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ECONOMIC UPDATE

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EXECUTIVE SUMMARY

AMERICAS: THE FED SLOWED ITS TIGHTENING WITH ¼ POINT BUMP AND SIGNALLED MORE HIKES AHEAD. The February 1st decision followed six consecutive larger rate rises. January data showed: **U.S. manufacturing** contracted again as higher interest rates stifled demand for goods, but factories didn't lay off workers in large numbers. **Nonfarm employment** increased by 517,000. Employment in the goods-producing segment grew by 46,000, led by construction and manufacturing. **Consumer confidence** fell as households continued to worry about the economy's prospects. December data showed: **The leading economic indicators**, a gauge of future U.S. economic activity, tumbled for a 10th straight month. **Durable goods orders** rebounded 5.6% due to a surge in the volatile civilian aircraft category, where orders rocketed 115.5%. **Factory orders** rebounded in December, increasing 1.8% after dropping 1.9% in November. **The U.S. trade deficit** for all of 2022 rose 12.2% to \$948.1 billion, the widest gap on record. **The producer price index** fell 0.5% as the costs of energy products and food declined, offering more evidence that inflation was receding. **Consumer prices** dipped 0.1%, the first decline since May 2020. Gasoline prices tumbled 9.4%. **Retail sales** plummeted 1.1%, the biggest drop in two years.

OVERSEAS: THE IMF NOW EXPECTS AN IMPROVEMENT IN THE 2ND HALF OF THE YEAR AND INTO 2024. At the World Economic Forum in Davos, business leaders and top government officials expressed optimism for the global economy as China drops COVID controls, the U.S. launches a green investment boom and Western Europe adjusts to Russia's war in Ukraine. **Germany's economy** grew by 1.9% in 2022. **The Chinese economy** advanced 3.0% in 2022, the lowest since modern Chinese GDP records began in the 1970s.

STEEL: NUCOR AND STEEL DYNAMICS OFFERED UPBEAT OUTLOOKS FOR THE STEEL INDUSTRY that countered the widespread view of a difficult economy in 2023. Nucor expects 1stQtr earnings to shake off last year's sluggish ending. Steel Dynamics said customer order entry activity remains healthy, steel pricing has firmed and the company believes North American steel consumption will increase in 2023. **Stainless steel prices** increased for the 2nd consecutive month in January and will rise again in February, pushed up by increases in nickel and ferrous scrap surcharges. LME nickel prices applied to January surcharges rose from \$10.89/lb to \$12.48/lb.

AUTOMOTIVE: EV SALES ACHIEVED 10% MARKET SHARE FOR THE FIRST TIME LAST YEAR, driven mainly by strong growth in China and Europe. U.S. auto makers sold 807,180 fully electric vehicles, raising the share of all-electric to 5.8% of total vehicles sold, up from 3.2% in 2021. **Electric air taxis** are capturing the attention of innovators around the world, including auto manufacturers Toyota, Porsche and Hyundai, looking for new and lucrative ways to adapt as the world moves to greener forms of transportation.

ENERGY: HANWHA WILL BUILD AN ENTIRE SOLAR-MANUFACTURING SUPPLY CHAIN IN GEORGIA, the biggest solar investment spurred so far by new tax incentives. The South Korean conglomerate's Qcells unit will build facilities that will manufacture 3.3 gigawatts of solar panels a year, 18% of the estimated U.S. demand in 2022. **Air Products and AES Corp**, a power company, are planning to build a \$4bn renewable-powered hydrogen factory in northern Texas. **Japan's ambitions to reboot its nuclear industry** risk being set back by a shortage of engineers and manufacturing capacity that has atrophied in the decade since the Fukushima disaster.

MEDICAL: GENERAL ELECTRIC STARTED 2023 BY SPLITTING OFF ITS HEALTHCARE UNIT, completing a key step in the slow-motion breakup of the industrial giant. GE HealthCare Technologies started trading the first week of 2023. **Medical device companies** set a positive tone for 2023 at the J.P. Morgan Healthcare Conference. **Dexcom and Intuitive** shared early results. Dexcom expects its 2023 revenue to increase by as much as 20%. Intuitive forecast a 12% to 16% increase in procedure volumes for the year.

AEROSPACE: CANADA WILL PURCHASE 88 F-35 COMBAT JETS MANUFACTURED BY LOCKHEED MARTIN to refurbish the country's aging air force. The total cost is budgeted at US\$14bn, with deliveries set to start in 2026. **SpaceX** is pushing to increase its flight rate this year as competitors work to debut new vehicles for the launch market. It is aiming to conduct up to 100 orbital flights in 2023, a 64% jump. **Boeing** reported a sharp jump in airplane orders and deliveries in 2022 but trailed Airbus for the fourth-straight year. Boeing delivered 480 airplanes and won 774 net new orders, while Airbus delivered 661 jets and won a net total of 820 new orders.

COMMODITIES: COPPER AND IRON ORE RALLIED IN JANUARY AS CHINA REOPENED ITS VAST ECONOMY, with benchmark copper prices passing \$9,000/tonne for the first time since June. Iron ore has risen 50% since its low in June, surging to more than \$120/tonne. **Molybdenum prices** reached their highest level in 17 years at the end of January. **Russian-made aluminum** is about to be slapped with a 200% tariff by the U.S. to keep pressure on Moscow as the one-year anniversary nears of the invasion of Ukraine.



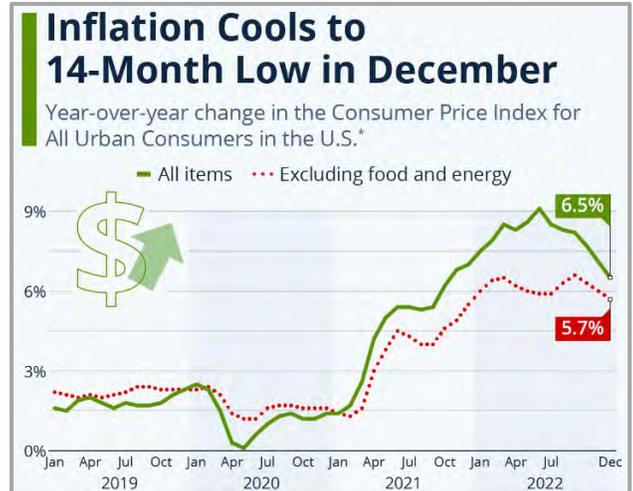
THE AMERICAS

- **Retail sales** plummeted 1.1% in December, the biggest drop in two years. A cold snap in December likely chilled sales, especially at restaurants and bars. Lower gasoline prices also helped to knock down sales. Receipts at service stations tumbled 4.6%. Sales at auto dealers fell 1.2%. Excluding automobiles, gasoline, building materials and food services, so-called core retail sales fell 0.7%.

Key Update: U.S. GDP increased at an annual rate of 2.9% in the 4thQtr of 2022, but momentum appears to have slowed considerably towards year-end. Consumer spending, the bedrock of the U.S. economy, grew at a 2.1% rate.

- **The U.S. trade deficit** was \$67.4 billion in December, as demand for consumer goods and autos picked up. The deficit for all of 2022 rose 12.2% to \$948.1 billion, the widest gap on record, as the U.S. continued to depend heavily on imports from other countries to meet domestic demand.
- **U.S. import prices** rebounded 0.4% in December after declining 0.7% in November. Imported fuel prices rose 0.6%. This first monthly rise since June 2022 reflected a 59.5% surge in natural gas prices, which offset a 2.7% drop in petroleum prices. Export prices fell 2.7%.
- **Durable goods orders** rebounded 5.6% in December due to a surge in the volatile civilian aircraft category. Orders for transportation equipment rebounded 16.7% after falling 5.0% in November. Motor vehicle orders rose 0.7%. Orders for civilian aircraft rocketed 115.5%.
- **U.S. manufacturing** contracted further in January as higher interest rates stifled demand for goods, but factories did not appear to be laying off workers in large numbers. The ISM's manufacturing PMI dropped to 47.4, the lowest level since May 2020 and below the 48.7 mark viewed as consistent with a recession in the broader economy.
- **Producer prices** fell 0.5% in December as the costs of energy and food declined, offering more evidence that inflation was receding. In the 12 months through December, the PPI increased 6.2% after climbing 7.3% in November. A 1.6% decline in the prices of goods accounted for the drop in the PPI. Goods were pulled down by a 7.9% plunge in energy and a 1.2% drop in food prices. Services prices edged up 0.1% after rising 0.2% in November.
- **The leading economic indicators**, a gauge of future U.S. economic activity, tumbled for a 10th straight month in December with a widespread weakening outlook for manufacturing, home building and both job and financial markets. The CB LEI slid 1.0% in December, following a downwardly revised drop of 1.1% in November.

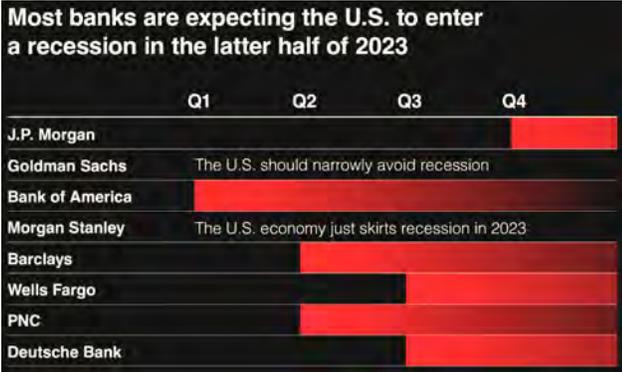
- **The consumer price index** dipped 0.1% in December, the first decline since May 2020. Gasoline prices tumbled 9.4% but natural gas increased 3.0% and electricity rose 1.0%. Food prices climbed 0.3%, the smallest gain in nearly two years. Prices for used cars and trucks fell 2.5%. New motor vehicles slipped 0.1%. In the 12 months through December, the CPI increased 6.5%. That was the smallest rise since October 2021 and followed a 7.1% advance in November.



- **Nonfarm employment** increased by 517,000 in January following an upwardly revised 260,000 gain in December. The unemployment rate slipped to 3.4% from 3.5%. Monthly average hourly earnings grew 0.3%, while annual wage growth came in at 4.4%. Separately, the government reported that U.S. labor costs increased 1.0% in the 4thQtr, their slowest pace in a year as wage growth slowed.
- **U.S. industrial production** declined 0.7% in December, driven down by decreases in manufacturing and mining output. Manufacturing output decreased for the second-straight month, falling 1.3% amid widespread declines across the sector. Annually, manufacturing output was down 2.5%. Mining output fell 0.9%, but utilities output rose 3.8%. Total industrial capacity utilization dropped to 78.8% in December from November's revised 79.4%.
- **Factory orders** rebounded in December, increasing 1.8% after dropping 1.9% in November. Factory orders were up 11.8% YOY. The December rebound was driven by a 16.9% jump in bookings for transportation equipment, which was driven by a 115.5% surge in orders for civilian aircraft. Motor vehicle orders fell 0.7%.
- **Consumer confidence** unexpectedly fell in January as households continued to worry about the economy's prospects over the next six months. The Conference Board said its consumer confidence index slipped to 107.1 in January from 109.0 in December.



- **Comments from Fed officials** were in concert with the prevailing wisdom that the U.S. economy will likely slow in 2023 but without a recession. The officials suggested that despite signs of slowing inflation, further smaller rate increases will be needed earlier in the year before stopping at some point and holding rates elevated through 2023. Most banks expect a recession in the second half of 2023.



- **Existing home sales** slid 17.8% in 2022 YOY to 5.03mn, their lowest level since 2014, as surging mortgage rates made home purchases too expensive for many buyers. December sales dropped 34% YOY. Sales of new homes rose for a third month in December, expanding 2.3% to an annualized 616,000 pace. Housing starts fell 1.4% to a rate of 1.382mn units in December and were down 3.0% for all of 2022. Mortgage rates reached a four-month low in January when the average for a 30-year, fixed loan dipped to 6.15%.

Key Update: At the current 30-year average, a borrower with a \$600,000 mortgage would pay roughly \$3,655 a month, about \$940 more than a year ago, when rates were 3.56%.

- **The services industry activity** rebounded strongly in January, as new orders recovered and prices paid by businesses for materials rose at a moderate pace. Non-manufacturing PMI increased to 55.2 vs. 49.2 in December.
- **Construction spending** dropped 0.4% in December but was up 10.2% for the full year 2022. Investment in residential construction slipped 0.3% in December, with spending on single-family housing projects tumbling 2.3%. Outlays on multi-family housing projects increased 3.2%.
- **U.S. consumer spending** fell 0.2% in December, the second straight monthly drop. Spending on gasoline declined 9% and new vehicles 5.2%. Personal income increased 0.2%. The personal saving rate rose to 3.4% from 2.9% in November, as consumers earned more and spent less.
- **U.S. steel mills** shipped 6.938 million tons of steel in November, a 12.1% drop from a year ago. Shipments for eleven months were 82.613 million tons, down 4.9% from the same period of 2021. (See **Appendix: Steel**, page 8)

- **Steel imports** into the U.S. in December totaled 2.186mn tons, including 1.848mn tons of finished steel. Full year 2022 total and finished steel imports were 30.832mn and 25.249mn, down 2.0% and up 10.9% respectively vs. 2021. Finished steel import market share was an estimated 23% in December and 24% for full year 2022.

- **Stainless steel prices** increased for the 2nd consecutive month in January and will rise again in February, pushed up by increases in nickel and ferrous scrap. LME nickel prices applied to January surcharges rose from \$10.89/lb to \$12.48/lb. Along with higher ferrous scrap, this led to a \$0.16/lb increase for grade 304. February surcharges will add another \$0.06/lb. Grade 316 is also affected by molybdenum prices which were up by \$3.60/lb.

- **Mill service centers** finished 2022 with 557,000 tons of stainless, 31% more YOY and represented four months of supply based on December shipments. Service centers shipped 1.7 million tons last year, down 3.4% from the prior year. Current stainless demand is described as “a bit lackluster”. Mill lead times for flat-rolled are 1-2 months.

- **Carbon steel sheet prices** increased in January with producers generally quoting \$800/ton for hot-rolled spot transactions. Large orders sold as low as \$720/ton. The January scrap market saw substantial price increases, mills stood more firm and spot transaction prices climbed.

- **Nucor and Steel Dynamics** reported strong 4thQtr results and offered upbeat outlooks for the industry that countered the widespread view of a difficult economy in 2023. Nucor expects 1stQtr earnings to shake off last year's sluggish ending, after U.S. Steel warned recession concerns could hurt demand. Steel Dynamics said customer order entry activity remains healthy, steel pricing has firmed and the company believes North American steel consumption will increase in 2023.



- **Russian-made aluminum** is about to be slapped with a 200% tariff by the U.S. to keep pressure on Moscow as the one-year anniversary nears of the invasion of Ukraine. The administration is concerned about collateral damage to U.S. industries, including aerospace and automobiles. Such a steep tariff would effectively end U.S. imports of the metal from Russia. While the country has traditionally accounted for 10% of total U.S. aluminum imports, the amount has dropped to just more than 3%, according to U.S. trade data.

Key Update: Aluminum prices dropped about 15% last year amid worries of a slowing global economy and the ongoing pandemic lockdowns in China, the world's largest consumer.

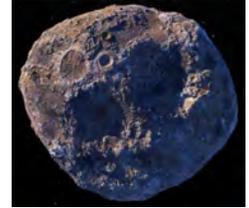
- **Electric air taxis** are capturing the attention of innovators around the world, including auto manufacturers looking for new and lucrative ways to adapt, as the world moves to greener forms of transportation. Toyota, Porsche and Hyundai see potential in such technologies, known in the industry as eVTOL, or electric vertical take-off and landing aircraft. These automakers are offering not only financial investments, but also their expertise and knowledge on areas such as mass production and supply chains.



Key Update: *With advancements in overlapping technologies such as batteries, processing/computing power and advanced composite systems, autonomous aircraft could be commonplace by 2040, per Morgan Stanley.*

- **Tesla** cut prices by up to 20% across the U.S. and Europe to lift demand for its EVs in the face of an economic slowdown and fiercer competition from established brands. The cuts were in response to falling supply-chain costs, as well as lower costs from shifting components closer to factories. Tesla reported record profit for the 4thQtr of \$3.7bn, up 59% from a year ago. (See **Appendix: Automotive**, page 11).
- **Ford** said it will increase production and cut prices of its flagship electric SUV to remain competitive in the electric vehicle marketplace, just weeks after Tesla’s decision to cut prices for its EVs in the U.S. and Europe.
- **General Motors** posted \$2bn net profit for the 4thQtr, a strong result as factory output rebounded from supply-chain troubles and pricing held strong despite mounting consumer pressures. GM said it is investing \$650mn in a mining company to jointly develop a lithium-extraction project in Nevada to support EV sales in coming years.
- **Tesla** is investing \$3.6bn in two new factories to build EV batteries and its all-electric Semi heavy-duty truck near an existing production site in Reno, Nevada. The new battery facility will have capacity for up to 2mn vehicles a year.

- **Asteroid-mining startup AstroForge Inc.** plans to launch its first two missions to space this year as it seeks to extract and refine metals from deep space. The first launch in April will test AstroForge’s technique for refining platinum from a sample of asteroid-like material. The second, planned for October, will scout for an asteroid near Earth to mine. The missions are part of AstroForge’s goal of refining platinum-group metals from asteroids, with the aim of bringing down the cost of mining these metals. It also hopes to reduce the massive amount of CO₂ emissions from mining rare Earth elements on earth.



- **SpaceX** is pushing to increase its flight rate this year as competitors work to debut new vehicles for the launch market. SpaceX is aiming to conduct up to 100 orbital flights in 2023, a 64% jump compared with the 61 missions the company did last year, which also was the top number among private and government rocket launchers around the world. SpaceX has built a powerful position in the launch market with its Falcon 9 vehicle, with a reusable booster capable of returning to Earth after liftoff. The size of the global launch market amounted to roughly \$8bn in 2022, according to Deutsche Bank analysts, who project growth to \$35bn by 2030.

Key Update: *Last year, U.S. rocket operators, led by SpaceX, collectively accounted for the most flights reaching orbit, with 76. Chinese companies or agencies launched 62 such missions, while Russia operated twenty-one.*

- **Boeing** reported a sharp jump in airplane orders and deliveries in 2022 but trailed Airbus for the fourth-straight year. Boeing delivered 480 airplanes and won 774 net new orders after allowing for cancellations in 2022, while Airbus delivered 661 jets and won a net total of 820 after allowing for cancellations. In 2022, Boeing delivered eight airplanes to China while Airbus delivered more than 100.
- **Canada** will purchase 88 F-35 combat jets manufactured by Lockheed Martin, ending a protracted, politically-charged decision process to refurbish the country’s aging air force. The total cost is budgeted at US\$14bn, with deliveries set to start in 2026 and all purchased aircraft expected to be in operation by 2034. Canada said the deal provides the country with the best jet fighter to meet its obligations to the NATO and protect the country’s Arctic, which Canadian officials say face elevated threats from Russia and China.

Key Update: *Lockheed Martin has said it stands ready to meet demand for its F-16 aircraft as some of Ukraine’s closest European allies revive efforts to provide fighter jets to Kyiv.*

- **Researchers at Boston University** have made a miniature beating heart. It's only the size of a postage stamp, but the tiny replica of a living heart chamber could have a powerful impact on heart disease treatment. The device, nicknamed miniPUMP, is a combination of nano-engineered parts and human heart tissue grown from stem cells, and it beats just like the real thing. Researchers hope to use it to get a close-up view of heart disease, studying its progression and testing potential new individualized treatments. (See [Appendix: Medical](#), page 13)



- **Demand for dental services** is holding steady, according to executives at Henry Schein, the leading distributor of dental products. Dental end-market trends were described as stable, helped by robust U.S. employment and overall stability in Europe. Equipment demand has also remained robust, although average selling price declines in digital tech have been a topline headwind as lower-priced products are gaining share.

- **Medical device companies** set a positive tone for 2023 at the January J.P. Morgan Healthcare Conference as earnings forecasts and company executives' comments set an "overall optimistic tone" for the year. J.P. Morgan wrote, "With staffing dynamics, capital constraints and supply constraints stabilizing/improving, procedure volumes and revenues should continue to move in the right direction in 2023." Dexcom and Intuitive shared early results, with Dexcom saying it expects its 2023 revenue to increase by as much as 20%, and Intuitive forecasting a 12% to 16% increase in procedure volumes for the year.

Key Update: *The Centers for Medicare and Medicaid Services (CMS) proposal to expand coverage for continuous glucose monitors to more than 3.3mn Medicare beneficiaries who use insulin is expected to greatly boost CGM sales in 2023.*

- **Trucking and logistics giant J.B. Hunt** expects freight demand to regain traction in the coming months as the pandemic-driven upheaval in supply chains fades and companies return to more conventional ordering cycles. Slowing shipping demand helped drop fourth quarter profit at J.B. Hunt 17% YOY. Operating revenues rose 4% to \$3.65bn, but freight-related revenues, excluding fuel surcharges, were off about 3%. Company executives expect what they called an "inventory correction" to fade and that retailers and manufacturers will soon start ordering goods for the summer and fall.

- **U.S. drugmakers AbbVie and Eli Lilly** became the first pharmaceutical groups to pull out of a pricing agreement with the UK government to supply the National Health Service in protest of a sharp rise in clawback payments.

- **Air Products and power company AES Corp** are planning to build a \$4bn renewable-powered hydrogen factory in Northern Texas, the latest large investment in green energy since Congress passed significant tax credits for such projects. The factory, which is slated to start operations in 2027 and will be built on the site of a retired coal plant, will use solar and wind power to manufacture the hydrogen. It will be able to produce more than 73,000 metric tons of hydrogen a year, making it the largest such facility in the U.S. and among the top 10 worldwide.

- **South Korea's Hanwha Group** plans to spend \$2.5bn to build an entire solar-manufacturing supply chain in Georgia, the biggest solar investment spurred so far by the massive tax incentives the U.S. introduced last year. The investment would allow the conglomerate's Qcells unit to build new facilities that would manufacture 3.3 gigawatts of solar panels a year, enough to supply 18% of the estimated U.S. demand in 2022. Qcells would also produce on-site nearly all the main components that go into the panels, including solar cells, ingots and wafers—items not manufactured in the U.S. (See [Appendix: Energy](#), page 10)



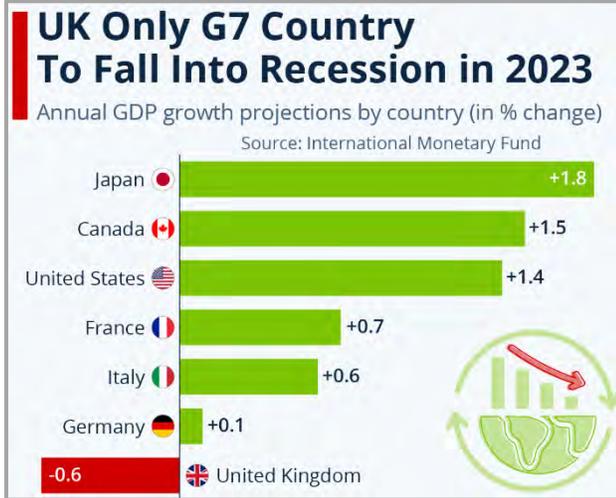
Key Update: *Legislation offering generous tax credits and other incentives has changed the economics of clean-energy investment in the U.S. Manufacturers are rushing to take advantage of the incentives with investments of >\$40bn for plants to make batteries as well as equipment for wind and solar power. Companies have made another \$40bn of capital-investment announcements on deploying clean energy.*

- **Global oil demand** is set to rise to an all-time high in 2023 as China relaxes its COVID-19 restrictions in a move that may push crude prices higher in the second half of the year. Demand for crude oil could rise 1.9mn barrels a day to reach a record 101.7mn b/d, while the evolving impact of Western sanctions on Russia threatens to constrain supply, the IEA said in its first monthly oil report of 2023.

- **ExxonMobil** raked in a record profit of \$55.7bn last year, underscoring the windfall for Big Oil after Russia's invasion of Ukraine despite a fourth quarter slowdown as fossil fuel prices retreated from recent heights.

EUROPE, AFRICA & THE MIDDLE EAST

- **At the World Economic Forum in Davos**, the IMF signaled that the fund would upgrade its economic forecasts. Instead of predicting a “tougher” 2023, it now expects an “improvement” in the 2nd Half and into 2024. Business leaders and top government officials have expressed optimism for the global economy as China drops COVID controls and the U.S. launches a green investment boom.



- **The eurozone’s manufacturing and service sectors** unexpectedly ticked up in January after six months of decline. Supply chain stress has eased and the reopening of the Chinese economy has helped restore confidence in the broader global outlook. The rise in the composite eurozone PMI index contrasts with an unexpected deterioration in the UK, where the index signaled the sharpest drop in 2 years.
- **The German government** raised its economic forecasts, predicting that it would narrowly avoid recession for the whole year as inflation eases. The country’s annual economic report said GDP would grow 0.2% this year, up from the autumn forecast of a 0.4% decline. But the country would probably not avoid two consecutive quarters of contraction. The German economy grew by 1.9% in 2022.
- **Ford Motor** is poised to cut its reliance on VW technology for its next generation of EVs in Europe, unravelling a core part of the alliance formed between the rival carmakers in 2021. By 2025, Ford expects to launch vehicles that use its own system, which is being engineered by Ford in the U.S.
- **Germany’s car industry** called for European policy to counter the U.S. green subsidies. The German car lobby VDA called on Brussels and Berlin to ensure that policies intended to protect the environment were also safeguarding the competitiveness of European industry. The VDA fears an exodus of small and midsized suppliers.

- **Heart Aerospace**, a Swedish start-up, is developing a 30-seater regional aircraft for 2028 and has firm orders for 230 planes from United Airlines and Mesa Airlines. Heart recently changed its plans from a pure electric 19-seater to a larger hybrid aircraft, using sustainable aviation fuel to power its reserve system for emergencies, extending its range to 800km from 200km if solely using batteries.



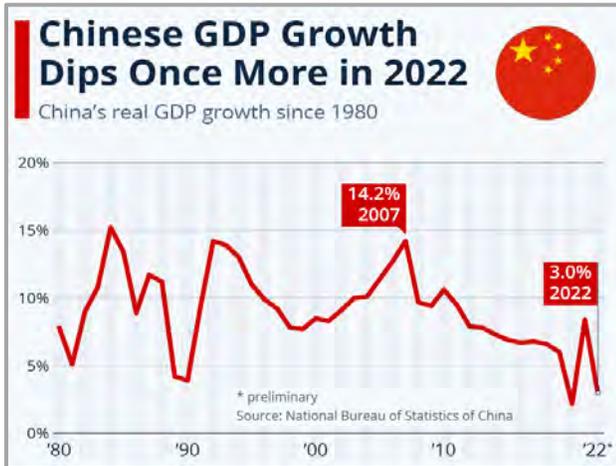
- **Aluminum Dunkerque** restarted production capacity idled last year when it was hit by soaring electricity costs. The site, which halted around a fifth of its output in the 4th Qtr, expects to reach full capacity by the end of May.
- **ArcelorMittal** said its idled Asturias blast furnace in Spain will resume operations in February, after the company curtailed the plant in September due to unfavorable market conditions that have since slightly recovered. Asturias is one of several European plants where ArcelorMittal reduced operations or idled last year as high energy prices combined with declining demand and prices for steel on the continent.
- **Sweden’s state-owned mining company LKAB** has discovered Europe’s largest deposit of rare earth metals. The discovery bolsters the continent’s ambition to rely less on imported raw materials needed for the green transition. The deposit is located north of the Arctic Circle in Lapland, and contains more than one million tonnes of rare earth oxides, the largest known deposit of its kind in Europe.
- **Sweden’s government** wants to build nuclear power plants to boost energy security and generate carbon-free energy. Prime Minister Ulf Kristersson said a law would be proposed to lift current restrictions that limit the number of nuclear reactors to ten in only three locations across the entire country. Sweden has six reactors in operation, half the number it once had before the Fukushima disaster. Vast projects to make carbon-free steel, iron ore and batteries in northern Sweden mean that the country needs to increase its electricity production significantly in the coming years. (See **Appendix: Energy**, page 10)

Key Update: Any new reactors could be at least a decade away because of the complexity of the safety technology introduced after the Chernobyl and Fukushima disasters.

