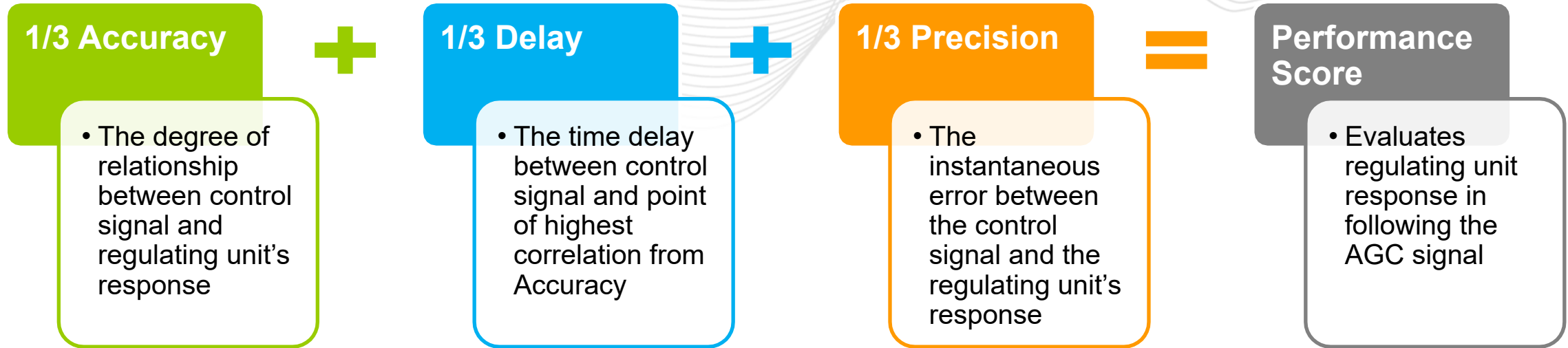




Performance Score Overview

Ilyana Dropkin, Senior Engineer I
Performance Compliance
RMDSTF
September 20, 2022



- Performance score equations are used on a 10-second interval basis
- Each component of performance score is averaged for the hour for overall performance score

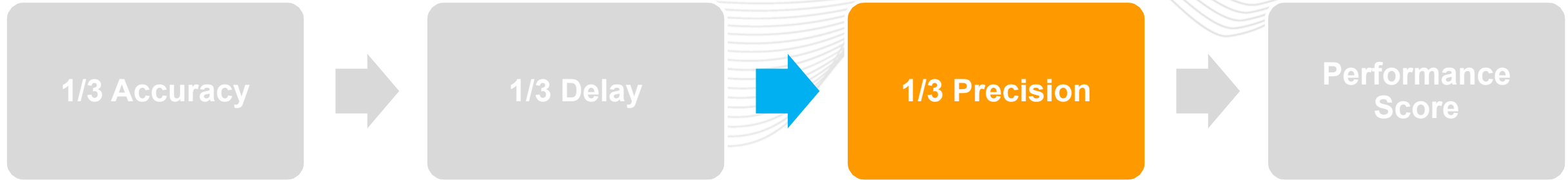


Accuracy & Delay Calculation:

$$\text{Correlation Score}_{\delta=0 \text{ to } 5 \text{ Min}} = r_{\text{Signal, Response}(\delta, \delta+5\text{Min})}$$

$$\text{Delay Score} = \text{Abs} \left| \frac{\delta - 5 \text{ Minutes}}{5 \text{ Minutes}} \right|$$

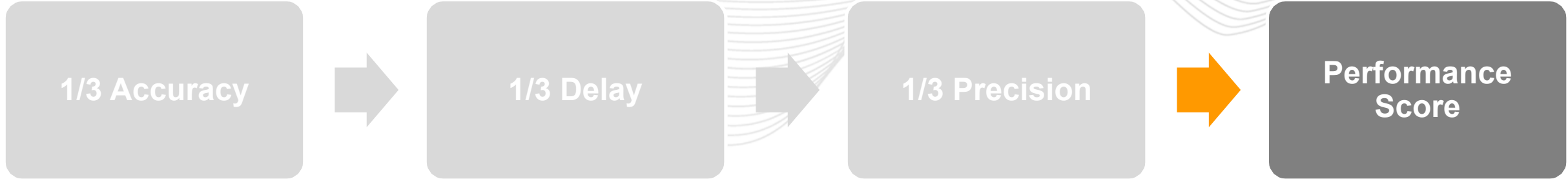
$$\max_{\delta=0 \text{ to } 5 \text{ Min}} (\text{Delay Score} + \text{Correlation Score})$$



Precision Calculation:

