



# FTR Credit Enhancements

Credit Subcommittee  
Bridgid Cummings  
April 10, 2018

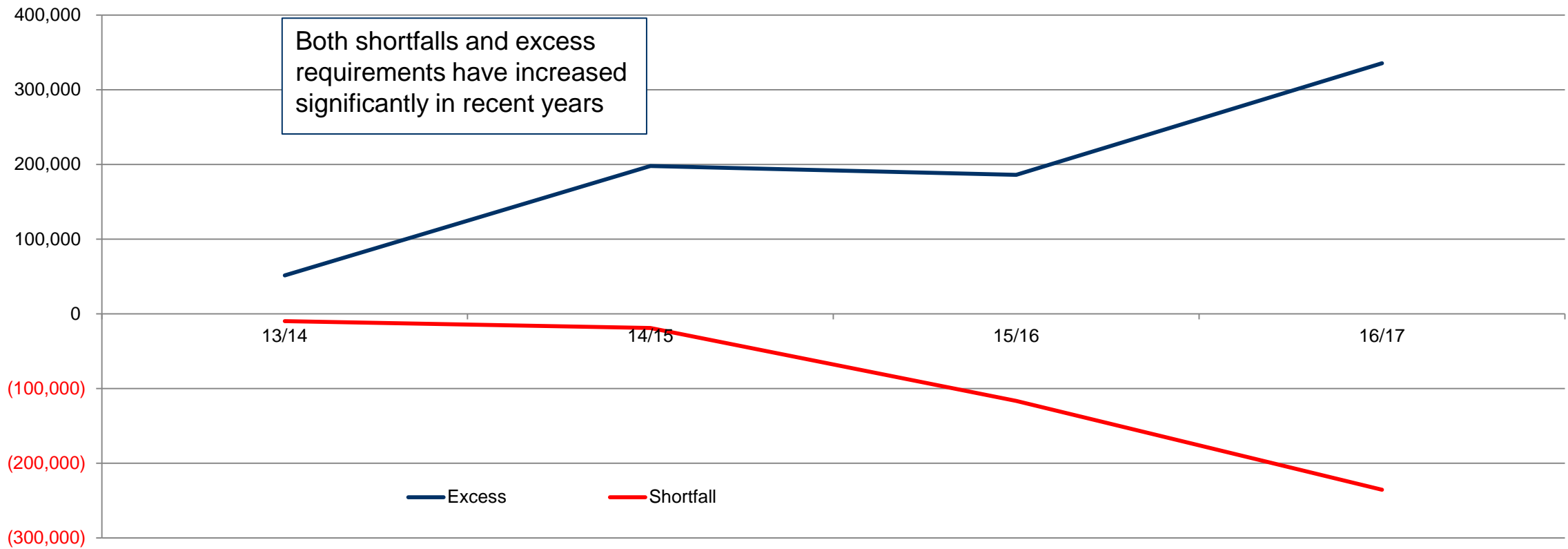
- Issue Charge endorsed February 12, 2018:
  - “Investigate and potentially recommend enhancements surrounding: (a) minimum collateral requirements for FTR portfolios; (b) enhancements to current minimum capitalization or other requirements established by FERC Order 741; (c) recommend whether the current undiversified counterflow FTR credit requirements is still necessary; and develop and recommend potential other credit tool enhancements for PJM (e.g., ‘mark-to-market’).”
- PJM has been analyzing possible enhancements related to the calculation of direct FTR credit requirements, specifically:
  - (a) minimum requirements, and (c) undiversified adder
- Minimum capitalization (b) and mark-to-market requirements are not part of the direct FTR credit requirements

- In order to minimize defaults, credit requirements normally greatly exceed expected loss amounts, resulting in excess collateral greatly exceeding loss amounts
  - Futures markets use 97% probabilities in credit design
    - Including a baseline credit requirement that is volume dependent
- In addressing the stated objectives of the issue charge, it may be necessary to increase credit requirements
  - However, PJM will continue to look for ways to improve credit efficiency, in order to minimize the overall credit requirements

