Performance Score

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RMDSTF
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Recommended Solution

- Change from 3 components of Performance score (1/3 Accuracy, 1/3 Delay and 1/3 Precision) to Precision Only score that follows Status Quo calculations.

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

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

- Keep disqualification from Regulation Market threshold at below 40%
  - A rolling average actual hourly performance score for the last 100 hours a resource has operated

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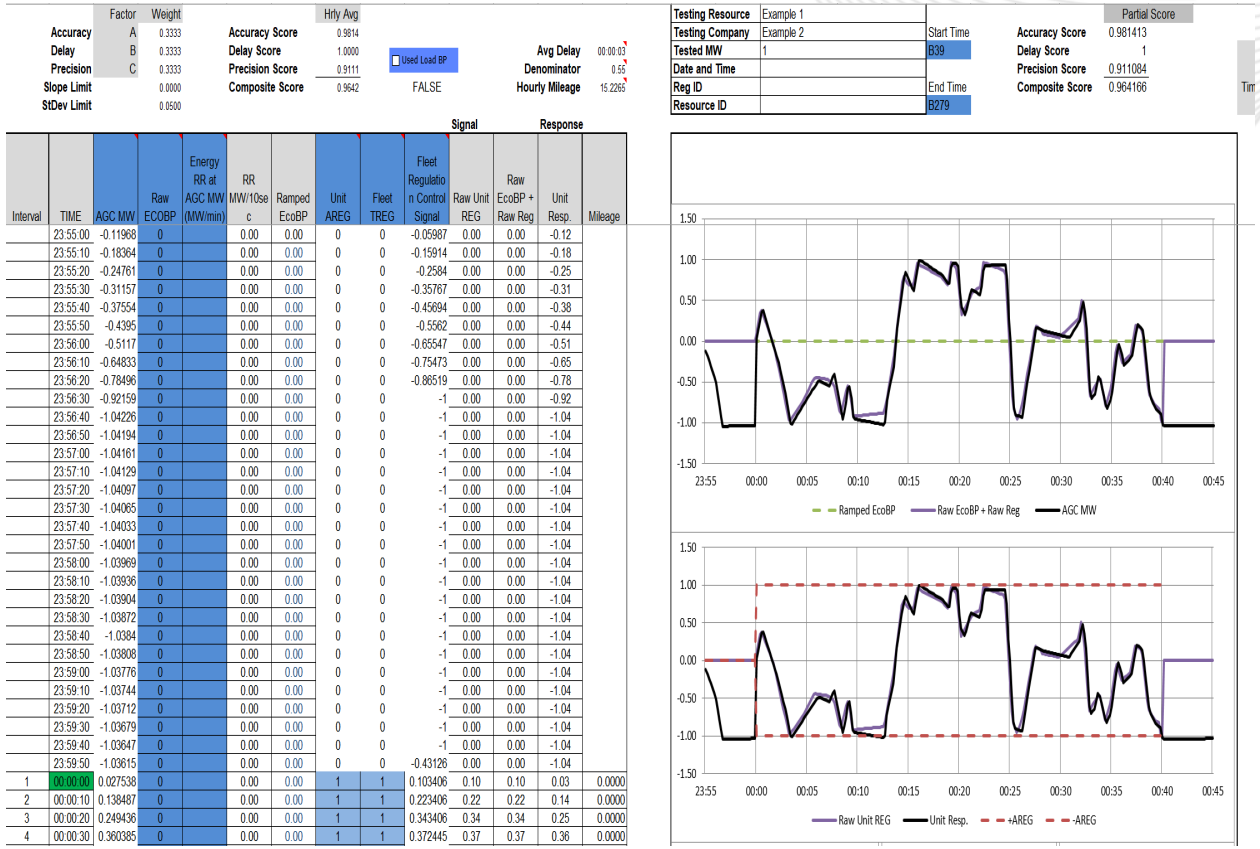
Performance Scoring Template



	Factor	Weight
Accuracy	A	0.3333
Delay	B	0.3333
Precision	C	0.3333
Slope Limit		0.0000
StDev Limit		0.0500