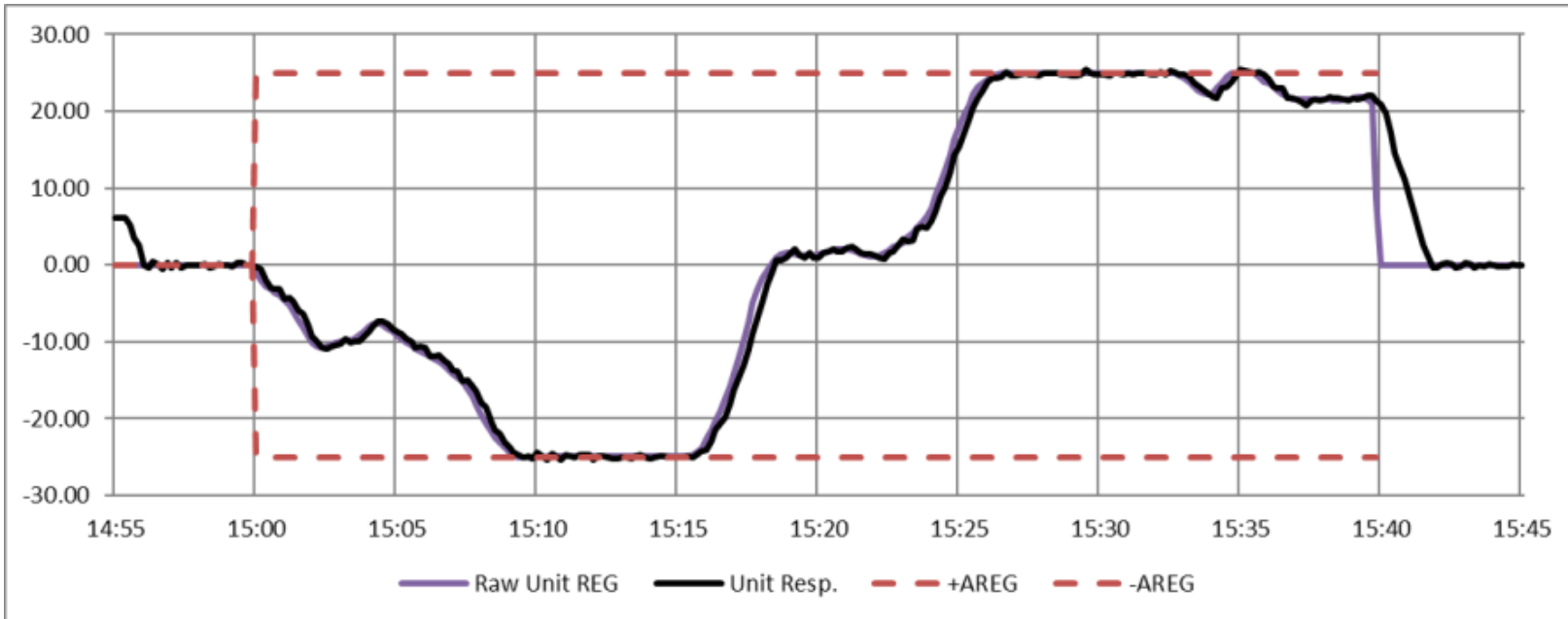
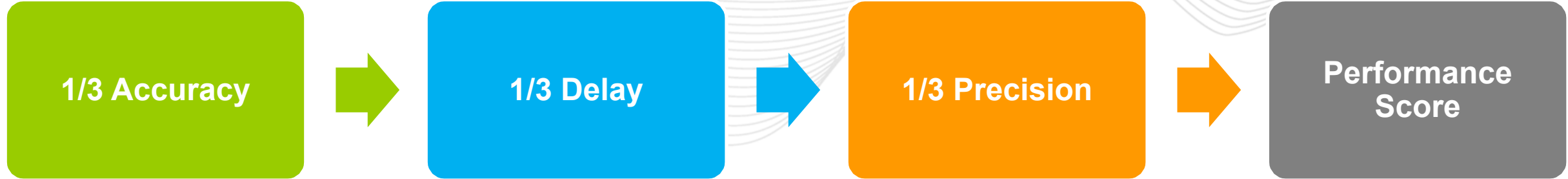
$$Error = Avg\ of\ Abs \left| \frac{Response - Regulation\ Signal}{Hourly\ Average\ Regulation\ Signal} \right|$$

$$Precision\ Score = 1 - \frac{1}{n} \sum Abs(Error)$$

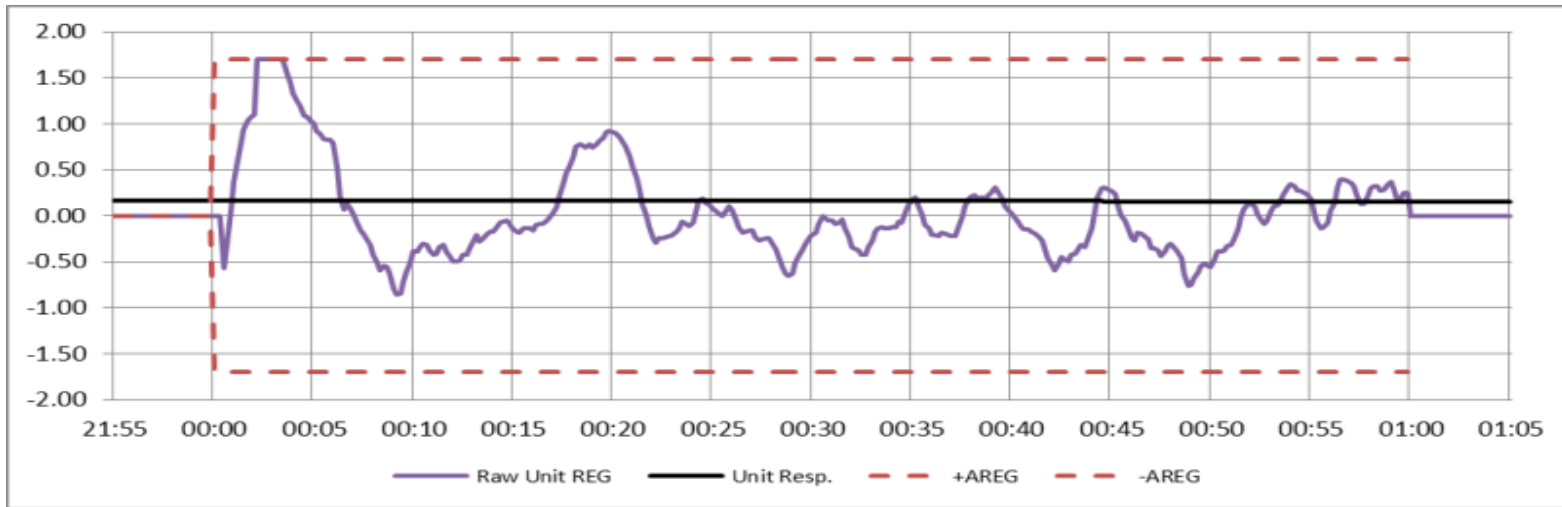


Performance Score Calculation:

$$\text{Performance Score}(t) = \max_{i=0 \text{ to } 5} \min \left[A * \frac{\text{Delay Score}(t+i)}{\text{Score}} + B * \frac{\text{Correlation Score}(t+i)}{\text{Score}} \right] + C * \frac{\text{Precision Score}(t)}{\text{Score}}$$

