Generator Performance Analysis Report

MISO Market

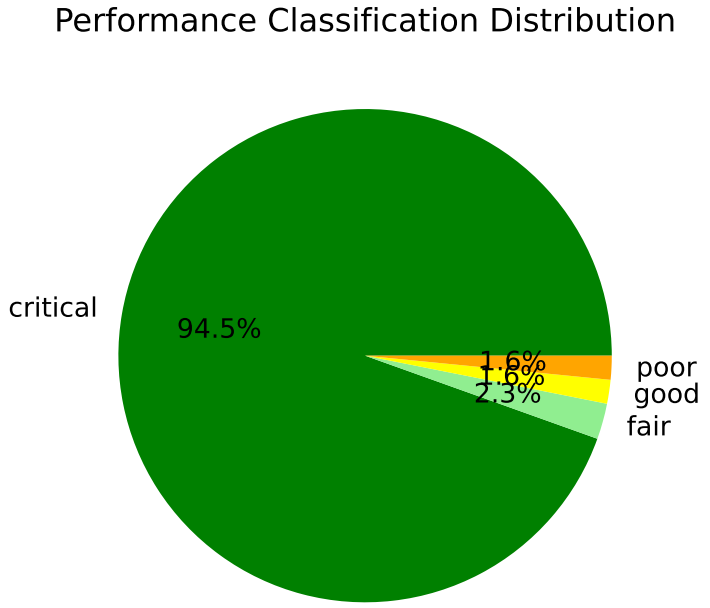
Analysis Date: 2025-08-12

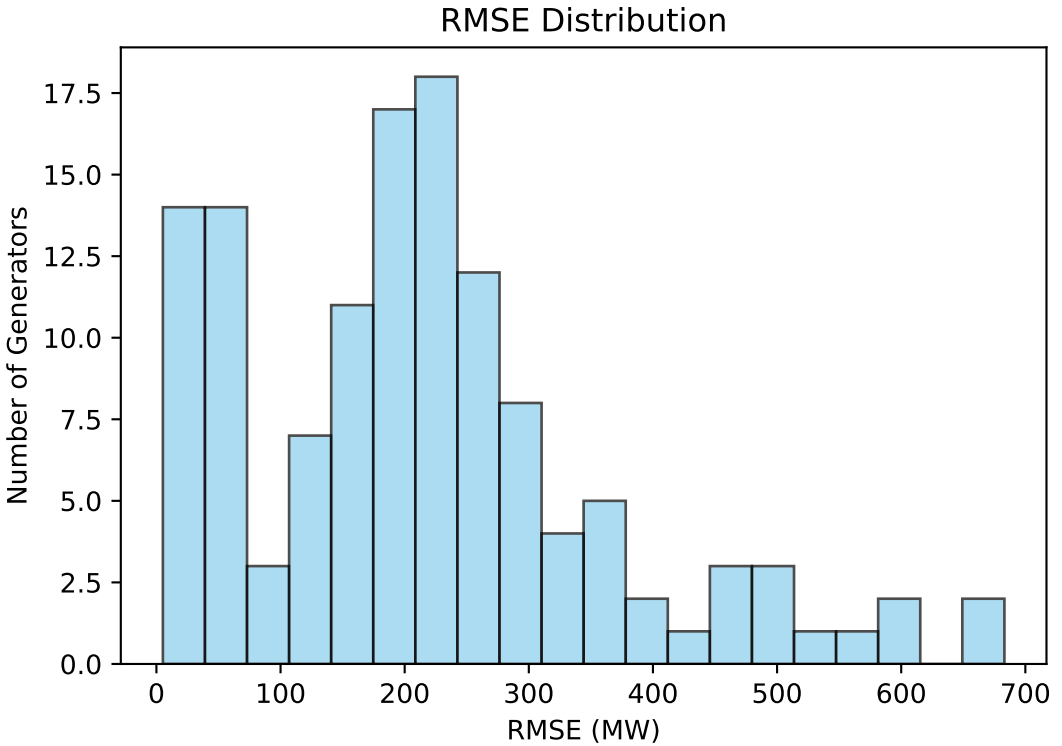
This report provides a comprehensive analysis of generator forecast performance, including performance classifications, anomaly detection, chronic error patterns, and bid validation results. The analysis identifies generators requiring attention and provides actionable recommendations for improvement.

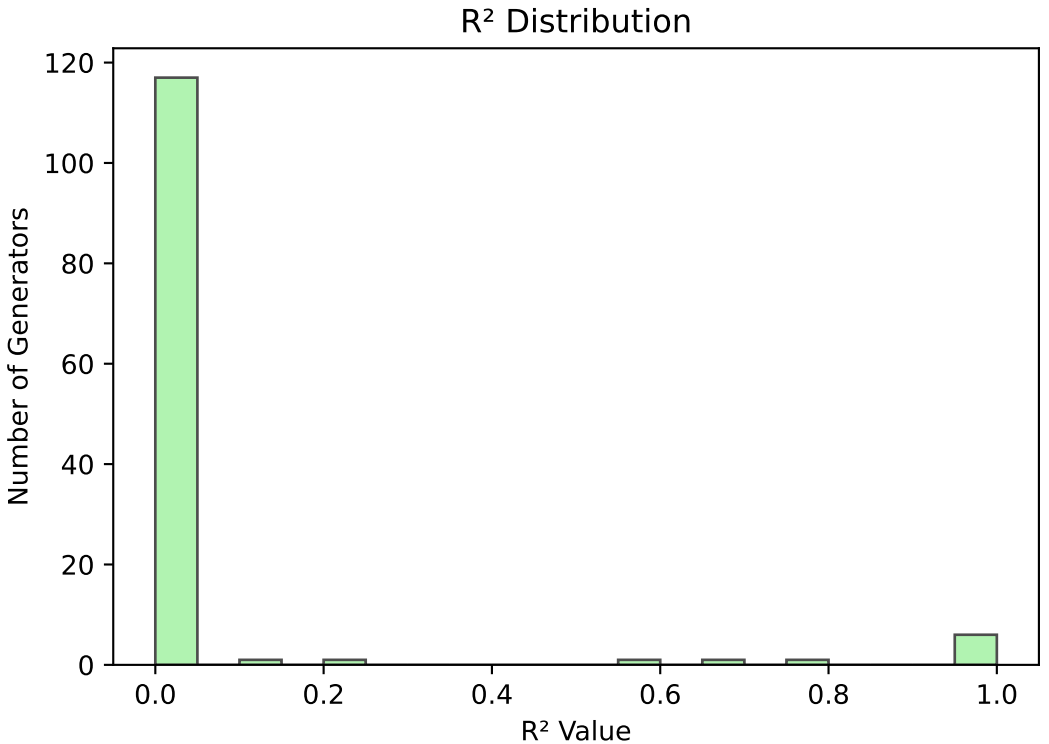
FILTERING APPLIED: Small generators are excluded from all tables if they meet BOTH of these criteria: Pmax < 500 MW AND max actual generation < 500 MW. (Previously used 3rd criterion 'max predicted generation' is no longer applied.)

