Domestic Oil Operations

Industry Research, Analysis, and Recommendations

Dr. Sihi--Fall 2020 Business Capstone

Blake Grider, Ruben Garcia, Zack Bencal, James Hill

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I. North American Oil Operations

Market Size

Domestic oil encompasses a variety of independent companies amongst the different levels from extraction, transportation, and refining aspects of the market. Domestic oil and gas peaked in 2014 with $218 billion in revenue. The industry faced a huge surplus of oil in 2015 which dropped the annual revenues by $90 billion. 2016 was a low point with only $103 billion in revenue. The industry began recovery 2017-2019. Recovery efforts were shocked with 2020's global pandemic. It lowered oil demand and with a surplus lowering prices. Downsizing and acquisitions have followed across industry leaders. Many employees were laid off and drilling sites were closed. Some international operations ceased. Travel overseas was frozen, and communication went virtual. An interview with an executive at an energy products and services company (Interview 1), uncovered that COVID-19 has forced these large oil companies to become more efficient. The interviewee states that all energy companies will eventually have to do this to become profitable, and that COVID-19 has pressed these efforts. The current U.S. infrastructure cannot run off renewable energy by itself. Oil is still the backbone of all energy production in the United States. Many other businesses/markets in the country rely on oil for their power. This ranges from anything to office building, houses, and factories.

Exxon Mobil, Chevron, and ConocoPhillips are the three largest oil and gas producers in the United States. It's difficult to estimate the exact size for oil and gas markets because of how much the price of goods depends on markets outside of the United States. Other countries can drive the price of oil up with a saturated market. A constant challenge in this market is the various tiers of petroleum extracting, transporting, and refining all have to remain profitable despite the cyclical nature of the industry. Expecting ups and downs, company leaders are expected to navigate through these challenges and keep petroleum supplies available while also holding themselves responsible for R&D in terms of innovation towards sustainability.

Global energy demand saw a decrease from 2018 to 2019. The growth was only .9% compared to the growth from 2017 to 2018 which was 40%. There was not much change in demand, but there was a huge change in what kind of energy was demanded. U.S. coal saw a decrease in demand while renewable energy saw a record increase in demand. This was a result of low gas prices, higher demand for renewable energy, and nuclear power. Nuclear facilities in China and Japan have finally been operating for a full year. In the United States the energy demand fell by .6% in 2019. There was a shift from the use of coal to natural gas because of the drop in gas prices. The use of coal dropped 15%; this level of use has not been seen since the 1960s in America (IEA. 2019). The U.S. is the largest producer of crude oil and natural gas.

Energy companies engaged in domestic production have been generating weak returns on investments. This is due to the "shale revolution" opening a new market for natural gas, but it also drives down gas prices. The natural gas market is on the rise for energy companies, while the demand for coal is slowly falling. Gas has taken some decline in

demand, but coal has it worse. Overall, energy consumption did not rise very much in 2019 due to weather and economic growth. Due to COVID-19 more people are staying home and driving less. This has lowered the price of gasoline as well as lowered the demand for gas in the market. People are staying home and running their air conditioning or heating units all day and using computers or television for work, this could offset some of the decline in energy consumption. This is tempered by the lower energy use by large businesses with vacant office buildings.

Oil Extraction (Upstream)

The extraction process begins on land with companies' leasing drilling sites. Specialized teams come in with equipment to flatten out dirt for a surface area large enough to accommodate machinery involved in the drilling process. There are off-shore sites along the California and Texas coasts where sites are built and engineered to function surrounded by the ocean. Pennsylvania and Oklahoma are inland, domestic hubs for oil. Contracted work is popular on-site for specialized tenants per equipment. An interview with a dispatch employee from a company involved with assembly and disassembly of drilling rigs (*Interview 2*) offered some insight on these rigs which are upwards of 100,000 lbs and require full crews to operate them. Different firms specialize in drilling the holes in the ground, extracting the crude oil, and maintaining equipment on-site. There are inspection teams monitoring pipes and variable pressures of reservoirs. There is also full on-site fueling capabilities because these sites can be out in the ocean or 120 miles off main highways. Fueling the equipment involved is a process alone. Transporting rigs site to site requires special trailers and hauling capabilities. Competitive advantages in extraction can be beneficial for large competitors because not every organization is involved in the extraction process. With so many steps to the final consumer, cooperation and a good chain of business partners is essential for consistent cash flow. The leases on the oil sites require substantial time for pre-construction and the long drilling process. It is a significant, initial capital investment to get involved in new sites. Different layers of the domestic petroleum process expose all players involved to potential risks/rewards. According to the U.S. Bureau of Labor Statistics, the oil and gas extraction sub sector employs nearly 160,000 employees as of October, 2020. *Exhibit 4* provides a visual of the industry vertical and players involved with extensive tools, expertise, and on-site services essential for smooth operations in this environment. This industry is the extractors of crude oil and/or commercial gasoline. The U.S. oil drilling industry is a small piece of an intricate supply chain. Key external drivers include the world price and production of oil, vehicle miles, and regulation on petrochemical manufacturing (Ross, 2020). Further, second tier suppliers include metal pipe/tubing and other oil tools required in machine manufacturing. First tier suppliers are the oil fields and industrial supplies/machinery wholesalers. Their audience of buyers are petroleum refineries and natural gas distributors. Second tier buyers are petroleum, rubber, and petrochemical manufacturers. This also includes U.S. gas stations and bulk stations (Ross, 2020). Oil's versatility allows tiers of companies with unique products available. Bigger players discussed in our external analysis have integrated processes upstream through the distribution chain, but there are also independent players in each facet. Companies find a niche where they can grab a piece of the multivariable industry.

Transportation (Midstream)

Gathering extracted oil and transporting it to plants/refineries offers unique challenges with tankers and moving parts at extraction sites. Storing and processing the petroleum also adds complexity to the supply chain. Tanker ships are used both domestically and abroad to transport both crude oil (crude tankers) and more refined contents (product tankers). The constant demand incentivizes these bulk orders. Systems of petroleum pipelines also transport various products from crude oil to more refined petroleum around refineries and off to distributors, and gathering systems collect the crude oil to be further processed in larger batches. Storing oil is an integral part of the industry because due to fluctuation in the price of oil, investors can hold products in barrels or tanks to later distribute at a more favorable price. The maximum oil that can be extracted is 4.4 million barrels a day then pressure varies in equipment involved in the process, slowing extraction. 5 years is about the shelf life if stored properly. In the extraction process, pressure drawdown forces fluids from the reservoir to the wellbore. The difference between the reservoir pressure and the pressure in the wellbore (where it's going) is drawdown pressure. This drawdown pressure is lost after 4 million barrels in a day. Through Interview 2*,* we learned the transportation of rig equipment for these drilling sites is an operation on its own. Diesel generators are set up on site to power equipment because of rural drilling sites. Special long-bed trailers and oversize load permits/capabilities are needed to haul the enormous cranes needed. Oversized equipment and tools are also hauled as freight. Sometimes drilling rigs can be too much weight capacity for a single crane, so a pair is used in moving it. There are also hurdles in managing cranes due to counterweight with titanic drilling units. Our third interview was with a commercial analyst for an organization which is involved with the petrochemical process refining crude oil into natural gas and other petroleum products. Our interviewee explained their company finds competitive advantage in automation and centrally controlling their plants. Being able to navigate pipelines and separate gas supplies to different departments from a single control keeps real-time attention for these firms. Miles of pipelines are able to be controlled remotely in Houston or Denver control centers. Fluidity in production allows increased margins for profitability with plants tending to market trends as they occur.

Petroleum Refining (Downstream)

Specialized refineries exist for supplying different crude oil products. This creates the complex supply chain full of independent players along the way. Wholesale/retail gas stations offer demand for clean oil from refiners. These gas and diesel products are then supplied to consumers from convenient stations. Oil extraction has turnover on investment with retailers buying/selling their petroleum products. Current refining trends follow the rest of the industry. Declining downstream demand has reduced profits for every player in the domestic oil supply-chain and surrounding fields. The capital-intensive industry as a whole is difficult to enter with major players involved generating $294.6 billion in costly revenue and $7.4 billion in profits. The industry is facing -10% growth 2015-2020, making this analysis extremely timely. Bulk petroleum

stations are down to -4.2% in demand with the stake being world price of crude oil -5.6%. Major conflicts for this industry are tech innovation, liable revenue, and increased regulation. Refining crude oil into useful products requires fractionation and straight distillation of raw product. This is transformed to petroleum products like fuels and lubricants producing marketable, chemical byproducts for wholesalers. Gasoline and diesel make up over 70% of products/services in the industry. 2020 revenue for petroleum refining is 44.8% down from previous years (Rodriguez, 2020). *Exhibit 8* shows the industry declining in its mature lifecycle stage. Coronavirus crushed oil demand, creating a surplus of discounted, crude oil. The U.S. oil and gas production index is up 6% 2015-2020. This overproduction pattern plummeted the crude oil world price 47% in 2015. Continued production until the social stop of COVID-19 recreated the damaging effects on these companies. The industry's volatility is a concern for America, employing nearly 170,000 domestically and accounting for $400 billion U.S. revenue. *Exhibit 9* references business density in petroleum refining, offering pride to Texans being the state with the most industry concentration.

There has been a fascinating inversion in petroleum refining internationally versus domestically. As you can see in *Exhibit 7,* international firms (imports) have traditionally been drivers of the petroleum refining industry. In 2011, $163,002 million was import performance compared to $117,369 million exported in refined products. On the contrary, in 2020 we saw $45,000 million in imports compared to nearly $75,000 million in exports. Domestic refineries grabbed a stronghold in the industry by taking advantage of international pauses due to the COVID-19 pandemic. Not all domestic refiners have crude extraction capabilities. Contracts regarding oil sites also hinder availability for companies. Strategic acquisitions and partners in petroleum blending help tend to the on-demand market. National shipments have to be on-time to demanding sectors. The refining process is capital intensive, requiring high initial investments with lower depreciation to follow. Petroleum and chemical engineers are needed to funnel oil products into tanks, mixing intricate chemicals. This transitions crude oil into its valuable, operable form. Refinery equipment required at initial construction includes the following:

- Storage Tanks
- Distillation Columns
- Catalytic Crackers
- Reformers
- Alkylation Units

II. External Analysis

Exxon Mobil Corporation

Exxon Mobil Corporation from Irving, TX is the "largest publicly traded oil company in the world" (Ross, 2020). Exxon practices in conventional and unconventional *hydrocarbon* energy sources. With 5.8% market share U.S. properties earned 26.5% of oil production and 48% of gas production in 2019 (Ross, 2020). Total revenue in 2019

was $264.9 billion with nearly 75,000 employees. Despite success in 2019, 2015 revenue dropped 44% when oil prices plummeted. Current climate and Covid-19 is burying prices at $40 a barrel. Ross continues stating the corporation's tactics include the following:

- Upstream approach- Extracting crude oil/natural gas for petroleum refining
- Downstream- Sale of oil/natural gas to international markets
- Chemical- Petrochemical manufacturing

Marathon Petroleum Corporation

Marathon holds 25.7% market share with headquarters in Houston, TX. Marathon excels refining 3 million barrels a day (Rodriguez, 2020). Mass-scale refineries are following industry trends with acquisitions in the current market lull. Cheap opportunities to take over market-share with smaller operations struggling to stay open. Increasing site/pump capacity now opens huge opportunities when oil price goes back up in the future. Marathon acquired *Andeavor* for $23 billion in 2018 was a stride to top competitors by 2025. Continued acquisitions seem smooth with the popularity of interior, contracted work industrywide. These acquisitions have been capacity expansions opening opportunities in internal operations for increased production/output. With steady suppliers in Mexico and Canada, the company looks to wield its acquisition for synergistic profits and increased cash flows. Industry-relevant revenue is looking to reach $76 billion in 2020. The company is looking to split into three separate operations, each focussing on one energy value chain piece. These moves are to open opportunities with sustainability investments, shifting operations in oil refining, and keeping a separate retail attack (*Rodriguez, 2020)*. *Exhibit 10* illustrates the firm's financial health exposing operating income at -$1,550 million in 2020 compared to $4,086 million in 2015. Expansion acquisitions are costly and inflate the books. However, Marathon has shut down operations across sites as a result. Shareholders are continuing to mouth concerns over the firm's profitability. Refineries face profitability responsibilities forgoing market shifts. Financially, long term investment funds used to hold 10% in the energy sector, while current trends show merely 1% committed to the field. Shareholders and financial advisors alike are weary to invest into the Covid-19 climate.

Valero Energy Corporation

Valero from San Antonio, occupies 26.1% market share with 7,400 retail and wholesale venues. Valero finds a competitive edge by diversifying its approach to the consumer with personal storefronts and wholesaler variety. This increases consumer opportunity purchasing their product, regardless of sole Valero storefront sales. The company has over 10,000 global employees bringing in $108 billion in revenue in 2019 (Rodriguez, 2020). Thirteen out of their fifteen petroleum refineries are in the states accounting for nearly 84% of their total production. Their domestic presence allows turnover on investment with a national supply-chain focus. Valero has more independent refineries

in number than competitor *Chevron.* Domestically, Valero's capabilities include 590,000 barrels a day with all refineries. Valero uniquely used government pressure to find an alternate route to success. Increased regulations limited the ability for some oil types to be processed. Valero prides itself on input flexibility, refining 86 different crude oil types compared to a more focussed competitor. The ability to shift to profitable varieties is a competitive advantage. The industry's nature promotes a high-maintenance approach. Watching trends and aligning products accordingly can beat competitors in specific product demand. This malleability will be crucial in Valero's efforts to survive the sustainability wave corporations are facing now and in coming years. 2015-2020 has seen a decline in the company's industry-relevant revenue by -2%. Valero brings in 21.6% of the industry's current revenue (Rodriguez, 2020). Their operating income has inverted in a similar trend to competitor *Marathon* from $5,655 million in 2015 to -$6,415 in 2020. The current drought in the industry alongside increasing operating costs are a constant threat. The machinery necessary in this industry is very costly to install and operate.

Chevron Corporation

Chevron exploded merging with Texaco Inc. in 2001 making the company the second largest U.S. based energy company with 11.4 billion barrels of oil/gas reserves and 1.7 million barrels of refining capacity (Rodriguez, 2020). With so many top players in this industry key mergers/acquisitions can leverage operating capacity and market share to bury the competition. Scarcity of oil reserves offers opportunities with strategic land acquisitions. In 2019, Chevron saw $146 billion in revenue with half of their 48,000 employees in the states. Chevron operates in the downstream, refining side of the industry with 5 U.S. refineries capable of 900,000 barrels each day (Rodriguez, 2020). The company has faced challenges outside of the price of oil, such as a major fire at their Richmond refinery ending production for the current cycle. Hazardous accidents increase compensation these companies provide on-site employees.

ConocoPhillips is discussed in detail in the *current climate* section.

Phillips 66 Company

Phillips 66 is a downstream energy player responsible for ConocoPhillips refining and marketing arms of business with 16.2% market share. Alos out of Houston, they purchase, refine, transport, and market oil globally. Some other sectors of the business focus on energy production, petroleum lubricants, and other ventures. One way Phillps 66 is gaining its competitive edge is investments towards natural gas processing. They own a company DCP Midstream LLC with 44 gas processing plants. 2019 Phillips 66 accrued $107 billion in revenue. The company has 13 U.S. refineries responsible for $2 million barrels daily. The largest is in Old Ocean, TX followed by the next two largest in Belle Chaste and Westlake, Louisiana. Phillips 66 is largely reliant on its domestic

activities accounting for 87% of the company's total refining capacity. A unique strength for Phillips 66 is its transportation advantages in supply chain operations with 22,000 miles of pipeline and 20 domestic terminals (Rodriguez, 2020). Industry-relevant revenue has declined from 2015-2020, with overall revenue following similar trends. WTI crude oil in Texas was cheap from pipeline shortages creating a surplus. Oversupply of oil drops the market price per barrel.