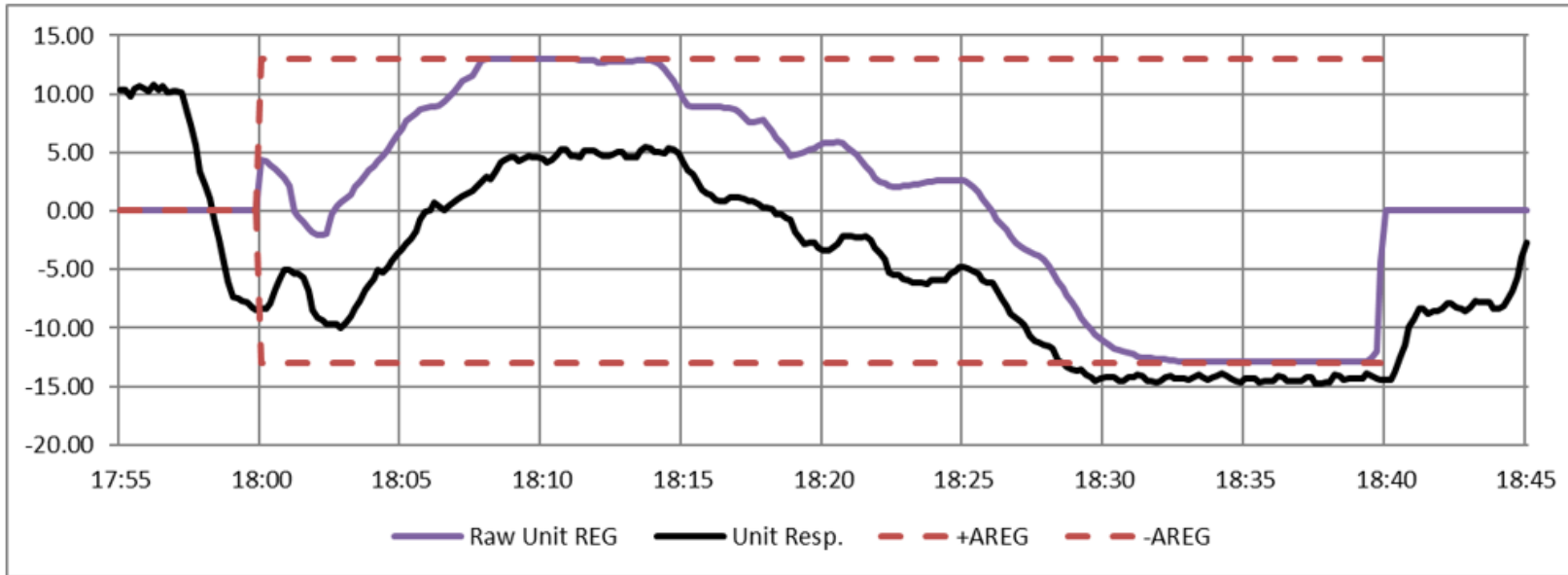


	Score
Performance	0.9895
Accuracy	0.9857
Delay	0.9994
Precision	0.9834

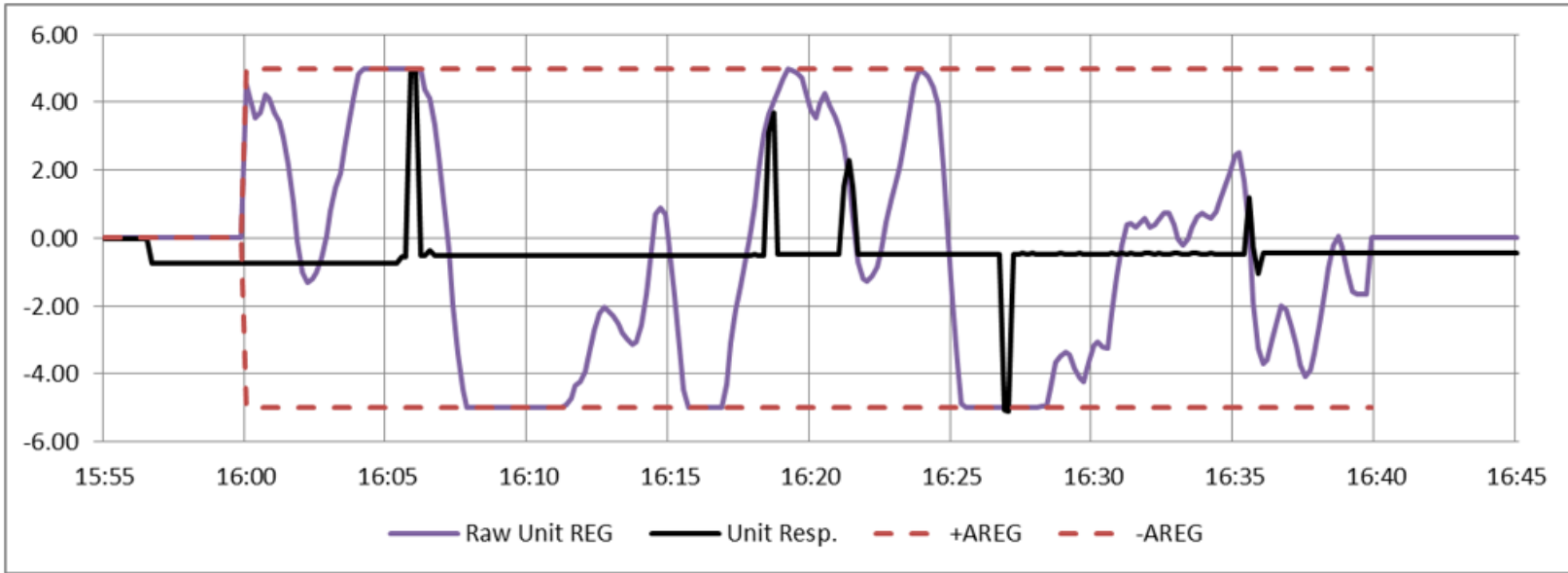


	Score
Performance	0.291
Accuracy	0.264
Delay	0.385
Precision	0.225

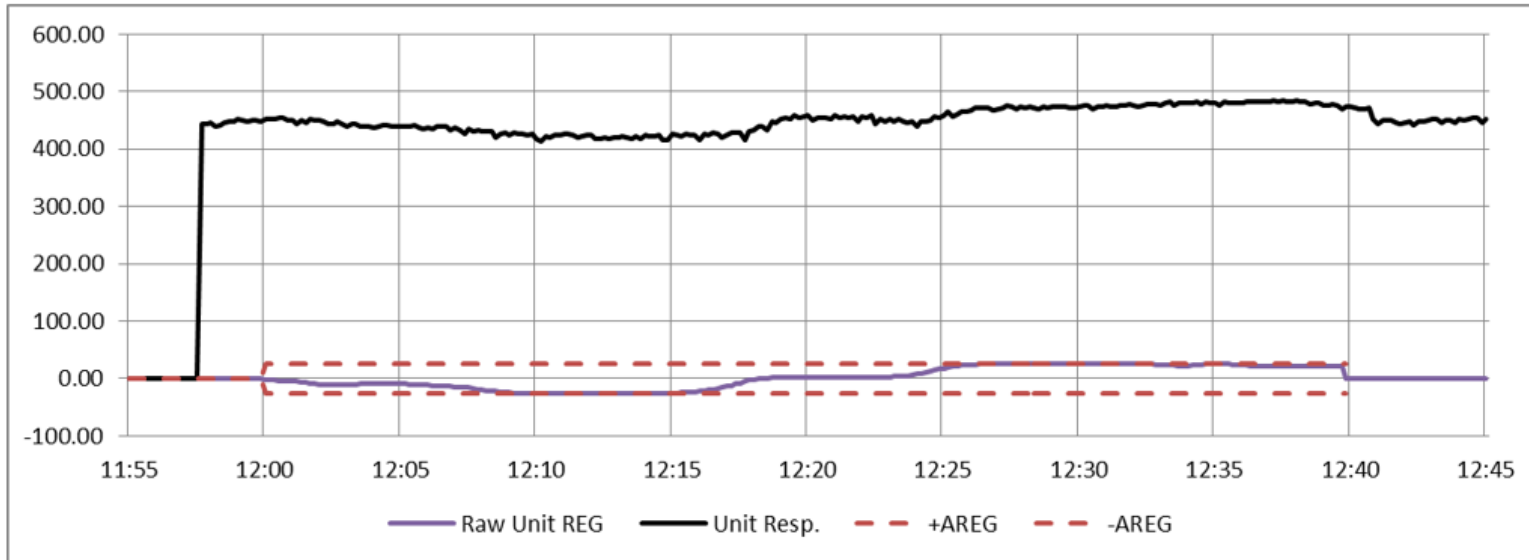
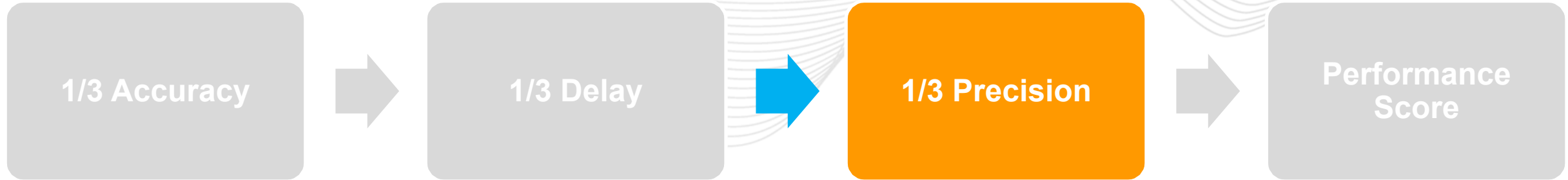
Accuracy & Delay Calculation Flaw



