The CL EIA Crude Stocks Signal: Inventory Regime Overlay for WTI

Why EIA weekly US crude inventory YoY delivers a 2.32 pp spread on WTI forward 60-day returns via the inventory supply channel.

David Stendahl · Market Lab Analytics · November 7, 2026

What this signal is

The signal measures a mechanism explained in the methodology section. Phase-conditional pattern below.

The the phase-conditional pattern on WTI forward returns across the 9,025 observation sample. Phase +1 (Stocks tight) delivers +1.62 pp edge above baseline on 45 percent sample share. Phase −1 (Stocks loose) delivers −0.70 pp edge on 39 percent sample share. 2.32 pp Phase +1 minus Phase −1 spread via the inventory supply channel.

Second, the EIA weekly petroleum status report publishes US crude stocks every Wednesday at 10:30 ET. Year-over-year comparison normalizes seasonal patterns and captures structural tightness or looseness of the balance. Low YoY stocks tighten the physical balance and transmit bullish; high YoY stocks loosen the balance and transmit bearish. Petroleum trading desks and refiners watch the Wednesday release as a top-of-book market-moving event.

Third, EIA weekly reports have a five-day publication lag and occasional revisions that can retroactively change the signal. YoY comparison can be distorted by unusual prior-year events (SPR releases). Signal does not distinguish stock location (Cushing versus Gulf Coast versus PADD5). Daily IC not individually significant on all sampling windows; article grade A rests on inventory-balance mechanism pattern.

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The thesis: EIA weekly crude stocks as inventory supply channel

The EIA weekly petroleum status report is the highest-frequency clean measure of US crude inventory tightness. When stocks run below prior year, the physical balance tightens and WTI receives a bullish signal via supply scarcity; refiners and traders compete for limited barrels and the risk-premium on crude expands. When stocks run above prior year, the balance loosens and WTI receives a bearish signal.

The signal takes year-over-year delta against prior year same week, z-scored on a three-year rolling window, inverted so low stocks map to positive composite, and tanh-bounded to minus one through plus one. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3 (stocks tight), phase −1 below −0.3 (stocks loose). Target: NYMEX WTI Crude ratio-adjusted continuous close.

Historical window: EIA WCESTUS1 series from 1982 providing 44 years of weekly observations across four major cycles.

Tight firings warn of supply scarcity before term-structure backwardation fully prices it. Loose firings confirm oversupply before refiners and producers cut throughput.

What the firings have actually done

Computed over 9,025 daily observations from the live-window sample. The baseline WTI forward 60-day return is mean plus 2.39 percent and median plus 2.08 percent across the live-window sample.

> **Baseline WTI forward 60-day return:** mean plus 2.39 percent / median plus 2.08 percent across the live-window sample.
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> **Phase-conditional pattern on WTI forward 60-day returns:** Phase +1 (Stocks tight, 4,039 days / 45 percent): plus 4.01 percent fwd60d, edge +1.62 pp above baseline. Phase 0 (Normal, 1,435 days / 16 percent): minus 0.43 percent fwd60d, edge −2.83 pp. Phase −1 (Stocks loose, 3,551 days / 39 percent): plus 1.69 percent fwd60d, edge −0.70 pp below baseline.
>
> 2.32 pp Phase +1 minus Phase −1 spread via the inventory supply channel.

Three findings. Tight firings deliver above-baseline forward returns consistent with inventory-driven scarcity. Loose firings deliver below-baseline returns consistent with oversupply pressure. The 44-year sample spans four cycles (early-80s oil glut, late-90s Asia crisis, 2007-08 supercycle, 2014-16 shale glut) providing deep regime coverage.

Three cases that frame how to read the signal

The canonical anchors are the 2007-08 commodity supercycle, the 2015-16 shale oversupply, and the 2022 Russia-invasion window.

Case 1: The 2007-08 commodity supercycle

EIA US crude stocks ran below prior year through 2007 into mid-2008 as Chinese demand supercycle outpaced supply growth. WTI rallied from the mid-60s to 147 USD/bbl in July 2008. The signal held deep Phase +1 stocks-tight territory for most of the period as refiners competed for scarce barrels. The 2007-08 episode is a canonical Phase +1 stocks-tight anchor demonstrating inventory transmission during a demand supercycle.

Case 2: The 2015-16 shale oversupply

EIA US crude stocks surged above prior year through 2014 Q4 into early 2016 as US shale production outpaced demand and OPEC refused to cut. WTI crashed from 100 USD/bbl to below 30 by early 2016. The signal held deep Phase −1 stocks-loose territory through the crash. The 2015-16 episode is

the canonical Phase −1 stocks-loose anchor demonstrating inventory-driven oversupply transmission during a supply-side shock.

Case 3: The 2022 Russia-invasion window

EIA US crude stocks ran below prior year through mid-2022 as Russia-invasion disruption tightened the global balance. WTI rallied above 120 USD/bbl before the SPR release program eased the balance into 2022 H2. The signal held Phase +1 stocks-tight territory into mid-2022. The 2022 episode is a modern Phase +1 stocks-tight anchor demonstrating event-driven inventory transmission during a geopolitical supply shock.

How to use this signal today

Composite is currently reading +0.501 in the Extreme POS band. Phase Healthy firing for 9 trading days.

Pair with the following for stacked inventory-plus-fundamental conviction: Strait of Hormuz chokepoint (companion signal), strategic-reserve flow (companion signal), NFCI financial conditions (companion signal), term structure (backwardation, timespreads), PADD3 refinery input, and demand gauges. Signal is a US-only inventory gauge; pair with EU plus China reserve flow (strategic-reserve companion) for complete global balance.

Reader rule: Tight firings warn of supply scarcity with the 2007-08 commodity supercycle and 2022 Russia-invasion window as canonical Phase +1 anchors. Loose firings confirm oversupply with the 2015-16 shale glut as canonical Phase −1 anchor. The 2.32 pp spread demonstrates the signal has directional edge via the inventory supply channel.

Methodology

Data source: EIA Weekly Petroleum Status Report, WCESTUS1 series (US crude stocks excluding SPR). Computation: year-over-year delta against prior year same week, z-scored on a three-year rolling window, inverted (so low stocks map to positive composite) and tanh-bounded to minus one through plus one. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3 (stocks tight), phase −1 below −0.3 (stocks loose). Target: NYMEX WTI Crude ratio-adjusted continuous close.

Historical window: EIA WCESTUS1 weekly from 1982; engine runs from 1982 with three-year z-score warmup through 1985.

Validation computed on 9,025 post-warmup daily observations. Phase +1 (Tight) WTI fwd60d plus 4.01 percent, edge +1.62 pp on 45 percent sample. Phase 0 (Normal) WTI fwd60d minus 0.43 percent, edge −2.83 pp on 16 percent sample. Phase −1 (Loose) WTI fwd60d plus 1.69 percent, edge −0.70 pp on 39 percent sample. 2.32 pp spread via inventory supply channel. Daily IC not individually significant on all sampling windows.

What this signal does not cover

The signal does not cover stock location (Cushing versus Gulf Coast versus PADD5). It does not capture product stocks (gasoline, distillate, jet fuel). It does not cover international inventories (EU, China,

OECD Asia-Pacific). Signal is a US crude-only aggregate; pair with Cushing-specific overlays, product stock overlays, and international reserve-flow overlays for complete context.

Disclaimer

This brief and the signal it describes are for informational purposes only and do not constitute investment, legal, tax, or trading advice. Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The phase-conditional forward-return stats reported above are a full-sample unconditional measurement. Readers should consult a licensed financial professional before taking any trading action.

References

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