	Hrly Avg
Accuracy Score	0.9814
Delay Score	1.0000
Precision Score	0.9111
Composite Score	0.9642

Used Load BP: FALSE

Avg Delay	00:00:03
Denominator	0.55
Hourly Mileage	15.2265

Testing Resource	Example 1		
Testing Company	Example 2	Start Time	
Tested MW	1	B39	
Date and Time			
Reg ID		End Time	
Resource ID		B279	

	Partial Score
Accuracy Score	0.981413
Delay Score	1
Precision Score	0.911084
Composite Score	0.964166

							Signal			Response			
Interval	TIME	AGC MW	Raw ECOBP	Energy RR at AGC MW (MW/min)	RR MW/10sec	Ramped EcoBP	Unit AREG	Fleet TREG	Fleet Regulation Control Signal	Raw Unit REG	Raw EcoBP + Raw Reg	Unit Resp.	Mileage
	23:55:00	-0.11968	0		0.00	0.00	0	0	-0.05987	0.00	0.00	-0.12	
	23:55:10	-0.18364	0		0.00	0.00	0	0	-0.15914	0.00	0.00	-0.18	
	23:55:20	-0.24761	0		0.00	0.00	0	0	-0.2584	0.00	0.00	-0.25	
	23:55:30	-0.31157	0		0.00	0.00	0	0	-0.35767	0.00	0.00	-0.31	
	23:55:40	-0.37554	0		0.00	0.00	0	0	-0.45694	0.00	0.00	-0.38	
	23:55:50	-0.4395	0		0.00	0.00	0	0	-0.5562	0.00	0.00	-0.44	
	23:56:00	-0.5117	0		0.00	0.00	0	0	-0.65547	0.00	0.00	-0.51	
	23:56:10	-0.64833	0		0.00	0.00	0	0	-0.75473	0.00	0.00	-0.65	
	23:56:20	-0.78496	0		0.00	0.00	0	0	-0.86519	0.00	0.00	-0.78	
	23:56:30	-0.92159	0		0.00	0.00	0	0	-1	0.00	0.00	-0.92	
	23:56:40	-1.04226	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:56:50	-1.04194	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:00	-1.04161	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:10	-1.04129	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:20	-1.04097	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:30	-1.04065	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:40	-1.04033	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:57:50	-1.04001	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:00	-1.03969	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:10	-1.03936	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:20	-1.03904	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:30	-1.03872	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:40	-1.0384	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:58:50	-1.03808	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:00	-1.03776	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:10	-1.03744	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:20	-1.03712	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:30	-1.03679	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:40	-1.03647	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
	23:59:50	-1.03615	0		0.00	0.00	0	0	-1	0.00	0.00	-1.04	
1	00:00:00	0.027538	0		0.00	0.00	1	1	0.103406	0.10	0.10	0.03	0.0000
2	00:00:10	0.138487	0		0.00	0.00	1	1	0.223406	0.22	0.22	0.14	0.0000
3	00:00:20	0.249436	0		0.00	0.00	1	1	0.343406	0.34	0.34	0.25	0.0000
4	00:00:30	0.360385	0		0.00	0.00	1	1	0.372445	0.37	0.37	0.36	0.0000

- PJM Website > Markets and Operations > Ancillary Services > Regulation Self-Test Signals > 40-Minute Performance Score Template – Updated to Reflect August MRC Changes.xlsm
  - https://www.pjm.com/markets-and-operations/ancillary-services