Domestic Oil Acquisitions

Ongoing acquisitions have been a trend with the slower Covid-19 market. Increasing debts have caused smaller competitors to go bankrupt and sell assets to industry leaders. Chevron recently acquired Noble Energy. Devon Energy is buying WPX Energy for $2.6 Billion. Chesapeake Energy out of Oklahoma City went under. Joel Angel Juarez and Clifford Krauss explain ConocoPhillips has proved its competitive relevance by acquiring Concho Resources in the lucrative West Texas Permian Basin for $97 million, the biggest deal since March's crash. "With Concho's 550,000 acres in the Permian, ConocoPhillips will more than triple its 170,000-acre position in the basin, which became the world's most productive oil field last year" (Krauss, 2020). Concho previously purchased RSP Permian for $9.5 Billion producing over 300,000 barrels in the second quarter of 2018 (Krauss, 2020). ConocoPhillips has made these critical moves chasing industry leader Exxon Mobil which acquired InterOil Corp. Distinguishing in terms of scale and quality are key factors in gaining competitive edge in this industry. Current efforts are focussed towards growth to then settle and shift attention to increasing returns. The U.S. has an abundance of natural gasses we learned in *interview 1,* which can lead to fluctuation in the market with so many independent players. Similar to the oil side of the industry, these competitors are strategically acquiring different pieces to construct their competitive advantage in the field. Different locations with rich returns, or edges in the supply chain can be monumental when your demand is country-wide or beyond.

International Contracts

Off-shore contracts are an important source of competitive advantage for domestic producers. Partners in international oil sites can bring extended supply compared to domestic-only numbers. Only so much of the domestic demand in oil is met through product in the United States. Service contracts have become increasingly popular for international partners because international owners can maintain oil rights. It can be mutually beneficial exchanging excess oil in a dense market. Domestic companies come in with the capital investment in machinery involved and extract oil. The U.S. currently holds service contracts in the following countries: Iran, Kuwait, Venezuela, Mexico, Bolivia, Ecuador, Iraq, and Turkmenistan (Ghandi & Lynn, 2014). Chevron, Shell, and Exxon are all active in Kuwait's oil operations. Production sharing contracts, in contrast, give more power to the domestic funder abroad. It grants some decision making in expansion and development. Ownership rights of the oil and sovereignty of the site is shared. A third option is a service contract, but these types of agreements require constant attention and decision-making each quarter based on market trends. Communication abroad can be a challenge, but many employees are also contracted

and relocated to international sites. These employees help maintain consistency in operations and are rewarded with benefits. Recent trends to bring production and manufacturing back to the states have supported domestic energy's growth, but Covid-19 has shut many operations down nationwide.

Economic Trends

Deflated demand for crude oil has killed the industry. Economic solutions include limiting the domestic oil production to push the price back up by 2025. Initial public consumption was overestimated creating this excess supply. Concerns with limiting production are increased reliance on international supplies/prices. Proponents of the proposal suggest it will lead to stable profits, boosting industry revenue annualized 7.4%, to $420 billion in 2025 (Rodriguez, 2020). The natural economy release after the pandemic, is likely to increase oil prices everywhere. The West Texas Intermediate is a price spot for specific oil grades/mixes. The WTI will see an increase in its extraction costs with a production delay. In *Interview 1*, the interviewee made it clear that oil supply/demand drive the price. Big players in the industry are acquiring and developing sites before the demand for them spikes. Current oversupply creates this bubble in the market where sites are transferred to firms with adequate funds in low-production quarters. There's a lasting pride in this industry as geo-politically, domestic oil's success lessens our reliance on oil reserves from other nations including the Middle East. The vast oil supply regionally allows international competitors to influence crude oil pricing. With domestic extraction efforts expanding, supply chains can be simplified and streamlined without international noise.

Government Regulations and Policy

Oil and gas companies are actively involved in legislation and regulation that impact the industry and environmental approach. The companies are impacted by such regulation and also play a critical role in implementation. Independent oil companies can join organizations like PESA, a trade association that helps the companies keep up with current legislation/regulations (Interview 1). The increased regulation of oil and gas drilling equipment directly affects industry product transactions. Regulations relating directly to oil equipment machine manufacturers are often passed with motivation to address environmental concerns. Industry participants must account for the increase in operating costs to comply with legislation. Regulation examples on fuel standards are the Clean Air Act of 1970 supported more recently by amendments in 1990 and the Toxic Substances Control Act. Accidents related to drilling or failure to comply with regulations can lead to fines. On-shore and off-shore oil operators are held liable for hazardous substance spills that have occurred according to the Federal Comprehensive Environmental Response, Compensation and Liability Act and the Federal Oil Pollution Act of 1990 (Ross, 2020). Pollution is an undeniable negative effect of corporate production, supply chain, and globalized business. Oil extraction has the chance of failure and creating giant, environmental hazards. Oil spills can be detrimental to companies losing investments. Fluidity allows assets to be wagered against losses with valuable oil sites. Oil and gas equipment trading is a separate market. Industry workers are *environmentalists* refining domestic energy production and distribution annually.

Consistency across players only helps keep the volatile market as smooth as possible. Government policy that can be a disruption to the industry is banning fracking on government lands. Government land extends to some of the most valuable crude oil sites in the world, the Permian Basin. Banning the most practiced extraction process would greatly flux the constant production output of the Permian Basin. Domestic oil relies on these sites for a huge portion of oil supply. This will make oil and gas very expensive, grabbing attention of entrepreneurs searching for the new, renewable disruption. A new, repeatable and scalable process will have to be introduced and accepted across the industry. This takes so much time, which is why efforts are focussed around fulfilling realistic energy demands for the current population. The government has offered some support to companies in struggling stages like tax returns and the ability to write off some losses understanding the industry slump. This explains the buy-outs corporations are employing to consume valuable market power. Denying domestic powerhouses access to the rich, western sites will shift U.S. power in the market as a whole. The federal government's decision with economic performance in mind will shape the future of this domestic market.

State governments reserve jurisdiction over which areas are open to oil exploration and extraction. State governments also hold stricter control compared to the EPA, in some cases, in regards to gasoline additives. California for example, banned methyl-tertiary-butyl-ether (MTBE). Unique state legislation can impact the market and products' limitations nationwide. The current system issues exploration and production leases and enforces environmental legislation. In efforts to protect the environment, regulations and mandates are frequently reviewed and adapted to output trends. As a result, industry participants are required to consistently stay informed and in compliance with existing laws that increase operation costs (Ross, 2020). The Energy Independence and Security Act is pushing 36 billion gallons of renewable fuel to be mixed with conventional varieties by 2025 (Rodriguez, 2020). The EPA bans the use of chemical additives such as butane in gasoline products. Emissions and fuel standard regulations haunt this industry holding corporations accountable for the sustainability of our planet. Fuel has come a long way where refineries previously would spike their gas with alcohols and ethers to boost octane rating and engine performance. In 2005 the Energy Policy Act with the Renewable Fuel Standard program mixed gasoline and diesel with renewable fuel additives. The transition from sulfur in fuels to without was clear going from 340 PPM (parts per million) in 1999 cutting to an average of 30 PPM in 2006. The need for fuel is absolutely essential in the current world. Supply chains, individual transportation, and mass manufacturing requires fuel to operate. The government's role is to take a holistic approach to energy consumption, realizing it's effects on the atmosphere. Regulation tries to shape a cleaner approach to the essential fuel consumption American society demands. Corporate leaders are the suppliers for national productivity with the negative effects of emissions. They also are at the forefront of R+D and data-collection shaping future practices.

The U.S. is a leader with government limits on business capabilities. Efforts such as the Clayton Antitrust Act apply limitations on ethical business practices in terms of monopolizing, price fixing, and labor practices. International competitors can unethically

hurdle these boundaries and take shortcuts to low pricing for example. International companies can own and control the whole vertical monopolizing the market and price structure. When limited members own all the resources, the power shifts to the firm with the majority of the oil sites. Regulation can shape sustainability efforts in that region. For example, with mineral deposit mining for electricity-storing batteries there's inequality in environmental attention internationally versus domestic practices. The U.S. builds its operations relying that ethical, safe practices are profitable in yield, and that reasonable business practices should be an American norm. OPEC, Organization of the Petroleum Exporting Countries, is the worldwide standard controlling the price of oil/gas. International tensions can influence countries' compliance with regulation, thus creating outliers in price. The essential industry damaging the atmosphere is fueling the clean energy race. This government influence helps shape business practices industry-wide with the use of common contracts, emission standards, and employee benefits. The government's influence helps shape a transition to a cleaner future. Corporations tuning production to avoid oversupply will help stabilize funding for green research and gambling on new practices.

Current Climate

In our first interview Covid was explained as a "black swan" unexpectedly shattering the industry and oil price quicker than many professionals in the field have witnessed in a lifetime. The market needs a barrel price increase in order to stabilize. Individual suppliers are setting low price marks to get rid of the supply they do have. Investment in U.S. shale oil has dropped from $100 billion annually in 2018-2019 to $45 billion in 2020 (Krauss, 2020). This trend is pushing oil companies into "mergers and acquisitions to survive" (Krauss, 2020). With so much downturn in finances, accidents and safety costs are expected to increase. Industry leaders are combining in order to survive the pandemic's $40 barrels. At $40 a barrel, many companies struggle to break even causing this "industry consolidation" (Krauss, 2020). Krauss continues saying share prices of ConocoPhillips and Concho are down 3% currently. "More than 50 North American oil and gas companies [are facing] debts totaling more than $50 billion [and] sought bankruptcy protection this year (Krauss, 2020). Independent producers are forcefully lowering costs by cutting back drilling operations. The executive we spoke with in Interview 1 was unfortunately no exception having to lay off 45% of his workers due to pandemic complications. Investors are recognizing market shifts and innovation trends across the industry; confidence is shifting towards renewable innovations. 569 domestic rigs have been decommissioned since the fall putting 100,000 U.S. oilfield workers out of a job (Krauss, 2020). Frictions between oil companies and drilling services are squeezing rig rental rates. Oil supply continues to exceed demand keeping prices deflated. *Exhibit 5* shows the Covid-19 influence on the oil drilling and gas extraction industry losing $232 billion in revenue from 2020's pandemic (Ross, 2020). 2015-2020 annual growth is down 4.6% alongside profit margin down 3.2%. Covid has held oil/gas prices down, squeezing refineries and suppliers. This distrust between shareholders and firms is seen directly with Shell cutting its dividends 33% and Exxon following a similar pattern. Less of these companies' net profits is being given back to shareholders. More money is being devoted to long term investments in renewable

energy options. The domestic oil industry is very susceptible to shifts in sustainability, while the energy industry's survival depends on oil demand's return.

This consolidation theme during the pandemic runs true down to the small, family operations as well. People with only a couple pumps are going under, not being able to make their money back. They're selling plots to bigger companies in acquisition or not running them. In the past, if you had a pump on your property, you ran it. Any oil that came up was profit. In current times, market shifts make it hard for individuals to stay profitable. Covid has created a lot of ownership transfers because big corporations can make up for low oil prices with their mass-scale sales. Smaller companies aren't as flexible once oil price drops below $50 a barrel. *Interview 3* gave us some insight on Houston proving its relevance with the gulf, off-shore rigs, and pipeline capacity through New Mexico, Oklahoma, California, Colorado, and Texas. This is a competitive advantage in the West being able to transport products easily across the densely-populated region of the market. Many companies are regionally located to better tend to demands of the area from equipment to operation. Upstream acquisitions are going on, and the industry is spreading out from original hubs like Houston. *Parsley Gas Co*. is an example popping up in Austin. Commercial contracts are being transferred as technology makes physical relevance to hotspots an advantage of the past. Companies are now centrally-controlling plants from headquarters allowing operations to spread out. With more automation and technology entering the field, this trend will only continue. The industry has also seen a shift towards the Denver Basin. Domestic operations are taking advantage of American sites while Covid-19 brought some international commerce complications.

III. Business Challenge -- Effects of Covid-19

COVID-19 enforced work from home orders vastly decreasing air/ground travel. Many nonessential businesses closed. Oil extraction slowed down with a *previous oversupply* and price drop. Social distancing and masks were enforced across the supply chain. However, all the COVID-19 equipment installed nation-wide is made from *petroleum-based products*; from masks, gloves, and plastic dividers to disposable everything. Through *Interview 2* we learned that communication in the midstream is dispatching trucks to jobs/sites aligning loads with what equipment is in demand. Physical paperwork travels from offices, to drivers, and inspectors of loads along the way. Extensive safety equipment is often required on site for fire-safety etc. but COVID-19 brought extra attention to employee safety. Business relations have resumed normal operations with a mix of electronic communication and face-to-face interaction. More masks, distance, and video calls have been used in communication. Some employees enjoy working from home, but on-site services obviously require physical attendance. Completely halting drilling would shock the world supply and only cause continued waves in the market. This deems oil and gas essential. Refineries and plants have also enforced mask regulations and increased sanitation efforts. With safety always a top concern of the industry, COVID-19 responses align greatly with consistent values in the sector.

2020 was full of bankruptcies for oil and gas companies as COVID-19 shocked a downward-trending market. Bankruptcies were seen from producers, to the oilfield sector, as well as midstream/transportation services. April 20th of this year crude oil prices went negative for the first time in history at -$37 a barrel (Wallach, 2020). The end of January we saw the first wave of lockdowns from the pandemic, and three months later U.S. storage of crude oil was at an all-time high of 19.2 million barrels. This shocked the oil price, and wasn't alleviated until May when countries began opening up again temporarily. Producers faced $30.7 billion in total debt by 25 separate bankruptcies. Oilfield services saw $24 billion in bankruptcy debt with 19 separate cases in the states. Midstream service companies took the *biggest hit* with $460.4 million in bankruptcy debt (Wallach, 2020). Without a crude oil price rebound, these bankruptcies look to be a continuing trend. This is a catalyst for consolidation of the industry as big players consume more market share and extraction capabilities. *Accruing debt on the capital intensive investments* has become increasingly difficult to pay off with current trends in the market. The commercial analyst we spoke with (Interview 3) explained the difficulty being on the job one month prior to the pandemic surge. He was still in training, learning everything when learning went virtual. He was struggling to learn contract lingo and figure out company processes working for home. The work from home order puts many in tough situations like this, but people have found new norms of productivity. Unfortunately, his company had to let go of a quarter of their corporate workforce as automation trends and decreasing revenues pressured management. This put more on the remaining staffs' plate as they transitioned to working from home. They converted to *Docusign* for contracts opposed to mail-in practices normally. The older workforce was also endangered with less familiarity to technology and new practices for the Covid-era workforce. These trends will force some technology into the industry however.

Shifts in Consumer Demand

Consumer demands shifting from Covid-19 has made waves across markets. Oil drives the majority of North America's businesses. People are working from home, and very few are traveling with the virus scare. Road trips have risen in popularity compared to air travel. The domestic oil market went from supplying the entire population's streets and skies to a fraction of the output. Gasoline, diesel, and jet fuel are major markets in petroleum products. Layoffs are happening industry-wide as acquisitions and consolidation continue to happen. With prices down, drilling is halted with less demand. The industry is eagerly awaiting the economy to open back up. Safety litigation has pushed people inside, changing society's daily routine. Fluctuations only shift the already cyclical industry. This permeates waves bleeding into the rest of America's industry and markets. The United States' economic ecosystem is centered around the fossil fuel industry. The country is dependent on the stability of oil and gas with so many jobs in the field. The abundance of jobs links the industry to society moreso.

Household demand accounts for a third of the oil refining industry. Household transportation consumes 90% of families' petroleum usage (Rodriguez, 2020). Covid reducing miles driven per household, petroleum demand also diminished. Work from home orders reduced overall commutes but boosted road trips. Covid testing became

regular for many consumers just like the constant testing of off-shore rigs. Domestic oil provides endless products integrated into consumers' daily lives. Everyone is a contributor to this industry. Covid has consumers afraid of the dense traffic in airports, and no one is flying as a result. The travel industry is expecting lasting impacts from consumers' fear of Covid-19. Airlines are a contributor to domestic oil's industry revenue. Consumers' confidence in airline safety is a lasting impact on aviation fuel demand.

