

The Forecast to World Energy Industry and An Outlook to World Energy Industry Investment

Zhengyang Shi^{1, †} Yiwei Sun^{2, †} Runze Wang^{3, †, *}

¹ Keystone Academy, Beijing, 101318, China

² Alcantara International College, Guangzhou, 511466, China

³ Keystone Academy, Beijing, 101318, China

*Corresponding author. Email: runze.wang@student.keystoneacademy.cn

† These authors contributed equally

ABSTRACT

This paper focuses on the expectations for the energy industry in 2023 when the market recovers from COVID-19. It provides a reference for a general overview of the trend of the energy sector and the outlook to world energy industry investment, which also extracts information from the current state of energy and historical trends in energy, from several papers and official reports. It includes information about the development of the energy industry e.g., natural gas, oil, fuel, and renewable energy, etc. Data includes about the trend of the petroleum industry from COVID-19 the time till now. The paper analyzes the demand for petroleum in the automotive and chemical sectors, and the impact of price change in petroleum products to different sectors are drawn from the official website of the U.S. Energy Information Administration (EIA). The data and information collected have been explored to make preliminary predictions and draw conclusions about the path of the market of the energy industry in 2023.

Keywords: World Energy Industry, Energy Industry Development Forecast

1. INTRODUCTION

1.1. Background

The main factor that determines the direction of the energy market is consumers. With the spread and infection of the new coronavirus on a large scale around the world, many countries and regions have closed customs and borders, and the tourism and transportation industries have been greatly affected. As the largest area of energy consumption, transportation has had a great impact on the energy market. This shock is not only the closure of many companies but also has a great impact on the development of the stock market and the energy industry. In 2021, many parts of the world are gradually recovering from the epidemic. Many Tourism and transportation have returned to normal. Many institutions and economists are estimating the general recovery status and market trend of energy market output value. This article also combines data analysis, industry judgments, and the trends to provide insights on the recovery and investment diagnosis of the energy industry worldwide.

1.2. Related Research

Fu and Shens' study of the impact of COVID-19 on to energy sector was mentioned. As COVID-19 has had a major impact on the global economy, the energy sector has also been severely affected by the pandemic. Some studies have analyzed the impact of COVID-19 on the performance of enterprises in the energy sector and found that COVID-19 has a significant negative impact on the performance of energy enterprises. When goodwill impairment is introduced as a moderating variable, companies with goodwill impairment are more affected by the epidemic. The study found that the COVID-19 pandemic harmed corporate performance in the energy industry, which declined in the first quarter of 2020. COVID-19 has damaged the productivity of the energy industry, causing companies' revenues to plummet. These companies failed to pay fixed costs and expenses, which ultimately led to poor company performance. We found that the performance of goodwill impaired companies was negatively affected by COVID-19, which is closely related to the operating risks brought by goodwill [1]. Shen et al. illustrate the focused on the international chain of energy sector which shows that the international

industrial chain has been hit by COVID-19, with the energy and power industry chains hardest hit. Studies have shown that COVID-19 has had an impact on the debt of energy and power companies, finding that COVID-19 has (a) increased corporate debt and (b) disrupted production, thus reducing performance and increasing financial stress. This study mainly discusses the debt problems of enterprises in the energy and power industry chain. The study noted a significant increase in energy and power chain companies' liabilities during the COVID-19 pandemic. On the one hand, during the COVID-19 pandemic, the external market environment has become more uncertain and energy production and consumption have been severely affected. On the other hand, high fixed expenses, poor performance, and tight cash flow have led to debt growth and reduced investment in the energy sector. The political, economic, and social impacts of COVID-19 have attracted extensive attention from the academic. This paper adopts the difference-in-difference (DID) model to study the impact of COVID-19 on the liabilities of enterprises in the energy and electric power industry chain. Our findings confirm that the COVID-19 pandemic is associated with rising debt. We show that the corporate liabilities of underperforming companies also increased significantly during the COVID-19 crisis[2]. Hoang et al. studied the enterprise liability problem in the energy and power industry chain. The study concluded that companies in the energy and power supply chain had significantly increased their liabilities during the COVID-19 pandemic. On the one hand, during the COVID-19 pandemic, the external market environment has become more uncertain and energy production and consumption have been severely affected. On the other hand, high fixed expenses, poor performance, and tight cash flow have led to debt growth and reduced investment in the energy sector. Some studies made a comprehensive analysis of the situation of electricity in the United States (2020). Firstly, the power supply and demand data are analyzed. In most countries where lockdown restrictions have been imposed, total electricity consumption has declined while the residential load has increased. The daily load profile has also changed. Total power generation has fallen along with demand, with coal-fired generation suffering the most. The share of renewable energy has increased, although the rate of electricity abandonment has also risen. The study also cited sharp falls in electricity prices in major markets, with The European market suffering the biggest drop in the world. Many coal-fired power plants and utilities are in financial trouble. Most investment projects have been suspended, but long-term investments in the power sector and the future transition to renewable energy are expected to remain largely unaffected. Finally, emission reduction and temporary environmental restoration are discussed as external effects of the pandemic. As governments around the world-imposed lockdown restrictions, electricity demand fell dramatically, while load composition and daily load

