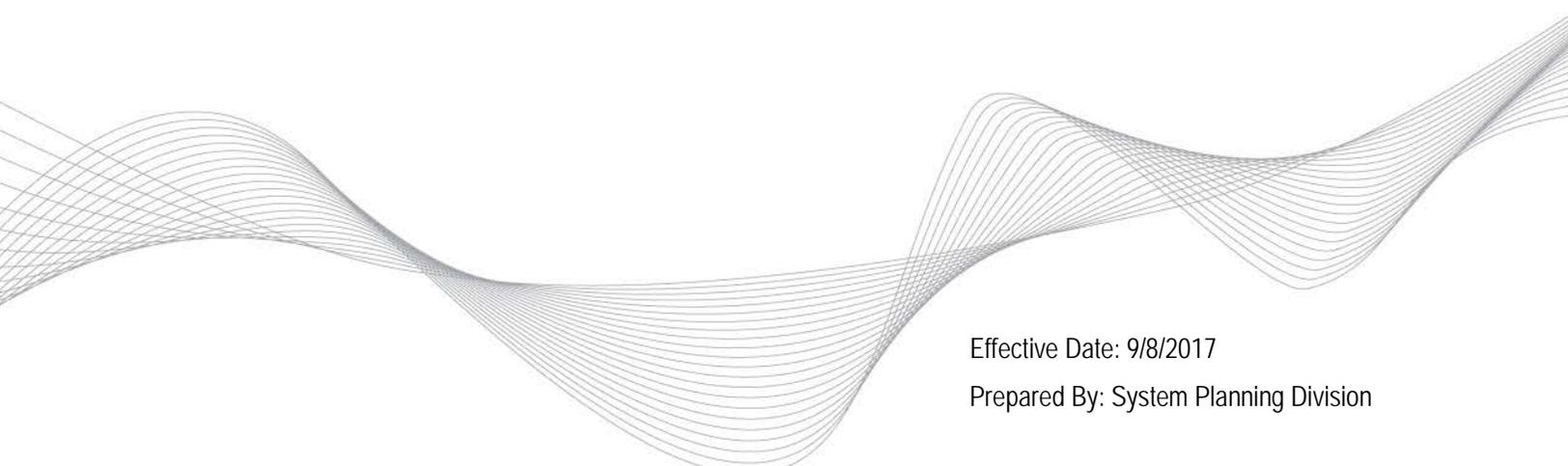




Transmission Cost Information Center User Guide

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Prepared By: System Planning Division

Transmission Cost Information Center

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General Overview & Instructions

The Transmission Cost Information Center (TCIC) is an Excel-based application developed to help PJM stakeholders better understand their current transmission costs and estimate their future transmission costs. To enable users to achieve this goal, the TCIC has a wealth of pertinent information pre-populated for each PJM Regional Transmission Expansion Plan (RTEP) Baseline and Supplemental Upgrade. The TCIC uses this information, along with applicable Carrying Charges for those Transmission Owners with formula rate filings on the PJM website, to estimate the Transmission Owners' Annual Revenue Requirement for each upgrade for the current Rate Year and for each of the next 10 Rate Years. From the Annual Revenue Requirements, the TCIC develops monthly transmission cost changes for each upgrade from the current month to a user-defined future month within the 10-year horizon, and summarizes the cost changes by Responsible Zone.

In the upper left-hand corner of the Cost Summary By Customer tab, users can select any future billing month within the next 10 years. The TCIC will then display monthly future transmission cost summaries by Responsible Zone. The future transmission costs provided by the TCIC may be inaccurate as they are not always based on the same information the Transmission Owners use to develop the actual future transmission costs. To better account for these inaccuracies, users may update the default pre-populated input data in any of the yellow-highlighted Input Tabs having a red font with more appropriate information, such as that contained in the formula rate filings posted on the PJM website. Also, the user may adjust values in the Projected Revenue Requirements tab having a red font such as the estimated CWIP and True-Up.

