Performance Score

Ilyana Dropkin, Senior Engineer I
Performance Compliance
RMDSTF
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Performance Score Components

- Performance Score Calculation
  - 1/3 Accuracy + 1/3 Delay + 1/3 Precision

1) **Accuracy** – The degree of relationship between control signal and regulating unit's response
2) **Delay** – The time delay between control signal and point of highest correlation from Step 1
3) **Precision** – The instantaneous error between the control signal and the regulating unit's response

Accuracy and Delay Scores

- Performance Score Calculation
  - 1/3 Accuracy + 1/3 Delay + 1/3 Precision

Accuracy & Delay Calculation:

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

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

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

Precision Score

- Performance Score Calculation
  - 1/3 Accuracy + 1/3 Delay + 1/3 Precision

Precision Calculation:

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

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

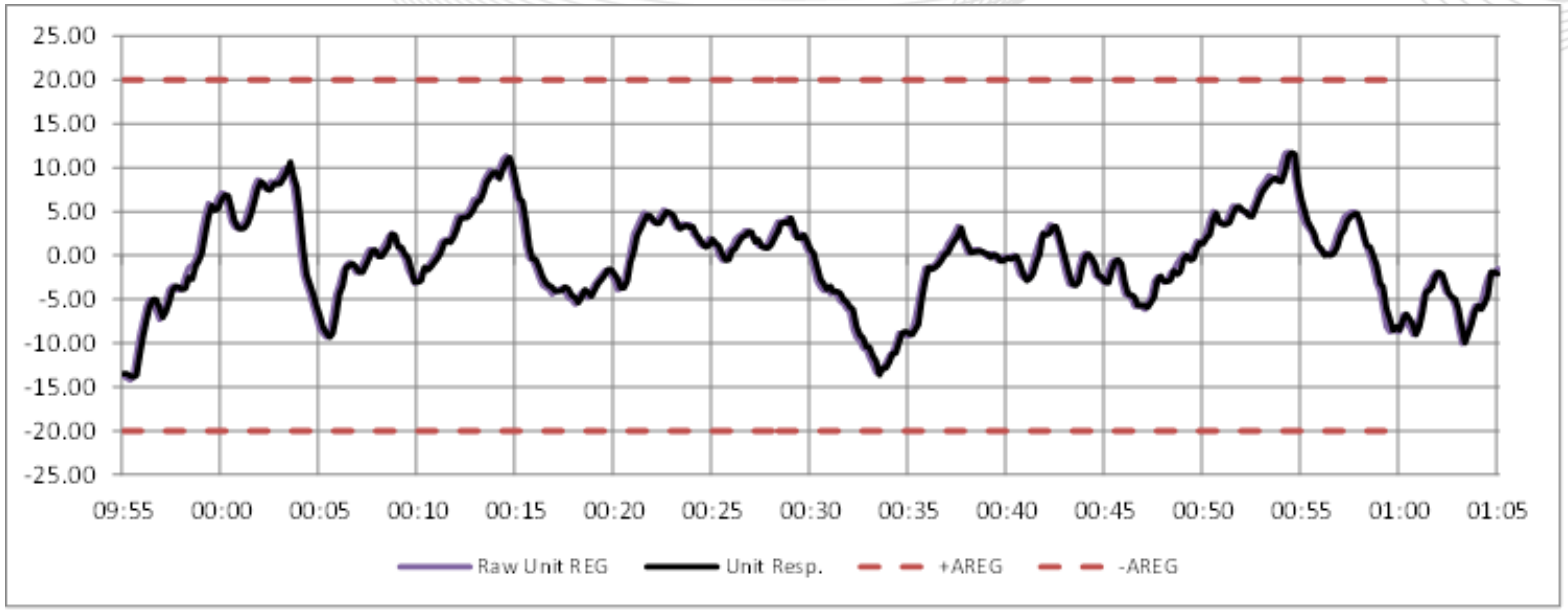
Performance Score Calculation

- Performance Score Calculation
  - 1/3 Accuracy + 1/3 Delay + 1/3 Precision
  - No score will be calculated for periods when assigned regulation is zero

Performance Score Calculation:

