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JMMF Feature article

Sulfur Prices are Indicative of the Dependence of the Global Technology Industry on Primary Raw Materials: Dawn of a New Critical Mineral

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1.0 Introduction

As of 14th April,2026 sulfur prices have already surged by roughly **70%** as the Middle East accounts for nearly **half of all global seaborne sulfur trade**. It is a critical "workhorse chemical" needed to produce sulfuric acid, which is essential for processing low-grade ores. Facilities typically only hold one to two months of stockpiles; a six-month disruption would lead to severe production halt.While the majority of sulfur today is recovered as a byproduct of oil and gas refining (to prevent pollution), **native sulfur** refers to sulfur found in its elemental, uncombined state in nature. Historically, this was the primary source of the element.

Sulfur is recovered today primarily as a byproduct of oil and gas refining via the **Claus process**. Refineries remove hydrogen sulfide from sour crude and natural gas using amine treatment, which is then oxidized and converted into pure, elemental yellow sulfur. This process helps meet strict environmental regulations, reducing pollution while generating a sellable byproduct used mainly for fertilizers and sulfuric acid. Today, more than **90% of global sulfur** is recovered as a byproduct of oil refining and natural gas processing. This isn't just a matter of resource efficiency; it is an environmental necessity to prevent acid rain.

Sulfur Recovery

The recovery happens in a two-stage industrial "relay": first, the sulfur is stripped from the fuel, and then it is converted into its elemental form.

Stage 1: Stripping (Hydrodesulfurization - HDS)

Crude oil and natural gas naturally contain organic sulfur compounds (like thiophenes and thiols). In a refinery, these are removed through a process called **Hydrodesulfurization**.

- **Reaction:** The fuel is mixed with hydrogen gas and passed over a catalyst (usually cobalt-molybdenum) at high temperatures (300°–400°) and high pressure.
- **Outcome:** The hydrogen "attacks" the sulfur in the fuel, breaking the chemical bonds and creating **Hydrogen Sulfide (H_2S)** gas.
- **Separation:** The H_2S (often called "sour gas" because of its rotten-egg smell) is separated from the now "sweetened" fuel.

Stage 2: Conversion (The Claus Process)

The H_2S gas captured in Stage 1 is toxic and cannot be released. It is sent to a **Sulfur Recovery Unit (SRU)**,

which uses the **Claus Process** to turn the gas into solid or liquid sulfur.

Step A: The Thermal Stage (Combustion)

About one-third of the hydrogen sulfide is burned in a furnace with oxygen.

$2H_2S + 3O_2$ -------$2SO_2 + 2H_2O$

This creates **Sulfur Dioxide (SO_2)**.

Step B: The Catalytic Stage (The "Claus" Reaction)

The remaining two-thirds of the H_2S is then reacted with the newly created SO_2 over an alumina catalyst.

$2H_2S + SO_2$ ------$3S + 2H_2O$

This reaction produces pure Elemental Sulfur (S) and water vapour.

Why this "Byproduct" Rules the Market:

- **Environmental Regulation:** Refineries are legally required to remove sulfur to meet "Ultra-Low Sulfur Diesel" (ULSD) standards.
- **Cost:** Because the sulfur *must* be removed anyway, refineries sell it at a price that traditional sulfur mines (like those in salt domes) simply cannot compete with.
- **Supply:** As we consume more energy, we inadvertently produce more sulfur, creating a steady, massive global supply.

A Note on Transport:

Once recovered, the sulfur is usually kept in a **molten (liquid) state** in insulated tanks or railcars. If it needs to be shipped as a solid, it is "pastillated" into small, dust-free beads to prevent fire hazards and respiratory issues.

The Supply-Demand Picture of Sulfur in the World Market in the Next 1 Year

As of mid-2026, the global sulfur market is undergoing a significant transformation. Historically a low-value byproduct of the oil and gas industry, sulfur has transitioned into a **strategic energy material**, leading to a supply-demand picture characterized by a **structural deficit** and high price volatility.

