GLOBAL EQUITY | March 2023

Natural Resources
Industry Primer

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Energy – Primer

The Return of Fossil Fuels

January 2023

The energy industry encompasses a range of sources, including both traditional oil and gas and alternative energy sources. Oil and gas can be divided into the upstream, midstream, and downstream sectors. Meanwhile, the alternative energy sector includes wind, solar, nuclear, and biomass sources and has seen significant growth in recent years. This report will identify and analyze the energy subsector's events, trends, and transactions.

Relevant News – The Energy Bull Run

2022 was a turbulent year, with the war in Ukraine setting the overarching theme for the energy industry, a tight energy market. Fossil fuel sources that have long been portrayed as the villain have once become the focal point as alternative green sources are yet to be meaningful to support the demand. Meanwhile, ambitious plans for carbon capturing were put on the table, governments proposed further steps on cutting emissions, and banks curtailed financing to fossil fuel projects under ESG concerns.

Industry Trends – Focus on Capital Discipline

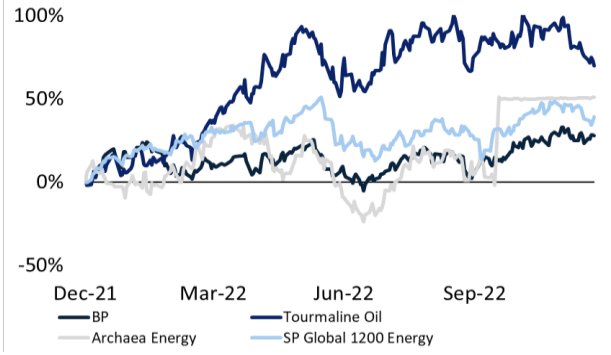
The rapid recovery in demand and geopolitical tensions turbocharged the oil prices to 2014 highs and upstream cash flows to record levels. Instead of reinvesting into CAPEX, the industry prioritized balance sheet health by distributing cash to shareholders and repaying debts in the face of economic uncertainty and volatile commodity prices. As a result, the M&A activities tapered momentum throughout the value chain. ESG continues to be integrated into the industry, with investments shifting from fossil fuel sources to renewable space and cleaner alternatives.

Industry Research	
Global Energy Industry Size	
Global Market Size	$4,703B
Annual Growth (Past 5 Years)	2.9%
Annual Growth (Next 5 Years)	5.0%

Source: IBISWorld

Key Companies	
Tourmaline Oil	TSX: TOU
Market Cap	$17.27B
Enterprise Value	$23.5B
EV/2021 EBITDA	3.0x
BP	NYSE: BP
Market Cap	$104.7B
Enterprise Value	$129.5B
EV/2021 EBITDA	6.6x
Archaea Energy	NYSE: LFG
Market Cap	$2.1B
Enterprise Value	$2.7B
EV/2021 EBITDA	55.2x

1-Year Return



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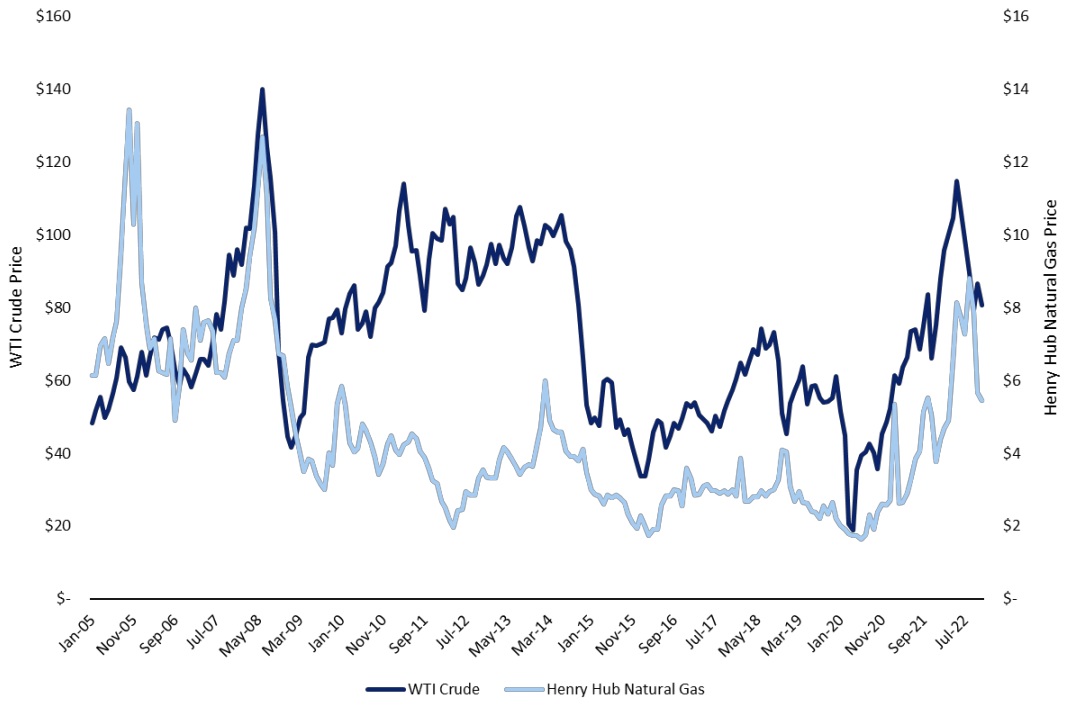
Oil & Gas Macroeconomics

The Next Oil & Gas Bull Cycle

Between mid-2014 and early 2016, the global economy experienced one of the most significant oil price declines in modern history. The 70% drop in price was one of the three most devastating declines since World War II and the longest-lasting since the 1986 supply-driven collapse. Factors including rising efficiency gains in US shale oil, reducing geopolitical tensions, and expanding Organization of Petroleum Exporting Countries (OPEC) production fueled the overwhelming supply in the market. The price plumbed with the strengthened US dollar and dimmer economic prospects of the growth of oil-importing countries. Although the price had moved away since the 2016 trough with a cut in supply due to reimposing sanctions on Iran and accelerating decline of Venezuelan production, the oil industry took another hit with Covid-19 shutting down the whole world.

Unlike the previous collapse caused by multitude of factors and spread out over a long horizon, the Covid-19 drop was instant and short-lived, as vaccine development through accelerated programs allowed countries to reopen simultaneously. Suddenly, the world shifted from a complete stop to full-on throttle, with economic activities returning to normal. The demand quickly outstripped supply, driven by robust economic growth, a severe winter in the Northern Hemisphere, and OPEC+ limiting output to support higher crude oil prices. This resulted in WTI Crude ending 2021 at $75.21, a 299% increase from the 2020 bottom, and Henry Hub Natural gas ending at $3.76, a 116% increase from the 2020 bottom.

Exhibit 1: Historical Prices of O&G



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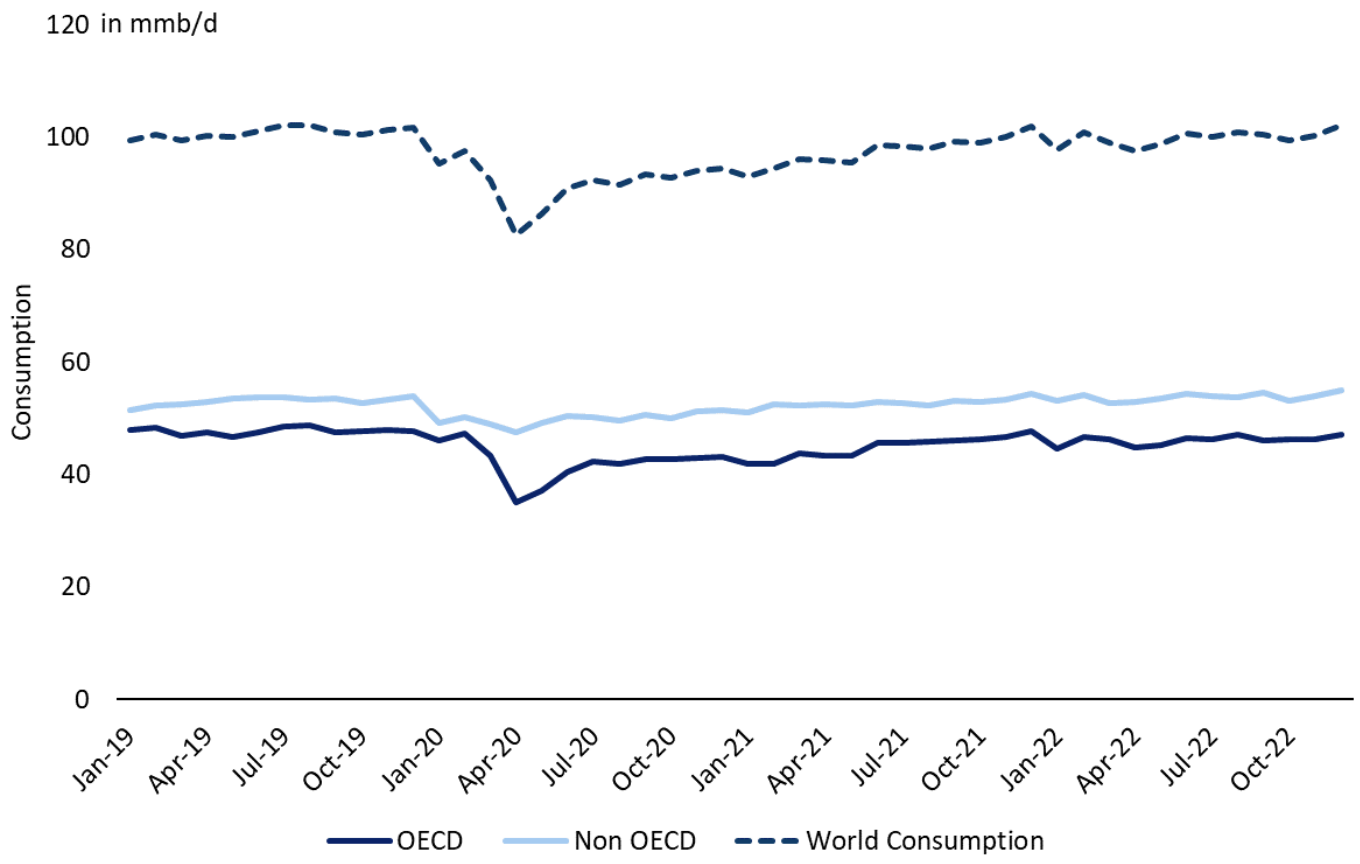
The Russian-Ukraine conflict that started at the end of February 2022 further magnified the demand and supply imbalance. Following the outbreak, several regions, including the European Union (EU), the United Kingdom (UK), the US and Canada, have imposed embargoes and restrictions on oil shipping and product imports from Russia, disrupting the flow of oil and gas (O&G) around the world. With Russia being the largest exporter of O&G, the market responded to the loss of supply by driving WTI Crude to $114.67 and Henry Hub Natural Gas to $8.81, prices last seen in the 2014 O&G bull cycle. Macro tailwinds, including the Russia-Ukraine conflict, flat O&G production, and ongoing need for reliable energy with population growth are likely to maintain the elevated prices. However, the momentum of the upward force remains in doubt before calling the start of the O&G bull cycle with uncertainties over tightening monetary policy, inflation, and stricter emission standards on O&G expansions.

Robust Demand Despite Macro Headwinds

Demand Recovering from Covid-19

Exhibit 2: Historical Oil Consumption by Regions



Source: US Energy Information Administration, OPEC 2022 Outlook

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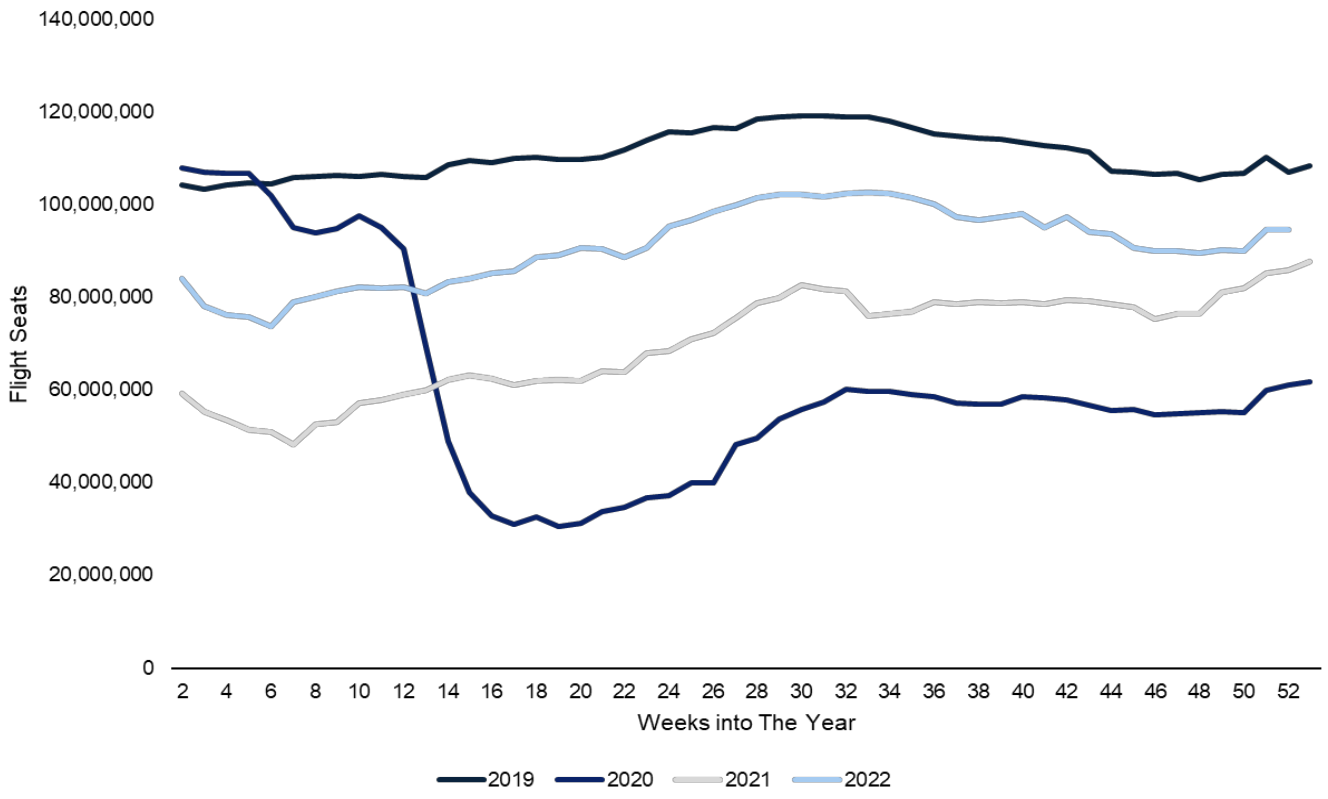
After the sharp retreat of demand during Covid-19, consumption declined 20% from the pre-pandemic peak of 102 mmb/d to the 2020 bottom of 82 mmb/d, with countries imposing lockdowns and border closure to limit the spread of the virus. Nevertheless, the looming demand quickly rebounded back to the 90 mmb/d levels with the advancements in Covid vaccine clinical trials. With the Pfizer/BioNtech vaccine in place at the end of 2020 and aggressive vaccination programs, countries gradually lifted their Covid restrictions and were back in business. To date, the consumption recovered to the 2019 level of 100 mmb/d. The Organisation for Economic Co-operation and Development (OECD) countries such as US, UK, and Canada faced a steeper decline at the time because of a primarily uniform lockdown timeline and slower economic growth. In comparison, the non-OECD countries comprised of emerging markets had robust GDP growths, healthy population, and differentiated lockdown strategies, which led to more resilient consumption at the time.

Exhibit 3: Total Scheduled Airline Seats



Source: OAC

With jet fuel making up a sizable portion of petroleum consumption, the recovery of the airline business suggests there is still a runway ahead for demand growth. With most Covid restrictions lifted and people enjoying their freedom out of the quarantine, the airline business is on its path to returning to the pre-pandemic level. Although the scheduled flight seats are still behind the 2019 level by around 12M, flight activities improved year-over-year in many areas of the world for domestic and international flights. North Africa, Central Asia, and Central/Western Africa even had an increase of 4.6%,

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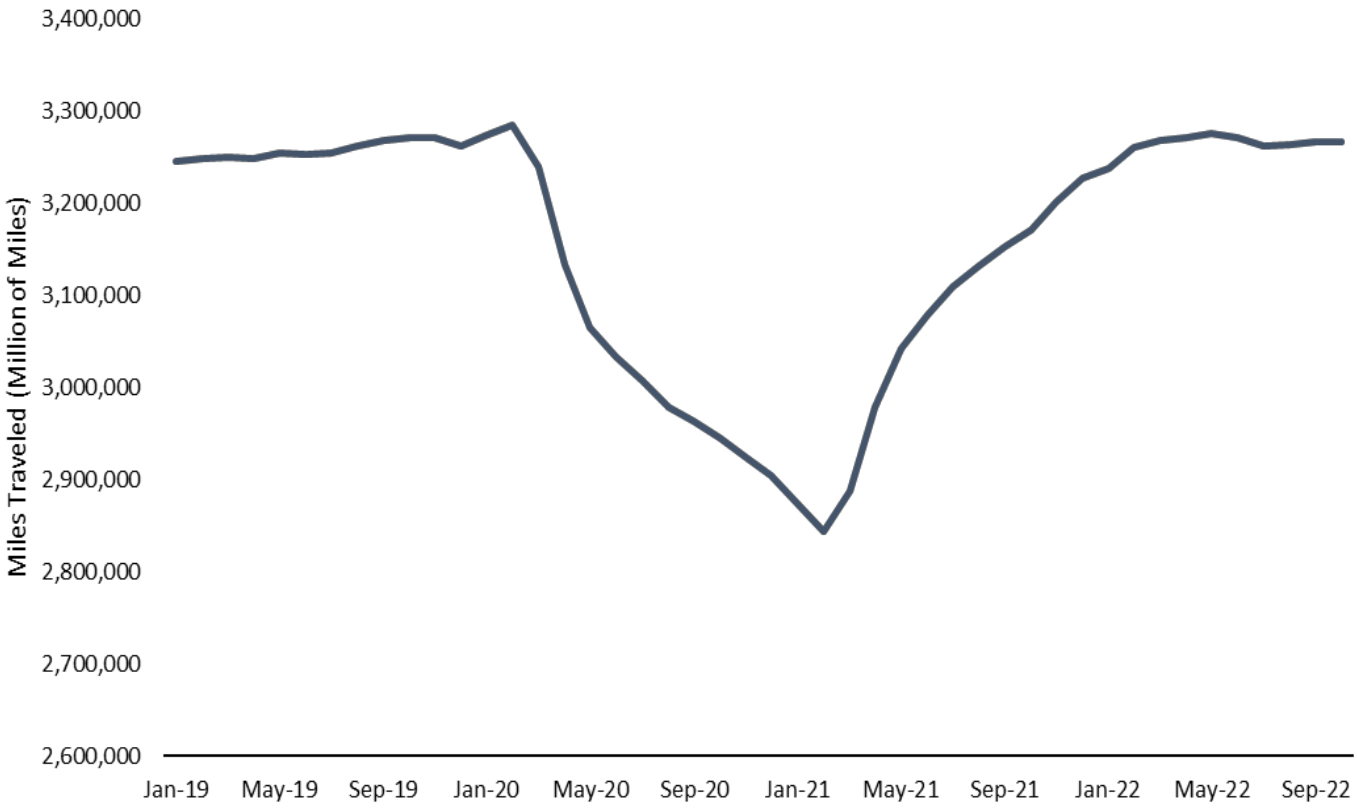
25.9%, and 6.8% in-flight activities, respectively, compared with the same week in 2019. Further demand growth is likely to be driven by North America, Western Europe, and Northeast Asia, as tourism recovers and China reopens its doors. Similarly, vehicle miles traveled have recovered, despite inflated oil prices, due to improved flight activities and the popularity of road trips. With 206 million Americans planning a road trip, gasoline demand is likely to stabilize at the current level in the short term.

Exhibit 4: Average US Vehicle Miles Traveled



Source: U.S. Federal Highway Administration

Growth in Emerging Markets Drives Future Demand

he population growth and expanding commercial activities have been the key factors driving energy demand in recent decades. The global population is forecasted to increase by 1.6B between 2021 and 2045, from 7.9B to 9.5B. The non-OECD region will account for over 96% of the expected total increase, with OECD only accounting for under 4%. The subsequent population boom is set to happen in the Middle East and Africa region, with the forecast of driving 48% of the population growth. Asia, India, and the OPEC region followed the lead by contributing between 15% and 19% to the development.

With China transforming from a developing to a developed country, the first-world issue of declining fertility rate and aging society will play out in the next 24 years, causing around 76M decrease in population. Meanwhile, India will take over as

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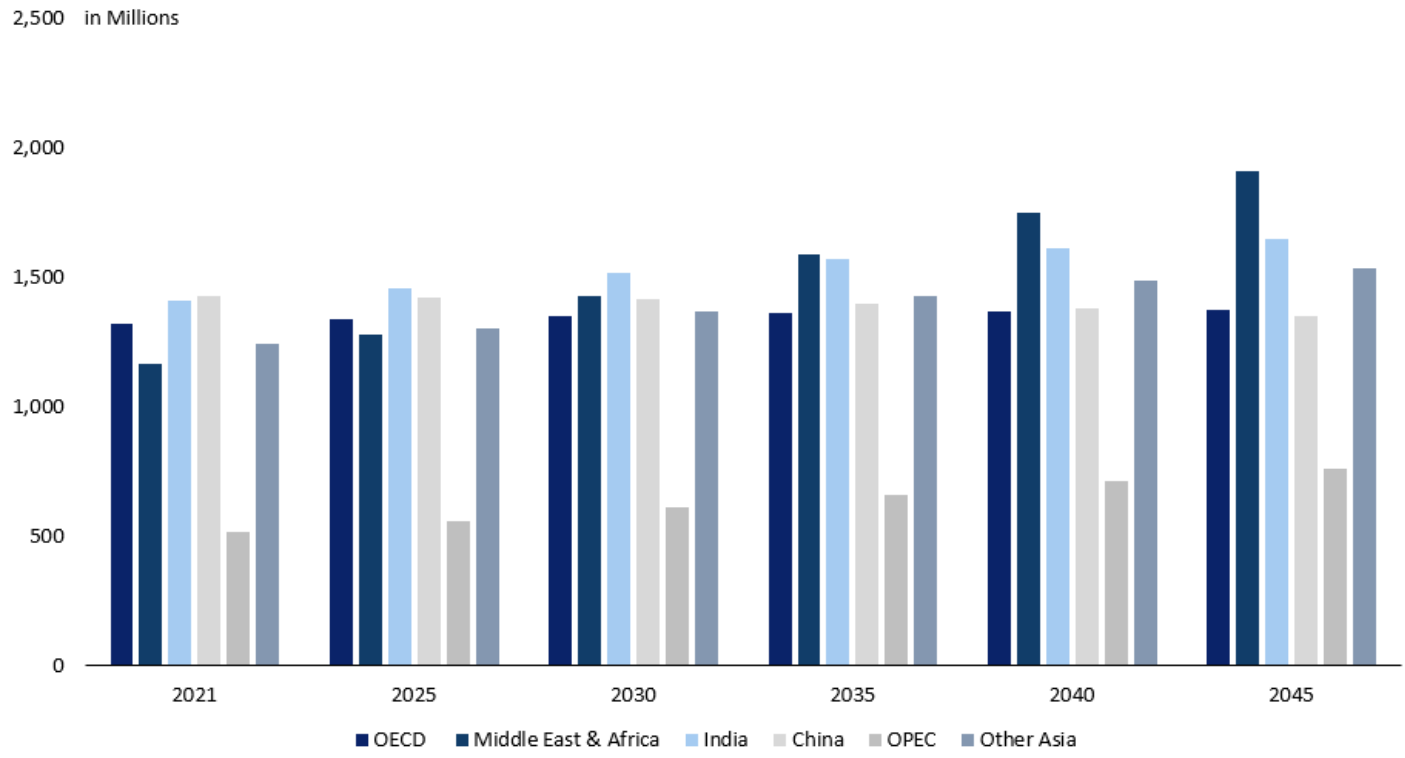
the most populated country by adding 238M over the same period. Notably, the Middle East & Africa and OPEC are the only regions projected to see an increase in their growth rate, adding 747 and 244 million people between 2021–2045, respectively. This increase in demand, coupled with the geographical proximity of these regions to fossil fuel sources, is expected to sustain O&G demand for the next decade.

Exhibit 5: Forecasted World Population Growth Break Down by Regions



Source: UN, OPEC

With China transforming from a developing to a developed country, the first-world issue of declining fertility rate and aging society will play out in the next 24 years, causing around 76M decrease in population. Meanwhile, India will take over as the most populated country by adding 238M over the same period. Notably, the Middle East & Africa and OPEC are the only regions projected to see an increase in their growth rate, adding 747 and 244 million people between 2021–2045, respectively. This increase in demand, coupled with the geographical proximity of these regions to fossil fuel sources, is expected to sustain O&G demand for the next decade.

In non-OECD countries, except for China and Russia, an increase in the working-age population will significantly affect economic growth. In regions such as the Middle East & Africa and OPEC, relatively lower labour productivity will continue to be offset, or even surpassed, by the positive impact of rapidly growing populations, improved education, a growing middle class, and government investments in domestic economies. For declining working-age population regions, including OECD Europe, Russia, and China, the economic growth will be limited, despite labour productivity is forecast to increase.