profiles changed. The share of electricity generated from renewable sources has increased, while total generation has fallen. Studies point to the multiple impacts of COVID-19 on human society. For example, the change of power balance status and the increase of demand which uncertainty bring more pressure to system operators, but also bring the overvoltage problem and the challenge of system maintenance and management. The electricity market has also been significantly affected, while long-term investment in clean energy is expected to remain stable. The severity and long-term impact of COVID-19 on the power sector remains to be seen, which is an important area for future research[3].

Yun et al. researched the impact of oil price change on airlines' stock price and volatility by using the data from China and South Korea's stock markets and VAR-GARCH-BEKK model. He pointed out that airlines are extremely sensitive to changes in crude oil prices as fuel expenses are accounted for a significant portion of the airline's total costs. The result of the research proved that the volatility spillover effect between crude oil prices and airline (transportation) stock prices is more significant than the earnings spillover effect. Yun inferred that compared with small and medium-sized transport enterprises, large enterprises are relatively more resilient to international crude oil price risks due to their obvious advantages in asset size and business scope since stock prices of major airlines in Korea and China are relatively less sensitive to changes in oil prices [4]. Brons et al. researched the impact of a change in the gasoline price on the demand of the automobile by using SUR approach with cross equation restrictions. Brons found out that in both the short and long term, the impact of changes in gasoline prices on demand is driven primarily by responses in fuel efficiency and mileage per vehicle, and to a slightly lesser extent by changes in vehicle ownership. In addition, Brons found out that study characteristics related to the geographic area studied, the year of the study, the type of data used, the time horizon, and the functional specification of the demand equation have a significant impact on the estimated value of the price elasticity of gasoline demand [5]. Ketterer researched the relationship between intermittent wind power and the behavior of electricity prices in Germany by using a GARCH model. Ketterer pointed out that variable wind power reduces the price level but increases its volatility. Also, the result shows that the merit order effect, the ability of wind feed-in to depress the price, has reduced over time. In addition, regulatory change has stabilized the wholesale price as the electricity price volatility has decreased in Germany after a modification of the marketing mechanism of renewable electricity [6].

Sönnichsen mentioned in her study that COVID-19 caused the energy industry to lose money because the demands of both renewable and unrenewable sources market are decreasing. She uses data to illustrate that in the region that has high demands on energy sector such

as China, America, and EU, the COVID-19 disease cause a negative impact to traffic and factory development. Then the main original buyer either be required to stop their business or be restricted. This becomes the primary reason cause the energy sector drops down. However she also gives a short forecast that indicates when COVID-19 is controlled or disappears. The energy market will recover [7]. Desilver has the comprehensive sample collecting on The United States consumed a record amount of renewable energy in 2020. The renewable energy-producing are mainly depends on the machine such as solar and wind power, the machine doesn't stop working even during the COVID-19 period, compared to the unrenovable sources sector, renewable sources will become a tendency and a reliable investment sector [8]. Mordor measures the China energy market changing during the COVID-19 period (the year 2019-2020). The chart shows a stable increase in the renewable energy sector, this proves that the renewable energy sector in China is considerable for investing and the paper mentions their forecast to 2035-2050 China renewable energy sector development [9].

1.3. Objective

This paper focused on expectations for the energy industry in 2023, which will analyze the current situation of energy and the energy of the historical trend. It also analyzes the collected data and information to make a path for the energy industry 2023 preliminary forecast.

2. DEVELOPMENT STATUS

2.1. Natural Gas

In the case of natural gas, natural gas will remain the largest source of electricity in the US, generating 38 percent of the country's electricity. Gas is now cheap and plentiful. EIA forecasts that supply will continue to outstrip demand, leading to higher prices in 2019. That is good news for consumers, especially in Texas, where more than half of electricity comes from natural gas. It is also good news for the Northeast, where natural gas plants have replaced retired coal plants. So the gas market in both places is positive. The EIA also noted that renewable energy is growing across the country -- powered by solar energy. The US Energy Information Administration expects renewable energy generation to double from 19 percent to 38 percent over the next 30 years. Much of that growth will come from solar, which means solar is gaining traction in the energy market.