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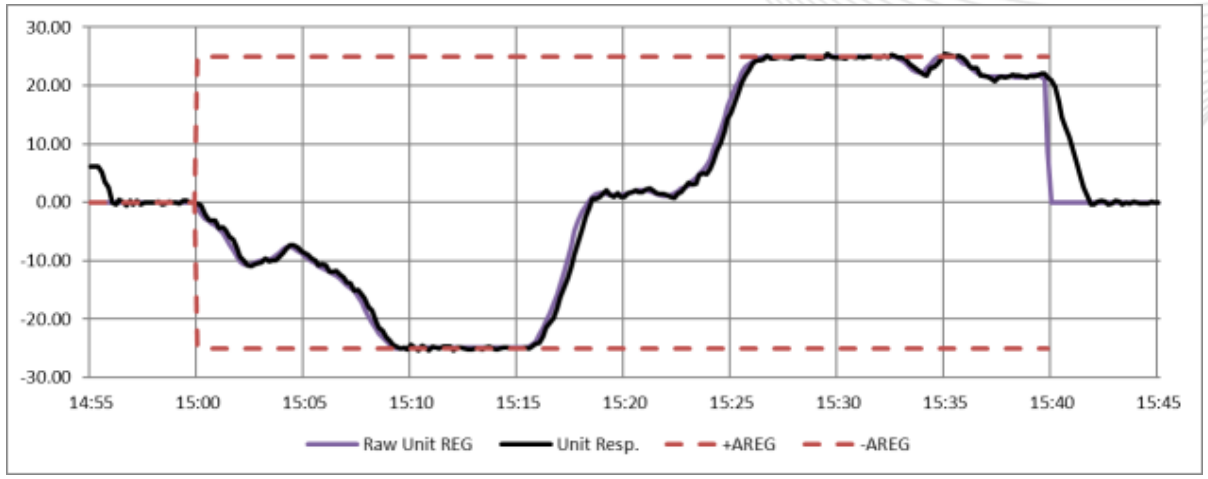
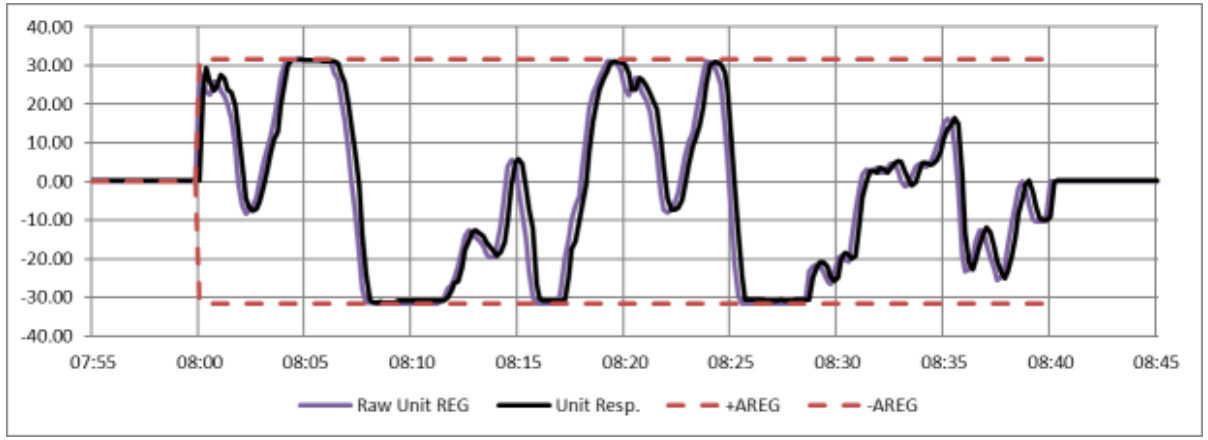
Examples of Good Performance



	Score
Status Quo Precision	**0.983**
~~Accuracy~~	~~0.986~~
~~Delay~~	~~0.999~~
Performance	**0.983**



	Score
Status Quo Precision	**0.906**
~~Accuracy~~	~~0.988~~
~~Delay~~	~~0.997~~
Performance	**0.906**