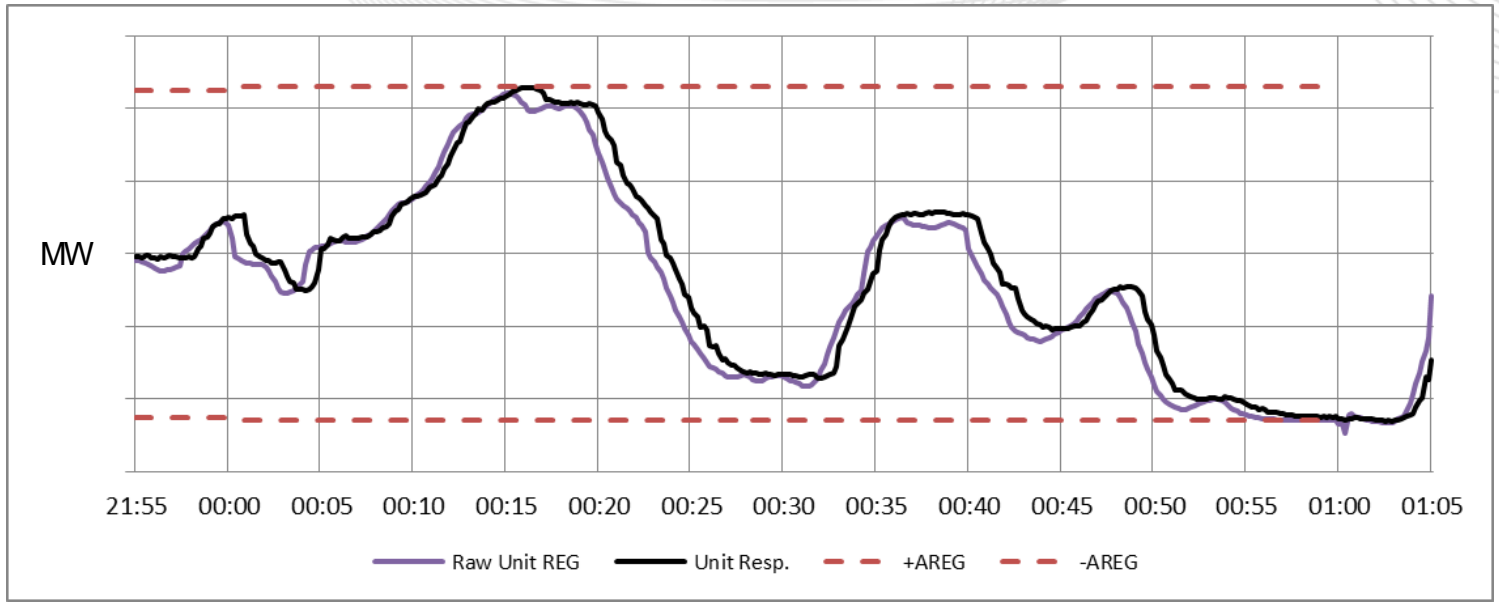
$$Performance\ Score(t) = \max_{i=0\ to\ 5min}\left[A * Delay\ Score(t+i) + B * Correlation\ Score(t+i)\right] + C * Precision\ Score(t)$$

Performance Score Example 1



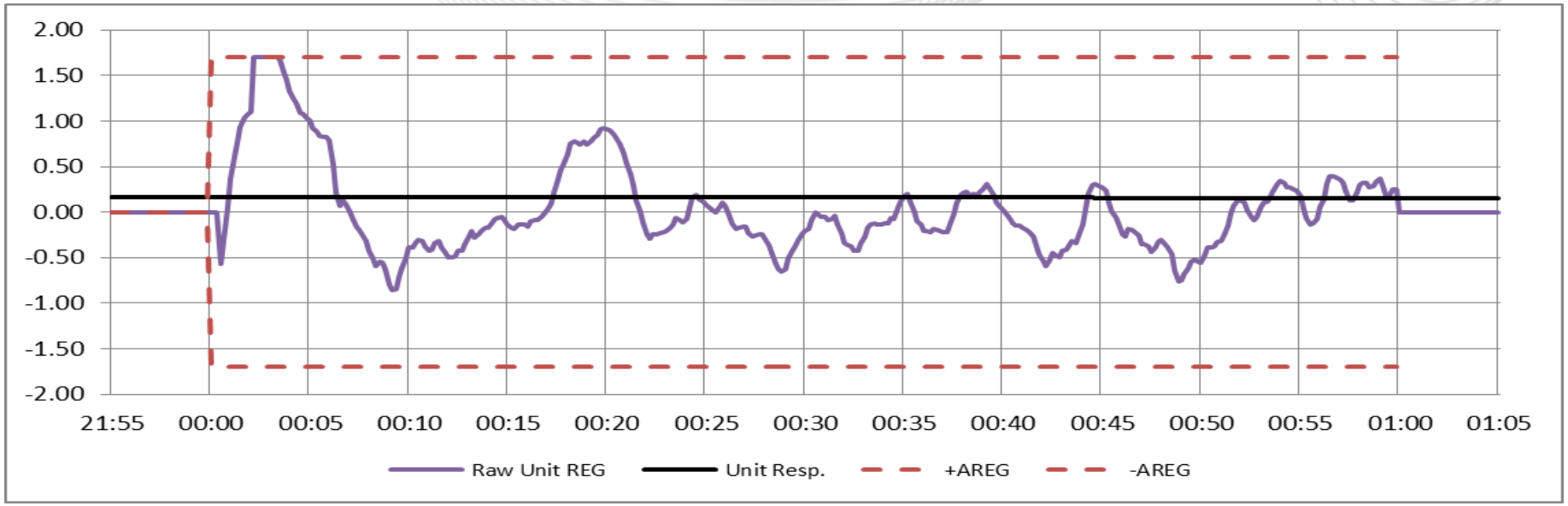
	Score
Performance	**0.984**
Accuracy	0.997
Delay	1.000
Precision	0.956