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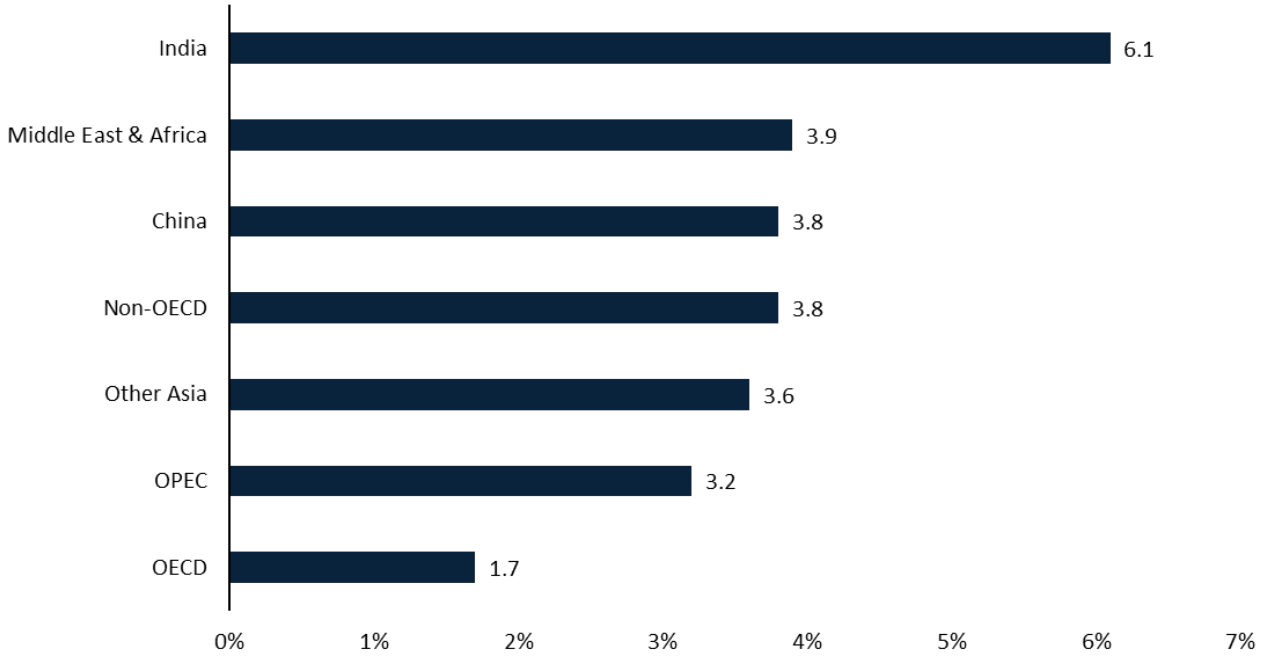
Exhibit 6: Average Forecasted GDP Growth 2019 – 2045 by Regions



Source: OPEC

Global real GDP growth is expected to increase on an average of 3% from 2021 to 2045, with emerging markets' growth offsetting the declines in OECD countries. India sees the highest GDP growth over the next few decades, owning the world's most significant working population and increasing income levels as more people enter the middle class. Although China faces a population decline, its well-established role in the global supply chain supports above-average growth. The less affluent regions such as the Middle East & Africa, OPEC, and Other Asia are also on track for accelerating growth trends benefiting from expanding population.

Naturally, non-OECD countries will increase their demand for energy with the increased population and thriving economic activities. At the same time, the OECD countries are declining due to slower economic growth, low fertility rate, and aging society. According to OPEC 2022 Outlook, the global oil demand is projected to increase by 12.9 mmb/d, rising to 109.8 mmb/d in 2040, with non-OECD demand growth offsetting the decline in OECD. IEA also shared a similar view with OPEC based on the trajectory implied by current policy settings. It suggested that O&G demand for 2040 can drop to as low as 34.1 mmb/d if the 1.5 °C stabilization in the rise in global average temperatures is achieved and universal access to modern energy is developed by 2030. However, without exponential growth in renewable energy capacity and aggressive policies to limit fossil fuel sources, demand will remain at the 100 mmb/d level in the coming decades.

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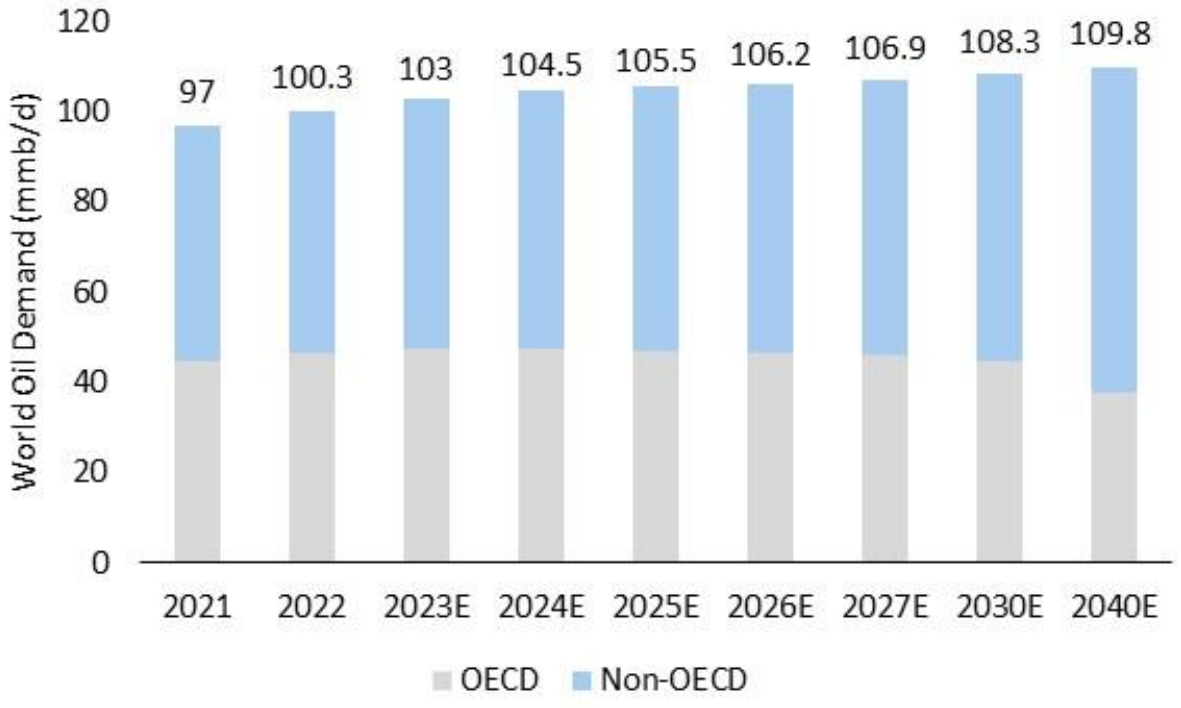
Exhibit 7: Forecasted World O&G Demand Till 2040



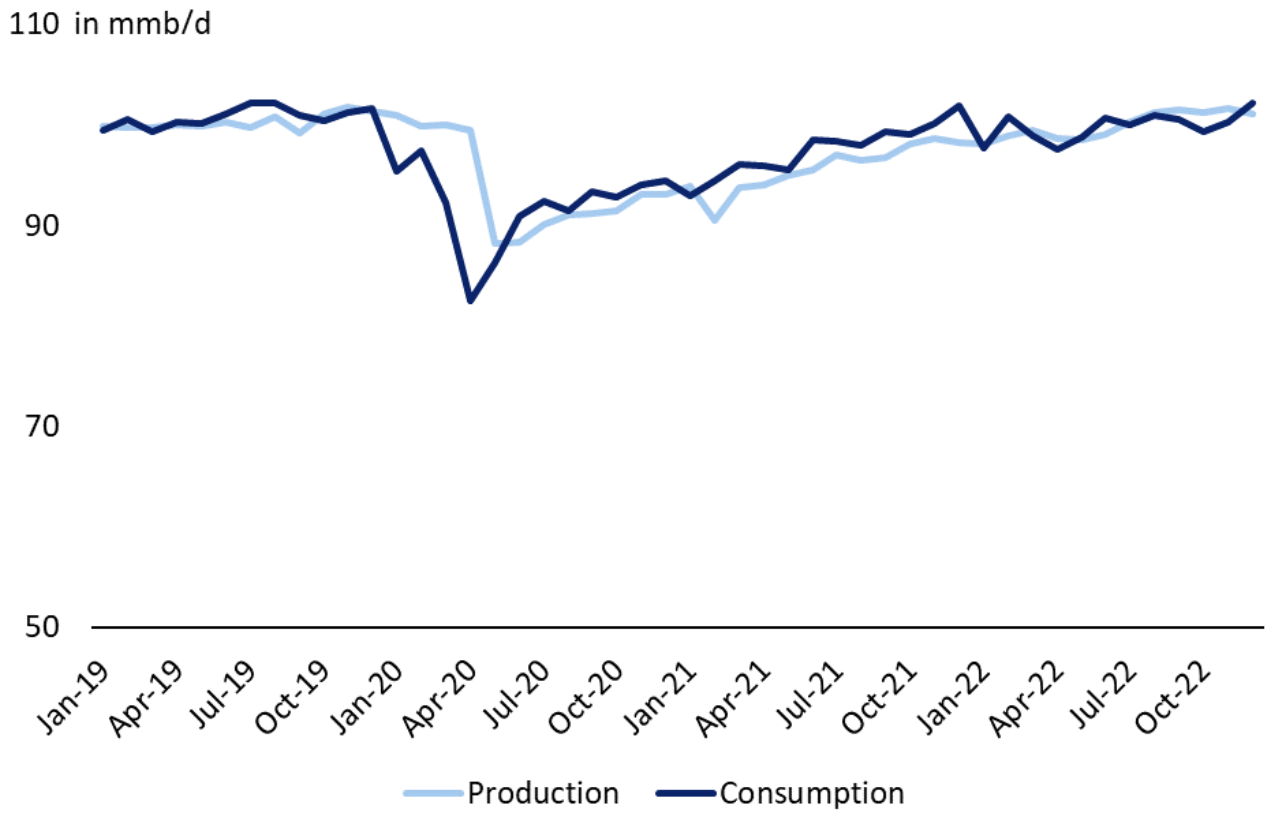
Source: OPEC, IEA

Flat to Declining Supply Support Energy Prices

Tightening Supply Exaggerated by Ukraine-Russia Conflict

With the world coming out of the pandemic, the speedy recovery of oil demand surpassed production leading to the steady climb of oil prices over the last two years. The Ukraine-Russia conflict further exacerbated the supply shortage in the market, disrupting Russian oil exports, which make up a significant portion of the world's energy production. The supply shortfall might be more severe with Russian oil exports mostly delivered to China and India under Western countries' sanctions on Russia. Over the last few months, India has been pumping its refineries to take advantage of the arbitrage opportunity by processing the discounted Russian crude to higher margin petroleum products and selling it at the inflated price to the world. Whereas China kept most of the crude imports to build robust reserves ahead of geopolitical uncertainties, indicating a global supply loss. Although demand retreated in the later months of 2022 due to slowed global economy caused by monetary tightening, there is still a risk of short supply in future.

Exhibit 8: Historical World O&G Consumption vs Production



Source: US Energy Information Administration

The tight supply market has also been reflected in the continuous drawdown of the US strategic reserves to fill the supply gap and maintain commercial inventories. Since March 2022, this has been the most significant release since the inventory was established after the Arab oil embargo in 1974. The US oil reserves declined by 33% from 566M barrels in March to 369M barrels in December, which is about 53% of the maximum authorized storage capacity of 714M barrels and enough to replace more than two years' worth of US crude net imports. The reduced strategic inventory implies that the US government will have fewer resources to counter future supply shocks.

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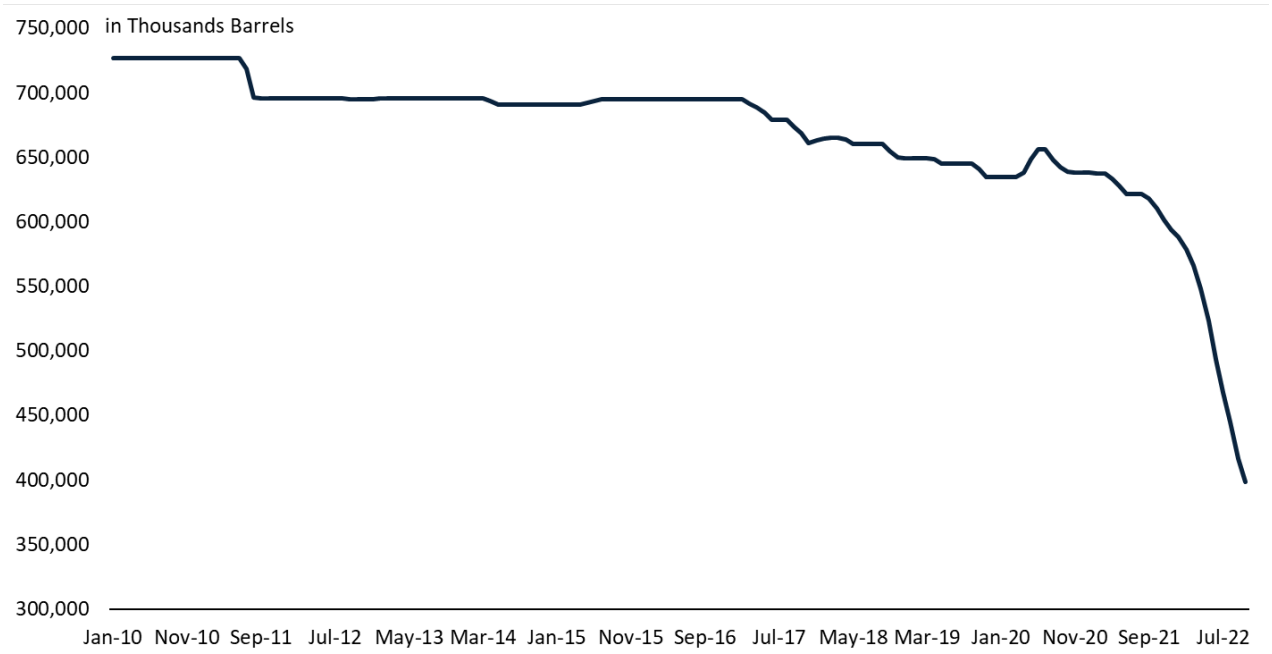
Exhibit 9: US Oil Strategic Reserve



Source: US Energy Information Administration

With major exporters experiencing capacity constraints, short-term supply is set to be flat to declining. The US is not increasing its oil production currently because of a shortage of labour and equipment and a lack of funding. Government policies and regulations are also hindering increased production. Additionally, investors are hesitant to finance repairs for the old oil refineries sector as there is a shift in demand toward renewable energy sources. As for December, the US refineries utilization rate is already 91%, with little room for expansion. Similarly, OPEC countries have limited spare capacity of around 1-2 mmb/d to replenish supplies. Furthermore, expanding production goes against the cartel's political will, as it collectively decided in October to cut production by 2 mmb/d to stop the slide in oil prices caused by the weakening global economy. By looking into past O&G cycles, the rapid rise in commodity prices were typically led by a period of fast economic growth outpacing the increase in production capacity. Vice versa, looming economics and maintained supply caused drop in price. Therefore, unless a severe recession destroys global demand at a scale, the oil price will likely stabilize under constrained supply.

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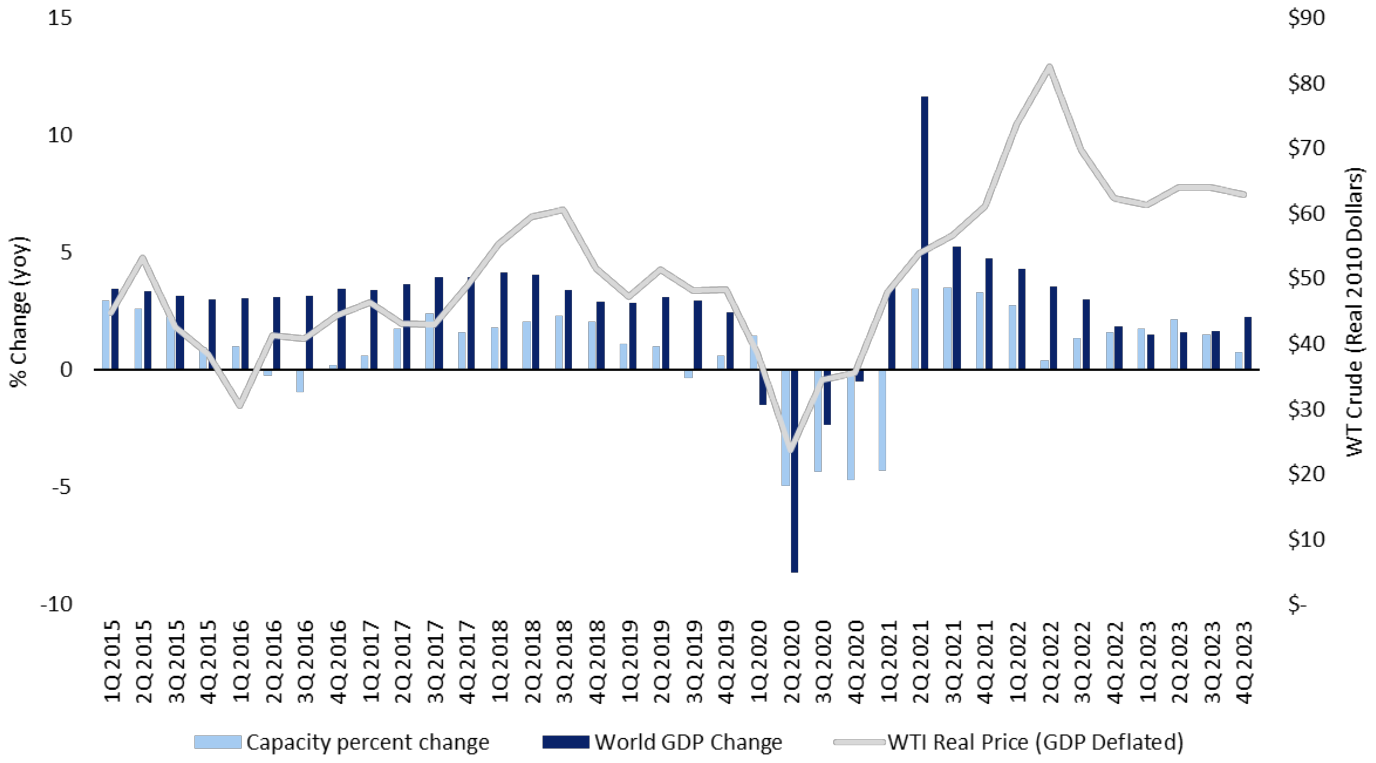
Exhibit 10: World O&G Production Capacity Change vs GDP Growth



Source: US Energy Information Administration

Structural Under-Investments Limiting Supply Expansion

A rotary rig is a bit of machinery that rotates the drill pipe from the surface to drill a new well or sidetrack an existing one to explore for, develop and produce oil or natural gas. The rig count is a reliable measurement for assessing future demand and supply in the O&G market. After the drilling activities bottomed in 2020 under the impact of Covid, operations resumed over the past two years soaring by 28% in 2022, a number still lower than the pre-pandemic level. The decline rate shows the pace at which production is expected to decline over the lifetime of an energy asset. Although the U.S. and Canada added some of the highest rig counts over time, the supply is susceptible to drilling activities with high decline unconventional plays dominating these regions. With total U.S. oil base production decline being 34% and initial-year decline for unconventional plays at 40% to 50% range, active drilling is required to maintain a healthy supply as old rigs experience a significant reduction in production. Thus, a shortfall in the North American region's supply will occur if drilling is reduced or halted.

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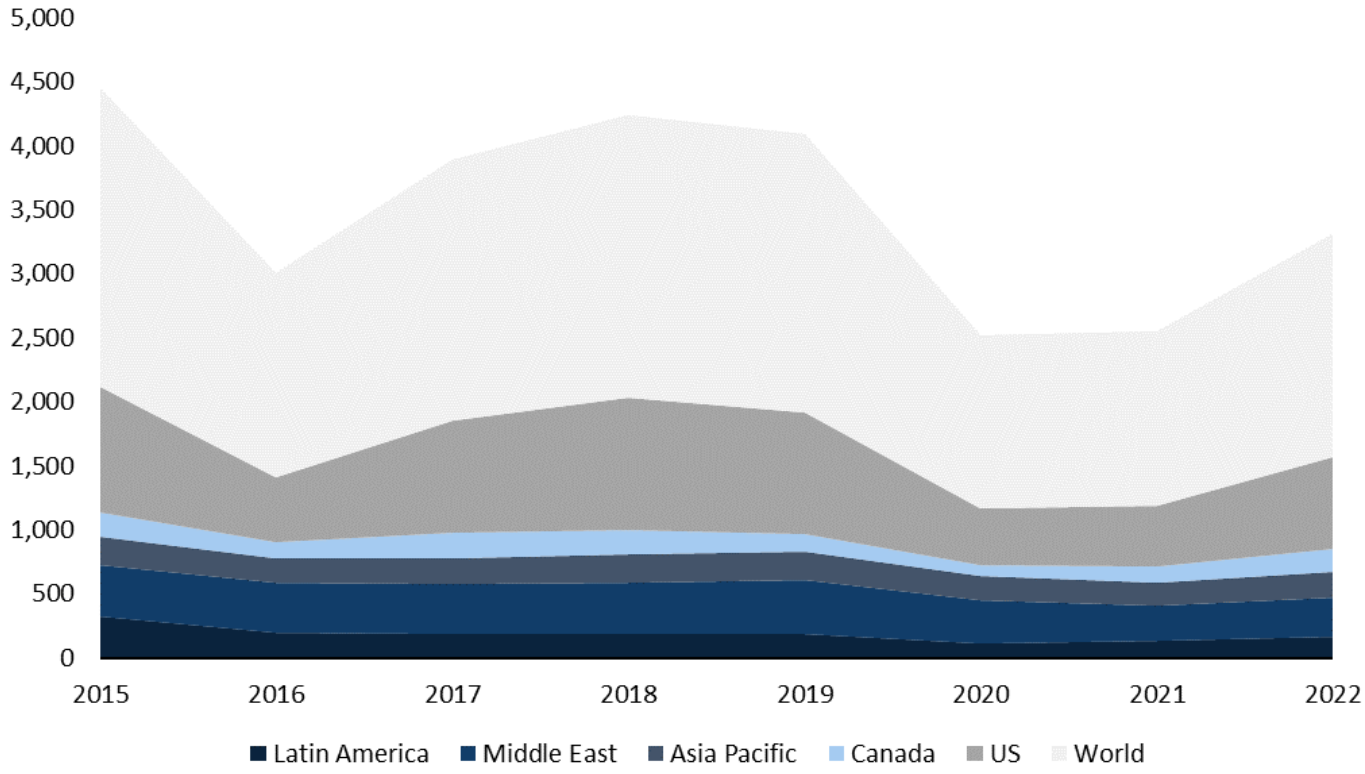
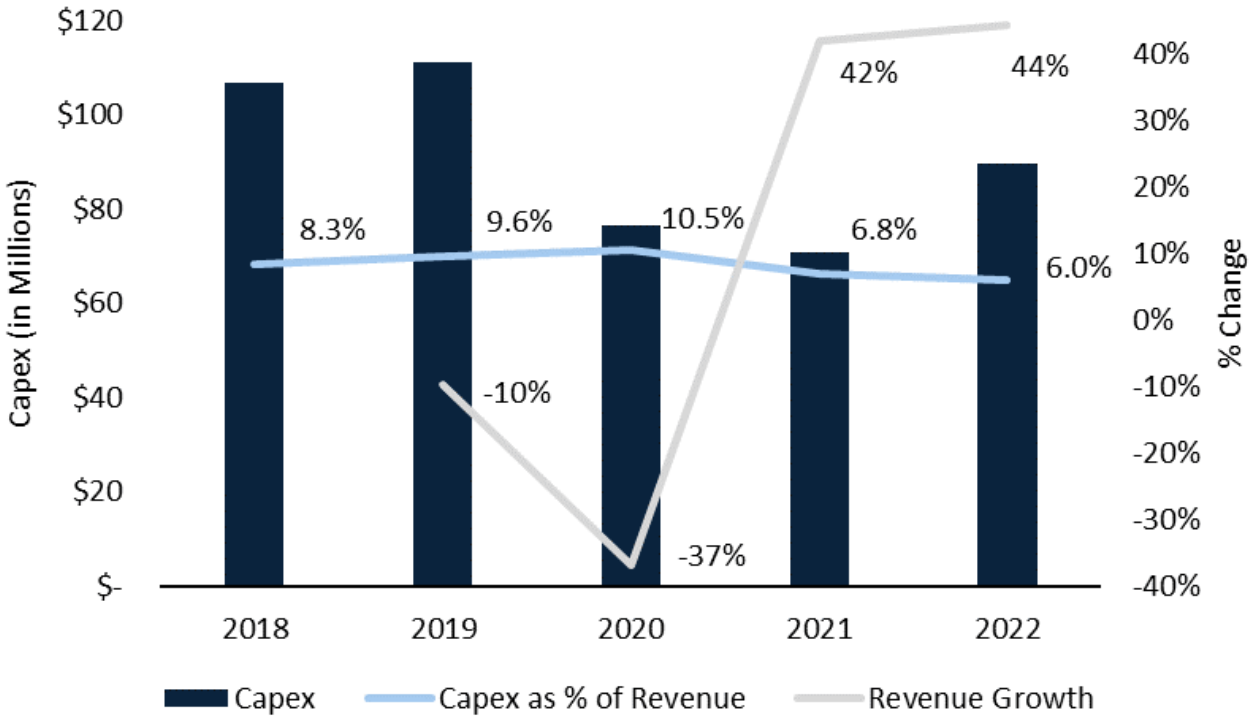
Exhibit 11: Historical Rig Counts Distributed by Regions



Source: Baker Hughes International Rig Count

Despite record high O&G prices, companies maintain capital discipline to avoid over-expansion, similar to the 2014-2016 O&G bear cycle. In 2013, upstream players aggressively developed production by leveraging hydraulic fracturing technology to capture extra profits from elevated prices, which ultimately led to a price collapse as supply vastly outstripped demand. Companies and investors have learned from this lesson and now prioritize balance sheet health and focus on the most profitable projects, rather than financing drilling indiscriminately. By reducing the reinvestment ratio – limiting investment in new production, more cash flows go into debt repayments, dividend issuances, and share repurchases. Additionally, tightening policies on emission control and climate risks make companies even more cautious about expansion. As a result, capital expenditures remain flat despite 44% revenue growth among the top upstream and integrated O&G companies in 2022. With capital discipline being the industry norm, a sudden increase in supply is unlikely.

Exhibit 12: Global Top Upstream and Integrated O&G Companies Capex vs Revenue Growth



Source: Yahoo Finance, Companies' Quarterly Reports

The medium-term outlook for the output of the OECD countries is forecasted to increase by 2.4 mmb/d from 2022 to 2025, driven by growth in the US, Canada, and Norway. In the long-term, the supply is expected to decline after reaching the projected peak in US tight oil production and maturity of production in the OECD countries. Canada, nonetheless, is still poised for long-term growth, with the potential increase in oil sands capacity offsetting the decline in conventional oil plays. Non-OECD growth will be supported by developments in Latin America, such as Brazil, with its ultra-deepwater pre-salt assets materializing in the future. Asia is expected to see the most pronounced decline, with supply falling by 1.2 mmb/d in 2040 with mature producers. China, the largest producer in the region, will have a flat supply in the medium term but eventually decline in the long term. With OPEC holding some of the region's lowest declining assets and rich resources, the production is set to increase to 43.9 mmb/d in 2040, compensating for the supply loss in other regions. Under the current projection, the O&G supply is behind demand in the future, indicating long-term oil price stabilization unless severe events curtailing the demand or exponential growth in the renewable sector displace fossil fuel demand at a large scale.