2.2. Oil and Fuel

2020 was an unlucky year for the oil and fuel field, even with the famous oil treasure incident. In 2020, the international commodity market was affected by COVID-19, geopolitics, short-term economic shocks,

and other comprehensive factors. On April 20, 2020, the official CME settlement price of WTI crude oil futures contract for May was \$37.63 / BBL, which triggered the "crude oil boom" event. On April 21, the bank of China crude oil products "USD/USD" and "USD/RMB" two US crude oil contracts were suspended for one day, while the UK crude oil contract was normal trading. [10]

Oil for this is the darkness of the year, although finally resolved, it still irretrievably upset the balance of the oil market. In terms of ethanol, diesel, and biofuels consumption, ethanol exports have been increasing as a share of production and driving market growth since 2013. EIA forecasts that net ethanol exports, which reached nearly 110,000 b/d in 2018, will fall to an average of 90,000 b/d in 2019 and 2020, mainly because ethanol exports to Brazil are not expected to continue at record levels in early 2018. About 70%. U.S. motor gasoline consumption was 9.31 million b/d in 2018, and the EIA expects it to grow by less than 1% to 9.36 million b/d by 2020. Domestic ethanol consumption will contribute about 950,000 b/d to automotive gasoline demand by 2020, equivalent to an estimated 10.2% national blending rate. There is limited demand for ethanol blends higher than E10, while continued regulatory and infrastructure barriers limit the growth of domestic ethanol consumption. (Data from the official website of EIA, 2020, September), from these data, we can see that although the increase of gasoline consumption is very small, it can remain stable.

2.3. Renewable Energy

In 2020, renewable energy production and consumption reached 11.77 and 11.59, respectively, a record high. In terms of hydropower, hydropower production in 2020 is about 1 percent higher than in 2019, but about 9 percent lower than the 50-year average. Total biomass production and consumption in 2020 are both 10% below the 2018 peak. Geothermal energy use in 2020 is almost identical to the highest annual level of geothermal energy production and consumption recorded in 2014. As for oil energy, oil accounts for about 90 per cent of energy consumption in the transport sector, but only 1 per cent of primary energy use in the electricity sector. Therefore, we can see that compared to renewable energy, petroleum energy is not in an advantage in the energy market.

2.4. Solar Energy

Solar energy is one of the fastest growing renewable energy sources in the United States, accounting for 2.53 percent of total U.S. electricity generation in 2018, according to another report. A sharp drop in the price of solar installations has led to a rapid surge in demand for solar panels. And at the 2017 U.S. Conference of Mayors, where more than 250 mayors from different cities signed resolutions, it is expected that many cities will rapidly

shift from fossil energy to renewable energy, which in turn may soon create plenty of opportunities for renewable energy companies.

In 2020, the United States installed more than 105 MEGAwatts of wind energy capacity, accounting for 21% of renewable energy generation, making the United States a major player in the wind energy market, but the United States new energy industry is highly competitive and the United States renewable energy market is partially fragmented. Some of the biggest players operating in the new Energy market include Vestas Wind Systems A/S, Siemens Gamesa Renewable Energy SA, and General Electric Co. And First Solar Inc. But that has left the market so competitive that there is little room, and some companies have even achieved a monopoly.

3. DATA ANALYSIS

3.1. Trend Of Petroleum Industry

From 2020 to early 2021, the petroleum industry has experienced some major setbacks, which is mainly caused by Covid-19 pandemic. The United States consumed 18.1 million barrels (B / D) of petroleum products per day, the lowest level in 25 years. From 2019 to 2020, the petroleum consumption of all energy consuming industries decreased, and the petroleum consumption of transportation industry decreased by a record of 15%. The response to the covid-19 pandemic was the main driver of the decline in petroleum consumption, especially for transportation. The reduction in travel has led to a decline in demand for the oil industry. However, the petroleum industry is recovering rapidly in 2021 [11].

First, for gasoline, after the covid-19 pandemic began in March 2020, the retail price of gasoline in the United States fell below \$2.00/gallon, and until the end of 2020, the price of gasoline was still lower than \$2.50/gallon. Due to the increase of mobility which is caused by COVID-19 vaccination, reduced gasoline inventory and rising crude oil price in the United States, gasoline prices have increased rapidly. From May 2021, the average retail price of ordinary gasoline in the United States increases to more than \$3.00/gallon, up 92 cents per gallon (42 percent) from the same period in 2020 and the highest level since 2014 [12].

