

CONCORDE
SPECIALTY GASES





Overview: SF6 Gas Supply Chain

- SF6 Gas Market continues to grow at 5.5% CAGR
 - SF6 Gas is expected to grow to 6.0% CAGR by 2026 <https://www.marketwatch.com/press-release/sulfur-hexafluoride-sf6-gas-market-insights-2030-2023-06-09>
- Emerging Markets Require the Majority
 - Asia Pacific <https://www.marketwatch.com/press-release/sulfur-hexafluoride-sf6-gas-market-insights-2030-2023-06-09>
- Current fluctuation in SF6 Gas Pricing
 - Demand Outpacing supply
- No Single Factor Causing Current Pricing – Perfect Storm
 - COVID-19
 - Global Logistic
 - Raw Material Demand
 - Hydrogen Fluoride Demand
 - SF6 Gas Market Drivers
 - The Impact on Rare Gases Due to The Russian Invasion of Ukraine (Gasworld, Volume 60, No. 05, May 2022)
 - Increased Duty, Freight, and Energy Surcharge



COVID-19

- Global Supply Chain is a Fragile System
- Post-pandemic world economy still feeling COVID-19's sting
<https://news.un.org/en/story/2023/05/1136727>
- Pandemic affected every part of the value chain
 - Port closures and congestions
 - Labor shortages
 - Difficulties with capacity utilization
 - Lack of new shipping containers
 - Chassis Shortage – U.S. Tariff on Chinese-Produced Chassis – U.S. made 1 –year
<https://usatruckloadshpping.com/container-chassis-shortage/>

Maritime Shipping – Shipping Delays & Freight Cost Increase 2023

<https://www.freightos.com/freight-resources/shipping-delays-and-cost-increases/>

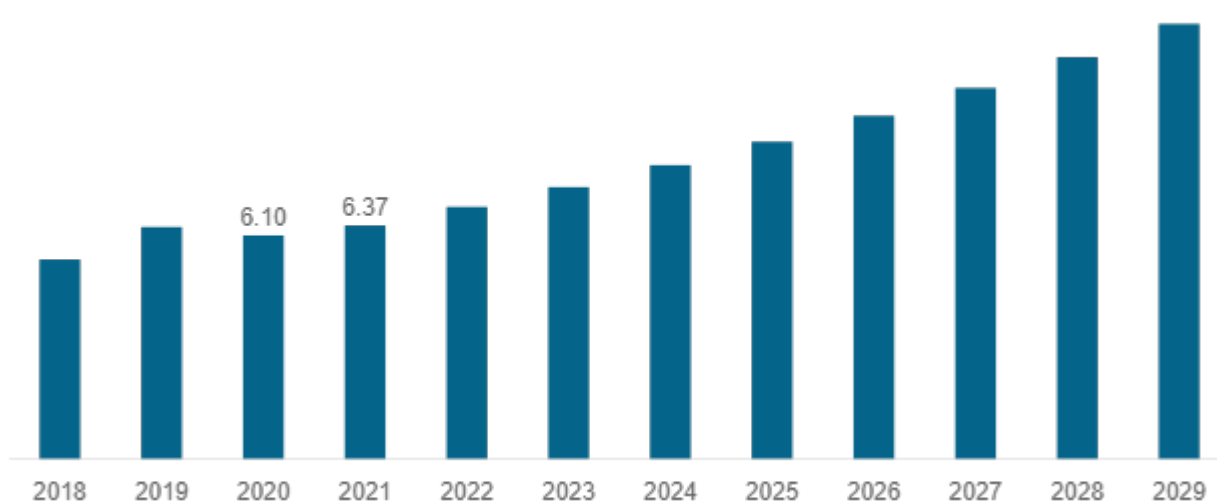
- A single port closure – estimated 13% back up in containers shipped
 - Car carrier caught on fire at the Port of Newark
 - Labor disputes at U.S. Ports



Global Logistics Disruption

- Logistic Disruption – Port Closures
- China’s live fire military drills near Taiwan – Shut down Shipping
- Maritime Freight Cost – 47% increase (9% by 2024)
<https://www.ecomcrew.com/sea-freight-rates-have-soared/>
- Production Delays – Imports and Exports Delayed
- Commodity Pricing – Import of Raw Material
- Higher demand for other lucrative products – Semi.

