COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION
DIVISION OF PUBLIC UTILITY REGULATION

UTILITY PREPARATION FOR AND RESPONSE TO JANUARY 2022 WINTER STORM "FRIDA"

SPECIAL REPORT OF THE DIVISION OF PUBLIC UTILITY REGULATION

October 14, 2022

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EXECUTIVE SUMMARY

This report ("Report") presents the results of a review by the Virginia State Corporation Commission Staff ("Staff" or "SCC Staff") of the preparedness and responsiveness of Appalachian Power Company ("APCo"), Virginia Electric and Power Company ("Dominion" or "DEV" or "Dominion Energy"), Central Virginia Electric Cooperative ("CVEC"), and Rappahannock Electric Cooperative ("REC" or "Rappahannock") (collectively, "Companies") (CVEC and REC, collectively "Cooperatives") relative to power outages and service restoration following the January 2022 Winter Storm Frida ("Frida" or "Storm"). These were the Virginia utilities most impacted by the Storm. Through this Report, the Staff:

- analyzes the responses of the Companies to the Storm;
- identifies the Companies' plans for improved response to future storms;
- presents the Companies' planned corrective actions to make their electric power systems less vulnerable to future storms;
- addresses the adequacy of the Companies' overall system reliabilities and pole and right-of-way ("ROW") maintenance programs; and
- presents a summary of the Staff's conclusions and recommendations.

It should be noted that the Companies vary greatly in terms of size of service territories and number of customers served. APCo and Dominion serve approximately 542,478 and 2,581,109 customers respectively, in Virginia, and CVEC and REC serve approximately 38,307 and 170,989 members respectively, in Virginia.

The Storm significantly impacted the Companies' electric infrastructure and customers; some factors driving Storm-related outages appear to have been beyond the Companies' control. First, Staff notes that just a few days prior to the Storm, weather forecasts had indicated only light, wintery precipitation; it was not until 24 hours before the Storm's arrival that weather forecasts began to predict snowfall accumulations from the Storm. Additionally, the largest contributing factor to outages appears to have been damage caused by trees, particularly those located outside the Companies' ROW; the Companies have a limited ability to trim such trees. For example, of the 1,345 outage events experienced by APCo, the company reports that 639, or 47.5%, were caused by trees located outside the ROW. Similarly, CVEC states that of the 1,168 outages experienced, 1,106 or 94.7%, were caused by trees located outside the ROW. REC also experienced outages caused by trees located outside the ROW. Of the 2,933 outages experienced by REC, 2,750, or 93.8%, were caused by trees located outside the ROW. With respect to Dominion, the company reports that 55.5% of the outage events, or 1,630 outages across DEV's Virginia service territory, were caused by trees. Dominion does not collect data relative to whether tree-related outages are caused by trees located within the ROW or outside the ROW.

Staff's review determined that Rappahannock's service territory experienced the greatest impact on materials; REC recorded 779 broken poles, 412 broken cross-arms, and approximately 219,000 feet of conductor needing to be restrung.

For the Companies, the outage lengths until total restoration ranged from approximately 6.5 days to 9.5 days.

Staff's review did not reveal evidence of restoration issues associated with personnel resources, equipment availability, or inventory levels. Furthermore, the review also did not reveal any major deficiencies in: (i) the prioritization plans for restoration of service; (ii) communication and outreach to the Companies' customers, the media, local and state government officials, and regional emergency management contacts; or (iii) the design of the Companies' distribution systems that may have compromised the ability of utility infrastructure to withstand the Storm.

Finally, Staff reviewed conformance of the Companies' Storm restoration practices with the goals of the Virginia Environmental Justice Act ("EJ Act")[1] and found no evidence that any of the Companies' Storm restoration practices violated the goals of the EJ Act.

Nevertheless, Staff's review uncovered a few areas for potential improvement related to weather forecasting, ROW maintenance practices, and transparency of restoration efforts. Staff makes several recommendations for the Companies relative to these areas of improvement. Those are described in greater detail in the "Conclusions and Recommendations" section of this Report.

The Staff asks that APCo, Dominion, CVEC, and Rappahannock provide written responses to all Staff's recommendations found in this Report by November 18, 2022. Responses should be directed to mike.cizenski@scc.virginia.gov.

[1] Code § 2.2-234 *et seq*.

INTRODUCTION

Storm Timeline

Winter Storm Frida resulted in heavy snowfall and high wind gusts of 40 miles-per-hour ("mph") in the Northwest and Central Regions of Virginia. The Eastern Region of Virginia received wind speeds of 50 mph, and rainfall. The Storm traveled up the East Coast and impacted electric services in Virginia from Monday, January 3 through Wednesday, January 12.[2]

Weather Forecast Analysis

On January 1, the National Weather Service ("NWS") projections indicated periods of rain switching to light wintery precipitation through midday on January 3. This was due to the warm weather Virginia experienced on January 1 and 2. The high temperature for Richmond, Virginia experienced on those two days was 72 degrees Fahrenheit. On the morning of January 2, the NWS forecast changed, due to a developing low-pressure system which was tracking further north and west toward the area. The revised NWS forecast included less than one inch of wintery precipitation in the eastern region of Virginia, two to three inches in the central region, and four to six inches in the northern and western regions. This warm weather preceded a strong cold front which passed through Virginia on the evening of Sunday, January 2.

As the Storm continued to develop, the NWS forecast continued to change, projecting higher snowfall accumulation. By the morning of January 3, the NWS forecast

[2] Unless otherwise specified, all dates referenced in this Report are in calendar year 2022.

indicated less than one to two inches for the eastern region, three to six inches for the central region, and six to twelve inches for the northern and western regions of Virginia. The forecast also called for wind gusts between 40 and 50 mph along the coast. Figures 1, 2 and 3 below illustrate the progression of the forecasted snowfall accumulation between the mornings of January 2 and 3.

Figure 1. Storm Total Snow Amounts in inches Forecast on January 2

Figure 2. Storm Total Snow Amounts in inches Forecast on January 3

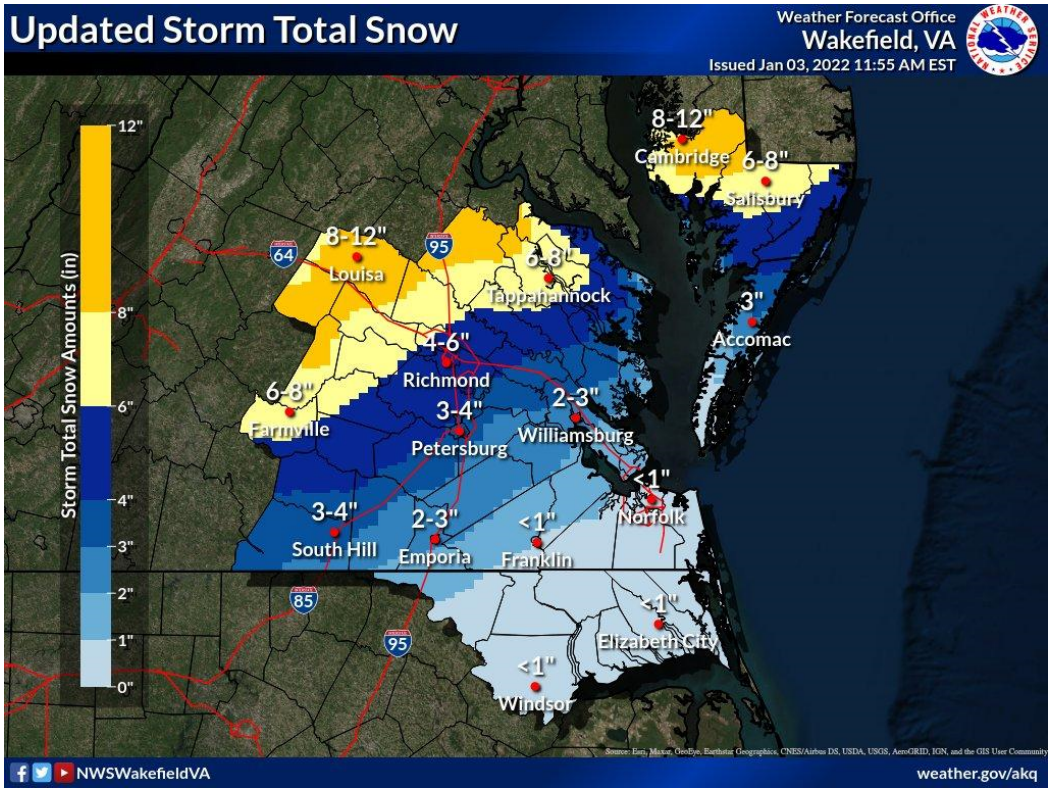
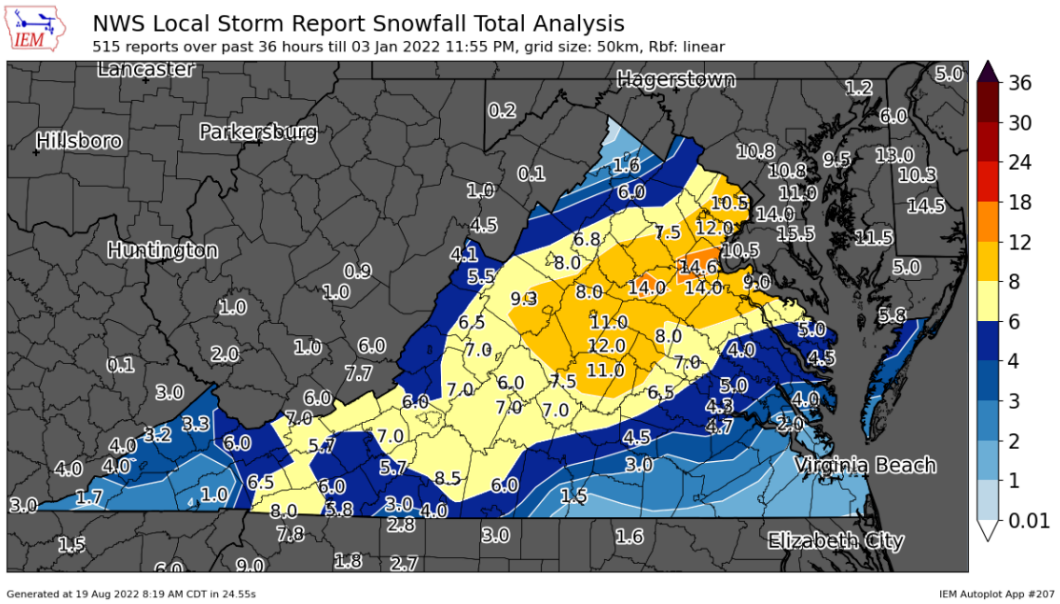


Figure 3. NWS Local Storm Report Snowfall Total Analysis by 11:55 PM on January 3



Storm Restoration Timeline

Figure 4, which follows, presents the restoration curves for all the Virginia utilities impacted by the Storm, while Figure 5 shows the restoration curves for the specific electric utilities discussed in this Report, namely, APCo, DEV, CVEC, and REC, who were most impacted by the Storm.