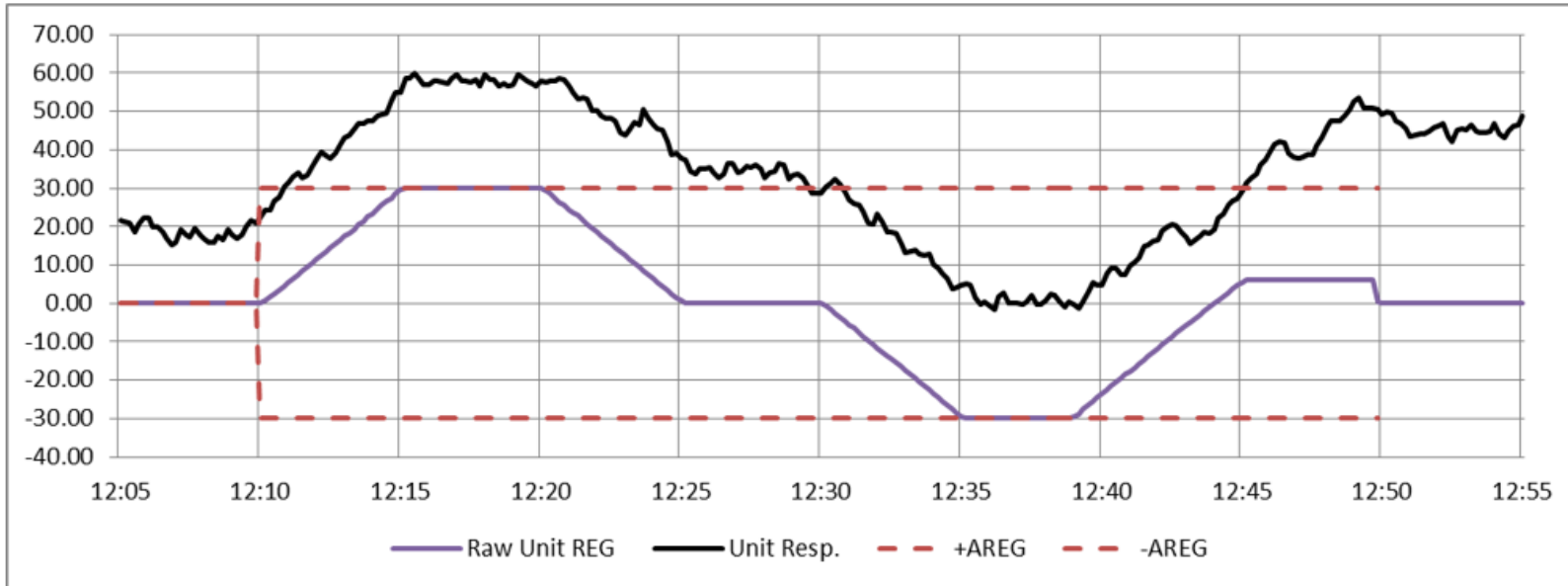
	Score
Performance	0.7068
Accuracy	0.9459
Delay	0.9784
Precision	0.1962



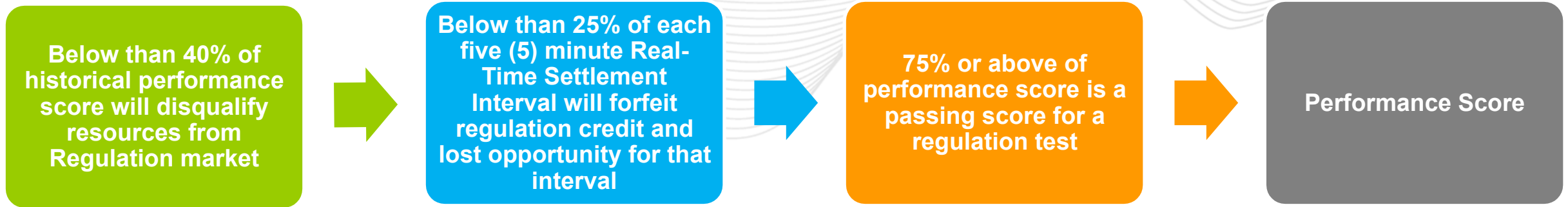
	Score
Performance	0.4947
Accuracy	0.2689
Delay	0.9490
Precision	0.2663



