the January 2010 winter event. Do you have a response?

A. The "January 2010 Winter Analysis" shows the impact that occurred as a result of the 2010 winter event in Florida. The SPP Transmission Winterization Program is designed to mitigate any potential transmission impacts that could result from a 1989 winter-type of event. FPL's modeling of a 1989 winter-type of event identified three

transmission line sections that would have capacity constraints and would not meet the forecasted load during an extreme cold weather event. Under the new Transmission Winterization Program, FPL will replace these sections of existing transmission line and the associated substation equipment with higher capacity equipment to better withstand increased load during an extreme cold weather event.

Q. On page 25 of his testimony, OPC witness Mara claims that the Transmission Winterization Program is not needed because FPL can simply isolate the transmission components prior to failure as they reach capacity limits during an extreme weather event. Do you agree?

A. No. OPC witness Mara's suggestion that FPL simply "isolate any components prior to failure" before approaching its capacity limit does not apply to the projects identified for the Transmission Winterization Program. The FPL transmission system is designed and operated to comply with NERC Reliability Standards, which includes a requirement to operate the system for an N-1 contingency without exceeding the rating of the facility under normal peak load conditions (*e.g.*, TPL-001). Although the Transmission Winterization Programed modeled an extreme winter load, this does not mean that the facility can simply be removed from service without consequences such as loss of firm load. The system is required to stay within its facility ratings under an N-1 condition unless there is mitigation to address the overload of the facility (NERC Reliability Standards TPL-001 and TOP-001). It is important to understand that during an extreme winter event, the system loading will likely be at maximum across the entire transmission system. Simply isolating the transmission equipment during this time will result in additional loading to other existing facilities and could potentially overload other facilities resulting in potential equipment failures and system reliability issues. It should be noted that as a part of its FPL's winterization analysis, FPL identified specific

existing transmission lines that would be overloaded under N-1 conditions as required by NERC Reliability Standard TPL – 001 during an extreme winter peak load with no mitigation other than disconnecting firm load. Only these specific facilities have been included in the SPP Transmission Winterization Program.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Exhibit MJ-2

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fourth Set of Interrogatories
Interrogatory No. 50
Page 1 of 2

QUESTION:
For the last 10 years, for each substation slated for modification by the substation flood mitigation program, list the following:

a. Provide the dates each of the substation had to be de-energized due to high water.

b. For each date of de-energization, provide the duration that the substation was de-energized.

c. Provide the number of customers served by each substation at the time of de-energization.

d. Describe the elevation of the substation and FPL's projected elevation of the flood water

RESPONSE:
a. Please refer to FPL's response to OPC's 4th Set of Interrogatories, No. 39.

b. Please refer to FPL's response to OPC's 4th Set of Interrogatories, No. 39.

c. Please refer to FPL's response to OPC's 4th Set of Interrogatories, No. 39.

d. Please see table below.

Sites	Existing Average Grade	2022 Elevation of Flood Protection	Expected Flood Elevation
St. Augustine	4.5 ft	10.0 ft	8-9 ft
Opa Locka	Approx. 9 ft	N/A-- Drainage Improvements ~11 ft	10 ft– post improvements
S. Daytona	5.4 ft	10 ft	7.8 ft
Lewis	6.4 ft	11.4 ft	8 ft
Aventura	4 ft	N/A--Drainage Improvements 4.4 ft	4.4 ft – post improvements
Pine Ridge	9.2 ft	11.2 ft	11.2 ft
Dumfoundling	4.4 ft	9 ft	6.4 ft

Corkscrew	19.18 ft	22.5 ft	20 ft
Chambers	Approx. 6 ft	10.5 ft	7.9 ft
Gracewood	Approx. 5 ft	10 ft	7.1 ft

Exhibit MJ-3

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fourth Set of Interrogatories
Interrogatory No. 40

QUESTION:
Distribution Winterization Program: Field Transformers

a. If a field transformer is projected to be overloaded in the summer, will it be included in the SPP? If not, why not?

b. If a field transformer is projected to be overloaded during normal winter weather (i.e., electric heat operating as designed in residences and businesses), would the replacement cost of the field transformer be included in the SPP? If not, why not?

c. If a customer adds load to a field transformer which may cause the transformer to be overloaded during extreme winter weather, who is responsible for the upgrade of the transformer, the customer or FPL? Would the budget funds for this be included in FPL's SPP?

d. Does FPL's standard protocol for sizing field transformers include sizing for winter loads?

e. Explain how FPL determined that 1,700 to 2,900 field transformers need to be replaced annually.

f. Provide winter rating assumptions for field transformers proposed to be replaced for extreme winter weather.

g. Provide the ratings of field transformers based on the winter assumptions (ambient temperature, duration of overload, etc.).

h. List and describe the standards used to determine extreme winter rating of field transformers.

i. Provide a list of all transformers damaged (unsalvageable) from extreme winter overloads, including size and year failed.

j. For each size of transformer proposed to be replaced, provide the fuse size and type used to protect the transformer.

k. For all sizes of overhead transformers on FPL's system, provide the fuse size and type used to protect the transformer.

l. If transformers are replaced by this program, describe how any replaced transformers can be re-used on FPL's system, and how credit for re-use is included in FPL's SPP budget.

RESPONSE:

a. No. Only transformers that could become overloaded for a 1989 winter-type event and could result in customer outages were included in the 2023-2032 SPP.

b. No. Only transformers that could become overloaded for a 1989 winter-type event and could result in customer outages were included in the 2023-2032 SPP .

c. Budget funds for such scenario are not included within the 2023-2032 SPP. The Distribution Winterization Program only addresses existing transformers that could become overloaded for a 1989 winter-type event and could result in customer outages; it does not address new construction, load, or service.

d. Yes, FPL design guidelines provide criteria for sizing field transformers for summer and winter loads.

e. FPL identified approximately 10,000 field transformers in the 2023-2032 SPP that could become overloaded for a 1989 winter-type event and could result in customer outages. These replacements were spread out over five years based on resource and equipment availability.

f. Please see attachment "Transformer Loading Guidelines" included in FPL's response to OPC's Fourth Set of Production of Documents No. 22 for FPL standard loading guidelines, which include summer and winter loading guidelines. Units identified in the SPP are forecasted to exceed these guidelines for a 1989 winter-type event.

g. Transformer loading guidelines are based on ANSI/IEEE C57.91 for transformer specifications (including ambient temperature, duration of overload, etc).

h. Transformer loading guidelines are based on ANSI/IEEE C57.91 for transformer specifications. FPL adjusted standard loading criteria to account for a forecasted extreme winter scenario.

i. Please see Attachment 1 which provides a list of all transformers damaged and subsequently replaced from FPL's January 2010 extreme winter event; however, it does not include transformer size as that information is not tracked at this level of detail.

j. Please see Attachment 2 for FPL's Design Construction Standard (DCS I-19.2.0) included with this response for FPL's fusing guidelines.

k. Please see Attachment 3 for FPL's Design Construction Standard (DCS I-19.0.0) included with this response for FPL's fusing guidelines.

l. FPL does not re-use field transformers that have experienced overload conditions.

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fourth Set of Interrogatories
Interrogatory No. 40
Attachment No. 1 of 3
Tab No. 1 of 1

Power Off Date	FPL ID
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1/7/2010 2:34	8849632
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1/7/2010 9:55	19260003
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1/7/2010 8:31	10395697
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1/11/2010 6:57	52347027
1/11/2010 6:54	64168736
1/11/2010 8:46	11700479
1/11/2010 20:26	25003506
1/11/2010 6:59	102181291
1/11/2010 7:05	14616008
1/11/2010 18:01	45156674
1/11/2010 7:57	61498818
1/11/2010 8:02	66521943
1/11/2010 9:35	123311080
1/11/2010 9:36	42415627
1/11/2010 9:30	13929872
1/11/2010 9:36	69606632
1/11/2010 9:40	14888978
1/11/2010 7:05	68730332
1/11/2010 7:09	28075993
1/11/2010 8:02	65173063
1/11/2010 7:24	12931746
1/11/2010 8:39	11054313
1/11/2010 7:07	13451810
1/11/2010 8:25	13874432
1/11/2010 7:11	61005592
1/11/2010 7:16	63327662
1/11/2010 7:11	52715273
1/11/2010 7:47	63819335
1/11/2010 11:20	34995625
1/11/2010 8:08	40166536

1/11/2010 7:46	18149661
1/11/2010 7:58	19233397
1/11/2010 18:14	30206935
1/11/2010 7:13	109912031
1/11/2010 7:19	8673088
1/11/2010 7:31	111203281
1/11/2010 7:14	49350095
1/11/2010 7:20	65575548
1/11/2010 7:20	65101659
1/11/2010 8:23	106413101
1/11/2010 7:43	51322698
1/11/2010 7:38	16961802
1/11/2010 7:17	47899813
1/11/2010 7:17	62587242
1/11/2010 7:23	55335504
1/11/2010 8:26	63084081
1/11/2010 8:19	67878628
1/11/2010 8:16	19355527
1/11/2010 10:01	10444643
1/11/2010 7:28	30957762
1/11/2010 11:41	64780664
1/11/2010 7:35	14113505
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1/11/2010 7:36	63757941
1/11/2010 7:33	10543283
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1/11/2010 7:43	13108357
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1/11/2010 11:20	25313443
1/11/2010 7:47	65700706
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1/11/2010 12:22	30468803
1/11/2010 11:06	63541792
1/11/2010 10:00	9093121
1/11/2010 8:00	66073380
1/11/2010 8:57	64808861
1/11/2010 8:52	16962228
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1/11/2010 8:07	61384895
1/11/2010 7:56	65071343
1/11/2010 8:08	8739487
1/11/2010 8:03	40816861
1/11/2010 8:00	13017545
1/11/2010 8:04	154840208

1/11/2010 8:02	126086687
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1/11/2010 8:07	69507290
1/11/2010 8:07	65635483
1/11/2010 8:07	15466508
1/11/2010 8:17	13759791
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1/11/2010 21:57	19096509
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1/11/2010 8:31	15735906
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1/11/2010 8:36	61127391
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1/11/2010 8:50	30201519
1/11/2010 8:43	14337527
1/11/2010 8:40	33798327
1/11/2010 8:44	11441309
1/11/2010 10:29	71307925
1/11/2010 8:45	8487522
1/11/2010 8:55	40179956
1/11/2010 8:48	64130791
1/11/2010 19:46	30255982
1/11/2010 19:41	15656209
1/11/2010 8:58	13929418
1/11/2010 8:57	15597134
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1/11/2010 11:43	17025973
1/11/2010 20:43	66642250
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1/11/2010 9:11	19016535
1/11/2010 9:11	66478536
1/11/2010 9:14	53971257
1/11/2010 12:51	44216640

