Energy Sector Analysis

CIAG

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Natural Gas and Oil

Natural gas continues to rapidly expand across the US and the energy sectors. Even while renewable energy expands, the oil and natural gas continues to expand at a rapid rate (McKinsey). Experts even argue that the demand to produce renewable energy is increasing the demand for oil and gas (Deloitte).The majority of minerals are mind in Indonesia, China, and Malaysia and in order to mine these minerals, companies continue to use oil and gas as the primary energy source (Deloitte). Due to this, the increase of renewable energy has actually driven oil and gas mining to new records, where in August 2024, U.S. oil production hit a record 13.4 million barrels per day (McKinsey).

Another factor increasing oil and gas consumption is the technology that allows for faster and better drilling techniques. The newest technology is horizontal drilling, where oil wells are drilled horizontally enabling oil companies to reach new oil basins that were previously unreachable in sensitive areas (Deloitte). In the United States, hydraulic fracking is common on indigenous lands that pushes water at high speeds to crack rocks, giving access to underground oil. The increase in adaptive technology has allowed for Extended Reach and Complex Reaching drilling, which has opened up new areas and spots for oil drilling (Deloitte).

In the future, numerous emerging technologies could aid in the efficiency of oil drilling. The most prominent one is generative artificial intelligence. Traditional artificial intelligence can help expedite tasks but generative artificial intelligence can prevent the typical night time downtime that halts with the current work structures (EY). It also has the ability to process data and factors within a geographic area fast, so it can optimize work conditions and efficiency. Shell and other major oil companies have already launched technology that can process 3D imaging of underground oil reservoirs allowing for the most oil to be extracted with a higher success rate (EY). Deloitte outlined four categories where generative artificial intelligence will aid in the oil and gas sector: “Cost Reduction (detect preventative measures), process efficiency (help optimize existing systems and data processing for supply), revenue expansion (3D images of reservoirs), and accelerated innovation” (Deloitte).

Renewable Energy

It is clear that the energy transition is closer than ever. As our world faces increasing climate change and the depletion of various ecosystems, the governments (and firms) of the world are bringing about changes to the way we use energy and fuel our daily activities. With that being said, it is now more important to look at exactly what is driving the shift towards renewable energy (from a policy view) and further consider the sources of energy that will make a shift not only possible but efficient and consumer-friendly. The Inflation Reduction Act in the United States, the Green Deal Industrial Plan in the European Union, and the Production Linked Incentives in India have all been policies with provisions aimed at spurring the growth of the clean energy sector (IBM). Some legislators have sought the implementation of net-metering programs which allow for energy producing customers to return excess energy to utilities companies for credits.

In the eight year stretch from 2015 to 2023, clean energy has increased from 120 to 530 GW/year (S&P Global). This growth is expected to continue in coming years as projections show clean energy capturing nearly 90% of all new power generation at a global scale (S&P Global). By 2025, it will surpass coal to become the largest source of energy in the world (IBM).

International Energy Policy

Currently, the efforts to stop climate change are largely led by renewable energy firms and world governments that hope to support them financially. The current goal, set at the 2023 United Nation's Climate Change Conference, is to triple the power capacity of global renewables by 2023. (S&P Global). Increasing renewable energy usage is the main focus of the policy (as well as most policies) because of the other benefits associated with it—namely, decarbonization and net-zero emissions in the long run. To implement this goal, countries have created their own policy initiatives to strengthen reliance of renewable energy. The European Union's Green Deal Industrial Plan is aimed at making Europe's net-zero industry competitive on the world stage. Through subsidies that help renewable tech firms increase their manufacturing capacities, the EU aims to increase jobs in the climate sector and compete with the United States and achieve net-zero emissions. The United States focuses on renewable energies with its Inflation Reduction Act, and India, among other Asian nations, aims to incentivize production of renewable technologies with its Production Linked Incentives policy. Finally, China has already surpassed many of its targets, with a series of economic policies that have bolstered their wind and solar industries with an aim to make the majority of their energy usage renewable by 2030. All of these policies, combined with

smaller-scale goals from corporations, cities, and so on has led to a drastic uptick of growth in the renewable energy market.