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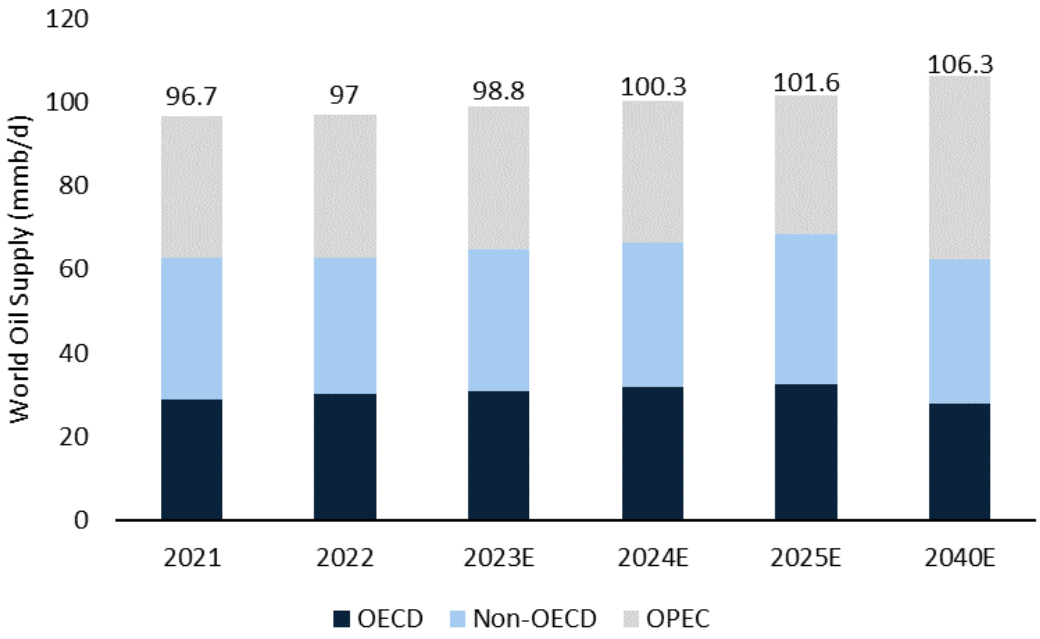
Exhibit 13: Forecasted World O&G Supply Till 2040

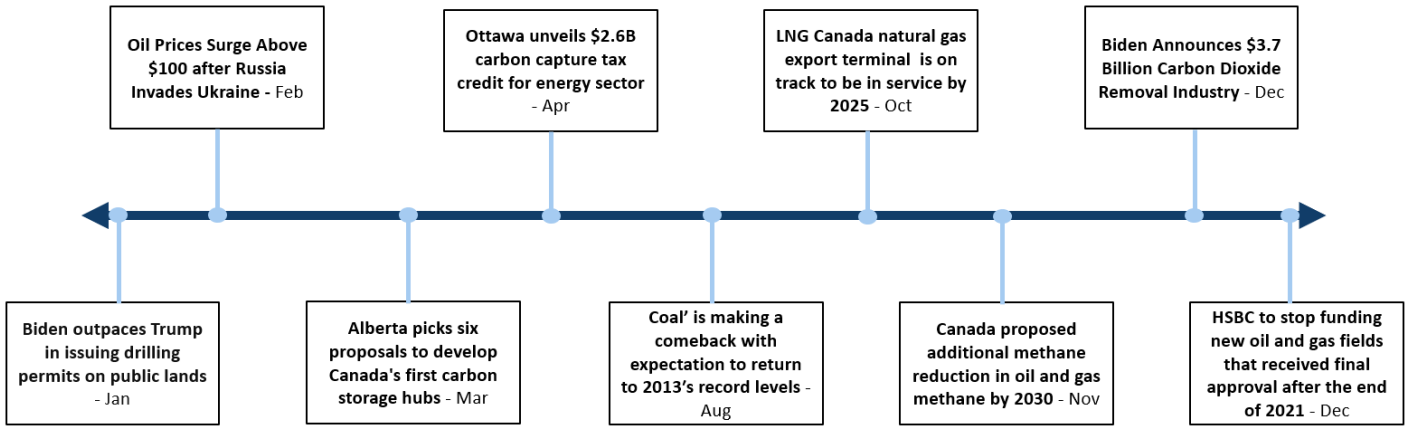


Source: OPEC

Energy Subsector News & Events

Timeline of Notable News & Events

Exhibit 14: Timeline of Notable News & Events



The Next Big Topic – Carbon Capturing

Ottawa Unveils $2.6B Carbon Capture Tax Credit

In April, the Canadian government announced the CAD $2.6B tax credit program for carbon capture utilization and storage (CCUS) projects in the next five years to support the costly development of this vital technology to reduce the country's emissions. The CCUS technology traps greenhouse gas emissions from industrial sources and stores them deep in the ground to prevent them from being released into the atmosphere. Immediately, firms can claim a tax credit of up to 60% for direct air capture projects. General carbon capture projects, such as the capture of CO2 from O&G production, are eligible for 50%. In addition, 35% is also available for investment in carbon transportation, use, and storage equipment.

The promising tax benefits will accelerate the build-out of the capital-intensive CCUS projects that aim to reduce emissions by 15 megatons by 2030. Enbridge, Atco, Capital Power, and the Pathway Alliances will benefit from the tax credit with their CCUS plans. By taking on the opportunity, emission-resilient upstream producers will not only be able to reduce their emissions from production but can also use the stored CO2 later to enhance oil recovery.

The US $3.7B Carbon Dioxide Removal Plan

In December, the US announced the launch of four programs emphasizing CCUS technology with $3.7B in funding from the Bipartisan Infrastructure Law. $3.5B of the total budget will support the development of four domestic regional carbon capture hubs that will showcase direct CCUS technologies on a commercial scale. Each hub is expected to remove at least one million metric tons of CO2 from the atmosphere yearly and store it permanently in geologic formations or convert it

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into products. The left-over 200M will fund research, grant commercialization of CCUS technologies, and form the Technology Commercialization Fund.

In addition, the Inflation Reduction Act also boosts the government subsidy "45Q" for capturing CO2 from polluting sources from $50 to $85 per metric ton. With the increased incentives, CCUS developers can invest in more complex projects in industrial facilities with lower CO2 concentration than previous investments, primarily in low-cost pure CO2 emitting projects. The new bill also streamlines the process for obtaining the tax credits and expands the subsidy to smaller carbon capture projects, effectively fulfilling the industry's desired carbon capture legislation changes. With robust policy support, CCUS developments will rapidly grow to remove legacy emissions from the atmosphere and reduce release from current productions.

Canada's Further Step to Reach Climate Goals

In November, Canada announced an aggressive plan to reduce O&G methane emission by more than 75% by 2030 relative to 2012 levels, which exceeded the Global Methane Pledge target of 30%. Although the proposal is yet to be part of the regulations, the wordings of the plan certainly provide a perspective of Canada's deep commitment and ambition in tackling methane emissions. Currently, the Canadian O&G sector accounts for 35% of the methane emission, followed by agriculture and waste with 30% and 28%, respectively. The proposed regulatory framework attempts to expand existing regulations' scope to a broader set of emitting sources throughout O&G production. Some key highlights include requiring non-emitting equipment when feasible, prohibiting and limiting flaring at sites and facilities, and expanding the application of inspection programs across assets. In addition, stricter emission standards urge upstream O&G producers to transform their operations further to comply with the nation's goal towards a green future.

Diverged Opinions on Fossil Fuel Projects Financing

With the Paris Agreement aiming to keep global warming to no more than 1.5°C and reach net-zero emissions by 2050, banks are moving toward a cleaner future. Of the world's 60 largest banks, 40 have some restrictions on financing oil and gas, and 38 of them applied the restrictions to some fossil fuel projects. Still, material reductions are not yet observed, with the total financing of the fossil fuel sector sitting at $742B in 2021, a 1.1% year-over-year decrease. The reality is that banks are ununited when it comes to fossil fuel financing, with some gradually moving out while the rest continue to back the sector. Following La Banque Bank's ground-breaking policy that commits to exiting O&G financing entirely by 2030, HSBC called to stop funding new O&G projects that received approval after the end of 2021. Major Banks, including UBS, Barclays, and Goldman Sachs, also curtailed their financing to O&G by more than 20% from 2016 to 2021. Meanwhile, JP Morgan, Citi, and Bank of America withheld their support since day one, keeping their championship title as the top financiers of the fossil fuel sector. The transition is undoubtedly more painful for banks with more significant portfolio exposures to fossil fuels, but their participation is essential to the net-zero goals.

Industry Trends

Emerging Role of Natural Gas in the Global Energy Mix

With the Ukraine-Russian conflict highlighting the importance of energy security, energy policy in the US and Europe began to pivot in 2022. Consequently, the previous aggressive plan of phasing out natural gas shifted to reducing emissions from natural gas production as cleaner alternatives are still developing to support the energy demand. In 2022, the US and Europe announced several policies to incentivize natural gas investment while ensuring emissions reductions, such as the EU recognizing LNG as a sustainable energy source to replace coal units and the US' Inflation Reduction Act auctioning more O&G lease sale while granting O&G to reduce methane, which will drive investment in natural gas to increase in 2023. In addition, the LNG vessel order book jumped to a record high, with around 103 LNG vessels ordered globally during the first seven months of 2022, indicating a bullish outlook on the LNG market.

LNG is set to take a more prominent role in the energy mix than other fossil fuels because of its comparatively lower cost and emissions from production and combustion. According to IEA's analysis, coal-to-gas switching reduces emissions by 50% when producing electricity and by 33% when providing heat, which yields significant CO2 and air quality benefits. With the spread between gas and coal narrows, the increase in accessibility, and the evident switching benefits, markets that rely on coal can rebalance their energy mix toward gas, especially Asia. The LNG market will double if Asia increases gas to 20% of its primary energy consumption from the current 12%. The role of gas will be more evident in the world as economies are displacing carbon-intensive fossil fuels with gas to align with climate goals.

Shift in Trends Driving 2023 M&A Momentum

The O&G industry experienced a robust recovery in the second half of 2021, and this momentum carried into the early months of 2022 due to rising oil prices, improved cash flow, and increasing demand. However, recent geopolitical tensions and economic uncertainty have had a negative impact on the M&A market. In the first nine months of 2022, O&G M&A activity declined by approximately 27% compared to the previous year, despite oil prices at a record high and the upstream industry's financial health is at an all-time high. The uncertain environment has made potential buyers more cautious and led them to change their buying strategies. Downstream M&A took the hit by falling 57% compared to 2021 due to the rising risk of recession, while upstream M&A still accounted for nearly 60% of deals by value despite losing some momentum. The Ukraine-Russian conflict draws attention to energy security, which may benefit acquisition activities in LNG assets and resilient midstream infrastructure. In addition, investments in commercializing clean energy technologies such as CCUS are expected to grow under supportive policies. ESG retains its momentum as a critical metric for O&G M&A, with players rebalancing their portfolio by divesting from emission-intensive assets to investing assets with a strong ESG profile.

Emphasis on Balance Sheet Health and Capital Discipline

It is projected that in 2022, the global upstream oil and gas industry will generate its highest-ever free cash flows of $1.4 trillion at an assumed average Brent oil price of $106 per barrel. Instead of reinvesting, many oil and gas companies have prioritized strengthening their balance sheets through debt repayment and returning cash to shareholders, with some major oil companies already increasing their shareholder payout targets for 2022. Some examples are Exxon announcing $30B buyback by the end of 2023, Chevron increasing buyback guidance to $15B per year, and Shell announcing that it has launched a $6B share buyback program for Q3. Following the capital discipline theme, capital expenditure in the upstream O&G industry is expected to be around 40% lower in 2022 compared to 2013-2014. This is due to efficiency gains, focusing

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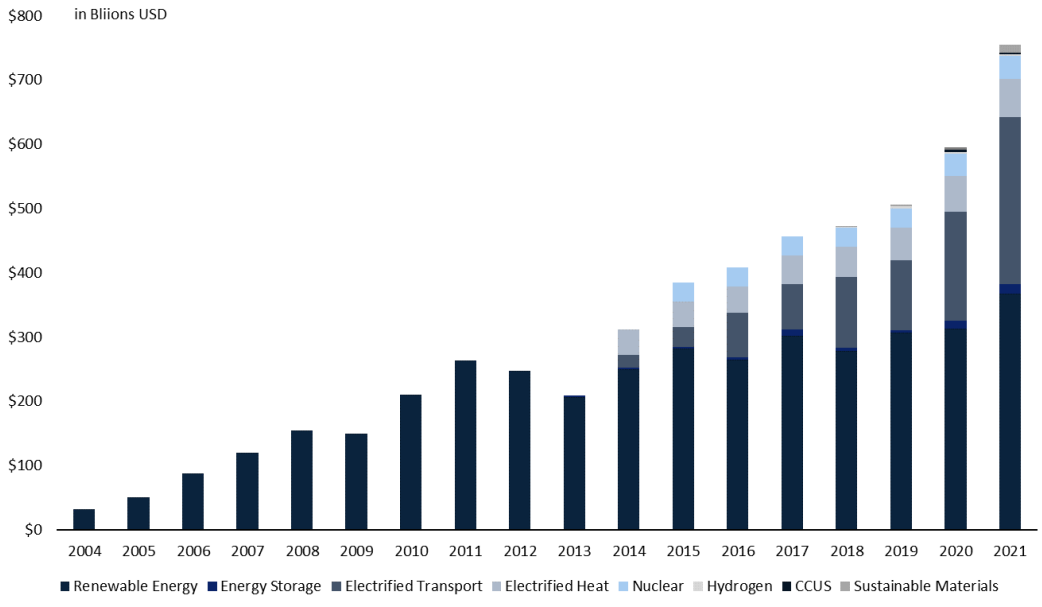
on the most productive acreages and wells, re-fracking of shale wells, and monetizing drilled but uncompleted wells. As a result of these efforts, production has increased without a corresponding increase in capital expenditure. Capital discipline is expected to continue to be a trend in the industry as economic uncertainty grows and energy prices remain volatile.

Energy Transition Accelerated by New Policies

Growing concerns over energy security and volatile commodity prices urge O&G players to diversify the energy supply and accelerate energy transition. Consequently, O&G companies' clean energy investment has increased by an average of 12% each year since 2020 and is expected to make up an estimated 5% of total O&G capital expenditure in 2022, up from the 2020 figure of less than 2%. A supportive policy environment and record high cash flow from premium commodity prices enabled O&G companies to rebalance their portfolio and invest in clean energy sources. The US's Infrastructure Investment Act and Inflation Reduction Act outline additional steps to net zero and provide for about $450B of clean energy and related investment expected to be in place in early 2023. In addition, with the Fit for 55 climate package and Europe's REPowerEU plan, the EU committed about $430B to the energy transition. Over a dozen countries have also been on board with their energy transition programs and fundings. According to Deloitte, future clean energy sector growth is expected to be mainly driven by three factors, including higher demand for low-carbon energies, more scalable and economical use case, and increased cash flows from the project. Unlike investments a decade ago that focused almost solely on upstream renewable energy production, recent investments extended to related infrastructures and end users, such as the exponential growth of electrified transports. The trend indicates investors recognizes the potential and the need for energy transition throughout the value chain, which led to a more efficient allocation of capital to support decarbonization goals.

Exhibit 15: Global Investment in Energy Transition by Sector from 2004-2021



Source: BloombergNEF

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Competitor Landscape

Industry Value Chain

The **upstream** segment consists primarily of the exploration and production of oil and natural gas. This is normally conducted by companies who identify where reserves are located (exploration) and then extract (production) the resource to be refined further down the supply chain. This segment also includes related services such as oil rig operations companies, machinery rental companies, and chemical supply companies (Oil Field Services).

The **midstream** segment is the intermediary between upstream and downstream companies. Companies in the midstream segment transport natural gas, NGLs, and crude oil from extraction sites to downstream refineries. This is primarily done through extensive pipeline infrastructure networks but can also be done with trucks, rails, or tankers. Other services considered to be midstream, include processing, storing, and marketing carbon-based products.

The **downstream** segment includes all activities after production up until the consumer buys the product. Downstream services include refining crude oil into more commonly used products like gasoline which is then sold through retail, commercial, or wholesale channels.

Industry Drivers

Upstream

The **cost drivers** mainly come from three parts, exploration cost, administration cost, and operation cost. The exploration costs are billed on the exploratory drilling (drilling that might not yield a usable result) and the expert workforce deployed to track profitable source of crude. After identifying a usable source, costs are spent to secure appropriate permits and leasing to start operations. Site preparation, well drilling, on-site workers, and necessary infrastructures mark the final operation costs. The **revenue driver** is through the sell of crude oil or natural gas that are significantly impacted by the movement of commodity prices.

Midstream

The **cost drivers** for midstream are the associated costs with the transportation of O&G through pipeline, tanker ships, or trucks. Typical cost items can be the building and maintaining cost for the pipeline network and fuel cost for the vessels and trucks. The **revenue driver** is from the percentage of fee midstream companies charged to transport or a share of the profit from the refined goods sale, and in some cases both.

Downstream

Typical downstream **cost drivers** consist of the building and maintaining costs of the refineries, operational costs, and chemical purchased for refining process. In addition, costs also arise from the final distribution of products to end-consumers such as fees for truck transportation. The **revenue driver** is similar to upstream companies, where the revenue is largely commodity-based.

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Notable Industry Players

Royal Dutch Shell (NYSE: SHEL) – Integrated

Shell is a British multinational O&G company headquartered in London. The company has operations in over 99 countries and is vertically integrated with upstream production around 3.7 mmb/d and 44,000 downstream service stations worldwide. Shell's competitive advantages lay on its market controlling position to bargain, vertical integration to control quality and reduce cost, and moat of patents through substantial investment in research and development.

ConocoPhillips (NYSE: COP) – Upstream

ConocoPhillips is an upstream independent exploration and production (E&P) O&G company with operation across 13 countries. As of 2022Q3, the company has the capacity to produce 1,754 mmb/d. ConocoPhillips' largest business segment centered at the Lower 48 that has high-quality positions in the US unconventionals, which has low cost of production and GHG intensity with significant upside potentials. ConocoPhillips' deep O&G reserves, successful track record of developing new products, and ability to execute cost-effective projects support its robust market position as an independent E&P.

Enbridge (NYSE: ENB) – Midstream

Enbridge is a multinational pipeline and energy company headquartered in Calgary, Canada. Enbridge's pipeline system is the longest in the North America and the largest oil export pipeline network in the world. Enbridge transports 20% of the natural gas consumed in the U.S. and 25% of North America's crude oil. Enbridge's competitive advantage is formed by its existing scale of pipeline network that is difficult for new entrants to disrupt with the extensive capital requirement for the projects.

Valero Energy (NYSE: VLO) – Downstream

Valero Energy is an American downstream O&G player in player in the business of refining, marketing, and transporting petroleum. Valero is the world's largest independent refiner with production capacity of 3.2 mmb/d from the 15 refineries. Valero also holds title for the world's 2nd largest renewable diesel and corn ethanol producer supporting the world's move to cleaner fuel sources. Valero's premier refining portfolio with low cost while achieving top quartile operations and fast-growing renewable products will continue to fuel Valero's growth.

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Tourmaline Oil (TSX: TOU)

Upstream - Energy

Tourmaline Leading the Green War

January 2023

Tourmaline Oil is a Calgary-based upstream O&G company engaged in the exploration, development, and extraction of O&G focusing on Alberta Basin, NEBC Montney Formation, and Peace River oil sands. The company is the largest natural gas producer in Canada and the fifth in North America.

Company Strategy

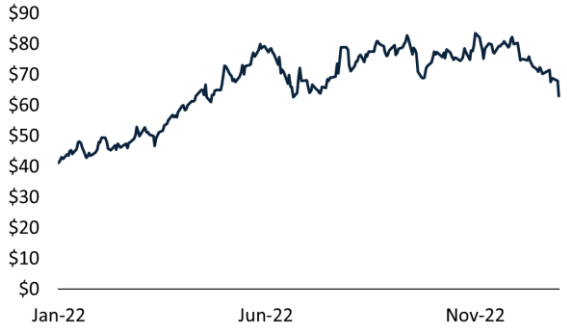
The company's long-term business strategy aims to strengthen shareholder value by forming extensive inventories over the core operating areas and developing those areas to increase production, reserves, and cash flows at a compelling return on invested capital. Over the years, the company has been effectively executing its strategy by building up 75 years of drilling inventory, which exhibited attractive earnings under the high commodity price environment in 2022. The company's gas-dominated production has strong growth potential with the ability to capture growth from the ongoing coal-gas switching and the increase in gas consumption.

Internal ESG Strategy Analysis

The company has the lowest GHG emission intensity among the Canadian Senior E&P peers, which achieved a 35% reduction in CO2 emissions from 2013-2020 and a 25% reduction in methane emission from 2017-2020 while ramping the production at three-digit growth. In addition, the company sees itself cutting down another 25% in emissions from the current level by 2027.

Industry Statistics	CAD
Current Price	**$62.75**
2021A Production (boe/d)	485,078
2021A 2P Reserves (mmb)	4,243
2021A Corporate Netback	$22.1
2021A DACF	$1.1B
2021A CFPS	$2.88
Key Statistics	
52 Week H/L	$84.3/$41.1
Market Cap	$21.24B
Net Debt	$(564.6)M
Enterprise Value	$23.05B
FDSO	338M
Free Float	315.6M
Dividend Yield	1.59%
Company Forecast	
2023E Production (boe/d)	545,000
2023E CFPS	$15.52
2023E Capex	$1.6B

5-Year Price Performance



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Archaea Energy - Target (NYSE: LFG)

BP PLC – Acquirer (NYSE: BP)

Natural Resources - Energy

BP's Bet on Bioenergy Sources

January 2023

Bp Plc (BP) announced on 18/10/2022 its intent to acquire renewable natural gas company Archaea Energy (LFG) for $4.1B, including $800M of net debt. The deal is in line with Bp's growth strategy on bioenergy while providing a strong ESG case. The deal was completed on 28/12/2022.

Acquirer Company Strategic Objectives

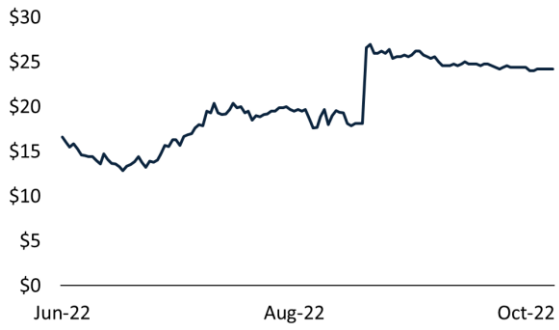
The acquisition of Archaea marked a significant milestone in expanding Bp's strategic bioenergy business as part of its "critical engines" growth plan. With Archaea Energy joining in, Bp will be a step closer to its biogas supply goal of 70,000 boe/d in 2030 and tap into the United States market and abroad. In addition, Bp projects Archaea's EBITDA to rise to over $500M by 2025 and to $1B by 2027 from the current EBITDA of $140M once the acquisition is fully integrated and synergies are achieved.

Synergies

Potential revenue and cost synergies could realize with the acquisition. Archaea's 46 RNG and landfill gas-to-energy facilities across the US will build on Bp's existing biogas business, which provides the opportunity to capture a fast-growing critical geography for biogas and become the leader in RNG production. In addition, operational and administrative costs could be saved by shredding redundant divisions based on the combined company.

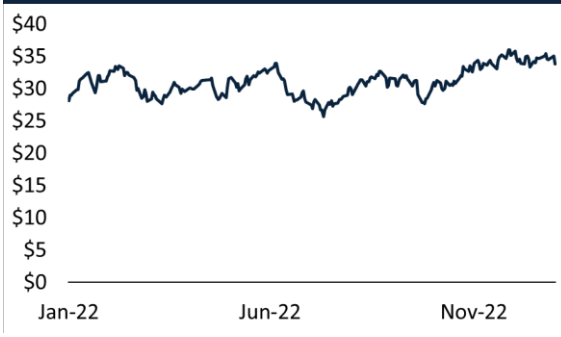
Target Statistics	USD
52 Week H/L	N/A
Market Cap	$2.1B
Net Debt	$481M
Enterprise Value	$3.7B
FDSO	56.5M
Dividend Yield	N/A

1-Year Price Performance



Acquirer Statistics	
52 Week H/L	$36.1/$25.4
Market Cap	$104B
Net Debt	$22B
Enterprise Value	$129B
FDSO	3.1B
Dividend Yield	3.97%

1-Year Price Performance



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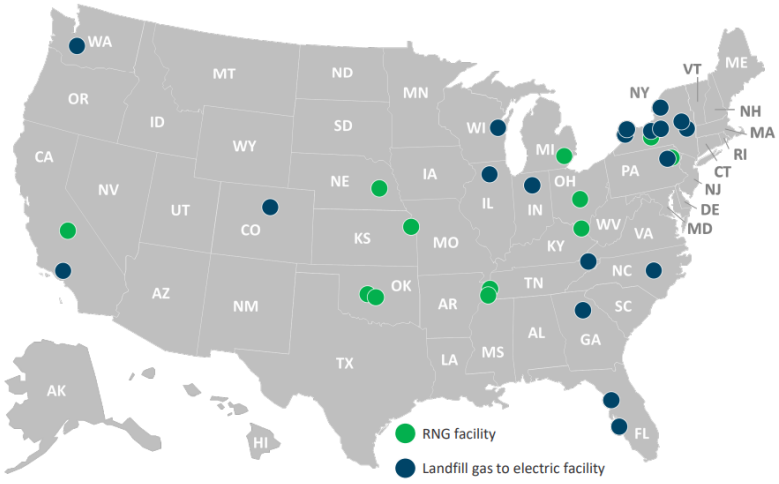
Business Overview – Archaea Energy Inc. *(pre-acquisition)*

Company Overview

Archaea Energy Inc went public by combining with a special purpose acquisition company Rice Acquisition Corp on 7/4/2021. The company is one of the US's most significant renewable natural gas (RNG) producers, focusing on capturing and converting water emissions from anaerobic digesters and landfills into low-carbon pipeline-quality RNG and electricity. It has grown its asset portfolio over the year to 13 RNG facilities and 33 landfill gas-to-electric facilities (LFGTE) through proprietary development, joint ventures, and strategic acquisitions. The company has 88 total development projects in backlog with a long-term gas rights agreement in place and continues to optimize acquired or legacy assets to Archaea V1 standard.

