The NG Carry Plus Storage Composite Signal, Grade B+ Supply Lens

Why a storage-anchored three-leg Natural Gas composite – 60 percent EIA L48 storage deficit, 30 percent EIA storage seasonal-model residual, 10 percent nearby curve carry – is a Grade B+ full-window directional signal (Grade A post-2003 with INDEPENDENTLY SIGNIFICANT non-overlap IC) on NYMEX Natural Gas forward returns.

David Stendahl · Market Lab Analytics · November 1, 2026

The signal and why it matters today

The L1-L6 nearby term structure is the single most-watched Natural Gas signal but on its own it is wrong-signed as a directional read. The predecessor was a pure L1-L6 carry z-score. Its daily IC vs NG forward returns was minus 0.036 – the exact opposite of its declared bullish polarity.

Phase edges were essentially zero. The signal was firing EXTREME_POS bullish at the moment the review caught it, with history saying that was an anti-signal. The L1-L6 differential encodes two things that cancel on direction: scarcity premium (bullish on backwardation) and seasonal calendar structure (winter contract trades premium in summer, no directional edge). The predecessor conflated the two.

This reformulated signal rebuilds around EIA weekly L48 storage data as the fundamental ground-truth anchor. 60 percent of the composite is storage vs 5-year week-of-year climatology (negative = storage below climatology = scarcity firing). 30 percent is the EIA storage seasonal-model residual (positive surprise above model = surplus, inverted). The L1-L6 nearby carry z-score is retained at 10 percent as a positioning overlay but no longer carries directional weight.

Daily Spearman IC against NG fwd60d is plus 0.103 at p-value 7.7e-22 across 8,621 trading days (full window) – strongly significant daily. Non-overlapping (every-60-day) IC is plus 0.149 at p-value 0.075 across 144 independent samples – same sign, marginal.

Post-2003 window (where storage data is mature): daily IC plus 0.131 at p-value 4.3e-24, non-overlap IC plus 0.234 at p-value 0.020 – INDEPENDENTLY SIGNIFICANT. Grade A on the mature-data subset.

Phase stats are cleanly monotone with wide spread: Phase +1 (Scarcity Firing) delivers plus 1.70 percent fwd60d, plus 2.79 pp above the minus 1.09 percent baseline. Phase –1 (Surplus Firing) delivers minus 4.18 percent, minus 3.09 pp below baseline. 5.88 pp directional spread.

Current reading: Normal at composite plus 0.052, 3 trading days running. EIA L48 storage is near 5-year climatology, seasonal-model residual is near zero. Signal DORMANT.

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How the storage-anchored composite composes

The US Energy Information Administration publishes weekly Natural Gas storage data every Thursday at 10:30 ET. The L48 total aggregates working gas across all underground storage facilities in the Lower 48 states. This is the fundamental balance of US gas supply vs demand – when consumption exceeds production + imports, storage draws; when supply exceeds consumption, storage builds.

Leg 1 (60 percent): EIA L48 storage vs 5-year week-of-year climatology. The signal computes a rolling 5-year climatology per week of year (same calendar week in each of the prior 5 years), then measures the deficit (actual storage minus climatology, inverted). Negative deficit = storage below climatology = scarcity firing. Z-scored on 504-day rolling window.

Leg 2 (30 percent): EIA storage seasonal-model residual. The seasonal-model table carries the actual weekly storage change, a consensus-model expectation, and the surprise (actual minus model). Positive surprise = storage build above model = surplus firing. The leg inverts the surprise and z-scores it. This is the forward-looking expectation layer that catches shifts before the climatology leg does.

Leg 3 (10 percent): L1-L6 nearby term structure carry. The 1st-nearby minus 6th-nearby close z-score. Retained as a weak positioning layer; on its own this leg was wrong-signed as a directional read, so weight is minimal.

Scarcity Firing (positive composite, Phase +1) means EIA L48 storage below climatology plus bullish seasonal surprise plus (optionally) backwardated curve. Historically coincides with 2022 Russia-invasion LNG pull, 2018 winter cold shock, 2014 Polar Vortex.

Historical pattern: Phase +1 delivers plus 2.79 pp above baseline.

Surplus Firing (negative composite, Phase –1) means EIA L48 storage above climatology plus bearish seasonal surprise. Historically coincides with 2020 COVID demand collapse, 2016 mild winter, 2024 production surge.

Historical pattern: Phase –1 delivers minus 3.09 pp below baseline.

Normal regime (Phase 0) is the equilibrium zone.

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What the state-conditional returns have actually done

> **Reference baseline – NG fwd60d (unconditional)**
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> NYMEX Natural Gas back-adjusted continuous forward-60-day return baseline over the live-signal window: mean minus 1.09 percent (NG is a chronic-negative-carry basket per roll-yield drag), median minus 2.80 percent, standard deviation 24.0 percent. Sample window 1992-04-02 through 2026-10-30, 8,621 trading days with observable fwd60d.

Per-day sampling (used for daily Spearman IC):

Phase plus 1 (Scarcity Firing, composite greater than plus 0.3) covers 1,379 trading days – 16.0 percent of the sample. Per-day mean fwd60d plus 1.70 percent. OUTPERFORMS baseline by plus 2.79 pp.

Phase 0 (Normal) covers 5,989 trading days – 69.5 percent of the sample. Per-day mean fwd60d minus 1.09 percent (near baseline).

Phase minus 1 (Surplus Firing, composite less than minus 0.3) covers 1,253 trading days – 14.5 percent of the sample. Per-day mean fwd60d minus 4.18 percent. UNDERPERFORMS baseline by minus 3.09 pp.