Second, for propane, Propane prices in at Mont Belvieu, Texas, the main U.S. hydrocarbon gas liquids (HGL) hub, have increased 120 percent since mid-September 2020, rising from \$0.51 per gallon (gal) to \$1.12 per gal from September 11, 2020 to September 10, 2021. Current wholesale propane prices are at their highest weekly average since February 2014 [13].

3.2. Demand For Petroleum In The Automotive And Chemical Sectors

The demand of the Automotive sector to petroleum is always huge. However, because of the pandemic, exports and imports of some petroleum products consumed primarily as transportation fuels - distillate fuel oil, motor gasoline, and jet fuel - all decline in 2020 compared to 2019. Since the mobility increases, which is caused by COVID-19 vaccination, the demand of the domestic and international markets. This is revealed by the increase of both export and import of the petroleum products. For the export part, exports of petroleum products averaged 5.5 million bpd in the first half of 2021, up from 5.3 million bpd in the first half of last year. For the domestic part, U.S. gasoline prices vary by region, reflecting local supply and demand conditions. Gasoline prices are typically highest on the West Coast region due to limited connectivity to other major refining centers, including the Gulf Coast, tight local supply and demand conditions, and the demand for higher manufacturing cost gasoline specifications. As of August 30, West Coast prices were \$3.94/gallon, up \$1.08/gallon (38 percent) from a year ago. The Rocky Mountain region faces similar logistical constraints as the West Coast, and exceptionally low inventories this year have resulted in retail gasoline prices averaging \$3.65/gallon, up \$1.30/gallon (56%) from 2020. Meanwhile, the Gulf Coast accounted for 54% of the country's total refining capacity, and it produced more gasoline than it consumed. As a result, gasoline prices along the Gulf Coast are often the lowest in the United States. Finally, in the east coast, the largest gasoline demand market in the five regions, the retail price of gasoline was \$3.02/gallon on August 30, an increase of 86 cents (40%) over 2020. Midwest prices rose 88 cents (42%) from 2020 to \$3.00 per gallon this year. Prices in the Midwest and east coast are closest to the average price in the United States [14].

Moreover, the demand of the chemical sector to petroleum products, which is propane is also huge internationally. Current wholesale propane prices are at their highest weekly average since February 2014 because of robust international demand and reduced global supply. Typically, propane prices rise during the winter heating season, when demand increases, and propane inventories decrease. This year, however, due to strong export demand and high margins in the petrochemical industry, prices rose during the summer months when demand is low, and inventories increase. Inventory growth in the 2021 inventory build season (April to September) is slower than in previous seasons because of the reasons above. As a result, because the inventories of propane decrease, the price goes higher and higher. In addition, U.S. imports of propane from Canada have also decreased this year, further contributing to increased inventories and higher prices.

All these reasons combined; the propane price reaches another peak since 2014.

3.3. The Impact Of Price Change In Petroleum Products To Different Sectors

First, rising petroleum prices have played an important role in the automotive industry. The increase in petroleum prices affects automobile companies' profitability. Petroleum has two main uses: the manufacture of gasoline and the production of tires. Oil is a major component in the production of tires. Higher oil prices mean higher costs for manufacturing tires. Tire manufacturers are raising the price of tires due to the increase in oil prices. Both gasoline and tire production affect the automotive industry because the increase in the price of gasoline and tire production affects their profit margins [15].

Second, the increase of price of propane causes problems in heating. Propane is used in homes, business, industrial and agricultural, primarily for space heating, water heating and cooking. Propane equipment includes a space heater, stove, water heater, stove, oven, clothes dryer and pool heater [16]. Because the price of propane increases, the price of the equipment will also increase. The room heating price during the winter will increase as well.

4. LONG-TERM ENERGY OUTLOOK AND FORECAST

4.1. What Are The Factors Affecting The Energy Industry?

First of all, the factors that affect the development of the entire energy industry are mainly depend on market demand and government policy. In terms of market demands. Global energy demand has been heavily impacted by the ongoing restrictions caused by the COVID-19 pandemic. However, energy demand changes have varied around the world. In the United States and the European Union, it is projected that coal demand will fall an estimated 1.45 percent and 1.9 percent, respectively, in 2021 relative to 2019 levels. In contrast, coal demand in China will increase by more than three percent. Oil demand has been the most negatively affected energy source due to the significant restrictions on mobility. Meanwhile, renewable energy demand has experienced growth during the pandemic. In 2020, global primary energy demand fell four percent year on year.