Exhibit 16: Archaea Energy's Operating Sites



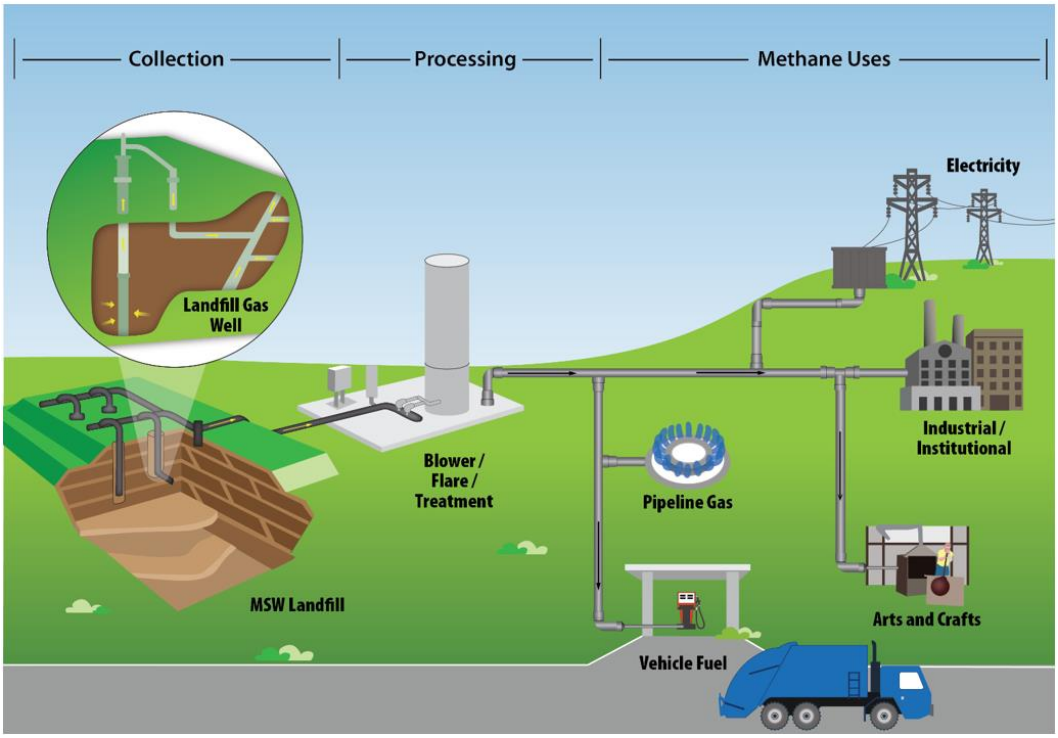
Source: Archaea Energy Investor Presentation

The company has three revenue streams, RNG, renewable electricity, and Environmental Attributes. The produced RNG has the same chemical composition as traditional natural gas from fossil sources, and the RNG produced and sold is pipeline quality and can be used interchangeably with natural gas in any application. Furthermore, generating RNG and renewable electricity also produces Environmental Attributes that can be monetized through various national and state initiatives. These Environmental Attributes include RINs, which are generated from the use of RNG as a transportation fuel, and state low-carbon fuel credits, which are generated from the conversion of biogas to RNG. Additionally, the transformation of biogas to thermal applications, such as power generation or heating, creates RTCs, while the conversion of biogas to renewable electricity generates RECs.

Landfill Gas Technology

Landfill gas (LFG) is a natural by-product of the decomposition of organic material in landfills. LFG is composed of 50% methane, 50% carbon dioxide and a small percentage of non-methane organic compounds. Instead of allowing the methane to migrate into the atmosphere and contribute to climate change, LFG can be captured and converted to renewable energy.

Exhibit 17: Renewable Natural Gas Production Illustration



Source: United States Environmental Protection Agency

First, LFG is collected through vertical and horizontal piping buried in a landfill. Then, the LFG will be undergone three stages of treatment. Primary Treatment removes moisture as the gas passes through a knockout pot, filter, and blower. Secondary Treatment involves the use of an after cooler or other additional moisture removal (as necessary), followed by siloxane/sulfur removal and compression (as needed). After the impurities are removed in the Secondary Treatment stage, the LFG can be used to generate electricity or as a medium-Btu fuel for arts and crafts or boilers. Advanced Treatment removes additional impurities and compresses the LFG into a high-Btu gas that can be used for vehicle fuel or injected into a gas pipeline.

Company Strategies

Steady Revenue Generation

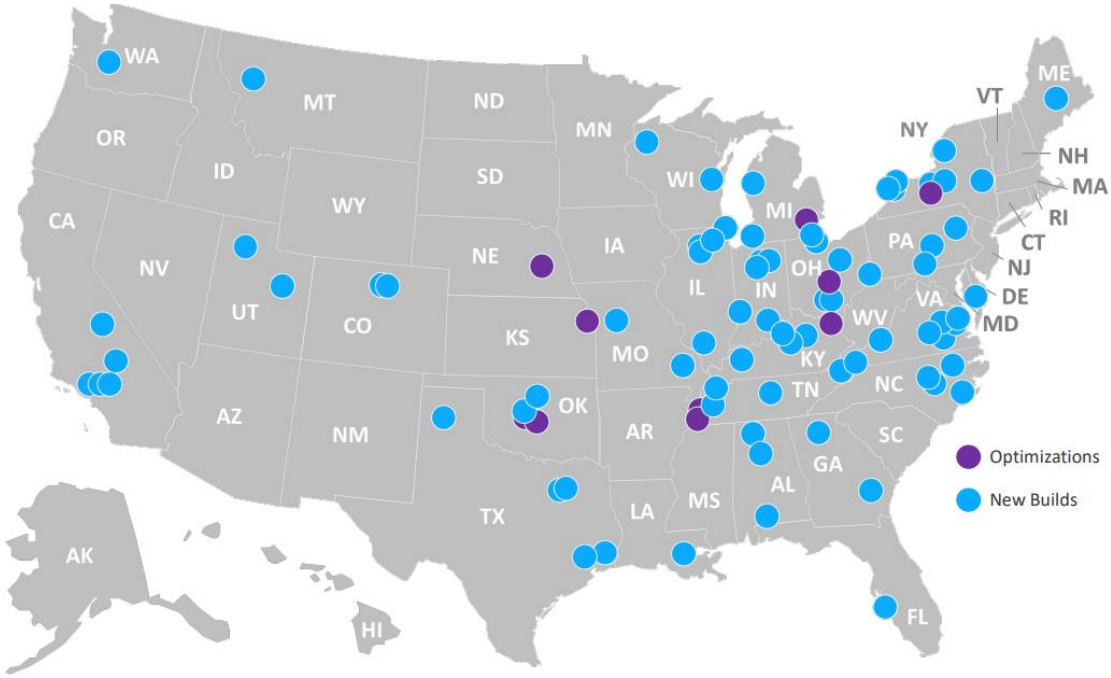
The company has a differentiated commercial strategy that primarily focuses on selling the majority of the RNG volumes through long-term, fixed-price contracts spanning 10 to 20 years with creditworthy partners, including corporations,

utilities, and universities, which support these organizations to reduce GHG emissions and achieve decarbonization goals while utilizing their existing infrastructures. Through signing long-term contracts with renowned partners, the company limits its exposure to the volitive commodity market and provides certainty over revenue generation. As of 15/3/2022, it has $5.2B in cumulative fixed-price value under the current existing contract with a weighted average term of 18.7 years. The Environmental Attributes follow the same scheme, with 30% sold at market price and the rest sold as a bundle with the RNG in long-term contracts.

Visionary Development Backlog Inventories

The company's firm base operation of 31 sites, paired with a prominent backlog position of 88 development opportunities secured by long-term gas rights agreements, positions itself to become and remain the most significant US RNG producer. The development opportunities include ten optimizations on existing assets to increase uptime and efficiency and 78 new builds of RNG plants on electric and greenfield sites. The optimization on legacy sites is expected to increase by 5% in uptime to 95% and 10% in methane recovery to 90%, which translates into an additional $1M of incremental adjusted EBITDA. In the long-term, with new builds in operation, the production is expected to increase by 10-fold to 50M MMBtu and EBITDA to about $600M. The company moved quickly with ten optimization projects and ten new builds in the 2022 development plan. In addition, it is on track to continue building resilient and robust backlog inventories, as 61 out of the 88 have been added in a little over a year, which will unlock further growth potential in the future.

Exhibit 18: Archaea Development Backlog



Source: Archaea Energy Investor Presentation

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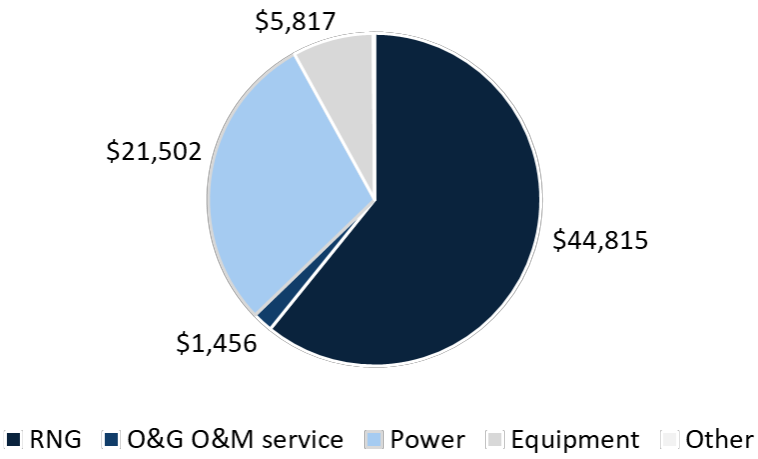
Pure RNG Play Aligns with ESG and Market Demand

The company's pure RNG play is in line with the decarbonization initiatives because the gas is produced from organic waste materials that would otherwise release methane, a potent GHG gas that contributed a significant share to climate change. By capturing and processing methane as a fuel, RNG not only helps to reduce the amount of methane released to the atmosphere but also can be used as a substitute for fossil natural gas to reduce emissions further. With governments, utilities, and universities proposing to incorporate RNG as a more significant share of their energy mix, the RNG supply is expected to grow at a CAGR of 11% to meet the voluntary RNG demand in 2030, based on information known today. With the ESG initiatives continuing to drive demand for RNG, the company positions itself for robust long-term growth. In addition, with its focus on landfills, the US's third largest contributor to emissions, there is a significant runway for growth compared to peers that focus on other sources of RNG, such as agriculture, organic waste, and wastewater.

Company Revenue Breakdown

For the year ending 2021, 61% of revenue came from the sales of RNG (including RINs and LCFS), 29% came from utility services under the landfill-to-gas model, and 7.9% came from equipment sales and associated services.

Exhibit 19: Archaea 2021 Revenue Breakdown by Product Types (in $K)



Source: Archaea Energy 2022Q3 Report

Business Overview – BP PLC

Company Overview

Bp plc is a British multinational O&G company headquartered in London. It is a vertically integrated company operating in all areas of the O&G industry, including exploration and extraction, refining, distribution and marketing, power generation,

and trading. The company used three main segments: (1) oil production and operations, (2) customers and products, and (3) gas and low-carbon energy. The overview will only focus on gas and low-carbon energy in consideration of the direct connection with the acquisition.

Gas & Low Carbon Energy

The Gas & Low Carbon Energy segment consists of the company's gas and low carbon operations. The gas business involves upstream activities that primarily produce natural gas, as well as integrated gas and power and gas and power trading. The low-carbon business includes solar, offshore and onshore wind, hydrogen, carbon capture and storage, and the company's investment in bp Bunge Bioenergia. The company's current gas businesses supply the world with 1,000 mmb/d and operate in Trinidad, North Africa, Mauritania & Senegal, the Middle East, India, and Asia Pacific. The Bp Bunge Bioenergia is a joint venture that operates 11 biofuels sites with a production capacity of 32 million metric tonnes of sugarcane annually in Brazil. In addition, the venture produces renewable energy from its biofuel manufacturing sites with the capability of exporting 1,200GW hours of biopower to the national grid. The Bp wind operates nine sites in six US states with a net generating capacity of 926 MW. Bp partners with Equinor on developing four assets in two existing offshore wind leases located in New York and Massachusetts that together have the potential to generate power for more than two million homes. Bp formed a joint venture with Lightsource on the promise to develop a 10GW solar project by 2023.

Although the gas & low carbon energy segment accounts for a roughly equal weight of Bp's oil business line, it made ambitious plans to expand the segment to transform itself into a modern and green energy provider. In February 2022, it announced to increase in the proportion of Capex in transition growth business to more than 40% by 2025 and to around 50% by 2030, including Bioenergy, Convenience, Electric Vehicle Charging, Renewables, and Hydrogen. Significant expansion in the segment is expected, with investments and resources being poured in.

Company Strategies

Resilient Hydrocarbons

The first pillar of Bp’s transforming strategy is resilient and focused hydrocarbons. It plans to decrease O&G production by 40% by 2030, and to create a stronger, cost-effective, and lower-carbon oil, gas, and refining portfolio that is smaller but of the highest quality. The leaner but more efficient portfolio will generate the cash flow to fund Bp’s transition to bioenergy, one of the five growth engines.

Convenience & Mobility

Bp aims to double adjusted EBITDA by 2030, while sustaining return on average capital employed between 15% to 20% by focusing on end consumers' convenience and mobility. The growth is expected to be driven by its differentiated convenience and fuels offers, selective growth markets expansion, acceleration of EV charging ambition, Castrol, aviation, B2B, and midstream businesses. Convenience and EV charging are two of its transition growth engines. Where it is expanding its strategic convenience network to around 3,500 sites by 2030 and accelerating EV charging network through "on-the-go" charging and fleets to grow EV charge points over 100K by 2030.

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Low Carbon Energy

The third pillar of Bp's strategy is shifting focus to low-carbon energy from alternative sources to deliver secure, affordable, and low-emission energy to the world. The growth engines of renewables and hydrogen and CCUS is set to drive strategic growth. It aims to build a leadership position in offshore wind and accelerate its solar growth through Lightsource bp and Bp's US solar pipeline. For hydrogen and CCUS, Bp aims to capture a 10% share in core markets by 2030. As hydrogen markets develop, it visions to create a portfolio of globally advantaged supply hubs by leveraging existing refinery demand to build regional supply positions.

M&A Rationales

Strategic Objectives

Staging to Become Biogas Leader

With Bp naming bioenergy as one of its five growth engines, the acquisition is closely aligned with the company's strategy. Archaea's established presence as the US's largest RNG producer will provide an immediate 50% increase in Bp's biogas supply immediately at the deal's closing, transferring the championship title to Bp. Moreover, Archaea's asset has significant growth potential in the coming years with its 80+ project backlogs with low-risk profiles as feedstock for more than 75% of projects has been secured, advanced equipment has been placed for 22 projects, and short development lead times. Bp expects Archaea can generate $1B in EBITDA with the completion of the project pipeline, meaningfully contributing to Bp's $10B EBITDA target in 2030 for transition growth businesses. Bp will also gain more control over the biogas value chain, with Archaea providing access to feedstock and scaling Bp's upstream participation. Under the combined business, Bp expects to take biogas supply volumes to around 70 mboe/d by 2030 and remains its leadership in the industry.

Geographical Expansion

Through the acquisition, Bp will gain immediate access to the US RNG market, one of the fastest-growing markets in the world. With Archaea's proven technology and established platform, Bp will be able to expand capacity and be one of the few producers that is able to deliver substantial RNG volumes in the short to mid-term to fulfill the rapid rising demand. In addition, Bp will be able to leverage the Archaea technology and its expertise to optimize its value and expand its use beyond the US to Europe and India, both of which are significant markets for BP with a large number of landfill sites available for landfill-to-gas production.

Synergies

The Bp's acquisition of Archaea energy signals a decisive step for Bp to transform its business model. With the combined business, cost synergy could be realized by cutting redundant divisions in administration and operation, as Bp already has an existing biogas business. Furthermore, revenue synergies will also be possible with stronger bargaining power on price by leveraging on Archaea's leading market share in the US and Bp's resourceful platform and broad customer base.

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Valuation

Although alternative energy sources have been rapidly developing over the past few years, the RNG industry remains a niche market compared with other sources within the more significant sector, such as wind and solar, in terms of investments and M&A activities. Therefore, we included a mix of companies around the globe that operate in biogas, biomass, and diversified renewables in the Public Comparables model. Notably, most renewable companies were assigned with premium EV multiples compared with single-digit multiples in traditional integrated O&G companies, signaling a bullish outlook for the renewable industry. Still, Archaea's valuation based on implied EV was significantly higher across the renewable sector.

Exhibit 20: Public Comparables Analysis

(Figures in mm USD)		Company Info				EV/Revenue Mutiple		EV/EBITDA Mutiple		P/E Mutiple	
Company	Ticker	Share Price	Diluted Shares Outstanding	Equity Value	Enterprise Value	2021 EV/Revenue	2022 EV/Revenue	2021 EV/EBITDA	2022 EV/EBITDA	2021 P/E	2022 P/E
Solar Energy											
Canadian Solar	(NASDAQ: CSIQ)	$39.75	64.3	2,555.9	4,395.9	0.8x	0.6x	8.3x	7.7x	26.9x	12.0x
SunPower	(NASDAQ: SPWR)	$14.91	174.2	2,597.3	2,636.7	2.0x	1.3x	N/A	19.2x	N/A	37.6x
Median						**1.4x**	**1.0x**	**8.3x**	**13.5x**	**26.9x**	**24.8x**
Mean						**1.4x**	**1.0x**	**8.3x**	**13.5x**	**26.9x**	**24.8x**
Diversified Renewable Energy											
Northland Power	(TSE: NPI)	$24.30	250.7	6,092.0	10,541.5	6.9x	6.4x	10.1x	11.3x	40.5x	23.2x
Boralex	(TSE: BLX)	$26.01	102.8	2,673.8	5,312.3	10.9x	8.6x	15.7x	13.7x	223.9x	118.0x
TransAlta	(TSE: RNW)	$8.36	266.9	2,231.3	2,783.6	8.1x	6.8x	15.8x	13.9x	21.7x	41.1x
Clearway Energy	(NYSE: CWEN)	$29.66	116.9	3,467.3	12,132.5	9.4x	10.2x	12.0x	12.6x	68.0x	6.0x
Innergex Renewable	(TSE: INE)	$10.50	204.2	2,144.1	6,672.8	12.2x	10.4x	20.2x	15.7x	N/A	N/A
Median						**9.4x**	**8.6x**	**15.7x**	**13.7x**	**54.3x**	**32.2x**
Mean						**9.5x**	**8.5x**	**14.8x**	**13.4x**	**88.5x**	**47.1x**
Renewable Natural Gas											
Ameresco	(NYSE: AMRC)	$43.95	51.9	2,281.0	3,679.4	3.1x	N/A	24.2x	N/A	38.4x	N/A
GFL Environmental	(NYSE: GFL)	$30.59	343.4	10,504.6	17,564.7	4.7x	3.5x	17.2x	14.1x	N/A	N/A
Median						**3.9x**	**3.5x**	**20.7x**	**14.1x**	**38.4x**	**0.0x**
Mean						**3.9x**	**3.5x**	**20.7x**	**14.1x**	**38.4x**	**0.0x**
Overall Max						**12.2x**	**10.4x**	**24.2x**	**19.2x**	**223.9x**	**118.0x**
Overall Median						**6.9x**	**6.6x**	**15.8x**	**13.8x**	**39.5x**	**30.4x**
Overall Mean						**6.5x**	**6.0x**	**15.4x**	**13.5x**	**69.9x**	**39.7x**
Overall Min						**0.8x**	**0.6x**	**8.3x**	**7.7x**	**21.7x**	**0.0x**
Archaea Energy	**(NYSE:LFG)**	**$26.00**	**83.4**	**2,168.40**	**5,418.40**	**55.6X**	**14.3X**	**N/A**	**36.7X**	**N/A**	**N/A**
Premium/Discount to Median						*705.8%*	*116.7%*		*166.2%*		

Source: Pitchbook, Capital IQ, WestPeak Research Association

Precedent transactions were selected following similar criteria for precedent transactions and further broken down by sectors. The multiples we compared the transactions with were enterprise value to the last twelve months of revenue until the acquisition announcement date (EV/LTM Revenue) and enterprise value to the last twelve months of EBITDA until the acquisition announcement date (EV/LTM EBITDA). Relative to the other transactions, the Archaea Energy deal has been assigned with a hefty premium of 17x EV/LTM Revenue and 78.6x EV/LTM EBITDA, which are even far above the highs

concluded from precedents. However, the abnormal price tag can be justified by Bp empathises biogas as one of its five future growth engines, Archaea's market leadership that immediately contributes to 50% of Bp's biogas production, and Archaea's significant growth potential that aims to hit $400M in EBITDA in 2025. If the growth realizes, which is possible with Bp's financial backing and resources, the forward EV/EBITDA will sit at only 8x.

Exhibit 21: Precedent Transaction Analysis

(Figures in mm USD)	Acquirer		Target				EV/Revenue Mutiple		EV/EBITDA Mutiple	
Announcement Date	Company Name	Ticker	Company Name	Ticker	Equity Value	Enterprise Value	LTM Revenue	EV/ LTM Revenue	LTM EBITDA	EV/LTM EBITDA
Feburary 28, 2022	Chevron	(NYSE:CVX)	Renewable Energy Group	(NAS: REGI)	1734.0	3568.1	3964.6	0.9x	414.9	8.6x
October 20, 2021	JP Morgan Investment Management	N/A	Flack Renewables	(BIT: FKR)	674.8	2966.8	678.0	4.0x	72.4	41.0x
May 19, 2021	Altri SGPS and Equitix	(LIS: ALTR)	Tilbury Green Power	N/A	82.6	345.6	36.7	9.0x	12.2	28.0x
Feburary 8, 2021	Drax Group	(LON: DRX)	Pinnacle Renewable Energy	(TSX: PL)	165.1	306.6	365.5	1.0x	42.1	7.0x
November 4, 2019	Canada Pension Plan	N/A	Pattern Energy Group	(NAS: PEGI)	2350.0	6414.3	505.1	12.7x	299.7	21.4x
October 17, 2022	**BP**	**(LON: BP)**	**Archaea Energy**	**(NYSE: LFG)**	**1104.5**	**5148.4**	**302.8**	**17.0x**	**65.5**	**78.6x**
Max								**12.7x**		**41.0x**
Median								**4.0x**		**21.4x**
Mean								**5.5x**		**21.2x**
Min								**0.9x**		**7.0x**

Source: Pitchbook, Capital IQ, WestPeak Research Association.

Risks

Limited Role of RNG as Part of the Long-Term Green Energy Mix

Archaea's business model is centred around the production of RNG; therefore, the development of the industry directly links to its future. The availability of supply and green-taste demand are the two critical issues with RNG. According to ICF, the RNG production can achieve 1,910 trillion Btus a year (tBtu/y) and 4,510 tBtu in 2040, under low and high resource potential scenarios, respectively. Compared with the 2009-2018 average US natural gas consumption of 15,850 tBtu/y, the RNG can only replace 28% of the consumption, even in the upside case. On the demand side, RNG might not be the world's top choice when it comes to decarbonization, as RNG still emits the same emission as regular gas. In addition, the market might be limited to industries that cannot replace gas with electricity and lack cost-effective alternatives for decarbonizing, as residential and commercial sectors can be relatively easily integrated with cleaner alternatives such as hydroelectricity and solar.

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GLOBAL EQUITY | March 2023

Natural Resources

II. Energy Transition

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Energy Transition

Politics Still Matter

Feb 2023

The Energy Transition has arrived and is not close to its end. The UN believes that $3.6 Trillion in investment is required every year to meet 2050 net-zero targets, up almost 500% from the $755 billion in global energy transition investments in 2021. This transition affects every part of the economy given the current dependence on fossil fuel-based modes of production.

Energy Transition Affects Everything

The Energy Transition refers to a shift from fossil fuel-based modes of production towards low or no-carbon technologies. This shift will affect every sector given that fossil fuels are intertwined in virtually all value chains either through global mobility, production processes, and energy production. For example, transportation today relies on fossil fuels, and as a result the energy transition will affect virtually everyone as the modes of transportation change.

Regulation, Green Finance and Geopolitics

Three core drivers look poised to shape the Energy Transition in the coming years. 2022 represented a landmark year for sustainability in North American with President Biden passing what is perhaps the most ambitious climate bill to date, the Inflation Reduction Act, which pledges hundreds of billions of dollars towards climate action. Green Finance, and a rise in socially conscious investment practices have also seen meteoric growth as institutional and retail investors alike demand climate action. Russia's invasion of Ukraine has sparked fears over supply chains and highlighted risks that may face the transition.

The Energy Transition is Political

The rise of Green Finance, and aggressive regulatory action has not occurred without substantial controversy or scrutiny. Within the US today, a battle is raging over the role that ESG should play in investing, and on October 18, 2022, Missouri pulled $500 million out of pension funds managed by BlackRock for allegedly pursuing a strategy based on ESG over returns. A crucial area where the question of what the future of the Energy Transition will look like will be fought in political arenas. Regulation plays a transformative effect and battles in political venues will shape the future of the transition.