The market in the next year (mid-2026 to mid-2027) is defined by the following "tug-of-war":

1. The Supply Outlook: "Rigid and Constrained"

Sulfur supply remains inelastic because it is a byproduct; production does not increase just because the price goes up.

- **The "Hormuz" Risk:** Roughly **50% of the Global Seaborne Sulfur Trade** passes through the Strait of Hormuz. Recent geopolitical instability in the Middle East has added a "risk premium" to prices, as major producers (ADNOC, QatarEnergy, KPC) have adjusted their selling prices upward to account for logistical bottlenecks.
- **Byproduct Limitations:** As the world moves through the energy transition, global refining capacity is nearing its peak. While new refining capacity in **China** (adding ~400,000 tons) and **India** is coming online, it is barely keeping pace with surging demand.
- **Russian Shortfall:** Ongoing geopolitical conflicts continue to suppress Russian sulfur exports, which were historically a major component of the global trade flow.

2. The Demand Outlook: The "Dual Engine"

Demand is no longer just about agriculture; it is being driven by the green energy revolution.

- **The "Battery Boom":** This is the most significant shift. Sulfur is essential for leaching metals (like Nickel and Cobalt) for EV batteries. Indonesia's **HPAL (High-Pressure Acid Leaching)** plants are expected to consume an additional **6.5 million tons** of sulfur as they reach peak capacity in 2026.
- **Traditional Agriculture:** Phosphate fertilizer production remains the "backbone" of demand, consuming roughly 50% of the global supply. However, high sulfur prices are starting to cause "demand destruction" here—farmers and fertilizer producers in Brazil and India are increasingly struggling with affordability.

Supply-Demand Balance (2026 Forecast)

Metric	2026 Forecast Value	Trend
Global Supply	~82–83 Million Tons	Constrained growth (+2.2–3.0%)
Market Balance	**Deficit of ~5.1 Million Tons**	Widening gap
Price Outlook	**High & Volatile**	Testing historical highs ($400–$550/MT)

How the Price Moved from September 2025 to Today

The period from **September 2025 to today (April 2026)** has been one of the most explosive chapters in the history of the sulfur market. We have seen prices move from a "steady industrial level" to a "critical strategic peak," driven by a collision between old-world geopolitics and new-world energy needs.

Price Trajectory Summary

In September 2025, Middle East sulfur (FOB) was trading around **$315/MT**. As of today, April 2026, prices have surged to approximately **$575–$600/MT**—a nearly **90% increase** in just seven months.

The "Perfect Storm" Timeline

1. Late 2025: The Battery "Pull"

- **The Driver:** Demand from China's LFP (Lithium Iron Phosphate) battery sector exceeded all forecasts, while Indonesia's nickel-leaching plants (HPAL) scaled up their sulfur consumption by nearly **50%**.
- **The Result:** Sulfur inventories at major global ports (like Vancouver and Jubail) hit their lowest levels in years. By December 2025, prices had already crossed the **$500/MT** mark.

2. Q1 2026: The Hormuz Crisis

- **The Driver:** Geopolitical tensions in the Middle East escalated in early 2026, leading to shipping disruptions in the **Strait of Hormuz**. Since 45–50% of the world's seaborne sulfur passes through this corridor, the market panicked.
- **The Result:** "Risk premiums" were slapped onto every cargo. Freight costs and war-risk insurance tripled, pushing the **landed (CFR) price** in major consuming hubs like Indonesia and Brazil toward record highs.

3. March – April 2026: Supply Fragmentation

- **The Driver:** Russia's export capacity remained crippled by ongoing logistical sanctions and internal refinery instability. Simultaneously, **Turkey announced a total ban on sulfur exports** in early April 2026 to protect its own domestic fertilizer industry.
- **The Result:** A "two-tier" market has emerged. Strategic buyers (like battery metal producers) are paying top dollar to secure supply, while some fertiliser producers have been forced to "idle" plants because they can no longer afford the raw material.