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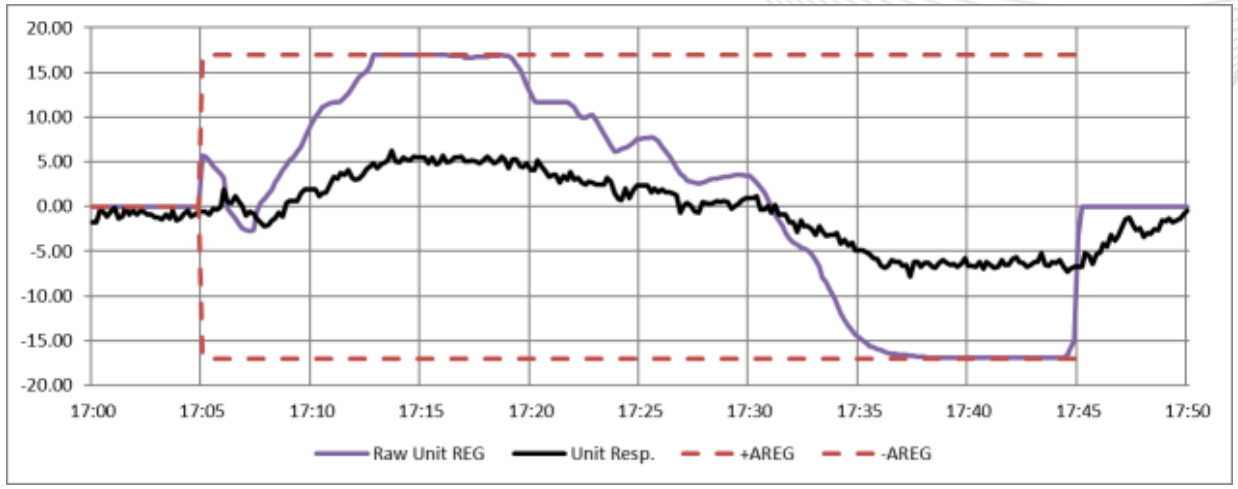
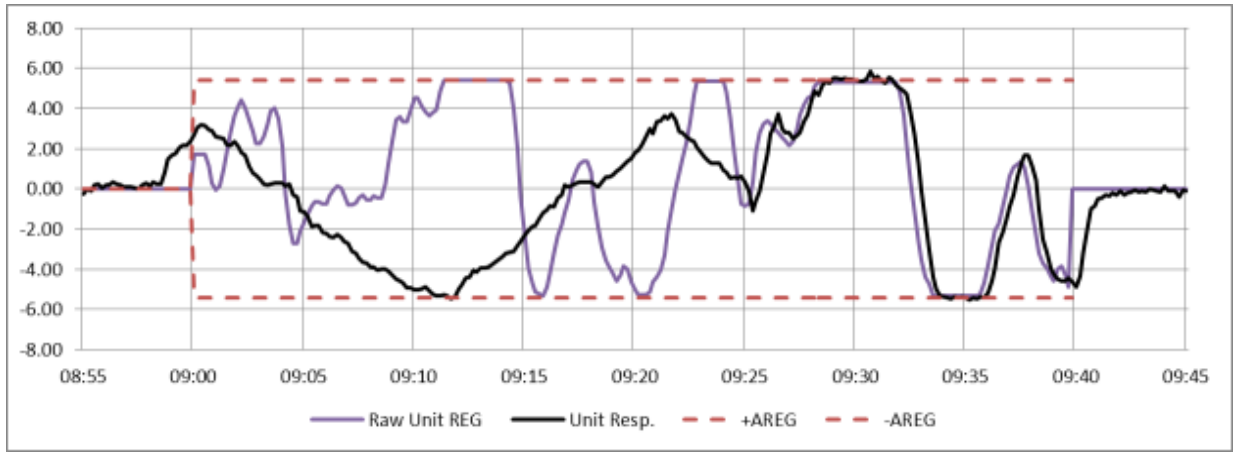
Examples of Poor Performance



	Score
Status Quo Precision	**0.362**
~~Accuracy~~	~~0.908~~
~~Delay~~	~~0.990~~
Performance	**0.362**



	Score
Status Quo Precision	**0.406**
~~Accuracy~~	~~0.586~~
~~Delay~~	~~0.627~~
Performance	**0.406**

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Hourly Average Regulation Signal vs Capability MW

Precision Calculation:

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

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

- A smaller Hourly Average Regulation Signal in the denominator yields a larger error, which in turn yields a lower Precision Score
- RegD resources tend to have a lower Hourly Average Regulation Signal when compared to their Regulation Capability than RegA resources because RegD crosses zero more often than RegA.