Figure 4. Restoration Curves for all Virginia Electric Utilities[3]

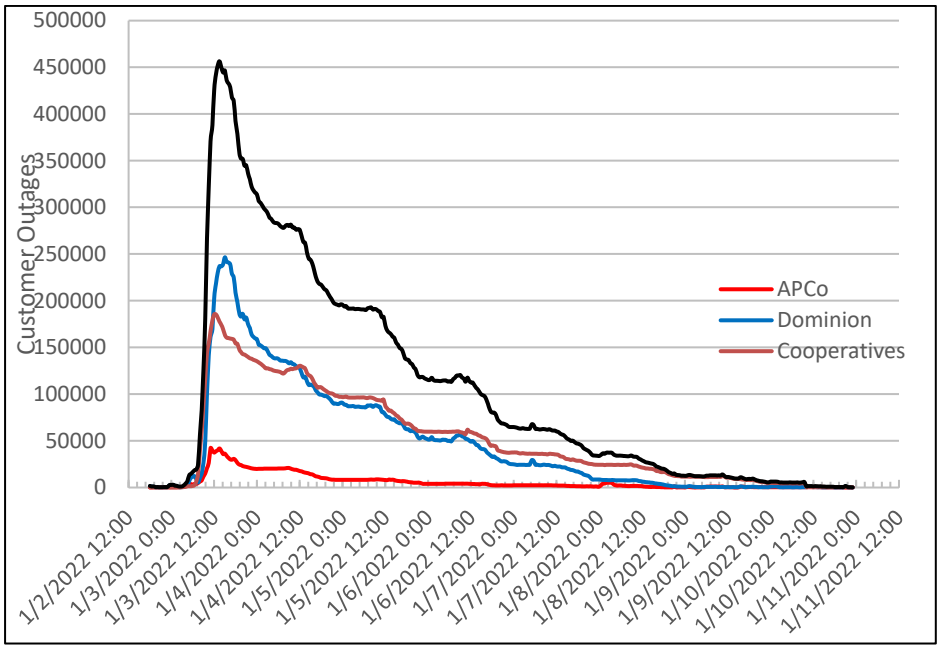
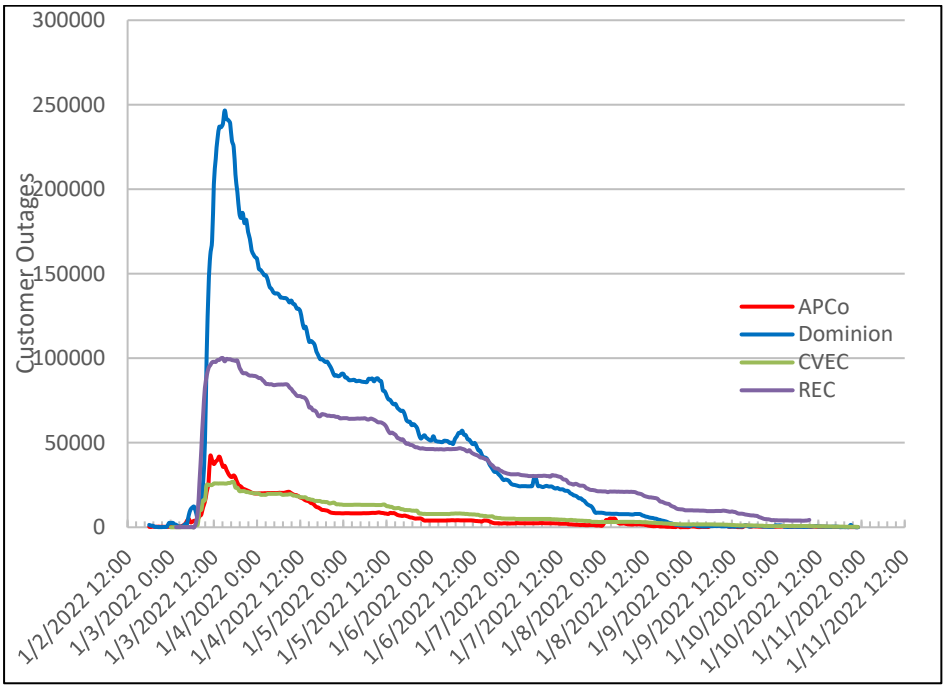


Figure 5. Restoration Curves for APCo, DEV, CVEC, and REC



[3] The "Virginia Total" and "Cooperatives" outages may be slightly understated due to reporting issues experienced with the Virginia Maryland Delaware Association of Electric Cooperatives ("VMDAEC")website between 12:00 PM, January 3 and 12:30 PM, January 4, 2022. The "Companies" outage numbers were not impacted by the reporting issues. Kentucky Utilities was largely unimpacted by the Storm and is therefore not included in this figure.

On January 3, at approximately 1:30 PM, the aggregate number of statewide outages peaked at approximately 456,397 customers.

UTILITY PREPARATIONS PRIOR TO THE STORM

Appalachian Power Company

According to APCo,[4] the first AEP-internal weather alert was issued on Sunday, January 2, one day prior to the Storm. Contract resources were informed of the potential for impacts and were asked to be prepared for relocation within the APCo system to support Storm restoration.

As part of preparations prior to Winter Storm Frida, APCo utilizes a "first responder" schedule, planning 16-hour coverage with a mandatory rest period of 8 hours per day to ensure employee safety. In addition, APCo states that it kept a smaller workforce overnight from 11:00 PM to 7:00 AM to ensure that resources were available to address hazard calls.

According to APCo, AEP has an Emergency Preparation and Resiliency Group ("ERP") that manages mutual assistance for all of AEP's operating companies. The company also relies on mutual assistance from APCo's sister operating companies, or from outside of AEP, with all mutual assistance request needs managed through the ERP. APCo recognized that the ERP would first attempt to fill requests from AEP-internal sources, and then from outside of AEP. AEP is also a member of the Southeastern Electrical Exchange ("SEE"). If resources were needed from outside of AEP, then the ERP would contact the

[4] APCo is an operating unit of American Electric Power ("AEP").

SEE as necessary. APCo states that on January 1, it had 3,815 spare distribution poles and 3,558 space cross-arms in inventory. APCo's supply chain did not have to acquire any additional poles or cross-arms beyond its available inventory for the Storm.

Dominion Energy

Dominion states that its weather forecast evolved significantly during the weekend leading up to the Storm. On December 30, 2021, the company's projections showed a small chance for spotty and light wintry precipitation, but with no operational impacts. It was not until 24 to 36 hours before the Storm's arrival that reliable weather models indicated the snow totals that would eventually spread across the area. Even at that time, Dominion asserts that snowfall rate projections combined with warm surface temperatures did not fully support the snowfall totals predicted by their model.

According to Dominion, meteorologists working for the company's Emergency Preparedness Center provide a daily seven day forecast which is distributed internally. These forecasts provide potential operational impacts for each day for each of the company's seven major service areas. The company states that operational impacts are categorized into one of four threat levels: Minimal; Moderate; Significant; and Catastrophic.

For Winter Storm Frida, Dominion's forecast indicated that the highest probability for significant impacts would occur in Virginia's Central Region. The meteorological team anticipated that the impacts would continue for an extended period of time after the storm.

Dominion advises that its media relations team also develops a staffing plan to support storm restoration efforts, including making staffing assignments; assessing staff

availability, expected storm duration, and backup personnel needs; and developing content messaging ideas.

On January 2, after an updated forecast projected that the Storm might pose a significant threat, Dominion's Supply Chain team ran a report for inventory status of commonly used storm items and shared it with local field offices to establish any potential material needs. Based on the forecast, Dominion established that it had sufficient inventory on hand for the expected damage. On January 2, Dominion notified its wood pole suppliers, Stella Jones and Koppers, of the upcoming forecast change. Dominion also coordinated with its integrated supplier, Wesco, to redirect shipments to offices which were expected to be most-impacted, primarily Charlottesville and Fredericksburg. Wesco's pre-packaged storm kits containing Dominion specific pole hardware for off-system crews were staged and ready for delivery on January 3 upon request. Dominion also notified Southwire (wire and cable supplier) and Power Partners (transformer supplier) prior to the storm and requested inventory availability and put them on notice of the possible need for expedited shipments.

Regarding the company's Storm Center preparations, Dominion's Incident Commander and Section Chiefs transitioned from an "awareness" mode to a "planning and preparation" mode on January 1. Daily updates on weather and resource and process calls were conducted. A formal review and status check of responsibilities and assignments was conducted on January 3, and Dominion's System Storm Center was activated on January 3.

According to Dominion, its Customer Service Organization is tasked with preparing its resources in advance of every storm. For Winter Storm Frida, customer service staff

completed a comprehensive pre-staffing plan in anticipation of potential weather impacts to the company's system. During this pre-storm period, the priority was responding to customers and reducing wait times. According to Dominion, all customer service staff were placed on 12-hour rotating shifts for 24/7 coverage to respond to customer calls and social media inquiries throughout the restoration event.

Dominion states that on-system contractors are used to supplement Dominion's workforce for daily work. These crews were available for assignment to outage restoration efforts. Accordingly, on-system contractors were pre-staged and reallocated throughout the Winter Storm Frida restoration event.

In terms of mutual aid resources available to Dominion, the company states it can request that Dominion Energy South Carolina hold company crews and their on-system contractors for possible deployment to the Dominion Energy's Virginia and North Carolina service territories. Availability of this resource would be contingent on Dominion Energy South Carolina's service territory not being impacted by the same or another storm event. For Winter Storm Frida, Dominion Energy South Carolina held crews in order to send them to Virginia and North Carolina in support of anticipated restoration efforts.

Central Virginia Electric Cooperative

CVEC states that Winter Storm Frida was unique due to a general lack of accurate forecasting from weather services ahead of the storm. For example, the forecasts predicted an average of six inches of snow; however, in the cooperative's heaviest hit areas, CVEC crews noted more than one foot of extremely moist snow, which added to the impact on vegetation. CVEC claimed that if a more accurate weather forecast had been available,

pre-staging of outside crews and additional field personnel in the first few days of the storm might have reduced restoration times by as much as one to two days.

According to CVEC, the cooperative's Personnel Policy states that the first day of maximum work hours (which typically occurs on the first day of a storm) cannot exceed 18 consecutive hours in a 24-hour period, following which a minimum rest period of six hours is required. On the next day, employees are only allowed to work 16 consecutive hours, with an 8-hour rest period; this typically occurs from day two through the end of a storm.

For Winter Storm Frida, the CVEC Operations team began storm preparations on Sunday, January 2, by arranging to have all crews report to work at 5:00 AM on Monday, in case the forecasted weather event were to impact CVEC's service territory. CVEC also called on its on-property contractors to help with restoration efforts; these contractors would work for CVEC prior to being released to other utilities.

In addition to its internal workforce and contractors, CVEC requested mutual aid crews from VMDAEC on January 3. CVEC requested 12 two-man crews, of which CVEC received nine crews to support its restoration efforts.

The cooperative asserts that its warehouses are always prepared for unexpected weather and outage events and that they keep an adequate quantity of conductor, splices, and other storm related material in stock. As the storm progressed, however, CVEC continued to work with its distributors to acquire additional materials that might be needed.