Industry Research	
Global Market Size	$1.1T
Key Companies	
Ford Motors Company	F:NYSE
Enterprise Value	$147.2B
EV/2022 EBITDA	11.5x
NextEra Energy	NEE:NYSE
Enterprise Value	$194.80B
EV/2022 EBITDA	22.0x
Chevron	CVX:NYSE
Enterprise Value	$312.2B
EV/2022 EBITDA	4.69x

Source: Bloomberg

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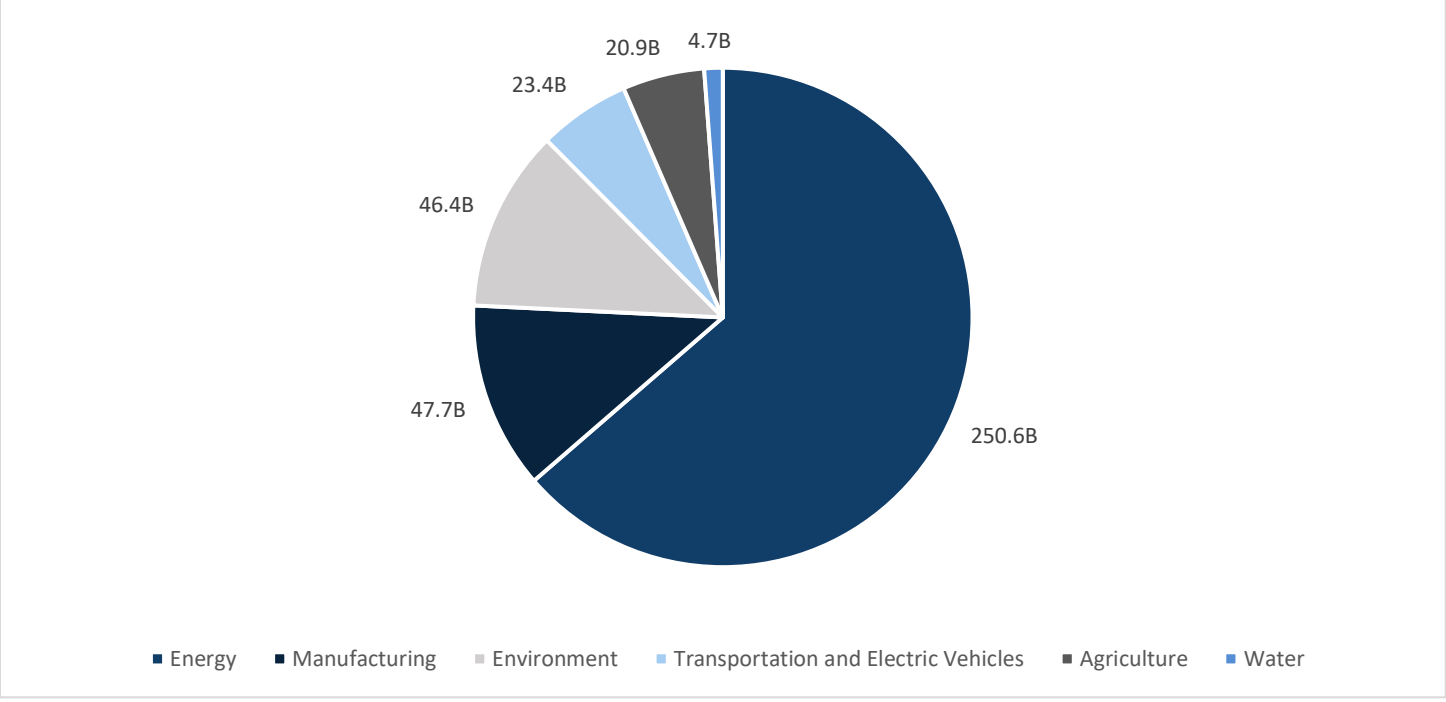
Key Trends / Drivers

Regulation

Two landmark pieces of legislation within North America will supercharge the Energy Transition by providing key incentives to decarbonize their respective economies. In Canada, a national Clean Fuel Standard was implemented which will reduce the carbon intensity of transportation fuels by about 15% by 2030 by providing financial incentives for low carbon transportation. In the US, perhaps the most ambitious climate bill in the nation's history, the Inflation Reduction act, was successfully passed. This landmark piece of legislation provides hundreds of billions in incentives to decarbonize the American economy. Aggressive government action can play a transformative role in the energy transition.

These were just two of many regulatory changes which came in 2022 British Columbia announced plans to overhaul its existing low carbon fuel standard program to increase the intensity and drive further emissions reductions, while Washington introduced a new Low Carbon Fuel Standard program which comes into effect in 2023. EV-buying mandates, a type of regulation which requires that a certain proportion of new vehicle purchases are either electric vehicles (EVs) or plug-in hybrid, have been introduced globally. In 2022, California's Air Resource Board passed a plan that requires new passenger cars and light trucks to be electric or plug-in hybrids by 2035 with multiple other states following this move.

Exhibit 1: Breakdown of Inflation Reduction Acts 393.7B Investments by Sector



Source: McKinsey & Company

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Inflation Reduction Act

On August 15, 2022, the Inflation Reduction Act was signed by President Biden. This piece of politically fraught legislation nearly died due to opposition from within the Democratic party from both Senator Joe Manchin (Democrat of West Virginia), and Kyrsten Sinema (Democrat of Arizona) over tax provisions within the bill aimed at corporations and the wealthy. Negotiations between Democrats yielded a resolution which maintained the core components for environmental spending, while modifying tax provisions.

The ground-breaking bill provides $369 billion USD towards Energy and Climate related programs with massive investments in battery technology, clean energy, and transportation policy. For example, incentives in the form of tax credits total $43 billion including s a $7,500 tax credit for electric vehicles, a $1,200 home improvement tax credit, and a $2,000 credit for heat pumps. This is just one among the many incentives offered by the program. A notable feature of the vehicle EV credits is the provision aimed at driving "friend shoring" by requiring that 40% of the battery materials (by value) are sourced from domestic or free trade state. This requirement increases to 80% by 2027.

The Inflation Reduction Act has spurred massive investments in renewables, energy storage, and manufacturing across the United States. According to an American Clean Power report, in the three months following the passage of the inflation reduction act more than $40B in clean energy projects have been announced – the same amount invested in US clean energy projects during all of 2021. In response to the Inflation Reduction Act, Panasonic has announced plans to built a second $4B plant to produce EV batteries in the US. This comes after the July announcement that it would build a $4B EV battery plant in Kansas. Panasonic is not alone, and the Inflation Reduction Act has supercharged domestic battery manufacturing by earmarking billions in funding for firms along the EV supply chain. Clearly, the inflation reduction act will shape investment decisions for firms involved in electrified transportation.

Canada's Clean Fuel Standard

In Canada, the Clean Fuel Standard, was announced and came into effect on July 1st, 2022. This landmark regulation will reduce the carbon intensity of transportation by creating a credit and deficit generation system on transportation fuels. Fuel with a carbon intensity above the limit set by the regulator accrue deficits which are met by retiring credits generated by supplying eligible transportation fuels. This market-based regulation tackles one of the hardest to abate sectors, transportation, which in advanced industrial economies comprises a large share of emissions. Similar programs have existed in California, the EU, British Columbia, and Oregon for years and have proved extremely effective at reducing emissions. Michael Wolinetz, and Jonn Axsen have dubbed the B.C Clean-Fuel standard "one of the best greenhouse gas emissions policies you have never heard of."

Canada's clean fuel standard should have a similarly transformative effect and by 2030, the low carbon fuel standard aims to reduce the carbon intensity of transportation fuels by 15% and deliver up to 26 million tonnes (Mt) of GHG emissions reductions by 2030. The first glimpse at the potential value of the credits came from Tidewater Renewables (TSX:LCFS), which sold 25,000 credits at $100 CAD per credit. This makes credits under this program among the most valuable carbon offset credits. Tidewater Renewables, a Calgary based low-carbon fuels producer, will generate these credits from the production fuels at its Renewable Diesel & Renewable Hydrogen Complex in Prince George, BC.

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Green Finance

Green Finance Products

Green Finance has grown exponentially in recent years and encompasses different instruments split across two broad categories: products that restrict the use of funds to "sustainable projects" and products that incentivize sustainability while allowing proceeds to get spent on anything. The most common product that restrict the use of funds are Green Bonds which require the proceeds are used for environmentally friendly projects. Another example are social bonds which restrict the use of funds to projects which create a positive social impact.

Conversely, Sustainability Linked Bonds and Loans have no restrictions on the use of funds and the proceeds can be allocated for general corporate purposes. These products use incentives and penalties for meeting or failing to meet pre-set sustainability targets to drive sustainability.

The Future Dynamics of Investor Pressure

The growth of sustainable finance has been driven largely by demand from institutional and retail investors alike that demand sustainable investment products. Interest in these products exists on a spectrum between those willing to accept concessionary returns because investing sustainably is the right thing to do, and those who believe that sustainability will yield superior returns. Green finance products have grown enormously and 2021 was a record year. According to Climate Bonds Market Intelligence, themed debt issuances broke $1.1T a 57% increase over 2020.

The emphasis on socially conscious investing by institutional investors has angered Republican legislators in multiple US states resulting in legislatures adopting anti-ESG legislation. Concentrated, but not exclusively in Republican states, 10 legislatures have enacted regulations targeting ESG investing with state financial officers and pension boards in Florida, Louisiana, Missouri, South Carolina, and Utah divesting a total of $4B in state assets (ie. Pension Funds) from BlackRock funds. Conversely, Democratic states like New York, Vermont and Washington state have even introduced pro-ESG laws. While these divestments are negligible relative to BlackRock's total assets, these divisions suggest that sustainable finance might face political contestation in the future.

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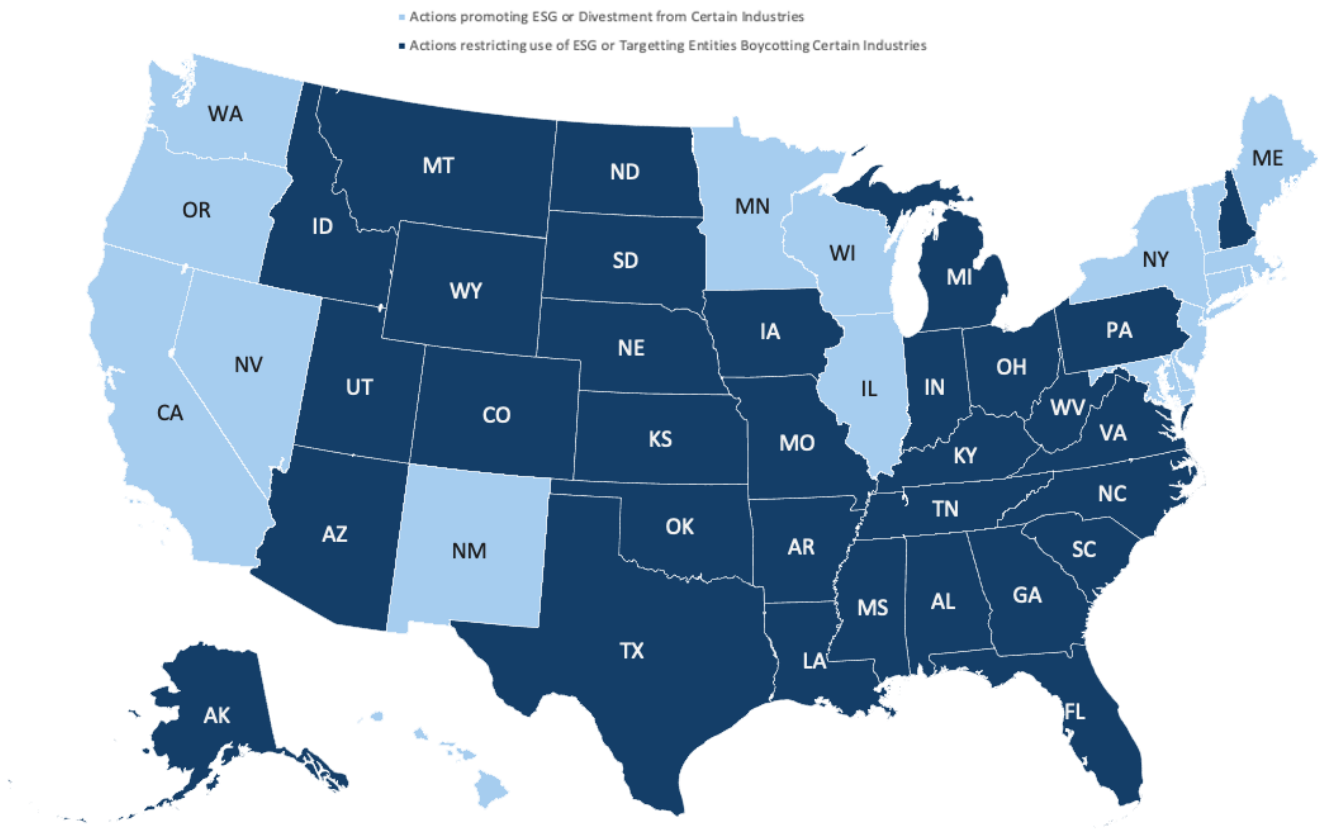
Exhibit 2: Pro and Anti ESG Legislation Breakdown by State



Source: Ropes and Gray LLP.

What is Sustainable?

A key challenge facing sustainable finance is defining the projects which should qualify as "Green." Emblematic of this question is Repsol, the Spanish multinational energy and petrochemical company, which had a failed green bond issuance in 2017. Repsol attempted to issue a green bond in 2017 to improve the efficiency of its fossil-fuel operations claiming these upgrades would result in 1.2 million tonnes of CO2 savings a year and had a second opinion from Vigeo-Eiris. The main green bond indices rejected the issuance because the project did not change Repsol's business model and would likely prolong the use of fossil-fuels. This raises the question of what should be green, and whether fossil-fuel based projects that reduce carbon emissions should receive the "green" label.

The debate over what constitutes a "Green" or "sustainable" rages on today and last year the European Parliament voted to label some gas and nuclear energy projects as "green" which provides them with the ability to access cheap financing

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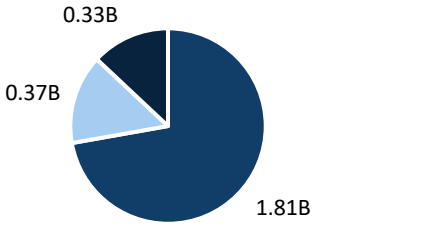
and subsidies. This question is unlikely to find swift resolution as the question of what is "Green" is politically charged and the answer is not straightforward.

Natural gas is one of the most contested debates. Natural gas projects can result in incremental reductions in carbon emissions when replacing higher carbon intensity electricity generation or heating (ie. Coal or Oil), but there is disagreement over whether this means such projects are "green." Proponents of natural gas suggest it is a vital "transition" that can replace high carbon intensity sources of electricity (like coal and oil) while global renewable capacity expands. Eventually natural gas would phase out in favour of fully renewable sources. This is the position the EU recently took, designating Natural Gas as green if they result in reduced emissions, and are eventually phased out. While this creates undeniable short-term climate benefits some argue that these investments entrench fossil fuels and will slow the transition in the future.

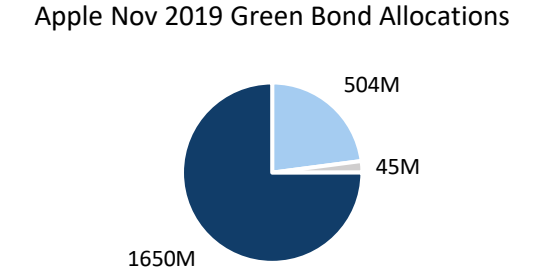
Exhibit 3: Selected Green Bond Issuance and Use of Proceeds

Ford Nov 2021 Green Bond Allocations



Source: Ford Sustainable Financing Framework 2021

Apple Nov 2019 Green Bond Allocations



Source: Apple's FY2021 Green Bond Impact Report

Geopolitics

Geopolitics Remains Important

An emergent trend this year has been the intersection of the energy transition and geopolitics. The geopolitics of energy and supply chains will influence the character of the energy transition by influencing policymaking and determining the physical constraints of the transition.

Energy Security

In February of 2022 Russia invaded Ukraine which disrupted European natural gas supplies threatening to cause huge challenges if the winter proved particularly cold. In response to sanctions imposed on Russia over its invasion of Ukraine,

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Russia began limiting natural gas exports to pressure Europe to end sanctions. In 2021 about 45% of natural gas used in Europe came from Russia, with certain key economies like Germany sourcing 55% of their natural gas from Russia. In 2022, only 17.2% of European natural gas came from Russia.

This dynamic looks poised to shape the future of the transition in the medium to longer term. In the near time, Europe has emphasized keeping the lights on and leaned heavily on alternative sources of natural gas, rationing natural gas, shuttering energy intensive businesses, and restarting coal plants. In the longer term, this uncertainty and renewed demand for domestic energy security looks poised to push a transition towards domestic, and low-carbon sources of energy to ensure energy security.

Electrification Supply Chain Security

With China-US tensions heating up, similar concerns over supply chains have emerged in relation to the metals that are necessary to build batteries. These tensions are particularly acute after an October 7th decision by the Biden administration to restrict sales of advanced semi-conductors to China. According to the Carnegie endowment, "these restrictions amount to the single most substantial move by the U.S. government to date in its quest to undermine Chinese technology capabilities" and could cripple Chinese chip production. This move has ushered in an era of competition between China and the US.

In the wake of Russia's decision to restrict natural gas supplies to Europe, and the American chip ban, fears have emerged that China might retaliate by throttling American battery production. China has almost complete dominance over the battery production supply chain controlling both manufacturing, raw materials, and processing of raw necessary to produce batteries. Any restrictions from China would severely undermine electrification, a key pillar of the energy transition.

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Highlighted Technology's

Energy Storage	
Mechanical Energy Storage	A set of technologies which use mechanical energy to store power from non-dispatchable energy sources like solar or wind. The most common version of mechanical energy storage is pumped hydro which comprised 93% of American utility-scale storage in 2021. New technologies have emerged in recent years like stacked blocks, and underground compressed air which harness the same principle. For example, Highview Power, a U.K.-based company cools air for storage in pressurized tanks.
Distributed Energy Storage	A set of technologies which use decentralized energy storage systems, like electric vehicle batteries, to provide energy. In 2022, General Motors announced a partnership with a California utility San Diego Gas & Electric to explore the potential to use vehicle-to-grid and vehicle-to-home battery integration to improve grid resilience.
Biofuel Production	
Anerobic Digestion	A process where bacteria break down organic matter (abating methane emissions) to produce valuable end use products including biogas. Burlington Ontario based Anaergia uses digestion to generate valuable products form municipal solid waste, wastewater agencies, and agricultural and food processing businesses.
Hydrogen Production	
Methane Pyrolysis	A process where that splits methane to produce hydrogen and carbon. The carbon that is produced is in a solid form, and the only by-product which means that the hydrogen is CO2-free. In 2022, FortisBC Energy, Suncor, and Hazer Group Limited announced a partnership to produce hydrogen at Suncor's Burrard terminal site.
Carbon Capture	
Direct Air Capture	A process where previously emitted CO2 is captured from the atmosphere directly where it can then be permanently stored in deep geological formations. British Columbia based Svante uses its unique patented technologies to capture CO2 from industrial flue gas streams.

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WESTPEAK RESEARCH ASSOCIATION

Energy Transition

How Sustainable are Sustainability Linked Loans?

January 2022

Sustainability Linked Loans (SLL) and Sustainability Linked Bonds (SLB) have seen exponential growth in recent years, but this rise has not occurred without substantial skepticism. Many are concerned that this sustainable financial product amount to little more than 'greenwashing' and that the Environmental, Social, and Governance (ESG) benefits of these loans are dubious at best.

What are Sustainability Linked Loans/Bonds?

SLLs are any loan that provide the borrower with an incentive for achieving pre-set sustainability targets. Similarly, SLBs are simply bonds with an incentive for achieving pre-set sustainability targets. SLL issuance grew 244% between 2020-2021, while SLBs grew 861% during the same period. As of 2021, the SLL market was worth $747B.

SLLs and SLBs differ from Green Bonds because of the different use of proceeds requirements. Green Bonds require that borrowers use the proceeds exclusively for projects that qualify as sustainable, while Sustainability Linked loans have no restrictions on usage. Instead, sustainability linked debt uses incentives and penalties to encourage sustainability.

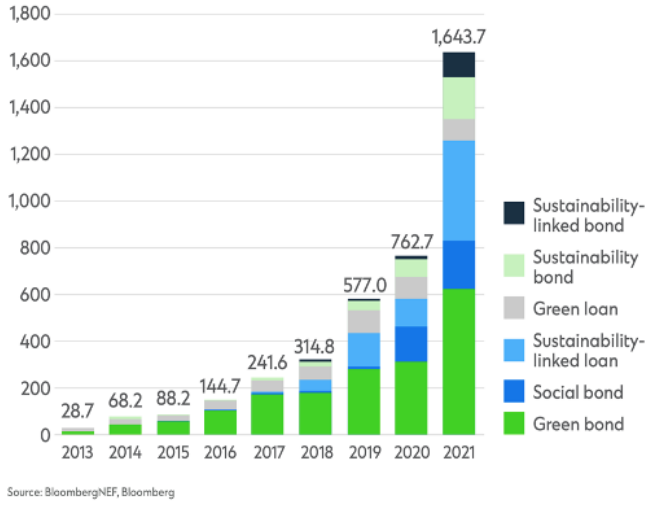
The Controversy

The big controversy surrounding SLLs and SLBs is whether they drive meaningful climate action or whether they are simply an example of "Greenwashing." As noted, SLLs and SLBs proceeds can be used for general corporate purposes. Incentives like reduced interest rates, or penalties predicated on whether the borrower meets pre-determined goal are intended to ensure that borrowers increase their sustainability.

The key concern is whether this model is adequate for driving real, incremental increases in sustainability. Proponents suggest that these products allow borrowers in less green industries to participate in sustainable finance and incentivize meaningful sustainability goals. Skeptics contend that the incentives and penalties attached to SLLs and SLBs are insufficient to drive meaningful climate action and that these instruments allow greenwashing. Borrowers can obtain the reputational benefits without achieving meaningful targets.

Global Sustainable Debt Annual Issuance

Issuance in USD



Source: BloombergNEF, Bloomberg

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WESTPEAK RESEARCH ASSOCIATION

Political Risk can be Tricky to Navigate

January 2022

Perhaps most famous for an Obama-era loan of $535M to failed American solar panel manufacturer Solyndra in 2011, the Inflation Reduction Act has supercharged the Department of Energy (DOE) Loan Program Office (LPO) with $100 Billion of new loan authority. This obscure office has proven both politically important, and now has the chance to play a crucial role in accelerating the American Energy transition with its renewed mandate.

What is the Department of Energy Loan Program Office

Founded in 2005, the DOE LPO is a program that provides funding in the form of loans or loan guarantees to drive the energy transition. With the passage of the Inflation Reduction Act, the DOE LPO has appropriated $11.7 billion to support issuing new loans, increases the existing loan program authority by about $100 billion, and created a new loan program (the Energy Infrastructure Reinvestment program) with billions in funding.

These funds are intended to drive the energy transition by enabling the DOE LPO to enable proven innovative technologies to scale.

Inherent Political Challenges?

The collapse of Solyndra became a key talking point during the 2012 US Presidential election. Republicans repeatedly criticized the Obama administration over Solyndra's bankruptcy. It should be noted that the LPO has been overwhelmingly successful earning $4.2B in interest, creating 37,000 permanent jobs, and displacing over 40M Tonnes of CO2 as of 2022. A notable recipient of DOE LPO funds was Tesla, who received $465M in 2010.

Nonetheless, program failures come with significant political risk and the high-profile failures of DOE LPO companies generate substantial backlash. In fact, the failure of Solyndra became a huge scandal that would haunt Obama during the 2012 election. The DOE LPO mandate to provide financing to innovative technologies prior to full commercial acceptance is inherently risky. This highlights that investing in Energy Transition is political.

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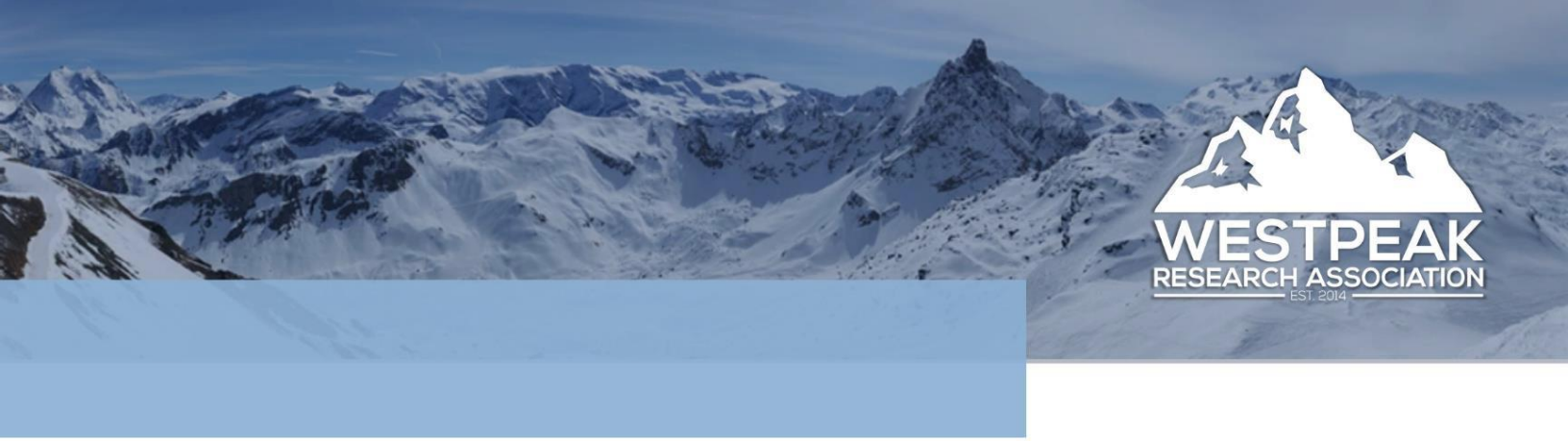

GLOBAL EQUITY | March 2023

Natural Resources

III. Metals and Mining

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Metals and Mining

Demand Outpaces Supply

April 2023

The metals & mining industry covers companies that locate and extract metal and mineral reserves. Generally speaking, the industry classifies metals into two broad categories: precious metals and base metals. Precious metals, such as gold and silver, have more economic value as a result of scarcity. Base metals, such as aluminum and copper, are less scarce and are primarily used for industrial purposes. A third, emerging category of metals consists of those used to create batteries (lithium, cobalt, manganese, nickel, graphite). As global demand for consumer technology products increases, so will global production.

Industry Overview

The rising cost of debt globally throughout 2022 has slowed exploration activity and project expansion. Smaller producer margins from active projects have further discouraged investment and adversely affected the sector's compounded annual growth rate (CAGR). As firms regain confidence in central banks' ability to manage inflation, margins and investor sentiment are likely to improve.

Industry Drivers

Highly commoditized markets are typically driven by factors of supply and demand. Presently, global demand for metals is steadily increasing, especially in the battery metals subsector, while global supply languishes as a result of the increased cost to exploration. Geopolitical conflict in resource-rich regions has created supply shocks that temporarily inflated metal prices and have forced firms to sell assets/relocate. Deglobalization remains a prevalent theme as global powers continue to incentivize firms to source and assemble materials domestically.

Industry Research	
Global Revenue	$2.0T
Annual Growth (Past 5 Years)	6.0%
Annual Growth (Next 5 Years)	7.0%
Key Companies	
BHP Group Limited	BHP
Enterprise Value	$250B
EV/2022 EBITDA	6.2x
AlcelorMittal S.A.	MT
Enterprise Value	$25B
EV/2022 EBITDA	1.3x
Rio Tinto Group	RIO
Enterprise Value	$123B
EV/2022 EBITDA	4.0x
Vale S.A.	VALE
Enterprise Value	$88B
EV/2022 EBITDA	3.4x
Teck Resources Ltd.	TECK
Enterprise Value	$25B
EV/2022 EBITDA	2.7x

Source: Bloomberg

Key Players and Net-Zero Targets

In 2017, mines around the globe generated nearly 2 billion pounds of toxic waste and, with demand for metals surging, this figure has only risen since. Recently, increased investor, governmental, and client concern over the large emissions of the mining sector has pushed many mining companies – especially large global players – to be more thoughtful about their emissions scope.

As of FY22, 20 of the world's 30 largest mining companies by market capitalization have set carbon neutrality goals, with most citing the year 2050 as an ambitious, yet achievable target to achieve net zero. The primary source of emissions cuts is set to come from switching from non-renewable to renewable energy sources to power corporate giants' operations. The switch is seen as a necessary step to both mitigate effects of global warming and preserve long-term profits: As renewables infrastructure becomes more efficient, more and more corporates are accepting the fact that the long-term cost of renewable energy will decrease in time.