Generated by Advanced Generator Analysis System

Executive Summary







Metric	Value
Total Generators (Raw)	128
Generators Analyzed	128
Small Generators Excluded	0
Anomalies Detected	128
Total Alerts	6309
Poor/Critical Performers	123
Average RMSE (MW)	213.49
Average R²	0.066
Pmax Discrepancies (>5%)	62

Performance Classification System

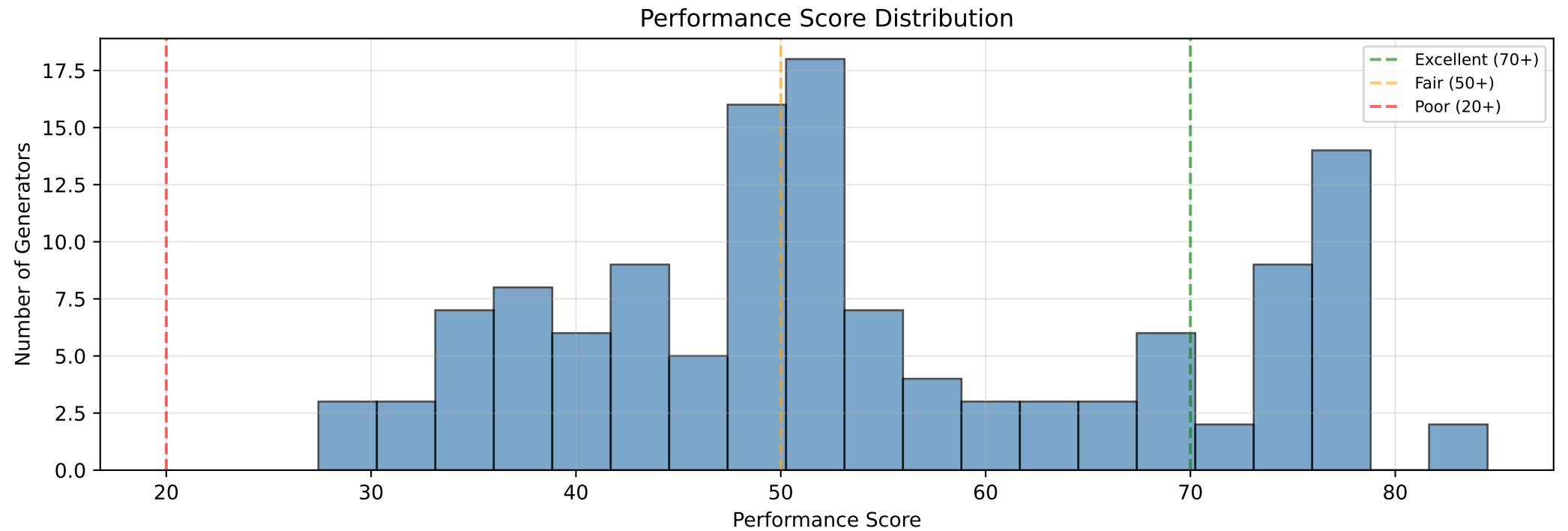
PERFORMANCE CLASSIFICATION SYSTEM

The system classifies each generator into one of 5 performance categories based on:
- RMSE as percentage of generator capacity (Pmax)
- R-squared correlation coefficient

Classification Criteria:
- EXCELLENT: RMSE ≤ 10.0% of Pmax, R^2 ≥ 0.7 (Highly accurate forecasts)
- GOOD: RMSE ≤ 20.0% of Pmax, R^2 ≥ 0.6 (Good forecast accuracy)
- FAIR: RMSE ≤ 30.0% of Pmax, R^2 ≥ 0.5 (Acceptable performance)
- POOR: RMSE ≤ 40.0% of Pmax, R^2 ≥ 0.2 (Needs attention)
- CRITICAL: RMSE > 40.0% of Pmax or R^2 < 0.0 (Immediate action required)

PERFORMANCE SCORE EXPLANATION:
The "Score" column represents a composite performance score (0-100) calculated as:
- 70% weight: Inverted RMSE percentage (lower RMSE = higher score)
- 20% weight: R-squared × 100 (higher correlation = higher score)
- 5% weight: Consistency score × 100 (more consistent = higher score)
- 5% weight: Inverted volatility score (lower volatility = higher score)

Higher scores (closer to 100) indicate better overall forecast performance.
Lower scores (closer to 0) indicate generators requiring immediate attention.