Once the economy returns, traditional problems will reappear. Corporations will battle CSR in their environmental footprint with the necessity for intense supply chains and massive production. Consumer relations deal greatly with CSR. People have more trust giving their money to companies that fundraise, are environmentally aware, and involved in the community. It increases the perceived value of services on the consumer. Customers are satisfied spending with firms that positively impact business ecosystems. These consumers are also more loyal, spreading awareness to friends to support businesses with positive intentions. Grocery stores, retailers, medical forces depend on supply chains for their on-time resources generally powered by fossil fuels. These necessities take into account energy needed to fuel the transportation and manufacturing of goods. Balancing corporate image with necessary vices like emissions is a daily battle. These big corporations have faced CSR nightmares with extensive oil spills when tankers wreck in the sea. Pipeline ruptures are another potential risk that have caused extensive damage and explosions in the past. These are impossible to clean up sometimes with the flow of water to connecting bodies. The negative impact on surrounding ecosystems also shocks the natural world.

Even beyond the commercial sector, Americans need their oil powered vehicles in order to arrive to work and contribute to the macro economy. The industry expert in our first interview assured us America's energy needs are going to be reliant on oil alongside renewables. The current supply of renewables available to our country doesn't align with the demand of the population. Transportation alone is enough to eat up the current green supply. Moreso, tech is only increasing energy demand, with computer chip power becoming increasingly stronger, more energy is needed for exponential future performance. States already experience "brownouts" when energy expenditure exceeds availability. Voltage unintentionally drops in supply systems. The country's needs are only expanding, which is why energy production does support sustainability. These firms know importance even greater than us. The infrastructure isn't currently available for a power-source as big as America's needs. Energy hasn't been completely digitized by any means. It's physical nature and relevance are far from gone.

Industry Innovations

Austin startup *Hyliion* has innovated midstream emissions with electric 18-wheelers and attachments for diesel-powered trucks. Applying innovations to both diesel and electric trucks keeps relevance of gas/charging stations. Coexisting future innovations is vital for the industry's survival long-term. This company is an example of the new age of oil supporting a cleaner supply-chain. Their Hypertruck ERX is powered by a reserve of

batteries, running off a generator, fueled by compressed natural gas. The truck is capable of 0-60 in 20 seconds with an 80,000 pound load (Hellman, 2020). Their e-axle can be fitted to diesel trucks reducing emissions 25%. The CNG battery-hybrid is also capable of recharging from brake friction. The company is going public to increase its capacity nationwide, and get more trucks on the road. Petroleum products are still relevant in lubrication, rubber tires, and the plastic body of the trucks. This industry is adapting, finding new roles in a sustainable future.

Entrepreneurial spirit innovates turnover in this industry, finding small value pockets previously untapped. The search for the blue ocean continues as tech revolutionizes nearly every other industry around us. Domestic oil operations are securing their future with innovations in employee safety and environmental impact. Drastic change in oil extraction in recent years is the wider hydraulic fracking implementation. This process began in the 1940s, but the process has been continually refined and developed. Aspects such as the slurry being injected into the wellbore have been adopted with the main motivation to yield higher return on production. Fracking, in the past decade, has also enabled organizations to tap into new sources of oil encapsulated in low permeable shale deposits without interfering with groundwater deposits. While technology continued to develop, *E-fracking* became prevalent by introducing electric components. By implementing electricity, extraction costs were lowered in comparison to diesel prices and posed higher benefits with regard to reduced air and noise pollution. While still in its early stages of development, it is being used by Royal Dutch Shell and ExxonMobil. “E-fracking is estimated to lower the fuel costs for fracking equipment by nearly 90.0% according to Wells Fargo & Co., which decreases the total cost of operating shale wells by between 4.4% to 5.8%. Although e-fracking only accounts for just 3.0% of active fracking operations in 2020, Tudor Pickering Holt & Co. forecasts that levels could reach between 25.0% and 33.0% during 2020 and 2025” (Ross, 2020). Top competitors’ power leaves smaller companies to invest in development and innovation to drill their hole in the industry.

Downstream operation has seen innovation in *hydroprocessing crude oil* which is more refined in removing unwanted contaminants like sulfur, nickel, or nitrogen; all are targets of recent government regulation. These different distillation levels make the various petroleum products and qualities across the market. Other innovations include liquifying natural gas for an alternative energy attempt. Interview 1 actually informed us that the green transition of this industry was slowed with Covid-19 and the price drop of oil. The big companies involved are the ones funding future projects. With their numbers down, and expendable funding shrinking, cuts are being made. Our interviewee explained that safety programs aren’t the ones being cut at his firm. But that general competitors won’t expend that money on R&D if they don’t have it. Employee safety is always a priority with a dangerous extraction process full of industrial, moving parts. The most innovative sides of the industry are in efficiency and safety. Getting robots or equipment in some of the dangerous pieces of the process can save lives and companies money. The hands-on side of the job can seem irreplaceable to some, but disruptions only take time.

Another innovation he explained to us was off-shore pad drilling which has increased safety and erased a lot of surface damage. He continued saying with all equipment on-site it can take up less than half a football field. The site is then drilled down 800 ft and extensions off that can reach up to 3 miles in various directions from there. Apparently, this reaches below groundwater levels so also keeps consumers safe not contaminating natural reservoirs. All the product being then extracted from a single pipe at the surface! Sustainable consumer products have slowly been introduced in other fields with reusable grocery bags, cardboard straws, and *vegan bottles* which are biodegradable. Consumers have picked up some trends, but until there's a disruption replacing plastic, the petroleum industry isn't leaving. Consumers talk about innovation, but rely on gas for their cars daily. Even electric drivers have plastic and rubber in their car parts, tires, and dash. Electric car batteries rely on minerals drilled in a similar process with diesel fuel.

Application of Technology

Oil and gas has been slower than other industries to make a full technology conversion, but it has found its place in *plant automation* and picking drilling sites. Data webs and research will be a catalyst once AI starts recommending unique approaches to drilling practices. Interview 3 informed us of companies like *RunTitle* which are disrupting the upstream process. They have digitized mineral ownership to a database similar to *Zillow* in the home-buying market. You can now see previous prices of drilling sites, opposed to the traditional method of checking the courthouse public records. This dramatically speeds up the process and has opened some transparency to the market. The commercial analyst in our second interview informed us of how his company has integrated technology into their midstream operations. They now have plants fully automated and centrally controlled by control centers in either Houston or Denver. Being able to change chemical ratios or product types remotely has streamlined their operations. They now have less on-field workers which are often huge paychecks due to hazard pay on-site. Technology and AI decrease overhead costs for the future by replacing some current positions. Plants traditionally occupied 100+ workers and are the most dangerous part of the process. Automation has also created trends cross-training employees to be instantly valuable across departments, as positions are evolving industry-wide.

Tech hasn't taken over or completely refined traditional operations, but it does grant companies advantages in preparedness, data collection, and real-time results adjustments. Companies are still investing for that one disruptor to set them ahead and change the industry forever. This industry operates harmonizing a molecular process with titanic machinery. 2018 started a trend for tech inclusiveness in oil and gas looking at business structure and approach overall. Experimenting with new functionality has sped up with cloud computing use in simulations. IT automation has begun opening opportunities in organizational restructuring with digital and AI counterparts. Using technology in simple forms with recruiting and packaging labels has sped up the entire workplace flow in some commercial firms. As with much of this world, the push for data collection and company-wide accessibility for analysis/improvement has made its way to oilfields and operating corporations. Being data-driven is the surest way to take action

as a company in modern times. Company-wide data access creates *cross-sectional benefits*. Data can mold regulation, maintenance, and general safety overlapping with other findings in different departments. Emergencies can be prevented by monitoring pressures/reactions from pipelines. Sensors tracking conditions of pipelines after natural disasters can prevent leaks and further explosions.

This data collection wave can be a powerful portfolio offering potentially new revenue streams for these companies. Imagine an oil company not completely reliant on the price of oil. The cloud brings immense value to the industry linking distributors, suppliers, to retailers smoother than ever. Imagine supply chain plans now *transferable and scalable* worldwide in an instant. The international business webs already in this industry are only going to increase their communication and transferability of data/information. “Key blockchain opportunity areas in oil and gas are land administration, supply chain, finance, inventory operations, and marketing” (Winsor & Sanderson, 2018). Tracking assets and contracting the complexities of oil extraction/processing needed technology to provide a consistent communication platform. The industry’s volatility needed software to predict rises/falls in demand with actual data to help companies prepare for waves in profits. One way technology has hurt the industry is the Covid zoom calls. In our first interview, we learned that the complexities of the industry and supply chain involved make it difficult without a full staff on-site, in person. We assumed it made international communication easier with so many international partnerships in these big companies. However convenient, working from home presents unique challenges aligning with physical deadlines and constant dispatching with trucks/loads involved. In the retail side of gasoline/diesel, price-lowering technologies are monumental in impact grabbing customers from nearby rivals in real time.

Regarding emission data collections , tech software companies alongside battery factories are fueling the future with data collecting motors (Bloomberg). Electric motors collecting data towards self-driving technology taking away emissions. Companies and startups alike are emerging with unique intellectual property setting them apart from the rest. Tesla consumes 30%-50% of the U.S. market with opportunities with more battery development experience than competitors (Bloomberg). Despite Tesla’s weight in the market, everyone is investing into the electric vehicle conversation. Dyson spent $640 million trying to get a piece of the tough market; Apple failed. Volkswagen has rumored to be teaming with Tesla for a larger scale production of electric batteries and cars. Amazon went to a green supply chain. Collaboration is building innovation in this industry.

Recovery Challenges

Traditional energy revenues are tied to oil and natural gas prices. With the low price of oil, companies are merging to spread losses. Oil’s decline is timed unfortunately with renewable opportunity’s rise. The industry is struggling to survive Covid-19 amidst a shift to zero emission vehicles; investors are uncertain of oil’s recovery. Government handling of the pandemic is also a huge influence on markets' return to normality, as demand for oil has plummeted during the crisis. Refineries are expanding infrastructure

beyond what is demanded. They are doing their part to keep oil moving. *Exhibit 3* shows climbing U.S. oil supply, but predictions suggest a plateau nearing 2025 because of external market threats. “Petrochemical feedstocks LPG/ethane and naphtha will drive around half of all oil products demand growth, helped by continued rising plastics demand and cheap natural gas liquids in North America” (IEA, 2020). Diversification of petroleum products helps the industry with support from mass plastic production. *Exhibit 1* shows despite an expected rebound in 2021, the future is only dwindling the relevance for oil/gas. *Exhibit 2* continues showing the demand for gas being cut to 20% in 2019-2025 compared to the demand from 2013-2019. Sustainability is an issue not disappearing, recruiting these big oil companies to fund affiliates, start-ups, and academics searching for the competitive answer.

Domestic oil and gas is cyclical by nature. Industry challenges revolve around finding profits despite pitfalls. Timing investments, budgeting funds, and acting swiftly if major changes are made. Cuts can be made in low stakes with these firms. With Covid-19 timing a trough in industry trends the last few years, the upswing is on its way. Oil will come back with the world’s activity and demand. Overall production and petroleum use is extremely relevant in household norms. Domestic oil and gas growth and consistency guides stabilization in our economy. Despite a dull market, domestic oil has immense infrastructure and population to tend to. The industry is resilient; challenges are surviving the low prices. Keeping operations for when the market swings up is how to maximize profit. Industry-wide recovery relies on distribution channels and drilling operations being timed perfectly with society’s demand for oil increasing. The cease of the pandemic will likely swing this trend, but the ominous certainty of the virus has firms weary, gripping assets.

IV. Recommendations

Redirecting Investments

Current investments increase operating capacity with acquisitions of smaller companies. Increasing market share will be favorable once the current oil supply runs out. Redirecting investments towards non-traditional routes is a huge opportunity out of the pandemic. Opportunities outside the industry with similar machinery, drilling, and even supply chain expose potential partners where extra revenue can be made. Synergy with outside players diversifies companies’ activity, network, and transferable skills for employees. Sustainable innovation is one way companies grow their non-traditional business practices. Already popular is contracted work for the military, or previous experience funding non-traditional projects. Interview 1 gave us some insight on companies working with submarine technology due to the intense pressure involved underwater. Seabed pipes drilling minerals face comparable challenges to crude oil extraction. This synergy of equipment and expertise is key to a fluid and involved market. Another example is attaching the bases of wind farms. This responsibility has been left to oil companies due to their expertise attaching 100,000 pound objects and stabilizing them to the ground. This direct effort is turning some emissions backwards. This same approach should be taken with innovation. Redirecting investments to non-traditional business opportunities can help with some revenues when the market is

on a downward trend, or the oil price is low. This can help support companies despite the market activity around them. Diversifying their operations can keep demand and hours up for employees.

Specializing these oil companies' workforce and operations allows teams to focus on disruptive innovations. Investing in solely oil plots for example can leave you sitting on your value in times of oversupply, like we currently are seeing. Having steady operations in fields surrounding/complimenting the industry can ensure valuable R&D and productive work is still happening, even when oil isn't being drilled. This can also help from letting employees go, if their expertise can be transferred to a supporting role. A separate field attempts to find solutions which they can provide insight/feedback on. Blending on-site experience with technical design/engineering of new equipment can eliminate disconnect from lab to field. With the vast number of independent drillers involved, offering compensation or incentive for smaller firms to test out and apply new technologies can help get real experience with them. Big corporations can't always risk new innovations ruining a large product run. Anything slowing the process down, or not working correctly, is subtracting revenue from these mass-scale, globally relevant firms. Specialized companies can experiment and perfect operations to then scale to big corporations where benefits can be multiplied.

Focus on Domestic Efforts

International oil transportation poses environmental risks and is expensive. Growing the domestic network streamlines U.S. supply chains. Companies need to support regional partnerships for efficient routes and smoother transactions with freight. Trucks need to deliver and pick up loads in both directions. Aligning loads across companies will double trucking profits and double the output with the same driving. This benefits CSR and increases synergy across the supply-chain. More independent companies getting equipment on time only allows drilling and profits sooner. This would better leverage the U.S. market against international competitors. Domestic companies will be supporting each other, instead of buying each other out like current trends. Domestic oil would become sought after in international markets and domestic demands would be readily met. This would also improve U.S. advantages on finding that disruption that changes the process. Domestic firms already use data to choose smarter drilling sites increasing turnover on investment and impacting the ground less. Having a data-driven approach to oil's location will only bring efficiency to companies. As more firms take on newer practices, efficiency will improve. Improving efficiency amongst domestic firms is key to nationwide growth and development.

--Specific Implementation Plan--

- Connecting National Supply-Chains / Pipelines
- Integrate Technology for Smarter Operations
- Data Transparency
- Update National Infrastructure
- Fund Domestic R+D

Domestic opportunity is still present; so many independent companies devote teams to innovative ventures of R&D. Funding real-time supply and demand tracking can prevent oversupply and provide geographic-specific demands for parts of the country. A focus on domestic oil will keep us independent from fluctuating world prices. Domestic transportation of products will cut down on emissions not crossing international waters. This improves CSR and environmental footprint industry-wide. Domestic demand brings revenue to the companies supporting the sustainable innovations here. America's demand will require oil for a long time; the sooner we blend commercial ventures with solutions the more synergy we will find across markets. These public-private partnerships create cycles of innovation and sufficient funding. The big corporations have data that can revolutionize innovative approaches to the field. Corporations will benefit with fresh eyes on data sets and technologies findings on the old industry. Letting independent, specialized companies work to help big corporations operate more efficiently is working towards a solution. It's mutually beneficial to both parties solving both corporate and environmental issues.