	Score
Performance	0.581
Accuracy	0.82
Delay	0.92
Precision	0

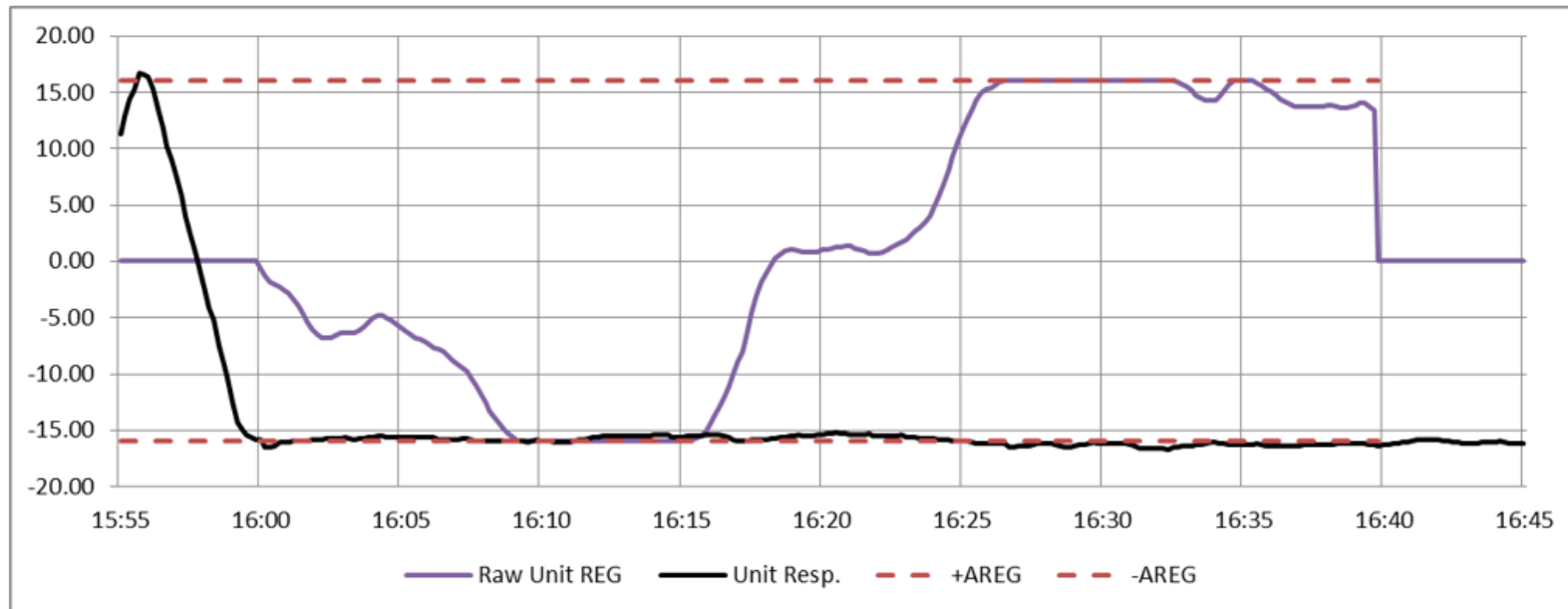
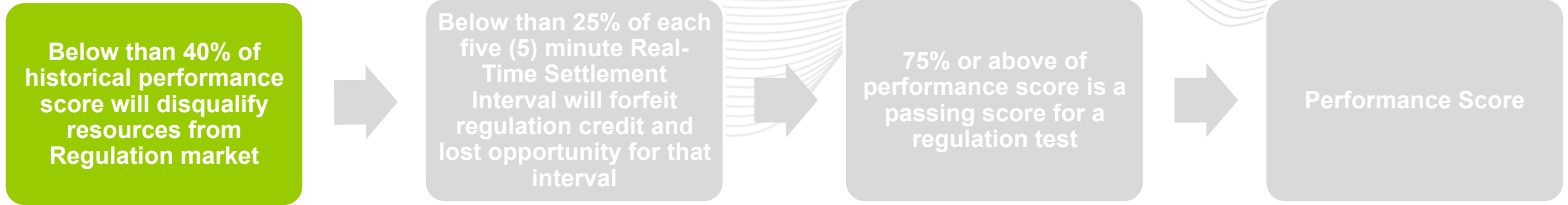


	Score
Performance	0.639
Accuracy	0.94
Delay	0.98
Precision	0



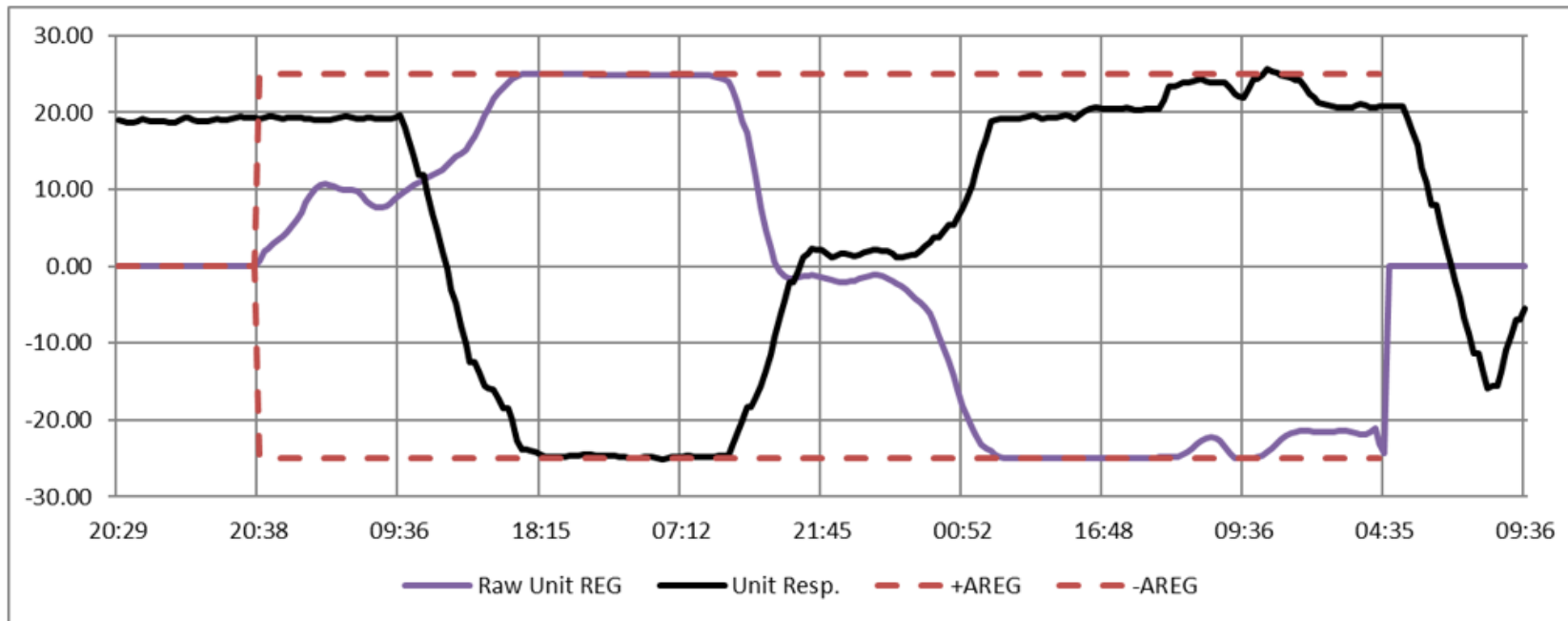
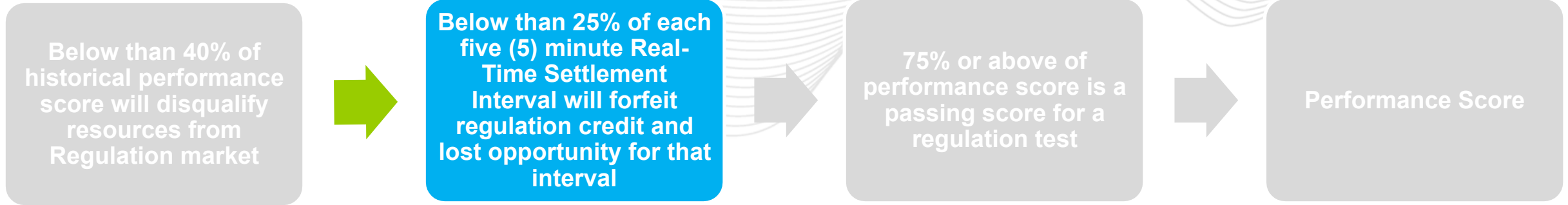
- Below 40% of historic performance score threshold for disqualifying from Regulation Market
 - A rolling average actual hourly performance score for the last 100 hours a resource has operated
- Below 25% threshold for receiving regulation credit and lost opportunity
 - Each five (5) minute Real-Time Settlement Interval
- 75% or above threshold for passing a regulation test