In terms of communications, CVEC states that prior to the storm, its customers and local government officials were cautioned to prepare for the approaching winter storm. A

more detailed discussion of CVEC's communication activities is provided later in this Report.

Rappahannock Electric Cooperative

According to REC, it prepared for the likelihood of snow, wind, and below freezing temperatures prior to Winter Storm Frida's arrival. REC states that it did not make specific plans or anticipatory estimates about the impact or size of the storm, nor did it identify the REC service area that would be most heavily impacted. However, REC stated that the cooperative was prepared to deploy crews as needed across its entire service territory.

The cooperative's policy with respect to shift workers is for crews to work 16 hours per day with no less than 8 hours of rest daily. In addition to its internal workforce, REC requested mutual aid crews from VMDAEC and REC's contractors on January 3. REC states that 725 mutual aid line workers and 182 ROW workers[5] provided support during its restoration efforts.

REC states that in advance of Winter Storm Frida, the communications team prepared appropriate media releases for use if and when outages began. In addition to press releases, REC also prepared content for social media, member emails, the cooperative's website and outage map, and internal communications. A more detailed discussion of REC's communication activities is provided later in this Report.

UTILITY-SPECIFIC IMPACTS FROM THE STORM

Appalachian Power Company

[5] ROW workers consist of personnel who would help clear the ROW following Winter Storm Frida.

APCo recorded its first storm related outages on January 3, at approximately 12:22 AM. Of APCo's 542,478 customers, approximately 69,415 customers, or 12.8%, were impacted by the Storm. APCo's Charleston District recorded 231 customers impacted, while the Kingsport and Roanoke Districts recorded 16,617 and 56,567 customers impacted respectively. APCo reported 1,345 outages that resulted in 955,534 customer-outage hours and creation of 2,182 work orders.

APCo reported 72 broken poles and 60 broken cross-arms; additionally, approximately 26,132 feet ("ft") of conductor had to be restrung.[6] Of the 1,345 total outages experienced on its system, APCo states that 639 outages, or approximately 47.5%, were caused by trees located outside of the ROW. A more detailed discussion of the company's ROW and wood pole maintenance strategy is provided later in this Report.

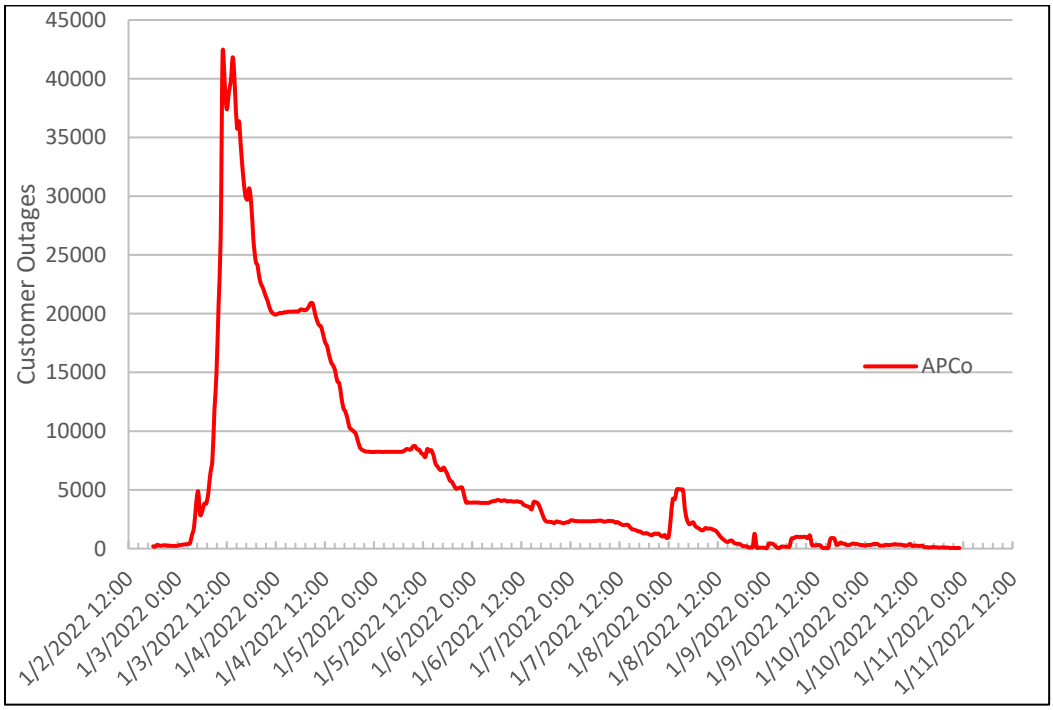
APCo utilized 205 company line employees, 78 company support employees, 62 storm center employees, and 371 operation center employees for the Storm. The company states that it also utilized 402 line contractors for Storm restoration. Of these, 303 were baseload line contractors, 99 were off-system line contractors, and 258 were tree contractors. Additionally, APCo states that it received 103 mutual aid personnel, which included four from off-system AEP and the 99 off-system line contractors referred to earlier.[7]

[6] APCo states that 3 of the 72 poles were owned by the local telephone company.

[7] APCo uses specific terminology to address its work crews. Line contractors perform overhead line work. Baseload line workers are those that work on the APCo system full time for regular work. These 303 crews were pulled off regular work to assist with storm restoration. They returned to normal work once the storm event is over. Off-system line contractors come from other power companies and assisted during this storm event. Once the event was complete, these 99 crews were released to their home power companies. Off-system AEP employees are staff from sister AEP

The figure Figure below presents APCo's Storm Restoration Curve. The time for total restoration for the Storm was approximately 6.5 days.

Figure 6. APCo Storm Restoration Curve



Dominion Energy

Dominion recorded its first storm related outages on January 3, at approximately 1:00 AM in the Central Region; 1:15 AM in the Eastern Region; and 3:30 AM in the Northwest Region.

The maximum number of reported outages occurred during the afternoon and evening hours of January 3, with approximately 250,000 customers out of service. Of the 2,581,109 customers in Dominion's service territory, 379,320 customers, or approximately

operating companies. These four employees were released at the end of the storm event. Tree contractors normally work on the APCo system to cut trees and vegetation to keep ROWs clear.

14.7%, were impacted by the Storm. According to Dominion, 35,382 customers were impacted in the Eastern region, 169,456 in the Central region, and 174,482 in the Northwest region of the company's service territory. The company reported a total of 423,492 outages which resulted in 8,552,172 customer-outage hours and 3,357 work orders. The restoration effort lasted two days for the Eastern Region, and seven days for the Central and Northwest Regions.

Dominion reported 366 broken poles, 729 broken cross-arms, and approximately 309,000 feet of conductor that needed to be restrung. According to Dominion, there were 1,630 outages caused by trees. This represents 55.5% of the 2,938 total outage events across Dominion's Virginia service territory. The company does not collect data relative to whether tree-related outages are caused by trees located within the ROW or outside the ROW. A more detailed discussion of the company's ROW and wood pole maintenance is provided later in this Report.

Dominion's restoration efforts across the Northwest, Central and Eastern Regions involved 755 company line employees; 2,500 company support employees; 560 tree contractors; 690 line contractors; and 1,140 line and support mutual aid personnel.

The Operating Centers in the Northwest and Central Regions ranged between a minimum of 26 employees and a maximum of 43 employees during day and night shifts from January 3 to January 9. The Eastern Region Operating Center ranged between a minimum 15 to a maximum of 32 employees during the same time frame.

Due to the broad coverage area and road conditions, resource movement was affected within the company's territory. A group of bucket trucks was moved from the

company's Eastern region to the Northern region on January 3. This was followed by more bucket trucks being relocated as they completed restoration in their primary office areas. This movement of resources into the heaviest impacted area continued throughout the restoration process.

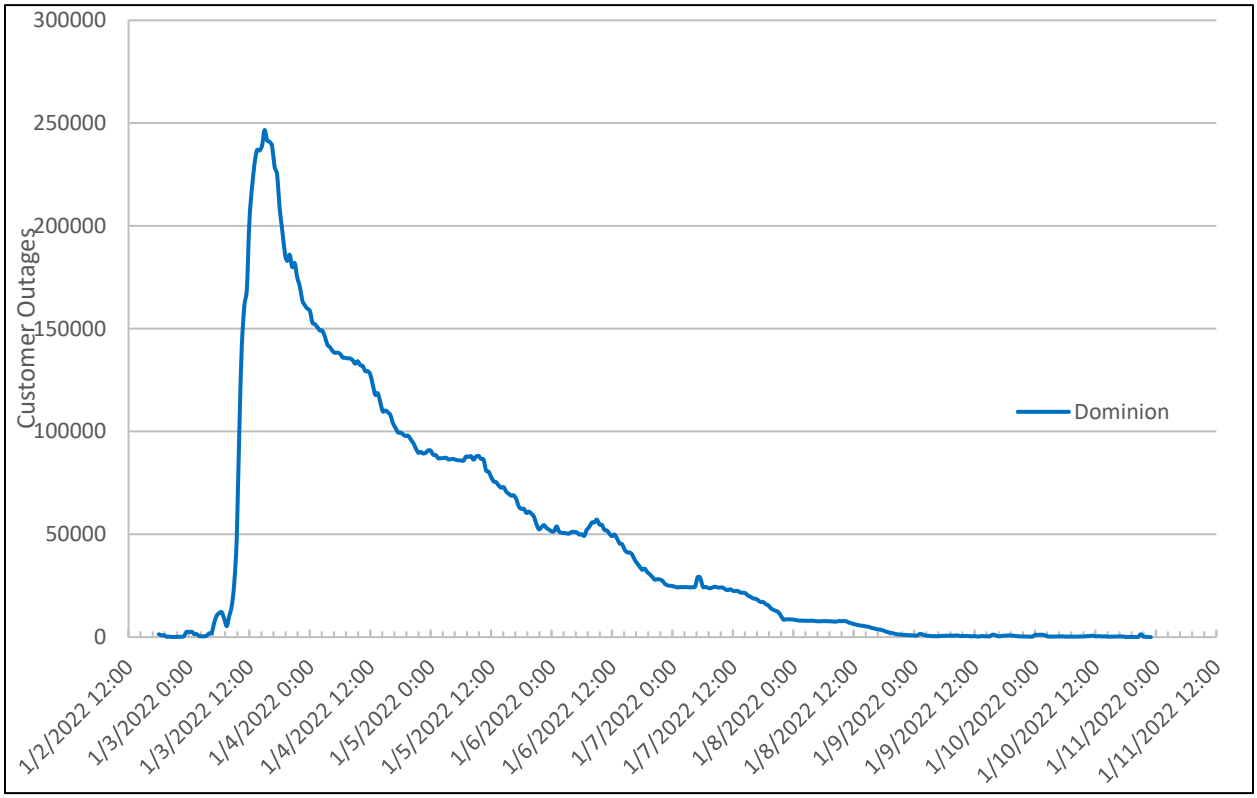
Regarding delays during restoration, Dominion states that when operational impacts began increasing, some crews had to discontinue work temporarily as trees began falling around them or travel conditions became dangerous; this was in accordance with Dominion's safety policy. On January 3, wet-snow accumulation resulted in treacherous roads and deteriorating field conditions that caused Dominion to temporarily suspend travel for crews that were lodged one or more hours' drive away from their work assignments; crews that were lodged closer to their work assignments continued restoration efforts. Conditions improved significantly within hours, and the crews that had been temporarily suspended were re-activated.[8]

To obtain off-system resources from other investor-owned utilities ("IOUs"), the company relies on its association with Regional Mutual Assistance Groups. Dominion requested a full committee Mutual Assistance Call on January 3 and was successful in securing a first wave of IOU mutual aid support, which the company began onboarding on January 4. The company later secured additional IOU line and tree crews from this source throughout the week. Dominion also acquired line contractors from non-IOU partners located within and outside of the company's service territory. Dominion states that crews

[8] The number of such occurrences was not tracked by the company.

from nine different states ultimately supported the company's Winter Storm Frida restoration effort. Figure 7 below presents DEV's Storm Restoration Curve. As can be seen, the time for total restoration was approximately nine days.