Generator Name	Plant ID	Unit ID	Pmax (MW)	Fuel Type	Score	RMSE
ANDRUS	8054	1	740.0	Natural Gas	27.4	483.8
AMOS	3935	2	800.0	nan	27.7	527.5
NEBRCTYG	6096	2	900.0	nan	29.9	683.1
MONROE4	1733	3	800.0	Coal, Oil	31.6	460.2
WELSH	6139	1	528.0	nan	32.4	307.6
CAYUGA	1001	1	503.2	nan	32.9	287.0
KINCAID	876	2	650.0	nan	33.3	372.0
POWERTO1	879	6	832.0	nan	34.4	464.1
GIBSON	6113	3	640.0	Coal	34.5	362.5
TIDD	2828	1	630.0	nan	34.9	324.7
RUSH_IS	6155	1	640.0	Coal	35.6	589.0
RUSH_IS	6155	2	640.0	Coal	35.6	589.0
NELSON_E	1393	6	550.0	nan	35.6	294.1
IATAN	6065	1	936.0	nan	36.1	374.5
ROCKPORT	6166	2	1320.0	nan	36.1	674.7
TIDD	2828	2	630.0	nan	37.1	302.0
SIOUX	2107	1	535.0	Coal	37.5	254.2
ERG	56068	2	650.0	Coal	37.8	311.1
CAYUGA	1001	2	503.2	nan	37.9	243.7
KAMMER	3948	1	790.0	nan	38.0	377.6
GIBSON	6113	4	640.0	Coal	38.4	318.0
LABADIE	2103	2	650.0	Coal	39.2	293.4
BALDWIN	889	2	605.0	Coal	39.7	278.5
MONROE4	1733	1	800.0	Coal, Oil	40.0	348.3
KING	1915	1	555.0	Coal	40.2	256.0
IATAN	6065	2	936.0	nan	40.5	421.2
INDEP2	6641	2	900.0	Coal	40.9	394.1
BALDWIN	889	1	605.0	Coal	41.9	255.5
AMOS	3935	3	800.0	nan	42.5	568.5
SIOUX	2107	2	535.0	Coal	42.6	226.6
GREENWOO	6035	1	795.0	Natural Gas	42.6	329.5
SHERCO	6090	1	529.0	Solar, Coal	42.7	289.9
HAWTHORN	2079	5	565.0	nan	43.5	235.5
PETERSBU	994	ST3	545.0	Solar, Coal, Battery	43.9	224.2
TH_HILL	2168	3	750.0	Coal	44.1	307.4
COAL_CR	6030	2	586.0	Coal	44.5	210.8
CBLUFFS	1082	4	559.9	nan	45.3	243.8
ROCKPORT	6166	1	1320.0	nan	45.8	496.5
SHERCO	6090	3	529.0	Solar, Coal	46.3	197.8
TIDD	2828	3	630.0	nan	46.7	242.6
GIBSON	6113	5	640.0	Coal	46.8	206.2
GIBSON	6113	1	640.0	Coal	47.5	234.3
LABADIE	2103	4	650.0	Coal	47.7	208.8
LOUISA	6664	1	710.0	nan	47.8	247.1
CHENOWET	67239	FOX01	577.0	nan	48.1	200.9
COAL_CR	6030	1	586.0	Coal	48.3	181.5
MEROM	6213	2	600.0	Coal, Natural Gas	48.5	201.6
LARAMIE	6204	1	658.8	nan	48.6	225.1
924_TRIV	63931	GEN1	580.0	nan	48.8	177.6
KINCAID	876	1	650.0	nan	48.9	217.8
924_TRIV	63931	GEN2	580.0	nan	49.1	178.9
ERG	56068	1	650.0	Coal	49.3	204.0
WELSH	6139	3	528.0	nan	49.4	167.2
AMOS	3935	1	800.0	nan	49.6	265.0
VIRGINIA	56808	1	605.0	nan	49.9	198.1
RODEMR1	6190	1	630.0	Coal, Natural Gas, Oil	50.2	195.4
MOUNTAI2	6264	1	1500.0	nan	50.2	451.8
LABADIE	2103	1	650.0	Coal	50.3	203.0
LABADIE	2103	3	650.0	Coal	50.4	204.4
LACYGNE	1241	2	750.0	nan	50.7	219.6
BELLERIV	6034	ST2	535.0	Coal, Natural Gas	50.9	159.7
BELLERIV	6034	ST1	535.0	Coal, Natural Gas	51.2	158.6
NINEMI	1403	6(4)	750.0	nan	51.2	225.7
GENTLMN	6077	2	670.0	nan	51.3	207.7
MEROM	6213	1	600.0	Coal, Natural Gas	51.6	185.5
CAMPBEL4	1710	3	810.0	Coal	51.9	236.1
WH_BLF	6009	1	831.0	Coal	52.1	243.2
KARN	1702	3	638.0	Coal, Natural Gas	52.2	162.1
INDEP2	6641	1	900.0	Coal	52.3	247.0
GENTLMN	6077	1	670.0	nan	52.4	184.4
GIBSON	6113	2	640.0	Coal	52.6	180.3
POWERTO1	879	5	832.0	nan	52.7	242.5
PETERSBU	994	4	545.0	Solar, Coal, Battery	52.7	143.6
KAMMER	3948	2	790.0	nan	52.9	216.7
MONROE4	1733	4	800.0	Coal, Oil	53.1	219.5
MONROE4	1733	2	800.0	Coal, Oil	53.8	212.8
KARN	1702	4	638.0	Coal, Natural Gas	54.1	144.5
WH_BLF	6009	2	831.0	Coal	54.5	216.2
GAVINAEP	8102	1	2000.0	nan	54.6	513.6
SABINE_E	3459	4	530.0	Natural Gas	54.8	148.6
PERVIL	55620	CT-1	650.0	nan	55.3	160.2
NEWTON2	6017	1	620.0	Solar, Coal, Battery	55.5	142.4
NEBRCTYG	6096	1	900.0	nan	56.1	210.3
LACYGNE	1241	1	750.0	nan	56.8	158.2
CBLUFFS	1082	3	559.9	nan	57.1	108.4
GAVINAEP	8102	2	2000.0	nan	57.7	410.6
G_GULF	6072	1	458.6	nan	59.5	133.3
MCADMS	55220	A02	551.2	Natural Gas	60.1	91.2
NINEMI	1403	5	750.0	nan	60.2	177.8
L_CATH	170	4	547.0	Natural Gas	61.8	107.0
MNTCELO	1922	1	690.0	Nuclear	62.1	124.9
929_JACK	62926	02	600.0	nan	64.8	75.1
L_GPSY	1402	3	525.0	nan	64.9	226.1
RODEMR1	6190	3	630.0	Coal, Natural Gas, Oil	66.4	249.7
929_JACK	62926	01	600.0	nan	69.3	52.0
GUERNSPS	62949	GPS3	635.0	nan	69.5	56.2
GUERNSPS	62949	GPS1	635.0	nan	69.5	56.2
GUERNSPS	62949	GPS2	635.0	nan	69.6	56.0
DOWMTR	55419	G500	900.0	Natural Gas	69.6	69.8
PERRY_FE	6020	1	1330.0	nan	72.0	56.3
WATERF	4270	3	1214.0	nan	73.8	73.6
20_BRAID	6022	2	1273.0	nan	73.9	62.6
1_LASALL	6026	1	1354.0	nan	74.7	22.7
COOK	6000	2	1220.0	nan	74.7	68.1
12_DRESD	869	2	975.0	nan	74.7	41.7
CLINTON0	204	1	1095.0	Nuclear, Natural Gas	74.7	26.9
20_BRAID	6022	1	1273.0	nan	74.9	68.9
PR_ISLD	1925	2	590.0	Nuclear	75.2	38.6
QUADCITY	880	1	980.0	nan	75.7	12.0
BYRON000	6023	1	1265.0	nan	76.1	52.9
BYRON000	6023	2	1265.0	nan	76.1	53.7
12_DRESD	869	3	975.0	nan	76.1	41.7
QUADCITY	880	2	980.0	nan	76.3	5.9
RVB	6462	1	1080.0	Nuclear, Coal, Natural G	76.3	17.7
DAVISBES	6149	1	970.0	nan	76.4	41.0
COOPER	8036	1	1025.0	nan	76.4	22.9
COOK	6000	1	1220.0	nan	76.5	30.4
PTBEACH	4046	1	617.0	Nuclear, Oil	77.2	5.2
FERMI	1729	2	1195.0	Nuclear, Oil	77.4	22.1
PTBEACH	4046	2	617.0	Nuclear, Oil	77.6	6.7
1_LASALL	6026	2	1354.0	nan	77.7	15.1
ARK_NU	8055	1	1031.0	Nuclear	78.0	16.0
ARK_NU	8055	2	1031.0	Nuclear	78.0	9.2