Thresholds for Performance Scores



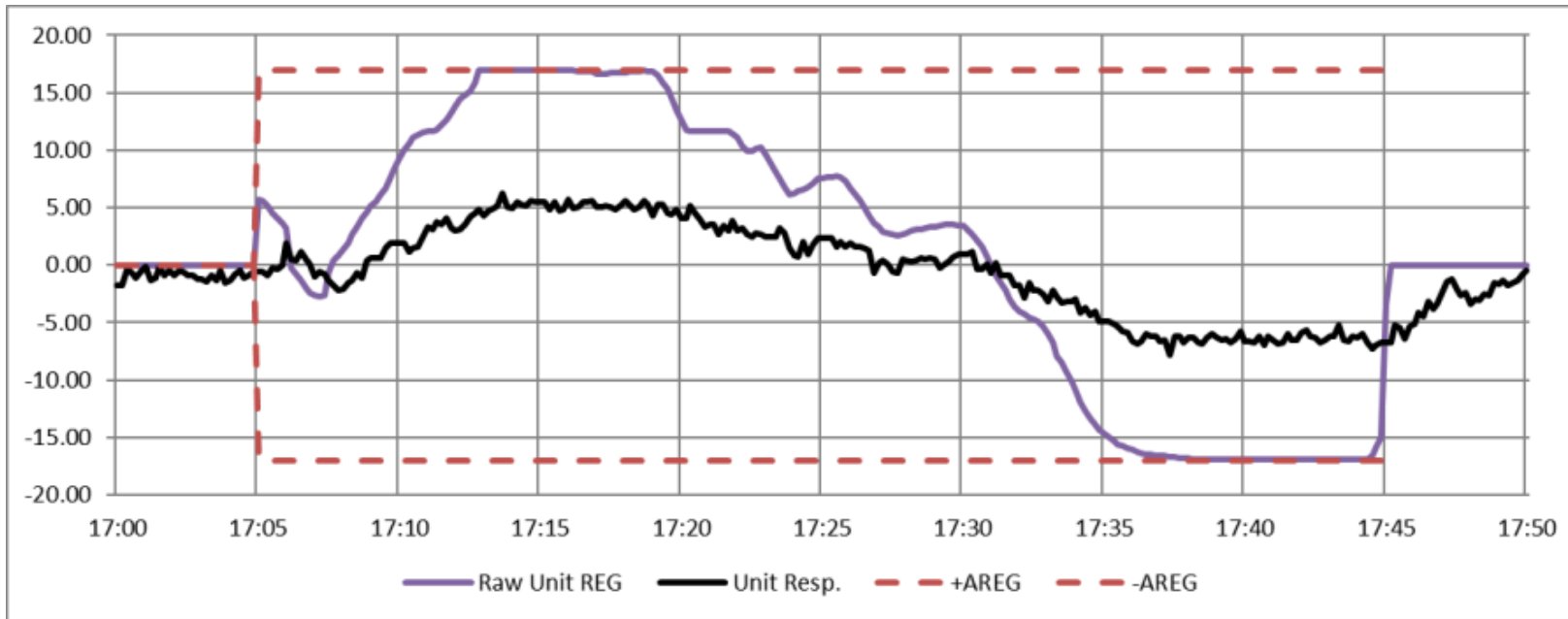
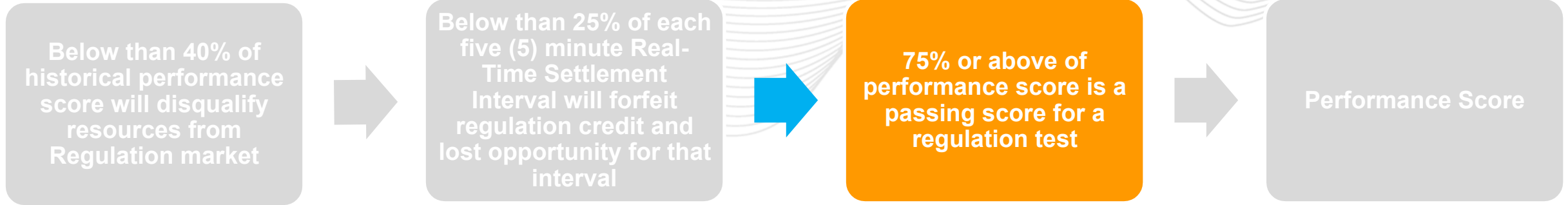
	Score
Performance	0.4013
Accuracy	0.417
Delay	0.512
Precision	0.275

Thresholds for Performance Scores



	Score
Performance	0.284
Accuracy	0.305
Delay	0.340
Precision	0.2071

Thresholds for Performance Scores



	Score
Performance	0.7539
Accuracy	0.9081
Delay	0.9907
Precision	0.3629

Thresholds for Performance Scores with Precision Only

Below than 40% of historical performance score will disqualify resources from Regulation market