Note that the default pre-populated input data does incorporate a significant amount of information from the formula rate filings related to the RTEP Baseline and Supplemental Upgrades specifically

identified in the most current version of the PJM TEC Settlement Worksheet. This information is contained in the TEC WS Revenue Requirements tab. Links to the formula rate filings are provided in the TCIC Overview tab and also in the Formula Rate Filing Information tab. **The TCIC has been designed to allow users to adjust any of the values and dates within the application that have a red font.** After the adjustments, the values in the remaining tabs will update automatically.

In addition to providing the user with the ability to adjust many of the values and dates throughout the application, the TCIC provides the ability to run future scenario studies to examine the impacts to future transmission costs due to events such as Responsible Zones leaving or joining PJM and phasing in large transmission projects.

Tab Descriptions

The TCIC contains 13 tabs grouped into three color-coded categories.

❖ Overview & Aggregate Cost Summary Tabs

➤ TCIC Overview

This tab provides brief descriptions of each of the tabs in the workbook, a glossary of terms and relevant links. In the left-hand margin there are outline buttons that can be used to condense or expand the overview. Right-clicking on any of the tab names within the TCIC Overview Tab Descriptions section will hyperlink to the first cell in the linked tab.

➤ Cost Summary By Customer

This tab is compiled from information and calculations from other tabs in the workbook and shows the estimated current, future and incremental monthly zonal transmission charges for each Responsible Customer. These estimated monthly zonal charges are further subdivided into charges for RTEP Baseline Upgrades, Supplemental Upgrades and Residual Transmission Facilities. The zonal charges for RTEP Baseline Upgrades are further subdivided to provide the user with additional summary information about this class of upgrades, including whether or not the upgrade was constructed by the local Transmission Owner. All charges are displayed both in terms of total dollars and dollars per MW of zonal load. In the left-hand margin there are outline buttons that can be used to condense or expand the summary.

A key feature of this tab is located in the top-left corner. The current billing date will auto-populate. The user can change the future billing date, which appears directly beneath the current billing date. If the future billing date is changed all of the formulas throughout the workbook will automatically be recalculated and the new future and the incremental monthly zonal transmission charges contained in this tab will reflect the updated date.

➤ **Cost Summary By TO**

This tab summarizes each Transmission Owner's estimated current, future and incremental annual transmission costs. The current Rate Year and the future Rate Year are selected based on the current and future billing dates from the Cost Summary By Customer tab.

Each Transmission Owner's estimated annual transmission costs are further subdivided to show the total transmission Carrying Value, Depreciation Expenses and Annual Revenue Requirements. Each of these terms is defined in the TCIC glossary. Comments are provided in each cell for the current Rate Year to show the location within the Transmission Owner's formula rate filing, as applicable, where the information was obtained from.

In the top margin of the tab there are outline buttons that can be used to condense or expand the summary. By expanding the summary, the user can view a breakdown of each transmission cost component into the costs associated with RTEP Baseline Upgrades, Supplemental Upgrades and Residual Transmission Facilities.

❖ **Input Tabs**

➤ **TEC WS Revenue Requirements**

This tab contains the Annual Revenue Requirement for each RTEP Baseline and Supplemental Upgrade contained in the latest version of the PJM Transmission Enhancement Charge Settlement Worksheet. It also provides inputs from the latest formula rate filing that were used to develop these Annual Revenue Requirements. These formula rate filing inputs will be used in combination with the estimated in-service dates in the Upgrade Information tab to project future Annual Revenue Requirements for these upgrades. Comments are provided in each cell to show the location of the information that came from a formula rate filing.

The formula rate filing inputs include the following values.

- Carrying Value (full and partial year)
- Construction Work In Progress (full and partial year)
- Carrying Charge
- Depreciation Expense (full and partial year)
- Annual Revenue Requirement (before true-up adjustment)
- True-up Adjustment for both the current and next Rate Year when available.

Several of the inputs from the formula rate filings contain both full year and partial year information. These values may be different if, for example, the upgrade is only in service for part of the current Rate Year. In all cases, the partial year values should match the values that the Transmission Owner has used to develop its Annual Revenue Requirement for the upgrade.