Chronic Forecast Error Detection

CHRONIC FORECAST ERROR DETECTION

Identifies generators with persistent forecasting problems over extended periods:

- CHRONIC OVER-FORECASTING: Forecast consistently > 2x actual generation for 3+ days in any 5-day window
- CHRONIC UNDER-FORECASTING: Forecast consistently < 0.5x actual generation for 3+ days in any 5-day window

Detection Criteria:
- Minimum 3 problematic days in any 5-day sliding window
- Minimum 2 hours of data per day to qualify (adjusted for 3x daily sampling)
- Only considers periods with generation ≥ 5 MW to avoid noise
- All detected chronic patterns are classified as medium severity

Impact: Chronic errors indicate systematic model issues requiring immediate attention.
This approach detects sustained chronic patterns while reducing sensitivity to short-term market volatility.
Regular 5-day window monitoring provides balanced detection of forecast degradation.

METHODOLOGY:

The sliding window approach analyzes forecast accuracy over time:

1. Daily Statistics: Calculate daily average forecast-to-actual ratios for each generator
2. Sliding Windows: Apply 5-day sliding windows across the analysis period
3. Pattern Detection: Identify periods where forecast ratios exceed thresholds:
   - Over-forecasting: Forecast/Actual ≥ 2.0 (forecast is at least 200% of actual)
   - Under-forecasting: Forecast/Actual ≤ 0.5 (forecast is 50% or less of actual)

This methodology ensures robust detection of persistent forecasting issues while minimizing
false positives from temporary market disruptions or operational anomalies.