Comparative Price Snapshot (2025 vs. 2026)

Region	Sept 2025 (Average)	Today (April 2026)	% Change
Middle East (FOB)	$315 /MT	$530 – $560 /MT	+73%
China (CFR)	$340 /MT	$580 – $610 /MT	+75%
Indonesia (CFR)	$365 /MT	$590 – $630 /MT	+68%
Brazil (CFR)	$330 /MT	$540 – $570 /MT	+67%

Why is this Movement Different from Past Cycles

In previous years, sulfur price spikes were usually short-lived and tied to "planting seasons." This current move is **structural**.

- **The "Nickel-Sulfur Link":** For every ton of nickel produced for an EV battery via HPAL, roughly **10 tons of sulfur** are consumed.
- **Inelastic Supply:** Because sulfur is a byproduct of oil/gas, refineries can't just "turn up the tap" because the price is high. We are effectively stuck with the supply we have, while demand is growing at **3% per year**.

The Bottom Line: If you are managing a supply chain today, the focus has shifted from "finding the best price" to simply "finding the molecules."

Month-by-Month Outlook of Sulfur Price from May 2026 to April 2027

The global sulfur market in the next 12 months (May 2026 – April 2027) is entering what analysts call a **"Structural Bull Phase."** We are moving away from seasonal agricultural cycles and toward a high-price floor driven by battery metal demand and geopolitical supply risks.

Below is the projected month-by-month trajectory based on current inventory levels, the Middle East geopolitical risk premium, and Indonesian nickel production ramp-ups.

Monthly Price Outlook (May 2026 – April 2027)

Month	Projected Price Trend	Key Market Driver
May 2026	**Peak ($550–$600/MT)**	**Middle East Supply Shock:** Lingering disruptions in the Strait of Hormuz keep "sour gas" exports constrained.
June 2026	**Slight Correction**	**Demand Destruction:** High prices force some fertilizer plants in Brazil and India to temporarily pause production.
July 2026	**Stable High**	**Indonesia HPAL Ramp:** New nickel leaching plants in Indonesia begin massive sulfur stocking for H2 operations.
August 2026	**Bullish**	**China Re-entry:** China lifts phosphate export restrictions, leading to a surge in internal sulfur demand for acid production.
Sept 2026	**Bullish**	**Autumn Fertilizer Window:** Peak demand from South Asia and the USA for fall application cycles.
Oct 2026	**Volatile**	**Energy Crunch:** Rising natural gas prices in Europe increase refinery costs, further squeezing sulfur recovery volumes.
Nov 2026	**Plateau**	**Contract Renewals:** Major Middle Eastern producers (ADNOC/QatarEnergy) set higher quarterly contract floors for 2027.
Dec 2026	**Minor Softening**	**Winter De-stocking:** Typical year-end inventory balancing in the Northern Hemisphere leads to a slight cooling.
Jan 2027	**Rebound**	**The "Battery Gap":** Realization of the 5-million-ton global deficit hits the market as battery metal demand accelerates.
Feb 2027	**Firm**	**LNY Holiday Lull:** Temporary dip in Chinese industrial activity, but prices stay firm due to low global stockpiles.
Mar 2027	**Rising**	**Spring Planting Prep:** Global fertilizer manufacturers compete for limited spot cargoes.
Apr 2027	**High & Tight**	**Maintenance Season:** Global refinery turnarounds reduce supply just as peak demand hits.

Critical Factors to Watch

- **The "Indonesia Variable":** In 2026, Indonesia is expected to consume an additional **6.5 million tons** of sulfur for its nickel-to-battery pipeline. This is the single biggest "demand shock" in the history of the sulfur market.
- **The Middle East Logistics:** Nearly **50% of seaborne sulfur** originates in the Persian Gulf. Any escalation in regional conflict acts as an immediate price multiplier.
- **China's Export Policy:** As a major producer and consumer, China's decision to either hoard sulfur for domestic batteries or export phosphate fertilizers will dictate the "swing" in global prices.