Figure 7. DEV's Storm Restoration Curve



Central Virginia Electric Cooperative

CVEC recorded its first Storm-related outage at approximately 6:00 AM on January 3. Of the 38,307 customers in CVEC's service territory, 29,212 customers, or approximately 76.3%, were impacted by the Storm. The cooperative reported 69,827 outage events resulting in approximately 1,429,371 total customer-hours of outage and 1,168 work orders generated for all Storm-related outages.

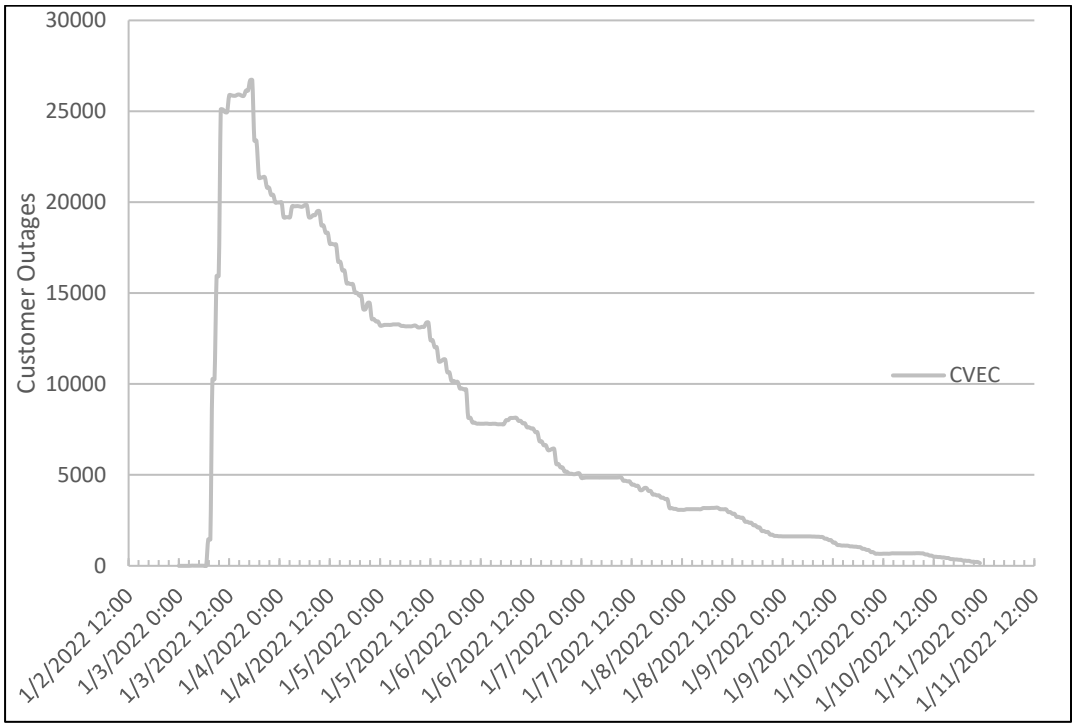
The cooperative recorded 163 broken poles, 55 broken cross arms, and 5,440 ft of conductor that needed to be restrung. Of the 1,168 total outages on the system, CVEC

states that 1,106, or approximately 94.7%, were caused by trees outside of the ROW. A more detailed discussion of the Cooperative's ROW and wood pole maintenance is provided later in this Report.

CVEC utilized 34 company line employees, 77 company support employees, 7 operations center employees, 24 line contractors, 45 tree contractors, and received a total of 62 mutual aid personnel (line & support).

Figure 8 below presents CVEC's Storm Restoration Curve. The time for total restoration for all CVEC members was approximately nine days.

Figure 8. CVEC's Storm Restoration Curve



Rappahannock Electric Cooperative

REC's first outage was recorded on January 3, at approximately 4:04 AM. Of the 170,989 customers in REC's service territory, 105,162 customers, or approximately 61.5%,

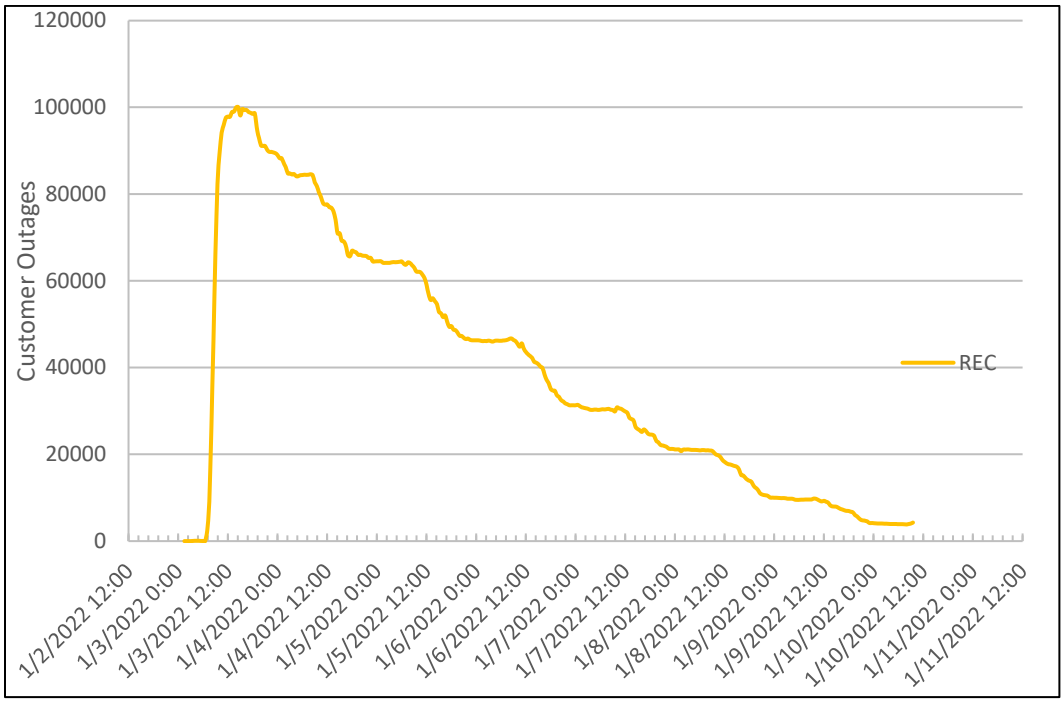
were impacted by the Storm. The Blue Ridge region recorded 503 outages, the Bowling Green region recorded 71,488 outages, and the Culpeper region recorded 69,509 outages. In total, the cooperative reported 141,500 outages which resulted in 6,483,071 total customer-hours of outage and 2,933 work orders generated.

REC recorded 779 broken poles, 412 broken cross-arms, and 218,547 ft of conductor that needed to be restrung. Of the 2,933 total outage events on the system, REC states that 2,750, or approximately 93.8%, were caused by trees located outside of the ROW. A more detailed discussion of the cooperative's ROW and wood pole maintenance is provided later in this Report.

For its restoration efforts, REC utilized 132 company line employees, 244 company support employees, 11 storm center employees, 11 operations center employees, 30 line contractors, 188 tree contractors, and received a total of 725 mutual aid personnel (line & support).

Figure 9 below presents CVEC's Storm Restoration Curve. The time for total restoration for all members was approximately 9.5 days.

Figure 9. REC's Storm Restoration Curve



RIGHT-OF-WAY MAINTENANCE

Appalachian Power Company

APCo reported that approximately 54.2% of Storm related outages were caused by trees, and of those outages, 47.5% were attributed to trees located outside of the company's ROWs.

The company states that if it had an improved or expanded vegetation management program in place, then depending on the frequency of vegetation management under that program, it would expect a reduction in the number of service interruptions caused by trees located within its ROWs. APCo referenced a cyclical vegetation management program implemented in the company's West Virginia service territory, where the company states that it has experienced a 71% reduction in the number of outages caused by trees located

within its ROWs. APCo states that were such a cyclical program established in Virginia, it would expect similar improvements.

According to APCo, the potential improvements that might be experienced through an additional focus on the removal of trees located outside of the company's ROWs is much more difficult to predict, because there are numerous factors that influence the number of trees that fall onto the company's facilities from outside their ROWs. These include, but are not limited to:

- Slope: a great number of APCo ROWs are located on hillsides;
- Exposure: trees not previously exposed to wind forces because they were protected by other trees along the ROWs, may bend, break, or become uprooted when exposed by APCo's re-clearing, tree removal, or widening efforts;
- Weather: snow or ice loading, higher than "normal" wind speeds, or winds from "abnormal" directions;
- Soil moisture: excessive rainfall/snowfall amounts leading to saturated soils and a reduction in the coefficient friction and resulting in slips, slumps, and landslides;
- Soil depth: slopes tend to have shallow soils, and roots do not penetrate bedrock, making trees more susceptible to wind throw; frequent fires tend to reduce soil depths;
- Soil type: clay soils have little air space, so tree roots do not penetrate deeply. Shallow root systems are more susceptible to wind throw, especially if the trees have recently been exposed;
- Insect or disease outbreaks: Emerald Ash Borer infested trees decline and die quickly, and affected trees are extremely brittle;
- Tree species: some species' growth characteristics lend themselves to snow/ice loads, uprooting, stem failure, etc.;
- Stand density: the competition for growing space in dense stands of vegetation (trees growing close together) results in small root plates, making the trees more susceptible to wind throw or becoming uprooted due to unbalanced crowns; and

- Natural stand mortality: a conservative estimate of a 1% annual mortality rate would result in more than 50,000 new danger trees in Virginia each year.

APCo further asserts that if it had a cycle-based vegetation management schedule, the likelihood of discovering and mitigating hazard trees would be increased. That said, the company estimates that 55% to 70% of the trees that cause service interruptions and are located outside the ROWs have no discernable defect, when inspected, but cause outages during actual storm conditions.[9]

Further, the company states that it cannot cut every tree that can reach its facilities, since this would not be acceptable to property owners and would be cost prohibitive. Thus, the company asserts that damage caused by trees located outside of the ROWs can be reduced, but not entirely avoided.