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1/11/2010 9:23	65737371
1/11/2010 9:30	65496361
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1/11/2010 10:07	19305497
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1/11/2010 10:16	24761417
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1/11/2010 20:40	61456998
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1/11/2010 10:40	65082825
1/11/2010 10:39	15652641
1/11/2010 10:44	17091298
1/11/2010 21:22	69132417
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1/11/2010 11:31	63341268
1/11/2010 11:43	60564235
1/11/2010 10:56	63628626
1/11/2010 16:51	43632847
1/11/2010 11:44	165806820
1/11/2010 11:52	8846515
1/11/2010 12:02	61141394
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1/11/2010 12:01	67483930
1/11/2010 12:31	268229791
1/11/2010 13:02	268625537
1/11/2010 12:36	8805108
1/11/2010 20:03	36455984
1/11/2010 19:09	
1/11/2010 19:49	30545882
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1/11/2010 16:26	11157978
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1/11/2010 17:25	41150054
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1/11/2010 21:59	33315200
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1/11/2010 15:36	65265756
1/11/2010 16:14	66874934
1/11/2010 15:34	61311470
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1/12/2010 11:42	57964336
1/12/2010 6:01	34197459
1/12/2010 3:53	64137274
1/12/2010 2:58	12962847
1/12/2010 5:16	60051456
1/12/2010 2:55	17830101
1/12/2010 6:48	15549808
1/11/2010 22:08	33802401
1/12/2010 6:05	18081153
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1/12/2010 6:15	68256263
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1/12/2010 16:30	63125544
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1/12/2010 6:39	47458627
1/12/2010 6:44	15645244
1/12/2010 17:25	12381662
1/12/2010 9:25	11609320
1/12/2010 8:51	72606691
1/12/2010 6:45	10250935

1/12/2010 7:10	53341447
1/12/2010 11:36	60334041
1/12/2010 11:34	70854050
1/12/2010 7:09	16537370
1/12/2010 9:03	64306695
1/12/2010 9:41	36664780
1/12/2010 7:20	66469526
1/12/2010 7:02	61597275
1/12/2010 7:13	67931206
1/12/2010 17:36	33975968
1/12/2010 20:28	33176666
1/12/2010 7:21	34157048
1/12/2010 7:37	8608353
1/12/2010 10:38	56598598
1/12/2010 7:52	43635265
1/12/2010 17:16	36551345
1/12/2010 10:29	15127479
1/12/2010 10:32	
1/12/2010 8:08	153265417
1/12/2010 8:02	33802401
1/12/2010 11:51	15395687
1/12/2010 12:26	55920419
1/12/2010 15:14	67819032
1/12/2010 21:27	55291522
1/12/2010 13:47	33605952
1/12/2010 8:51	26953123
1/12/2010 8:29	12775679
1/12/2010 10:36	71448148
1/12/2010 10:34	57290123
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1/12/2010 2:04	64883122
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1/12/2010 14:19	44329040
1/12/2010 15:49	11609641
1/12/2010 2:54	27496193
1/13/2010 6:46	33001448
1/13/2010 8:32	71281929

1/13/2010 17:34	42701388
1/13/2010 6:19	71590486
1/13/2010 4:15	15602244
1/13/2010 23:06	17275913
1/13/2010 17:52	27878065
1/13/2010 16:52	28535880
1/13/2010 6:54	17982188
1/13/2010 17:58	66355751
1/13/2010 6:44	28456126
1/13/2010 12:42	53901107
1/13/2010 7:24	10478280
1/13/2010 20:13	14564885
1/13/2010 6:20	33011914
1/13/2010 8:03	61535484
1/13/2010 9:16	35693212
1/13/2010 8:46	72128652
1/13/2010 10:29	40991026
1/13/2010 11:15	40860617
1/13/2010 10:20	56145119
1/13/2010 14:11	45196907
1/13/2010 12:23	20589194
1/13/2010 13:03	40033713

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fourth Set of Interrogatories
Interrogatory No. 40
Attachment 2 of 3
Page 1 of 1

I-19.0.0	TRANSFORMER FUSING TABLE AERIAL FUSE SWITCHES	I-19.0.0

ALL FUSES ARE TYPE "KS", "MS", OR "S" EXCEPT AS NOTED
("MS" AND "S" ARE EQUIVALENT TO "KS")

TRANSFORMER KVA PER PHASE (EXCEPT AS NOTED)	PRIMARY OPERATING VOLTAGE		
	2.4KV PHASE TO GROUND OR 4.16KV PHASE TO PHASE	7.62KV PHASE TO GROUND OR 13.2KV PHASE TO PHASE	13.2KV PHASE TO GROUND OR 22.86KV PHASE TO PHASE
	FUSE SIZE		
3	1-1/2"X"	3/4"X"	3/4"X"
5	2-1/2"X"	3/4"X"	3/4"X"
7-1/2	4	1-1/4"X"	3/4"X"
10	5	1-1/2"X"	3/4"X"
15	8	2-1/2"X"	1-1/2"X"
25	10	4 OR 10*	2-1/2"X"OR 10*
37-1/2	20	6 OR 10*	4 OR 10*
50	25	8 OR 10*	5 OR 10*
75	40	10	6 OR 10*
100	50 (7)	15	8 OR 10*
150	65 (7)	20	10
167	80 (7)	25	15
200	80 (7)	30	15
250	100 (7)	40	20
333	–	50 (7)	25
500	–	65 (7)	40
2000 3ø	–	100 (7)	50 (7)
2500 3ø	–	140 (7)(9)	65 (7)

* SEE NOTE 1

NOTES:

1. FOR FUSE SIZES SHOWN WITH *, USE THE SMALLER SIZE FUSE IF THERE ARE ANY BARE OPEN WIRE CONDUCTORS (SECONDARY OR SERVICE) ON LOAD SIDE OF TRANSFORMER. USE 10 AMP FUSE ONLY IF ALL SECONDARY/SERVICE CONDUCTORS ARE INSULATED. FOR ANY TRANSFORMER ON A LATERAL THAT IS FUSED AT LESS THAN 40 AMPS, USE THE SMALLER SIZE TRANSFORMER FUSE.
2. THE FUSE SIZES SHOWN IN THE ABOVE TABLE MAY BE USED AS A GUIDE IN FUSING STEP-UP OR STEP-DOWN BANKS, FOR BOTH POLE MOUNTED TRANSFORMERS AND UG RADIALS TO SINGLE TRANSFORMER (OR BANK) WHEN FUSED AT RISER POLE. UNUSUAL CIRCUMSTANCES OR COORDINATION PROBLEMS MAY REQUIRE A CHANGE FROM THE ABOVE TABLE.
3. STREET LIGHTING TRANSFORMERS (RO'S) SHALL BE FUSED ON SOURCE SIDE AS FOLLOWS WITHOUT REGARD TO THEIR KW RATING: IF INSTALLED ON 2.4KV CIRCUIT, FUSE WITH 25 AMPERE FUSES. IF INSTALLED ON 7.6KV CIRCUIT, FUSE WITH 10 AMPERE FUSES. CONSULT THE ENGINEERING DEPARTMENT FOR RO FUSE SIZE WHEN IT IS INSTALLED ON THE LOAD SIDE OF A LATERAL FUSE THAT IS THE SAME SIZE OR SMALLER THAN THE ABOVE OR THE LOAD SIDE OF AN OIL CIRCUIT RECLOSER.
4. FUSING INSTRUCTIONS FOR TRANSFORMERS LARGER THAN THOSE SHOWN IN THE ABOVE TABLE SHOULD BE OBTAINED FROM DISTRIBUTION PLANNING.
5. WHEN ONE FUSE LINK IS BLOWN ON A THREE PHASE BANK, THE FUSES IN ALL PHASES SHALL BE REPLACED.
6. NEUTRAL LEADS SHALL NOT BE FUSED.
7. RISER POLE FUSES SHALL BE TYPE "K" WHEN 50 AMP OR LARGER IS REQUIRED AND TYPE "KS", "MS", OR "S" WHEN SMALLER THAN 50 AMP.
8. THESE FUSE SIZES APPLY ONLY IN CASES WHERE THE TRANSFORMER DOES NOT HAVE INTERNAL FUSING OR IS OTHERWISE SUB-FUSED. IN CASES WITH INTERNAL OR OTHER SUB-FUSING, FUSING SHOULD BE PER NORMAL LATERAL/LOOP GUIDELINES.
9. FUSES GREATER THAN 100 AMPS SHALL BE INSTALLED USING A 200 AMP RATED CUTOUT (REFER TO DERM 3.6.2).

FPL
OH & UG DISTRIBUTION SYSTEM STANDARDS

NO.	DATE	REVISION	ORIG.	DRAWN	APPR.
3	3/25/19	UPDATE TABLE AND ADD NOTE 9	ARR	ELS	RDH
2	7/29/16	UPDATE TABLE	JJR	ELS	RDH
1	10/23/08	ADDED NOTE 8	CEA	ELS	JJM
0	9/11/99	REVISED FUSE CHART & NOTE 1	PMG	RAS	JJM

ORIGINATOR: PMG DRAWN BY: RAS
DATE: 8/9/96 APPROVED: J.J McEVOY NO SCALE
SUPERVISOR, OH/UG PRODUCT SUPPORT SERVICES

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fourth Set of Interrogatories
Interrogatory No. 40
Attachment 3 of 3
Page 1 of 1

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7-1/2	4	1-1/4"X"	3/4"X"
10	5	1-1/2"X"	3/4"X"
15	8	2-1/2"X"	1-1/2"X"
25	10	4 OR 10*	2-1/2"X"OR 10*
37-1/2	20	6 OR 10*	4 OR 10*
50	25	8 OR 10*	5 OR 10*
75	40	10	6 OR 10*
100	50 (7)	15	8 OR 10*
150	65 (7)	20	10
167	80 (7)	25	15
200	80 (7)	30	15
250	100 (7)	40	20
333	–	50 (7)	25
500	–	65 (7)	40
2000 3ø	–	100 (7)	50 (7)
2500 3ø	–	140 (7)(9)	65 (7)

* SEE NOTE 1

NOTES:

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5. WHEN ONE FUSE LINK IS BLOWN ON A THREE PHASE BANK, THE FUSES IN ALL PHASES SHALL BE REPLACED.
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NO.	DATE	REVISION	ORIG.	DRAWN	APPR.
3	3/25/19	UPDATE TABLE AND ADD NOTE 9	ARR	ELS	RDH
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FPL
OH & UG DISTRIBUTION SYSTEM STANDARDS

ORIGINATOR: PMG DRAWN BY: RAS
DATE: 8/9/96 APPROVED: J.J McEVOY
SUPERVISOR, OH/UG PRODUCT SUPPORT SERVICES
NO SCALE

Exhibit MJ-4

Florida Power & Light Company
Docket No. 20220051-EI
OPC's Fifth Request For Production of Documents
Request No. 33

QUESTION:
Please provide all documents identified in Late Filed Deposition Exhibit No. 8 (and the related discussion) from the May 24, 20022 deposition of FPL employee Eduard DeVarona, relating to the "2010 report".