Work Out a Strategy

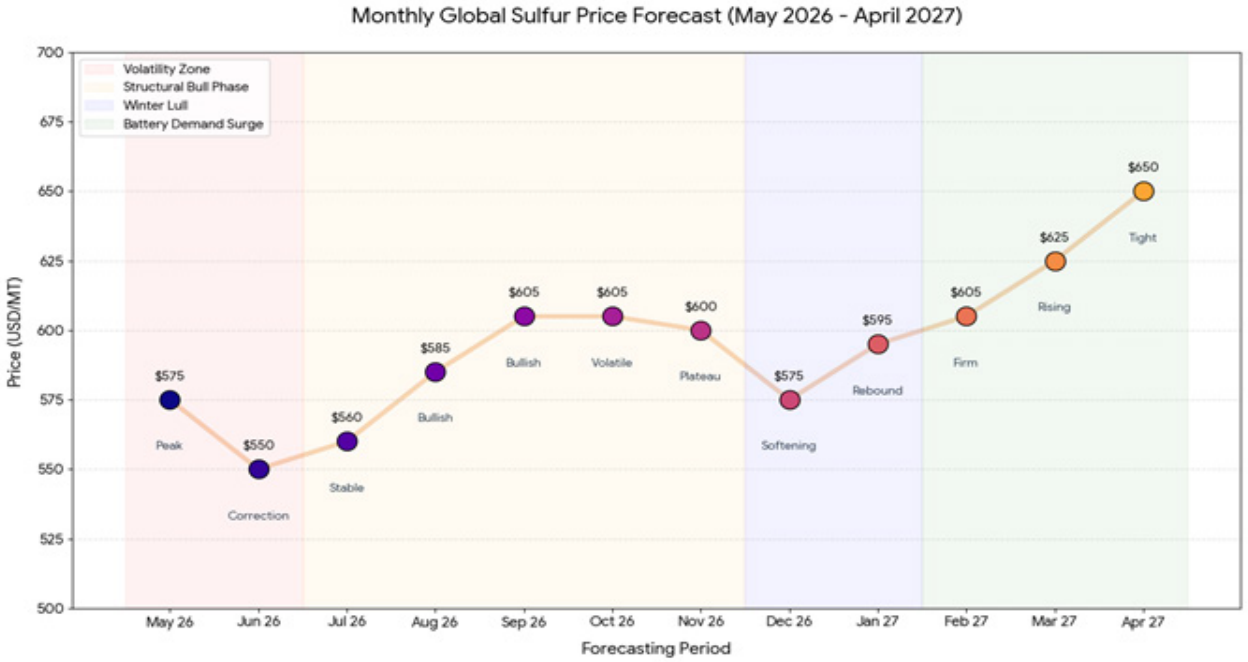
Expect the **average price center** for the next year to sit significantly higher than the 10-year historical average (traditionally $100–$200/MT). In this "New Era," prices below $350/MT are becoming rare, with spikes toward $600/MT likely if supply-chain bottlenecks persist.

Sulfur Prices Under Two Scenarios

If the major geopolitical conflicts (specifically in the Middle East and Eastern Europe) were to stop today, the sulfur market would experience an immediate "de-compression." While sulfur prices would not return to the $100 range (due to the new "floor" created by battery demand), the **$150–$200 risk premium** currently baked into the price would evaporate.

The "Peace Dividend" Comparison

The chart below compares the current high-volatility trajectory against a "Peace Scenario."



Detailed Comparison: Month-by-Month ($/MT)

Month	With War (Status Quo)	War Stopped Today	Difference (The "War Tax")
May 2026	$575	**$480**	-$95
June 2026	$550	**$420**	-$130
July 2026	$560	**$380**	-$180
August 2026	$585	**$360**	-$225

Month	With War (Status Quo)	War Stopped Today	Difference (The "War Tax")
Sept 2026	$605	**$375**	-$230
Oct 2026	$605	**$390**	-$215
Nov 2026	$600	**$410**	-$190
Dec 2026	$575	**$385**	-$190
Jan 2027	$595	**$400**	-$195
Feb 2027	$605	**$415**	-$190
Mar 2027	$625	**$440**	-$185
Apr 2027	$650	**$460**	-$190

Key Drivers of the Price Drop in a "Peace" Scenario

1. Logistics and Freight Normalization

Currently, seaborne sulfur from the Middle East is expensive due to skyrocketing insurance premiums and "war-risk" surcharges. Peace in the Middle East would immediately re-open the Suez Canal and Red Sea routes for Western markets, dropping the **landed (CFR) cost** by **$40–$60/MT** overnight.