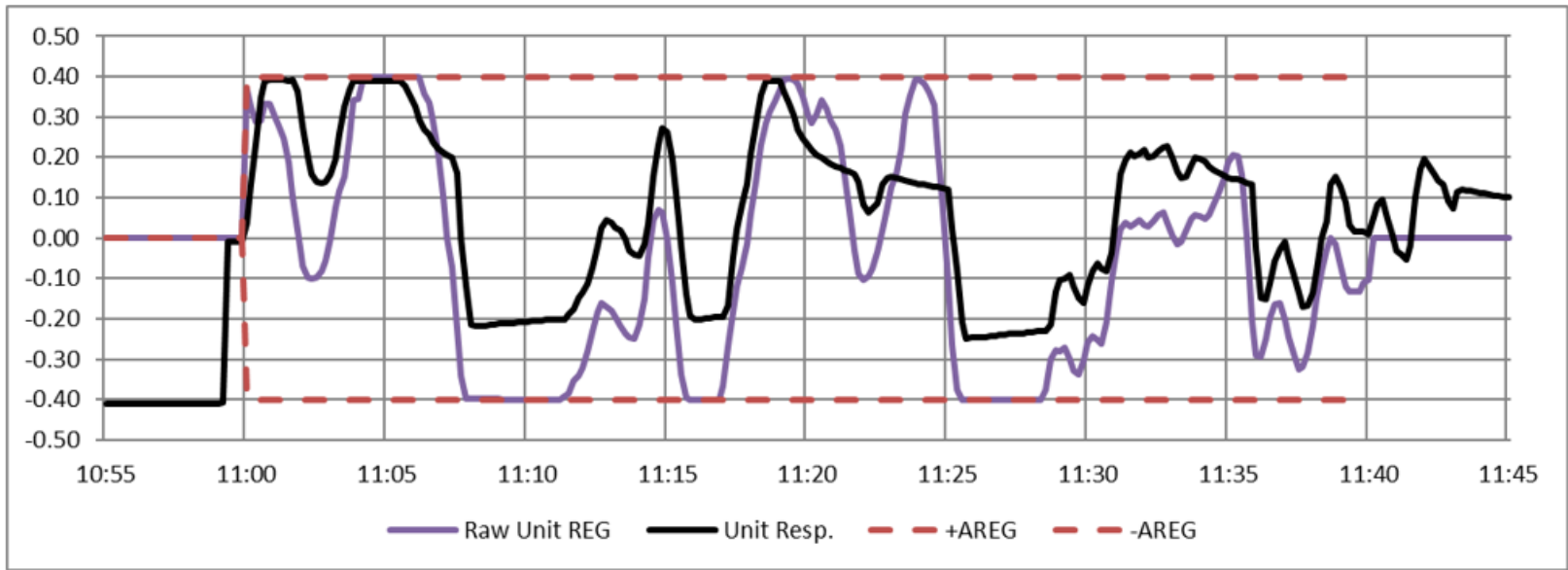
Below than 25% of each five (5) minute Real-Time Settlement Interval will forfeit regulation credit and lost opportunity for that interval



75% or above of performance score is a passing score for a regulation test

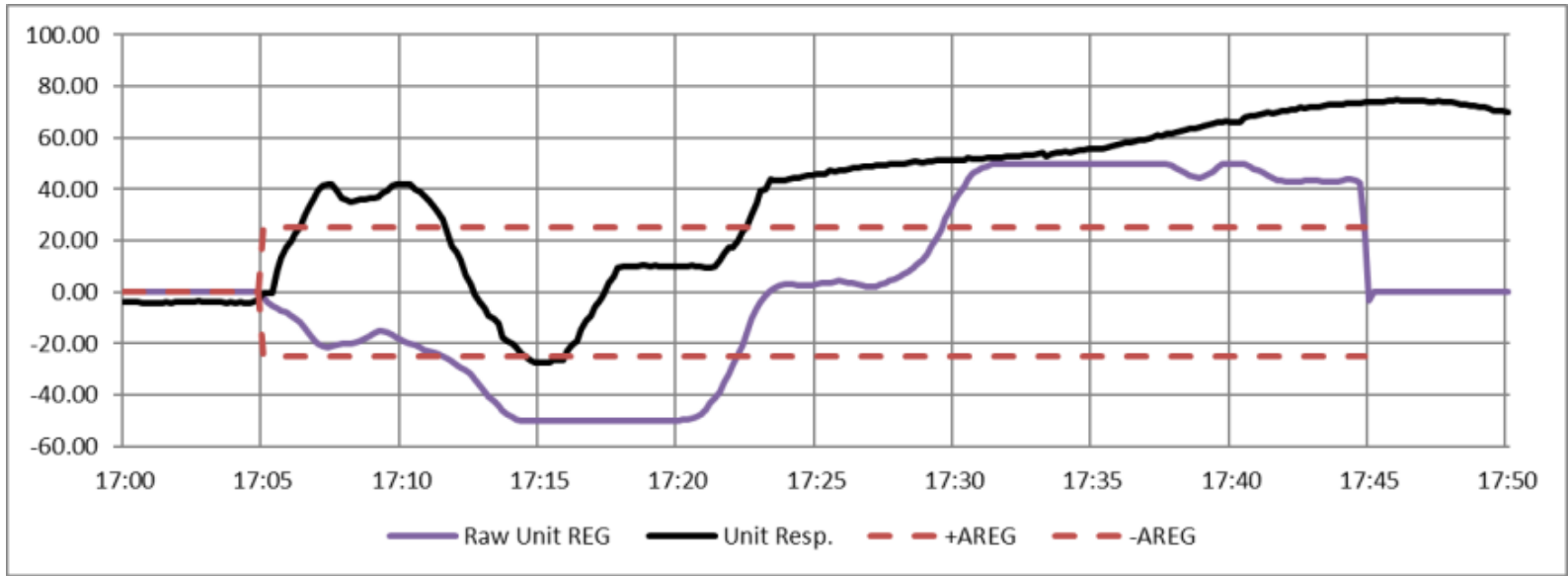
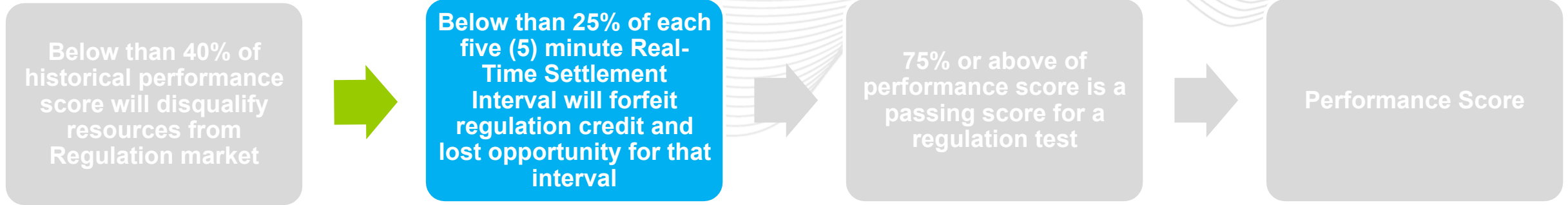