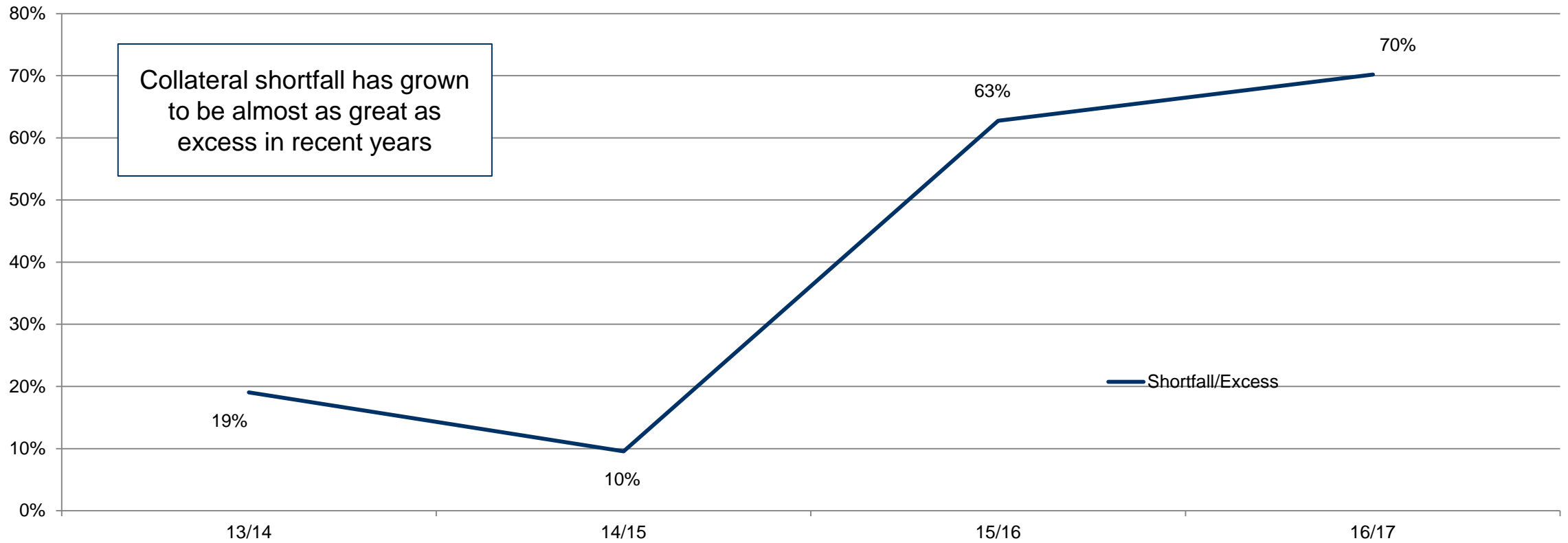
- Minimum requirements will, by definition, increase credit requirements, but only for members with current low requirements relative to their FTR volume
- Changes to the Undiversified adder will, by definition, decrease credit requirements, but only for portfolios with net counterflow costs

- In recent years, PJM's FTR market has seen actual shortfalls nearing parity with excess collateral requirements
- Between the 13/14 and 16/17 planning years,
  - Total annual auction credit requirements (Buy-Obligations only) increased from \$48 million to \$581 million
  - But actual shortfalls increased from \$10 million to \$235 million
  - The ratio of shortfalls to excesses has increased from 19% to 70%

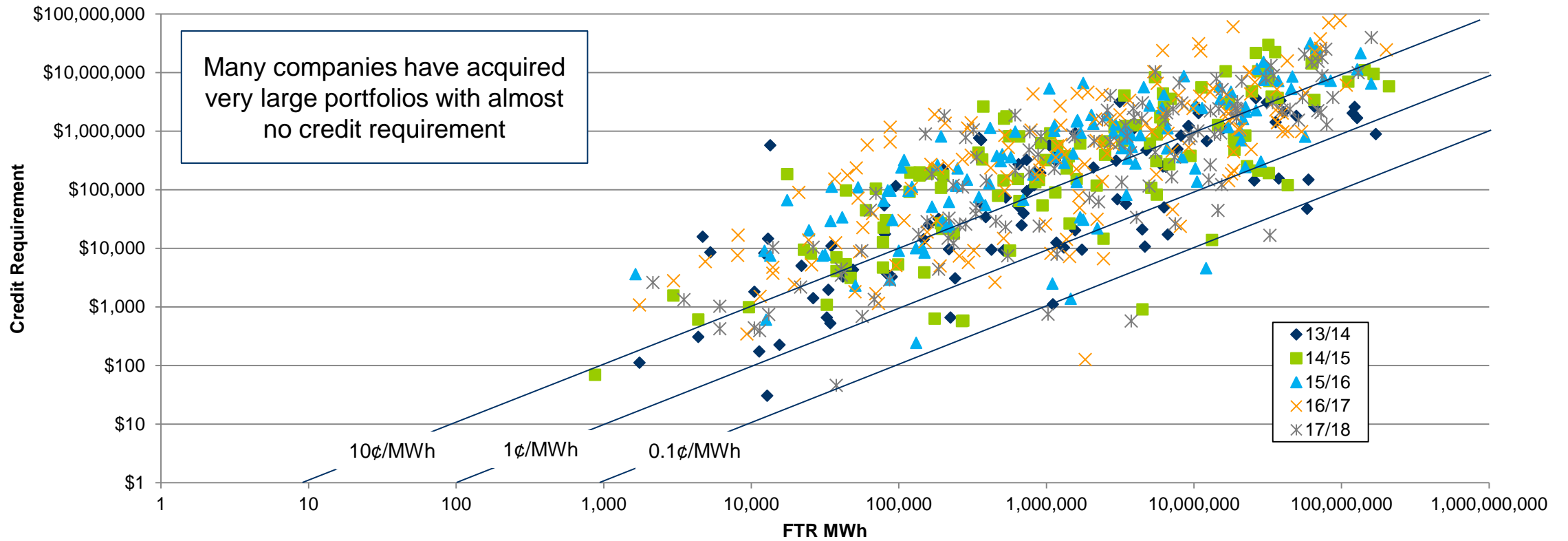
### Shortfall and Excess All FTRs and ARR



### Shortfall as a Percentage of Excess All FTRs and ARR



## Total FTR MWh versus Credit Requirement by Planning Period Annual Buy Obligations Only





- PJM is performing a stress test by analyzing the portfolios of five defaulting members in 07/08
  - With current credit requirements, analysis estimates that the \$56 million default would have been ~\$3.4 million
  - The undiversified adder is responsible for almost all of the reduction
    - Although the undiversified adder would have covered the PowerEdge default, it would not have completely covered some of the other defaults
  - An undiversified deductible quickly eliminated all protection from the defaulting members other than the largest

- Applying an undiversified deductible of \$100,000/month increases the stress test default by \$532,000
- Applying a minimum ¢/MWh requirement does not materially reduce the stress test defaults
- This implies that the ¢/MWh minimum cannot be relied on to cover exposure created by a deductible applied to the undiversified adder
- A deductible would still reduce collateral calls during auction clearing

- Although a minimum  $\text{¢/MWh}$  does not materially reduce stress test defaults, it does materially reduce annual shortfalls, especially in recent years
  - In the 16/17 planning year alone, a  $10\text{¢/MWh}$  minimum would have
    - Reduced shortfalls by \$44 million (19%)
    - Increased the annual auction requirement by \$70 million (12%)
  - This supports the premise that large portfolios with small requirements are posing a material credit risk
- A tiered minimum appears to require approximately similar collateral and results in similar shortfall reductions as the flat  $5\text{¢/MWh}$ - $8\text{¢/MWh}$  minimum, depending on the year

- PJM is also analyzing the counterflow and prevailing flow historical value adjustment factors to see the effect of changes on credit exposure, and whether or not there is a good interplay with other analyzed changes
  - Counterflow exposure is a risk that occurs when paths with modest historical values (and corresponding prices) experience congestion many times their historical value
    - Such as with extended major outages or extreme weather
  - Prevailing flow exposure occurs when paths with high historical value (corresponding prices) incur significantly less congestion
    - Such as due to transmission upgrades or abnormally mild weather

- An increase from 10% to 20% in the prevailing flow discount factor appears to have a much greater benefit on recent exposure than a similar increase to the counterflow adjustment factor
  - This indicates that recent exposure is mostly due to prevailing flow paths that experience reduction in congestion
  - This correlates well with the generally mild weather in the past several years\*, along with RTEP upgrades going in to service

\* The winter of 17/18 was not included in the analysis since the 17/18 year is not yet complete

- An increase from 10% to 20% in the counterflow adjustment factor had almost no effect on the stress test
  - This is not unexpected
  - The 2007/2008 defaults were due to an extended extreme tail event occurring on paths with modest historical values compared with the congestion levels of the event. A historical counterflow adjustment factor would have had to be extreme in order to be effective in such tail event.
  - Using market prices, as is done with undiversified adder, is the only way we have seen to date that would have materially mitigated the 2007/2008 defaults

- Initial analysis of volatility did not reveal any obvious paths towards increased credit efficiency
- Analysis was preliminary, however, and will be continued

- Continue volatility analysis
- Consider stakeholder suggestions, if any
  - Stakeholder suggestions are encouraged
- Prepare preliminary proposal(s)
  - May include multiple options for stakeholder consideration



# Appendix 1

## FTR Credit Requirement Calculations

- The FTR credit requirement starts with a monthly credit requirement calculated for each FTR
  - Monthly price minus discounted historical value for each month for each FTR
  - Historical value is the weighted average of the path congestion value over the past three years (50%-30%- 20%), on a monthly basis
  - Separate historic values used for on-peak, off-peak and 24-hour FTRs
- Within each month, individual FTR credit requirements are added to form a single credit requirement for that month
  - For cleared FTRs only, negative individual FTR credit requirements net against positive requirements within the same month.
- ARR credits in the account are subtracted from credit requirements each month
- An undiversified adder, if applicable, is applied on a monthly basis (explained in more detail on next slide)
- The total credit requirement for an account is the sum of all positive monthly subtotals

- Targets counterflow tail risk
- Calculated separately for every month on a portfolio basis (not calculated for individual FTRs)
- Added to underlying credit requirement for each month
- Based solely on cleared price
  - Cannot be applied until market is in process of clearing
  - Net negative cleared portfolio-month price causes adder to be applied
    - Adder is 3 times the value of the net negative FTR auction-based price
    - Total month credit requirement may still be negative if underlying is sufficiently negative
  - Total credit requirement is recalculated and one-day collateral call issued if needed

# Appendix 2

## Analysis Process

- Data gathered for four planning years
  - 13/14, 14/15, 15/16, 16/17
  - 16/17 planning year used for initial analysis
- Analysis includes all positions in the planning year
  - Annual, monthly and long-term FTRs Obligations, and ARRs
  - Shows actual total exposure to PJM membership

- Collateral excess and shortfall are measured by account on a runout (“to go”) basis
  - Equal to remaining collateral requirement minus remaining actual net loss (if any)
- Excess is the smallest positive difference
- Shortfall is the largest negative difference
- Accounts will have either a shortfall or an excess in a given year
- PJM looked at total excesses and shortfalls across all accounts for each scenario

## Example Account A: \$10,000 Shortfall

Month	Monthly Credit Requirement	Monthly Profit / (Loss)	Run-Out Credit Requirement	Run-Out Profit / (Loss)	Excess/ (Shortfall)
Jun	\$10,000	\$5,000	\$120,000	(\$40,000)	\$80,000
Jul	\$10,000	\$5,000	\$110,000	(\$45,000)	\$65,000
Aug	\$10,000	\$5,000	\$100,000	(\$50,000)	\$50,000
Sep	\$10,000	\$5,000	\$90,000	(\$55,000)	\$35,000
Oct	\$10,000	\$5,000	\$80,000	(\$60,000)	\$20,000
Nov	\$10,000	\$5,000	\$70,000	(\$65,000)	\$5,000
Dec	\$10,000	(\$20,000)	\$60,000	(\$70,000)	<u>(\$10,000)</u>
Jan	\$10,000	(\$20,000)	\$50,000	(\$50,000)	\$0
Feb	\$10,000	(\$20,000)	\$40,000	(\$30,000)	\$10,000
Mar	\$10,000	(\$20,000)	\$30,000	(\$10,000)	\$20,000
Apr	\$10,000	\$5,000	\$20,000	\$10,000	\$20,000
May	\$10,000	\$5,000	\$10,000	\$5,000	\$10,000

## Example Account B: \$10,000 Excess

Month	Monthly Credit Requirement	Monthly Profit / (Loss)	Run-Out Credit Requirement	Run-Out Profit / (Loss)	Excess/ (Shortfall)
Jun	\$10,000	\$5,000	\$120,000	(\$20,000)	\$100,000
Jul	\$10,000	\$5,000	\$110,000	(\$25,000)	\$85,000
Aug	\$10,000	\$5,000	\$100,000	(\$30,000)	\$70,000
Sep	\$10,000	\$5,000	\$90,000	(\$35,000)	\$55,000
Oct	\$10,000	\$5,000	\$80,000	(\$40,000)	\$40,000
Nov	\$10,000	\$5,000	\$70,000	(\$45,000)	\$25,000
Dec	\$10,000	(\$20,000)	\$60,000	(\$50,000)	<u>\$10,000</u>
Jan	\$10,000	(\$20,000)	\$50,000	(\$30,000)	\$20,000
Feb	\$10,000	(\$20,000)	\$40,000	(\$10,000)	\$30,000
Mar	\$10,000	\$0	\$30,000	\$10,000	\$30,000
Apr	\$10,000	\$5,000	\$20,000	\$10,000	\$20,000
May	\$10,000	\$5,000	\$10,000	\$5,000	<u>\$10,000</u>



- Factors analyzed for possible adjustments to the credit calculation
  - Per MWh Minimum Requirements (applied monthly)
    - Flat rate
    - Tiered
  - Undiversified Adder Deductible
  - Prevailing and Counter Flow Historical Value Adjustments
  - Volatility

- Per MWh Minimum Requirement
  - Single adder in single increments
    - \$0.03, \$0.05, \$0.07, \$0.10, \$0.20, and \$0.30 per MWh
  - Tiered approach analyzed\*:

Cleared MWh	Marginal Credit Rate
	\$0.50 Tiered*
First 1MM MWh/Mo	\$0.50/MWh
1 MM – 10 MM MWh/Mo	\$0.25/MWh
10 MM – 100 MM MWh/Mo	\$0.10/MWh
Above 100 MM MWh/Mo	\$0.01/MWh

\* Stakeholder proposal