Asia Pacific Semiconductor Gases Market Size, 2018-2029 (USD Billion)



www.fortunebusinessinsights.com

Bar Graph:

Blue the number of ships

Orange represent ships that are not at capacity
Less vessels, and are not leaving until the ship is at capacity.



https://www.joc.com/article/carriers-pare-blank-sailings-may-ocean-freight-rates-steady_20230525.html



Raw Material Demand for Fluorine Production

- Fluorspar – Mineral
 - Steyuan Mineral Resource Group - China
 - Mexichem Koura, Fluor S.A. De C.V. - Mexico
 - Yaroslavsk Mining Company - Russia
 - Mineral De Orgiva - Spain
 - MongolRos Tsvetmet – Mongolia

(Mexichem declared force majeure on all supply contracts – exacerbating a tight market)

- 60-65% of Fluorspar consumed – Production of Hydrogen Fluoride
- Hydrogen fluoride – Most important compound of fluorine
- 5.5% growth in Hydrogen Fluoride – product of fluorocarbons and fluorinated derivatives
 - Semiconductor, Uranium Hexafluoride and Sulfur Hexafluoride
 - Intel opening in Arizona
 - Micron new facility in New York
 - Intel broke ground (Sept. 2022) in Ohio



Semiconductor Gas Demands



Shortages of specialty gases & chemicals needed for chip expansions

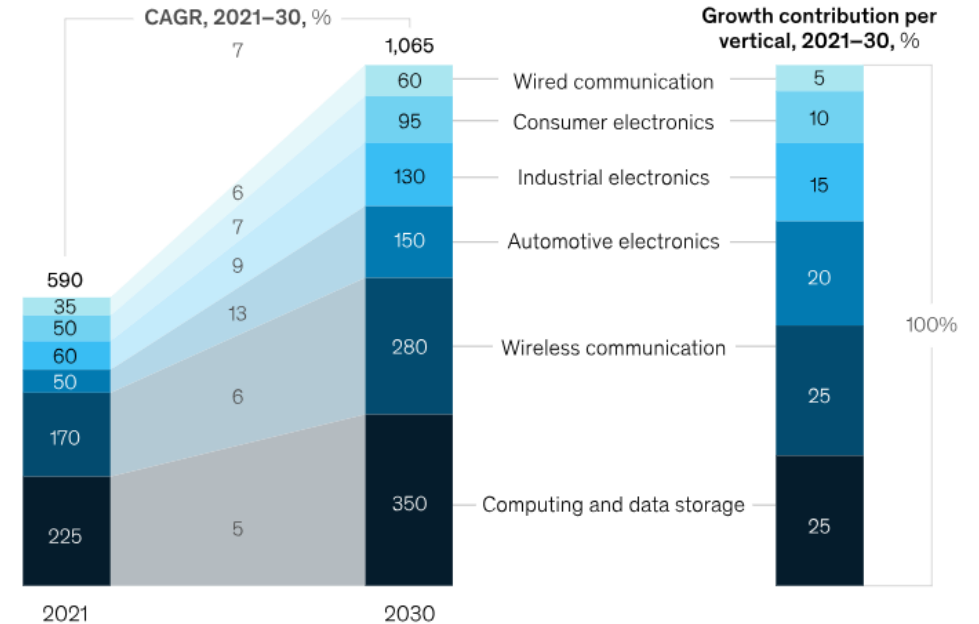


<https://www.gasworld.com/story/shortages-of-specialty-gases-chemicals-needed-for-chip-expansions/>

Semiconductor Gases Market Is Expected To Reach around USD 15.56 Billion by 2030, Grow at a CAGR Of 7.5% during Forecast Period 2023 To 2030 | Data By Contrive Datum Insights Pvt Ltd.

<https://www.globenewswire.com/news-release/2023/02/09/2605416/0/en/Semiconductor-Gases-Market-Is-Expected-To-Reach-around-USD-15-56-Billion-by-2030-Grow-at-a-CAGR-Of-7-5-during-Forecast-Period-2023-To-2030-Data-By-Contrive-Datum-Insights-Pvt-Ltd.html>

Global semiconductor market value by vertical, indicative, \$ billion



<https://www.mckinsey.com/industries/semiconductors/our-insights/the-semiconductor-decade-a-trillion-dollar-industry>