Governments have also sought other ways to increase the adoption – both at the corporate and consumer level – of renewable energy. As an example, the Inflation Reduction Act in the U.S., which will be discussed later in greater detail, includes tax credits for industries that add renewable power.

Exhibit 1 : Top 10 Metals & Mining Companies (by Mkt Cap)

Top 10 Metals & Mining Companies by Market Cap and their ESG goals (FY 2022 – in Millions of USD)

Company Name	Market Cap	Enterprise Value	Revenue	Adj. EBITDA	EBITDA Margin	ESG Goals
BHP Group LTD	144211	147213	65098	40550	62%	BHP said it would reduce operational greenhouse gas emissions by 30% by 2030 and net-zero Scope by 3 greenhouse gas emissions by 2050
Rio Tinto Group	113694	119746	55554	24466	44%	Rio Tinto aims to reduce Scope 1 and Scope 2 emissions by 50% by 2030 and reach net-zero emissions by 2050
Glencore PLC	85306	107970	255984	31818	12%	Glencore is committed to a short-term reduction of 15% by 2026, a medium-term reduction of Scope 1, 2,, and 3 emissions by 50% by 2035 compared to 2019 levels and net-zero emissions by 2050
Vale SA	75365	84649	43958	20889	48%	Value has committed to reduce emissions from its value chain by 15% by 2035 and achieve net-zero emissions by 2050
Saudi Arabian Mining Co.	42372	52386	10727	5005	47%	Saudi Arabian Mining Co. (Ma'aden) has pledged carbon neutrality by 2050
Anglo American PLC	47973	60551	35118	11689	33%	Anglo American is commited to being carbon neutral across its operations by 2040
Newmont Corp	37430	39984	11915	4528	38%	Newmont has committed to reaching carbon neutrality by 2050
Fortescue Metals Group Ltd.	37278	38165	17390	10728	62%	Fortescue is commited to real zero terrestrial emissions across iron ore operations by 2030 and net-zero Scope 3 by 2040
Barrick Gold Corp.	30112	38972	11013	4920	45%	Barrick Gold has committed to net-zero carbon by 2050
Angnico Eagle Mines Ltd.	232731	24565	5741	2609	45%	Agnico Eagle has committed to net-zero carbon by 2050

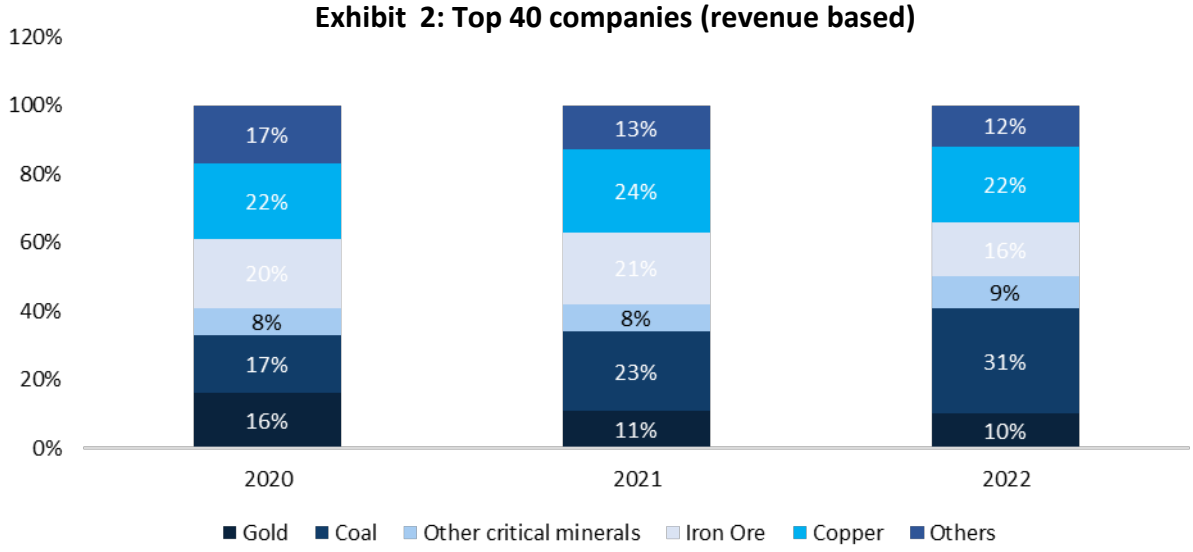
Source : Bloomberg

Subsector Updates – Precious Metals

Industry Overview

Metals with high economic value and uncommon supply are considered precious metals. There are 8 metals which classify within them, which include silver, gold, platinum, palladium, rhodium, ruthenium, iridium, and osmium. Unlike base metals, these are hard, less reactive, and ductile. They are often synonymous with an economic store of value, especially during inflationary environments. Mexico, China, and Peru are major producing regions for precious metals by volume. Whereas China, Russia, and Australia are the largest markets by value. The market is segmented into gold, silver, and platinum group metal with gold holding the highest market share. According to BlueWeave Consulting, the global precious metals industry is forecasted to grow at a CAGR of 8.1% from 2022-2028, projected to reach USD 415 bn by 2028.

Exhibit 2: Top 40 companies (revenue based)



Source : PWC

Growth Drivers

Rise in Disposable Incomes

The rise in disposable incomes across variety of geographies and the importance of their applications like jewellery in markets like Asia are contributing to the growing demand. Investors perception of gold as a safe haven asset has helped the market continuously grow during periods such as the pandemic. A study conducted by World Gold Council, concluded that ETFs and other investments made up to 23% of total gold demand in 2020.

Rise in Industrial Applications

Precious metals have been increasingly used in industrial applications thus increasing demands for metals such as copper, gold, silver, and palladium. Many companies are recycling precious metals due to ESG concerns and reinvesting them to make devices such as heart pacemakers. The rise of the electrical sector heavily contributes to the sectors growth as silver

is heavily used. High-tech fields such as equipment for communications, and aerospace also contribute to the rising demand for precious metals.

M&A Trends for Gold

Gold has the largest market share of the precious metals market. Despite the industry struggling to deliver value for shareholders over the past decade, over the past couple of years its performance has dramatically improved. Since 2020, global geo-political and economic uncertainty has helped the price of gold and deliver good performance to gold companies. M&A Activity heavily began in 2018 from the mega merger of Barrick Gold Corp and Rangold Resources which has been followed by similar consolidations like Newcrest acquiring Pretium resources.

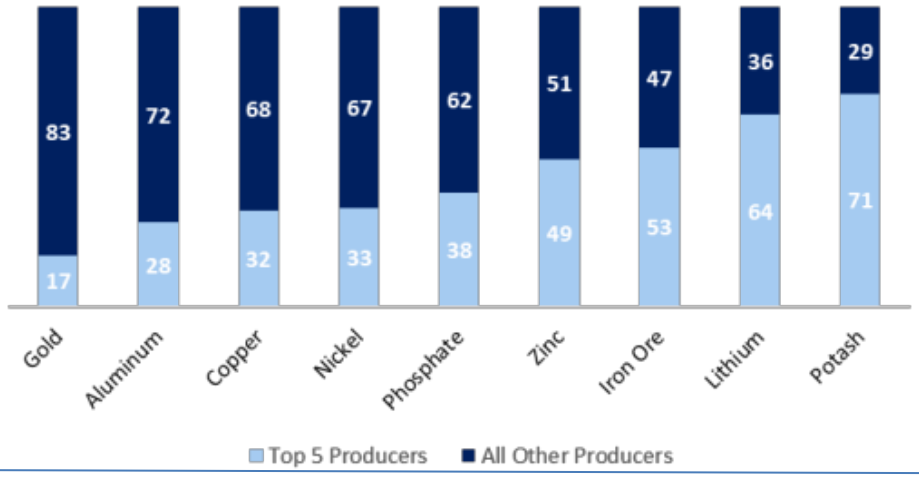
Exhibit 3 : Gold consolidation since 2018

Date Announced	Acquiring Company	Target	EV ($ mm)	EV/EBITDA
1/14/2019	Newmont	Goldcorp	12,300	12.3x
9/28/2021	Agnico Eagle	Kirkland Lake	10,700	6.1x
9/24/2018	Barrick	Randgold	5,400	11.3x
11/18/2021	Newcrest	Pretium Resources	2,600	8.5x
12/8/2021	Kinross	Great Bear Resources	1,300	NA
3/10/2019	Newcrest	Red Chris Gold Mine	807	NA
12/17/2019	Nortern Star Resources	Kalgoorlie (Newmont 50% Share)	775	6x
11/18/2019	Saracen Mineral Holdings	Kalgoorlie (Barrick 50% Share)	750	5.8x
4/5/2022	Highland Gold Mining	Kinross Russian Operations	680	1.3x

Source : Bloomberg

The gold industry stands as one of the most fragmented industries (Figure 3) compared to other metals where top 5 producers easily contribute to a higher percentage of the global production. According to McKinsey, gold companies have been generating higher cash flows and around 80% expect to see higher cash flows in the coming years. With leverage ratios decreasing, healthier balance sheets gold companies certainly have the room to take part in M&A.The debate over what constitutes a “Green” or “sustainable” rages on today and last year the European Parliament voted to label some gas and nuclear energy projects as “green” which provides them with the ability to access cheap financing and subsidies. This question is unlikely to find swift resolution as the question of what is “Green” is politically charged and the answer is not straightforward.

Exhibit 4 : Market Share of producers in Industry (%)

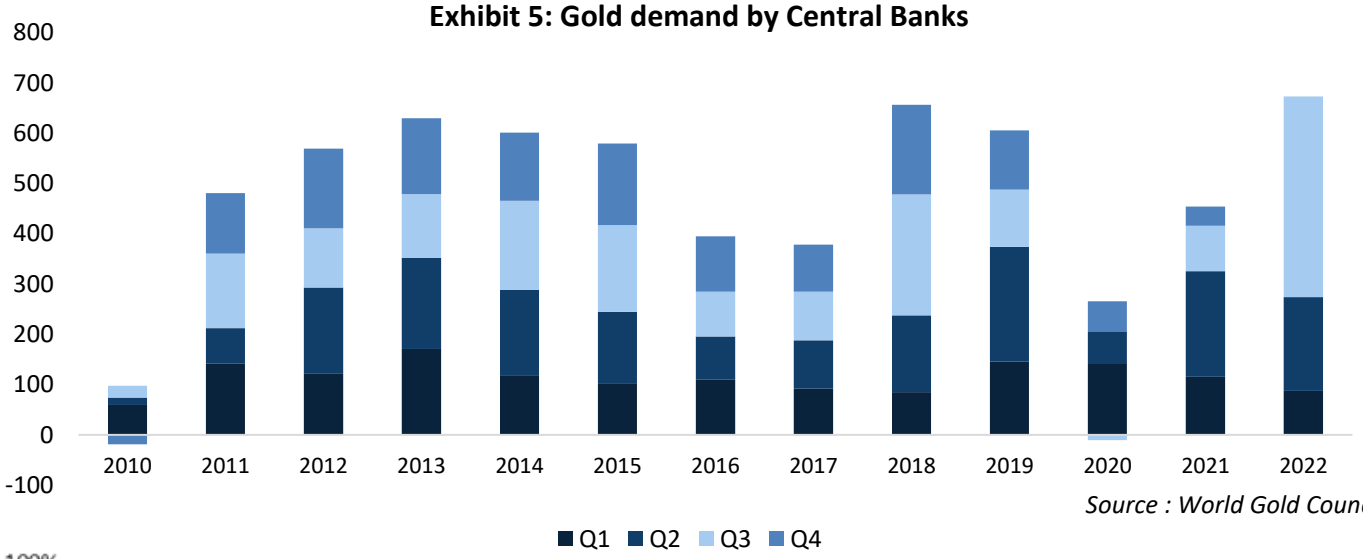


Source : PWC

Macroeconomic Analysis

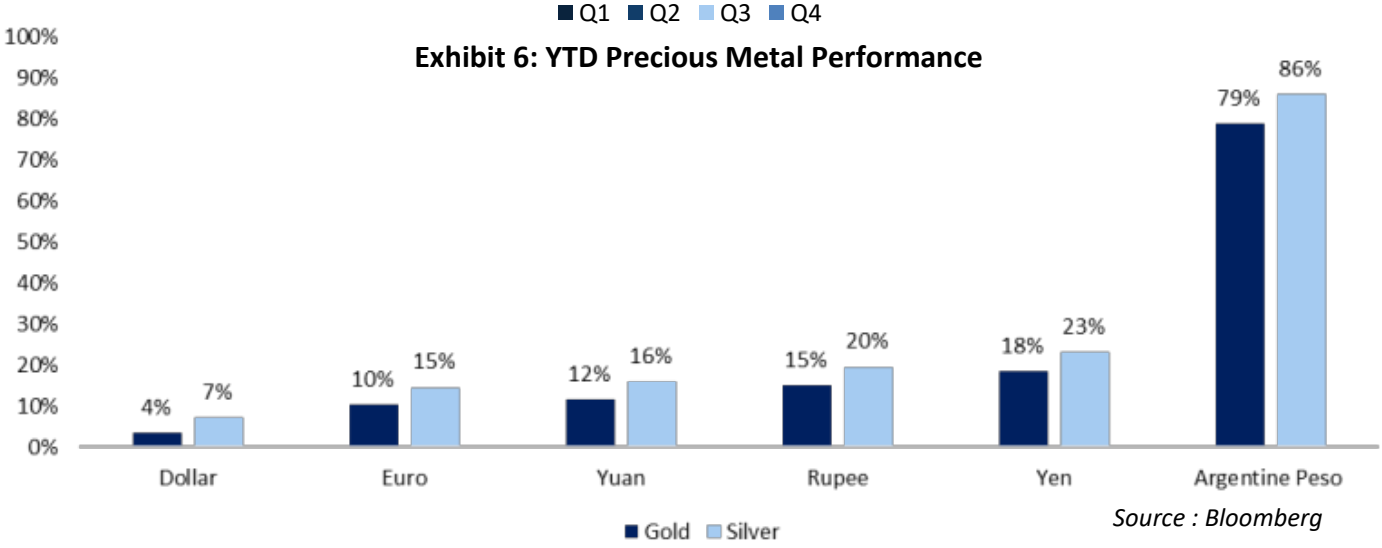
Precious metals over the past 2 years have been heavily influenced by the changing macroeconomic environment. Demand has been primarily driven by investors flocking to safer assets. Gold especially performed well due to geopolitical tensions between Russia and Ukraine, causing an initial price spike. However, during second half of 2022 gold relatively underperformed due to rapid rate hikes by the US central government, causing a strong value of the US dollar. Central banks during 2022 purchased assets like Gold at one of the highest pace since 1967, a trend that has been continuing over the past decade as countries look to reduce reliance on the US Dollar.

Exhibit 5: Gold demand by Central Banks



Source : World Gold Council

Exhibit 6: YTD Precious Metal Performance



Source : Bloomberg

Precious metals have performed much better in weaker currencies like Pes, and Rupee, as demand for precious metals like gold usually increases when currencies are weaker as its viewed as a better store of value due to its limited supply.

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Pretium Resources– Target (TSX : PVG)

Newcrest Mining– Acquirer (TSX : NCM)

Natural Resources – Metals & Mining

Pretium acquires Newcrest – how do investors feel?

November 9, 2021

Newcrest Mining acquires Pretium resources to geographically diversify and add an existing Tier 1 producer to its existing portfolio to create shareholder value. Investor's however have mixed sentiments

Pretium Resources Strategic Objectives

Shareholders will get exposure to a larger, top tier, and diversified gold producer. Further, investors receive a premium payout opposed to the shift in recent years to no premium mergers in the gold industry. Thirdly, shareholders get risk diversification from operating as a single-asset operator

Newcrest Strategic Objectives

The deal added an asset like Brucejack, a Tier 1 large scale mine, to Newcrest's portfolio of Tier 1 Assets. It's one of the highest-grade operating gold mines in the world. Newcrest already has operational expertise established in the region from its Red Chris mine. The deal allows them to embark upon their Golden Triangle Expansion by increasing gold production by 15%, making Newcrest the largest gold producer in the golden triangle. The deal also reduces Newcrest's exposure to higher risk jurisdictions

Synergies

Newcrest expects cost synergies of approximately C$15 million to C$20 million per annum; mainly through leveraging supply, logistics, travel and procurement opportunities with Newcrest's majority owned mine, Red Chris, 140km away from Brucejack. The asset is expected to produce ~350 koz/pa at lowest quartile AISC with limited capex requirements. Newcrest is set to benefit from savings through infrastructure and labour cost from sharing resources with it's Red Chris mine

Analyst: Sampan Bansal, BCom. '24
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Key Statistics - Target	
52 Week H/L	$19.7/$10.9
Market Capitalization	$3.8B
Average Daily Trading Volume	$30M
Net Debt	$100M
Enterprise Value	$260M
Net Debt/EBITDA	0.46x
Diluted Shares Outstanding	$33M
Dividend Yield	10%

1-Year Price Performance

Key Statistics - Acquirer	
52 Week H/L	$28.0/$13.8
Market Capitalization	$14.2B
Net Debt	$100M
Enterprise Value	$18.56B
Net Debt/EBITDA	0.6x
Diluted Shares Outstanding	$893M
Dividend Yield	1.38%

1-Year Price Performance

Subsector Updates – Base Metals

Industry Overview

Base metals possess a unique property where they are nonferrous (contain no iron). Examples include aluminum, copper, lead, nickel, tin and zinc. Since they are much easier to mine, in comparison to precious metals, they are a lot cheaper and common to the earth's crust – supply is typically there. Application of base metals vary widely with most uses being in the manufacturing, construction, commercial and industrial applications industries.

Growth Projections

The Global Base metals market was estimated at $551 bln USD and is expected to reach $1,028.8 Billion by 2031 which registers a CAGR of 3.5% (2022-2031). Due to the COVID-19 Pandemic, there's been a significant slowdown and price drop in the base metals industry. Specifically, end-user such as construction, automobile, and transportation were all negatively affected by lockdown regulations. However, as restrictions ease, recovery is expected to restore the growth trajectory with construction and electrical vehicles (EVs) being the main drivers.

Rise in Demand from the Construction Industry

Base metals, such as aluminum and copper, are typically used for construction due to their durability and strength. Over the next couple of years, as COVID-19 disruptions ease, the Asia-Pacific region will account for the largest share of the global construction industry owing to rises in income levels, rapid urbanization, and investments in infrastructure by the government.

- China: China is in the midst of a construction boom. It's expected to spend ~ 13 trillion USD on buildings by 2030.
- India: The Foreign Direct Investments (FDI) received in the construction development sector 23.17 billion USD according to the Department for Promotion of Industry and Internal Trade (DPIIT).
- NAM: Many major infrastructure projects such as the Baltimore-Washington Airport and Affordable Housing Initiative (AHI) in both the US and Canada will support the sector's growth.

Exhibit 7: Base Metals Market – Growth

Source: Mordor Intelligence

Risks

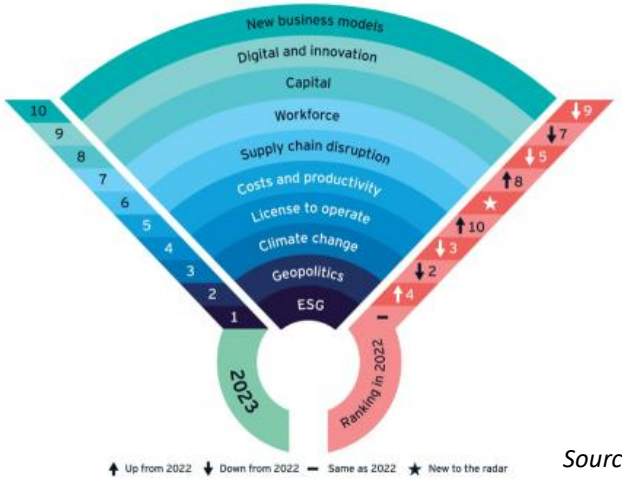
High Fluctuations - Base Metal prices are quite contingent on economic cycles. For example, many based metal prices started to lose ground during September 2022 due to recession worries in major economies. During times like these, price movements in copper serve as an indication of how healthy the global economy is. Therefore, their dependency on economic cycles and the industrial industry, result in volatility. Prices for many non-ferrous metals are set by the London Metal Exchange (LME) and other international markets.

Purchase Methods - The purchase methods for many base metals are done through long-term contracts with annual renewal negotiations. This makes things difficult for companies operating in the space as favorable terms and conditions, in relation to current markets, are not secure. Not only are prices for base metals volatile, but so are macroeconomic events and purchase agreements.

Transportation Logistics - Base metal's natural delicacy requires them to keep in certain environment conditions to maintain its. This is a huge risk factor when it comes to transportation methods and transportation timing. Since they can easily oxidize and tarnish, they serve as less durable currencies and require extra care when being bought/sold.

Technological Transformation - The technological evolution has brought remarkable changes in data analytics, artificial intelligence, and simulation capabilities in the industry. The implementation of these technologies in the industry create significant advances. However, the transition and adaption of these technologies play a risks in the operations and deliveries of the resource. Depending on how far technological adaption goes, so can the risks and negative effects of it. On a micro-management front, individual companies who fail to keep up with new technology or invest in wrong applications, will fall behind.

Exhibit 8: Top 10 mining and metals risks



Source : EY

Subsector Updates – Battery Metals

Industry Overview

The battery metals subsector consists of metals that are used in the production of batteries for a variety of applications, including portable electronics, electric vehicles, and renewable energy storage systems.

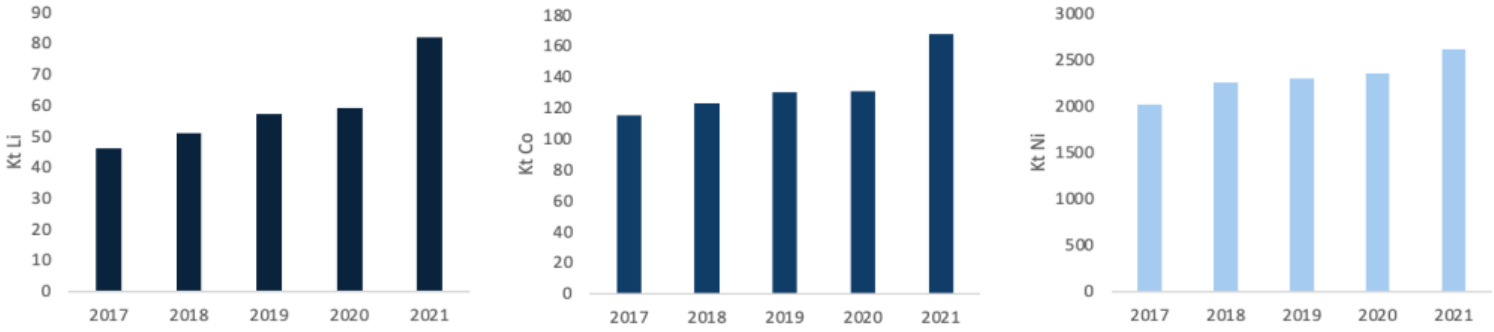
Some of the metals that are commonly used in the production of batteries include:

- Lithium: Commonly used in the production of lithium-ion batteries, which are widely used in portable electronics and electric vehicles due to their high energy density and low self-discharge rate.
- Cobalt: Often used in the production of lithium-ion batteries due to its ability to store a large amount of energy
- Nickel: Used in the production of nickel-cadmium and nickel-metal-hydride batteries (commonly used in portable electronics and electric vehicles).

Growth Drivers

Heightened Demand for Electric Vehicles - In 2021, approximately 10% of passenger vehicles sold globally were EVs, accounting for 6.6M units worldwide. The IEA forecasts that EVs will represent 60% of new vehicle sales in the year 2030, pushing global EV ownership to over 350M vehicles. Global demand for key battery metals, especially NCM (Nickel, Cobalt, Manganese), will increase exponentially: As an example, lithium demand for EVs and other batteries is projected to grow more than 40-fold by 2040. 5-year historical demand for lithium, cobalt, and nickel are shown below:

Exhibit 9: Historical Demand for Li, Co, Ni (2017-2021)



Source : IEA

Chinese Dependence - China produces three-quarters of all lithium-ion batteries and is responsible for upwards of 70% of global production capacity for select constituent parts (cathodes & anodes). Over half of lithium, cobalt and graphite processing and refining capacity is located in China. According to the International Energy Agency (IEA), China will continue to be responsible for approximately 70% of global battery production into 2030.

Recent Corporate Activity

Recently, car manufacturers have been seeking to regain control over supply chains through investing in and partnering directly with mining operations across the globe. Below are some of the recent partnerships that have been made public:

Exhibit 10: Key Partnerships between Carmakers and Global Mining Operations (FY22)

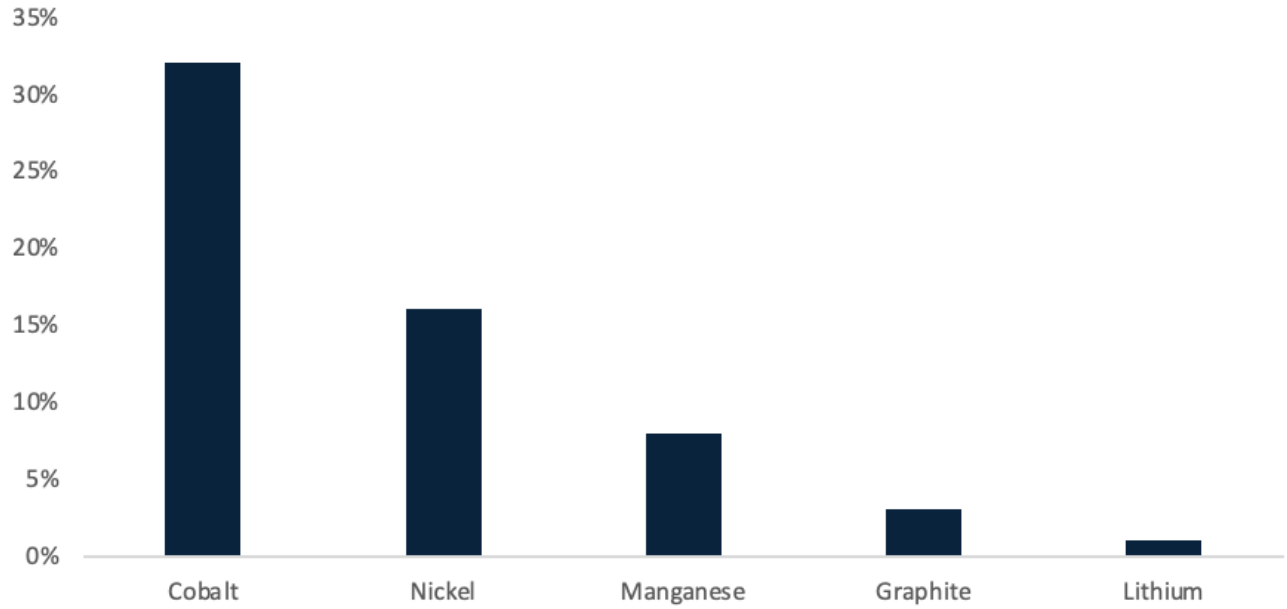
Date	Carmaker	Mine	Country	Details
01-10-2022	Tesla	Talon Metals	USA	Nickel
02-16-2022	Tesla	Liontown Resources Limited	AUS	Lithium
04-12-2022	General Motors Co	Glencore PLC	USA	Cobalt
09-23-2022	Mercedes-Benz	Rock Tech	CAN	Lithium
09-23-2022	Mercedes-Benz	CATL	CHN	Lithium, Nickel, Cobalt

Source : Yahoo Finance

Demand for Battery Metals Projected to Outpace Global Supply

The IEA predicts that the world could face lithium shortages by 2025. On the demand side, this phenomena is brought about by the increasing prevalence of batteries and their constituent materials in almost every consumer product. On the supply side, the rising cost of debt globally has made the investment of exploring new sites and expanding current operations more costly, which also affects future output given the average length of time for new discoveries to become fully operational mines is approximately 12.4 years. The conversion rate from discovery to mine also varies tremendously from commodity to commodity. For example, gold conversion is generally higher than copper or nickel. Thus, the current combination of political uncertainty and deceleration of economic growth is choking global supply of battery metals even more than the mining sector average. One potential solution to resolve this impending threat is to increase recycling rates of batteries. The figure below highlights current battery metal recycling rates in Europe.