The control measures for the COVID-19 and the actual impact of the COVID-19 in each country are different. The information mainly focused on the European Union, India, China, and the United States. Global non-renewable resources including oil and coal are all experiencing negative growth as demand decreases. Oil and coal have been press harder in some

high COVID-19 infected countries, such as the United States. To study the energy sector in 2023, we have to consider the reality of market demand and how big a market there is for a product.

4.2. Expectations For The World Energy Industry

4.2.1. America Sector

About the development forecast of the US energy, The focus point will consider, market recovery and analyze the data. In 2020 states, cities, utilities, and businesses continued to announce or pursue decarbonization plans, despite the onset of a global pandemic and an economic recession. Even without a direct incentive for green infrastructure development in the economic stimulus measures passed in response to COVID-19, clean energy demand in the United States proved resilient as renewables and storage recorded declining costs and rising capacity and usage factors. What's more, renewables edged out other electricity generation sources when electric demand fell this year. As of early December, the share of renewables had exceeded that of coal in generation for 153 days compared with 39 days in 2019. According to the US Energy Information Administration (EIA), electricity consumption will likely fall by 3.9% year over year in 2020 and increase 1.3% in 2021.

4.2.1.1. Renewable Energy

Renewable growth may accelerate in 2021 as the new administration starts to execute on a platform that includes re-joining the Paris Climate Accord, investing \$2 trillion in clean energy, and fully decarbonizing the power sector by 2035 to achieve a larger goal of net-zero carbon emissions by 2050. A new administration is expected to wield its executive authority to facilitate the deployment of renewables. This may include powers over emissions, public lands, procurement, foreign relations, trade, and agency appointments [17].

To a large extent, Data shows that The new energy industry and renewable energy industry in The United States will have a good development prospect with The encouragement and support of government policies, and this industry will not be affected by COVID-19. With The United States re-joining The Paris Agreement, the renewable energy industry will receive a large market and demand. At this point, the renewable energy industry will keep growing.

Wind energy, or electricity generated by wind-powered turbines, is almost exclusively consumed in the electric power sector. Wind energy accounted for about 26% of U.S. renewable energy consumption in 2020. Wind surpassed hydroelectricity in 2019 to become the single most consumed source of renewable energy on an

annual basis. In 2020, U.S. wind energy consumption grew 14% from 2019. Hydroelectric power, or electricity generated by water-powered turbines, is almost exclusively consumed in the electric power sector. It accounted for about 22% of U.S. renewable energy consumption in 2020. U.S. hydropower consumption has remained relatively flat since the 1970s, but it fluctuates with seasonal rainfall and drought conditions. Wood and waste energy, including wood, wood pellets, and biomass waste from landfills, accounted for about 22% of U.S. renewable energy consumption in 2020. Industrial, commercial, and electric power facilities use wood and waste as fuel to generate electricity, produce heat, and manufacture goods. Biofuels, including fuel ethanol, biodiesel, and other renewable fuels, accounted for about 17% of U.S. renewable energy consumption in 2020. U.S. biofuel consumption fell 11% from 2019 as overall transportation sector energy use declined in the United States during the COVID-19 pandemic. Solar energy accounted for about 11% of U.S. renewable energy consumption in 2020. Solar photovoltaic (PV) cells, including rooftop panels, and solar thermal power plants use sunlight to generate electricity. Some residential and commercial buildings use solar heating systems to heat water and the building. Overall, 2020 U.S. solar consumption increased 22% from 2019 [18].

4.2.1.2. Non-renewable Energy

Renewable energy in the United States has a lot of room for long-term growth, while non-renewable energy will gradually decline, which is not affected by COVID-19, but due to the country's long-term policies. In the short term, there may be a big increase due to COVID-19, but there will be a rebound when COVID-19 is fully over. Renewable energy can be incrementally increased by 10-20% per year (according to EIA), and at this rate, renewable energy must be worth investing in.