Staff recognizes that APCo cannot mitigate all potential outages caused by trees located outside of the ROW; however, Staff recommends that the company utilize a ground-to-sky approach for tree trimming inside the ROW; such a practice would further alleviate the overhanging branches that often cause issues when they fall across distribution infrastructure. A summary of all Staff's recommendations is provided later in the Conclusions and Recommendations section of this Report.

[9] APCo states that these percentage figures are based on evidence from outage investigations conducted over the last few years on outages coded to "Tree Outside Right-Of-Way. The company states that many trees appeared to have been alive and healthy with no evidence of decay or damage before they either snapped at a point above ground level or uprooted due to the stresses imposed by the weather conditions. While detailed follow-up outage investigations did not occur on every outage that occurred during Winter Storm Frida, information provided by crew personnel supported the assumption that similar findings would have resulted following this storm event.

Dominion Energy

Dominion states that there were approximately 1,630 outages caused by trees during Winter Storm Frida, which represents approximately 55.5% of the approximately 2,938 total outage events across the company's Virginia service territory.[10]

The company asserts that it does not collect data on whether outages are caused by trees located within or outside of the ROW.

Dominion states that its herbicide program and ash tree remediation program, both recently implemented as part of the company's Grid Transformation Plan,[11] can reduce the impact of future storms by improving access to damaged facilities, speeding repairs, and eliminating outage events caused by dead or dying ash trees affected by the Emerald Ash Borer since these trees pose a threat to overhead distribution facilities.

The company states that its ROW maintenance program is performed on an approximately four-year schedule and is based on factors such as the amount of time since the last trim; the condition of the ROW; and the number of tree-related interruptions, with a focus on maintaining safe and reliable grid operations. The program's structure and timing ensure that circuits in all communities are maintained in an equal and scheduled manner.

[11] See *Petition of Virginia Electric and Power Company, For approval of a plan for electric distribution grid transformation projects pursuant to § 56-585.1 A 6 of the Code of Virginia*, Case No. PUR-2019-00154, 2020 S.C.C. Ann. Rept. 318, Final Order (Mar. 26, 2020).

In order to reduce impacts caused by trees located outside the ROW, Staff recommends that Dominion utilize a ground-to-sky approach for trimming inside the ROW.

Central Virginia Electric Cooperative

During Frida, CVEC reports that it experienced approximately 1,168 outages, of which 1,112, or approximately 95%, were caused by trees. Of the outages caused by trees, 1,106, or approximately 99.5%, were caused by trees located outside of the cooperative's ROWs.

CVEC states that it has initiated a program to identify off-ROW trees that could potentially cause outages. These "danger trees" are identified in the field and investigated by the cooperative's Vegetation Management Department. The CVEC danger tree program has been in place since 2016 and has reduced potential damage, although CVEC states that no specific calculation of the positive impact can be made at this time.

To reduce impacts caused by trees located outside the ROW, Staff recommends that CVEC utilize a ground-to-sky approach for trimming inside the ROW. In addition, Staff recommends CVEC track the number of "danger trees" removed and develop metrics to track the effectiveness of the "danger tree" program.

Rappahannock Electric Cooperative

Rappahannock reported that approximately 95%, or 2,800 outage events were caused by trees during Frida. Approximately 98% of the outages (or 2,750 outages) were caused by trees located outside the ROW. The cooperative performs vegetation management on a five-year cycle.

Since 2019, REC has performed mid-cycle inspections along circuits whose trees were trimmed during the main cycle. Through these inspections, the cooperative identifies off-ROW hazard trees, trees in decline, and dead trees for removal. Further, REC recently began using satellite-based change detection and drone technology to aid in identification of these trees.

As noted previously, Staff recommends that the cooperative utilize a ground-to-sky approach for trimming inside the ROW; such a practice would further alleviate the overhanging branches that often cause issues when they fall across distribution infrastructure.

WOOD POLE MAINTENANCE

Appalachian Power Company

As of December 2021, APCo maintained approximately 617,319 poles in its service territory. All poles are visually inspected as part of the company's circuit inspection program. The objective of APCo's program is to visually inspect all overhead facilities on a five-year cycle in order to identify and correct deficiencies needed for the safety of employees and the public under the conditions specified in the National Electric Safety Code ("NESC"), and for system reliability. In its most recent inspection, APCo inspected approximately 849 miles of circuits and identified approximately 1,126 defects.

The company also states that eligible poles, by age, receive an above and below ground inspection as part of the pole inspection program. The objective of this program is

for every pole to meet the in-service criteria, to be inspected, and to be maintained as required on a ten-year cycle based on the date of the initial pole treatment type and age:

- Poles in service 15 years and longer are treated with Penta, Creosote, and Copper Naphthenate; and
- Poles in service 30 years and longer are treated with Chromated Copper Arsenate ("CCA").

In APCo's most recent inspection, the company states that approximately 16,898 poles were inspected, and 958 defects were identified that are now scheduled for replacement. The table below provides a breakdown of the poles by material composition on APCo's system and the number of poles that needed to be replaced during Frida, separated by pole type.

Table 1. Poles Replaced During Frida by Type

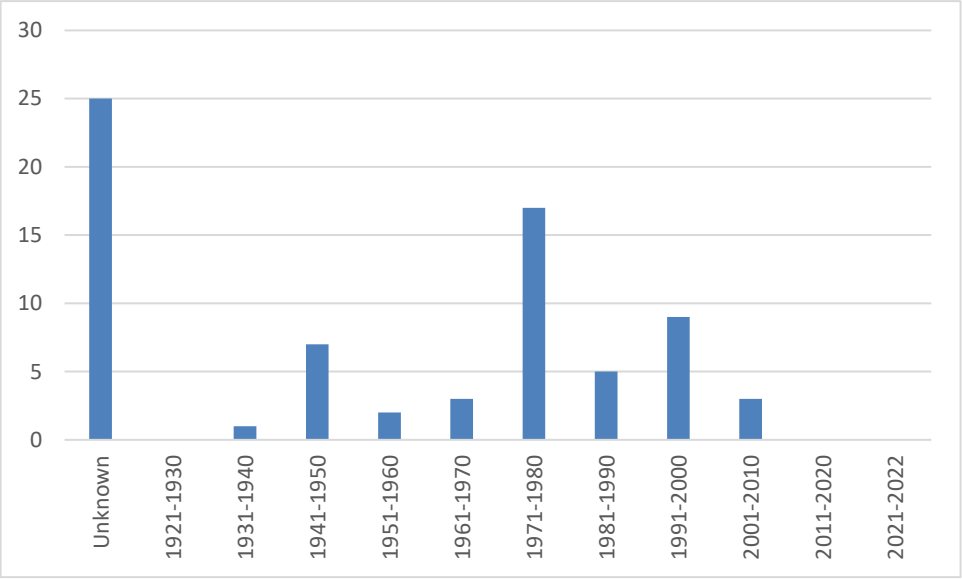
Pole Type	APCo Poles	Foreign Poles,[12] APCo Attached	Total Number in System (APCo + non-APCo)	Replaced During Frida
Wood	597,441	61,199	658,640	72
Concrete	130		130	
Steel	7,145	14	7,159	
Aluminum	3,578	8	3,586	
Fiberglass	8,734	8	8,742	
Ornamental	291		291	
Total	**617,319**	**61,229**	**678,548**	**72**

APCo states that there are approximately 362,773 poles with attachments[13] in its system, of which 21 were replaced as a result of Storm Frida. Figure 10 below depicts the

[12] In response to a Staff inquiry, APCo clarified that "Foreign" poles are poles owned by an entity other than APCo on which the company has supported its conductors.
[13] APCo specifies that "attachments" are conductors that are attached to its poles but owned by other entities, and may include fiber, cable, and telephone wires.

number and vintage of poles replaced as a result of Winter Storm Frida. The company states that this data suggests that age and condition of the poles were not a significant factor in the storm due to the prevalence of failures of relatively newer poles.

Figure 10. APCo Poles Replaced During Storm by Vintage



Regarding its maintenance program, APCo states the following:

- APCo does not perform stress test on poles. APCo verifies service life by core drilling during the pole inspection process;
- As of January 2022, APCo had approximately 3,815 poles and approximately 3,558 crossarms in inventory;
- APCo's supply chain did not have to acquire any additional poles or cross-arms beyond its current inventory at the time of the Storm; and
- Because there were no additional replacement poles needed for Storm restoration, no additional time was required for acquiring poles.

During the last five years, the number of spare distribution poles APCo kept in inventory varied from a low of 2,486 in 2018 to a high of 3,815 in 2022.

Table 2. Poles Kept in Inventory by APCo

	2018	2019	2020	2021	2022
Virginia Inventory	2,486	3,232	3,245	3,812	3,815

Data provided by APCo shows that the company has replaced an average of approximately 0.12% of the number of inspected distribution poles per year during the years 2019-2021. According to APCo, none of the poles that were replaced during Storm Frida were overdue for replacement.

The company also states that it is not likely that a stronger class of pole type would have served to reduce the number of outages, adding that trees falling onto lines will have an impact, whether by damaging the conductor, cross arms, or poles or activating a sectionalizing device. Stronger poles might result in shorter outage duration since they would be less likely to be damaged and therefore may not need to be replaced. APCo states that it incorporates storm hardening strategies in its design process whenever a pole is replaced, or a new pole is installed.

Dominion Energy

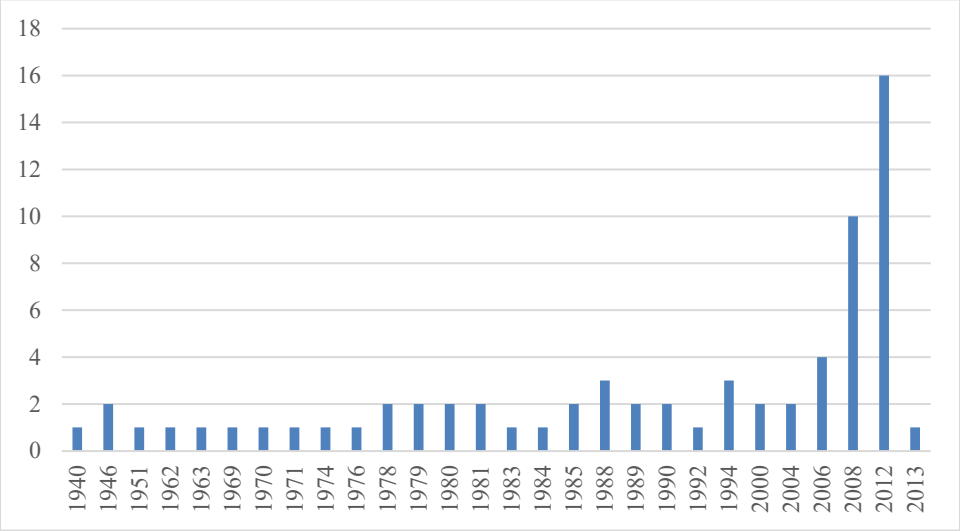
As of December 31, 2021, Dominion states that it has approximately 1,254,549 poles throughout its system. These are categorized into five groups based on material composition. Approximately 366 poles were replaced during Frida, as shown in the Table below.