Performance Score Example 2



	Score
Performance	**0.899**
Accuracy	0.901
Delay	0.945
Precision	0.851

Performance Score Example 3



	Score
Performance	**0.291**
Accuracy	0.264
Delay	0.385
Precision	0.225

Summary of Performance Score Solution from RMISTF

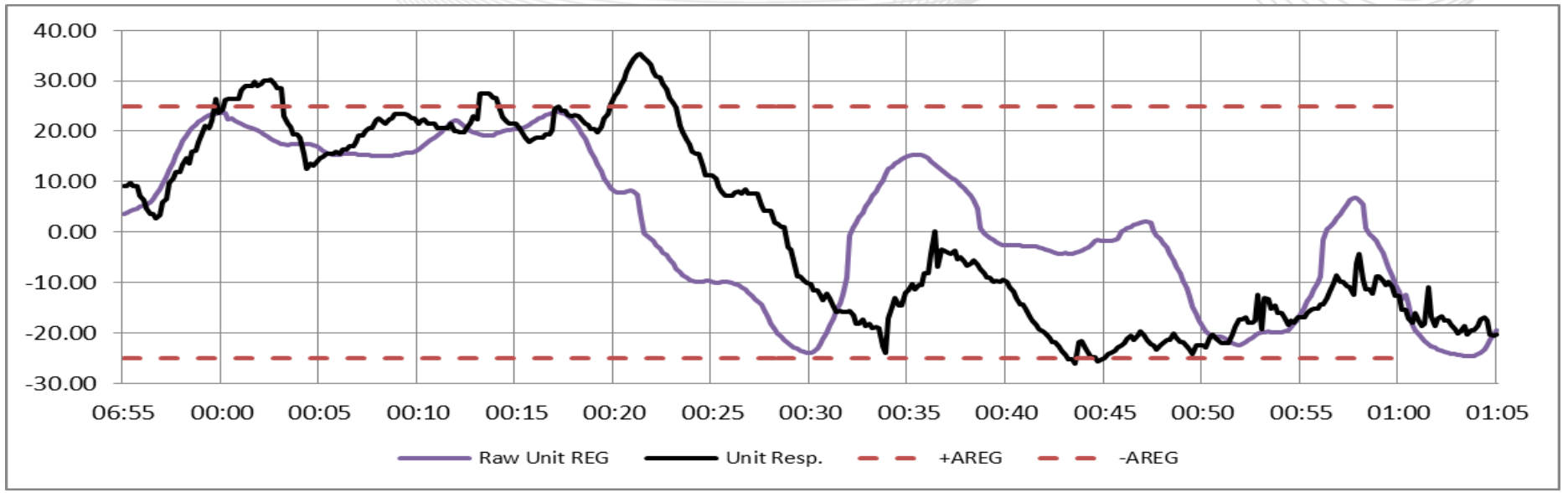
- Performance Score:
  - Precision-only Calculation
    - The lowest of the absolute error between the signal at t0 and the response at t0 and t10. The denominator in the precision calculation will be an average of the regulation award and the absolute average hourly signal.

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

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

  - No Accuracy Calculation
  - No Delay Calculation

RMISTF Example



	Current Score	Precision-Only Score
Performance	**0.626**	**0.344**
Accuracy	0.748	N/A
Delay	0.786	N/A
Precision	0.344	0.344

Summary of Performance Score Solution from RMISTF

- 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.

Presenter/SME

Ilyana Dropkin,
Ilyana.Dropkin@pjm.com

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

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