For upgrades that are not included in this tab, the Formula Rate Filing Information and Upgrade Information tabs will be used to project future Annual Revenue Requirements. Also, upgrades not

included in this tab that are either in service or projected to be in service by the end of the current calendar year will be allocated 100% to their host zone regardless of their Current Planning Allocations.

➤ **Formula Rate Filing Information**

Each Transmission Owner either has a formula rate or a stated rate that they use to determine their Annual Revenue Requirement. For each Transmission Owner that has a formula rate, the Formula Rate Filing Information tab provides a link to the latest formula rate filing posted on the PJM website, their current and estimated future Carrying Charge, an estimate of the useful life of their transmission facilities, and the start and end dates of their current and future Rate Years. The future Rate Year is based on the future billing date selected by the user in the Cost Summary By Customer tab. The values and dates contained in the Formula Rate Filing Information tab are based on the latest formula rate filings posted on the PJM website. A link to the latest formula rate filing for each Transmission Owner is provided in the Rate Filing Type column.

Users can modify the estimated useful life or the future Rate Year Carrying Charge and the TCIC will adjust the default estimated useful life and Carrying Charges in the Upgrade Information tab for all upgrades owned by the Transmission Owner. Default useful lives and Carrying Charges for specific projects can be individually modified in the Upgrade Information tab as well.

A PJM Weighted Carrying Charge is provided below the individual Transmission Owner Carrying Charges.

➤ **Upgrade Information**

This tab shows information about PJM RTEP Baseline and Supplemental Upgrades. Each upgrade has an ID that begins with a “b”, “s” or “T”. Upgrades beginning with a “b” are considered PJM RTEP Baseline Upgrades, and upgrades beginning with an “s” or a “T” are considered Supplemental Upgrades. (Note that upgrades IDs are no longer assigned beginning with the letter “T”).

Users can modify the following parameters for an individual upgrade in this tab and the TCIC will recalculate the future monthly bill with the selected modifications.

- In-service date
- Latest cost estimate
- Estimated useful life
- Depreciation expense
- Status

The depreciation expense is calculated by dividing the latest cost estimate by the estimated useful life, and will be automatically populated as long as the project is not cancelled or on hold.

➤ **Network Service Peak Loads**

For each Transmission Zone, this tab shows the peak load for the previous year in the current NSPLs column. The future NSPLs are by default set to be the same as the current NSPLs but can be modified.

These values are used to help customers figure out the cost per MW of each project. The tab also calculates the load-ratio-share allocations for both the current and future Rate Years.

Users may adjust the NSPLs expected for the future Rate Year and the future Rate Year load-ratio-share allocations will be recalculated and applied to develop the future monthly bill with the revised NSPL. Changing a future NSPL value to zero will update both the future load-ratio-share and DFAX allocations on a pro rata basis. Changing a zone's future NSPL value from zero MW to a positive value will update the future load-ratio-share allocations on a pro rata basis but no new DFAX allocations will be assigned to the zone.

➤ **Current & Future Planning Allocations**

These tabs show the planning allocations for each RTEP Baseline Upgrade to each Responsible Zone. The tabs also list, when available, which appendix in Schedule 12 the upgrade can be found in and the upgrade's allocation type. The allocation types are

- 100% Load Ratio Share
- 100% Solution Based DFAX
- 100% Violation Based DFAX
- 50% LRS & 50% DFAX
- Single Zone
- Cancelled - note that if an upgrade has been cancelled but is included in the TEC WS Revenue Requirements tab that the allocation type will be assigned to one of the other allocation types listed above.

The planning allocations are shown as three separate tables, namely the non-load-ratio-share, the load-ratio-share and the aggregate cost allocations for each RTEP Baseline Upgrade to each Responsible Zone.

The user may modify any of the allocations that have a red font in the Future Planning Allocation tab tables and the revised allocations will be reflected in the future monthly billing calculations. Make sure the total column on the right side of the cost allocation tables sums to 100% when making manual allocation modifications.

❖ **Detailed Cost Summary Tabs**

➤ **Projected Revenue Requirements**

This tab estimates the Transmission Owner's Annual Revenue Requirement for each RTEP Baseline and Supplemental Upgrade. For each upgrade, the upgrade ID, TEC Worksheet ID, Transmission Owner and the estimated date the rates began or are projected to begin are displayed. The Rates Begin date is based on the year of the in-service date from the Upgrades Information tab as well as the month and day the Rate Year begins for the Transmission Owner as defined in the Formula Rate Filing Information tab. When charges for an upgrade occur prior to the Rates Begin date, this typically indicates that the upgrade is partially in service.

The remainder of this tab is broken into 11 similar sections with one section for the current Rate Year and one section for each future Rate Year in the 10-year horizon. For each of these years, the Annual Revenue Requirement for each upgrade is by default calculated by first multiplying the sum of the upgrades Carrying Value and CWIP by the applicable Carrying Charge and adding the annual depreciation expense to the sum. Then, any true-up adjustment is added to the resulting sum. For upgrades that are only in service for part of the year, the Annual Revenue Requirement is pro-rated based on the number of months the upgrade was in service.

Below is a description of the components of these 11 sections. If an upgrade has a TEC Worksheet ID then all values in the current Rate Year section are taken from the TEC WS Revenue Requirements tab. Also, if there is a separate true-up adjustment filing made mid-year for those Transmission Owners whose Rate Year begins in January, then the true-up adjustments are added for the next Rate Year as well.

- **Start Of Rate Year:** For the Current Rate Year + 0, the Start Of Rate Year is taken from the Formula Rate Filing Information tab based on the Transmission Owner of the upgrade. If the upgrade does not have a Transmission Owner listed in the Formula Rate Filing Information tab, it will show an "N/A". For the remaining 10 future Rate Year sections, the start of the Rate Year will be calculated from the start of the Rate Year listed in the Current Rate Year + 0 section. For example, Current Rate Year + 5 is five years into the future from the Current Rate Year + 0.
- **Upgrade Carrying Value:** This column by default shows the upgrade's estimated remaining useful value at the end of the applicable Rate Year. However, if the upgrade has a TEC Worksheet ID, then the Carrying Value will be based on the Carrying Value (Partial Year) or the Carrying Value (Full Year) from the TEC WS Revenue Requirements tab as appropriate.

The default Carrying Value is calculated by summing the Carrying Value and CWIP from the prior Rate Year and subtracting the depreciation expenses for the Rate Year under investigation. A partial year adjustment is made to the Carrying Value if the upgrade is only in service for a portion of the Rate Year under investigation.

An upgrade may have a zero Carrying Value for a particular Rate Year for a variety of reasons including if the year the rates begin is greater than the start of the Rate Year, the upgrade has been cancelled or placed on hold, the upgrade does not have an applicable Transmission Owner or the upgrade's costs have been assigned to another upgrade as indicated in the TEC WS Revenue Requirements tab.

- **Construction Work in Progress:** The values in this column are set to zero by default unless the upgrade appears in the TEC WS Revenue Requirements tab with CWIP. Otherwise, if there is CWIP for a particular upgrade, you can fill it in here and it will be accounted for when calculating the upgrade's Annual Revenue Requirement.

- **Depreciation Expense:** The default depreciation expense is based on the values in the Depreciation Expense After First Year In Service column in the Upgrade Information tab. If the year the rates are scheduled to begin is equal to that of the start of the Rate Year under investigation, then the annual depreciation expense is calculated by considering only the portion of the year that the upgrade has been in service.

If the upgrade has a TEC Worksheet ID, then the depreciation expenses will be based on either the Depreciation Expense (Partial Year) or Depreciation Expense (Full Year) from the TEC WS Revenue Requirements tab as appropriate.

- **Applicable Carrying Charge:** The Carrying Charges by default come from the Upgrades Information tab and these values are in turn sourced from the Carrying Charges in the Formula Rate Filing Information tab. If the upgrade has a TEC Worksheet ID, then the Carrying Charge will come from the TEC WS Revenue Requirements tab.
- **True-Up:** The true-up adjustment is set to zero by default. If the upgrade as a TEC Worksheet ID, then true-up will come from the TEC WS Revenue Requirements tab.
- **Annual Revenue Requirement:** The Annual Revenue Requirement for a particular upgrade is the amount that a Transmission Owner must collect in order to cover the costs associated with the upgrade and also earn a fair rate of return on the investment. The default Annual Revenue Requirement is calculated for the Rate Year under investigation by using the following formula
 - $ARR = (\text{Carrying Value} + \text{CWIP}) * (\text{Carrying Charge}) + \text{Depreciation} + \text{True-up}$

➤ **Current Monthly Zonal Charges**

This tab shows the monthly transmission charges to each Responsible Zone and is split into three sections. The first section show general information related to each upgrade. The remaining two sections show the monthly charges in terms of total dollars and in terms of dollars per MW.

The zonal charges in terms of total dollars are calculated by multiplying the revenue requirement for the current month by the zonal cost allocation for the upgrade. For RTEP Baseline Upgrades, the zonal allocations come from the Current Planning Allocations tab. For Supplemental Upgrades, the zonal allocations are always 100% to the zone in which the upgrade is constructed. The zonal charges in terms of dollars per MW are calculated by dividing the zonal charges in terms of total dollars by the current NSPLs located in the Network Service Peak Load tab.

The total column near the top of the tab contains the sum of the monthly charges to each Responsible Zone for all Baseline and Supplemental Upgrades for the current month.

➤ **Future Monthly Zonal Charges**

This tab is set up the same as the Current Monthly Zonal Charges tab except the calculations are based on information for the future billing month selected by the user in the Cost Summary By Customer tab. NSPLs for the future billing month come from the future NSPLs in the Network Service Peak Load tab.

While it is recommended that the user modify the in-service date in the Upgrade Information tab in order to globally alter the timing of both the TO revenue requirement and the customer charges for an upgrade, the user may modify the in-service date in the Future Monthly Zonal Charges tab as well. However, the in-service date in this tab functions only to inform the TCIC whether the upgrade will be in-service by the end of the current calendar year or not. Allocations for upgrades with in-service dates in this tab that occur prior to the end of the current calendar year are always assigned 100% to the host zone unless they appear in the TEC WS Revenue Requirements tab. Allocations for upgrades with in-service dates in this tab that occur after the current calendar year and allocations for all upgrades that appear in the TEC WS Revenue Requirements tab are taken from the Future Planning Allocations tab. See FAQ #4 in the Appendix for an example of how to assign the allocations from the Future Planning Allocations tab to existing upgrades that do not appear in the TEC WS Revenue Requirements tab.

➤ **Incremental Monthly Zonal Charges**

This tab shows the difference between the current and future monthly zonal charges determined in the Current and Future Monthly Zonal Charges tabs.

Appendix: Frequently Asked Questions

1. How can the user phase in a project before its scheduled in-service date?

The TCIC can linearly phase in a project that has a scheduled in-service date beyond the Rate Year under investigation. An upgrade will be phased in automatically whenever the upgrade has a positive Carrying Value or CWIP populated in one of the 11 Rate Year sections in the Projected Revenue Requirements tab that starts prior to the year of the upgrade's projected in-service date from the Upgrade Information tab. For each subsequent Rate Year prior to the Rate Year during which the upgrade is scheduled to be fully in service, CWIP is assigned to the future upgrade by taking the cost estimate from the Upgrade Information tab, subtracting the Carrying Value for the Rate Year that CWIP is to be assigned to, and dividing the result by the number of years until the scheduled in-service date. Then, at the end of each Rate Year the added CWIP rolls back into the Carrying Value for the subsequent Rate Year.

For example, given the inputs below where the user adds a 2017 Carrying Value, the TCIC will automatically populate the values in the yellow cells in the output table.

Inputs	
<input type="radio"/> Upgrade projected in-service date	1/1/2021
<input type="radio"/> Upgrade cost estimate	\$45,000,000
<input type="radio"/> Estimate Useful Life (years)	40
<input type="radio"/> Carrying Charge	10%
<input type="radio"/> User adds 2017 Carrying Value	\$5,000,000

Outputs	2017	2018	2019	2020	2021
<input type="radio"/> Carrying Value	\$5,000,000	\$5,000,000	\$15,000,000	\$25,000,000	\$43,875,000
<input type="radio"/> CWIP	\$0	\$10,000,000	\$10,000,000	\$10,000,000	\$0
<input type="radio"/> Depreciation Exp	\$125,000	\$125,000	\$375,000	\$625,000	\$1,125,000
<input type="radio"/> ARR	\$625,000	\$1,625,000	\$2,875,000	\$4,125,000	\$5,512,500

2. The Cost Summary by TO"" tab includes MAIT (as successor to Penelec and MetEd). But the Current and Future Planning Allocation tabs still treat Penelec and MetEd as separate TO zones. I believe the rates are going to continue to be separate" though I could be wrong about that so wonder if there needs to be a different representation of MAIT on the "Cost Summary by TO" tab or an explanation that shows that is rolling up the two zones together (assuming that's the case)

Under MAIT, there is now only one common NITS rate for the ME and PENELEC zones. The [MAIT NITS rate](#) is determined by taking the annual transmission revenue requirement for the MAIT transmission assets in both the ME and PENELEC zones and dividing that by the combined coincident peak load for both zones.

However, the ME and PENELEC zones are still customer zones under Schedule 12 of the PJM tariff. Therefore, when a PJM TO requests PJM to collect the revenue requirement for individual Schedule 12 upgrades allocated in part to either the ME or PENELEC zones, PJM will charge the LSEs within these zones directly.

The TCIC Cost Summary By Customer tab accounts for these considerations, namely,

- If an upgrade is constructed inside either the ME or PENELEC zones by MAIT and MAIT does not request PJM to collect the revenue requirement under Schedule 12, the revenue requirements are split between the two zones based on their load-ratio-share. These revenues will be collected by MAIT via the MAIT NITS charge.
- If an upgrade is constructed inside either the ME or PENELEC zones by MAIT and MAIT does request PJM to collect the revenue requirement under Schedule 12, the revenue requirements are assigned to the two zones based on their Schedule 12 allocations. These revenues will be collected by MAIT via a Schedule 12 TEC charge.
- If an upgrade is constructed outside both the ME and PENELEC zones by a PJM TO other than MAIT, and the other TO requests PJM to collect the revenue requirement under Schedule 12, the revenue requirement is assigned to the two zones based on their Schedule 12 allocations. These revenues will be collected by the other PJM TO via a Schedule 12 TEC charge.

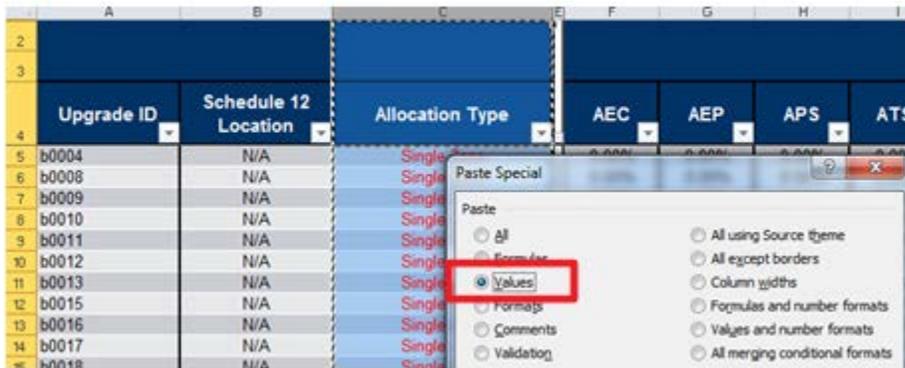
There is a footnote at the bottom of the TCIC Cost Summary By Customer tab that briefly discusses this.

3. How can I remove a zone but still keep the 100% VBDFAX allocations?

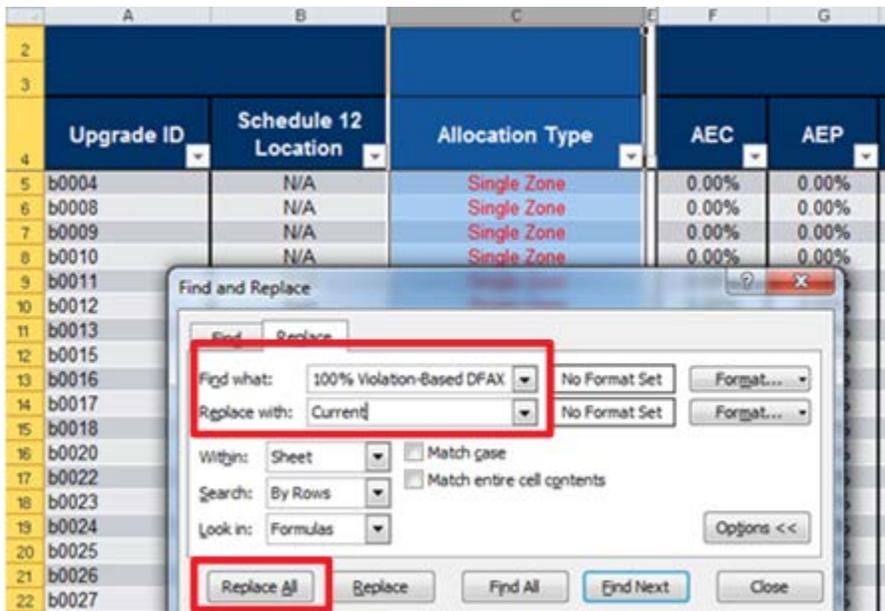
By setting a zone's future NSPL to 0 MW in the Network Service Peak Loads tab, the zone's allocations will be removed and both the load-ratio-share and DFAX allocations will be adjusted such that the remaining zones having allocation will share the zone's allocation proportionally according to their allocations.

In order to not adjust the 100% VBDFAX allocations a few additional steps must be taken by the user.

- In the Network Service Peak Loads tab, set the zone's future NSPL to 0 MW.
- In the Future Planning Allocations tab, select the entire Allocation Type column.
- Copy the entire column (CTRL + C) and convert the formulas to values by using the paste special values command (CTRL + ALT + V and select Values)



- Select the entire Allocation Type column again, copy the entire column (CTRL + C) and replace (CTRL + H) "100% Violation-Based DFAX" with the term "Current" (Replace All).



4. How does the TCIC account for PECO baseline upgrades that have Schedule 12 allocations to more than one zone?

As indicated in note 2 in the Cost Summary By TO tab, the PECO formula rate is pending approval by FERC at docket ER17-1519-000 and has been included in the TCIC with an effective date of July 1, 2017. However, as indicated in note 1 in the Cost Summary By Customer tab, no existing baseline upgrades are allocated outside of the host zone in the TCIC unless they appear in the TEC WS Revenue Requirements tab, which contains the RTEP Baseline Upgrades for which TOs are currently collecting TECs.

Therefore, on the one hand, since PECO upgrades are not included in the TEC WS Revenue Requirement tab, existing PECO Baseline Upgrades will be allocated 100% to the PECO zone whether or not the upgrades have planning allocations to more than one zone. On the other hand, future PECO Baseline Upgrades with multi-zone allocations will be allocated according to the specified allocations in the Future Planning Allocations tab.

In order to have the TCIC allocate existing PECO Baseline Upgrades outside the PECO zone for the future billing month for upgrades having multi-zone allocations, the user will need to change the in-service dates for these upgrades in the Future Monthly Zonal Charges tab to be any date beyond the current calendar year.

For example, upgrade b0269 is an existing PECO Baseline Upgrade with a Schedule 12 allocation type of 100% load-ratio-share. However, because the upgrade does not appear in the TEC WS Revenue Requirements tab, the TCIC allocates it 100% to PECO for both the current and future billing months. In order to reflect a 100% load-ratio-share allocation in the future billing month, change the in-service date for the upgrade to 1/1/2018 in the Future Monthly Zonal Charges tab.

Upgrade ID	Transmission Owner	Latest Cost Estimate (\$M)	In-Service Date	Start Of Future Rate Year	Revenue Requirement For Future Month	AEC	AEP	A
TOTAL					\$333,057,719	\$5,604,196	\$47,085,226	\$10,0
b0269	PECO	\$30.20	1/1/2018	6/1/2017	\$452,877	\$7,679	\$64,558	\$25