Table 3. Poles Replaced During Frida, by Type[14]

Pole Type	Number in System	Replaced During Frida
Wood	1,068,484	359
Concrete	86,259	2
Fiberglass	83,384	5
Aluminum	8,988	0
Steel	7,434	0
Total	**1,254,549**	**366**

Figure 11 below depicts the number and vintage of poles replaced as a result of Winter Storm Frida. This data suggests that age and condition of the poles was not a significant factor in the storm due to the prevalence of failures of relatively newer poles.

Figure 11. Dominion Poles Replaced During Storm by Vintage[15]



Regarding its pole maintenance program, the company states:

- It has not performed an analysis of the remaining life of existing poles with joint use attachments;

[14] Information for this table was updated in an email from Matthew Holland to Mike Cizenski on August 26, 2022.
[15] In addition to the poles included in this chart, Dominion states that of the 366 poles replaced as a result of damage during the Storm, the vintage (or birth year) of 297 additional poles is unknown.

- It has not conducted any stress tests on poles after installation. Calculations are performed, at the time of installation, to determine the applied stress based on the conditions specified in the NESC;
- It had approximately 2,605 poles and 5,697 cross arms in inventory at the time of the storm;
- It acquired additional poles outside of existing inventory during the storm;
- The average estimated time taken to receive ordered poles from the company's manufacturers was approximately 12 hours. The company utilized direct shipments from Stella-Jones in Whitmire, South Carolina, and Warsaw, Virginia, and Koppers in Newsoms, Virginia;[16] and
- Dominion states that the time required to receive poles did not slow their restoration process during Frida.

As shown in Table 4 below, during the last five years, the number of spare distribution poles Dominion kept in inventory varied from a high of 3,358 in 2017 to a low of 2,833 in 2021.[17]

Table 4. Poles Kept in Inventory by Dominion

	2017	2018	2019	2020	2021
Virginia Inventory	3,358	3,322	2,994	2,948	2,833

Dominion states that it has a Groundline Pole Inspection program through which creosote treated poles are inspected on a 12-year cycle and a sampling of CCA treated poles are inspected annually.

[16] In response to Staff questions, the company states that it acquired additional poles outside of existing inventory during the Storm. Additional poles were ordered prior to final damage assessments being completed to preemptively have pole availability. The average estimated time taken to receive ordered poles from its manufacturers was approximately 12 hours. The company utilized direct shipments from Stella-Jones in Whitmire, South Carolina, and Warsaw, Virginia, and Koppers in Newsoms, Virginia.

[17] In response to a Staff question, Dominion stated that its pole inventory fluctuates based on availability at that time. The pole counts provided were a snapshot of availability at that moment. The company works to maintain consistent inventory to ensure it is prepared.

The 2021 program inspected 36,777 poles, resulting in a 1.9% reject rate. Rejected poles are segmented into three categories: Restorable, Non-restorable (to be scheduled for replacement), and Priority Non-restorable (to be checked by Dominion's local Operations group for a determination of immediate replacement needed versus scheduling for later replacement).

Table 5. Rejected Pole Results for 2021

Rejection Type	Poles Rejected	Rejection Rate
Restorable Poles	303	0.08%
Non-Restorable Poles	395	1.07%
Priority Non-restorable Poles	15	0.04%

Over the past five years, the company has replaced an average of 0.98% of the number of inspected distribution poles per year.

Dominion states that it is not able to identify the number of poles replaced during the Storm that were overdue for replacement as part of the Groundline Pole Inspection program. According to the company, the Outage Management System used to manage restoration activities does not capture specific work locations or the specific location and identification of each broken pole associated with an outage event. Poles identified for replacement as part of the Groundline Pole Inspection program are managed in the company's Work Management System.[18]

[18] In response to Staff questions, Dominion states that its current OMS has does not have capacity to archive and capture each broken pole location for each specific outage event. The company is working on a strategy to create a track and manage this data. While this was not a recommendation from last year's report the company recognizes the need to build this functionally and are actively working toward that goal.

Central Virginia Electric Cooperative

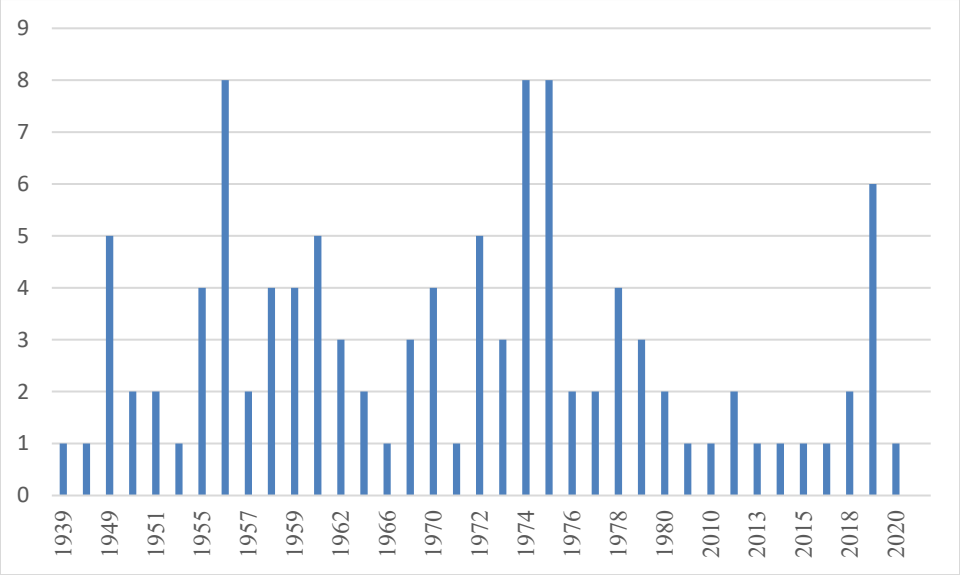
As of December 2021, the cooperative states that it had approximately 60,769 poles throughout its system, each categorized into one of six groups based on material composition. Of these, approximately 163 wood poles were replaced during Storm Frida.

Table 6. Poles Replaced During Frida, by Type

Pole Type	Number in System	Number Replaced During Frida
Wood	60,202	163
Concrete	93	0
Steel	423	0
Aluminum	20	0
Fiberglass	22	0
Composite	9	0
Total	**60,769**	**163**

Figure 12 below depicts the number and vintage of poles replaced as a result of the Storm. This data suggests that age and condition of the poles was not a significant factor in replacement during the storm.

Figure 12. CVEC Poles Replaced During Storm by Vintage



Regarding its pole maintenance program, the cooperative states the following:

- It has not performed an analysis of the remaining life of existing poles with joint use attachments;
- It has not conducted any stress tests on its installed poles;
- It had approximately 530 poles and 285 cross arms in inventory at the time of the storm;
- It acquired additional poles, outside of existing inventory, during the Storm;
- The longest time that CVEC had to wait for poles/crossarms was 2 days;
- In some cases, the Cooperative received crossarms the same day that it ordered them. Poles were delivered 1-2 days after placing the order; and
- The time required to order and receive poles during an outage situation does not slow the cooperative's restoration process.[19]

During the last five years, the number of spare distribution poles CVEC kept in inventory was an average of 627 poles.

The cooperative states that distribution and transmission poles are inspected on a 10-year cycle. Inspection is performed by a pole inspection contractor and includes a visual inspection and treatment to prevent insect damage and rot at the ground line.

The cooperative contracted with Osmose to do annual inspections in 2021. Osmose inspected 4,348 distribution poles and treated 403 poles externally and 1,027 poles internally. Additionally, 31 poles were rejected.

During the last five years, the cooperative has replaced an average of 3.35% of the number of inspected distribution poles per year.

[19] In response to Staff questions, CVEC states that it maintains inventory at a level that provides adequate response to storm related outages. In addition to the normal level of inventory, the Storm came during a time when CVEC inventory levels for poles was slightly above normal due to the number of pole replacements done in the past few years. The cooperative states that, in a normal storm, the ordering and delivery time for poles is a manageable logistic, though there could be unusual impacts in a constrained supply chain environment that affect the distributors' abilities to deliver poles in a timely manner.

CVEC also states that none of the poles replaced during this storm were overdue for replacement based on the cooperative's pole replacement policy or latest pole inspection results.

Rappahannock Electric Cooperative

As of December 31, 2021, REC states that it had approximately 188,000 poles throughout its system. These are categorized into nine groups based on material composition. Of these, approximately 807 wood poles were replaced during Storm Frida.

Table 7. Poles Replaced During Frida, by Type

Pole Type	Number in System	Replaced During Frida
Wood	180,742	807
Steel	1,266	0
Fiberglass	2,401	0
Aluminum	160	0
Bronze	3	0
Concrete	231	0
ATL	1	0
Laminated Wood	1	0
Unknown	3,335	0
Total	**188,140**	**807**

REC does not maintain information on the number of poles by year of vintage and in-service within the cooperative's service territory, or the number of each vintage that failed during the Storm. Staff recommends that REC work to track the vintage of poles in its service territory as well as those replaced as a result of future storms, as doing so can provide insight into the effectiveness of the cooperative's pole maintenance program.

Regarding its pole maintenance program, REC states the following:

- It has not completed a recent analysis of the remaining service life of its existing poles;

- The cooperative acquired additional poles outside of its existing inventory during the storm; and
- REC states that the time required to receive poles did not slow its restoration process.

During the last five years, the number of spare distribution poles REC kept in inventory varied from a high of 709 in 2020 to a low of 493 in 2017.

Table 8. Poles Kept in Inventory by REC

	2017	2018	2019	2020	2021
Virginia Inventory	493	555	593	709	524

REC states that its in-service pole inspection program is conducted on an almost year-round basis with the goal that each pole on the system be visited and inspected every ten years. Poles are inspected to ensure they meet the strength requirements as specified by the NESC. Inspection procedures and methods used are considered "conventional," and include visual, sound, boring, and probing.[20]

These inspections also include the application of remedial treatment to poles that meet NESC requirements but still show evidence of wood decay or wood-boring insects. REC's annual schedule for in-service pole inspections target, on average, approximately 10% of the system's support structures (18,500 poles). Actual annual schedules over the last five years included between approximately 18,000 and 21,000 poles inspected per year.

[20] REC states that it would consider the description of these methods as "conventional" is as opposed to inspection tools or technologies such as ultrasonic testing or resistograph drill testing which detects decay and defects in trees and timber.

Each yearly inspection activity includes circuits in each of REC's three regional office areas: Blue Ridge, Culpeper, and Bowling Green. According to REC, the inspection and application of remedial treatments are performed for REC by a nationally recognized contractor specializing in providing these services.

During the last five years, the cooperative has replaced an average of approximately 2.38% of the number of inspected distribution poles each year.

The cooperative states that none of the poles replaced during Frida were overdue for replacement based on its pole replacement policy or latest pole inspection results, and that poles that fail inspection are replaced in a timely manner.