--Lasting Benefits--

- International Price Freedom
- Reduce Emissions / Environmental Hazards
- U.S. Jobs
- Immediate Attention to U.S. Markets

Avoiding international tankers and the gamble of oil spills is part of our national *corporate social responsibility*. More domestic attention will allow the states freedom from international price fluxes. Petroleum supply-chains can learn from retail giants' Amazon's nationwide data knowledge. Increased safety and control with domestic practices can help keep consistent quality and output. Domestic focus will also tend to the consumer base easier, understanding the market and isolating outside variables. This opens the opportunity to work alongside the consumer base to achieve needs and sustainable efforts. Focusing on domestic demand can tailor production avoiding issues with oversupply dropping oil prices. Domestic environmental relief actions can be taken by corporations planting trees to naturally combat CO2 emissions. U.S. jobs will stick around as more drilling sites and refineries stay open. *Corporate culture* is shaped by domestic activity. Supporting oil will shape the rest of our markets positively. We can end price-gouging and let domestic giants keep consumer prices low. Profits can better be spaced along the supply chain, and safety can continue a priority. Domestic oil needs to get back to the prideful image it once was, and continue fueling the future of America. Domestic R&D can give us the competitive edge helping us out of the Covid-19 economic slump. Air travel will come back, and tech is only bringing the states closer together. Communication is at an all-time high; we can continue this with a blending of markets. Domestic players helping each other, whether it's supply chain tips, new innovation, or fundamental processes is what will rebuild our domestic economy.

Oil Coexisting with Future Innovations

Oil's longevity depends on its ability to compliment surrounding markets. An example of this is British Petroleum rebranding as beyond petroleum. The country's infrastructure isn't ready to support a full electric shift, neither are consumers' needs. Grid supply doesn't have the sufficient capacity for full transition to electric cars for example. Even as popularity grows for electric vehicles, supply chains nationwide will depend on diesel. The executive we spoke with in interview 1 explained it to us as paralleling telephone wires transporting electricity without the capacity to store large amounts for on-demand usage. While there are some capabilities like solar batteries that can store energy collected for households, there is no nation-wide solution or infrastructure ready. Tesla has introduced similar batteries to collect some solar energy to then charge the electric vehicle. But that is only one company focused on this technology for their vehicles. We need a national grid disruption before anything changes. While the cloud and datasphere have emerged as huge pools of data/analysis for companies to learn from, it's a long time before market disruptions occur. Domestic oil has fueled the U.S. for nearly two centuries; clean innovation will compliment it. Cleaner alternatives can take their respective niches, while oil will handle large-scale demand. Consolidation which we've recently seen in the mature industry needs to continue. Let the big players keep prices low with huge scale. Let them fund the green projects which they are already out in front doing.

Keeping the industry specialized for the most productive and fluid extraction, transportation, and refining of oil that can be possible is what's best. Innovation hubs, startups, and new tech advances will do their part moving towards the future, introducing new innovations. Let the companies with the history and expertise of the dangerous process do their job. AI will eventually intervene with vast data extractions and new engineering streamlining, but until then the traditional process must continue. We can't put the nation's energy supply in construction and wait for the next new source. Energy demand is only going to increase with a greater population with more tech dependency. As technology and the future of AI integrate themselves more into this field, oil will only become more profitable and efficient. Technology pinpointing profitable sites and the extraction process becoming more automated will only increase margins for these firms. Fewer wells will need to be drilled with more data-based planning and diligence in action. This decreases environmental footprint and capital investments by companies. The future of domestic oil will be far more efficient than current practices.

V. Conclusion

U.S. oil and gas has seen downward trends with the pandemic and current oversupply of crude oil. The low oil price has led to acquisitions industry-wide as smaller players forfeit in bankruptcy. The shifting market opens opportunities in non-traditional investments, increasing supply-chain communication, and supporting domestic innovations. Oil's relevance in everyday society proves its demand will return. Understanding market fluxes prevents waste and unnecessary traffic for efforts towards a greener future. Without multiple industry disruptions, oil will continue fueling our world another lifetime. North America will optimize the extraction, refining, and transportation of oil as an example for our world to prove sustainability.

VI. Appendix

Exhibit 1 (IEA, 2020).

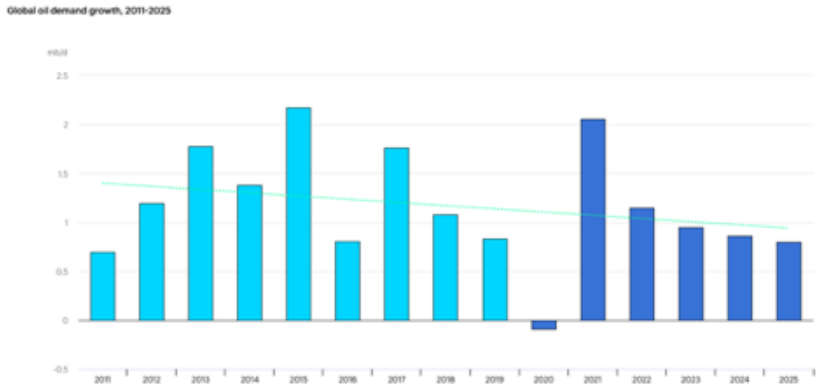


Exhibit 2 (IEA, 2020).

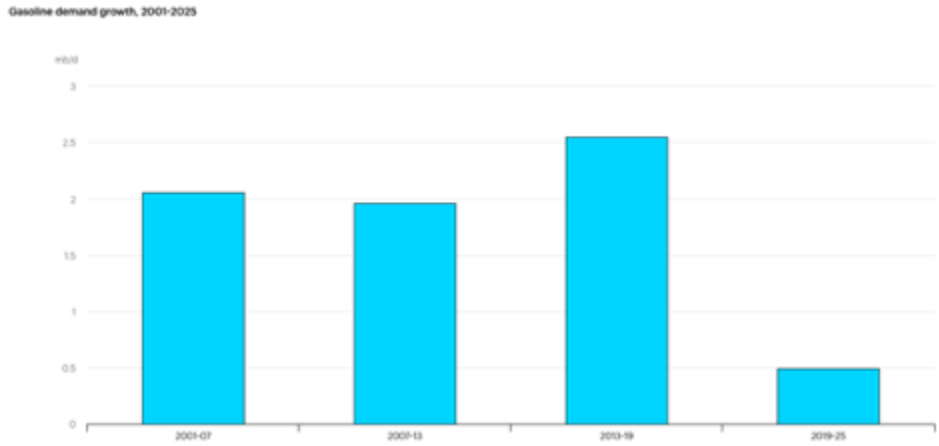


Exhibit 3 (IEA, 2020).

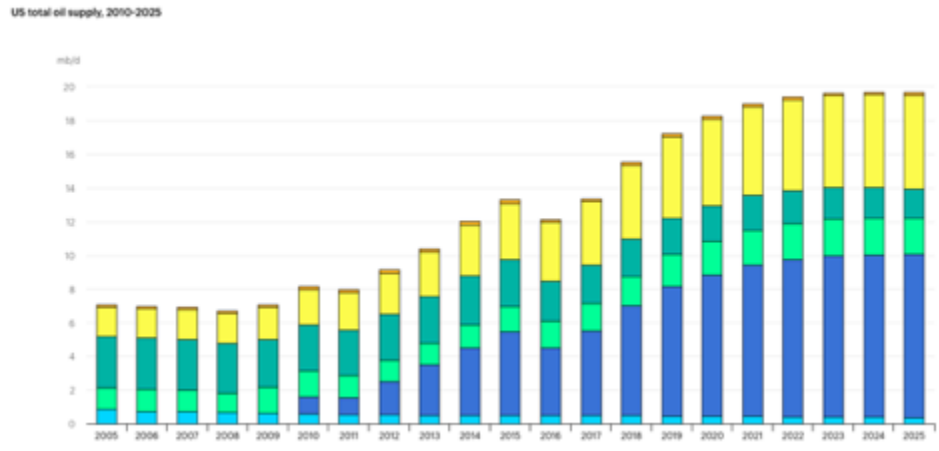


Exhibit 4 (Ross, 2020).

Exhibit 5 (Ross, 2020).

Exhibit 6 (Gold & Hidari, 2020).

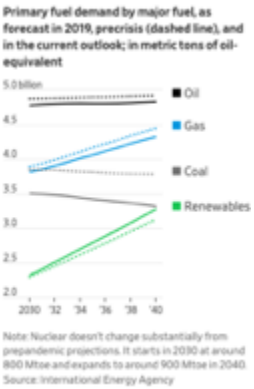


Exhibit 7 (Rodriguez, 2020).

Historical Performance Data

Year	Revenue ($m)	IVA ($m)	Estab. (Units)	Enterprises (Units)	Employment (Units)	Exports ($m)	Imports ($m)	Wages ($m)	Domestic Demand ($m)	World Price of Crude Oil ($ per barrel)
2011	916,721	69,040	296	198	62,982	117,369	163,002	7,620	962,353	104
2012	910,209	87,147	152	68	62,542	125,440	152,549	7,959	937,318	105
2013	898,920	55,572	191	78	61,663	132,621	137,509	7,929	903,808	104
2014	811,614	69,125	178	78	64,363	128,557	122,876	8,254	805,932	96.2
2015	503,063	42,675	194	92	64,451	84,608	72,999	8,466	491,454	50.8
2016	416,537	25,220	197	96	64,934	71,207	58,657	8,558	403,987	42.8
2017	529,592	22,995	155	66	66,352	88,047	66,610	8,696	508,155	52.8
2018	653,984	44,666	152	64	66,315	106,670	82,828	8,696	630,142	68.3
2019	533,405	38,477	136	57	57,620	94,490	73,675	7,464	512,590	61.4
2020	294,557	16,488	111	48	39,912	74,855	44,920	4,960	264,621	35.3

Exhibit 8 (Rodriguez, 2020).

Exhibit 9 (Rodriguez, 2020).

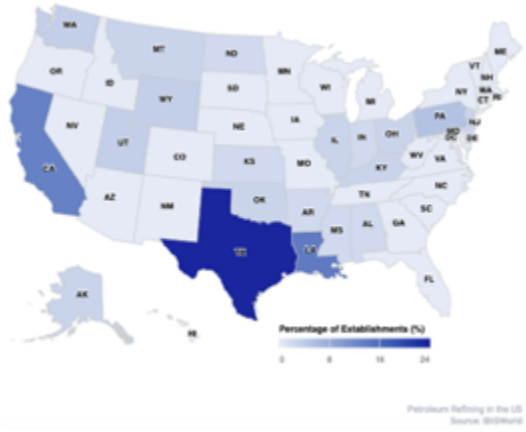


Exhibit 10 (Rodriguez, 2020)

Marathon Petroleum Corporation (US industry-specific segment) - financial performance*

Year	Revenue ($m)	Growth (% change)	Operating Income ($m)	Growth (% change)
2015	64198.0	N/C	4086.0	N/C
2016	53817.0	-16.2	1543.0	-62.2
2017	64691.0	20.2	2321.0	50.4
2018	82599.0	27.7	2481.0	6.9
2019	106742.0	29.2	2367.0	-4.6
2020	75845.4	-28.9	-1550.5	N/C

Source: Annual report and IBISWorld

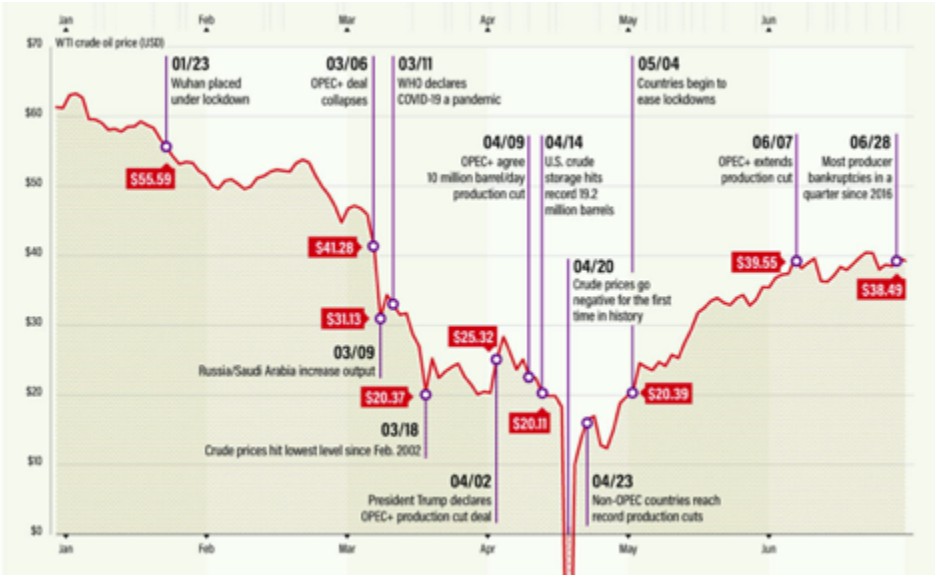
Exhibit 11 (Rodriguez, 2020).

Petroleum Refining in the US 32411 August 2020

Industry Financial Ratios

					April 2018 - March 2019 by company revenue		
Liquidity Ratios	**April 2015 - March 2016**	**April 2016 - March 2017**	**April 2017 - March 2018**	**April 2018 - March 2019**	**Small (< $10m)**	**Medium ($10m-50m)**	**Large (> $50m)**
Current Ratio	1.5	1.8	1.4	1.5			1.7
Quick Ratio	0.8	1.0	1.0	1.1			1.1
Sales / Receivables (Trade Receivables Turnover)	25.9	16.6	15.6	15.0			17.6
Days' Receivables	14.1	22.0	23.4				
Cost of Sales / Inventory (Inventory Turnover)	20.0	19.5	22.1	21.7			22.4
Days' Inventory	18.3	18.7	16.5				
Cost of Sales / Payables (Payables Turnover)	15.6	17.5	15.2	13.9			13.4
Days' Payables	23.4	20.9	24.0				
Sales / Working Capital	22.1	14.0	30.3	18.8			25.9
Liabilities, %							
Notes Payable-Short Term	8.1	5.1	4.7	6.3			7.5
Current Maturities L/T/D	2.4	1.8	2.7	1.1			0.7
Trade Payables	19.0	14.9	21.0	20.7			25.1
Income Taxes Payable	0.1	0.3	0.7	0.4			0.3
All Other Current Liabilities	8.5	9.7	8.6	6.8			6.6
Total Current Liabilities	38.1	31.8	37.7	35.3			40.2
Long Term Debt	19.6	12.3	11.8	11.3			9.2
Deferred Taxes	1.2	1.1	0.2	0.9			0.9
All Other Non-Current Liabilities	2.2	2.4	8.4	6.7			8.8
Net Worth	38.9	52.3	41.9	45.7			40.9
Total Liabilities & Net Worth ($m)	1,424.1	1,641.9	1,718.6	1,478.1	3.4	127.4	1,347.3
Maximum No. of Statements Used	31.0	31.0	25.0	27.0	3.0	8.0	16.0

Exhibit 12 (Haynes and Boone, 2020).