2. The Return of Russian Supply

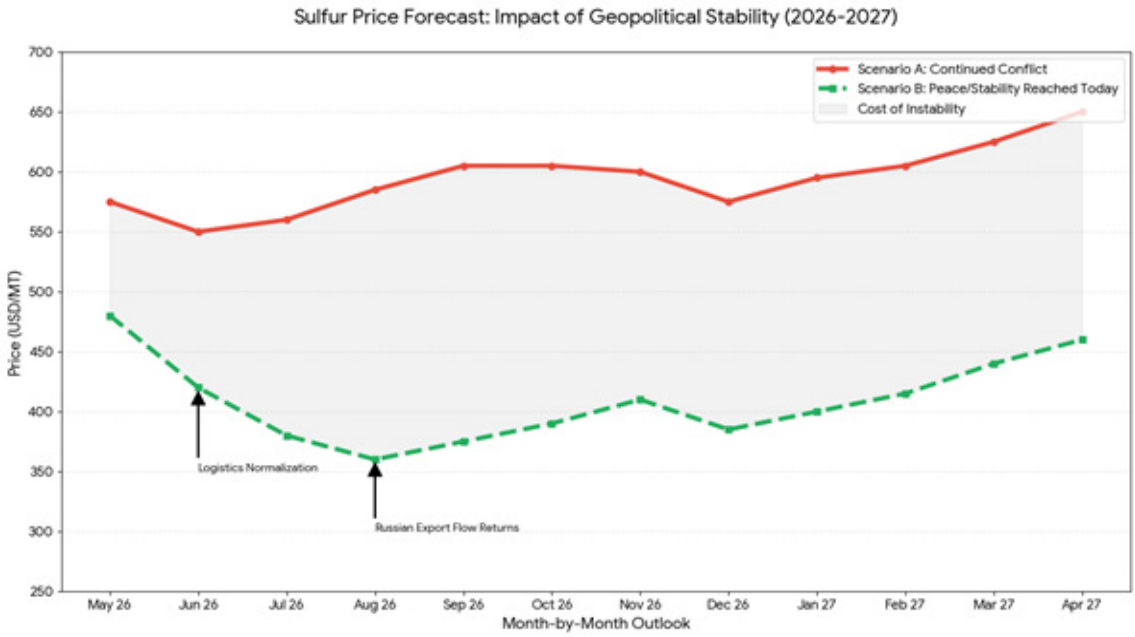
Russia is a top-three global sulfur exporter. Currently, its supply is "clogged" due to logistical sanctions and bank clearing issues. If peace is reached and trade normalizes, a massive "slug" of Russian sulfur (roughly 4–5 million tons) would hit the global market, breaking the current supply deficit.

3. Lifting of Protectionist Export Bans

Countries like Turkey and China have restricted sulfur/fertilizer exports to protect their domestic food security during wartime instability. In a peaceful global environment, these trade barriers would likely be lowered, increasing the "fluidity" of global supply.

4. The New "Floor" ($350+)

Even with peace, one will notice the price doesn't drop to historical lows ($150). This is because the **Indonesian Nickel/Battery boom** is an independent industrial trend. Peace would stop the panic, but the world would still be



short on sulfur due to the energy transition, keeping the price floor at a healthy **$350–$400/MT**.

If the War Intensifies and Blockages Exist

If the war were to intensify and key maritime chokepoints—such as the **Strait of Hormuz** or the **Suez Canal**—were blocked, the global sulfur market would move from a state of "scarcity" to a state of **"systemic collapse."** Under this scenario, price discovery would become nearly impossible, and "spot prices" would reflect extreme desperation rather than industrial logic.