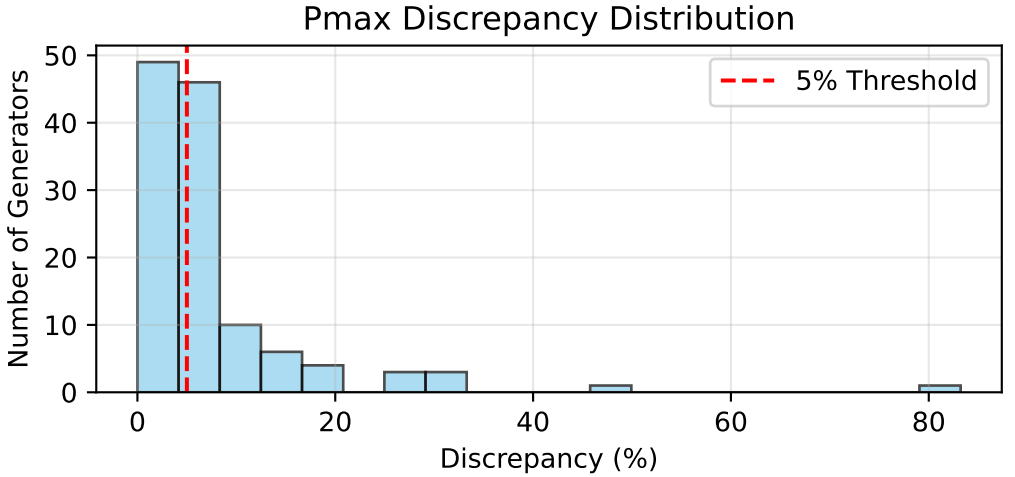
Generator	Plant ID	Unit ID	Error Type	Pmax	Fuel Type
12_DRESD DR-2	869	2	OVERFO	975.0 MW	Unknown
12_DRESD DR-3	869	3	OVERFO	975.0 MW	Unknown
1_LASALL LA-1	6026	1	OVERFO	1354.0 MW	Unknown
1_LASALL LA-2	6026	2	OVERFO	1354.0 MW	Unknown
20_BRAID BR-1	6022	1	OVERFO	1273.0 MW	Unknown
20_BRAID BR-2	6022	2	OVERFO	1273.0 MW	Unknown
924_TRIV GEN1_CC	63931	GEN1	UNDERF, OVER	580.0 MW	Unknown
924_TRIV GEN2_CC	63931	GEN2	UNDERF, OVER	580.0 MW	Unknown
929_JACK GEN1	62926	01	UNDERF, OVER	600.0 MW	Unknown
929_JACK GEN2	62926	02	UNDERF, OVER	600.0 MW	Unknown
AMOS AM1	3935	1	UNDERF, OVER	800.0 MW	Unknown
AMOS AM2	3935	2	UNDERF, OVER	800.0 MW	Unknown
AMOS AM3	3935	3	UNDERF, OVER	800.0 MW	Unknown
ANDRUS G1	8054	1	UNDERF, OVER	740.0 MW	Natural
ARK_NU G1	8055	1	OVERFO	1031.0 MW	Nuclear
ARK_NU G2	8055	2	OVERFO	1031.0 MW	Nuclear
BALDWIN BALDWIN_U1	889	1	UNDERF, OVER	605.0 MW	Coal
BALDWIN BALDWIN_U2	889	2	UNDERF, OVER	605.0 MW	Coal
BELLERIV BEL1_DECO	6034	ST1	UNDERF, OVER	535.0 MW	Coal, Na
BELLERIV BEL2_DECO	6034	ST2	UNDERF, OVER	535.0 MW	Coal, Na
BYRON000 BY-1	6023	1	OVERFO	1265.0 MW	Unknown
BYRON000 BY-2	6023	2	OVERFO	1265.0 MW	Unknown
CALLAWAY 1	6153	1	OVERFO	1270.0 MW	Nuclear
CAMPBEL4 CA3_CONS	1710	3	UNDERF, OVER	810.0 MW	Coal
CAYUGA CAY1	1001	1	UNDERF, OVER	503.2 MW	Unknown
CAYUGA CAY2	1001	2	UNDERF, OVER	503.2 MW	Unknown
CBLUFFS WSEC_3_UNIT	1082	3	UNDERF, OVER	559.9 MW	Unknown
CBLUFFS WSEC_4_UNIT	1082	4	UNDERF, OVER	559.9 MW	Unknown
CHENOWET FOXSQUSP	67239	FOX01	UNDERF, OVER	577.0 MW	Unknown
CLINTON0 CLNTN_U1	204	1	OVERFO	1095.0 MW	Nuclear,
COAL_CR REC1_AC	6030	1	UNDERF	586.0 MW	Coal
COAL_CR REC1_DC	6030	1	UNDERF	586.0 MW	Coal
COAL_CR REC2_AC	6030	2	UNDERF	586.0 MW	Coal
COAL_CR REC2_DC	6030	2	UNDERF	586.0 MW	Coal
COOK CK1	6000	1	OVERFO	1220.0 MW	Unknown
COOK CK2	6000	2	OVERFO	1220.0 MW	Unknown
DAVISBES DB10	6149	1	OVERFO	970.0 MW	Unknown
DBDS SF_1	66624	DBD	OVERFO	593.0 MW	Solar
DOWMTR DOWCHEM	55419	GS00	UNDERF, OVER	900.0 MW	Natural
ERG ERG1	56068	1	UNDERF, OVER	650.0 MW	Coal
ERG ERG2	56068	2	UNDERF, OVER	650.0 MW	Coal
FERMI FE2	1729	2	OVERFO	1195.0 MW	Nuclear,
GAVINAEP GV1	8102	1	UNDERF, OVER	2000.0 MW	Unknown
GAVINAEP GV2	8102	2	UNDERF, OVER	2000.0 MW	Unknown
GENTLMN 1	6077	1	UNDERF, OVER	670.0 MW	Unknown
GENTLMN 2	6077	2	UNDERF, OVER	670.0 MW	Unknown
GIBSON UN1	6113	1	UNDERF, OVER	640.0 MW	Coal
GIBSON UN2	6113	2	UNDERF, OVER	640.0 MW	Coal
GIBSON UN3	6113	3	UNDERF, OVER	640.0 MW	Coal
GIBSON UN4	6113	4	UNDERF, OVER	640.0 MW	Coal
GIBSON UN5	6113	5	UNDERF, OVER	640.0 MW	Coal
GREENWOO GW1	6035	1	UNDERF, OVER	795.0 MW	Natural
GUERNSPS 11CC	62949	GPS1	UNDERF, OVER	635.0 MW	Unknown
GUERNSPS 21CC	62949	GPS2	UNDERF, OVER	635.0 MW	Unknown
GUERNSPS 31CC	62949	GPS3	UNDERF, OVER	635.0 MW	Unknown
G_GULF G3	6072	1	OVERFO	458.6 MW	Unknown
HAWTHORN HAW5	2079	5	UNDERF, OVER	565.0 MW	Unknown
IATAN IAT1	6065	1	UNDERF, OVER	936.0 MW	Unknown
IATAN IAT2	6065	2	UNDERF, OVER	936.0 MW	Unknown
INDEP2 G1	6641	1	UNDERF, OVER	900.0 MW	Coal
INDEP2 G2	6641	2	UNDERF, OVER	900.0 MW	Coal
KAMMER ML1	3948	1	UNDERF, OVER	790.0 MW	Unknown
KAMMER ML2	3948	2	UNDERF, OVER	790.0 MW	Unknown
KARN KA3	1702	3	UNDERF, OVER	638.0 MW	Coal, Na
KARN KA4	1702	4	UNDERF, OVER	638.0 MW	Coal, Na
KINCAID KN-1	876	1	UNDERF, OVER	650.0 MW	Unknown
KINCAID KN-2	876	2	UNDERF, OVER	650.0 MW	Unknown
KING KING_1_UNIT	1915	1	OVERFO	555.0 MW	Coal
LABADIE 1	2103	1	UNDERF, OVER	650.0 MW	Coal
LABADIE 2	2103	2	UNDERF, OVER	650.0 MW	Coal
LABADIE 3	2103	3	UNDERF, OVER	650.0 MW	Coal
LABADIE 4	2103	4	UNDERF, OVER	650.0 MW	Coal
LACYGNE LAC1	1241	1	OVERFO	750.0 MW	Unknown
LACYGNE LAC2	1241	2	OVERFO	750.0 MW	Unknown
LARAMIE BEPM	6204	1	UNDERF, OVER	658.8 MW	Unknown
LOUISA LOUISA_1_UN...	6664	1	UNDERF, OVER	710.0 MW	Unknown
L_CATH G4	170	4	UNDERF	547.0 MW	Natural
L_GPSY G3	1402	3	OVERFO	525.0 MW	Unknown
MCADMS G1	55220	A02	OVERFO	551.2 MW	Natural
MEROM UN1	6213	1	UNDERF, OVER	600.0 MW	Coal, Na
MEROM UN2	6213	2	UNDERF, OVER	600.0 MW	Coal, Na
MNTCELO MNTCEL_1_UN...	1922	1	OVERFO	690.0 MW	Nuclear
MONROE4 MON1	1733	1	UNDERF, OVER	800.0 MW	Coal, Oi
MONROE4 MON2	1733	2	UNDERF, OVER	800.0 MW	Coal, Oi
MONROE4 MON3	1733	3	UNDERF, OVER	800.0 MW	Coal, Oi
MONROE4 MON4	1733	4	UNDERF, OVER	800.0 MW	Coal, Oi
MOUNTAI2 MT1	6264	1	UNDERF, OVER	1500.0 MW	Unknown
NEBRCTYG 1	6096	1	UNDERF, OVER	900.0 MW	Unknown
NEBRCTYG 2	6096	2	UNDERF, OVER	900.0 MW	Unknown
NELSON_E G6	1393	6	UNDERF, OVER	550.0 MW	Unknown
NEWTON2 1	6017	1	UNDERF, OVER	620.0 MW	Solar, C
NINEMI G4	1403	6(4)	OVERFO	750.0 MW	Unknown
NINEMI G5	1403	5	OVERFO	750.0 MW	Unknown
PERRY_FE PR10	6020	1	OVERFO	1330.0 MW	Unknown
PERVIL G1	55620	CT-1	UNDERF, OVER	650.0 MW	Unknown
PETERSBU PE3	994	ST3	UNDERF, OVER	545.0 MW	Solar, C
PETERSBU PE4	994	4	UNDERF, OVER	545.0 MW	Solar, C
POWERTO1 PO-5	879	5	OVERFO	832.0 MW	Unknown
POWERTO1 PO-6	879	6	OVERFO	832.0 MW	Unknown
PR_ISLD PR_ISL_1_UN...	1925	1	UNDERF, OVER	590.0 MW	Nuclear
PR_ISLD PR_ISL_2_UN...	1925	2	UNDERF, OVER	590.0 MW	Nuclear
PTBEACH PT-BCH_PB1	4046	1	UNDERF, OVER	617.0 MW	Nuclear,
PTBEACH PT-BCH_PB2	4046	2	UNDERF, OVER	617.0 MW	Nuclear,
QUADCITY 1BUQC-1	880	1	OVERFO	980.0 MW	Unknown
QUADCITY 1BUQC-2	880	2	OVERFO	980.0 MW	Unknown
ROCKPORT RP1	6166	1	UNDERF, OVER	1320.0 MW	Unknown
ROCKPORT RP2	6166	2	UNDERF, OVER	1320.0 MW	Unknown
RODEMR1 G1	6190	1	UNDERF, OVER	630.0 MW	Coal, Na
RODEMR1 G3	6190	3	UNDERF, OVER	630.0 MW	Coal, Na
RUSH_IS 1	6155	1	OVERFO	640.0 MW	Coal
RUSH_IS 2	6155	2	OVERFO	640.0 MW	Coal
RVB G1	6462	1	UNDERF, OVER	1080.0 MW	Nuclear,
SABINE_E G4	3459	4	OVERFO	530.0 MW	Natural
SHERCO SHERCO3_NSP	6090	3	UNDERF, OVER	529.0 MW	Solar, C
SHERCO SHERCO_1_UN...	6090	1	UNDERF, OVER	529.0 MW	Solar, C
SIOUX 1	2107	1	UNDERF, OVER	535.0 MW	Coal
SIOUX 2	2107	2	UNDERF, OVER	535.0 MW	Coal
TH_HILL THOMAS_HILL...	2168	3	UNDERF, OVER	750.0 MW	Coal
TIDD CD1	2828	1	UNDERF, OVER	630.0 MW	Unknown
TIDD CD2	2828	2	UNDERF, OVER	630.0 MW	Unknown
TIDD CD3	2828	3	UNDERF, OVER	630.0 MW	Unknown
VIRGINIA VACTYG1	56808	1	UNDERF, OVER	605.0 MW	Unknown
WATERF G3	4270	3	OVERFO	1214.0 MW	Unknown
WELSH 1	6139	1	UNDERF	528.0 MW	Unknown
WELSH 3	6139	3	UNDERF	528.0 MW	Unknown
WH_BLF G1	6009	1	UNDERF, OVER	831.0 MW	Coal
WH_BLF G2	6009	2	UNDERF, OVER	831.0 MW	Coal