Exhibit 11: Recycling Rates of Battery Metals (EU)

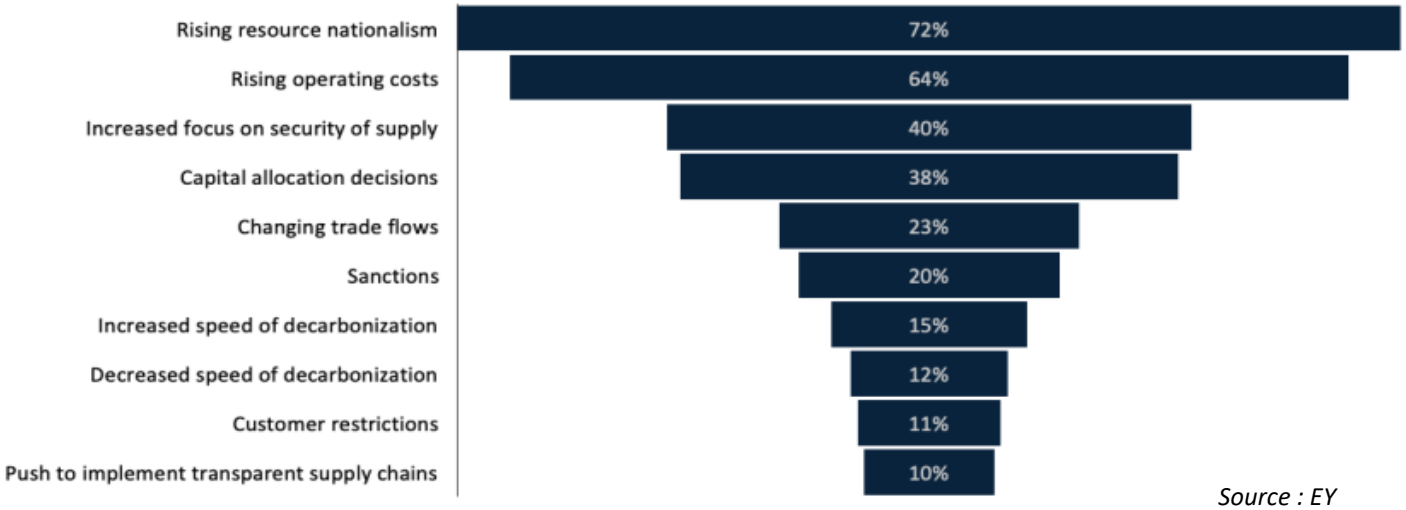


Source : Deloitte

Geopolitics

According to EY's 2023 Metals and Mining Global Outlook, geopolitics ranks second on the list of risks that surveyed mining firms identified (up from 4th in 2022). When asked how they thought current geopolitical uncertainty would impact their operations, firms responded with the following concerns:

Exhibit 12: Mining Firms' Geopolitical Concerns for FY23



Source : EY

Rising Resource Nationalism

In order to understand why firms' concerns pertain so much to geopolitics and uncertainty surrounding supply, it is important to see just how concentrated the extraction of battery metals is around the globe. In fact, the mining and processing of copper, lithium, nickel, and cobalt are dominated by just 7 countries:

Exhibit 13: Battery metal Mining and Processing Supply Chain Geographically Concentrated

Metal	Mining	Processing
Copper	Chile, Peru	China, Chile
Lithium	Australia, Chile	China, Chile
Nickel	Indonesia, Philippines	China, Indonesia
Cobalt	DRC	China

Source : IEA

Policy Changes in United States and European Union

In the United States EV market, automakers must source at least 40% of their battery components (by value) domestically or from a country with which the US has a free trade agreement in order to qualify for tax credits. In 2024, the figure is set to increase to 50%, then again to 80% in 2027 and 100% by 2029. As early as 2027, recent EU legislation will require manufacturers to fully disclose the quantity of recycled cobalt, lithium, nickel, and lead in new car batteries. The Union will place a floor on the percentage of recycled cobalt and lithium to be used in batteries and is planning to double said limit between 2030 and 2035.

GLOBAL EQUITY | March 2023

Natural Resources

IV. Forestry

ANALYSTS

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Head Analyst

WESTPEAK
RESEARCH ASSOCIATION

Paper & Forest Products

A Vivid Nature Alongside Pressure

March 2023

The forestry and paper products industry involves the cultivation, management, and harvesting of trees, as well as the manufacturing of products from wood, such as paper, lumber, and wood-based composites.

Industry Trends

The industry has been shifting towards digitalization and automation. Companies are using technology such as Geographic Information Systems (GIS) and remote sensing and adopting new 3D scan technology for forest management. There is also a growing popularity in forestry related software to improve harvesting efficiency and reduce cost at the front end. Such programs could improve the accuracy of forest inventory and reduce the need for manual labour.

Industry Drivers

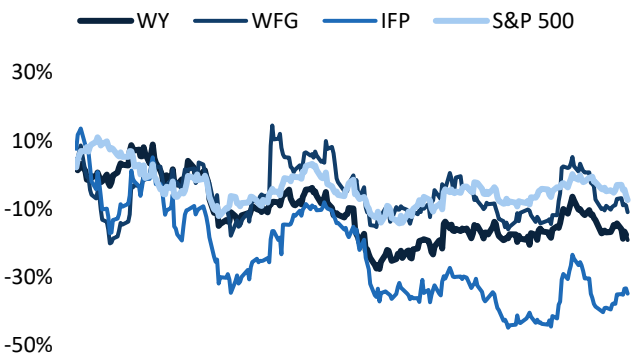
The industry is highly correlated to macro environment and, therefore, key drivers include major economic factors such as interest rates and housing starts. On the cost side, changes in exchange rates and energy costs, such as electricity and fuel, also affect the production volume of wood fibre and lumber. On the end market and demand side, trade policies, regulations and political uncertainty could impact imports and exports of wood and paper products. Changes in consumer behavior, such as the favor of e-commerce can lead to shift in demand for specific paper products and packaging.

Industry Research	
Paper & Forest Products	
Global Revenue (2021)	US$518.0B
Annual Growth (Past 5 Years)	0.3%
Annual Growth (Next 5 Years)	6.5%

Source: IBISWorld, Capital IQ

Key Companies	
Interfor Corporation	TSX:IFP
Market Capitalization	C$1.99B
Enterprise Value	C$1.24B
EV/2021 EBITDA	1.6x
West Fraser Timber Co. Ltd	TSX:WFG
Market Capitalization	C$9.45B
Enterprise Value	C$8.34B
EV/2021 EBITDA	1.1x
Weyerhaeuser	NYSE:WY
Market Capitalization	US$21.87B
Enterprise Value	US$25.46B
EV/2021 EBITDA	7.2x

1-Year Return



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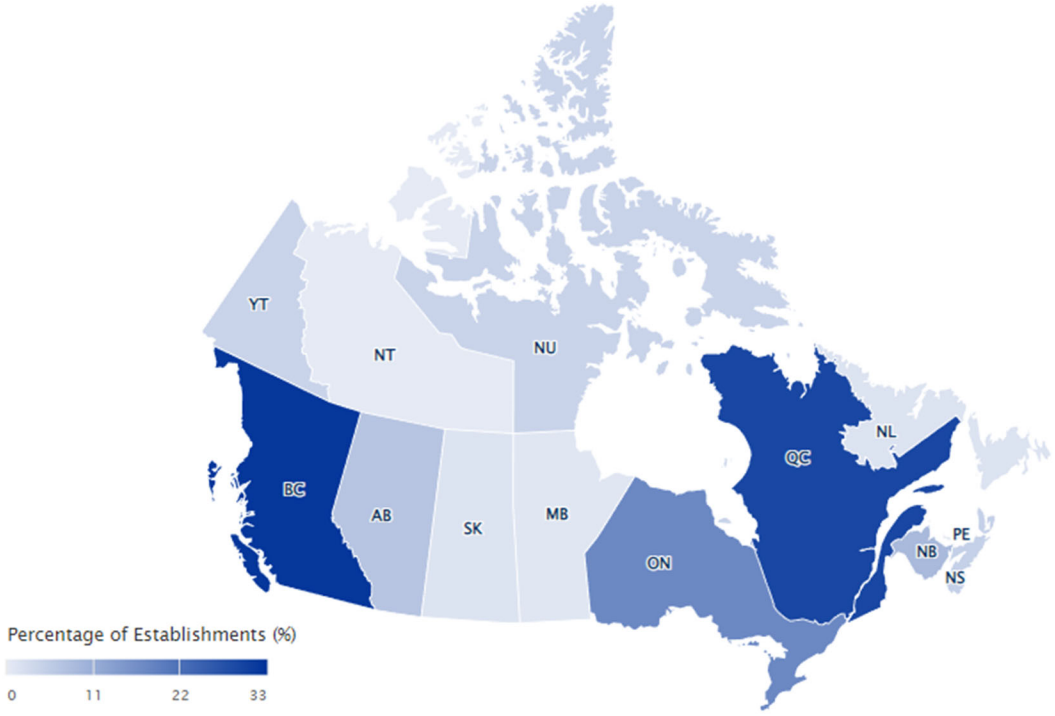
Subsector Overview

Canada

Quebec and British Columbia are two of the largest provinces in Canada with significant supplies of timber, and logging is concentrated in these regions. In British Columbia, logging is a major industry, particularly in the coastal regions where the forests are rich in Douglas fir, western red cedar, and other high-value species. In Quebec, logging is also an important industry, particularly in the regions north of the St. Lawrence River where there are large stands of spruce, fir, and other softwood species. Many logging companies prefer to operate in regions with abundant timber supplies close to their target markets, as this reduces transportation costs and makes their operations more efficient. British Columbia's proximity to key export markets in Asia, such as China, Japan, and South Korea, makes it an attractive location for logging companies.

Exhibit 1: Logging Distribution of Establishments in Canada



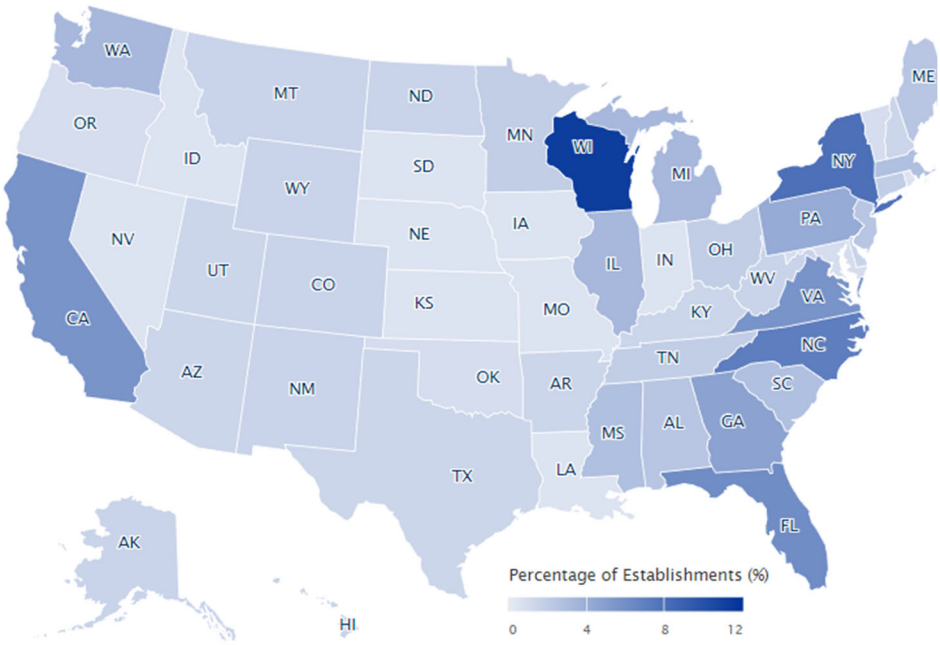
Source: IBISWorld

US

According to the US Census Bureau, the Southeast region accounted for 30% of the total US pulp and paper mill establishments, and 29% of the total industry employment. However, the share of establishments in the Southeast has been declining faster than the industry as a whole. One reason for this decline is lower demand for paper products, which

has led some large corporations to cut their capacity in the Southeast. For instance, in 2020, International Paper announced the closure of a paper mill in Cantonment, Florida, due to declining demand for uncoated freesheet paper. On the other hand, the Great Lakes region is becoming more attractive for pulp and paper mills due to its proximity to Canadian timber stocks. In 2018, Georgia-Pacific announced plans to build a new $285 million lumber facility in Talladega, Alabama, to take advantage of the region's proximity to Canadian timber.

Exhibit 2: Paper Mills Establishments Concentration in the US



Source: IBISWorld

Industry Trends

Forestry Processing: Innovation & Digital Transformation

Many companies are adopting digital technologies to optimize their operations and improve customer experience. For example, International Paper has developed an online platform called IP eCommerce that allows customers to order and track their products in real time. Winning in this industry—as in many industries—has always been about productivity and cost differentiation. In the past, success on the cost curve meant coupling the most modern and sizable machine with the right fiber source. Going forward, digital and analytics can provide the next step change: for example, by applying already-proven digital and analytics applications, companies can improve productivity and throughput by 10 to 15 percent—representing significant gains on traditional cost-curve differences between many players or individual machines and mills. This opportunity can be further extended by using digital and analytics to optimize the end-to-end value chain—from fiber (forest or recycled) to end product—in order to harness the full value of the data along the supply chain.

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Building Materials: Increasing External Competition for Substitution

Steel, masonry, and concrete have largely replaced softwood as a structural element in non-residential constructions. In the flooring sector, recycled plastic lumber, linoleum ceramic tile, stone, and strawboard compete. Furthermore, due to its greater fire resistance, gypsum wallboard has nearly fully replaced wood as an inside wall coating. The advent of synthetic alternative goods, mostly via price competition, has reduced the usage of wood in office partitions, prefabricated structures, and store fronts. While the demand for wood products and building materials is expected to remain strong in the coming years, the availability of substitutes and alternative materials may put pressure on the industry to adapt and innovate in order to remain competitive.

Packaging: Expansion in E-commerce Propelling Demand for Packaging Materials

The growth in e-commerce shopping has led to a significant increase in demand for packaging materials, including paper and plastic packaging. This has driven up the cost of these materials, as producers struggle to keep up with demand. According to the American Forest & Paper Association (AF&PA), the average price of containerboard, a type of paperboard used in packaging, increased from $560 per ton in January 2021 to $1,240 per ton in January 2022, an increase of 121%.

Macroeconomics in Paper and Forest Products

Key Drivers/Macroeconomics Factors

Tightening Log Supplies and Production Curtailments in the West Cost of North America

The industry has announced 1.0bbf of temporary curtailments and permanently shut down 600mmbf of capacity since Q4 2022. Given the issues with the availability of fibre, it is not surprising that the bulk of curtailments occur in the B.C. region. U.S. South and Pacific Northwest (PNW) are both witnessing reduction at the same time. In response to rising fibre costs, West Fraser has announced an indefinite closure of its Perry sawmill in Florida for 100mmbf. Sawmill closures are limiting the availability of residual woodchips and driving pulp mills to close. Canfor recently indicated that its Prince George plant will permanently cut market pulp by 280k/mton. When sawmill production declines in British Columbia, the region's pulp production is anticipated to suffer.

Wildfires have been a growing concern in the region, leading to significant forest destruction and reducing the amount of available timber. For example, in 2020 alone, wildfires in California burned over 4 million acres of land, impacting timber supply. In addition, outbreaks of pests and disease, such as the mountain pine beetle and sudden oak death, have led to significant tree mortality, reducing the amount of available timber in the region. Moreover, the industry is also facing competition from other industries such as real estate development and recreational activities, which are encroaching on the available forested land in the region. Meanwhile, government regulations around harvesting timber in the region have become stricter, leading to a decrease in the amount of available timber. For example, in British Columbia, the government has implemented a new approach to timber harvesting called the "results-based" system, which puts more emphasis on the environmental impact of harvesting rather than the volume of timber harvested.

Rising Interest and Mortgage Rates Leading to Short Lived Downturn

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Looking ahead to 2023, the industry outlook remains optimistic, with easing interest rates and strong demand for housing expected to support continued growth in the market. Housing starts are forecasted to bottom out to 1.3mm in 2023 before bouncing back to 1.55mm in 2024, indicating a potential return to pre-pandemic levels. The repair and remodeling sector is also expected to remain close to trend levels, further supporting demand for lumber and other building materials. It's estimated the lumber prices will trend higher by early spring given more activities started, taking the advantage of record low raw material prices. According to Forestry Economic Advisors (FEA), the total softwood lumber demand in North America will decrease 8.3 % to a nine-year low in 2023, following a 1.6 % loss in 2022, as end-use markets deteriorate, and a recession remains possible. This will be short-lived, with a 7.5% increase expected in 2024 to 62.5bbf.

Exports to Asia Dampening with New Regulations

Following Russia's invasion of Ukraine in 2022, several countries, including the United States and Canada, imposed sanctions on Russia. These sanctions have limited Russia's ability to export lumber to certain countries, which has resulted in more Russian lumber being redirected to China. This has decreased demand for North American-produced lumber in China. In addition to the sanctions on Russia, China has put new quarantine restrictions on imports of North American pine timber. Because of these regulations, the cost of transporting southern yellow pine and SPF timber to China has skyrocketed, making it more difficult for North American manufacturers to compete with other nations.

Key Indices

Commodity Indices

Referring to Bank of Canada commodity price index (BCPI), three major index components in the Forestry industry group are:

- Pulp (US$/tonne) northern bleached softwood Kraft pulp, using US PPI Woodpulp Index (base year 1982)
- Lumber (US$/mbf) random length lumber front month futures from Chicago Mercantile Exchange (CME)
- Newsprint(US$/tonne) 30 pound newsprint price, using US PPI Newsprint Index (base year 1982)

Correlation with Energy Prices

The industry is energy-intensive, with energy expenses accounting for a sizable share of total production costs. As a result, changes in energy costs can have a direct impact on the profitability and competitiveness of the sector. The price of wood fibre, the principal raw material used in the paper industry, is directly proportional to the price of energy. The cost of energy needed in harvesting, shipping, and processing can have an impact on the price of wood chips and pulpwood. In the United States, for example, the price of wood chips has been proven to be highly associated with the price of natural gas, which is frequently utilised in the pulping process. In addition, the cost of transportation for forest products can also be influenced by energy costs. Increasing fuel costs might raise the cost of transporting wood materials to mills or completed products to consumers. Rising fuel prices, for example, have been identified as a key issue in Canada's timber business.

Exhibit 3: Lumber Price Correlation with Natura Gas Price from 2018 to 2023

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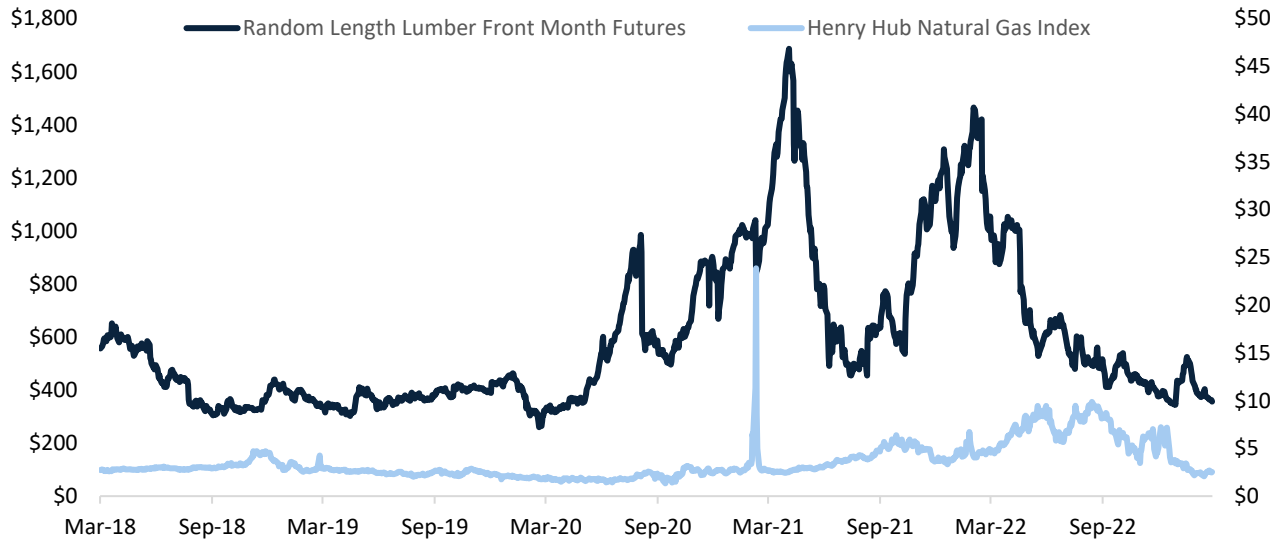
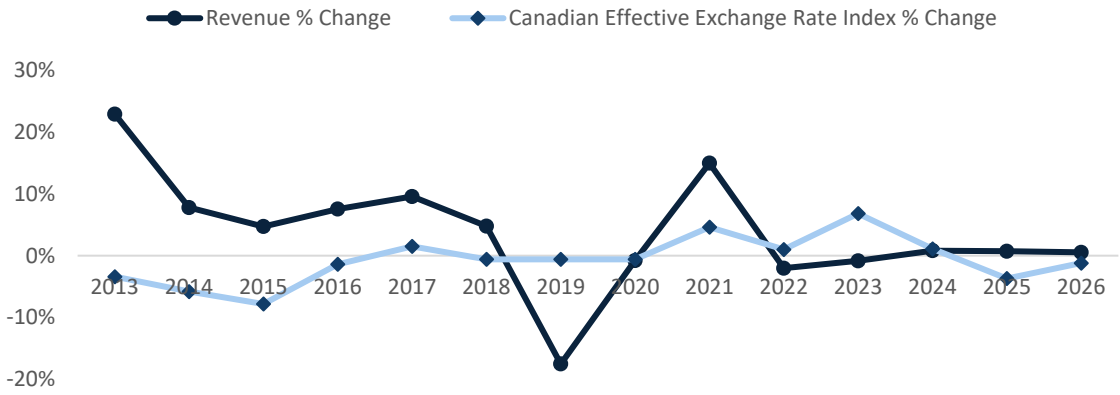


Source: CME Group, Bank of Canada Commodity Index

Correlation with Exchange Rates

The Canadian effective exchange rate (CEER) index evaluates the strength of the Canadian dollar in relation to key trading partners' currencies. In general, a lowering CEER index benefits sawmills by making goods less expensive and hence more competitive in domestic and foreign markets.

Exhibit 4: Sawmills & Wood Production Revenue Correlation with CEER Index from 2013 to 2026



Source: IBISWorld

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Competitive Landscape

Overview

The forestry industry in North America is highly competitive and dominated by a few large players. According to IBISWorld, the top four companies in the industry control nearly 40% of the market share, with many smaller companies making up the rest. The competitive landscape moderately varies dependent on how the larger Forestry sector is divided by different sub-segments. Total North America lumber production is 61bfbm in 2021, with West Fraser, Canfor, Weyerhaeuser and Interfor leading the production. The OSB Industry capacity is 26bsf-3/8'', with West Fraser, Louisiana-Pacific, Georgia-Pacific, Weyerhaeuser capturing the majority of the market share.