Scenario Analysis: Conflict Intensification (Scenario C)

In an intensification scenario, we project sulfur prices to break through the **$1,000/MT** barrier by early 2027. This represents a total market fracture where the cost of the raw material exceeds the value of the final products (food and energy).

Specific Disruptions under "Intensification"

1. The "Hormuz Chokepoint" Effect

The Middle East produces the bulk of the world's exported sulfur as a byproduct of natural gas. A blockage here doesn't just raise prices—it physically removes the product from the global ecosystem. There is no alternative supply source large enough (e.g., Canada or Kazakhstan) that can replace Middle Eastern volumes in the short term.

2. The "Food vs. Fuel" War

At $1,000/MT, sulfur becomes too expensive for agricultural use. Fertilizer companies would be forced to stop production, leading to a massive deficit in phosphate fertilizers for the 2027 planting season. Governments would likely have to choose between subsidizing fertilizer to prevent famine or allowing the sulfur to go toward the high-margin "Green Energy" sector (batteries).

3. Logistical Rerouting Costs

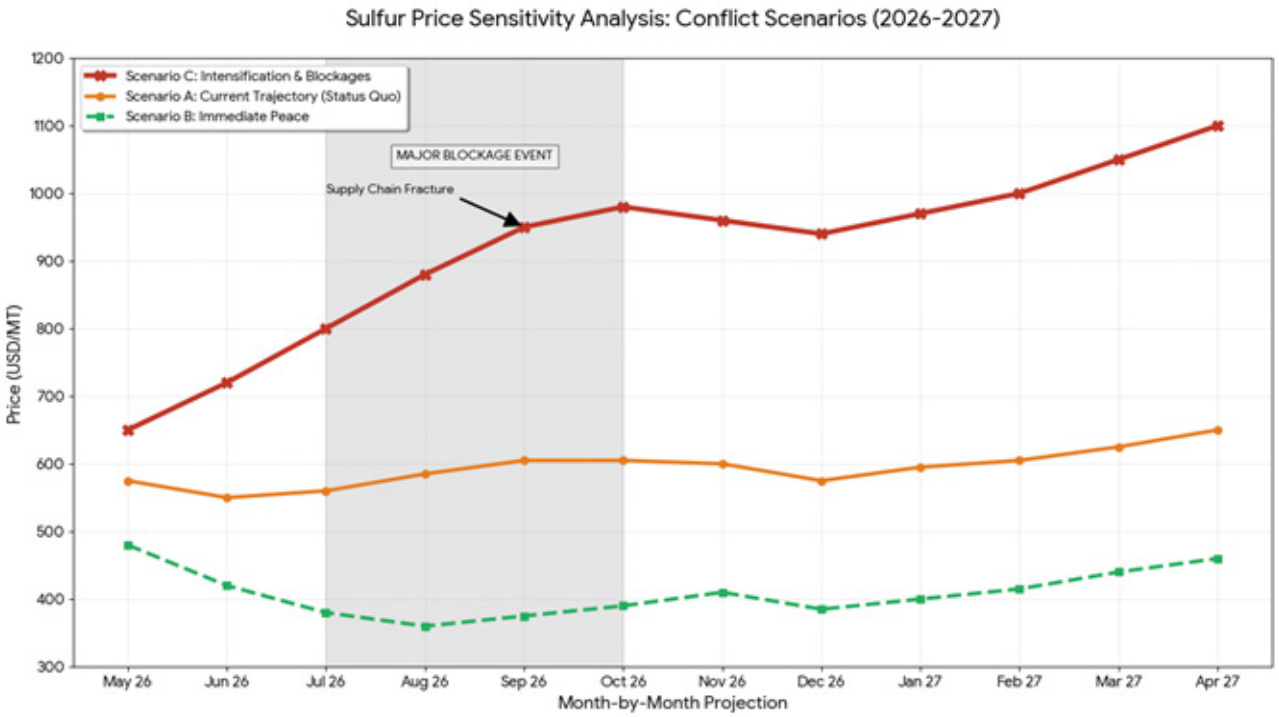
If the Suez Canal or major Red Sea ports are blocked, ships must travel around the Cape of Good Hope. This adds **15–20 days** to transit times and increases freight costs by **$30–$50/MT** purely in fuel and labor, even before considering the higher price of the sulfur itself.