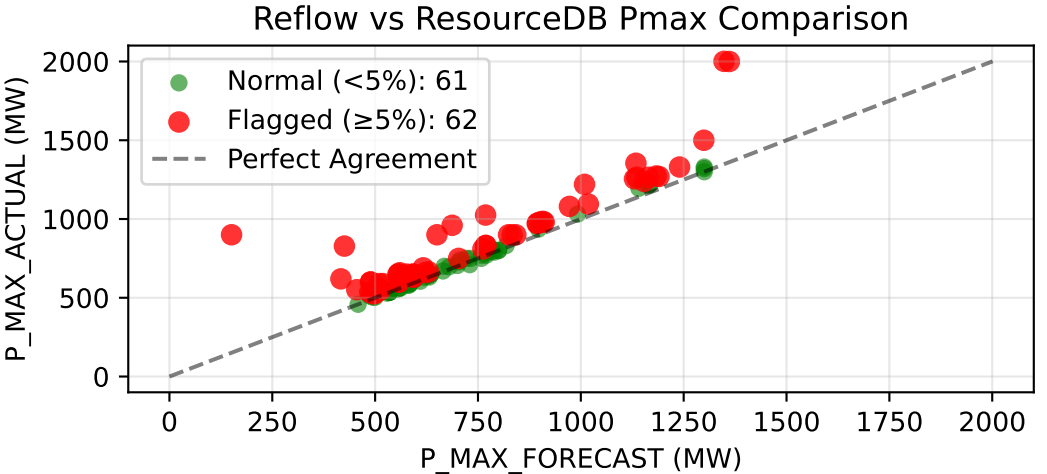
Pmax Discrepancy Analysis - Data Synchronization Issues

Pmax Discrepancy Analysis compares generator capacity values from two sources:
• P_MAX_ACTUAL: Capacity from reflow operational data
• P_MAX_FORECAST: Capacity from ResourceDB system

Discrepancies >5% may indicate data synchronization issues between systems.

Analysis Summary:
• Total generators analyzed: 123
• Generators with >5% discrepancy: 62 (50.4%)
• Average discrepancy: 7.6%
• Maximum discrepancy: 83.2%