Interview Questions

Interview 1-- Executive VP of Operations at an energy products and services company

1. Can you walk us through the general process of oil extraction, refining, and distribution of a final product?
    1. Industry has 3 segments: upstream, midstream and downstream. Upstream-operators go out and drill for and produce oil and gas on location. Can be independent, or integrated. Usually hire companies in the service sector that do the construction.
    2. Midstream-gather oil and gas from the wellhead, then transfer it to the end-user. Usually get processed at a refinery of some kind first.
    3. Downstream-do refining and processing, make it into marketable goods. Sell the refined gas to third parties or retail outlets.
2. How do you see Covid-19 progressing the push to clean energy alongside tech dependency?
    1. Energy was an industry that was hit heavily, demand dropped by 25% and the industry shut down. Led to oversupply and under demand. Still have to run day to day business which is harder with covid protocols (i.e. remote, masks, etc.) Must do extensive testing before going offshore. International travel ground to a halt. Lack of travel has made it difficult to keep up a global industry. Both macro and micro impacts.
    2. The general view in the energy industry is that you must have a balance of all energy sources. Lower prices slow down the transition to clean energy. The challenge of that transition is that different uses of energy don't always match up with the sources. Example wind doesn't really translate to car energy. Oil and gas is likely to remain an essential part. The process takes a lot of time to occur realistically. Low prices make conversion harder as they change the demand.
3. Do we have the means of technology/funding available now for a sustainable infrastructure worldwide?
    1. No, not really. Little money has been spent on sustainable infrastructure. Much has not even been digitized. Need to find a way to store energy which is hard to do. We probably should have emphasized natural gas rather than crude oil since it is cleaner. We're gonna need to do lots of spending.
4. What domestic effects do you see with a fall of traditional energy, due to our dependency on the oil industry?
    1. The traditional oil and gas industry has done a lot for our domestic economy. Lots of jobs have been created in the sector and it drives a lot of business in many areas. Have largely become energy independent which has loosened our dependence on the Middle East. COVID has made these benefits less impactful but it will remain important.
5. What current innovations are you excited to see future effects from?
    1. Drilling down and dispersing in different directions to maximize extraction.
    2. There have been tremendous strides in the fossil fuel industry in efficiency and safety. Examples include pad drilling which can produce 12 wells in a

small space and drill down and across to drill through a single localized purpose. A lot can be said for renewable energy as well.

6. Do you think Covid-19 has merely accelerated changes that were inevitable or do you think that it has fundamentally changed the industry in a way that never would have happened had it not arisen?
    1. Changes have certainly been accelerated. Covid has been a Black Swan event that nobody could have seen coming. Market collapsed in around 45 days. Companies have been forced to strive more for efficiency and profitability in order to survive. Many of these changes will end up being permanent. Massive consolidation is occurring. Will ultimately result in sustainable and profitable growth in the long term as companies adapt.
7. In what ways has Covid-19 been beneficial for the energy industry?
    1. Same as the previous question. Lots of adaptation has forced companies to strive for efficiency. More flexibility and time saved on commuting. Lots of reevaluation and reinterpretation has forced cuts of superfluous things. It will be interesting to see how things change if/when things settle down again.
8. In what ways have government incentives helped/hurt your industry? Do you think they will have a profound effect or will it be something that companies/individuals need to undertake more so on their own pretense?
    1. The CARES Act changed some of the tax code leading to recovery of a substantial amount of money. Unemployment benefits have incentivized some individuals to start working.
9. How do you monitor legislation to consistently maximize output?
    1. PESA is a trade association that helps monitor the legal/political side of the industry. There is not one political leaning that dominates the industry like many believe. Regulation is not something we avoid like many assume. Climate issues are important and we do our best to keep that in mind. Banning of fracking could change things up. Supply restrictions could actually have an economic benefit. It's very much an essential industry that impacts all others. Fracking is a lot less dangerous than many believe. Factual conversations could benefit this problem significantly.
10. What are the major risks for participating in the fossil fuel industry?
    1. Several layers of risk exist, but it separates into above ground and below ground risk. There's always operational risks which include lots of logistics and capital investments. Finding oil is not the whole process. Gotta have solid business models to be profitable and efficient. Certain countries can't always profit from the oil they have given their business models. Risk analysis is very important. Can't always plan for every risk like COVID. Try to be as healthy as possible as a company to prepare for risks.
11. When your organization has required effective leadership in crisis scenarios, what characteristics have stood out that have proven optimum response from employees?
    1. To provide effective leadership you can't just start the day the crisis happens. My style is being open, honest and accountable. Communicate

often and play to everyone's strengths. Develop that trust so that when things do get bad you can still work together to get through things. Definitely remain calm and focus on what must be done. Wrong decisions always happen.

12. What role do you see the government playing in the push to cleaner energy and what role do companies and individuals play?
    1. Clearly both have a role here. Legislation is what really forces social change rather than just society itself, and that's where government plays a role. Political aspirations don't always benefit the country. Government is really who needs to drive the change. Need to understand the goals and map the process to get there.
13. We've seen some overall revenue declines in the industry as a whole from 2015 to 2020. How has this affected your company and what do you think it means for the industry as a whole moving forward?
    1. Business is very cyclical, often called "self-correcting" because the prices drive the industry. Things were going well till 2014 when OPEC decided to flood the market. Recovery began, but was a lot slower and will continue to be gradual. Led to a flattening of the market. Overall things will be okay, they will just take time. These cycles play out differently but overall have lots of similarity.
14. What recommendations do you have for this industry moving forward?
    1. Investment-wise the industry needs consolidation to truly be a mature industry. Certain things have just changed and things need to be let go. Lots of growth is happening in the non-traditional oil and gas businesses. Lots of specific practices can be made more efficient, safer, and environmentally friendly.

Interview 1**, Transcript**

All right, we're going here. And so we have about 14 questions or so that we can go to the score if we can and we're all taking notes, right so I'll get out of there so I can start.

Yes, sir.

I know we all have out. We also we all wrote Our Own Questions like a different question. So how about we each ask a question we were out so I don't know if you guys haven't pulled out but I just have to list.

So the first question we have is can you water ski like the general process of oil extraction refining and then finally distribution of the product. Sure, I go through the basics and if you want more detail and half.

Broken down into three segments or three buckets. If you will the Upstream Midstream and downstream.

How's that for a very exciting nomenclature there? I did work for expiration production operators for a big part of my career before going to Allstate's The

Operators are actually the ones that go out and and drill for fine drill for introduce. The only gas on location. Now that can be a small independent companies. They can be integrated companies.

Great companies have both upstream and downstream operations. That's the big names. You heard on Exxon Exxon Mobil where they have both the properties of producing properties and sales and the service stations the retail so they span the entire distribution chain play in the Upstream sector. Variety of responsibilities if you will it. It depends whether you're talkin onshore us offshore operations International operations of the international operations. Obviously have a national oil company. That's a that's essentially a segment of the government itself who produces the reserves and their particular country, but I'll talk to her that you asked for talk in person and gas they drill the wells and actually produce it.

To do that they typically hire companies in the service sector construction guys for like we're the ones that helped them drill the well and we have the rig certain certain companies have the the completion side of the well where once it's drilled you got a complete it get it ready for production and then they actually ties into a gathering system so that the Upstream piece and a very simplistic view is the companies that actually gather the only gas from the Wellhead. If you gather it up and then transport it to whatever the end-user is, you'll both oil and gas typically.

Processed before going to their end users.

So the beetle gas plant or refinery in the case of oil actually transport the goods to the downstream sector old one they do the refining and processing to take the raw materials for the process of oil into the various products gasoline diesel jet fuel fuel oil whatever whatever the need is and then they ultimately sell it some summer Vine or something and sell it to third-party Distributors with your kind of the sum of the No Name gas stations.

You see up and down the road if you will, but some of them go

refineries to retail outlets for gasoline airports for kill, Fairfield and then and then Whatever whatever the End Market is. So those are the three natural buckets of the industry itself. I got this great.

It's our next question is obviously like we said the products boxing a lot on the Covenant packed on industry. We know covid-19 like, you know, it's been a lot of us could still take a lot of changes that were either going to happen by them up or you know, just made changes already know. How do you progressing the push to clean energy alongside Tech dependency?

First of all energy was one of the end.

Is that almost directly?

Whipsawed by koven for a couple reasons first Alda man dropped dramatically by 25% So I'm driving the flying industry shut down. So that really knocked demand The Band fill more quickly than falling.

So obviously oversupply price graders at the light. So you've got to be the impact of the overall demand drop and he also complicated that is the you still have to run the business.

It was told me wish the day today National Business and stuff.

You've got to face the same challenges every Goffstown sax working in the mascot.

You know, we got people working remote. It was never work remotely before.

Offshore operations, you can imagine it's got to be kin to the creation. You got to do extensive testing make sure people don't have covid-19 to the very tight Quarters on and off for a platform Rossmoor.

Rig international travel just stopped ground to a halt and of course, the only gas business is very much and international business crude travels the world as I recently fungible commodity macro side, but also the just the day-to-day business side for one gas.

You know how well that will accelerate the the Tran to either Alternatives or or whatever.

The last question is.

I think one. Everybody telling her story sometime to meet the energy needs. You got to have it all the above. Plus when you got to have altered you going to have fuel and you got to have solar you got to have when you got to have geothermal. You've got to have nuclear to balance it out that you've got to have all in cash to do that.

So I do think they'll be a push for that certain ways low prices slow down that transition because as the cost of only gases lower is much more cost effective to keep using hydrocarbon-based. the challenge for that transition if you will. you know, there are a lot of

directions to transition over a 20 year. 30 or whatever you want to do. You have sources of energy. And that's to do some research on this but the overall source to supply all the wind transportation and transportation.

It doesn't wind doesn't impact Transportation very much.

Even if you convert to electric cars and such a small piece of the overall pie, even if you left your car is like their vehicles bro to the extent.

We think they will.

Investment. Austin California electric vehicles. That's great for support that California's grid.

I am proud rolling brownouts now, they can't. The grid won't support the power needs today for to air condition the state to provide the electricity for the industrial side to charge electric vehicles all across the state. I mean, it's just it's a very slow process and and while you know, there is a bit of realism that has to be injected into it as far as the overall process to get us there.

You have such a traumatic hit to supply and demand it for your time, which is probably true. Low prices are not they make it harder to convert to other sources.

Jeff.

The idea of electricity is going to be raising a nobody wants to do it more but the actual process is still dirty crude oil because of Hachi. I think it's two-fold. I think the price definitely drives the demand side of it. It's kind of math in that right now. Oil and gas hydrocarbon-based fuels however, you want to describe it or such a big part of the power source.

You can also then say okay on the power needs. We're just going to convert all that electricity and say that's going to go away in the math just didn't work. You don't have enough power sources to drive how where the power is needed. And I think that's fine too ill to look at that. We did constantly look for cleaner fuels. I just think it's a complicating Factor.

Yeah for sure. I thought about taking next question.

Do you think we have the sustained in the future support for it? If it were as we got a date, I think there's been.

There's been very little infrastructure spending in the overall scheme of things, all Industries, which is electrical switchgear company control systems for the power grid across the US heading to digitize yet. You don't much less have the capacity to it. You got to figure out a way to store energy energy on power lines. Is it stored it?

It's that reduces its efficiency. So no, I think there's a massive spending. I think I actually hindsight's 20/20 when? Yeah, we have an abundant resources of natural gas here in the United States. I think one of the best things that should have been done or could have been done would be natural gas filling station all up and down the interstate system. Curry Burns cleaner than wood wood burn cleaner than dog means of powering investment in infrastructure. That would have really had an impact on climate change.

Had that conversion.

There has been tremendous strides that an industry telling story and that probably what we do what we do terrible job both efficiency and safety. It's

amazing. I mean for example mus on Shore the US Shale plays revolutionize the way the business works by actually going to the source Rock of the hydrocarbons it led to the Advent a pad drilling, you know, if I've ever been to a Well site. Phone number West Texas probably smaller than half a football field.

Are you drill down seven eight thousand feet and then drill at 3. My lateral in different directions to produce all the only gas up to a single localized point is huge at it it prevents in a lowers the footprint on the surface, which is good and hit it makes it more effective more efficient to produce. Same with offshore. I mean the the the safety and the efficiency of the drilling offshore and production offshore has the same type of improvements ever seen.

I don't know as much about that. But I think the answer is yes. Let me and you see ya wind farms. I think you seen advancements and solar there their new technique to allow the solar be more efficient than the way the mirrors are positioned to capture the maximum energy things like that. So yeah, I assume there been similar type improvements on on the hillside and I think she skipped over question here.

So I'll go back to it. So what domestic effects do you see what I'm Paul Traditional energy due to our question reads. What domestic effects do you see with the fall of traditional energy to do our dependency on oil industry?

Do you see with a fall of traditional energy due to our dependency on the oil industry?

Yeah, I think it's been very beneficial to our country is in a lot of ways. First of all, it's a great job crater at the end of the day. You got some graduates are all looking for jobs to do what you want to do. Try to decide the best way to for you and your partner to provide for your family going down Road, and that's what everybody's If everybody is driven by that.

Business over the last fifteen years. We essentially energy independent. Doesn't match up exactly. But look at the political impact of that. We're no longer dependent entirely on the Middle East has the world traumatically and no simple answer each.

If you look at it now where the price of small in the industry collapse do the Cove in Decline.

We talked about it.

We're a smaller part of a portfolio. You see any Index Fund is now kind of 1% energy. You used to be 10% energy now, we got to get back for investable. We got to get back and I've had to lay off 45% of my work for

And everybody else is going to be taking pretty significant pay cuts in order just to survive through this downturn but it's still an important part of the country. The 19 has merely accelerated changes that are inevitable or do you think it has

fundamentally changed your industry in a way that you don't think for the prison without it? It definitely accelerated it. There definitely are fundamental changes as well. So like I said you have a

Once in a lifetime event that you don't see coming or not. You know so that you have that dramatic point where you know are the market has collapsed. You could look at it be forcing companies to be more efficient if forces to look and see okay. Well if we're going to be in investable security going forward two people can fire spot possible and we can't just ride the Cycles meet proper when it's good and when it's not

It was a gut-punch and forces to change the oil and gas business you're seeing massive consolidation on the operator side ExxonMobil EOG. Pioneer and parsley there more in the last two months, you'll see that consolidation on the sector side as well. So it will be a little Force change as that as an industry matures. you got to be a fairly positive guy to be in the only gas business cuz it's

I figure we're putting that it for now. I think they can touch. Our next question which was how covid actually has been beneficial for the industry.

Gas business working at home. I'm fortunate. Can working all day long I was at the end of the day. I think people are still searching said enjoying the flexibility. It's a learning curve when you when you work at home. You ain't got to get away from it. She got to do it, but it's downtown.

I live in Houston easy commute. My kids less than 30 minutes each way. But if I work at home for a week, that's 5 hours a week if that's what you guys know, what time and how much like you guys are drunk on a lot of schedules to look at. You know, what it takes to to rather visit there. Probably some things we always did just cuz we've always done them that did Nursery add value. And when we made, you know, I'm not willing to cut our program and we should people in dangerous situations and we're kind of unusual because of that regard or Ashley.

Then they were springing up everywhere Franklin we push that.

Yeah, I think that's true of like, you know, a lot of things are. You know, if you need to one industry, I think we're seeing a lot of things just about did the work as a whole.

Business have to have transport goods are just isolate the the impact on the oil and gas business itself.

But you know, I think You say when you when things recover after cold?

Be as readily adopted as it was before dinner with as it gets better or people can be okay. We're going back to work, but I want to ride a crowded bus ride. I want to drive own car. So it'll be here soon to see will people's assessment of that risk, will it change their behavior that may actually be counterintuitive to just the safe

continue reduction the man that we've seen since two words a little bit before you get back into that progress made on the overall reducing your carbon footprint.

lyrics

Like government incentives or is it something that companies is going to take up more personal approach to? employees during this time I think the government incentives for Being able to carry back or net operating losses Brothers carry on chords. So we're able to men's returns care of that in a while back. So the timing issue by doing that we were able to recover of a reasonably substantial amount for us today rather than over future years.

Scale farm Toys R Us got an interesting because the we went through a massive reduction in force, but since some of the money that were being offered people say,

Flip pikmi I can make more money if I'm unemployed then I could I swear that's that's a little counterintuitive because I want to talk to a guy that may be there for a month or two months, but we actually had a few people that you know, what's best for the company. That's what we're paid to do, but can't work. Relationship I've heard that added only but we experienced.