4. Energy Security Feedback Loop

Sulfur is required to refine gasoline (alkylation) and treat power plant emissions. An intensification of war typically involves high energy prices; when you add a sulfur shortage on top of high oil prices, the cost to produce "clean" gasoline or electricity increases exponentially, further fueling global inflation.

Monthly Outlook: The Intensification Timeline

Month	Projected Price ($/MT)	Impact of Intensification
May - June 26	**$650 – $720**	**Initial Shock:** Escalation leads to panic buying. Importers in India and Brazil begin "hoarding" any available cargoes.
July - Sept 26	**$800 – $950**	**The Blockage:** A closure of the Strait of Hormuz cuts off 50% of the world's seaborne sulfur. Global inventories drop to "zero days" of safety cover.
Oct - Dec 26	**$980 – $940**	**Industrial Shut-downs:** Fertilizer production in non-producing nations halts entirely. Only the most profitable EV battery projects continue to purchase.
Jan - Apr 27	**$970 – $1,100**	**Total Fracture:** Prices go "parabolic." Black markets emerge. Nations begin seizing sulfur stockpiles as "strategic assets" for national security.



Conclusions: A New Critical Mineral

The comprehensive analysis of the sulfur market from 2025 through 2027 leads to one unavoidable conclusion: **Sulfur has officially transitioned from an industrial "waste byproduct" to a "strategic critical mineral."**

The following five pillars summarize the core observations of this market evolution:

1. The End of "Cheap" Sulfur

Historically, sulfur prices fluctuated between **$50 and $150/MT**. Those days are likely gone forever. Even in a "Peace Scenario," the structural demand from the energy transition has created a new price floor near **$350/MT**. The market is no longer driven solely by seasonal agriculture but by the year-round, high-intensity needs of the EV battery supply chain.

2. Geopolitics as the Primary Price Driver

Because nearly **half of the world's seaborne sulfur** originates in the Middle East or travels through sensitive corridors (Suez/Hormuz), the price of sulfur is now a direct barometer for global stability.

- **Stability** equals manageable costs ($400 range).
- **Conflict** equals systemic failure ($1,000+ range).

3. The "Food vs. Technology" Conflict

We are witnessing a "tug-of-war" for sulfur molecules.

- **Agriculture** (Fertilizer) is a low-margin business that cannot easily absorb high sulfur costs without triggering food inflation.
- **Technology** (EV Batteries/Nickel) is a high-margin business that can afford to pay a premium to secure supply. This creates a disruptive environment where the "Green Revolution" may inadvertently jeopardize "Global Food Security."

4. Inelastic Supply vs. Elastic Demand

Since sulfur is produced as a byproduct of oil and gas refining, its supply cannot be "ramped up" easily. If the world builds more battery plants, we cannot simply "mine more sulfur" to keep up. This **inelastic supply** ensures

that any minor disruption in logistics or a slight surge in demand leads to **extreme price volatility**.

5. Regional Protectionism and Supply Sovereignty

As seen with recent export bans in Turkey and China, sulfur is becoming a tool of national security. Countries are increasingly likely to hoard their domestic sulfur to protect their own farmers and manufacturers. This "Supply Nationalism" will likely lead to a fragmented global market where prices vary wildly from one region to another based on local availability rather than global benchmarks.For industrial units, sulfur is no longer a commodity to be purchased "at the gate" on a whim. Success in the next three years will require **long-term strategic sourcing, vertical integration** (owning the sulfuric acid plant), and a heavy focus on **sulfur recycling technologies** to reduce dependence on a volatile global market.

Strategic Note: ***In the 20th century, we looked at Oil as the indicator of industrial health. In the mid-21st century, Sulfur may well be the metric that determines which nations can successfully feed their people while simultaneously powering their electric grids.***