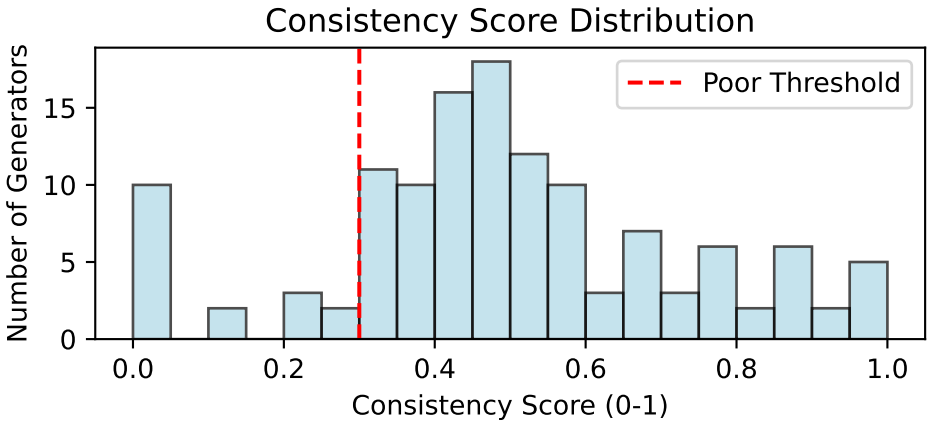


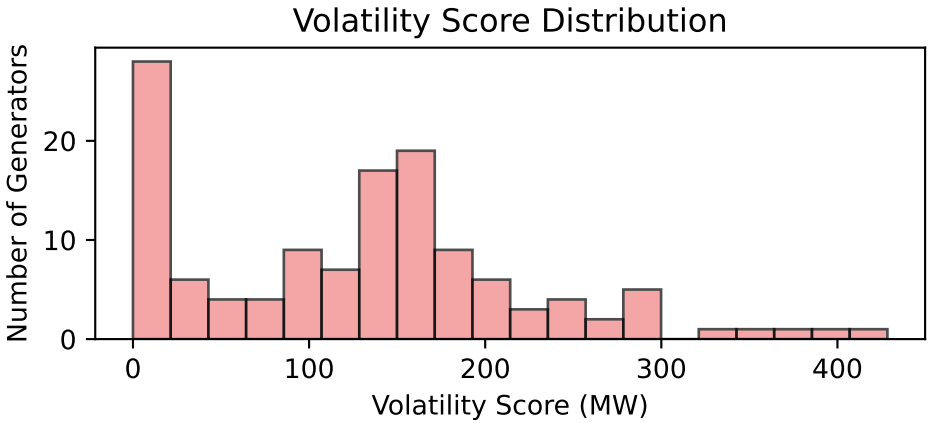
Generator	Plant ID	Unit ID	Reflow (MW)	ResourceDB (MW)	Difference (MW)
DOWMTR	55419	G500	900.0	151.0	+749.0
GAVINAEP	8102	1	2001.0	1348.0	+653.0
GAVINAEP	8102	2	2000.0	1361.0	+639.0
WH_BLF	6009	1	828.0	425.3	+402.7
NEBRCTYG	6096	2	960.0	687.2	+272.8
COOPER	8036	1	1025.0	768.5	+256.5
NEBRCTYG	6096	1	900.0	650.3	+249.7
1_LASALL	6026	2	1354.0	1133.9	+220.1
COOK	6000	1	1220.0	1009.0	+211.0
RODEMR1	6190	1	620.0	416.8	+203.2

Advanced Forecast Metrics Analysis

Advanced Forecast Metrics

- CONSISTENCY SCORE (0-1): Measures how consistent forecast errors are over time (higher = better)
- VOLATILITY SCORE: Rolling standard deviation of forecast errors (lower = better)
- TREND ANALYSIS: Statistical trend in forecast performance (improving/stable/deteriorating)
- RMSE % OF CAPACITY: RMSE normalized by generator capacity for fair comparison





Generator	Plant ID	Unit ID	Pmax (MW)	Consistency Score	RMSE	Class	Fuel
CALLAWAY	6153	1	1270.0	0.000	274.4	fair	Nuc
PR_ISLD	1925	1	590.0	0.000	156.1	fair	Nuc
L_CATH	170	4	547.0	0.000	107.0	crit	Nat
MCADMS	55220	A02	551.2	0.000	91.2	crit	Nat
KARN	1702	4	638.0	0.000	144.5	crit	Coa
KARN	1702	3	638.0	0.000	162.1	crit	Coa
LABADIE	2103	4	650.0	0.038	208.8	crit	Coa
DBDS	66624	DBD	593.0	0.047	116.1	good	Sol

Generator	Plant ID	Unit ID	Pmax (MW)	Volatility Score	RMSE	Class	Fuel
MOUNTAI2	6264	1	1500.0	428.364	451.8	crit	Unk
GAVINAEP	8102	1	2000.0	395.253	513.6	crit	Unk
ROCKPORT	6166	1	1320.0	382.747	496.5	crit	Unk
GAVINAEP	8102	2	2000.0	349.398	410.6	crit	Unk
MONROE4	1733	1	800.0	324.285	348.3	crit	Coa
ROCKPORT	6166	2	1320.0	298.687	674.7	crit	Unk
GREENWOO	6035	1	795.0	293.638	329.5	crit	Nat
IATAN	6065	2	936.0	290.036	421.2	crit	Unk