Solar

Of the current renewable energy trends, solar is the strongest, with what appears to be the greatest potential for a world powered by renewable energy. There is consistent, constant work to make solar panels and PV (photo-voltaic) systems more palatable to individual (and corporate) consumers, and renewed policy support from various governments is continuing to drive the solar wave. Solar power usage can lead to tax credits, subsidies for utility companies, and so on. All of this means that the solar supply chain is growing rapidly, and manufacturing is at a constant boom. As mentioned previously, China in particular is currently dominating the solar landscape, with 95% (add footnote here) of new solar technology manufacturing facilities in 2022, and Asian technology in the PV space is making more efficient solar panels to drive this growth further. Currently, the aim is to follow solar all the way to the lofty 2030 energy goals, with solar tech driving decarbonization efforts consistently.

Wind

Wind has been more shaky than solar power throughout the last few years, with some regions embracing wind to fuel growth (as China has been doing, with a “66% increase in wind power capacity in 2023”) while others have been lagging behind on offshore wind development, like the US and the UK. With that being said, there is still room for optimism in the wind market. The EU’s Wind Power Action Plan is aimed to increase jobs in the wind sector and acquire more permits for land, and the United States is looking into investing in floating wind farms. Bypassing the land/space issue and harnessing the power of the winds from the seas is a

monumental step towards efficient, profitable wind farms, and the United States may become a ladder in such developments down the line.

Hydropower

Hydropower is the greatest source of energy amongst clean energy sources, and is expected to remain the greatest source of energy until 2030. Hydropower, formerly the main focus of the clean energy industry, has seen recent project slowdowns throughout the world, and new hydropower additions are generally expected to decrease year over year for the next decade. As governments and corporations embrace solar energy, given improved technologies in the space, hydropower is becoming an overlooked source, even if it is still currently the largest. Only about thirty countries offer policies, at the moment, to support original hydropower development, while more than a hundred countries support wind and solar systems.

Biomass

While biofuel expansions is generally ignored in the West (and Japan), biofuel is amassing lots of support in developing economies, particularly in Asia. With demand largely stemming from the transportation sector in those nations (and plenty of biomass stock available), nations like Brazil are seeing lots of growth in biofuel, with an estimated 40% of growth by 2028. This is not as possible in the West, mostly due to the high costs of biomass along with the domination of electric vehicles in the renewable transportation market. However, it should be noted that they are not just helpful in isolation, as the IEA notes that together, EVs and biofuels have the potential to offset over 4 million barrels of oil by 2028. It should also be noted that biogas has seen growth, as policy support increases in the light of the dangers of

natural gas. Europe, and particularly Germany is seeing increased biogas production, as worries abound about oil supply and natural gas importation.

Geothermal

Currently, geothermal energy is still an unreliable, largely untapped source of energy, even amongst the other clean energy sources. Though technological advances (like Enhanced Geothermal Energy Systems) are paving the way for further geothermal projects, particularly in North America, the policy support for geothermal energy is not nearly as robust as that for wind, solar, or even hydropower. Currently, geothermal energy projects are still capital-intensive, and inefficient as a whole.

Conclusion

While the introduction of new renewable and carbon-neutral energy sources is shifting the demand for fossil fuels, the necessity for oil and natural gas continues to increase as energy dependence increases and the population grows. Oil is currently a vital component of both the global energy market but also the developing sustainable energy market. In regards to the expanding sustainable energy market, traditional modes of sustainable energy such as hydropower, solar, and wind are still growing steadily in the US and abroad. New emerging technology in geothermal and biomass is making these markets more accessible but are currently still developing areas within the energy sector.