Exhibit 5: Major Lumber Producers in North America by Market Share(%)

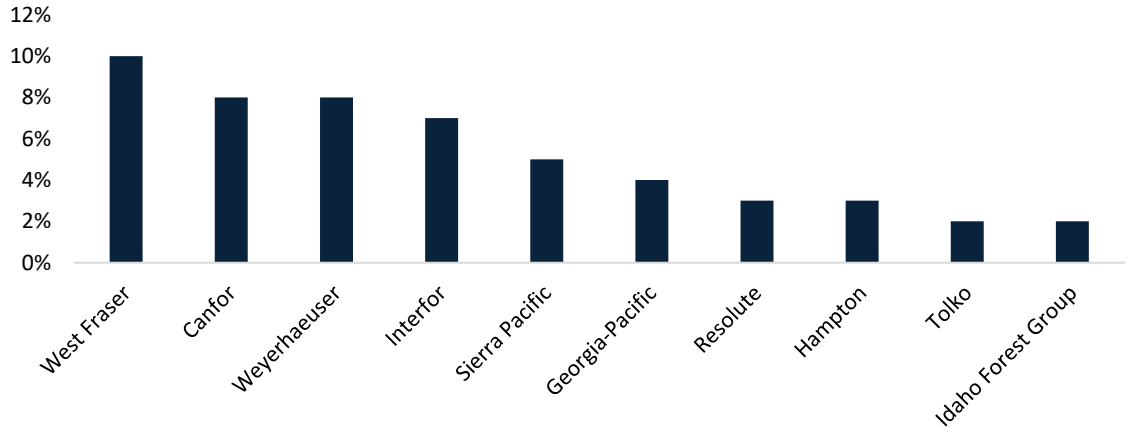
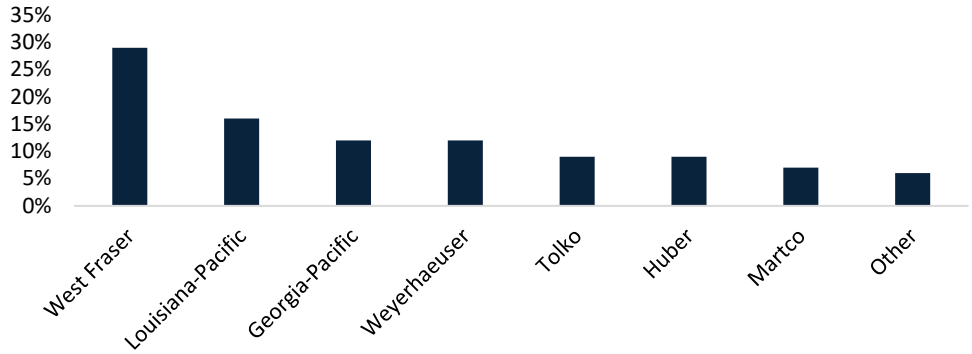


Exhibit 6: Major OSB Producers in North America by Market Share(%)



Source: Company Investor Presentation

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M&A Activity

Mergers and acquisitions (M&A) have been a key element in the competitive environment of the North American forestry business. Consolidation has occurred in the sector in recent years as corporations seek to grow market share, boost efficiency, and expand their geographic reach. One significant example of this tendency is the 2019 merging of Georgia-building Pacific's materials division with Bestwall LLC. Georgia-Pacific Gypsum, the new corporation, is currently one of North America's major gypsum manufacturers. Another example is West Fraser Timber's acquisition of Rayonier's pulp plants, which was completed in 2021. West Fraser became North America's largest lumber producer as a result of the transaction, alongside its increasing footprint in the pulp and paper industry.

Investment Perspectives

Volatility & Mitigation

Since most forest products are commodity-like, with no distinction based on quality or brand, they provide little protection from price cycles. The prices of timber and pulp products are driven by global supply and demand factors, which lead to price volatility and cyclicity. However, high-end products such as furniture-grade wood and custom cutting businesses may provide some respite from commodity pricing. For instance, speciality woods may command higher prices due to their unique characteristics and quality. Moreover, companies in the forestry industry could mitigate price risk through effective hedging strategies to lock in prices or enter long-term contracts instead of open market purchase. Conducting future contracts or options to mitigate exposure to price volatility is a commonly used hedging strategy in the forestry industry.

Risks & Credit Rating

Fluctuating marketing pricing – The level of volatility depends on the relevance of specific product lines to the macro markets. Especially, non-consumer packaging subsegment and building materials exhibit more volatility as they are very correlated to the health of key housing construction markets, or weather patterns affecting renovation activities.

Regulation and tax policies – Governments actively utilise tax laws to protect domestic providers from imports and to discourage raw log exports. Cross-border trade difficulties, such as timber taxes imposed by the United States on Canadian manufacturers, increase international rivals' risks and costs.

Structural trends and substitution effect – changes in consumer preferences can affect end-market pricing in the forestry sector while paper products might be replacing by electronic devices or other alternative to tree products.

Regarding operating profitability and cash flow management, forestry and paper products are likely among the most volatile industries, owing to substantial changes in related commodity prices.

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Forest Products — Primary FRA Metrics				
Primary Metric	**A**	**BBB**	**BB**	**B**
Cash flow-to-debt (%)	45 to 75	30 to 45	15 to 30	0 to 15
Debt-to-EBITDA (x)	0.75 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 8.0
EBITDA-to-interest (x)	15.0 to 25.0	7.5 to 15.0	2.5 to 7.5	1.0 to 2.5
Debt-to-capital (%)	20 to 35	35 to 45	45 to 60	60 to 90

Source: DBRS Global Methodology for Rating Companies

Timberland operators' credit risks are measured differently. These companies typically control timberlands through long-term contracts and incorporate logging activities and more expensive harvesting techniques with highly skilled workers. The ability to monetize the growing asset base and HBU land sales to bolster coverage is an important consideration. Therefore, appraised value-to-debt ratio is assigned to measure the financial risk.

Timberland Operators — FRA Metrics			
Primary Metric	**A**	**BBB**	**BB**
Appraised value-to-debt ratio (x)	> 3.25	1.75 to 3.25	1.25 to 1.75
EBITDA-to-interest coverage ratio (x)	> 3.50	1.50 to 3.50	1.25 to 1.50

Source: DBRS Global Methodology for Rating Companies

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Chaleur Forest Products - Target (Private)
Interfor Corporation – Acquirer (TSX:IFP)

Natural Resources – Paper & Forest Products

Building Value in All Dimentions

March 2023

Interfor Corporation (Interfor) announced on October 3, 2022 that it intended to acquire 100% of equity interests in Chaleur Forest Products (Chaleur), a sawmill and woodlands operator located in New Brunsweck, Canada, from an affiliate of the Kilmer Group. The purchase price is C$325 million, including C$31 million of net working capital. The deal has been closed on November 30, 2022.

Strategic Objectives

Interfor's acquisition of Chaleur is viewed as a strategic move by the company to increase its footprint in the Eastern Canada market and enhance operational efficiency. Chaleur's sawmill will supplement Interfor's current production facilities in Quebec and Ontario, with an annual capacity of about 350 million board feet. The transaction also brings approximately 30% share of the total Crown Forest in New Brunswick to Intefor's existing portfolio.

Key Considerations

The acquisition is relatively small in terms of transaction size, with a purchase price of C$325 million. However, the transaction is expected to generate a positive return on investment over the long term, as the synergies generated from the acquisition will be realized within a year.

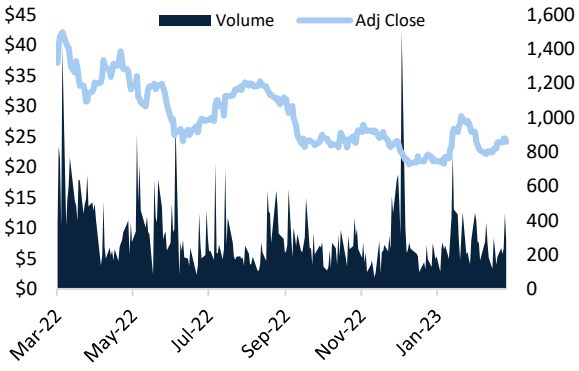
Synergies

The transaction is intended to save cost by increasing operational efficiency and optimising supply networks. Interfor may also use its current infrastructure to assist Chaleur's activities, minimising redundant expenses and increasing overall profitability. Interfor can capture greater value from the lumber supply chain by vertically integrating its operations through acquiring Chaleur, from forestry operations through sawmill production to the sale of timber products.

Analyst: Yewen Wang, BCom. '23

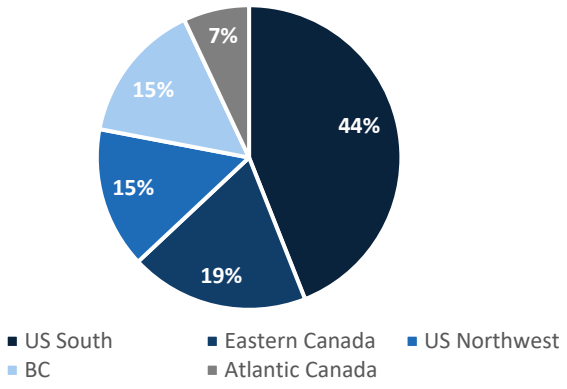
Acquirer Statistics	CAD
52 Week H/L	$42.69/$19.75
Market Cap	$1.24B
Net Debt	$720.4M
Enterprise Value	$1.99B
FDSO	51.4M
Dividend Yield	N/A

1-Year Price Performance



Transaction Metrics	CAD
Purchase Price	$325M
PF Annual Production Capacity	5.1BBF
PF Annual Synergies	$5M
PF Net Debt/Invested Capital	<20%
PF Liquidity	$322M

Pro-Forma Asset Distribution by Region



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Business Overview – Chaleur Forest Products

Company Overview

Chaleur Forest Products is a privately operated sawmill in Northern New Brunswick, Canada. The firm specialises in the manufacturing of softwood lumber products in North America and abroad. Chaleur is the second-largest lumber producer in Atlantic Canada and maintains a contemporary sawmill operation that employs cutting-edge technology to create high-quality timber products. In addition to sawmilling, Chaleur Forest Products maintains a planing mill that creates value-added goods such as decking and fence. Its primary revenue stream is the selling of softwood lumber products. The company's goods are sold to wholesalers, distributors, and retailers in North America and across the world.

The company has two well-capitalized sawmills located in Belledune and Bathurst in New Brunswick with an aggregate annual production capacity of 350 million board feet. Chaleur also has a woods management section situated in Miramichi that maintains roughly 30% of New Brunswick's entire Crown Forest. This division offers a steady, long-term source of cash flow through third-party log sales, licence management fees, and silviculture activities, as well as a dependable source of fibre supply for the sawmill operations.

Exhibit 7: Chaleur Asset Map

Source: Interfor Investor Presentation

Company Development

Prior to the acquisition by Interfor, Chaleur was a PE-backed company held by Kilmer Group. Kilmer Group's investment in Chaleur began with the acquisition of the company's sawmill operations in 2016. At the time of acquisition, Kilmer Group stated that it perceived significant potential for growth and value creation in Chaleur Forest Products. More than $40 million was spent in capital projects by Chaleur under Kilmer Forestry's direction, enabling Chaleur to make adjustments to its business practices such as mill automation, just-in-time equipment reporting, asset upgrades, and initiatives to address environmental sustainability. Now that through the acquisition by Interfor, Chaleur becomes a subsidiary of the public company.

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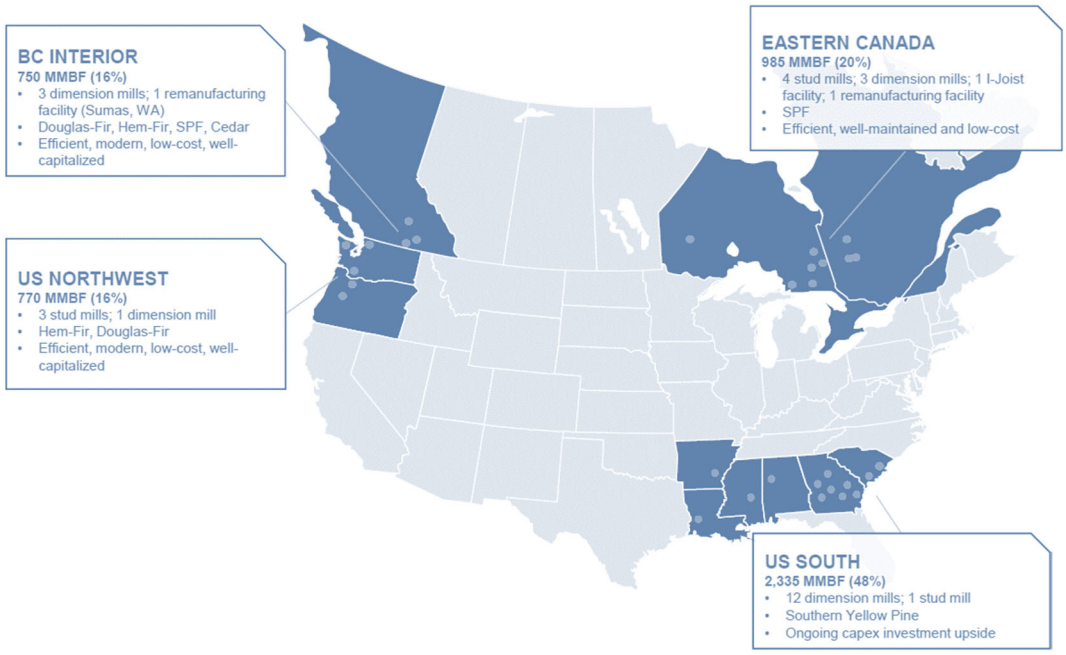
Business Overview – Inferor Corporation

Company Overview

Interfor Corporation is a Canadian forestry company that operates in Canada and the United States. The company produces a range of lumber products for customers in North America, Asia, and Europe. Majority of its revenue comes from lumber sales in the US market (84% of total sales) followed by the Canadian market (13% of total sales). Interfor manufactures a wide range of softwood timber products, including dimension lumber, specialised goods (such as decking, fence, and siding), and value-added remanufactured products (such as finger-jointed studs and laminated veneer lumber). The firm also manufactures wood chips, which are utilised in the pulp and paper industries. Interfor has 30 strategically located facilities in Canada and 13 sawmills in Canada and the US South. The firm has a total yearly production capacity of roughly 4.8 billion board feet of lumber with operations in all major timber baskets. The company currently has three subsidiaries: Chaleur Forest Products for forestry processing, Keadle Land Company for forestry development and harvesting, and EACOM Timber for wood and hard products.

Exhibit 8: Interfor Operating Regions (Excluding the Acquisition of Chaleur in News Brunswick)



Source: Interfor Investor Presentation

Company Strategy

Vertically Integrated Business Model

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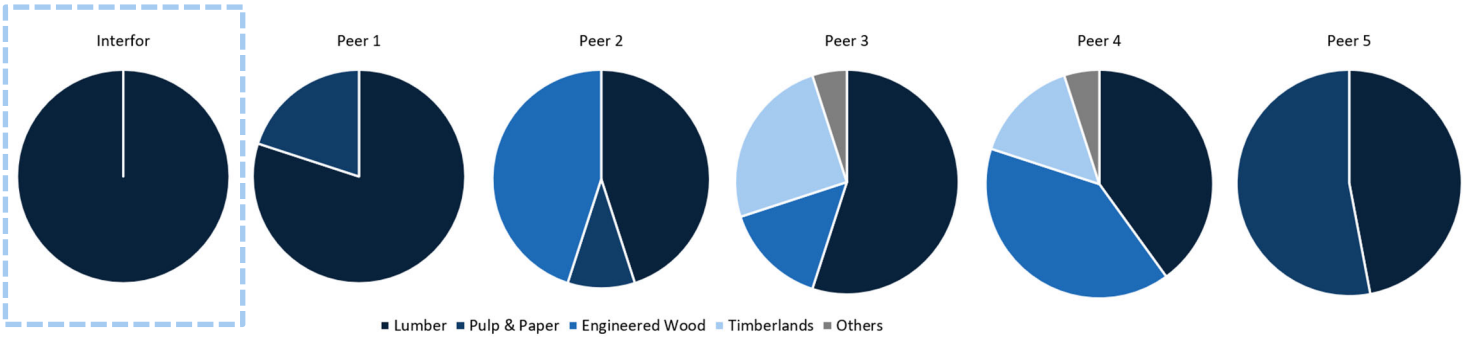
The company owns and operates sawmills, woodlands, and value-added facilities, which allows it to control its supply chain and reduce costs. Such a business model acts as a key strength, providing a cost advantage, better quality control and creates opportunities for operational efficiencies and value-add marketing. Moreover, Interfor is the only publicly-traded pure play lumber producer among peers, allowing the company itself to focus on key initiatives and area of development in lumber.

Exhibit 9: Industry Players' Revenues by Business Segment



Source: Interfor Investor Presentation

Long-Standing Growth Strategy through Acquisitions of Assets and Cutting Rights

One of the company's key strategies is its strategic acquisition over years. In history, Interfor consolidates its platform and expanded into US Northwest in early 2000s, followed by a focus on southern expansion across Arkansas, Georgia, and South Carolina from 2013 to 2016. Then, from 2017 to 2021, Interfor has made several acquisitions of cutting rights over the years and continued to expand its footprint to sustainable practices. Cutting rights refer to the legal right to harvest timber in a particular area or forest. Recently, the company has completed transactions to expand its exposure to eastern area. The pathways also indicate that Interfor is diversifying its lumber portfolio geographically. Some of the key transactions include:

- **Acquisition of Adams Lake Lumber in 2008** - The deal provided Interfor with a sawmill in British Columbia, which helped to increase the company's production capacity and strengthen its operations in Western Canada.
- **Acquisition of Keadle Lumber Enterprises in 2013** - Interfor acquired two sawmills from Keadle Lumber Enterprises, giving the business access to facilities for manufacturing in the Southeastern United States. This gave Interfor access to new markets and allowed it to increase its global reach.
- **Acquisition of Simpson Lumber Company in 2015** - By purchasing Simpson Lumber Company's sawmill assets, Interfor gained more production capacity and access to timber with a high appearance grade. The acquisition improved Interfor's operations in the Pacific Northwest as well.
- **Corporate Assets and Cutting Rights from WestProck in 2019** - Interfor completed the purchase of the WestRock sawmill in Summerville, South Carolina, which included associated timberland and cutting rights. This acquisition

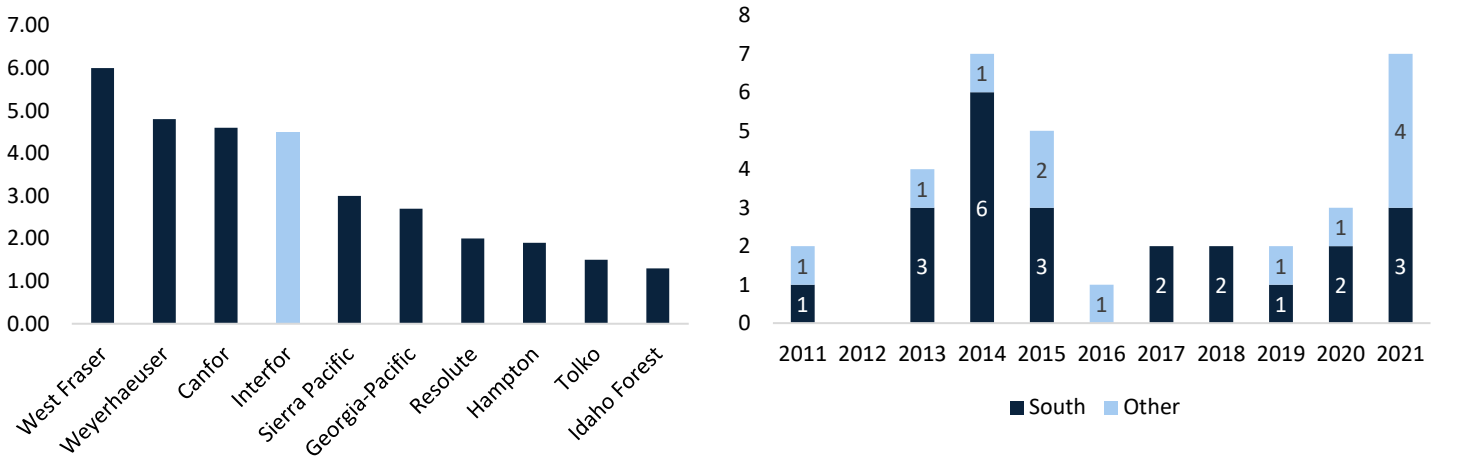
further strengthened Interfor's position in the U.S. South and provided access to additional cutting rights in the region.

- **Cutting Rights from WestProck in 2020 -** Interfor acquired cutting rights from Canfor to support Adams Lake long-term fibre supply.
- **Acquisition of EACOM Timber Corporation in 2022 -** Interfor gains access to all important North American fibre markets and establishes a new corporate office in Montreal, Quebec.

Industry Positioning & Market Activity

The North American lumber industry is highly fragmented with opportunities for consolidation. In 2021, top 30 producers altogether occupy 67% of the total market share. Interfor ranks the fourth among peers by production.

Exhibit 10: Interfor Positioning by Production in Billion Board Ft. (2021) (left) and Lumber Deal Volume by Region (right)



Source: International Wood Markets, Pitchbook, Investor Presentation

Despite a niche market with limited deal volume, M&A activity has been relatively active in recently years with bigger firms buying smaller manufacturers to increase their market share and gain access to new geographical areas. A notable manufacturer of OSB materials, Norbord, for instance, was acquired by West Fraser in 2019 after being publicly disclosed. The cyclical nature of the lumber sector is another factor contributing to the market's M&A activity. During economic downturns, manufacturers aim to buy assets to increase market share and streamline operations.

M&A Rationale

Transaction Overview – Acquisition of Chaleur

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The purchase price is C$325 million, on a cash and debt free basis, including C$31 million of net working capital. In addition, Interfor will assume Chaleur's countervailing and anti-dumping duty deposits at closing, for consideration equal to 55% of the total deposits on an after-tax basis.

Strategic Objectives

Expanding Footprint with Further Geographic Diversity

New Brunswick is an ideal location due to its secure, high-quality, and competitive log supply, supportive investment environment, and proximity to key eastern markets. Chaleur as a subsidiary would also help maintain consistent margin growth across regions over time by diversifying cash margin routes represented by varying mill net selling prices, net log costs as well as conversion costs.

Transformative Growth Contributing to Scalability and Leading Position in Lumber Production

On a proforma basis, Interfor's total annual lumber production capacity was expected to increase to 5.1 billion board feet as a result of the acquisition of Chaleur Forest Products. This would have represented a significant increase in Interfor's capacity and would have strengthened its position as a leading producer of lumber in North America. The Chaleur acquisition would contribute to a 11% CAGR growth target in the next 5 years, helping transform Interfor into the major global lumber producer role. Chaleur's desirable SPF product mix also fits well within Interfor's existing portfolio.

Financial Flexibility and Value-Creating Capital Deployement

The transaction will bring Interfor significant financial flexibility to pursue strategic capital investments and other value-creating capital deployment options. Interfor intends to finance the Chaleur transaction with cash on hand and current credit arrangements. Its debt profile would still remain healthy. Interfor has net debt of roughly C$48 million as of August 31, 2022, resulting in a Net Debt to Invested Capital ratio of 2%. Taking into consideration the Chaleur purchase and Interfor's C$100 million SIB completed on September 12, 2022, Interfor's Net Debt to Invested Capital ratio would stay below 20%. This indicates that Interfor has a comfortable level of financial leverage and can continue to pursue growth opportunities and strategic investments without compromising its financial stability. Additionally, Interfor's pro forma liquidity would be about C$322 million, excluding any extra borrowing capacity available under existing credit limitations.

Synergies

The transaction is expected to be immediately accretive to its earnings, and to provide attractive returns in both the near-term and over the long-term. The company estimated Chaleur's mid-cycle EBITDA to be approximately C$50 million per year pre-synergies, taking into account mid-cycle lumber prices and current run-rate performance.

Interfor expected to achieve synergies of C$5 million per year from the acquisition of Chaleur Forest Products. These synergies were expected to come from a combination of sales and marketing opportunities, shared purchasing programs, and general and administrative expense reductions. Interfor anticipated that it would be able to realize these synergies within 12 months of completing the acquisition.

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Recent Transaction – Another Acquisition of EACOM

Interfor Corporation acquired all outstanding shares of EACOM Timber Corporation for CAD $458 million. The acquisition was completed through a court-approved plan of arrangement under the Canadian Business Corporations Act. As part of the transaction, EACOM's shareholders received CAD $0.68 in cash per share. Interfor financed the acquisition through a combination of cash on hand, existing credit facilities, and a new CAD $250 million term loan. The term loan has a five-year term and bears interest at a rate of 1.5% above the Canadian Dealer Offered Rate (CDOR). Interfor acquired all of EACOM's operating assets, including seven sawmills, a remanufacturing facility, and a distribution center in Ontario, Quebec, and British Columbia. The acquisition also includes EACOM's interest in the Elk Lake sawmill joint venture and its related logging operations. In total, Interfor acquired approximately 1.1 billion board feet of lumber production capacity, which represents an increase of approximately 25% in Interfor's production capacity.

Valuation

Precedent Transactions

In the precedent transaction model, five acqsuition deals are chosen based on their recency, location, asset type, transaction size and operating segments. Unlike energy and mining segments, the North American forestry and forest products market has relatively mild deal volume and smaller deal size. Most acquisitions are either corporate asset portfolio purchase or million-size mergers. Therefore, the recency is expanded to within 5 years of the Chaleur acquisition. The multiples used to compare the trasctions with were enterprise value to the last twelve months of revenue and enterprise value to last twelve months of EBITDA. Relative to other transactions, Chaleur’s acquisition EV/EBITDA multiple was calculated as approximately 6.5x based on management’s estimates of its pre-synergies EBITDA being $50 million. The 6.5x EV/EBITDA multiple is slightly on the higher end of the industry peer multiples. Interfor is expected to realize synergies of $5mm/year and the well-capitalized sawmill assets are expected to bring 35% increase to Interfor’s Eastern Canada capacity, which will be coverted to a long-term stream of stable cash flows. In addition, given the easing interest rates and perspectivces on forestry and lumber recovery, multiples tend to be higher than before. All there factors could explain the premium over average industry multiples.

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Exhibit 11: Precedent Transaction Analysis

Precedent Transaction Analysis

(Figures in mm CAD)	Acquirer		Target		EV/Revenue Multiple		EV/EBITDA Multiple	
Announcement Date	Company Name	Ticker	Company/Asset Name	Transactio	LTM Revenue	EV/LTM Revenue	LTM EBITDA	EV/LTM EBITDA
23-Nov-21	Interfor Corporation	(TSX:IFP)	EACOM Timber Corporation	490.0	n.a.	n.a.	490.0	1.0 x
2-Sep-21	Builders FirstSource, Ir	(NYSE:BLDR)	California TrusFrame LLC	229.2	176.3	1.3 x	n.a.	n.a.
12-Apr-21	GreenFirst Forest Prod	(TSX:GFP)	Rayonier Portfolio of Forest and Paper Product Assets	293.0	586.0	0.5 x	62.3	4.7 x
10-Dec-20	UFP Industries, Inc.	(Nasdaq:UFPI)	PalletOne, Inc.	329.1	658.2	0.5 x	47.0	7.0 x
15-May-18	Conifex Timber Inc.	(TSX:CFF)	Suwannee Timber Management/Suwannee Lumber Holding Company/Caddo	257.7	128.9	2.0 x	18.0	14.3 x
3-Oct-22	Interfor Corporation	(TSX:IFP)	Chaleur Forest Products	325.0	70.0	4.6 x	50.0	6.5 x
Median						0.9 x		5.9 x
Mean						1.1 x		6.8 x
High						2.0 x		14.3 x
Low						0.5 x		1.0 x

Risks

Challenges to Near-Term Value Realization Owing to Interest Rates and Slow Housing Market

If interest rates grow considerably, Interfor's borrowing costs might go up and the market for lumber could decline as higher mortgage rates make it more expensive for people to buy homes. This may have an effect on Interfor's financial health and capacity to provide the anticipated synergies from the Chaleur purchase.

A weakening housing market may also result in less demand for lumber and reduced lumber costs, which would have an effect on Interfor's bottom line. In addition, a severe slowdown in the housing market would affect the timing and rate of Interfor's planned capital investments and therefore postpone the realisation of anticipated Chaleur synergies.

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