COMMUNICATION

Appalachian Power Company

APCo states that it strives to speak with "One Voice" during major storm restoration efforts. "One Voice" is a process designed to provide uniform and timely information to interested parties, such as customers, the media, local and state government officials (legislators, county administrators, SCC Staff, regional emergency management contacts, regional contacts at VDOT, etc.), and internal employees.

"One Voice" messages are written by the company's Corporate Communication employees. According to APCo, the process promotes proactive communication by providing information before questions are even asked. APCo states that these messages communicate:

- When and where the weather event occurred;

- Impact to APCo facilities;
- Issues complicating restoration efforts;
- The number of outages and crews working;
- Safety messages; and
- Restoration times.

This information is shared by email with established external and internal contacts, and as news releases with area and state-wide media. According to APCo, the process ensures that the company's communications are timely and uniform across many audiences.

APCo states that if a major storm is forecasted, communications begin in advance of the storm. The "One Voice" information is also shared on the company's social media pages, and outage related information is provided on an outage map that is located on the company's website.

APCo customers can also sign up for mobile alerts to receive specific outage information about their account via text and email. During Frida, APCo's Corporate Communication staff provided one-on-one email responses, and live and recorded interviews with newspaper, television, and radio reporters. APCo staff also arranged for reporters to get photos and video of crews working in the field.

APCo states that beginning at 11:00 AM on January 4, outage restoration estimates by county and company service district were communicated to customers and the general public via "One Voice."

The company states that no communications were sent in advance of the Storm. "One Voice" messages were sent to affected areas, in addition to being shared with the news media. Corporate Communication staff kept reporters in APCo's service territory informed of the company's storm response effort. A list of the dates, times, and locations where "One Voice" messages were sent out is as follows:

1/3/22	5:30 PM	Roanoke and Kingsport Districts
1/4/22	11:00 AM	Roanoke and Kingsport Districts
1/4/22	5:15 PM	Roanoke and Kingsport Districts
1/5/22	10:30 AM	Roanoke District Only
1/5/22	5:15 PM	Roanoke District Only
1/6/22	10:30 AM	Roanoke District Only
1/6/22	5:00 PM	Roanoke District Only
1/7/22	11:00 AM	Roanoke District Only

Dominion Energy

During the Storm, Dominion's Central Region Incident Commander hosted four update calls with local emergency operations centers in the region. One update was conducted prior to Storm impacts, and three were conducted post-impact.

Dominion designates a liaison employee that is dedicated to communications with the Virginia Department of Emergency Management ("VDEM"). Due to efforts to mitigate the spread of COVID-19, this work was performed virtually during Frida; however, the liaison was available for assistance each day and responded to approximately twelve inquiries during the Storm.

Prior to the Storm, Dominion's Deputy Incident Commander contacted the Virginia Emergency Support Team ("VEST") Coordinator and provided an update on Dominion's storm preparations; ad-hoc communications continued after the Storm made impact. Ad-

hoc communications also occurred with VDEM's Transportation Emergency Support Function ("ESF"). The Deputy Incident Commander also attended a WebEx Meeting with the State Infrastructure Branch on January 4 and 5, and the company's Central Region Incident Commander provided updates at four VDEM Region 1 calls throughout the event. Daily updates were also provided to the SCC Staff.

Dominion sent an email to local officials on Sunday, January 2, focusing on the company's storm preparations; this email also contained information that is provided to customers in the event of an outage.

During a seven-day period from January 3 to January 9, Dominion representatives communicated with local officials regarding storm preparations, and also provided outage recovery updates. According to Dominion, these communications included approximately 100 email updates to local officials and their staff in all regions of the company's service territory. Most of the communications focused on areas in Northern, Western and Central Virginia, including the Piedmont area; those were the areas that sustained the most significant damage and outages.

Dominion made direct outreach to the media on January 2 and January 3, where it shared storm preparation information. The company issued press releases on January 4 and January 5. The company states that both releases were issued in English and Spanish. Rather than issuing additional broad releases, the company sent media relations representatives and business unit executives to Charlottesville and Fredericksburg, the two hardest hit localities, to conduct individual outreach and interviews, as a way to continue sharing information with the media and customers.

In addition to traditional media, the company also engaged in what it describes as a thorough information outreach plan on social media channels to inform customers and the public about the Storm impacts.

Central Virginia Electric Cooperative

CVEC states that it employed every method of communication possible during Winter Storm Frida. This included emails sent to impacted members, web updates and alerts through CVEC's mobile application, social media, town hall meetings, resources assigned to field inbound calls and emails, television news interviews, and updates to county partners and the media.

Prior to the Storm, the membership was cautioned to prepare for the approaching storm via social media posts. Once the Storm hit and outages began to increase, CVEC began its outreach on social media and the Cooperative's website, and prepared talking points for CVEC Member Services Representatives ("MSRs") to use as they fielded inquiries received through phone calls and email.

CVEC held a town hall meeting for its members, local emergency managers, elected officials, and the media. In addition, CVEC met with media outlets in the field to give interviews and to show area residents the extent of the damage. The cooperative created a webpage where updates were posted, thereby making it accessible to anyone searching online for information related to the Storm.

CVEC's Key Accounts Representative was charged with fielding all inquiries from local emergency managers and elected officials and offering updates to them on each day of the outage. Media inquiries were also fielded by the cooperative's Communications

Manager as well as the President/CEO on each day of the outage.

After the Storm, members and CVEC's community partners were alerted of the cooperative's progress until the last home was re-energized. Statistics on the impact of the outage were shared with members via the *"Current Communicator,"* the cooperative's printed newsletter.

In response to Staff questions, CVEC states that it does not utilize automated estimated restore time communication during major storms.

CVEC staffed phones with sufficient operators to cover approximately 803.5 hours of calls between January 3 and January 10, with a total talk-time of approximately 393 hours. CVEC MSRs were able to speak with approximately 83.19% of the members who called. The remaining 16.81% of callers abandoned the call before it was answered by CVEC staff. The maximum wait time was approximately five minutes and fifty seven seconds with an average wait time of approximately three minutes and eighteen seconds.

Cooperative Response Center ("CRC"), the cooperative's third-party call center, provided after-hours and overflow-call support. CRC staffed its overflow call center 24/7 to assist with the calls that on-site CVEC MSRs could not take during high volume queue times. Normal shift staffing from 7:00 AM to 5:30 PM was resumed on Monday, January 10.

The cooperative states that, as expected during outages, some members voiced their frustrations on social media and via telephone regarding the restoration process, specifically stating their concern that areas with fewer homes would only be restored after the "backbone" distribution system and larger service areas were restored.

CVEC states that it endeavored to educate members, Emergency Medical Service providers, and elected officials about the restoration process via graphics, articles, interviews, social media posts, web updates, and through qualified professionals who fielded the thousands of calls received.

The cooperative states that during large outages, it does not provide specific outage restoration times. Accordingly, given the massive extent of damage experienced during Frida, specific outage restoration times were not given. Staff believes greater transparency regarding the cooperative's restoration efforts would be beneficial to its members. As such, Staff recommends that the cooperative explore: 1) providing to its members information on the locations where work would be performed each day during restoration; and 2) develop an outage management system that can provide specific restoration times for a member's location.

Rappahannock Electric Cooperative

REC states that its Communications and Public Relations team maintains a crisis communication plan that focuses on major power outage events. The plan includes draft press releases that REC can modify and adapt prior to an approaching storm in order to provide storm-specific information.

In advance of Frida, the communications team prepared media releases to be used were outages to occur. In addition to press releases, REC also prepared content for social media, member emails, the cooperative's website and outage map, and internal communications.

Additionally, REC's major storm restoration team directed an "all hands on-deck" communication to be made to all internal employees. Simultaneously, each department (including call center, line crews, etc.) began identifying the individuals who would work each shift at the onset of the storm. REC immediately began reaching out to the VMDAEC to secure mutual assistance crews, as well as vendors to secure materials.

REC prepared for the restoration effort by exercising its option to retain the contractors who normally work on its system (during non-storm events) in an effort to bolster the number of crews who could quickly deploy on to the grid to perform restoration work.

Regarding restoration times, REC's Network Management System automatically generates member-specific restoration times. Restoration times, once generated, are communicated through REC's dispatch function. When member-specific restoration times are not available due to extensive damage, REC's Communications Group works with its Operations Department to provide high-level estimates of restoration times to members based on the information available at the time.

In response to Staff questions, REC noted that:

- It began providing member-specific outage restoration times, when available, on the first day of the restoration effort;
- It does not have the ability to track each estimated restoration time; and
- It is not feasible to track restoration time estimates in an event of the magnitude of Frida because of the large number of events.

REC conducted daily briefing calls with local emergency managers, elected officials, and other state agencies to keep them apprised of its restoration progress and to provide a venue for them to alert the cooperative of information pertinent to the restoration effort.

Additionally, on a daily basis, REC held ad-hoc calls with local officials representing impacted areas across its service territory.

The cooperative states that it maintains relationships with media contacts on a year-round basis. When a major weather event is forecasted to impact the area, REC prepares messaging to be shared with the local community.

During a major outage, as part of its general procedure, REC sends out media releases twice daily and makes follow-up calls to communicate REC officials' availability for interviews during the outage event. REC states that it also maintains open contact throughout outage situations in order to provide updates as they are requested. After a major event, REC provides a final update and responds to requests for interviews or for specific information related to the total number of outages so that it can be included in media reports.

ENVIRONMENTAL JUSTICE AND EQUITY CONCERNS

Appalachian Power Company

Equity in Restoration Policy and Practice

APCo states that Environmental Justice ("EJ") is not specifically considered in the company's outage restoration policy or procedures. Furthermore, its restoration priorities

follow an approach that first investigates and mitigates hazardous conditions focusing on identifying hazards such as downed wires or broken poles. After a storm, the emphasis shifts toward restoring essential services such as hospitals, water treatment facilities and emergency services. Finally, the restoration focuses on restoring outages affecting the highest number of customers.

Equity in ROW Maintenance and Pole Replacement

APCo asserts that it practices "fair treatment" through the use of an objective, data-driven process to prioritize distribution system maintenance, including ROW maintenance, and pole replacement; this process does not consider the race or income of the affected communities.

Equity in Planning Reliability Work

According to APCo, the company utilizes a data driven approach when planning reliability work. As such, the process does not consider the race or income of the affected communities.

Equity During the Storm Restoration Effort

Staff has reviewed the information provided by APCo and found no evidence that its Storm restoration process was inconsistent with the goals of the EJ Act. Staff, however, urges APCo to continually review and ensure implementation of its EJ Act and equity related policies.

<u>*Dominion Energy*</u>

Equity in Restoration Policy and Practice

Dominion states that its restoration program is applied uniformly to all customers, regardless of where they live, with a primary focus on customer safety. During an event, work is focused on restoring power for all communities to ensure access to critical services such as hospitals, 911 centers, and police and fire services. Once critical services are restored, the restoration program follows a hierarchal approach focused on restoring large groups of customers regardless of where the outages occur.

Physical damages and impacts from a storm will vary from community to community, and DEV asserts that following each storm its restoration program is designed and executed with consistency, regardless of the location impacted. Furthermore, the program is stated as being scalable and adaptable such that additional restoration resources can quickly converge into areas that incur more damage and outages.