- **Finland’s Olkiluoto-3 nuclear plant** was due to open in 2009, but it has been repeatedly delayed and has ended up more than three times over budget. The power station is forecast to start full production in March, though that date was pushed back several times in 2022 because of problems, including trouble with the cooling water pumps.

ASIA/PACIFIC, JAPAN, AUSTRALIA & INDIA

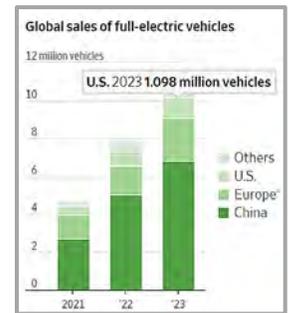
- **The Chinese economy** grew by just 3.0% in 2022. That reading was the lowest since modern Chinese GDP records began in the 1970s, with the exception of the 2020 Covid crisis year. China's economy is closely watched internationally, as many corporations consider it a key market in reaching their own growth targets.



- **After the Chinese government** started to dismantle its zero-COVID strategy in early December, infections surged, but government figures have not been in line with reports of overwhelmed hospitals and cremation facilities. An independent forecast from health analytics company Airfinity put the number of daily new cases in late December at one million and the number of daily new deaths at 5,000. The analysts predict a second peak of the wave around March 3rd at 4.2 million daily new cases in provinces further away from current Chinese coronavirus epicenters.
- **China's exports** suffered the sharpest decline in almost three years in December, piling on further economic pressure as policymakers in Beijing grapple with sluggish economic growth and a nationwide outbreak of COVID-19. Exports declined 9.9% YOY in dollar terms in December. Imports slid 7.5%, up from a 10.6% drop the month before. For the full year, China's trade surplus hit a record \$878bn on the back of a pandemic-era boom that boosted exports.
Key Update: Exports to the United States and the EU slumped 18 and 20% respectively, as rising interest rates dampened demand for Chinese goods.
- **Total world crude steel production** was 140.7 million tonnes (Mt) in December, down 10.8% vs. a year ago. Total world crude steel production in the full year 2022 was 1,878.5 Mt, a 4.2% decrease compared to 2021. China produced 1.013bn MT or 54% of the world total. (See **Appendix: Steel**, page 8)

- **The World Bank** sharply lowered its growth forecast for the global economy this year as persistently high inflation has elevated the risk for a worldwide recession. The bank expects global growth to slow to 1.7% in 2023, down from an estimate of 3% growth last June. For all of 2023, the bank forecasts U.S. GDP will increase 0.5% from the prior year, and expects no growth for the eurozone. The bank predicts China's GDP will increase 4.3%, an uptick from an estimate of 2.7% growth last year. Russian GDP is forecast to contract 3.3% after falling 3.5% in 2022.

- **Electric-vehicle sales** achieved around 10% market share for the first time last year, driven mainly by strong growth in China and Europe. Global sales of fully electric vehicles totaled 7.8mn units, an increase of 68% from 2021. For 2022, fully EVs accounted for 11% of total car sales in Europe and 19% in China. The U.S. lags in the rollout of EVs, but last year automakers sold 807,180 fully electric vehicles in the U.S., a rise in the share of all-electric vehicles to 5.8% of total vehicles sold from 3.2% in 2021.



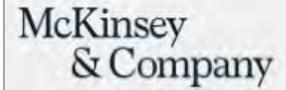
- **Molybdenum prices** reached their highest level in 17 years at the end of January. Pure molybdenum has now cracked the \$100,000/tonne mark in Asia, up almost 150% since February 2021. According to analysts, the available quantity of molybdenum will not be able to cover demand until at least 2025. (See **Appendix: Commodities**, page 15)
- **Iron ore** rallied in January as China reopened its vast economy. Iron ore, the key ingredient in steel-making, has risen 50% since its low in June, surging to more than \$120/tonne in the benchmark Qingdao spot market for high-quality ore. Chinese mills have maintained limited inventories in recent months and are restocking.
- **A group of base metals**, led by tin, zinc and copper, have surged more than 20% in three months on bets that China's reopening will boost demand for raw materials. Further support comes from the U.S. Federal Reserve signaling a slowdown in the pace of interest rate rises and a softening in the U.S. dollar, which importers use to buy commodities. Tin has rocketed almost 80% to \$32,262 per tonne, while copper prices have rallied by 10% in January alone to \$9,329 per tonne on brighter prospects for China's economy.
Key Update: The price of tin, which is becoming increasingly strategic because of its use in solar panels and microchips, has also been pushed higher by speculative buying by China, leading to a build-up in inventories there.



ECONOMIC UPDATE: APPENDIX TO THE FEBRUARY 2023 ISSUE

ENVIRONMENT: NET ZERO TRANSITION FOR STEEL, AVIATION, POWER AND ROAD TRANSPORTATION

What could the net-zero transition in the U.S. look like? McKinsey & Company mapped out a pathway that spans multiple sectors. Significant shifts include a zero-emissions power sector by 2035, electric vehicles comprising 75% of all new-car sales by 2030 and an 80% reduction of oil and gas methane by 2030. Such a

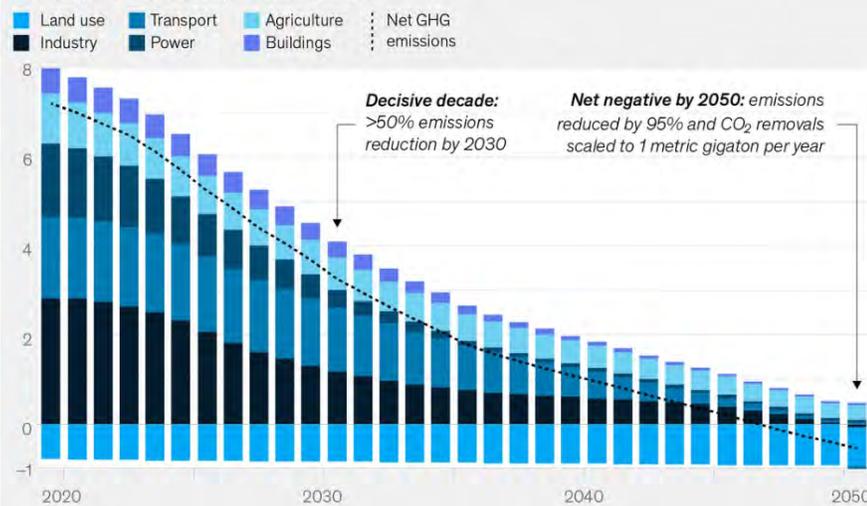


transformation of the U.S. economy won't be easy for business leaders, as uncertainty surrounds the pace and scale of deploying climate solutions. But companies that assess and prepare for a net-zero economy could put themselves in a position for growth and positive impact.

A 1.5°C emissions pathway for the United States would entail the transformation of every sector.

US emissions, by sector

Estimated greenhouse-gas (GHG) emissions in a 1.5°C scenario, metric gigatons of CO₂ equivalents¹ per year

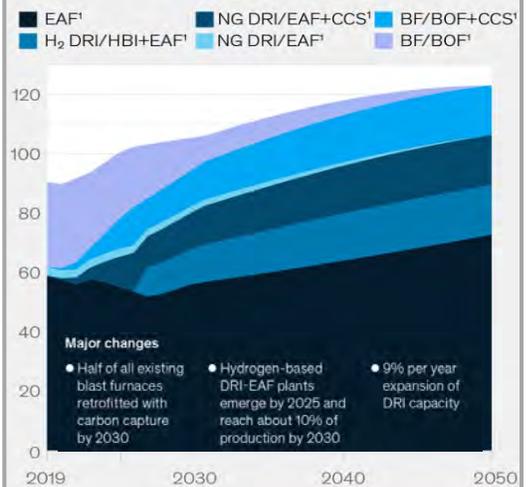


Major changes

- Zero-emissions power by 2035, met by coal phase-out by 2025 and rapid expansion of renewables generation and grid transmission
- Industrial asset transition: 50% of natural-gas demand replaced with electricity, hydrogen, and biogas by 2030; 80% by 2050
- Rapid electrification of mobility: 75% of all new-car sales are electric vehicles by 2030
- Curbing methane emissions: 80% reduction of oil and gas methane by 2030

US steel sector

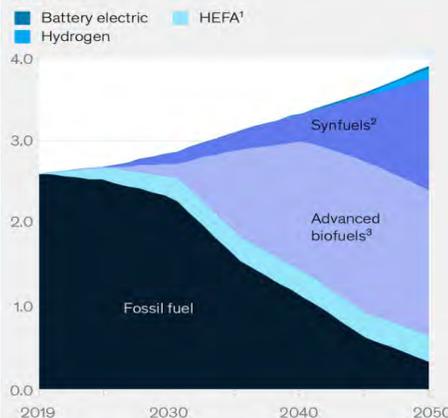
Steel production, million metric tons of liquid steel per year



¹BF/BOF: pig iron produced from iron ore in a blast furnace (BF), followed by steel production in a basic oxygen furnace (BOF); BF/BOF + CCS: the BF/BOF production technology outfitted with carbon capture and storage (CCS); NG DRI/EAF: pig iron produced from directly reduced iron ore (DRI) using natural gas (NG), followed by steel production in an electric arc furnace (EAF); NG DRI/EAF + CCS: the NG DRI/EAF production technology outfitted with CCS; H₂ DRI/HBI + EAF: the NG DRI/EAF production technology using hydrogen (H₂) instead of NG; EAF: steel produced from primarily scrap steel in an electric arc furnace.

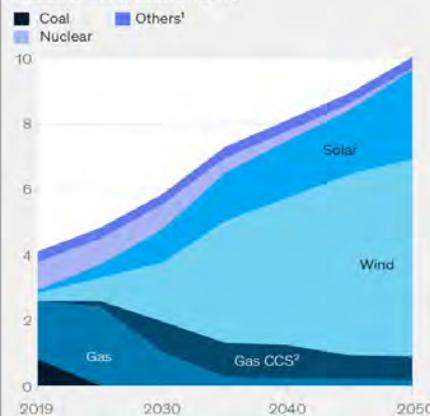
US aviation sector

Jet fuel consumption, exajoules



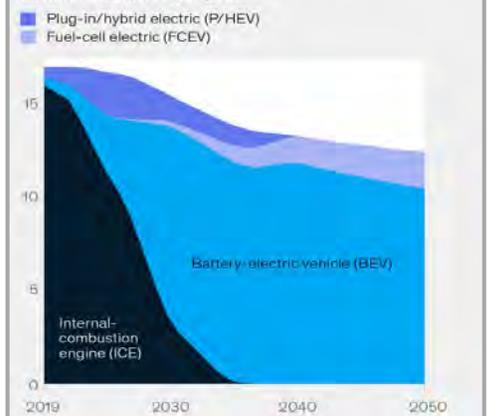
US power sector

US electricity generation, thousands of terawatt-hours



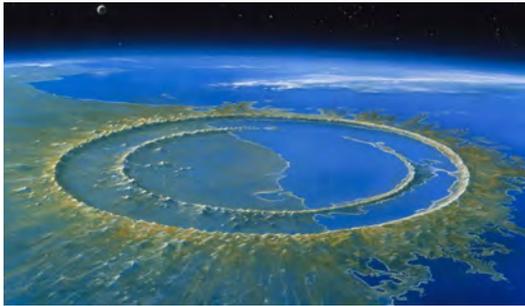
US road transportation sector

Passenger car and truck sales, millions of vehicles per year



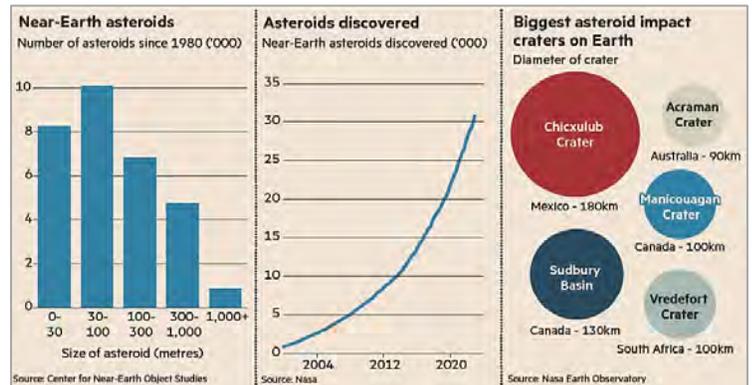


AEROSPACE: PLANETARY DEFENSE AGAINST ASTEROIDS BY EMPLOYING REDIRECTION



Asteroids that hit the Earth at high speed can cause craters 20 times larger than themselves in diameter. An asteroid would need to be at least 10km wide to cause mass extinction. Thousands of these objects have been identified over the years. The Chicxulub crater in Mexico (pictured) is a testament to Newton’s second law of motion. At 180km across and 20km deep, it is thought to have been formed by an asteroid that was just 10km wide but traveling very fast. The success of NASA’s Double Asteroid Redirection Test last year means the same principles might one day prevent a repeat hit. Dart was the first demonstration of a planetary defense technology using a kinetic impact to alter the course of an orbiting body. NASA smashed a satellite into

an asteroid to change its speed and trajectory. The target, harmless asteroid Dimorphos, was 160 meters across and orbited a larger asteroid called Didymos. Dart hit Dimorphos at a speed of about 22,000km per hour and managed to alter its orbit by about 1%. In the vastness of space, that is enough to make a difference. The odds of an asteroid the same size as the one that formed the Chicxulub crater (and wiped out the dinosaurs) hitting Earth are remote. Some 66 million years have passed since it landed. However, the impact from a smaller rock could still be devastating. No known asteroid larger than 140 meters has a chance of hitting the Earth for the next 100 years, but only half of an estimated 25,000 near-Earth objects of that size or larger are known. Even smaller asteroids can have a significant impact. The approximately 50 meter-sized object that exploded above Siberia in 1908 levelled trees over 2,000 sq km. In theory, the same principles used to create Dart could be scaled up to tackle larger and more dangerous asteroids. Bennu, with a diameter of 500 meters, ranks as one of the highest-risk known asteroids with a roughly one in 2,000 chances of impact sometime between 2178 and 2290. A scaled-up satellite would need a mass of eight tonnes to have the same impact as NASA’s test run. More power is likely to be needed for any more substantial threat to our planet. Space scientists are studying the possibilities of nuclear payloads.



ENERGY: GE SET TO SPIN OFF ITS HEALTH UNIT—PUTTING FOCUS BACK ON POWER DIVISION

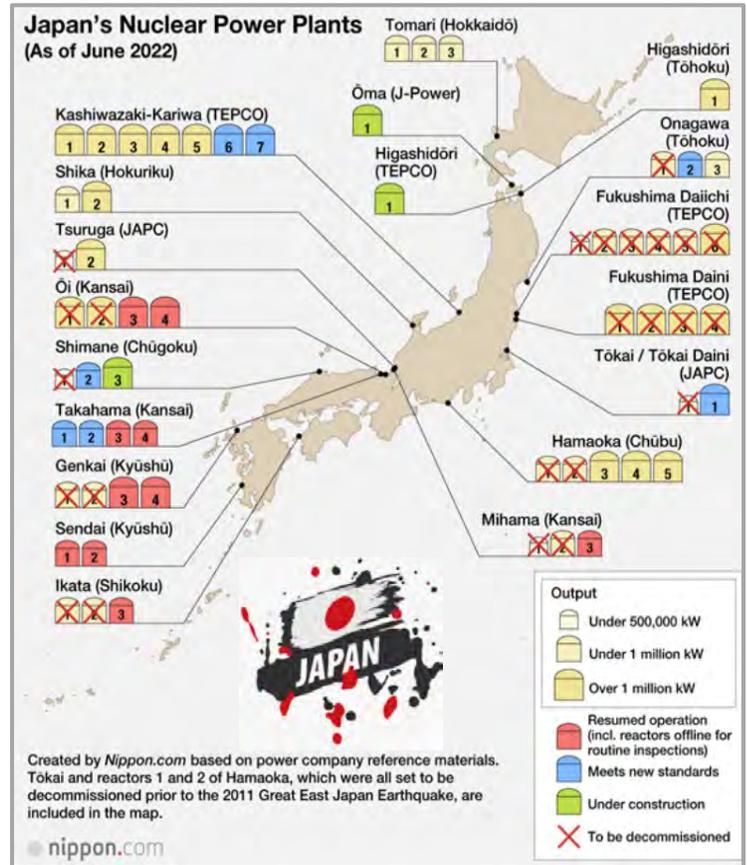


General Electric started 2023 by splitting off its healthcare unit, completing a key step in the slow-motion breakup of the industrial giant. For the rest of the year, it will face questions about the next big step: shedding its power businesses. GE HealthCare Technologies started trading the first week of 2023, leaving the once-sprawling conglomerate with three divisions: jet engines, natural gas-powered turbines and wind turbines. **The gas and wind turbines are expected to be combined with other GE energy businesses into a new company called GE Vernova that will split off in early 2024.** The power-generation business, which dates to the origins of GE and was once a fountain of profit, has produced losses, accounting headaches and concerns about its fossil-fuel burning future in recent years as the world moves toward greener sources of energy. Meanwhile, the onshore wind-turbine business has struggled with cost inflation and supply-chain problems. GE CEO Larry Culp says the spinoffs will bring more focus and accountability to the business he has revamped since 2018. Culp plans to stay on as CEO of GE Aerospace, the biggest and most profitable unit. GE is spinning off HealthCare and will put Renewables and Power into a new company. Scott Strazik, CEO of GE Vernova, has about a year to get it ready to be its own public company. He has already reversed the cash flow of the power business, which burned through about \$2.7 billion during 2018. It is now cash-flow positive. He is now restructuring the Renewables business, which is expected to post a loss of about \$2 billion this year. “Within gas power, we’re really on the other side of the journey,” Strazik said. “For wind, I see a similar dynamic with gas, where in the first year you ground yourself. In the second year, you work towards a material improvement.” The Boston conglomerate’s three-way split follows years of restructuring that sold entire divisions and remade the management philosophy of the former American icon. The spinoffs are designed to simplify its operations and make the assets more attractive to investors.

ENERGY: LACK OF ENGINEERS AND MANUFACTURING CAPACITY STUNTS JAPAN'S NUCLEAR REVIVAL

Japan's ambitions to reboot its nuclear industry risk being set back by a shortage of engineers and manufacturing capacity that has atrophied in the decade since the Fukushima disaster. Prime Minister Kishida's new policy calls for the construction of new nuclear power plants, raising hopes for Japanese manufacturers that are working on smaller reactors and other upgraded nuclear technologies. But the industry's nuclear supply chain is under strain, warned executives and experts. The 2011 accident triggered a massive exit of more than 20 manufacturers, including Kawasaki Heavy Industries and Sumitomo Electric Industries. "We've had nothing happening with respect to new nuclear plants and slowly you start losing equipment suppliers, expertise and people," said George Borovas, head of the nuclear practice at Hunton Andrews Kurth in Tokyo. "If you lose a generation of that, it's really hard to recover and it's a big concern for the industry." **Japan sourced about a third of its electricity from 54 reactors before the disaster. Now, only nine are operational.** "Not only did construction cease, but jobs such as replacing and repairing equipment that would have been needed if plants had been in operation were also drastically reduced," said Tomoko Murakami, at the Institute of Energy Economics in Japan.

In a further sign of the shrinking sector, Japan is no longer able to domestically procure protective tubes placed inside a nuclear reactor to contain radiation after Zirco Products, an important manufacturer, collapsed in 2017. **The number of skilled engineers responsible for manufacturing nuclear equipment has decreased by about 45%**, according to the Japan Electrical Manufacturers' Association. There are also fewer students in nuclear engineering at universities and graduate schools in Japan, with the number declining 14% since 2011. Despite the fallout from the disaster, some companies, such as Mitsubishi Heavy Industries, Hitachi and Toshiba, are investing in nuclear.



The disruption of gas supplies after Russia's invasion of Ukraine has also motivated countries to reassess their nuclear power policy. "If the prime minister can get public opinion on his side, Japan can definitely be a leader in these new, advanced designs," said Neil Hirst, an honorary senior fellow at Imperial College London, who was a former director of the International Energy Agency. **Along with Rolls-Royce in the UK, France's EDF and U.S.-based NuScale Power, GE Hitachi is also pushing for small modular reactors, which they believe can deliver nuclear power with less cost and risk.**



Advocates argue SMRs are more cost-effective and quicker to build, but critics say such reactors cannot compete against economies of scale achieved by the large ones. "We believe we are the fastest in terms of SMR development speed among players in the West," said Keisaku Shibatani, who leads communications and government relations for Hitachi's energy arm. "Although we haven't received orders yet, Canada, the U.S. and Poland have agreed to construct our BWRX-300," he added,

referring to the water-cooled small reactors that GE Hitachi has developed. Mitsubishi Heavy Industries is working on an upgraded version of nuclear reactors that are deemed safer but are based on conventional technology. Its SRZ-1200, an advanced pressurized water reactor developed with four domestic utility companies, is equipped with additional safety measures that will reduce the risk of radioactivity release in the event of a meltdown. "The SRZ is based on proven technology with new safety mechanisms, while small modular reactors are still in the phase of requiring various demonstration experiments," said Akihiko Kato, MHI's nuclear division head. He forecast that its SRZ will be commercialized in the mid-2030s while it will probably take until the 2040s for SMRs to begin operations in Japan.

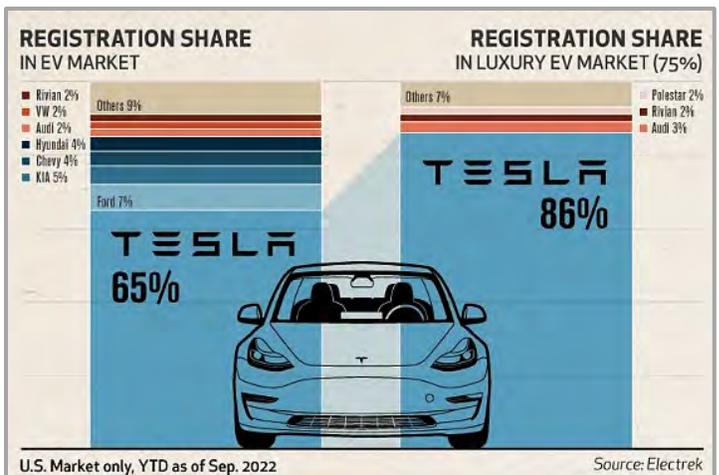
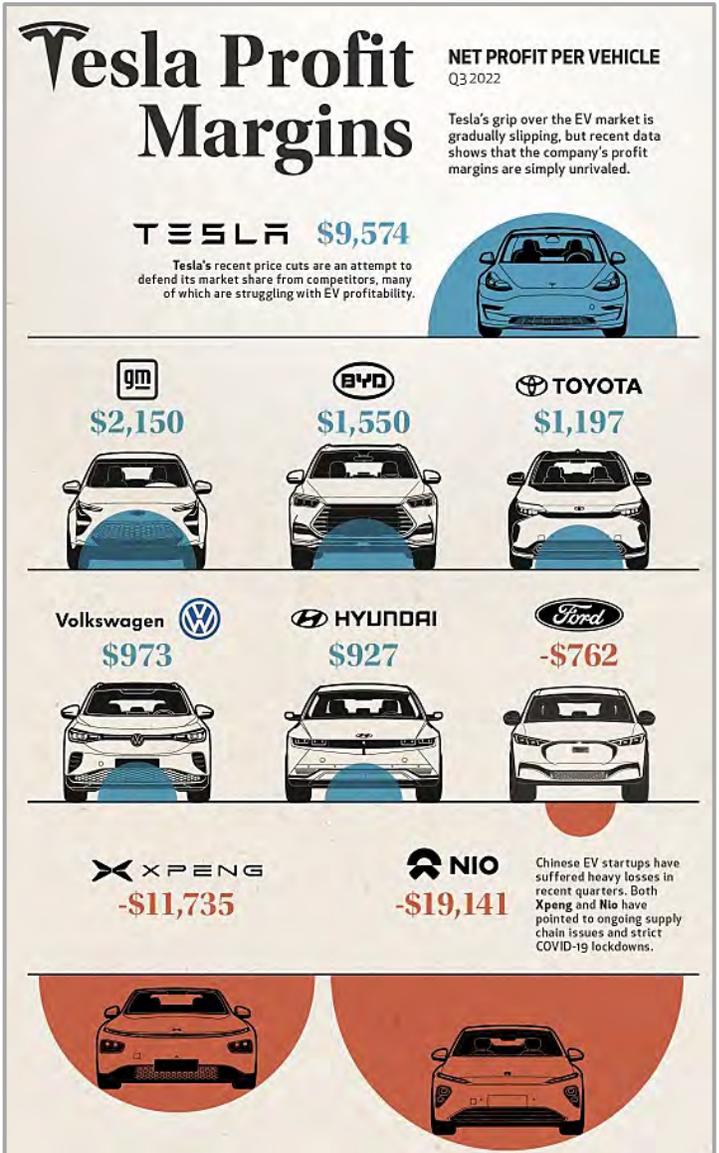
AUTOMOTIVE: TESLA'S UNRIVALED PROFIT MARGINS

In January this year, Tesla made the surprising announcement that it would be cutting prices on its vehicles by as much as 20%. While price cuts are not new in the automotive world, they are for Tesla. The company, which historically has been unable to keep up with demand, has seen its order backlog shrink from 476,000 units in July 2022, to 74,000 in December 2022. This has been attributed to Tesla's robust production growth, which saw 2022 production increase 41% over 2021 (from 930,422 to 1,313,851 units). With the days of "endless" demand seemingly over, Tesla is going on the offensive by reducing its prices—a move that puts pressure on competitors, but has also angered existing owners.

Cranking up the Heat: Tesla's price cuts are an attempt to protect its market share, but they're not exactly the desperation move some media outlets have claimed them to be. Recent data compiled by Reuters shows that Tesla's margins are significantly higher than those of its rivals, both in terms of gross and net profit. This graphic only illustrates the net figures. Price cutting has its drawbacks, but one could argue that the benefits for Tesla are worth it based on this data—especially in a critical market like China. In the case of Chinese EV startups Xpeng and Nio, net profits are non-existent, meaning it's unlikely they'll be able to match Tesla's reductions in price. Both firms have reported year-on-year sales declines in January. As for Tesla, Chinese media outlets have claimed that the firm received 30,000 orders within three days of its price cut announcement. Note that this hasn't been officially confirmed by anyone within the company.

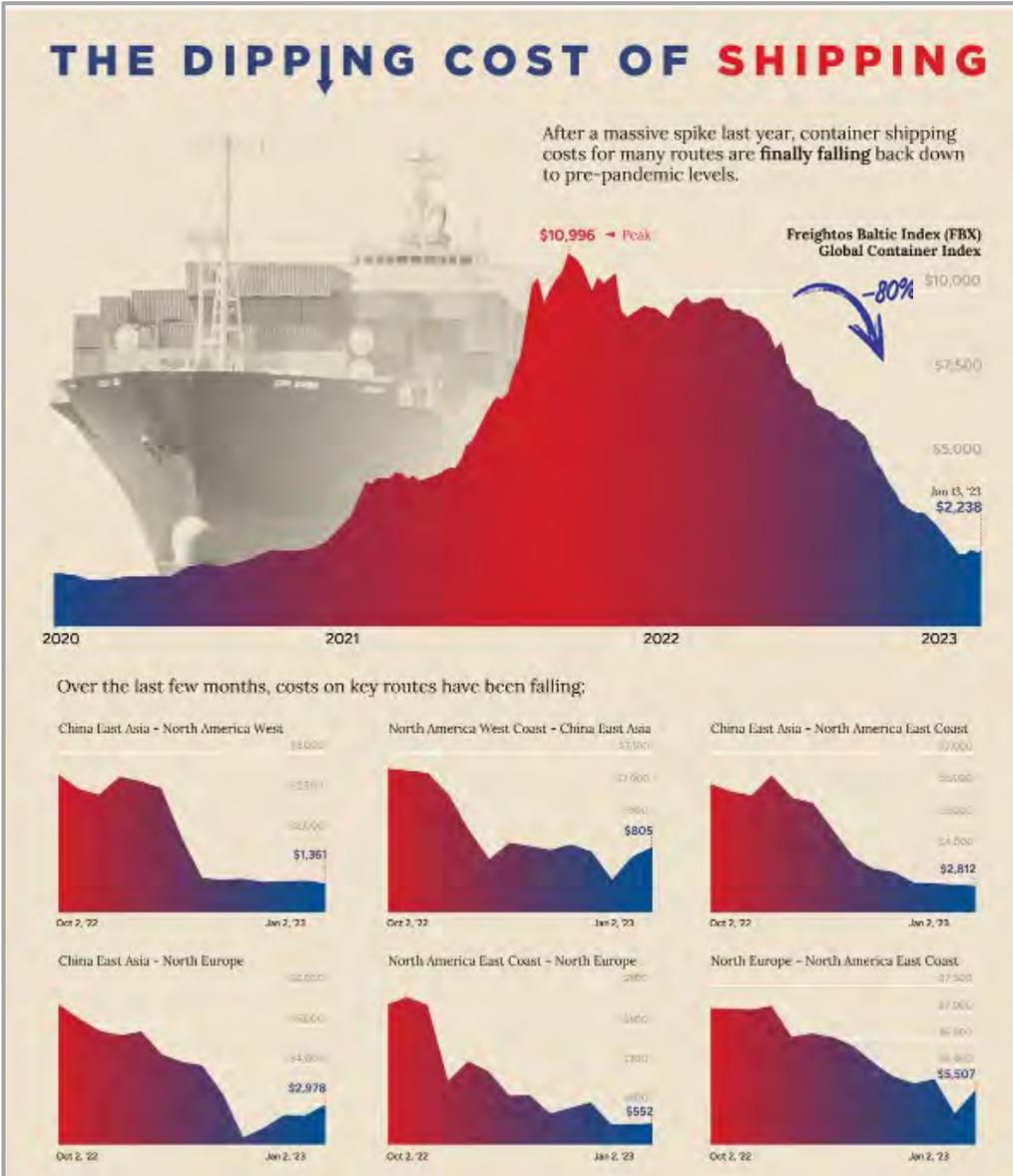
Tit for Tat: Ford made headlines recently for announcing its own price cuts on the Mustang Mach-E electric SUV. The model is a direct competitor to Tesla's best-selling Model Y. Chevrolet and Hyundai have also adjusted some of their EV prices in recent months. Volkswagen is a noteworthy player missing from this table. The company has been gaining ground on Tesla, especially in the European market. This decision to not cut prices could hamper Volkswagen's goal of becoming a dominant player in EVs, especially if more automakers join Tesla in cutting prices. For now, Tesla still holds a strong grip on the U.S. market.

Thanks, Elon: Recent Tesla buyers became outraged when the company announced it would be slashing prices on its cars. In China; buyers even staged protests at Tesla stores and delivery centers. Recent buyers not only missed out on a better price, but their cars have effectively depreciated by the amount of the cut. This is a bitter turn of events, given Musk's 2019 claims that a Tesla would be an appreciating asset. These comments were made in reference to Tesla's full self-driving (FSD) capabilities, which Elon claimed would enable owners to turn their cars into robotaxis.





TRANSPORTATION/INFLATION: THE DIPPING COST OF SHIPPING



A little over one year ago, congestion at America’s West Coast ports were making headlines, and the global cost of shipping containers had reached record highs. Today, shipping costs have come back down to Earth, with some routes approaching pre-pandemic levels. This graphic, using data from Freightos, shows just how dramatically costs have fallen in a short amount of time. The Freightos Baltic Index (FBX)—a widely recognized benchmark for global freight rates—has fallen 80% since its peak in late 2021.

Why Shipping Costs Matter: The vast majority of trade is conducted over the world’s oceans, so skyrocketing shipping costs can wreak havoc on the global economy. A recent study from the IMF, which included 143 countries over the past 30 years, found that shipping costs are an important driver of inflation around the world. In fact, when freight rates double, inflation increases by 0.7 of a percentage point. Of course, some nations feel the effects of higher shipping costs more acutely than others. Countries that import more of what they consume and that are more integrated into the global supply chain are more likely to see inflation rise as shipping costs elevate.

Falling Freight Rates Are a Good Thing, Right? Falling shipping costs are great news for everyone except, shippers. While most of us can eventually look forward to improved

supply chain efficiency and less inflationary pressure, shipping companies are seeing the end of a two-year boom period. For example, major shippers like COSCO and Hapag-Lloyd saw a staggering 10x or more increase in profit per 20-foot equivalent unit (TEU) shipped. For the time being, carriers are canceling voyages and sending obsolete ships to scrap to keep prices from bottoming out completely. In early January, container spot freight rates rose for first time in 43 weeks, signaling that the rollercoaster ride that shipping rates have been on since the start of the pandemic may be coming to an end.

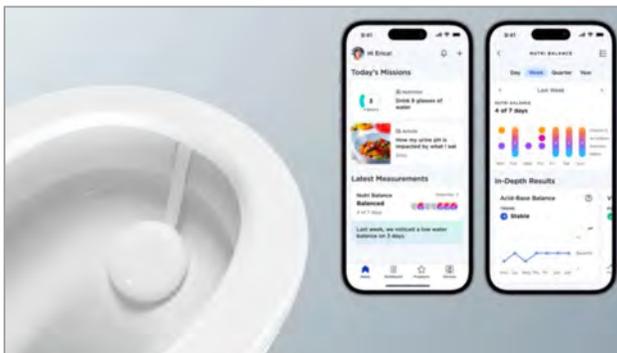
MEDICAL/INNOVATION: STAIR-CLIMBING WHEELCHAIRS, ASSISTIVE TECH GAINS AT CES IN LAS VEGAS

The smartphone revolution of the past decade, which reduced the cost of super-efficient processors and tiny cameras, is now enabling innovators to create subtler, more effective tools to assist people with disabilities. **Accessibility was among the consumer trends in focus in Las Vegas in January at the Consumer Electronics Show, a global technology bazaar where companies offer clues about what’s coming in the year ahead and beyond.** The Scewo Bro is an adjustable-height wheelchair designed by roboticists and inspired by luxury vehicles. You can drive the wheelchair using a smartphone, a joystick or a game controller. “We wanted it to look like a supercool mobility solution,” said Thomas Gemperle, co-founder at Swiss startup Scewo. “People may ask what it is, but they never ask if it’s a wheelchair.” The device is about the same size as a traditional powered wheelchair, but it has two wheels and a pair of tank-like treads for rocky terrain and stair climbing. When approaching stairs, users tap a button. Laser sensors detect how steep the stairs are, and the chair automatically adjusts for the climb. The company tested it with several hundred wheelchair users and tweaked the design based on their feedback. “People said they wanted to be able to go up high to talk to others at eye level, but also be low when it’s time to eat at a table,” said Bernhard Winter, another co-founder. The product is already out in Switzerland, where the company says most users offset its cost with insurance. Scewo hopes to sell the product in the U.S. in the coming years for roughly \$40,000. The company hopes health insurance can help reduce the out-of-pocket cost.



MEDICAL: THIS COMPANY WANTS YOU TO, AH... WELL, PEE ON ITS NEW DEVICE!

Withings, a company most known for its smartwatches, stormed the Consumer Electronics Show with an at-home, hands-free “urine lab” that sticks to the inside of your toilet. The company says it hopes to take the ick out of urinalysis testing. **The U-Scan is composed of two parts, the reader and the cartridge. The reader — the part you pee on — is a pebble-shaped device containing all the components required for urine sample collection, analysis by optical means and data transfer by Bluetooth or Wi-Fi connection.** The cartridge is

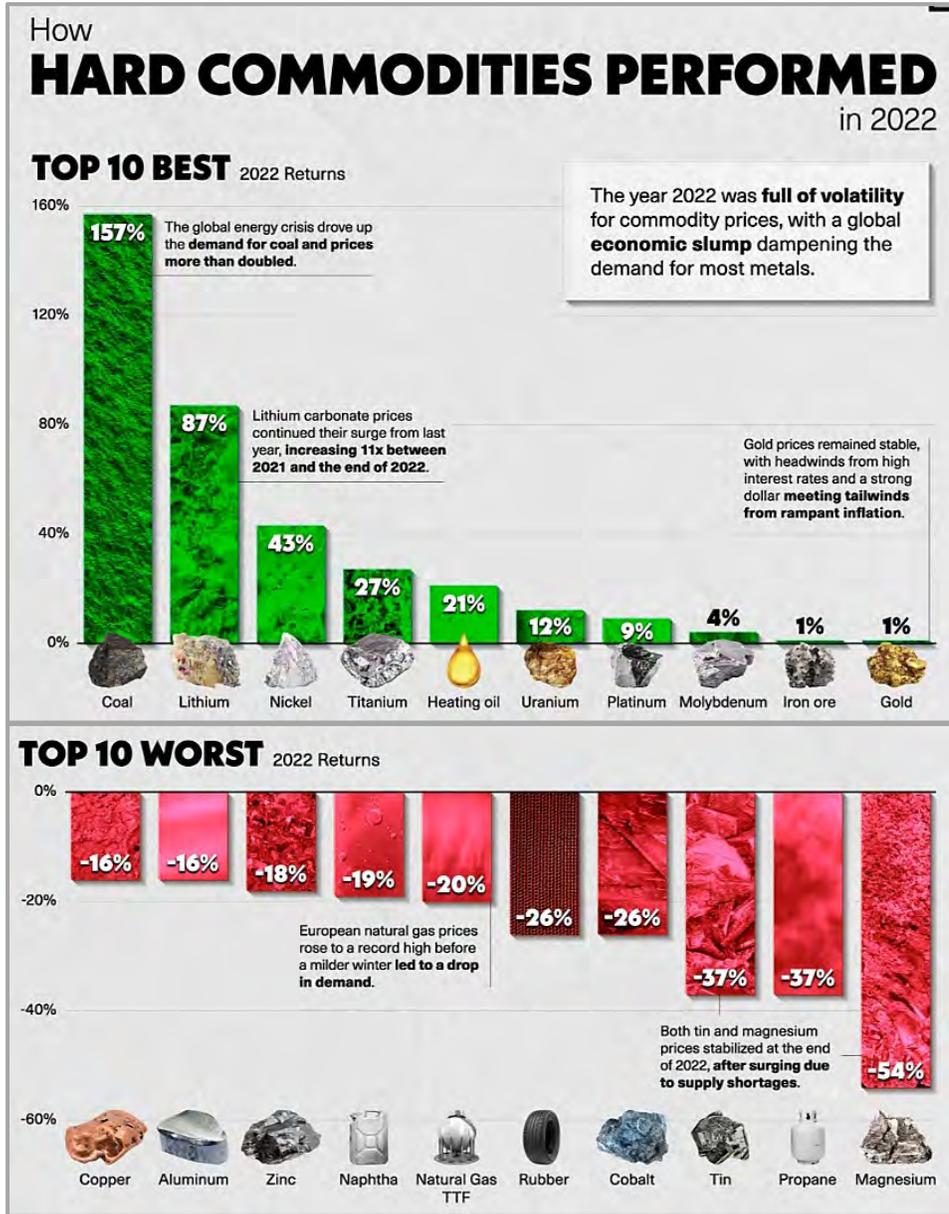


an interchangeable component made of cylindrical plastic and inserted in the reader which contains dozens of test pods composed of chemical reagents that can detect the level of various human biomarkers in urine. U-Scan has a thermal sensor to differentiate between pee and toilet water as well as who is urinating. This device detects the identity of who’s peeing by the movement and distance of the stream. The device is self-activating and there are enough tests in the cartridges for about one test per day for 3 months. Once the reader senses you’re peeing, it uses a microfluidic circuit to take a small sample while the rest of the pee gets dumped and flushed. Withings says it took four years and 13 patents to get to a device that you

don’t have to risk touching until the battery needs recharged using USB-C or the cartridges are ready to be switched out (about 3 months for both). To start, the company is focusing on two use cases, reproductive health and nutrition. The Cycle Sync cartridge, which is used for reproductive health, measures luteinizing hormone (LH), pH levels, and hydration levels by testing how concentrated your urine is. This can help detect which part of the menstrual cycle a person is in as well as estimate an ovulation window. pH levels can also act as an indicator of a diet in need of more vegetables (too acidic) or more protein (too basic). The nutrition focused cartridge, called Nutri Balance, also measures pH and hydration as well as ketones and vitamin C. Too many ketones in blood can trigger ketoacidosis, which is a serious condition where your blood is too acidic. The addition of vitamin C tracking, according to Withings, could help people improve iron absorption. Once the tests are complete, the Withings app comes into play. The results are sent via Bluetooth or Wi-Fi to the app and the cartridge rotates to the next test pod. Within the app, users also get actionable tips to improve their health based on test results. Withings is launching with the reproductive health and nutrition cartridges first to gauge interest in the system, as well as pitch to professional medical markets for research, clinical trials and remote patient monitoring. The company is currently collaborating with Georges Pompidou European Hospital in Paris, France, for kidney stone patient follow-up and a future collaboration is planned with Institut Curie to “develop a way to monitor bladder and ovarian cancer relapses and screenings,” according to an article in *The Verge*. European consumers will be able to buy the U-Scan reader and both Cycle Sync and Nutri Balance cartridges in the 2ndQtr of this year for €499.95. After the initial payment, users will have to subscribe to refill cartridges (€29.95 monthly) or buy them separately. Medical applications for U-Scan are still pending European regulatory approval. Withings is currently waiting for FDA clearance.



COMMODITIES: HARD COMMODITIES PERFORMANCE IN 2022



Hard commodities had a roller coaster year in 2022. While prices for some commodities stabilized after skyrocketing on the heels of the pandemic, others delivered stellar returns. Behind the volatility was a plethora of factors, including the Russia-Ukraine war, the global economic slump and a drop in China’s demand for materials.

Energy Crisis Sets Coal on Fire: The global economic rebound of 2021, which set the fastest post-recession growth pace in the last 80 years, sparked coal prices as energy demand increased. Russia’s invasion of Ukraine ignited the spark, with coal prices exploding 157% in 2022. Consequently, coal was the best performing commodity in 2022, far outperforming the other nine top commodities by returns.

The 10 Biggest Commodity Drawdowns: The negative returns for most commodities can be largely attributed to prices stabilizing at lower levels after bullish runs in 2021 and the beginning of 2022. For example, magnesium prices more than halved in 2022, declining from an all-time high in September 2021. Similarly, tin prices also normalized after rising due to unprecedented demand from the electronics sector during the economic rebound from the pandemic. The volatility in European natural gas (TTF gas) was one of the highlights of the year. Prices rose to around €340 per megawatt-hour in August as the region looked to cut its reliance on

Russia. However, they have since fallen due to milder temperatures in winter and the overall drop in energy demand. Still, on average, TTF prices were 150% higher in 2022 than in 2021. Copper prices are known to reflect the state of the global economy. It’s safe to say that they did so in 2022, falling 16% as economic growth slowed down and China’s economic activity came to a halt at various times due to zero-COVID policies.

How Will Commodities Perform in 2023? According to Goldman Sachs, commodity markets have a bullish outlook for 2023, mainly due to underinvestment and the lack of supply response in 2022. Rising interest rates worldwide increased the cost of capital in 2022, which drained money from commodity markets. Therefore, supply shortages are expected to persist. As China reopens and eases its lockdown measures, the demand for hard commodities is likely to rebound, putting upward pressure on prices. J.P. Morgan has similar expectations. The bank expects oil prices to rise due to an increase in demand but projects a “transitional year” for base metals, with prices expected to remain relatively stable. The outlook for precious metals is more positive, with gold prices expected to hover around \$1,860 per ounce towards the end of 2023. Of course, commodity markets are volatile. With various geopolitical and macroeconomic moving parts, it’ll be interesting to see what this year has in store for fuels and metals.



COMMODITIES: VISUALIZING THE METALS YOU CAN BUY WITH \$1,000

For millennia, people have purchased and relied on metals for decorative and industrial uses, figuring out their values based on their practical applications and visual luster. Today, precious and industrial metals markets quote figures in millions and billions as they exchange thousands of ounces, with varying densities and values of metals making it difficult to compare them. This graphic visualizes how much of each metal you can buy for \$1,000 so you can see just how much, or how little, of each metal you get for your money.

How We Value Precious and Industrial Metals:

Characterized by their natural shine, metals are valued using the two key principles of rarity and their industrial uses, with unique properties such as their appearance or cultural significance also affecting their value. **Rarity:** A scarcer metal or resource will often have a higher value than one which is more abundant, e.g., while there are an estimated 2.1 billion tonnes of identified copper deposits, there are only 57,000 tonnes of underground gold reserves. While copper is valued at \$0.24/troy ounce, gold is worth around \$1,815/troy ounce. **Industrial uses:** Metals which are needed for important industrial processes will often have a high demand from manufacturers, increasing their valuation. E.g., for most of its history cobalt was used decoratively for its striking blue color and for the creation of superalloys and steel products. However, when it was recently discovered that cobalt could be a key component in lithium-ion batteries for EVs, demand for cobalt surged, sending its price from \$23,000/tonne to more than \$90,000/tonne at one point. Along with these two primary factors, unique properties and historical uses can also affect a metal's valuation. Former monetary metals like gold and silver are still sought after by investors for their potential ability to retain value over time compared to today's fiat currencies. Meanwhile, platinum's durability, resistance to tarnishing and its bright white color makes it highly sought after for jewelry, raising the demand and value of the precious metal.

Getting Less for More, Comparing Metal Density: A key factor that determines the volume of a metal you get for a certain price is also the metal's density. Precious metals tend to be more dense than industrial metals, with sometimes more than double the density depending on the specific metals compared. \$1,000 worth of highly dense metals like gold, iridium and osmium amount to small cubes less than a centimeter across. Meanwhile, \$1,000 of a less dense (and also less valuable) metal like aluminum with a density of only 2.7 g/cm³ yields a large cube nearly two feet tall. To put these densities in comparison, if gold had the same density as aluminum, its cube on the graphic above would be more than seven times larger. While it's impossible to directly compare the value of each metal's industrial uses and applications, seeing just how much (or how little) of a metal you get for \$1,000 can give some perspective to their value.



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Charles was a Senior Vice President of procurement in the metal container industry, with a career spanning nearly four decades. He specializes in steel and aluminum procurement and utilizes his expansive knowledge of the steel and aluminum industry in the production of this detailed monthly update for Ulbrich and the company's valued employees and partners.



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