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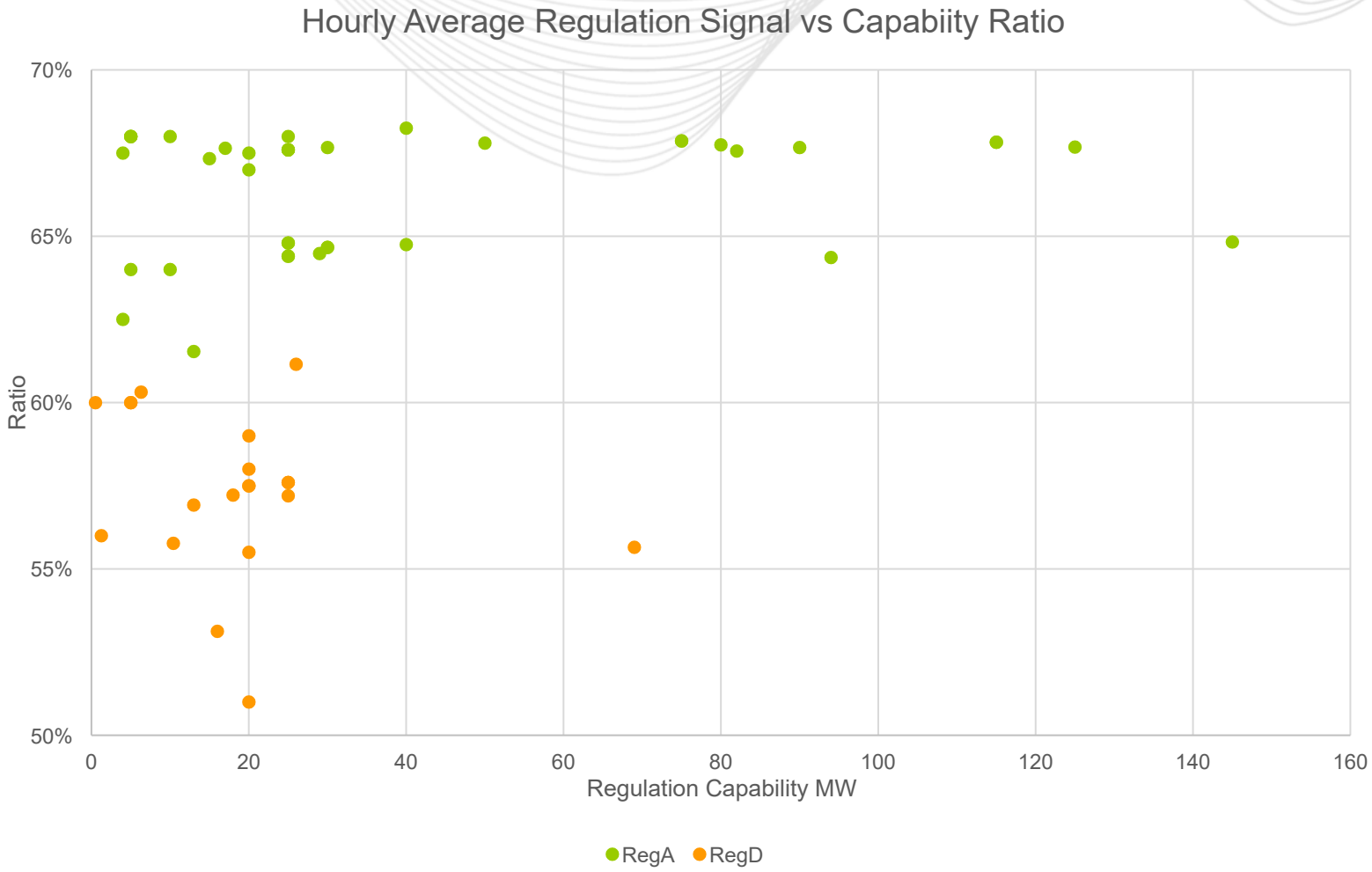
Hourly Average Regulation Signal vs Capability MW



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Single Signal Design

- Single Signal Design eliminates the concern with Reg D resources tendency to have a smaller Hourly Average Regulation Signal that yields to a lower Precision Score.

- PJM's Reg Signal Presentation from January 24th 2023 RMDSTF meeting https://www.pjm.com/-/media/committees-groups/task-forces/rmdstf/2023/20230124/item-03-reg-signal-presentation-1242023.ashx

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