Clean monotone directional pattern. 5.88 pp directional spread.

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Three cases that frame how to read this signal

Case 1: 2022. Scarcity Firing extreme-positive – Russia-invasion LNG pull.

Firing period: Q2 through Q3 2022 at composite near plus 0.80. Context: Russia invasion drove EU TTF premium above HH, pulling US LNG exports higher. EIA L48 storage ran persistently below 5-year climatology. NYMEX NG rallied to multi-year highs above $9. Modern-era Scarcity anchor.

Case 2: 2020. Surplus Firing extreme-negative – COVID demand collapse.

Firing period: Q2 through Q4 2020 at composite near minus 0.80. Context: COVID demand collapse pushed EIA L48 storage well above 5-year climatology. Industrial and commercial consumption dropped sharply; power-sector gas demand softened. NYMEX NG fell through 2020 to multi-decade lows around $1.50. Canonical Surplus anchor.

Case 3: Current – Normal.

As of October 30, 2026, the composite reads plus 0.052, Normal firing. EIA L48 storage is near 5-year week-of-year climatology, seasonal-model residual is near zero. NYMEX Natural Gas trades the $2.80-3.10 range. Signal DORMANT.

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How to use the signal today

As of November 1, 2026, the composite reads plus 0.052 – Normal firing, 3 trading days running. EIA L48 storage is near 5-year week-of-year climatology, seasonal-model residual is near zero. NYMEX Natural Gas trades the $2.80-3.10 range. Signal DORMANT.

Historical Phase 0 delivers approximately zero edge vs baseline. Current Normal state is DORMANT – no high-conviction direction. Pay close attention to the next EIA weekly storage print and the seasonal-model residual direction for the next phase transition.

Pair with four confirming reads for direction when the mechanism fires toward either extreme:

- **CFTC NG Positioning Signal**. Managed-money positioning extremes mark reversal setups.
- **TTF-HH Spread Signal**. LNG export arb – when EU TTF premium opens, US HH demand firms.
- **US Gas Rig Count Signal**. Supply-response lagging indicator; useful as regime filter.
- **CH4 LNG Outage Detector**. Export disruption gate (Freeport 2022 archetype).

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Methodology notes

Data sources. (1) EIA Weekly Natural Gas Storage L48 Working Gas: 878 weekly observations from 2003 onward. (2) EIA storage seasonal-model residual: 878 weekly observations with actual, consensus-model, and surprise values. (3) NYMEX Natural Gas 1st-nearby and 6th-nearby closes (nearby continuous).

Signal construction. 60 percent EIA L48 storage deficit z: compute rolling 5-year week-of-year climatology, subtract from actual, invert sign, z-score on 504-day rolling window with 126-day minimum sample. 30 percent EIA storage seasonal-model residual: invert surprise and z-score on 252-day rolling window. 10 percent nearby L1-L6 carry z. Each leg tanh-bounded then weighted-summed. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Target: NYMEX Natural Gas back-adjusted continuous.

Validation statistics. Daily Spearman IC against NG fwd60d is plus 0.103 at p-value 7.7e-22 across 8,621 observations (full window) – strongly significant daily. Phase +1 (Scarcity Firing) per-day mean fwd60d plus 1.70 percent (plus 2.79 pp above minus 1.09 percent baseline). Phase 0 mean minus 1.09 percent. Phase −1 (Surplus Firing) per-day mean minus 4.18 percent (minus 3.09 pp below baseline). 5.88 pp directional spread.

Independence test. Non-overlapping (every-60d) sampling yields Spearman rho plus 0.149 at p-value 0.075 across 144 independent observations (full window) – same sign, just above the strict 0.05 bar. Post-2003 subset (where EIA storage data is mature): non-overlap rho plus 0.234 at p-value 0.020 – INDEPENDENTLY SIGNIFICANT. Grade A on the mature-data subset.

Reformulation history. Rebuilt 2026-11-01 from pure L1-L6 nearby carry predecessor per Priya+Marcus 5-engine review. Predecessor had daily IC minus 0.036 (wrong-signed vs declared bullish polarity), non-overlap p=0.787 null, 0.17 pp directional spread. The L1-L6 differential conflates scarcity premium with seasonal calendar structure – both components cancel on direction when the signal is standalone. Rebuilding around EIA storage as the fundamental anchor restores correct polarity and delivers 5.88 pp directional spread.

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What this signal does not cover

First, EIA storage data starts 2003 so pre-2003 period runs on the 10 percent carry leg only (effectively noise).

Second, non-overlap rho full-window p=0.075 is marginal; post-2003 subset p=0.020 is INDEPENDENTLY SIGNIFICANT. Grade B+ overall / Grade A post-2003.

Third, NG is a chronic-negative-carry basket; baseline fwd60d is minus 1.09 percent (roll-yield drag). All phases must be read against this negative baseline.

Fourth, LNG export disruption (Freeport 2022 archetype) can invert the signal temporarily. The CH4 LNG outage detector should be checked as a separate gate; this composite does not integrate it.

Broader caveat: Grade B+ full-window / Grade A post-2003 storage-anchored composite. Pair with CFTC positioning, TTF-HH spread, US gas rig count, and CH4 LNG outage detector for stacked confirmation across supply + demand + export + positioning channels.

This research brief is for informational purposes only and does not constitute investment advice. Past performance is not indicative of future results. Signal reads reflect historical state-conditional statistics; any decision to act on signal readings is the reader's responsibility. Data sources: EIA Weekly Natural Gas Storage L48 Working Gas; EIA Storage Seasonal Model Weekly; NYMEX Natural Gas nearby continuous target. State-conditional statistics computed through 2026-10-30.