4.2.2. China Sector

4.2.2.1. Non-renewable Energy

It will be reasonable to believe that in the unrenovable aspect China will still have a long-term market increasing in the next several years. Base on the data from IEA, China is the world's largest consumer and producer of primary energy as well as the world's largest emitter of energy-related carbon dioxide (CO₂). China surpassed the U.S. in primary energy consumption in 2010 and CO₂ emissions in 2006. In 2018, China was responsible for 21% of total global primary energy use (IEA, 2019a) and about 29% of global energy-related CO₂ emissions (IEA, 2019b). China's 1.4 billion people consume energy to meet their daily needs, including heating and cooling of their living and working places, fuel for cooking their meals, electricity to power their appliances and equipment, and fuels for both their own

personal transportation as well as the products they purchase. The Chinese government intends to reduce non-renewable energy, but in fact, the demand in this area is also extremely large. We cannot see a large increase in the long-term, but it may be non-renewable in the longer-term development goal of 30-50 years. Energy markets will be press [19].

4.2.2.2. Renewable Energy

Static shows China renewable energy increasing will mainly focus on hydropower segment area, based on the data that the hydropower segment accounted for a significant market share in 2019, China, the world's largest energy consumer, plans to reduce its CO₂ emission to 5150 million metric ton by 2035 and 2,600 million metric ton by 2050. Moreover, the Chinese government plans to increase the share of renewable energy to nearly 37% by 2035 and 58% by 2050 in its energy mix. Thus, the country's objective of reducing CO₂ levels and increasing renewable share in the energy mix is expected to create an opportunity for the market to grow in the future [20].

4.2.3. Europe Sector

4.2.3.1. Non-renewable Energy

The static cover by Eurostat shows that Gross available energy in the European Union in 2019 slightly decreased compared to 2018 (-1.7 %). Oil (crude oil and petroleum products) continued to be the most significant energy source for the European economy, despite a long-term downward trend, while natural gas remained the second-largest energy source. Oil used was again on the decline, after a slight increase in the period between 2014 and 2017, whereas a certain fluctuation is observed in natural gas, with levels back on the rise in 2019. The contribution of renewable energy sources shows a stable growth, having already surpassed solid fossil fuels in 2018 and gaining further ground in 2019. Solid fossil fuels decreased by 19.7 % in 2019 and reached the record lowest value since 1990 [21].

The decline in non-renewable energy in Europe is very small. Although it is gradually in a downward trend, the dependence on non-renewable energy will never be reduced. In the future investment market, non-renewable energy is still a strong development market, and it will gradually improve in the post-epidemic period.

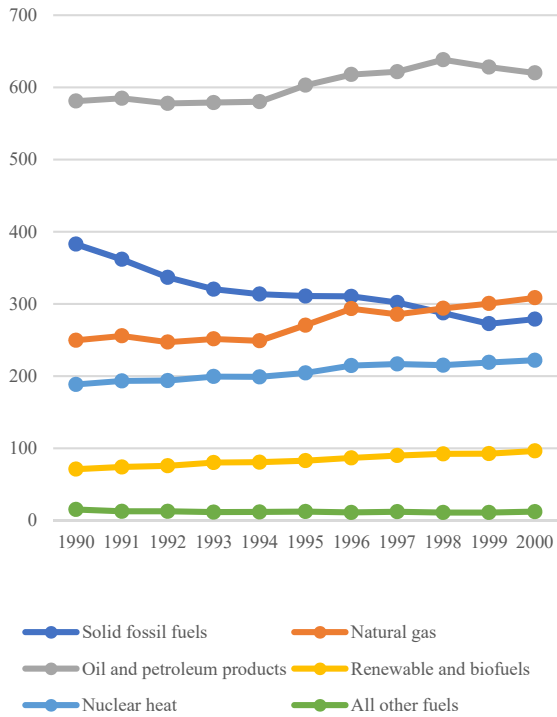


Figure 1 Gross available energy EU 1990-2000[22].

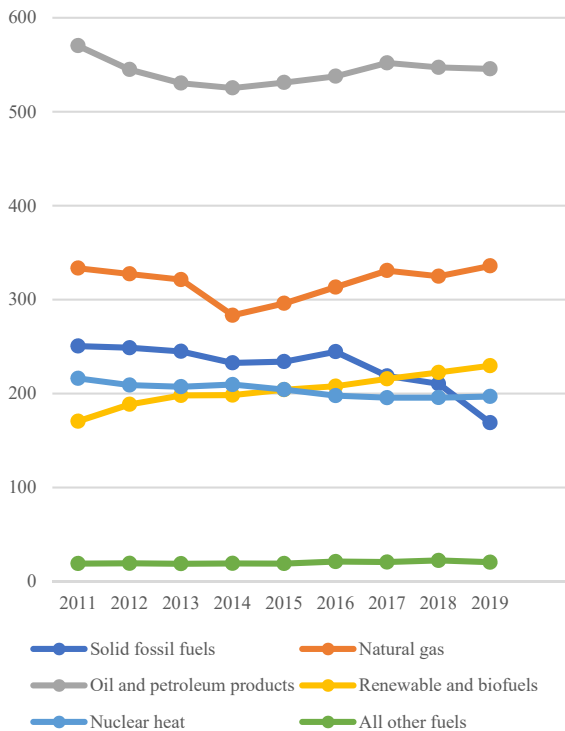


Figure 2 Gross available energy EU 2000-2010[23].