SF6 Gas Market Driver

- Global SF6 Gas Manufactures – County Import into United States – 2020
 - Russian Manufactures (39.5%)
 - Chinese Manufactures (21.2%)
 - Germany and South Korea Manufactures (25.9%)
 - Japanese Manufacture (13.6%)
- Russian/Ukraine War Affect on the SF6 Gas Market
 - Russian Manufactures – Not bound by sanctions but the banking is affected – USD
 - Duty: 25% - Freight: \$18,428.22 (20' container roundtrip) - Additional cost per lb.: \$3.96/lb.
 - Chinese Manufacture – Force majeure on supply contracts
 - Duty: 28.8% - Freight: \$21,982.11 (20' container one-way) - Additional cost per lb.: \$3.81/lb.
 - German Manufacture – Force majeure on supply contracts
 - Freight: \$14,902.22 (ISO Tube roundtrip) - Energy Surcharge: \$2.97/lb. (\$2.58/lb.) - Additional cost per lb.: \$4.50lb. (\$4.11/lb.)
 - Energy Surcharge changing monthly*



Future Needs of SF6 in North America

Bill Gates Says High-Voltage Power Lines Will Save America. He's Right.

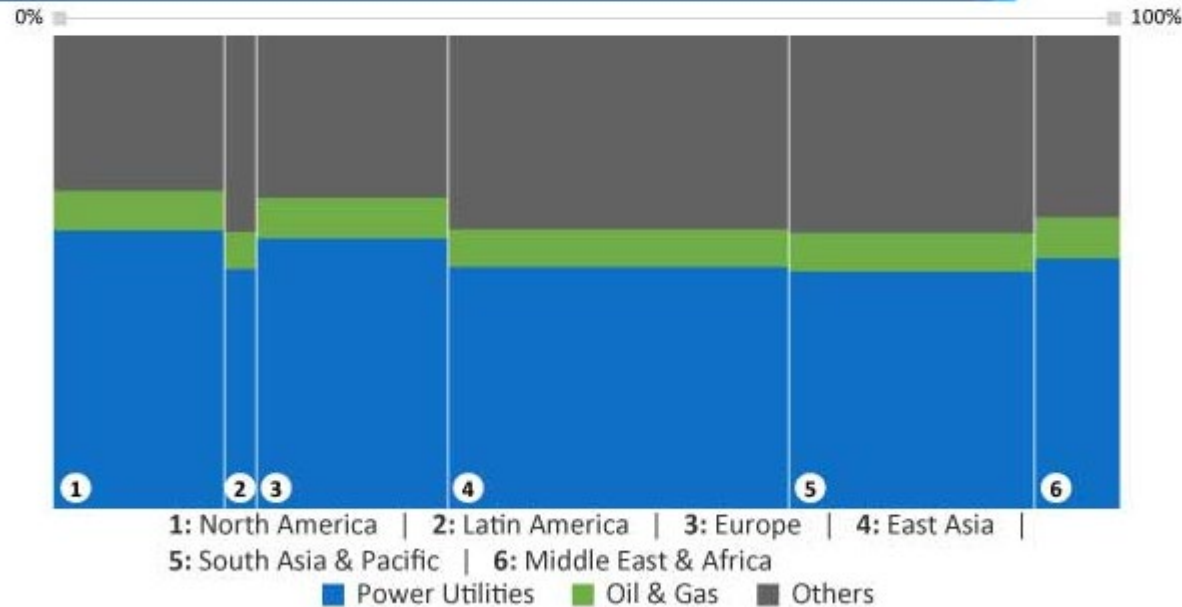
Gates goes one to explain that if the U.S. wants to reach its net-zero carbon emissions goal in 2050, the country is going to need an upgraded energy grid that can handle the estimated 40 to 60 percent increase in electricity demand because of the proliferation of electric vehicles, electric stoves, and other electric-powered appliances and infrastructure.

<https://www.popularmechanics.com/science/green-tech/a42780369/bill-gates-transmission-power-lines/>



End-User Location

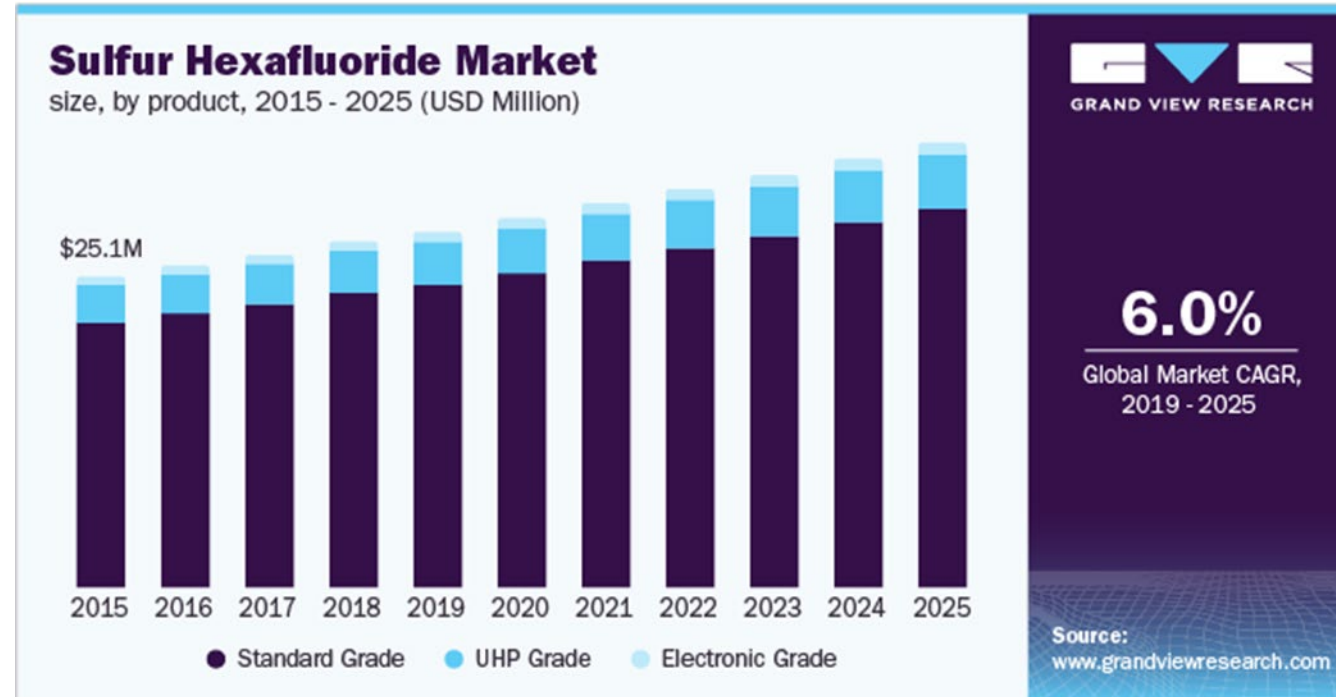
Global Di-electric Gases Market, Key Regions and End Use Sector Mekko Chart, 2021



More projects that require SF6 gas is going to the emerging markets. With a limited supply currently on the market price is going to dictate who and where SF6 gas will go.



Forecasted Market



Global market of SF₆ gas. The forecast have not factored in the semi-conductor market that will require fluorine for their etching gases. The chart was made before the Intel plant in Arizona, the new semi-conductor expansion fabs in Ohio and New York State.



3M NOVEC

- PFAS (polyfluoroalkyl)
 - **Exit all PFAS manufacturing by the end of 2025:** 3M will discontinue manufacturing all fluoropolymers, fluorinated fluids, and PFAS-based additive products. We will help facilitate an orderly transition for customers. 3M intends to fulfill current contractual obligations during the transition period.
 - **Work to discontinue use of PFAS across our product portfolio by the end of 2025:** We have already reduced our use of PFAS over the past three years through ongoing research and development, and will continue to innovate new solutions for customers.
 - <https://news.3m.com/2022-12-20-3M-to-Exit-PFAS-Manufacturing-by-the-End-of-2025>

- Will this cause SF6 Gas demand to increase?
 - That is why we are all here.



Summary & Conclusion

- Tightening of the SF6 gas market – *No allocations* – Changing daily
- Supply remain consistent – significantly higher price
- Commodity prices – above the 5-year average
- COVID surge and a Prolong War – exacerbate the market
- Russian/Ukraine war reinforces organizations need a more resilient supply chain.

- Conclusion:
 - OEMs and Utilities need to use their SF6 Gas more efficiently and continue to partner with a company that help them reach their goals.
 - SF6 Gas Reporting – Tracking Usage and Heel Gas
 - SF6 Gas Management – Best practices – What is working for others.
 - SF6 Gas Recycling/Reconditioning for reuse – Off New Gas Purchase/Keep nameplate consistent