Yeah, I think a lot of these next couple questions are swerve on that governmental side. So what is the process? You know, we know that there's a lot of political talk about the energy and change to clean energy sources and stuff. Yeah, just in case I

forgot her what sort of how what is the process, you know for your company and you yourself for monitoring legislation, you know to see how it's going to affect your business in the industry is whole and such a trade association called a chair that years ago.

So it's a good trade Association. That's one of the kind of benefits of value out of that membership is that they help kind of monitors in the old Franklin has been in the news so much. Everybody in the only gas business has one for the political affiliation with the other relevant.

I think the business is an environmentalist all my

guys there the biggest Outdoorsman.

Which is a

petroleum equipment and services Association membership is that they help kind of monitors in the old Franklin has been in the news so much. everybody in the only gas business has one for the political affiliation with the other relevant, but I think the

car business

Arizona gas business is an environmentalist at the end of all my guys there is a big ass Outdoorsman you can imagine, you know, they love and so

Great lakes that consistency of the room. Some of the changes, you know, there's possible Neil Banning of fracking on federal lands, that could be a possibility Google map of federal lands. You realize his kind of the western half of the United States has the Permian Basin is the biggest Basin in the country the New Mexico Porsche that is nearly all on Federal Land. So it's a huge butt It's funny. I have this debate internally with work love you'll go. Let's just be class our business operations, but right now

Titan Supply a ghost that mismatch before I mean, they're those who think our industry all to be shut down. That's fine. I don't share that opinion, but he couldn't if you wanted to at the end of the day, I mean the the entire economy would collapse without it. So it's said people need to have a dialogue have a conversation based on facts, you know, there's a lot of people anti-fracking when I get that I guess butt crack has been going this country for 80 years, you know, most the fracking talk about is done about half of Rock. The first race is extended best, you know a hundred feet, you know what I mean?

Don't let the facts get in the way of a good story. I mean that's sexual conversation What are we trying to succeed and you can keep the environmental environment clean?

So much you're going to go out of order little bit here. Just cuz I think you touched on some of what this question asks.

Yeah, I know.

Touchdown this year, but if there's anything you want to add a government playing in the score for the world, do you think companies and individuals have in that as well?

I think it's both I mean clearly. as much as Philosophical here as much as we like to think societal changes comes from society. Ultimately. It's legitly. That's what forces change if you look at anything that happens and then there's there's some legislative change that that kind of triggers. A process from there and so the government definitely plays a role in this of the challenge when the government gets involved. political aspirations

Always mirror what's good for the country?

I know that's a very fragmented industry owns all the reserves the downstream in Saudi from the service side, but they control that old business from Soup To Nuts production Downstream companies all of whom have to act in the Rinconada country show.

and then where you are and where you want to be then mapa a reasonable process to get there.

I think legislation does accelerate things sometimes but you can't just demand. Which one of the questions is what are some of the major risk of participating in the fossil fuel oil and gas market?

I think it's probably several layers for the rest, but Play the best way, you know that there's the above above ground risk and below ground. Rest of you. Look at the risk of the business. You got to have the

42 have seismic work to look.

2 miles below the surface of the Earth shoe size make Pine the reserves find the one to ask and just the Practical complexities and technicalities of drilling a well hitting the reservoir for dishing it so that the risk associated with that overall business in the in in the investment required to do so, so that's kind of business. I think the above-ground think we talked about the best oil and gas reserves out there to sell it.

You've got to be able to know what's the tax came around after you make any money you got to track vester's can you do it environmentally friendly manner or are you going to do all this and then have the legislative risk for the tax rules completely change and impact freakonomic analysis.

To perform when you went into the business Shell oil shale the best rock and some other country because you don't have those. You don't have to if you don't have the ability to produce your other abilities. That's the above ground rest at all. Those kind of have to line in order for the for the Investments to make sense. As any company would Enterprise risk management is the buzzword I guess.

Why didn't why was that a risk of anybody's chart? Plan for what happened what happened? And so I think the way you at all times and quickly have that flexibility.

It's about a little bit about things like leadership and stuff and we always talk about this again with the riskier effective leadership in the crisis scenarios. What?

Styx really stood out that a proven Optimum responses.

In order to provide leadership through a traumatic event like Cove in you clearly can't start bleeding the day. It happens. You've got to exhibit that leadership throughout the throughout the throughout your your time as a leader whether it's as a supervisor or manager or my case price of a division or re VP of operations overextended my basic leadership style is pretty straightforward. I'm open and honest with my guys and I hope my cannibal I communicate with them often so so I know kind of what they're doing. I don't run their business. That's what they get paid to do. I'm not a technical guy didn't grow up in the oilfield.

Thank goodness. Otherwise, we wouldn't be successful at all. You got it about that trust so that when it does hit the fan when things turn bad, you know when I talk to people and I had several town halls with different regions around when

things are falling apart and I think I develop that it's a look. I'm not blowing smoke. We're going to get through this we're going to we will not all be on this call six months from now because our groups that be a lot smaller, but you know, we're going to we're going to do what we need to do to survive and thrive going forward. Email for me.

but I never really Ching to get rattled, I mean there's a sense of urgency clearly, but but you got to have that. Okay. This is what we got to do some wrong decisions. I mean, I'm sure we did some things that either we we went too far and are Cuts or some areas.

We didn't go far enough.

We should have we know we should actually be clown three of them try to keep their everything for it in the right direction stuff. Communication people have to realize that you're on the team.

rocket science Salt Lake this next question since this was part of what I was working on here. So we did a lot of the financial, you know, and I'll see if hear a big thing. I saw and Trends up for the 2015 to 2020 which is overall Revenue declines in a lot of Industries oil gas. So I'll learn stuff that was very much a trend. That's all of those 5 years. So I don't know if that's true for your company. But you know what that's where things go on the industry. You know, what does that mean for your company? And I guess what is how does that affect?

You know, how do you move forward in business I've ever seen for high prices for low prices.

Capital floods and the supply side grows and and the price comes down the definition of 20/20 you would have found a different story. 2010. He found the development of the shells start out the gas side and then oil and so from 2010 to 2014 Hall of Business is just OPEC that decide to flood the market the market began coming down in 15.

16 was really add up here to just as you came in.

Slower inclined less inclined florist lower slope going forward instead of these real steep amplitude.

You began to see this kind of flattening of the markets. I think that piece of the Spheres you looked at was actually kind of the slope of a cyclical business, but the lack of investment on the only gas side will too strict Supply demands going to come back when covid passes when the economy starts to open up continue to improve on school work.

They're all the excess inventories and the price of oil go up.

Samsung 3000

Closing thought is just overall. What recommendations do you have for the industry that you guys are obsessed with that being honest with everybody but I guess just looking bigger picture. You know, what what do you think of other companies should do to kind of find some more success? why there is to fold I think from Prominent Point before the industry needs consolidation you are if you're doing this, but what's the best kind of the definition of a mature industry you start seeing that consolidation cuz you need fewer players to survive that the market. I think that's where we are. So we need to consolidate you need to realize that there certain piece of the business that is change. So you just need to jettison those businesses.

value want but their distraction what you do so from that either step out or grow their non-traditional and gas businesses as we got a military products group that we have any last words group of rubbers group that we have. We sell supplies to the US government for nuclear submarines Anthony around on. Goods I don't think any of you get a shot for that type.

Russia Fox Creek, we have a lot of risers that go from the seabed to the two production platforms for deep sea operations. Well a lot of that quickly on the seabed cuz the mechanism for the same process for an offshore wind farm. So you're still attached in some some big ass cuz it's pretty cool with the examples of the changes. If you look at the the minerals required for battery storage. You know, there are the rare earth minerals. If you will, you'll most those are produced out of China and those are not every battery every letter.

Well companies that are mining those just off the seabed and if you think about it, they got these robotic.

Roombas for life of need some way to rise up here to bring that stuff to the surface and that's what we do. We actually have some kids out and the Roomba.

Vacuuming up the seafloor, you know to mine some of the of the raw earth materials up on the surface without going to China without a footprint.

Are companies like Baker Hughes, which is pretty well-known on field service company that are really transitioning to liquefied Natural Gas to alternative energies out of that transition is the buzzword you hear about today. Do you know they're kind of pull on embracing it? in a British Petroleum BP if you look at all their stuff is beyond petroleum away from the gas but a transition not going to happen overnight either so are the guys that mean that was the last of our questions are usually thought of as

Christian Park Zoo while there are things we need to do to improve without a doubt. It is entirely different industry today than it was when I joined a graduate from Southwestern and from what I started work 20 years with somebody else. It's an important business. It is the industry that drives all others. We got anything we do appreciate you taking the time to really learn more about a business.

Bakersfield, so I see a bunch of

time with us, so we got a lot to get info here and I think you know, I definitely can see why Darcy insist we do to

get back on the phone or respond with notes

making all that in case you're curious of what

That's good, that's a good afternoon. That's absolutely great weekend. Take care cool.

Interview 2 -- Dispatcher at company involved in transportation of drilling equipment

1. How does your company fit into the supply chain of domestic oil?
    1. Involved in the assembly/disassembly of drilling rigs. The rigs they transport begin the process of extraction, creating the hole in the ground. They specialize in trucks/trailers and cranes with overweight, wide-load capacity out of Ventura and Bakersfield, Ca. They do work up and down California as well as some jobs in Nevada and Utah. There are multiple companies involved in the drilling process with independently contracted specialties such as the following: ground levelling for safe construction, transportation of equipment, operation of equipment, working on equipment if failure occurs, overseeing/supervising safety protocol, and many in between.
2. How far domestically do you guys operate?
    1. Answer in previous question, but other companies will do long distance or out of state jobs. This just complicates things with contracts/weight of loads across state lines as well as diesel cost with proximity to the job site. Popular regions are Texas and North/South Dakota. Previous experience was a company that hauled more specialized oil tools and equipment on-site versus the 100,000 lb rigs in operation he deals in now.
3. Can you tell me a little more about your regional relevance being out of the West?
    1. Companies in the industry are regionally located due to proximity of oil drilling sites and oil supply. However, bigger companies have traveled from their headquarters to establish practices in these hotspot areas. There are locations in Bakersfield due to vast oil operations there, and nearby Ventura with access to ports at Port Hueneme and off-shore drilling sites in the Ventura/Santa Barbara area. The port is a huge demand with their crane operations loading/unloading cargo and tanker ships.
4. What are some more of the moving parts between extraction and refineries that you know of?
    1. It’s evident intense weight-driven transportation is required in each step of the process. The particular companies involved depend on the end goal for the crude oil. Certain firms handle petroleum products like plastics or

rubbers, while another will do the gasoline, diesel, or oil. While they transport equipment, another company drills the hole for extraction. Tankers and railcars are often used in transportation. These big batches are normally for fossil fuel purposes. There's different types of specialized refining for different types of products.

5. What other pieces of the industry do you guys partner with?
    1. *We* do a lot of contracted work for drilling operations around California. Other companies are on-site for inspection of pipes going in the ground. It takes an individual company for each step of the process from crude oil in the ground to a refined petroleum product in consumers' hands.
6. Cranes can be an unseen cost to some looking at the field. What are some other sides to equipment and transportation people don't always recognize or think about?
    1. Nobody thinks about the wear and tear on the equipment. It's 100,000 lb equipment being hauled excess miles on rubber tires. Sometimes on site the rigs in place are too heavy for one crane to pick up and handle. Two cranes handling a rig with off-balance weight distribution can be a nightmare if you don't know what you're doing.
7. What impact do you see equipment in drilling relying on diesel for its relevance in the future? As well as grease and lubricant products.
    1. The huge equipment involved throughout the oil extraction, transportation, and refining process all depends on diesel for power and grease, a petroleum-based lubricant for operation. Looking on a larger scale, with the introduction of electric/lithium battery power the minerals involved in production are drilled out of the ground just like crude oil. Even with electric powered semi-trucks for hauling, all plastic pieces of the vehicle as well as all lubrication is still petroleum based. These food hauling rigs needs diesel powered refrigeration so food doesn't spoil, even if the overall truck is electric. These drilling sites are also in the middle of nowhere where they rely on diesel-powered motors or generators for all their energy, regardless if electric components were integrated or not. There isn't enough energy supply in the middle of nowhere where these drilling sites are.
8. Do you see consumer plastics and other daily petroleum products ever disappearing?
    1. Even with driving down, and traveling down it isn't zero. No-contact delivery still uses petroleum-based grocery bags. Plastic is everywhere. While renewables will be introduced, the immense demand will need plastics and oil-based products regardless. Axles, plates, and bearings will be greased forever. There is no alternative currently.
9. Has Covid changed anything in your day to day job?
    1. We've been in the office despite the pandemic. A lot of the communication is phone calls/email so that hasn't changed. Hand signatures and in-person inspection of loads/trucks haven't changed. Despite some distancing and masks the hand signatures and face to face okays taking trucks to the next yard is the same. Paperwork flows from the office, to the

driver, on-site signatures, back to the driver and office. The industry in general has slowed, but transportation and cranes have stayed steady.

10. Have you heard of any innovations in your field towards renewables?
    1. Not currently in our yard. Traditional practices are constantly in demand, so time for innovation isn't always at the forefront.
11. What insights do you have on biohazards involved in the transportation of oil?
    1. Any time a tanker transports oil the risk of a huge spill is on-hand. This contaminates water supplies and can be an absolute mess to clean up. These tankers can have 100s of thousands gallons of oil and one stint in poor weather can disrupt their path in the middle of the ocean. This gamble with international oil spills has proven the benefits of a push for domestic oil all around.

Interview 2, **Transcript**

Hey how's it going? I'm ask you a few questions about what you guys what you guys got going on and see if you could help us out a little bit on our a Capstone project domestic oil and gas. So I will go ahead and get started. Our first question is how does your company fit into the supply chain of domestic oil? Can you track and train is a crane company as well as the trucking company? That specializes in moving and moving drilling rigs. The we are on the Forefront. in the whole process of we move the machines in the equipment that drill the hole in the ground.

the process finding oil drawing the whole gets the oil that starts the whole process is so special products that are geared towards moving oversize loads. Most of this equipment is very heavy at times. So therefore we have large size cranes in Northern, California, Northern, Nevada. And as far as I, Utah. Wicked clean moved everything in California junk everything but a majority of

One particular company kinda drills drilling rigs crop at in California ass. Where's our other line states? Oh in that. It takes multiple trucks mobile trailers. Michael the pin pon or the location is from it where it's at and words point two. These are wrong. Days with multiple different is not just our company involved better. I guess that are all involved in the drilling process so we move all the necessary items that are required for whatever size drilling rig it is to drill the hole as well as their drill pipe.

Their beauty equipment that has to go in and get serviced and then take him back and all this multiple different things that we take care of. As far as what it takes to make where the word all starts from. Sounds good. My next question was how far you guys operate be touched on that just California up and down, Nevada, Utah, but the majority of California's operations go to California where dreams are trucking company. it works better trucking companies that will call sings long distance. Amarillo, Texas and North and South Dakota areas, so

previous trucking company I work for Biltmore in as far as the LTL, what's it limited truck load stuff that is pretty much was hauling equipment for pieces that

or manufactured here in California that go to other states. Required for drilling rigs just the miscellaneous light to ring and equipment. Are the parts of that? As far as getting before getting too detailed and not getting the right information to you guys. There's a lot of equipment that is produced or manufactured for drilling rankings and Specialty tooling and stuff like that.