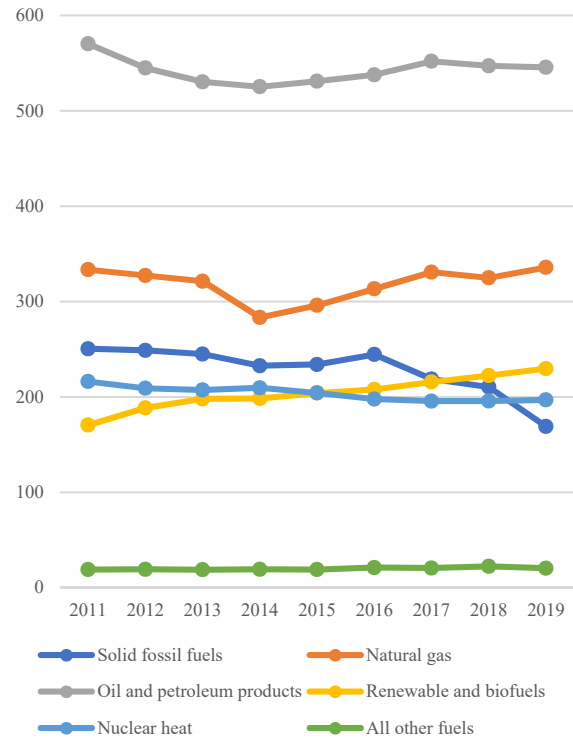


Figure 3 Gross available energy EU 2010-2019[24].

4.2.3.2. Renewable Energy

The population density of Europe is sparse, and many sustainable energy sources are in the form of individualization and fragmentation. In a small number of countries, unified development can be achieved, such as the United Kingdom, Spain, France, Germany, Portugal, Italy, Slovakia, etc. But in some places restricted by geographical conditions, such as Ireland, Morocco, Switzerland, Finland, and Iceland. This limited development has left the sustainable energy industry without any substantial expansion. The main reason is that the population is sparse and does not require a large amount of production capacity. In terms of investment, it is recommended to start from some markets like the United Kingdom, Russia, Germany, and not some small start-up companies.

4.3. Conclusion of Energy Market Forecast.

On the long-term development, many developed and developing countries, such as NATO, BRICS, EU, and Russia, are vigorously encouraging renewable energy sources such as wind, water, and solar energy. These countries will have a long-term growth development for renewable energy, and for non-renewable energy such as coal and oil, we still maintain a certain degree of dependence on these energy sources, such as military, aviation, shipping, and production. These resources are not available, but with more alternative solutions, there will not be any increase problems in the short term.

5. CONCLUSION

Renewable energy has some investment values, because it is the direction of development of the world. Some countries and regions have a great demand for the non-renewable energy such as China, Russia, NATO, the EU. At present, non-renewable energy is still worth investing. However, for countries that are not very dependent on non-renewable energy. This sector is certainly not strongly supported. Based on the above views and data analysis. The results indicates that the demand of non-renewable energy is investable, but it's hard to get a stable and long-term return. However, the renewable energy has a steady long-term payoff.