Performance Score



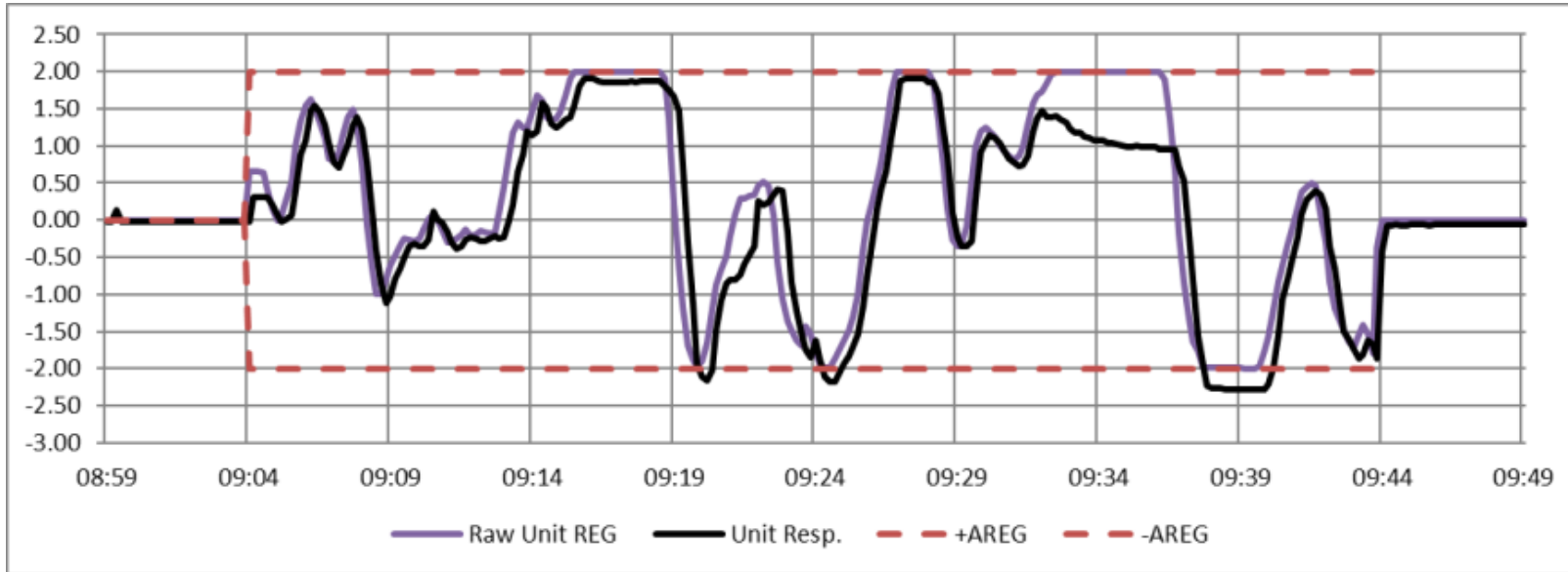
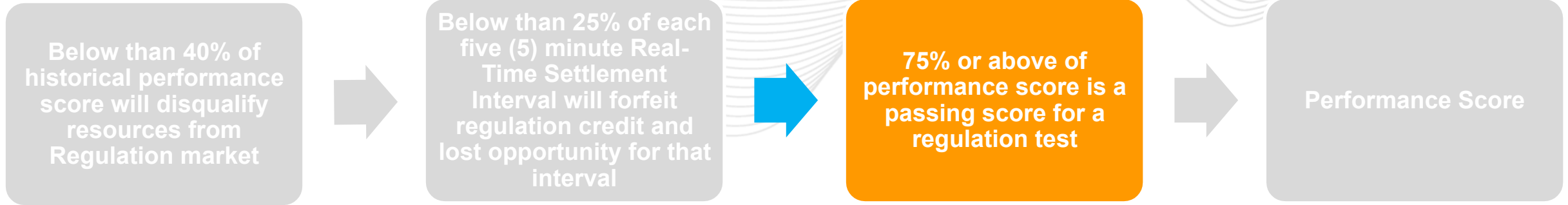
	Score
Performance	0.7601
Accuracy	0.9202
Delay	0.9997
Precision	0.3606

Thresholds for Performance Scores with Precision Only



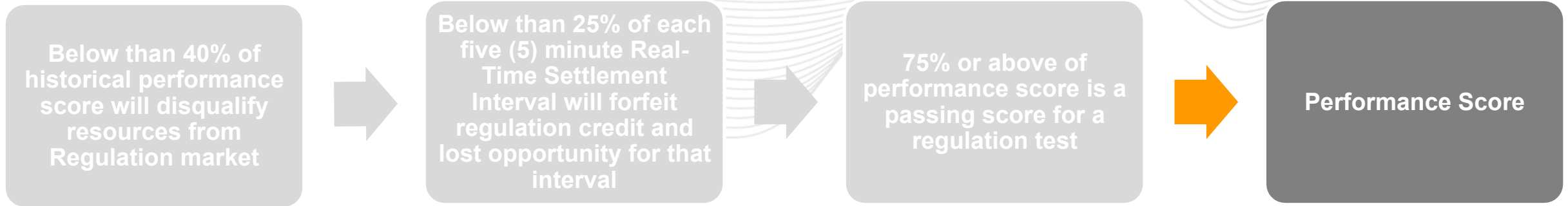
	Score
Performance	0.6500
Accuracy	0.7652
Delay	0.9265
Precision	0.2582

Thresholds for Performance Scores with Precision Only



	Score
Performance	0.8970
Accuracy	0.9460
Delay	0.9907
Precision	0.7543

Thresholds for Performance Scores with Precision Only



- Leave Status Quo for thresholds if Precision Only Method is selected

Presenter/SME

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Appendix

- Performance Score:
 - Precision-only Calculation
 - The lowest of the absolute error between the signal at t0 and the response at t0 and t10. The denominator in the precision calculation will be an average of the regulation award and the absolute average hourly signal.

$$Performance\ Score_{10sec} = 1 - MIN_{t0-t10} \left(\frac{Response - Signal}{0.5 * ABSHourlyAvgSignal + 0.5 * AREG} \right)$$

$$Performance\ Score_{hourly} = Average (PerfromanceScore_{10sec})$$

- No Accuracy Calculation
- No Delay Calculation

- Performance Score:
 - Minimum allowable participation threshold to be raised from status quo 40% to 50%
 - It is important to maintain a minimum allowable participation threshold to ensure we are not committing poor performing resources for regulation that are not helping system control or providing adequate regulation service.

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