RESPONSE:
Please see the attached responsive document.

Cold Weather Event Jan 9-11, 2010

Transformer Analysis Summary

Distribution

February 1, 2010

Executive Summary (slide 1 of 2)

- **During January 9 -11, 2010, the entire state faced record temperatures impacting customer usage – roughly, a once in thirty-five year event**
- **Customers affected = 171,134** (Distribution outages = 130,592)
- **Transformers accounted for the most Customer Minutes Interrupted (CMI) and second most Customers Interrupted (CI)**
- **Analysis shows:**
  - Transformer loading was the most significant factor
  - FPL service region was the second most significant factor

Executive Summary (slide 2 of 2)

Follow-up Actions based upon analysis results:

- Develop risk-factored prioritization list of East Region transformers by using transformer load %, number of customers/transformer, average KVA-Demand per customer, and transformer KVA size. Expand to entire system.
- Revise Asset Management System (AMS) load calculations to incorporate available Automated Metering Infrastructure (AMI) data to improve accuracy of peak load calculations.
- Options for pursuing transformer replacements:
  - Based upon current information, up to 22,000 padmount transformer replacements may be required over time to address indicated overload conditions - estimated data limiting accuracy of plans (i.e. estimated transformer loading)
  - Incorporate AMI data as it becomes available to determine necessity for replacing overloaded transformer conditions based on risk evaluation - more accurate data insures appropriate corrective actions over time (i.e. AMI data deriving accurate transformer loading)

FPL

Overview & Facts

Event Summary

- **Weather – During this event, the entire state faced record temperatures impacting customer usage**
  - West Palm Beach Airport – Average 12-day temperature, 49.9 degrees, was the lowest on record for any 12-day period
  - Miami International Airport – Average 12-day temperature, 52.7 degrees, 10th lowest on record for any 12-day period and the coldest such period since 1940
- **Customers Affected – 171,134**
  - Substation Outages 40,542
  - Distribution Outages 130,592

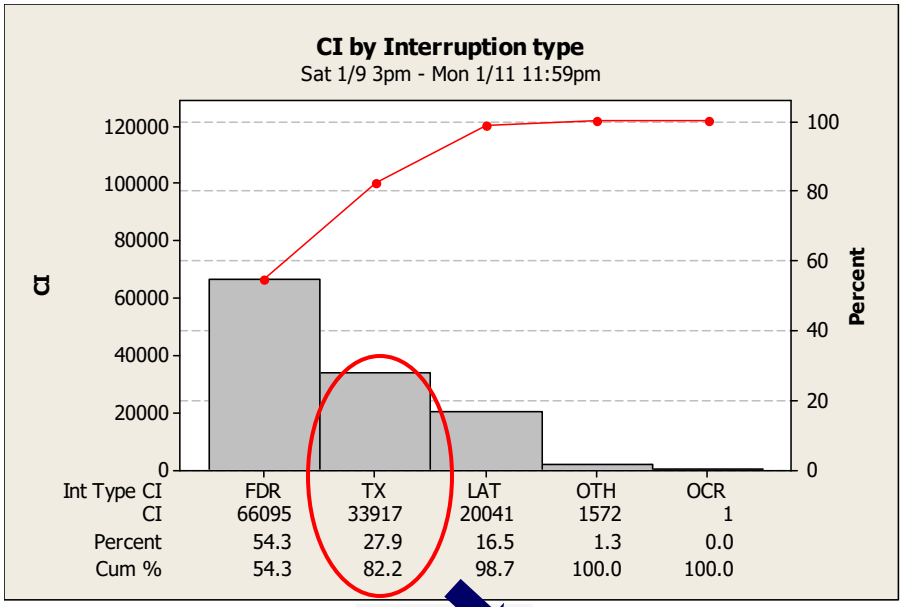
Customer Out by Day					
9-Jan	61,606		10-Jan	80,683		11-Jan	28,845
Customers Out By Region							
North	17,739		East	41,889		West	48,078
Broward	42,364		Dade	21,064		**Total**	**171,134**

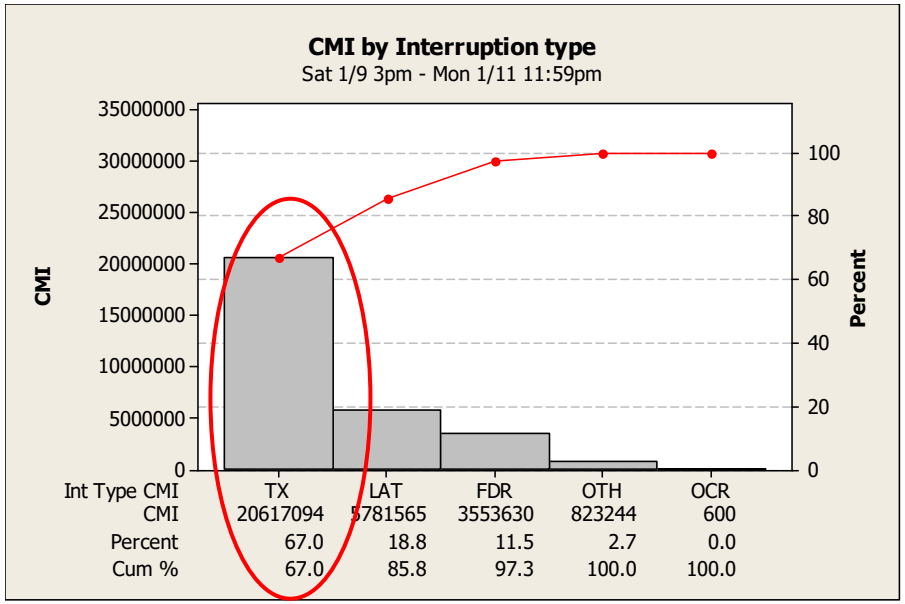
Unprecedented record temperatures forced an event that we had not previously faced.

FPL

What device impacted our indicators the most during the event?

Sat 1/9 3pm – Mon 1/11 11:59pm





Two Proportions Test of TX % contribution to CI

Sample	X	N	Sample p
Event	33917	121626	0.278863
Avg. Jan 08&09	83065	988761	0.084009

3X greater!

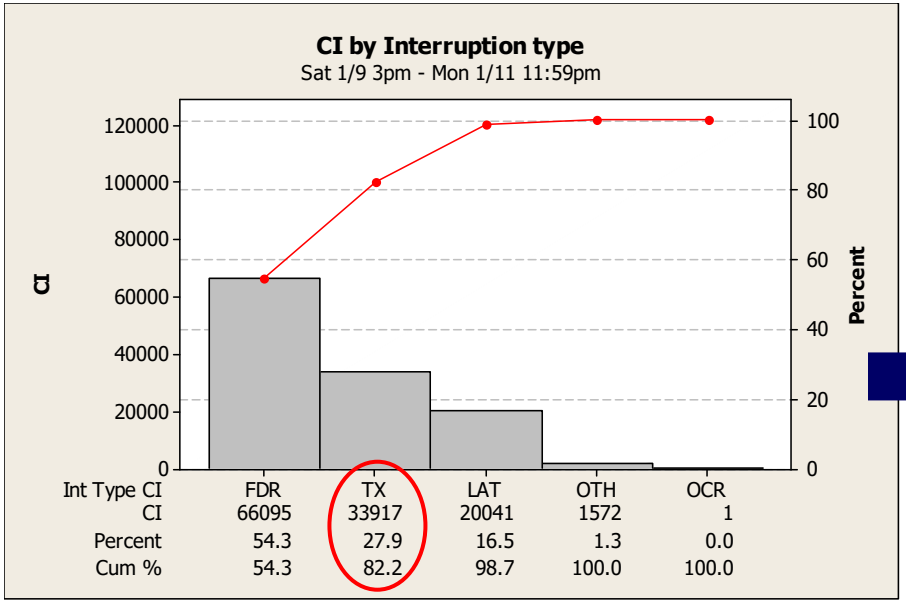
Difference = p (1) - p (2)
Estimate for difference: 0.194854
95% CI for difference: (0.192275, 0.197433)
Test for difference = 0 (vs not = 0): Z = 148.09 P-Value = 0.000

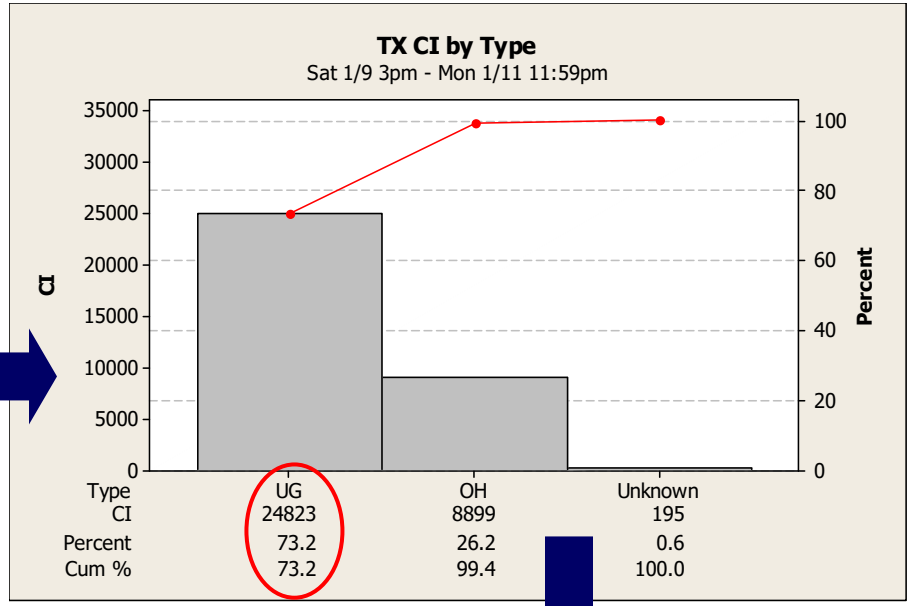
Fisher's exact test: P-Value = 0.000

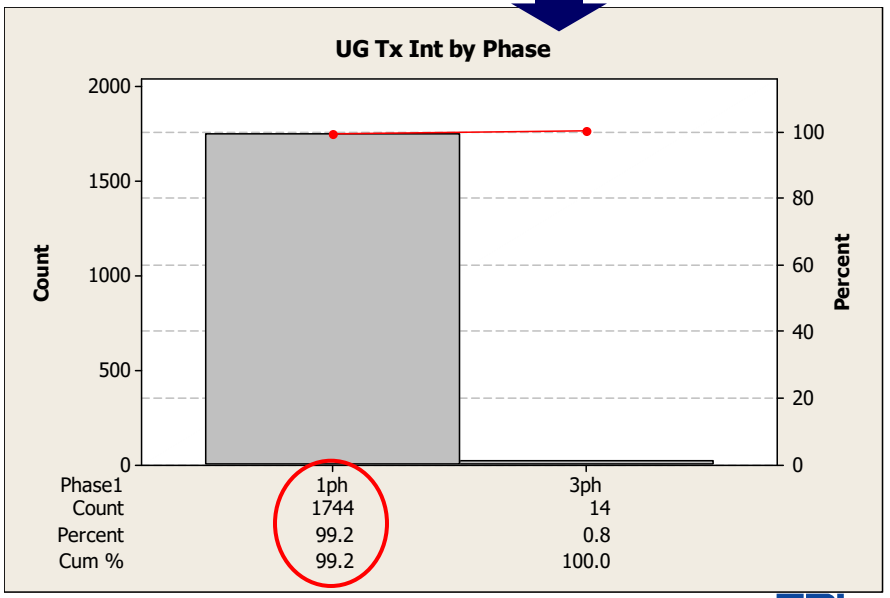
Transformers accounted for the most CMI during the event. They also accounted for the second most CI, which is not typical compared to an average day in January.