A county, in the outlying areas murder or lawyer is driven up, really count early area that have deterred areas to buy dot. The I used to do is since sin. I'm the cook pretty much. Just specialty drilling equipment all over the place where I worked dealer companies, but now or work now is just primarily moving the drawing rigs with our trains and stuff like that and trucks when needed. So would you say is a lot of relevance. Just come with a lot of geographically. I was originally gonna do on the sites. You have to have trucks and equipment in that area in a widow widow sites are, and that's why allow those companies are originated kind of regionally together own primary.

origin for their big companies that are from other drilling areas that stuff moved into like the Bakersfield area or that go to other areas that drill for oil and stuff like that it's a drilling company that I think I think he is drunk every that's in California that has a bunch of different size rigs in California that we We move. Just asked what I mean. There's other companies that move to but they're like originally from Oklahoma or somewhere back in that area. That's where they originally came from and they have stuff going on back there to take care of here in California. Do you explain a little bit more than moving Parts between extraction and and moving?

refineries Dodgers to your knowledge go to my knowledge as far as test on what we do as we move drilling rigs from point A to Z. once I think the hole is drilled and then it's I guess it's blocked off and then the construction companies come in put pumping units on a tire that pumping unit into. their system of where they pull the pulley oil from and ship it to just on their location or in their area on their lease on their oil these From there goes that I think I don't know if the refineries process starts there. Or is something else transpires where they started finding it there and then it goes into Weatherby tanker truck or rail cars.

Rail tankers and then from there get shipped out to other refineries to get better refined for where it's gonna go and what it's gonna be used for. Ah. Is transportation along? Every part of it never ratified it. It just all depends on what that oils kidding. What? What is where it ends words? English English is good majority. Stuff here. Thinking in our area, Baker so is more geared towards I'm probably feel fossils. It's it's going towards being a fossil fuel. Think it's. It's own answers. The area? I think it depends on. I think there's different oils from different parts of the country and stuff like that that are probably used in different products firm in that. It's all gone.

It's worth all ship to different areas to be refined different. And then I think the refining process. Which product goes to which refining process determines what items it's used for? turn into a plastic ball towards turn into a plastic battery

container for your car or Something like that. Movin On going to look at it. Just kind of other pieces that you guys partner with you kind of touched on that so we can continue to I was thinking about how cranes and you know, some of the big equipment is something that people can Overlook, you know, they can focus a lot on like extraction and going to say, you know, what goes here and goes there but

Realize kind of a complex city of the big equipment and heavy loads like you were saying so I was going to say what are some like I'm seeing challenges that people don't always realize go into the transportation at its equipment. How's the weather in church takes on the equipment? I mean you have a Crane that's over a hundred thousand pounds just as itself that has to drive down the road. That is got I mean Rubber tires. It's got a big diesel motor in it. It's got you know, it's got all these moving Parts. It needs oil and it needs grease and it needs diesel fuel field. Go from point A to point B, whether it's Doing it weathers moving a drilling rig or if it's just going to sit in air conditioning unit on hospital. So I mean is that crane counterweights to get to its job and do what?

Needs to do. Some of these loads are so big and so heavy. Where are these drilling reports that it sometimes takes two cranes and they appear to claim picked to be able to set up in the urge to disassemble and assemble the drilling rig that's gone out there to draw their on ground to find oil, that's gonna create all, but you know it's gonna start the supply chain for Moby already talked about so it's overall and tear in the long run away in live bigger than than they realise? Yeah. I mean, people see em and they get shot now. Oh my God. How can you get agree on? Get in and wait isn't exactly evenly distributed without equipment either eyes. I remember you talking about how you know trainer. You know, so being grounded because their arm has to hang out and pick up some much weight you know extended.

On the base, right? So that's not getting into too much detail. But if you if you hold your arm up. 90 degree angle near you have to think of what are you going to do to be able to hold your arm up like that just the way it has to be and you have to have a force of counterweight on one end while it's you know, if you have all that you have your arm is sterilized before being referred to as of the Boom at this point, but You can't go pick up 150000 lb with a crane that doesn't have the kind of way to do it, but that's kind of just getting to typing too far and depth in the crane stuff. But there's you know, the crane requires its amount of equipment itself as a machine to move a drilling machine that drill in the hole.

I mean there's a bunch of other products and other the whole site are on the site each site, you know, all the people that are working the site that are working on a drilling rig or they're the supply companies for the drilling rig theater. Supplying all the either, you know the Mud Equipment or the drilling fluid equipment. That's the same thing by the drunk fluid if you want to go in through and thought out but drilling fluid equipment the Drilling Fluids, you know, that's all one company handles that and then there's other there's a inspection company that does inspection on the pipe that goes down when they're that's the pipes that they're using a drill the hole with hundreds or thousands of feet sometimes of different.

Diameter pipe with different to lean on it and stuff I dad in helps stabilize the string of high but all the way down the ground Union, and if they get down there too far and we hit something and they get stuck there too. There's all these different types of processes, Titan they you have to go through when they're the drone a big all around trying to find all so. There's a lot of moving parts. There's a lot of equipment that goes and that all involved and all that, but are in in the end of it. Muslims all require a fuel because are no nowhere to get. Set up shop so all these generators run on diesel fuel because you can't just been under row. You get you can't run. A joy Reid off of a power. Pulled it out there. Learn on my feet all these sites around the middle of nowhere where they have to bring your own power, they have.

Fuel tanks to supply the fuel for the generators that run all of their equipment. So I mean, yes, they are electric. There's electric parts on drilling rigs to Sender me off that they have big generators big motors that are supplying power to where is that? There's nothing around exactly. So in the end of that. It's a big diesel motor that runs on diesel fuel. And it's sub motorcycles going to need some type of lubrication. So there's an oil that's in that motor. So they're using their own. In the end of it, they're using good that they're using in the process of it.

so what you were kind of touching on is the cycle of me know you're you're drilling for resources at the equipment you're using is using and I kind of Segways into our next question is You know with the with the equipment of the industry relying on diesel. I feel like there's a it's obviously supporting the future of the industry at the same time with another grease lubricant and Diesel involved. and so it's just kind of interesting to see that that Trend in cuz people say, you know, we have to go to Renewables like you were saying with products being in the middle of nowhere. It's not always easy to have that electric power. Source Walters. No grid for you have to create your own grid. If you're out in the middle of nowhere doing something if you're out in the middle of nowhere, and there's nothing established.

There's not anything and you have to pretty much everything into this site. That's been you know. Excavators come out and then they break the ground up. They make the pad and then all the sudden this is how you go from a desolate desert area and say, But U-Haul equipment in to begin with on trucks because it has two that's how it has to be hauled there to be able to cut the ground to cut the roads be able to be able to have the truck to come in. Nothing nowhere. Prius is not going to be able to hold a hundred thousand lb generator on it's on a trailer behind it. So

You can use an electric this or electric that four hundred equivalent wonder hundred and twenty miles off of a main highway in somewhere. Yeah. That's in the middle of nowhere. So as far as renewable energy goes, I mean, I don't think there's any way that you could. The process that I'm involved in could happen with things that are electric. I know there's talks of some somebody somewhere is one of their start know. Come out. Manufacture these trucks that are electric in this manner. Nothing else. Well that's all fine. And dandy for trade center, you

know Holland food from feeling better on the highways that are on the freeways this now, but at the same time those trucks that are Holland, food, and Han frozen.

It has a pretty much a refrigerator on the front of the the van will you know what that refrigerator runs off a generator? a diesel generator fuel tank on trailer supplies and fuel to the generator that creates electricity for the refrigeration unit on it that keeps food Cold Stone from grocery store so I mean they will that trailer still has. oil on its axles Escape grease Any news on his will and wheel bearings or this that and everything else that?

triple play the truck hooked up to the wheel bearings in the U-joints and on the truck. It's got to be full engineering electric trolling base. As far as being able to be renewable, I don't see you that way because I don't know what synthetic Park you're going to be able to come up with. Networks that would be able to if you're going to be able to refine grease from something else. Grease is Andre leaving from in oil? and then as far as

Clean energy goes. He talked about the lithium batteries they in a previous. And how bout every electric cars it's gonna be produced? It's gonna be helping the environment at yad. It cuts down on them the gas emissions, but at the same time it doesn't because the minerals to go into those batteries have to be mined out the ground. So you still training? Her store. Carbon footprint was being produced from again. A big diesel piece of equipment that's gone down in a hole that's mining all this all these minerals to be able to gather. Men are gathered the minerals the they go into batteries to create a electric car here. You look at the metal whereas the metal come from. How's Atlas? That's from a refinery standpoint is still.

Being produced from something the plastic that's doing that car. It's the center console. That was where did that come from? Earth certain beard steering wheel for your dash for this the for that for everything else today or plastic or vinyl. They're not metal consistent, but they're still or plastic Basin they used to be 2030 years ago or more You are you kind of covered a couple of our questions. When was just looking at consumer Plastics and kind of how daily products you know, Patrol and relevance and

And so you can you queue of cover that little bit and also another question was just talking about Innovation towards Renewables. So you touch fun out how you don't see any right now pressing in the process changing. I guess I don't see any way to replace its need right now is going to be ORD weather alternative to alternative to oil was going to be I guess moving on. Have you seen any big changes with the Cove in the pandemic changing your job whether it's your day today job or a communication and relations with the guys that you work with. I know you do a bunch of stuff over the phones so that probably hasn't changed but

Any onsite, things change or any? Anything else that you know well? Phone the vast majority of everything I do either on the phone or email stuff like that earlier customers dealing with we still deal with customers face to face at times on in the industry. I work in. Yes we do. Go out. We haul stuff when something goes up to haul something they have to get loaded, they go get loaded by somebody there. Some severe form work better. Come in, contact with. I personally do everything by hand as far as paperwork. So there's a piece of paper that I write on. They get transfer to somebody else. They fill out paperwork that gets transferred back to me. I guess. Process through my office. There's still I mean people to sign a piece of.

That they received certain products in good condition things that get delivered to me in my office that I have to find paperwork. Hurdles, I guess you could say in the Cove in pandemic are on right now that's going on in a walking handstand typing all that texting and wear masks. We have had to even still going and working in certain refineries and certain. Crayons and stuff like that that are trains go to you just to do maintenance work. Sometimes they're required to wear a mask the entire time they're working. They're working alongside people still. Where it's not the social distance. Pringles it's okay to do when you can but in certain aspects of life.

Work in general. I don't see where. In order to work wearing glasses glasses for safety vests or safety equipment and masks and all that and wearing clothes. Good times. We used to have to work alongside somebody and be within inches of them by. That's the way the world works for the last how long it's going to be that way for the next however long. the shutdown in the oil in oil this year that I have seen have just Not been there. So I mean that's that in itself is diffused in.

I guess Im unemployed a bunch of people because the oil not doing what it's doing, but at the same time I don't see Kobe hoping that either the more people have to stay home and not be. And how to work or are working from home now? Doesn't I be agreed? Last demand for oil products is far as the fuel. Moron am the word before going to work as much a newspaper saga work. Just so people let her drive and they're still people are now using using, but it's not as much as was for. I mean, there's people still gonna grow sorghum bicycle every day. Oh but I think there's gonna be a demand at some point if the stuff if is either gonna go away. It's.

If it's here to stay then I mean is people just going to have to work with it and take precautions to help slow the spread some say everybody gets to wear. It levels out deal. I mean, I haven't seen it either. I've been around people. Buying in mind is free. It hasn't hit us that hard. I mean, it's just I think this year has just been with the industry as it's been. Yes, sir. I'll ask question is kind of looking at a little bit of just kind of environmental impact not exactly.

Emissions and sustainability, but just biohazards involved with the transportation of oil like with tankers and a real cars and stuff like you were saying. Just kind of what inside do you have on that besides for me? I know it's a mess to clean up

about when you get a chance all over the place just did. What has an everlasting effect?

Nov know where that might be next to a stream and the streamer water that goes to connect to a river in. It could pollute the river this Saturday else. I mean, there's different different scenarios. Dead. I mean concrete, different biohazards. Either I mean there's companies out there that that's all they do, is they. Do they clean up oil spills on it ways that they've you know chemicals? I contradict what it does. What? It does what it would do for an environment. Yes. I'm sure. Arms environment, some points too limited of amount once they get cleaned up to a certain point. I think what I was looking at or what I was talking about was the importing of oil products from overseas. And how that's I think how I think and I think.

Show about it is one of the biggest. And how unpredictable I mean it is unpredictable, but it is predictable how much the weather is and how the tides can change and everything else big tanker ships going down all the time. But I mean, it's just that to me would be a bigger gamble then. If you have domestic oil being produced in the amount enough to where you don't have to rely on other countries to ship their their oil and their product here for us to have to refine still and then use. Forster products play come along with it. well, I mean, I mean

Covers it on our end. Now you've helped fill a lot of the gaps that we had in transportation and just some of the equipment involved and I just wanted to thank you for taking the time with us today.

Interview 3-- Commercial Analyst at Midstream Services Company

1. What are your daily responsibilities in your position in the energy industry?
    1. My organization is one of the largest gas processing companies. They do not have active producing wells, but they combine gas off the well heads. The company runs that gas through pipelines that separate the different types of gasses. The Commercial Analyst position supports commercial buyers nn a gathering and processing side. They go out and get contracts with big upstream producers. The position drafts contracts with big companies as well as smaller mom and pop producers in rural areas. Big range of massive contracts range from 100,000s MCF flow just 2-5 daily. The specific job is to assist buyers by helping draft contracts and figuring out which wells have been dedicated to the amount of interest dedicated to a well. Daily tasks such as ownerships transfers and keeping the system updated with owners are also regular responsibilities.
2. What geographical relevance does your job being in Houston have?
    1. Houston is the “hub” for oil and gas because of the industry’s history. Covid has been a shock because oil and gas operations are typically present in the office five days a week. It historically has always been an in person work field and that culture comes from Houston. Coastal production requires location in Houston and also provides geographic

leverage for distribution. Parsley was a younger company and was one of the first big ones in Austin. With the current shakedown, there has been less reliance on Houston. Despite this, “all pipes lead to Houston”. Pipelines go all the way to Denver to reach all markets. Other big markets are in Pennsylvania and have smaller oil and gas fields. Above all, the Port of Houston is the biggest hub it could get to.

3. What were the initial steps in adjusting operations to account for pandemic regulations?
    1. It was a rude awakening, I had only been there for a month so I was still very much learning the industry and my role. It was on a Friday and I was in the conference room while being taught what different parts of contracts mean. There was a knock on the door to a co worker saying they’re sending everyone home and a stay at home order had been issued. It was very shocking and I even had a co-worker that was supposed to start on that Monday. He got a laptop from HR and had his first day at home. It was very difficult to learn virtually. I had to learn names of people too and was very much still in learning phase of the job and the company cut a quarter of the corporate workforce. The reality is that I’m young and had to adapt to working from home. It was hard to figure out the boundaries due to long hours at first generally 8-7. I had to get on a schedule of getting up early; trying to get off at a decent time was vital to productivity. Adjustments were trying to learn things and get to know people over the phone. Older co-workers are not as tech oriented as this generation and oil and gas is very old school. Utilizations of docusign instead of faxes in signatures was another adjustment. Work from home is going to spur industry to move to a more tech oriented environment and hopefully one day a more tech friendly workplace.
4. What current innovations are you interested in seeing implementation of?
    1. I don’t deal too much with extraction or the manufacturing process, but I know that Upstream Run-Title has been shaking up industry. They produce maps of oil and gas parcels and disclose information on who has title. Access to leasing beforehand could only been done by running public records at courthouses. With regard to midstream, leads charge in automating processing plants. Switching manual operation to automated centrally controlled plants has been proven as beneficial for operations. Control centers in different locations could now change ratios of chemicals wanting to be produced. They also could then have the ability to shift gas flow from one side of a plant to the other side of the plant. Pre Covid we had been pushing to bring on ten automated plants, due to covid it only ended up being four but there will be a big push in the future. The highest paid lower skilled people are in the field people and its hazard pay which is expensive. Automation reduces risk and overhead costs long term.
5. What are the major benefits being in your position in the industry?
    1. I like it a lot because it deals with many different working parts of the industry primarily accounting and NGL trading groups. I have a wide variety of experience in the company and growing knowledge of different

departments. Options to go to commercial side of things or go buyer management route are possible outlets but I am very flexible because of a lot of background knowledge. Contract knowledge and daily job is applicable to other industry as well. Every industry utilizes contracts. Versatility in contract language and negotiations and the fact I play a very broad role that will alow pursuance of a career path to access the niche parts of industry. Overall, I work directly with the division orders department, sales, and accounting departments.