Equity in ROW Maintenance and Pole Replacement

Dominion views the planning of its ROW maintenance and pole replacement programs (described previously) in a manner similar to its restoration program for EJ considerations under the EJ Act. As such, DEV advises that these programs apply equally throughout its service territory, and no community is prioritized over another.

Equity in Planning Reliability Work

According to Dominion, most reliability infrastructure work focuses on replacing equipment and facilities that are reaching their end of life, or that require upgrades or reconfiguring due to poor performance. Communities impacted by this work directly benefit from improved reliability. DEV also states that when new infrastructure is

contemplated, it conducts an EJ review to ensure fair treatment and meaningful involvement for both the proposed facilities and alternatives considered.

Equity During the Storm Restoration Effort

Staff has reviewed the information provided by DEV and found no evidence that its Storm restoration process is inconsistent with the principles of equity and the EJ Act. Staff urges Dominion to continually review and ensure implementation of its EJ Act and equity related policies.

Cooperatives

Equity in Restoration Policy and Practice

According to CVEC and REC, their restoration processes prioritize damaged areas, with a focus on restoring service to the most members as quickly as possible based on the damage to the system, without regard to the identity of any member or other factors.

After the hardest hit areas were addressed, REC altered its typical approach slightly to prioritize safety, in light of the significant number of restoration crews on the cooperative's system. Specifically, rather than moving crews from one outage location to another, REC directed crews to work on a given feeder or circuit for as long as they were safely able to, or until all, or nearly all, of the outages on the given circuit had been restored.

Equity in ROW Maintenance and Pole Replacement

CVEC and REC both assert that their ROW maintenance, vegetation management, and pole replacement programs are prioritized based on infrastructure needs and not on the characteristics of any community or customer.

Environmental Justice in Planning Reliability Work

Both CVEC and REC state that most of their construction activities are need-based, such as the need for construction of a new substation; in such instances the site location may be dictated by engineering imperatives, permitting requirements, or by feedback received from the community. Other construction activities may be driven by member requests, such as requests for new line extensions. CVEC and REC aver that they strive to be supportive of community and member inputs during their planning and siting activities; they believe these practices are consistent with the Commonwealth's EJ principles.

Equity During the Storm Restoration Effort

Staff has reviewed the information provided by CVEC and REC and found no evidence that their storm restoration process is inconsistent with the principles of equity and the EJ Act. Staff encourages the Cooperatives to develop a formal EJ Act policy.

UTILITY-IDENTIFIED LESSONS LEARNED

Electric utilities typically perform post-storm critiques and implement corrective actions for lessons learned, in an effort to improve future restoration efforts. Following Winter Storm Frida, the Staff asked the utilities to provide their lessons learned as a result of any post-Storm critiques or assessments; this includes information obtained from debriefings of the mutual aid crews.[21] The following are the directly quoted responses received from APCo, Dominion, CVEC and REC relative to the Staff's data requests.

[21] Staff's own conclusions and recommendations are provided later in the "Staff Conclusions and Recommendations" section of this Report.

Appalachian Power Company

According to APCo, "debriefs centered around improving assessment activities and frequent updates for repair crews and information channels."

Dominion Energy

Dominion identified the following lessons learned:

Lesson Learned #1 - New Resource Management System Implemented During the Event

> The January 3 ice storm event[22] and resulting restoration coincided with the replacement of our resource management system. The previous system, Resources on Demand ("RoD") was discontinued and no longer supported by the vendor. A new system, Crew Manager, was integrated during 2021 and user training was nearly complete at the time of the January 3 ice event. As with any new system implementation, there were initial challenges in some areas such as data entry and formatting. This impacted the quality and consistency of reporting from the system as has been standard practice. To overcome these issues during the restoration, the Emergency Preparedness Center established a 24/7 helpline staffed with Crew Manager subject manager experts to field questions from local office personnel responsible for populating and updating Crew Manager throughout the restoration. A positive takeaway is that the "going live " experience accelerated user experience. Anecdotal feedback after the storm indicated that after receiving live experience, users believe Crew Manager will be an upgrade over the previous system. Crew Manager training will continue to be offered during the Company's normal storm training activities. Crew Manager allows visibility of all engaged resources along with the ability to manage lodging.

Lesson Learned #2 - Estimated Times of Restoration (ETRs)

> Effective communications of estimated times of restoration (ETRs) during long duration restoration efforts requires a balance of global communications to customers in impacted areas and providing specific ETRs to individual customers. The ability to provide either of these communications requires an assessment of the

[22] This is Dominion's preferred descriptor for Winter Storm Frida.

damage that has been incurred to the electric grid. The company utilizes two damage assessment strategies:

1. An Initial Damage Assessment is performed immediately following storm impact and the goal is to complete this assessment within several hours. The goal is to gain a very high -level review of the types of damage that has occurred. For example, are crews seeing lots of broken poles or mainly wires down. This intel informs the global communication of restoration times – with the goal being to approximate how long the overall restoration will take by number of days. This will start at the system or state level and then evolve into regional and local levels as more damage assessment is attained.
2. A Detailed Damage Assessment begins in parallel with the Initial Damage Assessment and requires a circuit-by-circuit review of damages. These damage assessments include both ground and aerial patrols. In larger restoration events, several hundred personnel will be assigned to this effort. It's this assessment that will ultimately inform the specific ETRs that are communicated to individual customers.

The Company is keenly aware that customers expect to receive their individual ETRs as soon as possible and works around the clock to attain the level of damage assessment that will enable those communications. During the January 3 ice storm restoration, the Company began populating some individual ETRs before there was enough damage assessment completed. This led to having to recommunicate ETRs in some areas.

The major takeaway is that damage assessment during an ice storm restoration is much more different than other types of large storm restorations for several reasons:

1. Damages to the electric grid can occur for multiple hours or even days as freezing rain continues to accumulate on facilities creating additional damages. This is very different from a tropical event where damage to the grid occurs during a very brief timeframe and typically weather conditions are favorable after the tropical event exits the area
2. Access to facilities is treacherous and slow which negatively impacts both repair time and damage assessments
3. Damage from ice is frequently significant
4. Damage can also occur as ice melts and trees rebound to their normal state

Dominion further indicated that the January 3 ice event provided a reminder of the importance of balancing the desire to quickly provide specific ETRs to all customers with

the need to be patient and wait for damage assessment to progress to a point where a higher level of confidence is available to inform individual ETRs.

Central Virginia Electric Cooperative

CVEC identified the following:

> CVEC performed a debrief session with all managers and supervisors associated with the numerous aspects of executing the emergency response plan on January 14. Improvements were identified in the area of crew management and data management. Additional personnel will be identified in the CVEC Emergency Response Plan and assigned to assist in these efforts. It was also identified that improved use of software tools could be beneficial in the damage assessment effort to track information gathered and distribute information to construction crews. Additional software tools are being investigated. These changes are intended to improve the efficiency of the outage restoration process but will not have a significant impact on the length of the outages caused by a major storm event.
>
> After the last two events that created similar length of outages in the CVEC area (Hurricane Isabel in 2003 and the derecho in 2012), CVEC held similar debrief sessions and revised plans for response in future storms. The greater impact to limiting damage and increasing responsiveness in rare storms such as this, typically comes from system improvement projects that occur to meet growth or reliability needs between the storms.
>
> Winter storm Frida was also unique in the lack of accurate forecasting available from weather services ahead of the storm. If better forecasts had been available, additional pre-staging of outside crews could have been implemented to allow for additional field personnel in the first few days of the storm, which might have reduced the overall event restoration by a day or two.

Rappahannock Electric Cooperative

REC identified the following:

> Over the several months since Winter Storm Frida impacted REC's system, REC has conducted a thorough After Action Review ("AAR"). The goal of the AAR is to identify areas where REC performed well as well as areas for improvement. Further, the AAR will identify recommended actions that would improve REC's readiness, performance, and efficiency in its next restoration effort following a large, impactful storm by eliciting feedback, discussion, and input from all departments across the organization and from the vast majority of REC employees

who were involved in the Winter Storm Frida restoration effort. As of May 2022, REC is finalizing the recommendations from its AAR process. Once those recommendations are final and REC has identified actions that it will take going forward to improve its preparedness, readiness, and efficiency to respond to and restore service during/after a major storm, REC will share those findings with the SCC Staff and would be happy to discuss the findings at Staff's convenience.

The major areas of focus for the AAR are:

a) Process, Training, and Knowledge;
b) Operations and Management;
c) Safety;
d) Equipment, Materials, and Procurement;
e) Communication;
f) Vehicles and Transportation;
g) Personnel and Crew Accommodation; and
h) IT Infrastructure and Systems, including the REC Outage Map.

STAFF CONCLUSIONS AND RECOMMENDATIONS

Based on Staff's analysis of the Companies' preparedness and responsiveness to Winter Storm Frida, Staff provides the following conclusions and recommendations:

- The time required for full restoration of services following Winter Storm Frida was, for most customers, 9.5 days or less. Given the unexpectedly more severe weather than initially forecasted, the large number of customers impacted, and the wide extent of the damage, the overall storm response of the Companies was not, in Staff's opinion, unreasonable, especially based on the historical record impacts of the Storm.

- Staff's review did not reveal evidence of restoration issues associated with personnel resources, equipment availability, or inventory levels. Furthermore, the review also did not reveal any major deficiencies in: (i) the prioritization plans for restoration of service; (ii) communication and outreach to the Companies' customers, the media, local and state government officials, and regional emergency management contacts; or (iii) the design of the Companies' distribution systems that may have compromised the ability of utility infrastructure to withstand the Storm.

- Staff concurs with the Companies' prioritization plans for restoration of service following a major outage, which generally employs a strategy of first restoring service to critical safety and public welfare facilities and then proceeding to those circuits that result in the restoration of service to the greatest number of customers. This restoration strategy is not inconsistent with the goals established by the Virginia Environmental Justice Act.

- From a materials impact perspective, REC appears to have had the greatest impact from the Storm, recording 779 broken poles, 412 broken cross-arms, and approximately 219,000 ft of conductor needing to be restrung. Despite this level of damage, REC was able to restore service to nearly all its members within 9.5 days. Notably, the cooperative was able to call upon a significant number of mutual aid personnel (664 total) to supplement the cooperative's own crews in safely restoring service.

Staff makes the following recommendations:

- Staff recommends that all utilities use a "ground-to-sky" approach for tree trimming inside their ROWs, as such a practice will help to alleviate the overhanging branches from trees outside the ROW that often cause issues when they fall across distribution infrastructure.

- Staff recommends that Dominion track the impact to outages from trees located outside of its ROWs.

- Staff recommends that, as part of its ongoing program to identify off-ROW trees that could potentially cause outages, CVEC track the number of "danger trees" removed and develop metrics to track the effectiveness of the program.

- Staff recommends that REC work to track the vintage of poles in its service territory, as well as those replaced as a result of future storms, since doing so can provide better insight into the effectiveness of the cooperative's pole maintenance program.

- Staff recommends that CVEC explore providing members with daily work location information during storm restoration, and to the extent possible, also implement a management system that can provide member-specific restoration times.