Source: Data Warehouse

What type of Transformers impacted CI the most?







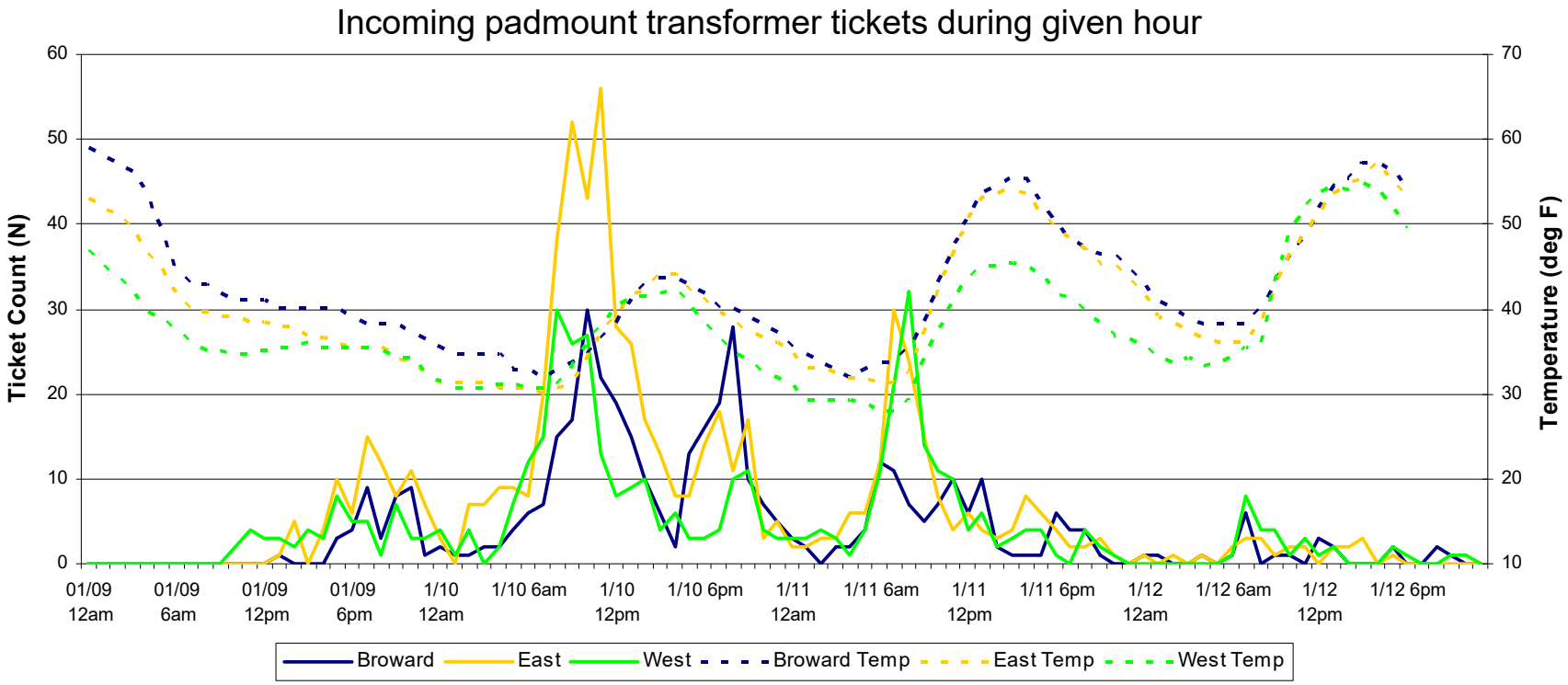
Single-phase Underground (Padmount) Transformers accounted for the majority of the Transformer interruptions

Source: Data Warehouse

FPL

Overview & Facts

Padmount Transformer Failures Summary



North and Dade regions were minimally impacted. Broward, East, and West regions accounted for 78% of the transformer tickets for this event.

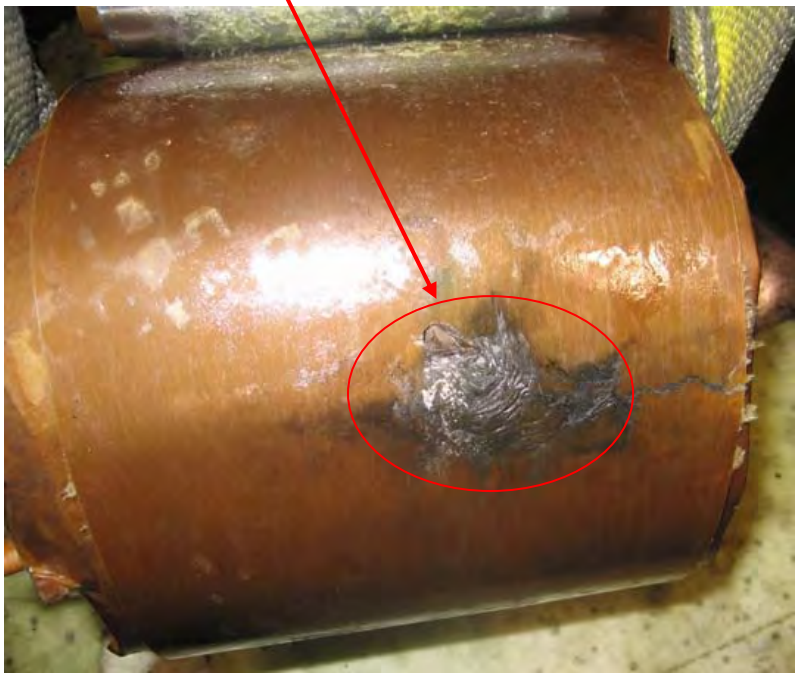
As temperatures dipped below 40 degrees, padmount transformer interruptions began to increase, accounting for 41% of the Customer Minutes Interrupted (CMI) and 20% of the Customers Interrupted (CI).

FPL

What failed inside the transformers?

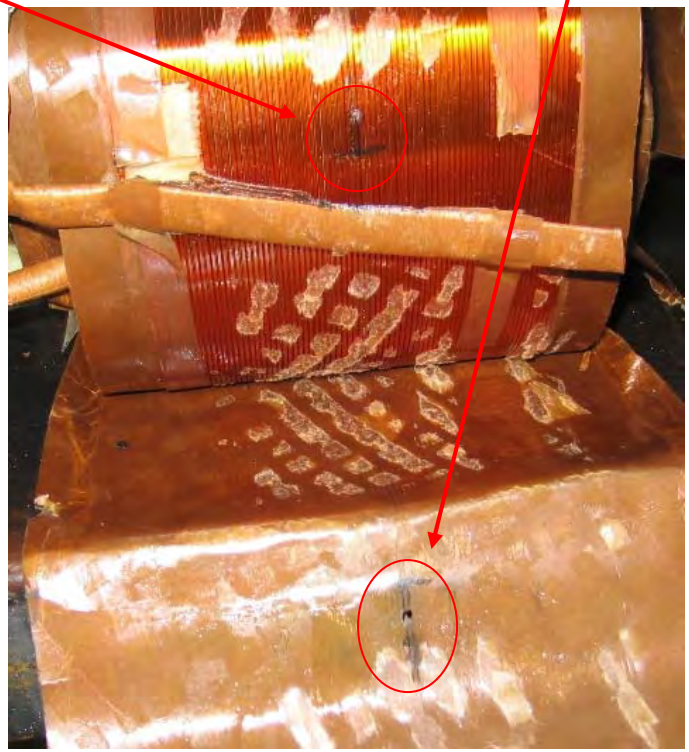
Forensic Analysis Results

Hot spot between primary and secondary coils compromised dielectric strength of insulation



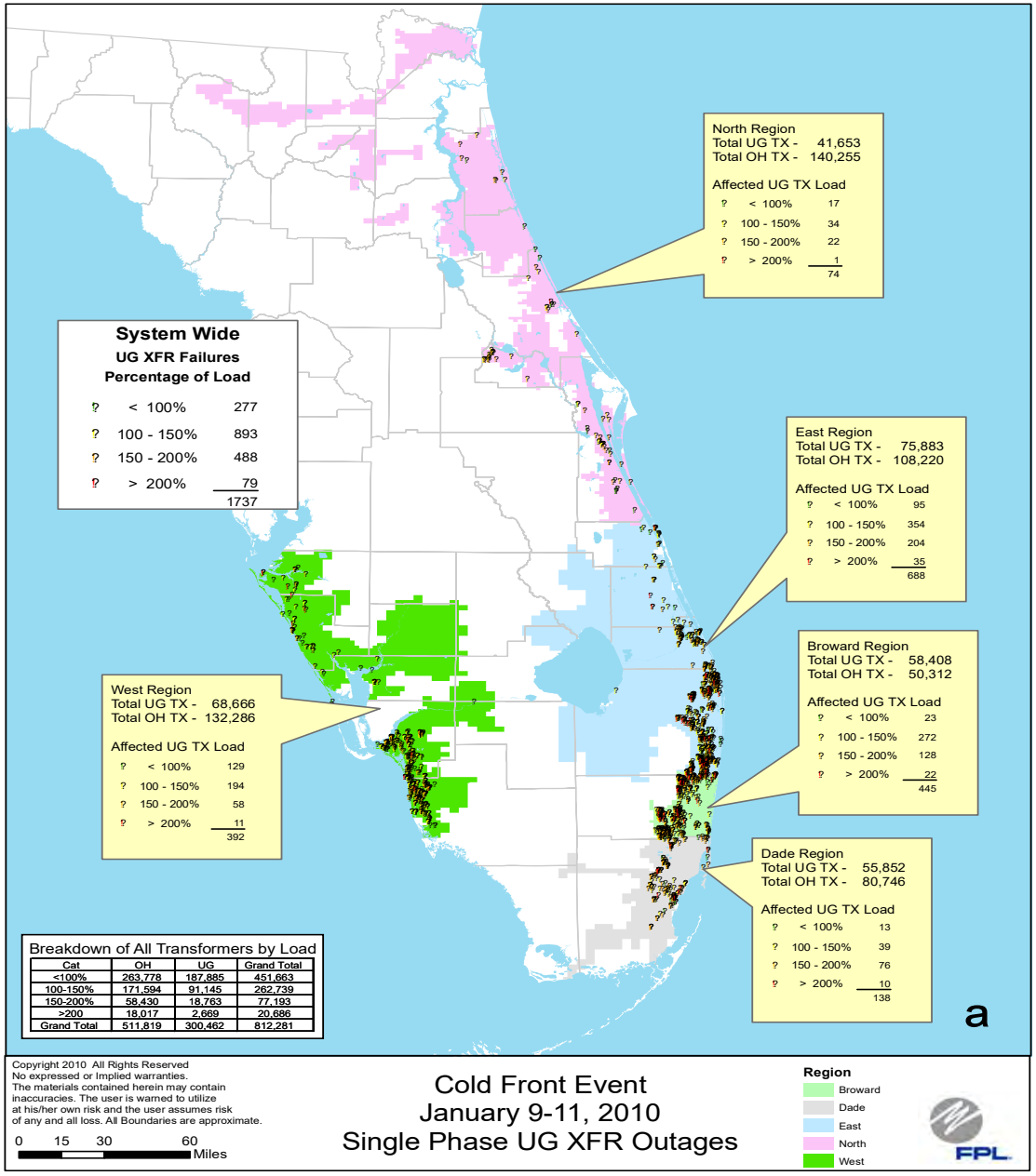
Flash point on primary winding

Pin hole burn caused by the dielectric breakdown



Overloading of transformers will deteriorate, over time, the dielectric strength of the insulation. The voltage between the primary and secondary windings creates an arc perforating the insulation and shorting the two windings.

Impact Summary



What was the impact of the cold weather event on transformers?

- 0.38% of all transformers were interrupted
  - Out of population size of 812,281
  - 99.6% were not affected which translates to a sigma level of 2.7
- 0.78% of all underground pad mounted transformers were interrupted
  - 1,737 affected out of population size of 222,511
  - 99.2% were not affected which translates to a sigma level of 2.4

How often to these cold weather events occur?

- In the period from 1940 to present, extended cold event periods comparable to the recent one have occurred roughly every 35 years
  - 37 years from 1940 to 1977 and 33 years from 1977 to 2010

FPL

What factors are the most statistically significant?

Logistic Regression Table

Predictor	Coef	SE Coef	Z	P	Odds Ratio
Constant	-8.63753	0.192389	-44.90	0.000	
KVA size					
38	0.567977	0.176791	3.21	0.001	1.76
50	1.66192	0.168157	9.88	0.000	5.27
75	2.33022	0.176295	13.22	0.000	10.28
100	1.86547	0.201108	9.28	0.000	6.46
Phase					
B	-0.0086861	0.0584801	-0.15	0.882	0.99
C	-0.0737969	0.0599859	-1.23	0.219	0.93
Region					
DADE	-0.966837	0.0987967	-9.79	0.000	0.38
EAST	0.556199	0.0639701	8.69	0.000	1.74
NORTH	-1.03798	0.127356	-8.15	0.000	0.35
WEST	0.337818	0.0724947	4.66	0.000	1.40
Summer Load %					
100%-150%	2.00649	0.0743520	26.99	0.000	7.44
150%-200%	3.42808	0.0910336	37.66	0.000	30.82
200+	4.19360	0.146133	28.70	0.000	66.26
Type					
Live Front	-1.24346	0.227795	-5.46	0.000	0.29
Customers					
c6-8	0.185886	0.0758334	2.45	0.014	1.20
d9-15	0.538929	0.0768843	7.01	0.000	1.71
e16-50	0.135744	0.121321	1.12	0.263	1.15
f51-100	-20.6175	9051.30	-0.00	0.998	0.00
g>100	-21.7593	51351.5	-0.00	1.000	0.00
Primary Voltage					
22.9	0.416369	0.0518143	8.04	0.000	1.52
4.16	-15.7696	50345.2	-0.00	1.000	0.00
Unknown	-18.1831	28704.8	-0.00	0.999	0.00

Tests for terms with more than 1 degree

Term	Chi-Square	DF	P
KVA size	346.18	4	0.000
Phase	1.09	2	0.581
Region	367.67	4	0.000
Summer Load %	1421.28	3	0.000
Customers	53.25	5	0.000
Primary Voltage	54.34	3	0.000
Install Year	5.62	4	0.230

- Phase & Install Year not significant
- 50-100 KVA Tx had the highest interruption rates
- East region had the highest interruption rate out of all regions followed by the West
- TX's loaded 150% or greater were 30-66 times more likely to have interruptions than those loaded below 100%

Logistic regression shows Load was the most statistically significant factor (Issue #1) followed by Region (Issue #2) and KVA size (combined with Issue #1)

Issue #1

How is transformer loading calculated?

Meter-reading Data *(current)*

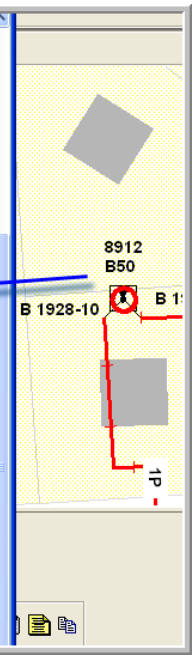
Substation Name	BUTTS	**AMS Facility Status**	Constructed	**PPD Address**	DEL PRADO CIR N. W/O SOLIMAR CIR # ENTR
Service Center	BRO - Boca Raton	**Last Updated**	07/22/2001	**Ref Drawing**	C02CK1
Mgmt Area	Boca Raton	**Last Updated By**	sw$admin	**Original Install Date**	

	Current Information	Summer Peak Information	Winter Peak Information
Date	01/01/2010	10/29/2008	01/01/2009
Customers	4	4.000000	4.000000

	Current Load			Summer Peak Load			Winter Peak Load		
Phase	**KVA**	**KVAD**	**%**	**KVA**	**KVAD**	**%**	**KVA**	**KVAD**	**%**
B	50	33.0	66.00	50	44.0	88.0	50	34.0	68.0

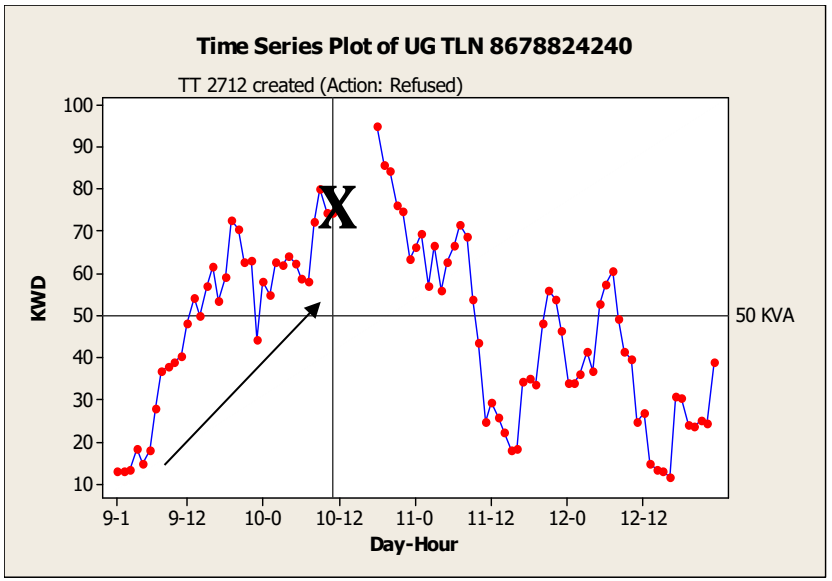
Ph	Type	DV	M S Num	Mfg	Latest Install Date
B	Padmount - Dead Front	No	459481	MCE	04/01/1998

Ph	Loop	Sw1	Status 1	Sw2	Status 2
B	1928	11	Normal Closed	10	Normal Closed



- AMS currently estimates demand based on **monthly meter department kWh readings**

Advanced Metering Infrastructure Data *(future)*



- **AMI** captures load information on an **hourly basis**.
- Approximately 100K AMI meters in place primarily in Broward

AMI technology will improve load data accuracy and resolution in the near future

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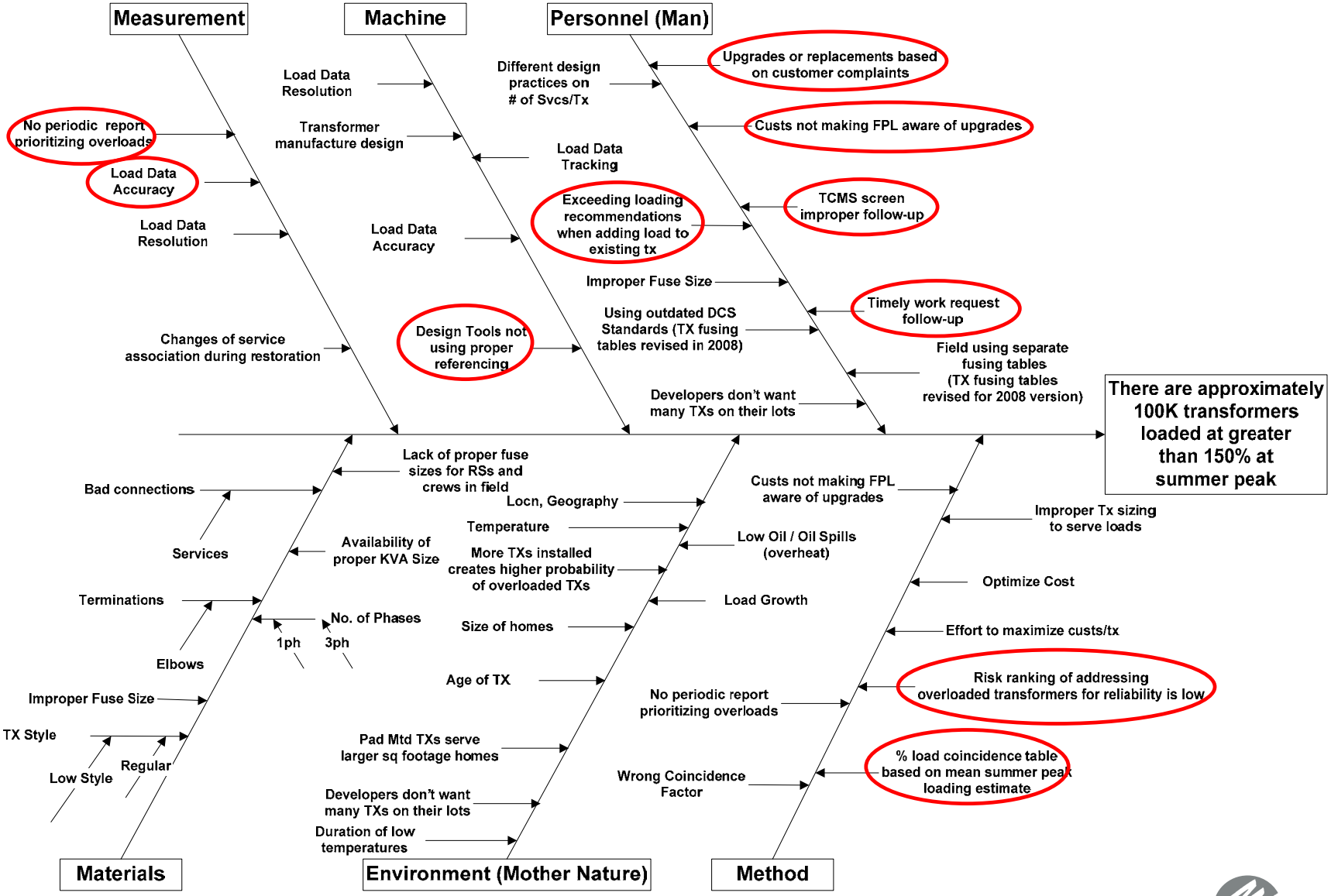
Issue #1

Why are transformers overloaded?



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Issue #1

What causes are contributing the most to the problem?

FMEA

Process Function	Potential Failure Mode	Potential Effects of Failure	SEV	Potential Cause(s)/ Mechanism(s) of Failure	OCC	Current Process Controls	DET	RPN
AMS Reports	No periodic report priortizing overloads	Areas are not aware of magnitude of overloaded transformer population.	8	Addressing overloaded transformers not a high priortity. Overloaded transformers have low reliability impact.	8	We have Distribution Transformer Loading Guidelines in the Service Planning Quick Reference Guide for designers.	8	512
	Load Data Accuracy	Overloaded transformers not recognized or overloaded transformers incorrectly identified.	5	Customer transformer misassociation and AMS to TCMS link could be inaccurate.	5	No formal process to correct inaccurate associations or data transfer issues.	8	200
Design Reference	Design Tools not using proper referencing	Transformer size to load match is incorrect.	7	Tool references to transformer design needs to be reviewed and revised if necessary.	2	Review triggered by change in product characteristics or design.	9	126
	Risk ranking of addressing overloaded transformers is low	Overloaded transformers get neglected due to low priority and are only addressed on an individual basis.	9	Addressing overloaded transformers not a high priortity. Overloaded transformers have low reliability impact.	8	We have Distribution Transformer Loading Guidelines in the Service Planning Quick Reference Guide for designers.	8	576
	% load coincidence table based on mean summer peak loading estimate.	Undersized transformer; actual peak load could be higher than estimated.	8	Coincidence table is designed to estimate the mean peak load.	8	Review triggered by change in customer demand patterns.	9	576
Existing Customer Upgrades	Exceeding loading recommendations when adding load to existing transformers.	Overloaded transformers and Power Quality issues with services.	8	Mis-application or not referring to transformer loading guidelines.	7	No process control to review all load additons to existing transformers.	9	504
	Upgrades or replacements based on customer complaints.	Not addressing all overloaded transformer cases.	5	Overloaded transformers have low reliability impact. Resources allocated to high CI projects.	2	Customer generated only. Many overloaded transformers are missed under this process.	8	80
	Custs not making FPL aware of upgrades.	Potential overloaded transformers not identified during customer upgrades.	5	Communication of cust upgrade not required in all cases.	7	No process for the "hidden" customer load increases.	8	280
Customer Complaint Process	TCMS screen improper follow-up.	Backlog of overloaded transformers that may not be replaced.	7	Volume of tickets too high to address and screen to prioritize.	3	Review of transformer related tickets by area personnel.	3	63
	Timely work request follow-up.	Backlog of overloaded transformers that may not be replaced.	7	Volume of work requests too high to address and screen to prioritize.	3	Review of transformer related work requests by area personnel.	3	63

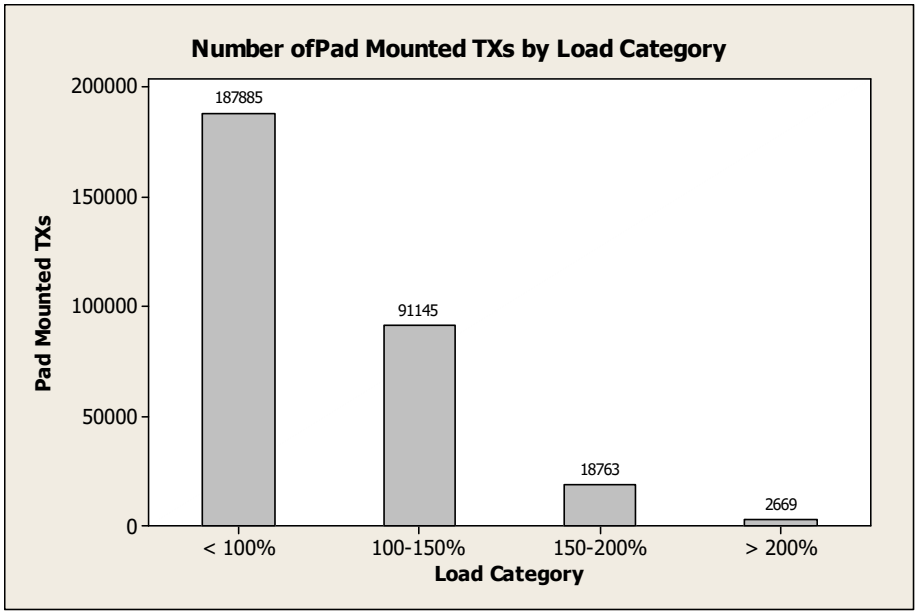
FPL

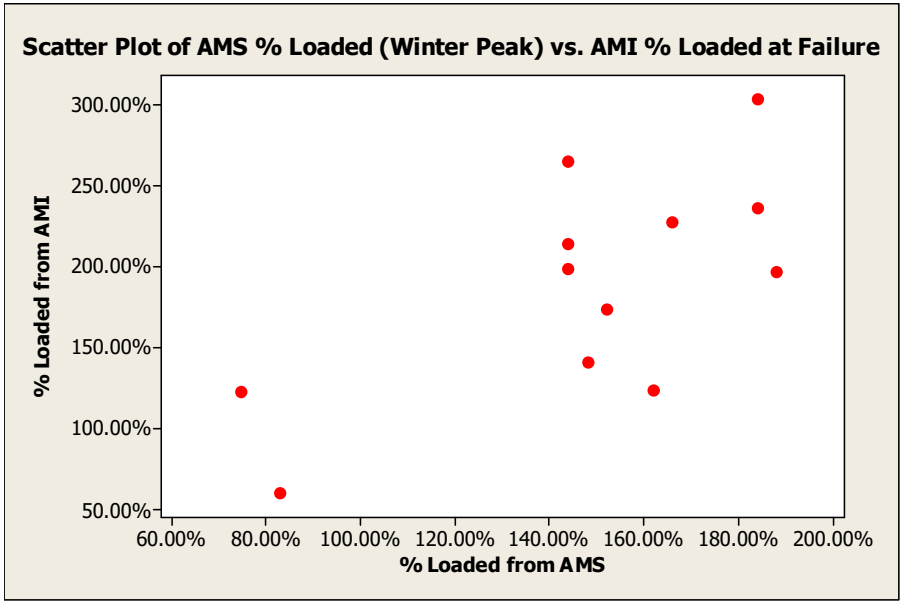
Issue #1

Padmount Transformer Load

- **Load was the most statistically significant factor in transformer-related outages, followed by region and kVA size.**
  - Transformers loaded 150% or greater were 30 to 66 times more likely to have interruptions than those loaded below 100%.

- **Correction Plan**
  - Develop prioritization list for transformers based on load %, customer count, kVAD per customer, and kVA size
  - Develop ability to detect and track overloaded conditions at a transformer level
  - Incorporate AMI data to improve accuracy of peak load data



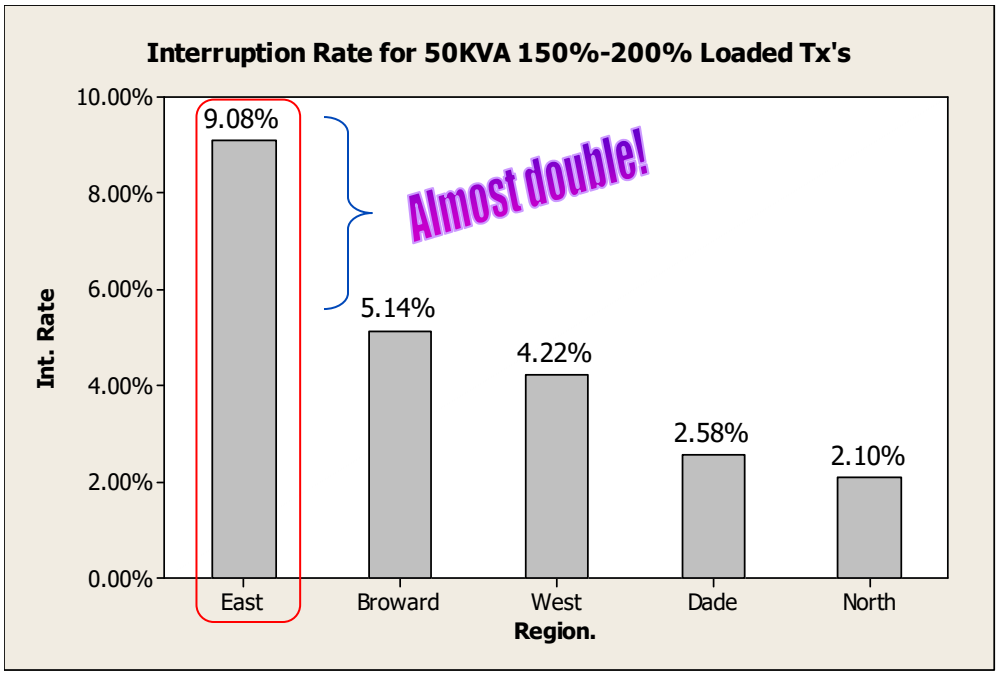


Load accounted for the most statistically significant factor, AMI data shows that we are not predicting peaks well.

Issue #2

What Regions had the most Transformer interruptions?

- 50 KVA Tx's loaded between 150% and 200% is the largest population of transformers within the high interruption-rate category highlighted in the regression model. Within this category:
  - East has 3rd lowest population of 50 KVA, 150%-200% loaded transformers but had the highest transformer interruption rate during the event



So what drove the high interruption rates in the East Region??

Source: Data Warehouse / AMS

Issue #2

Do customer load characteristics differ in the East Region?

- *Non-normal data*
- *Analyzing population of 50 KVA TX's loaded 150%-200%*

Kruskal-Wallis Test: Summer Peak versus Region

Kruskal-Wallis Test on Summer Peak

Region	N	Median	Ave Rank	Z
BRWD	2230	81.00	3927.4	1.29
DADE	2151	80.00	3908.0	0.78
EAST	1609	80.00	3800.4	-1.52
NORTH	971	80.00	3837.2	-0.58
WEST	790	80.00	3845.3	-0.[illegible]
Overall	7751		3876.0	

No difference

H = 3.90 DF = 4 P = 0.420
H = 3.92 DF = 4 P = 0.417 (adjusted for ties)

Summer peak KVAD / TX

Customers / TX

Kruskal-Wallis Test: Cust Served versus Region

Kruskal-Wallis Test on Cust Served

Region	N	Median	Ave Rank	Z
BRWD	2230	8.000	3836.4	-0.99
DADE	2151	9.000	4121.3	5.98
EAST	1609	8.000	3188.4	-13.85
NORTH	971	10.000	4671.3	11.84
WEST	790	8.000	3742.7	-1.77
Overall	7751		3876.0	

Fewer customers!

H = 303.93 DF = 4 P = 0.000
H = 308.75 DF = 4 P = 0.000 (adjusted for ties)

Summer peak KVAD / Customer

Kruskal-Wallis Test: KVAD per Cus versus Region

Kruskal-Wallis Test on KVAD per Cus

Region	N	Median	Ave Rank	Z
BRWD	2230	9.625	3948.0	1.80
DADE	2151	9.222	3634.3	-5.89
EAST	1609	10.125	4532.6	13.22
NORTH	971	8.182	3075.5	-11.92
WEST	790	9.556	3977.5	1.35
Overall	7751		3876.0	

Larger loads!

H = 291.84 DF = 4 P = 0.000
H = 291.88 DF = 4 P = 0.000 (adjusted for ties)

Within the high interruption-rate category, the East tends to have fewer customers per TX with larger loads per customer. This increases the probability of all customers in TX simultaneously experiencing peak demand (Coincidence Factor).

Issue #2

Why do the East Region customers have larger loads?

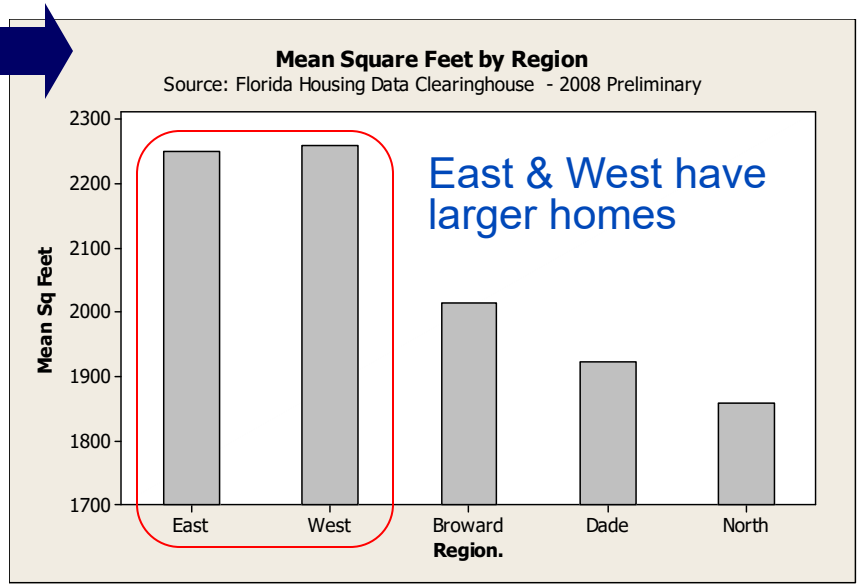
Mean Sq Feet by County (single-family homes)

Source: Shimberg Center - Florida Housing Data Clearinghouse 2008 Preliminary

County	Region	Single Family Mean Sq Feet	Residential Cus	PM Tx
Palm Beach	East	2,400	609,135	56,295
Broward	Broward	2,014	761,796	52,311
Miami-Dade	Dade	1,923	867,413	46,316
Lee	West	3,038	202,844	19,884
Manatee	West	2,560	148,451	13,447
Sarasota	West	1,796	220,496	18,043
Collier*	West	*2,017*	158,937	15,000
Brevard	North	1,717	253,131	16,460
Martin	East	1,979	83,501	8,826
Volusia	North	1,636	151,237	10,273
St. Johns	North	2,480	62,159	6,511
St. Lucie	East	1,718	99,382	6,815
Indian River	East	2,107	45,881	4,394
Charlotte	West	1,680	89,328	5,263
Seminole	North	1,945	43,079	4,136
Flagler	North	2,267	44,961	2,965
Nassau	North	2,238	15,668	1,611
Okeechobee	East	1,725	17,552	908
Columbia	North	1,921	10,653	715
DeSoto	West	1,757	12,888	762
Hendry	West	1,705	8,446	704
Putnam	North	2,042	16,840	368
Baker	North	1,807	4,182	158
Suwannee	North	1,670	4,101	145
Bradford	North	1,716	3,986	49
Union	North	1,801	1,311	37
Clay	North	2,187	703	23
Highlands	East	1,799	624	14
Florida	**FPL**	**2,017**	**3,938,685**	**292,433**

Collier county data not available; using Florida mean

Mean Sq Feet by Region

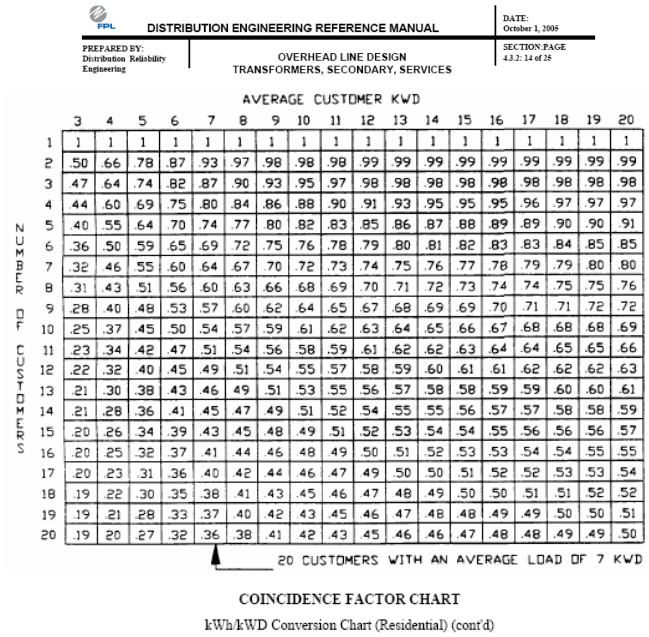


The East & West regions tend to have larger homes which typically have larger loads.

Issue #2

Coincidence Factor

- Most end use appliances are turned on and off randomly. Because of this, the probability of all customers simultaneously experiencing peak demand is small and decreases as the number of customers increases.
- Because of this, our Distribution system is designed to supply less power than the sum of individual customer peak demands.
- The ratio of peak system demand to the sum of individual customer peak demands is called Coincidence Factor.
- **Significant factor during this event since the probability of all customers simultaneously experiencing peak demand is high during cold temperatures and increases as the number of customers decreases. Consequently, equipment becomes less reliable as they become more heavily loaded.**



FPL DISTRIBUTION ENGINEERING REFERENCE MANUAL

DATE: October 1, 2005

PREPARED BY: Distribution Reliability Engineering

OVERHEAD LINE DESIGN
TRANSFORMERS, SECONDARY, SERVICES

SECTION:PAGE 4.3.2: 14 of 25

AVERAGE CUSTOMER KWD

NUMBER OF CUSTOMERS	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	.50	.66	.78	.87	.93	.97	.98	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99
3	.47	.64	.74	.82	.87	.90	.93	.95	.97	.98	.98	.98	.98	.98	.98	.98	.98	.98
4	.44	.60	.69	.75	.80	.84	.86	.88	.90	.91	.93	.95	.95	.95	.96	.97	.97	.97
5	.40	.55	.64	.70	.74	.77	.80	.82	.83	.85	.86	.87	.88	.89	.89	.90	.90	.91
6	.36	.50	.59	.65	.69	.72	.75	.76	.78	.79	.80	.81	.82	.83	.83	.84	.85	.85
7	.32	.46	.55	.60	.64	.67	.70	.72	.73	.74	.75	.76	.77	.78	.79	.79	.80	.80
8	.31	.43	.51	.56	.60	.63	.66	.68	.69	.70	.71	.72	.73	.74	.74	.75	.75	.76
9	.28	.40	.48	.53	.57	.60	.62	.64	.65	.67	.68	.69	.69	.70	.71	.71	.72	.72
10	.25	.37	.45	.50	.54	.57	.59	.61	.62	.63	.64	.65	.66	.67	.68	.68	.68	.69
11	.23	.34	.42	.47	.51	.54	.56	.58	.59	.61	.62	.62	.63	.64	.64	.65	.65	.66
12	.22	.32	.40	.45	.49	.51	.54	.55	.57	.58	.59	.60	.61	.61	.62	.62	.62	.63
13	.21	.30	.38	.43	.46	.49	.51	.53	.55	.56	.57	.58	.58	.59	.59	.60	.60	.61
14	.21	.28	.36	.41	.45	.47	.49	.51	.52	.54	.55	.55	.56	.57	.57	.58	.58	.59
15	.20	.26	.34	.39	.43	.45	.48	.49	.51	.52	.53	.54	.54	.55	.56	.56	.56	.57
16	.20	.25	.32	.37	.41	.44	.46	.48	.49	.50	.51	.52	.53	.53	.54	.54	.55	.55
17	.20	.23	.31	.36	.40	.42	.44	.46	.47	.49	.50	.50	.51	.52	.52	.53	.53	.54
18	.19	.22	.30	.35	.38	.41	.43	.45	.46	.47	.48	.49	.50	.50	.51	.51	.52	.52
19	.19	.21	.28	.33	.37	.40	.42	.43	.45	.46	.47	.48	.48	.49	.49	.50	.50	.51
20	.19	.20	.27	.32	.36	.38	.41	.42	.43	.45	.46	.46	.47	.48	.48	.49	.49	.50

20 CUSTOMERS WITH AN AVERAGE LOAD OF 7 KWD

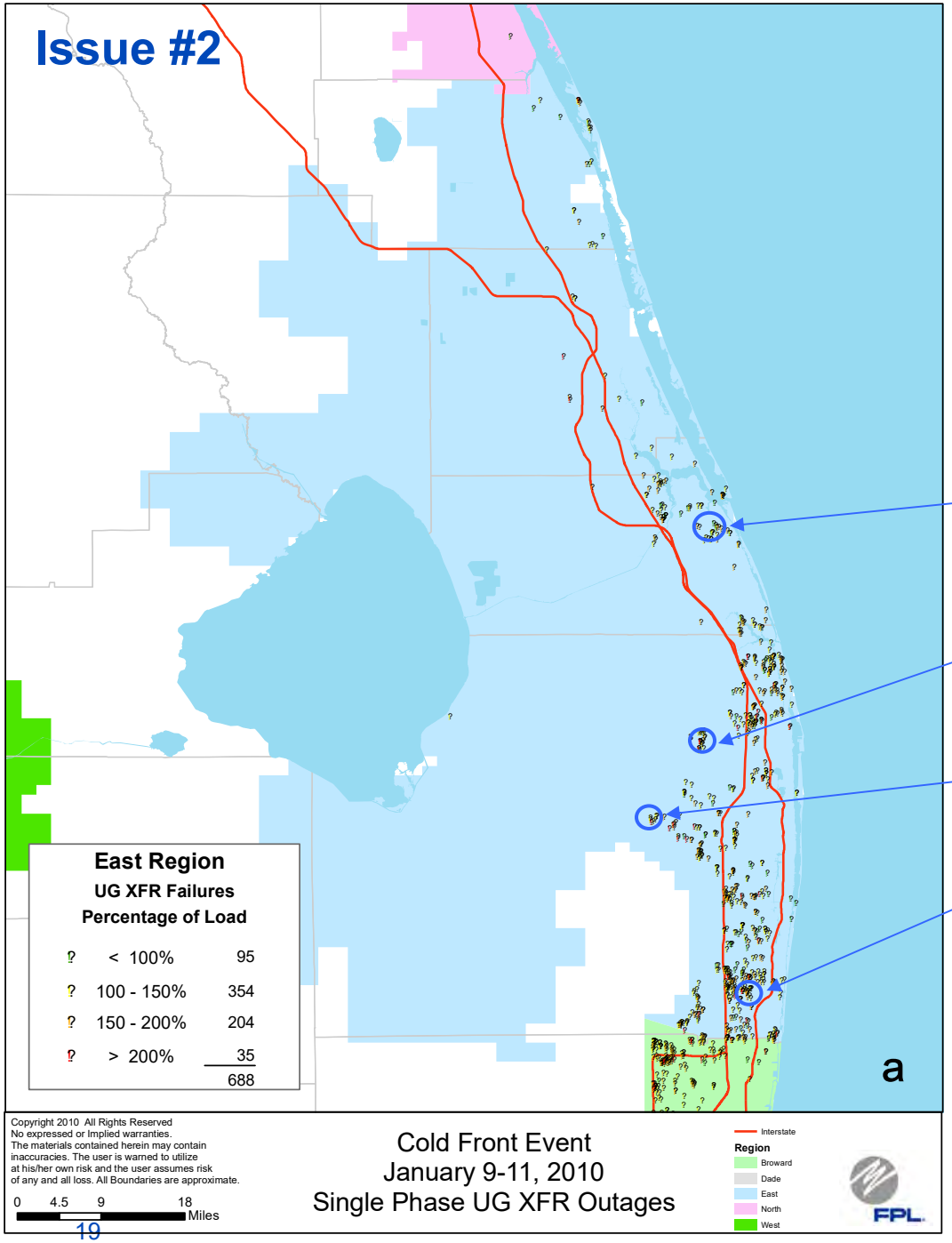
COINCIDENCE FACTOR CHART

kWh/kWD Conversion Chart (Residential) (cont'd)

- Coincidence factor example using 80 KVAD as the baseline shown below
- Depending on # of customers and size of load, proper TX size varies

Custs	Avg. KVAD	Total KVAD	Coinc. Factor	Adj KVAD	TX Size
4	20.0	80	0.97	77.6	100
5	16.0	80	0.89	71.2	75
6	13.3	80	0.80	64.0	75
7	11.4	80	0.73	58.4	75
8	10.0	80	0.68	54.4	75
9	8.9	80	0.62	49.6	50
10	8.0	80	0.57	45.6	50
11	7.3	80	0.51	40.8	50
12	6.7	80	0.49	39.2	50
13	6.2	80	0.43	34.4	50
14	5.7	80	0.41	32.8	50
15	5.3	80	0.34	27.2	50
16	5.0	80	0.32	25.6	50
17	4.7	80	0.31	24.8	25
18	4.4	80	0.22	17.6	25
19	4.2	80	0.21	16.8	25
20	4.0	80	0.20	16.0	25

Proper application of the Coincidence Factor is very important in selecting the correct transformer size



Subdivisions with more than 1 UG Transformer Interruptions

MARINER SAND

IBIS GOLF & COUNTRY CLUB

BINKS FOREST OF THE LANDINGS

BAY POINTE OF UNIVERSITY PARK

FPL

Issue #2

Transformer interruptions: Stuart – Martin County
(East Region)

Interrupted UG transformers
MARINER SANDS

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Issue #2

Transformer interruptions: West Palm Beach – Palm Beach County (East Region)

Interrupted UG transformers

IBIS GOLF & COUNTRY CLUB

Issue #2

Transformer interruptions: Wellington Area – Palm Beach County (East Region)

Interrupted UG transformers

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Issue #2

Transformer interruptions.: Boca Raton Area – Palm Beach County (East Region)

Interrupted UG transformers

BAY POINTE OF UNIVERSITY PARK

Root Cause – Padmount Transformer Failures

Issue 2

- **East region had the highest interruption rate of all the regions.**

– Our findings show that pad mounted transformers between 50-100kva loaded at > 150% had the highest interruption rate.

-- Within this category the 50kva transformers loaded between 150-200% were the largest population.

– Analyzed population of 50kVA transformers loaded 150-200%. In the East, these transformers had:

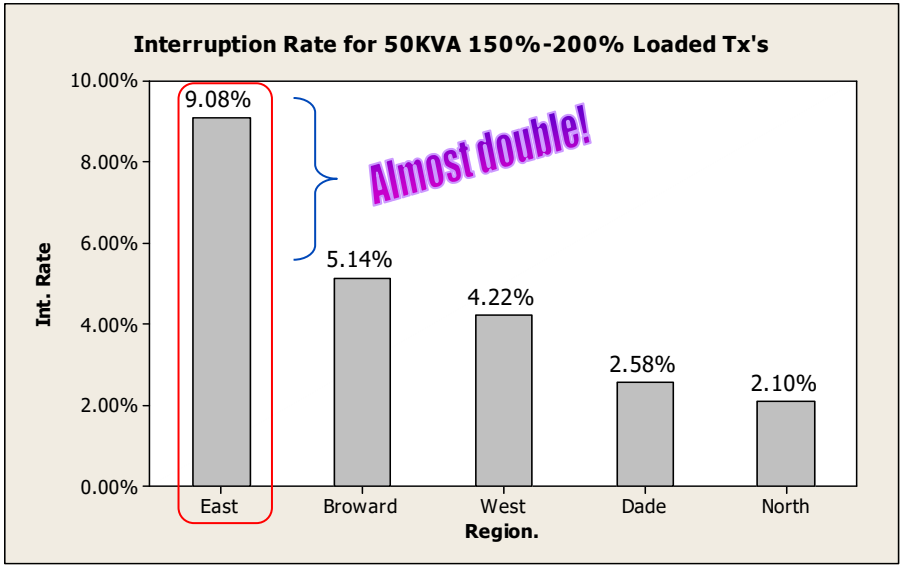
-- An interruption rate of 9.08%; approximately double that of the remaining regions

-- Fewer customers per transformer on average than each of the other regions

-- Customers with larger loads on average than each of the other regions

-- Based on mean square footage, the East and West regions tend to have larger homes.

– Due to these factors, the probability of multiple/all customers on a transformer simultaneously experiencing peak demand increases (coincidence factor)



Customers / TX

Kruskal-Wallis Test: Cust Served versus Region

Kruskal-Wallis Test on Cust Served

Region	N	Median	Ave Rank	Z
BRWD	2230	8.000	3836.4	-0.99
DADE	2151	9.000	4121.3	5.98
EAST	1609	8.000	3188.4	-13.85
NORTH	971	10.000	4671.3	11.84
WEST	790	8.000	3742.7	-1.77
Overall	7751		3876.0	

Fewer customers!

H = 303.93 DF = 4 P = 0.000
H = 308.75 DF = 4 P = 0.000 (adjusted for ties)

East Region had the highest interruption rate.

Actions - Summary

- **Developing prioritization list for East Region Transformers by using Load %, number of customers, average KVAD per customer, and KVA size and evaluate against risk. Expand to entire system.**
- **Investigate options to track and determine how long Transformers experience overloaded conditions.**
  - This characteristic can be included in the regression model to determine significance and impact to interruptions.
- **Revising AMS load calculations to incorporate available AMI data to improve accuracy of peak load calculations.**
- **Determining if Coincidence Factor is being properly applied by all Project Designers in all Regions.**
- **Confirmed auto-plat/automated engineering design applications provide correct transformer sizing in accordance to current standards.**
- **Researching comparison of original developer designs submitted versus actual homes built – determine if origination of under- or over-sizing transformers exist.**

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APPENDIX

Replacement Cost Scenarios

Underground transformers **Loaded >200%**

Population	Load %	Tx Size	Cost per Tx	Capital %	O&M	Capital	Total Cost
40	>200%	75 kVA	$ 5,147	65%	$ 72,058	$ 133,822	**$ 205,880**
135	>200%	75-100 KVA	$ 5,147	65%	$ 243,196	$ 451,649	**$ 694,845**
381	>200%	50 kVA	$ 5,147	65%	$ 686,352	$ 1,274,655	**$ 1,961,007**
516	>200%	50-100 KVA	$ 5,147	65%	$ 929,548	$ 1,726,304	**$ 2,655,852**
2,669	>200%	All sizes	$ 5,147	65%	$ 4,808,070	$ 8,929,273	**$ 13,737,343**

Underground transformers **Loaded >150%**

Population	Load %	Tx Size	Cost per Tx	Capital %	O&M	Capital	Total Cost
315	>150%	75 kVA	$ 5,147	65%	$ 567,457	$ 1,053,848	**$ 1,621,305**
793	>150%	75-100 KVA	$ 5,147	65%	$ 1,428,550	$ 2,653,021	**$ 4,081,571**
8,132	>150%	50 kVA	$ 5,147	65%	$ 14,649,391	$ 27,206,013	**$ 41,855,404**
8,925	>150%	50-100 KVA	$ 5,147	65%	$ 16,077,941	$ 29,859,034	**$ 45,936,975**
21,432	>150%	All sizes	$ 5,147	65%	$ 38,608,676	$ 71,701,828	**$ 110,310,504**

Average costs based on upgrading a 50 kVA transformer with a 75 kVA

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