6. What risks do you see in the industry?
    1. Decreased travel with covid has been the biggest impact. People more cautious and less willing to travel and it poses our biggest threat. A large percentage of the oil and gas industry is driven primarily by airlines and jet fuel. With that, vacations are less likely. Biden being elected President could throw a wrench in the system given his plans of legislation to impose more restrictions on fracking. Environmental impacts have absolutely been seen, so what its going to come down to is not completely getting rid of oil or processing like crazy. It will be which companies can produce the most without impacting the environment by a combination of eliminating spills and clean operations.
7. How do you see Covid-19 progressing the push to clean energy alongside tech dependency?
    1. If you're not putting gasoline in your car you're putting in plastic. Our world would change drastically without oil and gas. Moving forward, we will see more planning and more due diligence of where wells will be placed and higher importance on that versus the ideology of installing as many wells as possible.
8. What is the most rewarding aspect of what you do?
    1. When I see how much money is put together in contracts it is rewarding for me to see a quantification of my contribution. Seeing a contact bringing in a million dollars a year is a great feeling. It serves as proof of me making money and playing an integral role in the business. I am a proponent that work is work and what makes it positive is the people that are around in the company. I like my co-workers and that contributes to a positive daily flow. Uplift changes when you know your work is directly affecting the business.

Interview 3, **Transcript**

What are what are you doing Jack Lee? So I work for DCP Midstream, which is one of the largest gas processing companies means we don't have active producing Wells specifically gas in the gas off the meds and then we run those get run that gas through pipelines to our fractionation plants, which take the gas and separate it down into your natural gas and then all be different names you can think of that, you know, pretty Plastics and additives to a number of different.

Petro chemical processes more specifically commercial buyers on the Gathering and processing your extreme producers. So we're Contracting with the big

companies and we're also Contracting with a small mom-and-pop users out in rural Oklahoma that maybe have to producing Wells from contracts that have a hundred thousands of mcf a day

I guess. And then we've also got ones that might flow, maybe two or three himself day so my specific job is to assist the buyers. I assist them by helping draft contracts a drafting exhibit B am committed lands so figuring out which am which wells that we have dedicated to us. Those those producers have interest in and how much interest is allocated to those wells am because you can have multiple owners on well and we have to pay them. You know, according to that interest so I do a lotta open. Find that now. I am also do a candidate. New daily tasks such as like ownership transfers stats often. We've seen a lot of coded a lot of the small mom and pop shops it out. You know, just have a few wells are going.

You know they were they were heads too high. So they're Wells were only you know, making money at $55 barrels $50 barrels and Market position that we've seen has a lot of those companies out of business and Company directions holiday, so I go in for systems and I do like the system updates and the owners getting our system sending out DocuSign for contracts. You're much more involved on customer relations.

Are cashew processing and I'm so think of it as kind of the wheels means I draft contracts you just saying and what kind of feeling some of those gas like how you saying you independently contract with the big companies and small that goes like right in line with what we've been writing about that Super Bowl.

Cats and lived been a big market share. Go and Jew previously with you know other dibs only gas industry a lot of upstream a consolidation honesty. You've seen coming? There's been several big upstream acquisitions. More specifically, like in Austin. Oh gosh. Halls and Anna company alone the big one on Austin got acquired and then and her gosh for some light on the names right now came the gun names. Ask any other time in spin off the top of my head. But yeah, I've seen I've seen in a lotta a lotta big acquisitions recently. I I did one of the biggest acquisitions in my company history. Oh. About four months ago it was up at in the Denver basin.

I was bought out first all that transfer of all of the commercial contracts until 1. Are you talking about a lot of Acquisitions happening in Austin? That kind of leads us into what I wanted a snack. So being Houston how much are graphical relevance? Is that playing how much does a pose as a benefit or as Arrest for being a graphic of where you're located? I mean Houston is it's coming and I think more so is the Hub because of

History has been one of the industry's that has been kind of lost on the technological curve. Where is she? A lot of everything's very mobile. And then I work from home can only answer sheet for the main part is always been you know, you're in the office five days a week, you know, it's it's always been a very in person, you know at work field really just comes from Houston to Coastal

production facilities. It was you had to have an office in Houston if you were going to be going to have a big companies

Yeah. Now with some of the newer companies at your scene really is really tick me off. I do not know the name of the Aussie government. Look it up. It was. It was kind of one of the first to be in Austin sales cash companies parsley. Parsley was a was a kind of a younger company and instead they were count one of first big ones in Austin and so I think now, especially with the shakedown. I think you'll start to see a little bit of earners. A reliance of the companies being used in em like you said I think it's it's mainly just because Houston used to be the the help for everything and you know the jokes around, but in all piously Houston.

We have five ones that go all the way from the Permian all the way from New Mexico to Fort Houston. There's go all the way to Denver. We have pipelines that go up into your Colorado. So I've been to Oklahoma so you got to be true Houston, so interesting. Permian Mid-Continent, which is Oklahoma in Denver outside of that Pennsylvania, which is big is not have

Houston is really the biggest hug that it could get to definitely not because of the the climate in Houston on say that. I just got all that down. Who you are first place in the office when someone must have been?

Read every a waking up in Washington DC p for just over a mile while in a so a I still learning and I remembers vividly was ad is on Friday. I was in the conference room with my boss and she was can't teach me how to add. You know what the different M? Parts of our contracts, mean Indiana just that a contract language that we use and we had someone come in knockout are like hey. Like they're sending everyone home like this. Apparently you know, like there's the word from home or go out or whatever, so like it or not a pack your bags and go home and up. At that point. I hadn't worked at home. All I know so it was it was real real shocking. An even crazier thing was is want. My coworkers now was supposed to start the following.

First day for his first day. He met one of our HR people at the office and got his laptop from from HR and then you don't have his first day at home on virtually. I mean contract I have to learn people's names that you know, I am may be seen in person a couple different times and then on top of that maybe maybe not even a month after you know, we can all went work from home or company, you know about a quarter of our

Corporate Workforce to new people my boss and then one senior analyst that have been in that position for a year. So we were we were definitely very young and just having to adapt to your work and everything was definitely interesting a little bit later about 8 and then working in Hill. Seven 8 at night so now I'm trying to get myself and then trying to get off at a decent time versus versus super long hours, but

It's definitely been an adjustment trying to ah, learn people in and do business over in over. The phone has been a struggle, especially as somebody bought work. Whether will bit older and they're not this exactly tech oriented. His us is probably been another a significant hurdle a and as I said before or ill. Gas industries pretty pretty old school am a lot of the contracts were signed in hand, Indiana viewed is in a contract out in in the company would sign it and send it back to us. You know we have middle to do that as much room had you utilize Doc. You sign. Hi. Some are contracts him unless the staff and something that's been a a big push at think I am. I think this whole work from home thing is gonna really can spur our industry to move to a little bit more.

Tech oriented environment or text friendly environment or at least it should

Are there any are there any push towards I know you. There I mean where is the extraction or the processing of it? Especially, you know fracking is a very big tool that we utilize and ask for

new technology or new method of extraction And what that is, I'm not sure but I mean all of our CEOs Minds across in the streets on a lot of all the major only gas companies even the small ones in the street. And actually it's band. Another thing that I've seen or at least a little bit of knowledge on Upstream.

And that has been kind of shaking up the industry, so they're starting to do a. Ah. I'm kind of mapped. Think of like a company like H, a R dot com or an nightshade are the Alec website reading it on and it's like Google maps, but you can click on houses and will bring up like the previous sale pictures or like you can look at like when a house was listed at previously, and so they're doing stuff like that, but they're doing it with all the gas leases am so you can see who's in a wheelchair areas. Least stop in here. They have the title that goes along with that land, and so that will be an interesting upstream a company that I am actually interviewed for them. I got to a third round interview with them. Ah. So thou be an interesting company to see what happens with ah. How technologies gonna come into play with? Only ask is ours.

having that kind of access to wishing because previous to figure out which areas were least and stuff you had to go run public records at courthouses. So I think our company is leading the charge and automating our gas processing plants that they're out of the plant and they are trained to do this one specific job at the plant and That sort of thing. We're switching a lot of this opening a lot of our plants over to automated centrally-controlled plants, so

Houston control center may have a dimmer control center in the plants that we have that are all automated. But you know, they can change what ratio of chemicals they want to produce or what, you know ratio of NGL as they're willing to produce or they can shift gas flow from this side of the play all remotely the hands on your turning of wrenches that used to be done by hand. So we've I believe you're to bring online. I believe 10 plants for automated and just because of the capital reduction of command-and-control centers.

I think that's going to be any. That's gonna be a big a big push in the future is a meme. You think about knowing gas and Israel on your highest paid em? You know, lower skilled people are all feel people and it's hazard pay am near. You have to pay at that higher price to have those people there in harm's way, and I think as technology progresses and ass, especially a I and all of these other different robotic technologies progress. I think you're gonna start seeing that camera. Am your industry wide has more Ana Armagh nation and plants? Okay. That makes a lotta sense so effective. Will you be spending much less is a classic were more expensive? It's gonna mean it's one of those. Things is alot over at a lot of initial capital. Spend you know but you will see a reduction in.

Personal that we have crossed trained them. So they don't know just one thing anymore. They have me for having, you know, a hundred workers at a plan for what do you like about where you're at right now and how that could involve my position. I like this cuz I get to see a lot of different aspects of our company on a daily basis and I deal with are commercial wraps deal with consumers.

I deal with division orders trade-in gl's on the day markets a wide variety of our company and I have a lot of kind of reaching knowledge of those different departments and so is my upward trajectory goes in the company. I have other options to go more towards the commercial side of things and potentially go to Empire and I go that management route or you know, I wanted to change things up and Different kind of business, you know, I already I already have a lot of background.

My job. But then, thinking beyond that contract knowledge in in Canada, the daily job that I do is very applicable to other industries. Any kind of industry really mean, you know? Contracts which is every industry I've got. You know. Ample experience in contractual language can now is the different area contract negotiations. This and that sort of thing. So my role is a very broad role and will allow me to encounter pursued the career path that I like the most, and I get to experience a lot of those different niche. Aspects of the industry also excludes a year or indirectly getting cross trained a little bit, since are getting a little bit of everything. Yeah. In a minute.

instance where We had a contract problem where? That we had been set up incorrectly have been settling in freckly for a number of years and me and my team were able to track that down and figure it out directly with our accounting department to get that meter setup correctly. And then I also work directly with our division orders Department to make sure that the payment allocations got fixed and it was one of the scenarios where I told our division orders kind of what needed to know what needed to happen, but they weren't recognizing what I wanted done. So I was able to go in and show them. Hay in your system. I need the payments Broken Out by this this and this and you don't know her like I like that that makes sense. Like I didn't know.

It's always basically able to tell them exactly what I need is in how to do it because you know, I've had that experience with seeing how their systems

interact with mine. So Partners collaboration moving forward? Well, I mean travel is the biggest thing that is enacted since it's been travel. Yeah covid

People being more cautious, and that's gonna opposes this averages poses a huge at a huge threat. No. Ninety. I am. It's. I would say around ninety, but a a large percentage of oil and gas industry is driven directly by a airline aviation fuel mix since am so I think once you start to see a return to you. The Airlines doing good and you'll start to see prices. Come back up and then. Obviously. Once people start getting out and you're spending more, you know, that's just kind of the whole snowball effect at once, you know, once they start opening, I once people start spending more, they're gonna they're gonna vacation more Julio, see the whole industry. Come up. Like I said earlier, you buy mean elected president and Beckett really really throw a wrench in a thing you do, if the if the Senate or Congress.

Does it stop you all of his bills and trying to cut back fossil fuels I know in all all the gas companies in Throne same amount of money as lobbying only gas or uniprobe fossil fuels. But at the same time, you know, we're not just trying to go out there and just completely destroy the environment. I know our company specifically has worked on reducing our methane emissions the premium. We were kind of a Violator I think the environmental impacts.

You know what? It's going to come down to him as a happy middle ground of no not one in a completely getting rid of fossil fuels or just, you know, probably like crazy. I think it's going to come down to which companies can do the most at a environmentally conscious. Rate, the least amount of spillage least amount of pipeline rupture has the least amount of impact on the physical environment. Which all comes from your legislation and is a different different rules handed down by government agencies. Crayola makes a lot of sense what you were saying earlier about the election?

Rescue got pushed me energy like alongside tech dependencies. We feel like that's sort of instilled people to be more motivated. Find an alternative source of energy or Marlboro innovation for operations currently.

What are the Disposable masks made out of? What's the rubber that she know holding ear pieces going to wear those made out of what is the meaning of plexiglass in the dividers that you're seeing everywhere. Now? What are those made of? if you're not if you're not if you're not putting gasoline in your car your buying plastic, I mean I think as much as people say they want to get away from it. You know, people don't realize what all comes from holding a spear. Absolutely. Yeah, I know we got everything. Mother's Day put things down is the more they actually using everything. our world would change quite drastically with

I didn't even really mention. Okay, but yeah. They control the price of oil and gas but they're making money and you know what the price of oil is at $2 or whatever they're going to be richer so they would like to see higher prices to the market

would really settle down and even industry would really really sure but I think a lot of people are starting to hedge their Wells. Have a lower price mark one thing. We had recently in are in a quarterly meeting was talking about you know, where is back in the Heyday doing people were Drilling.

On the ground as fast as they could, you know, just to get anything out of the ground. One of the year, thirteen days pure wells drilled. But they're gonna be more productive. Wells. I'm stuffy. That's gonna be become a future. Too is sad, more more planning and more due diligence behind year you're planning process at where you're going. Pretty well, you'll. You'll start to see the bear. Reliance on those have importance from them versus. Just here, however, many while you stick, it has many holes in the ground. Kids go out enough if people sick all drowning in a witness. A dry and rye Holden allowed an excellent drummer. I one series at once. Dry it out. I think you you'll. You'll see that in the future? Sure. Right south answered with lots and we got. What is what was the most rewarding thing about what you do?

Oh, man, typically for me is when I see how much money you know, I've done in contracts, you know, when I put together a contract and contracts a million-dollar contract a year contract. Bring them knowing that my position is integral to the business and you There are in a group isn't doing what it's doing our job that you can have contracts are going out the door companies not make it money or awarding work is work in what makes Works animals the people.

Around and in a lot of really cool. I think that's that's rewarding to is is here. Like the people I work with and they're all. I bet when I bet that's awesome seeing those numbers like quantify to think that they are going to be difficult. I deal with a lot of you know, what what are Marching was beforehand? And you know what it was cuz this year 2020, we really focus on re-contracting contracts that we're coming into coming up on there in the in the primary term that again every contract into those where you know, our margins were better and there was Jacksboro March in Maine

Eighty m. In Sierra an hour, making a dollar twenty, five minutes. He. Has you seen these big? The outlet changes that it's. It's really cool to see that. Now what's? Your work is directly affecting the business with autumn. Very thing I had scripted it better with paints else you want. Add a splash one no matter what there. Anything I can. The three biggest departure goes paper. Anything that you need. Help filling anything I can help monitor by filler. I mean, you gave a button causing perfection of the way that we kind of needed. Some insight on open super helpful. Nice catch. Now do the same time. Yeah. Quite crazy last something different

Podcast

For our podcast, we plan on capturing the trail of money with oil across all domestic markets. Our conversation looks into the cyclical nature of the oil industry alongside an intense financial hit from Covid-19. The extraction process is a cycle of diesel-fueled

drilling to provide crude oil for the country's demand for the same fuel. We want to touch on America's lack of an electric grid for a complete renewable shift. Our solutions revolve around streamlining domestic supply-chains with tech/data analysis. Ultimately, we will attempt to weigh in on how the industry is changing to eventually evolve to an optimum balance of necessary production with minimal emissions, spills, and overall demand implications.

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We have acted with honesty and integrity in producing this work and are unaware of anyone who has not.