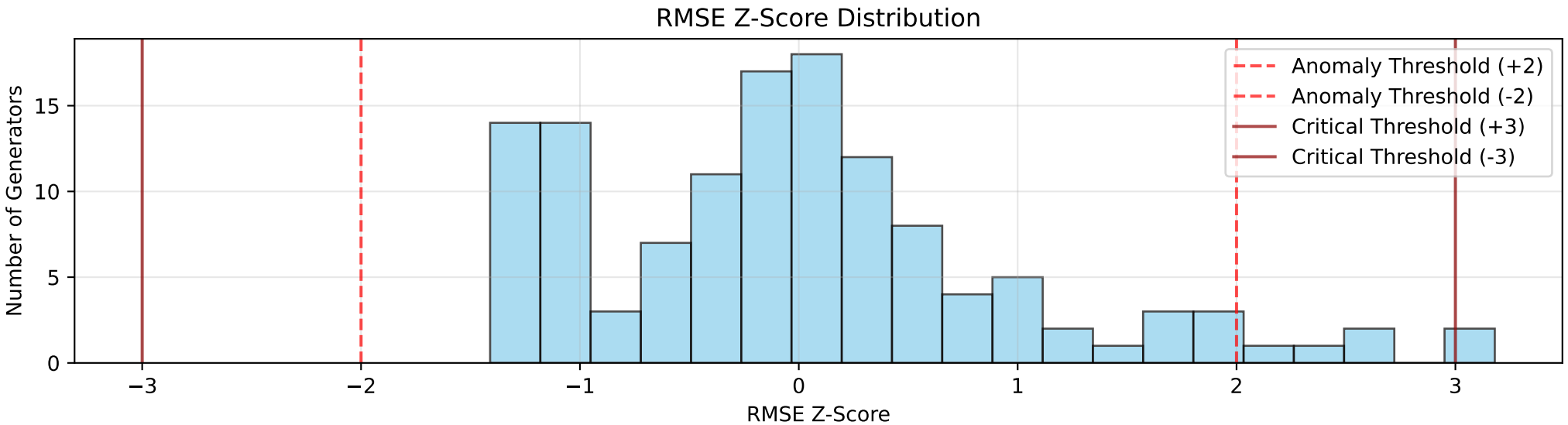
Statistical Anomaly Detection

Statistical Anomaly Detection

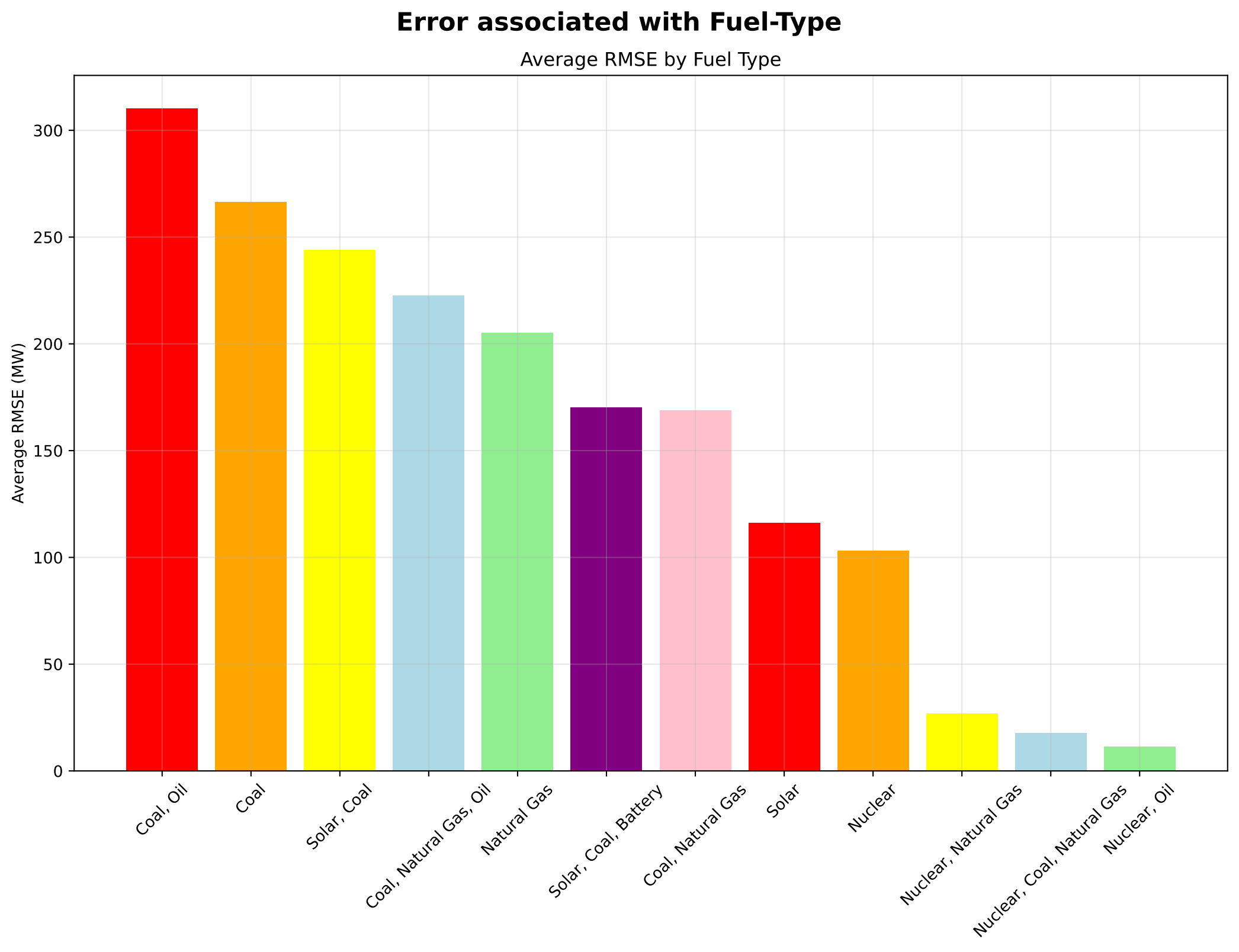
Uses population statistics to identify generators with anomalous performance:

- RMSE Z-SCORE: How many standard deviations above/below population mean (threshold: >2.0)
- MAE Z-SCORE: Mean Absolute Error compared to population (threshold: >2.0)
- POPULATION OUTLIERS: Generators performing significantly worse than peers

Generators with Z-scores > 2.0 are flagged for investigation.
Z-scores > 3.0 are considered critical and require immediate attention.



Generator Name	Plant ID	Unit ID	Pmax (MW)	RMSE Z-Score	Severity	Class
NEBRCTYG	6096	2	900.0	3.18	Critical	crit
ROCKPORT	6166	2	1320.0	3.12	Critical	crit
RUSH_IS	6155	2	640.0	2.54	Critical	crit
RUSH_IS	6155	1	640.0	2.54	Critical	crit
AMOS	3935	3	800.0	2.40	High	crit
AMOS	3935	2	800.0	2.13	High	crit
GAVINAEP	8102	1	2000.0	2.03	High	crit


Error associated with Fuel-Type
Average RMSE by Fuel Type
Average RMSE (MW)
0
50
100
150
200
250
300
Coal, Oil
Coal
Solar, Coal
Coal, Natural Gas, Oil
Natural Gas
Solar, Coal, Battery
Coal, Natural Gas
Solar
Nuclear
Nuclear, Natural Gas
Nuclear, Coal, Natural Gas
Nuclear, Oil

Recommendations and Action Items

🚨 CRITICAL: 121 generators with critical performance require immediate model review

⚠️ HIGH: 2 generators with poor performance need attention within 1-2 weeks

📈 CHRONIC ERRORS: 127 generators with chronic forecasting patterns

→ Review dispatch model parameters and operational constraints

→ Analyze market conditions during chronic error periods

📊 STATISTICAL: 7 generators are statistical outliers

→ Compare with similar generators in same zone/fuel type

→ Investigate if these generators have unique operational characteristics

⛽ FUEL TYPE: Coal, Oil generators show higher error rates (4 poor/critical)

→ Review Coal, Oil generator modeling parameters

✅ GENERAL RECOMMENDATIONS:

- Prioritize generators with multiple performance issues
- Review forecast models for generators with $R^2 < 0.5$
- Monitor generators with increasing error trends
- Update capacity constraints for generators with Pmax issues
- Consider market condition correlation analysis