REFERENCES

- [1] Fu, M., & Shen, H. (2020). COVID-19 and Corporate Performance in the Energy Industry. *Energy RESEARCH LETTERS*, 1(1), 12967.
- [2] Xiong, H., Shi, W., Xu, S., & Shen, H. (2021). Impact of COVID-19 on Corporate Liabilities in the Energy & Power Industry. *Energy RESEARCH LETTERS*, 2(1), 18936.
- [3] Hoang, A. T., Nižetić, S., Olcer, A. I., Ong, H. C., Chen, W.-H., Chong, C. T., ... Nguyen, X. P. (2021). Impacts of COVID-19 pandemic on the global energy system and the shift progress to renewable energy: Opportunities, challenges, and policy implications. *Energy Policy*, 154, 112322.
- [4] Yun, X., & Yoon, S.-M. (2019). Impact of oil price change on airline's stock price and volatility: Evidence from China and South Korea. *Energy Economics*, 78, 668–679.
- [5] Brons, M., Nijkamp, P., Pels, E., & Rietveld, P. (2008). A meta-analysis of the price elasticity of gasoline demand. A SUR approach. *Energy Economics*, 30(5), 2105–2122.
- [6] Ketterer, J. C. (2014). The impact of wind power generation on the electricity price in Germany. *Energy Economics*, 44, 270–280.
- [7] Sönnichsen, N. (2021, June 14). Global primary energy demand change 2019-2021, by select country [Lecture notes]. *statista*. DOI: <https://www.statista.com/statistics/1243592/change-in-primary-energy-demand-globally-by-fuel-and-country/#statisticContainer>
- [8] Desilver, D. (n.d.). Renewable Sources. DOI: <https://www.pewresearch.org/fact-tank/2020/01/15/renewable-energy-is-growing-fast-in-the-u-s-but-fossil-fuels-still-dominate/>
- [9] The China Renewable Energy Market. (n.d.). Mordor Intelligence. DOI: <https://www.mordorintelligence.com/industry-reports/china-renewable-energy-market>
- [10] Baidu. (n.d.). [https://baike.baidu.com/item/treasure of crude oil in warehouse event / 50025085? Fromtitle = crude treasure event & fromid = 50005896 & fr = Aladdin](https://baike.baidu.com/item/treasure%20of%20crude%20oil%20in%20warehouse%20event%20/%2050025085?fromtitle=%20crude%20treasure%20event%20&fromid=50005896&fr=Aladdin)
- [11] Hack, K., & French, M. (2021, September 17). The U.S. exported slightly more petroleum than it imported in the first half of 2021 DOI: [https://www.eia.gov/todayinenergy/detail .php?id=49596](https://www.eia.gov/todayinenergy/detail.php?id=49596)
- [12] This Week In Petroleum Summary Printer-Friendly Version - U.S. Energy Information Administration (EIA) -. (2018). *Eia.gov*. DOI: https://www.eia.gov/petroleum/weekly/archive/2021/210804/includes/analysis_print.php
- [13] This Week In Petroleum Summary Printer-Friendly Version - U.S. Energy Information Administration (EIA) -. (2018). *Eia.gov*. DOI: https://www.eia.gov/petroleum/weekly/archive/2021/210804/includes/analysis_print.php
- [14] Hack, K., & French, M. (2021, September 17). The U.S. exported slightly more petroleum than it imported in the first half of 2021 DOI: [https://www.eia.gov/todayinenergy/detail .php?id=49596](https://www.eia.gov/todayinenergy/detail.php?id=49596)
- [15] The Economic Impact of Rising Oil Prices in Automotive Industry - Law Essays. (2020, March 30). *LawAspect.com*. <https://lawaspect.com/economic-impact-rising-oil-prices-automotive-industry/>
- [16] What is Propane Gas - Uses, Properties + More - Elgas. (2019, October 29). *ELGAS - LPG Gas for Home & Business*. <https://www.elgas.com.au/blog/1689-what-is-propane-gas/>
- [17] 2021 renewable energy industry outlook [Fact sheet]. (n.d.). *Deloitte*. Retrieved September 18, 2021, from <https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/renewable-energy-outlook.html>
- [18] Francis, M. (2021, June 16). The United States consumed a record amount of renewable energy in 2020 [Fact sheet]. *EIA*. Retrieved September 18, 2021, from <https://www.eia.gov/todayinenergy/detail.php?id=48396>
- [19] The China Renewable Energy Market. (n.d.). *Mordor Intelligence*. Retrieved September 22, 2021, from <https://www.mordorintelligence.com/industry-reports/china-renewable-energy-market>

- [20] Zhou, N., & Khanna, N. (n.d.). China Energy Group [Fact sheet]. Retrieved September 22, 2021, from <https://china.lbl.gov/china-energy-outlook-2020#:~:text=The%20new%202030%20goals%20are,generation%20from%20non%20fossil%20sources>
- [21] Eurostat. (2020, May). Gross available energy, EU, 1990-2019 </>. Retrieved October 7, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview
- [22] Eurostat. (2020, May). Gross available energy, EU, 1990-2019 </>. Retrieved October 7, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview
- [23] Eurostat. (2020, May). Gross available energy, EU, 1990-2019 </>. Retrieved October 7, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview
- [24] Eurostat. (2020, May). Gross available energy, EU, 1990-2019 </>. Retrieved October 7, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview