

Oil and its position in the future of energy carriers taking into account supply and demand

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By knowing energy carriers, human beings have made extensive efforts to extract and apply them in industry and economic development. These resources played an important role in the development of the industrial revolution, which led to the development of industry and technology, and global dependence on fossil fuels, especially oil, expanded rapidly in response to the need. With vast investments in alternative sources of renewable energy to address the crisis caused by the production and use of energy in terms of resource constraints and environmental threats, world life is affected by the need for energy and will be significantly dependent on fossil fuels in the future. The results of this paper indicate that use of oil and its derivatives is currently the first because of economic dependence of countries, and in the future, despite the constraints on resources, will play the most important role in global demand and supply.

Keywords: Oil; energy; demand; supply

Introduction

Industrial Revolution was a source of enormous changes in the world, especially in the energy sector. Population increase affected by the positive impact of technology on health and longevity, the development of plants, and more need to labor caused migration from the countryside to the city and created a new style of life for urban and rural communities that its most important outcome is great need to energy and its various uses. What is more important in this regard is considering sources of energy supply. Use of available resources while leads to the running out of the resources, causes crisis in environmental dimensions. Now, different types of energy, status of resources, and developments resulting from their use, and their need are studied in the below.

Different types of energy

In general, energy resources in the world are divided into two categories

A) Non-renewable energy sources including fossil fuels (oil, gas and coal) and nuclear energy

B) Renewable energy sources including solar, wind, hydroelectric, geothermal, biomass (biofuels) and tidal.

Prediction of the demand for energy carriers

According to World Energy Outlook (Figure 1), demand for primary energy will be accelerated by 2035, with petroleum, natural gas and coal fossil fuels being the first in primary energy demand.

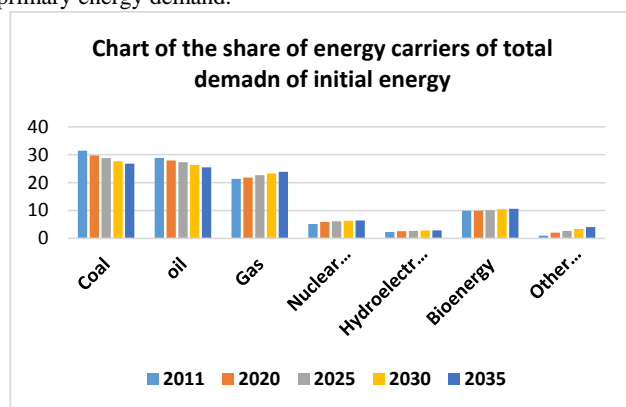


Figure 1. Figure shows the share of energy carriers from the total initial demand in 2011 and the forecast by 2035.

According to the data from the above figure, from 2011 to 2035, the highest demand will be for natural gas with 1332 million tons of crude oil and coal with 655 million tons of crude oil and then, crude oil with 553 million tons. At a later stage, demand for other renewable energies is significant.

Contribution of different regions in increasing global demand for energy

According to Figure 2, Non-Oeco Asia countries has the largest share in increasing energy demand with more than double that of other countries demanding energy.

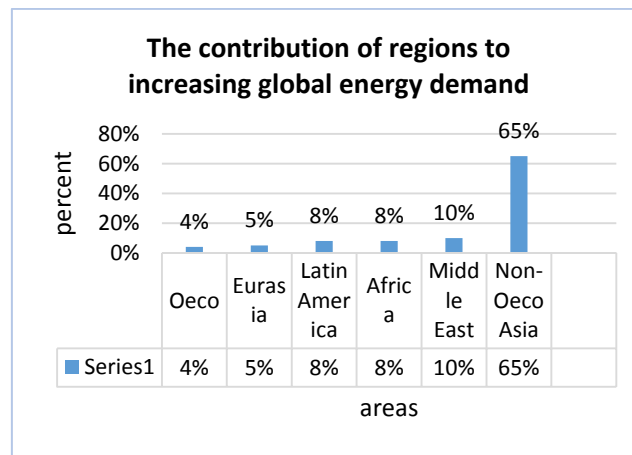


Figure 2. The contribution of regions in increasing global energy demand drawing the author.

With this situation, the increasing trend of energy consumption, especially oil, continues throughout the world. Despite all the extensive research and investment that has been made around the world to produce alternative and renewable energies, oil and gas consumption has continued to prevail in recent years, and the economic dependence of countries on the supply of oil and gas is still increasing.

Fossil fuels (Non-renewable energy)

At present, fossil fuel accounts for more than 70 percent of the world's energy consumption, including oil, gas and coal. In this paper, based on the issue under review, oil and reserves and the rate of supply and demand are examined.

Oil and global energy crisis

With increasing global population growth and limited energy resources, all countries face energy problems. Energy is a major issue for all people. Energy has penetrated all aspects of human society and affected its various aspects from daily family life to global and international politics and national development plans. Energy has become very important in recent years due to the phenomenon called "the global energy crisis" (Saghafi, 2009).

Forecasting the limited important resources and reserves of energy such as oil and gas and their excessive consumption and increasing world population in the future and, consequently, increasing energy demand has raised concern for economic development and the availability of alternative sources.

Excessive and irregular consumption of oil has created worries. Most importantly, oil supplies will be at their lowest level, and the planet will not be able to replace it in the natural cycle in the near future.

Oil reserves

Stabilized world oil reserves in 2014 were 1700 million barrels with a lifetime of 52.5 years. In 2013, world oil consumption surpassed its production, resulting in a decline in world oil inventories. The United States, with a share of 19.9 percent of the world's crude oil consumption, is the world's first oil consumer. Among the various regions of the world, the Middle East with the stock of 8.71 billion barrels of reserves, equivalent to 47.7 percent of the total stabilized world oil reserves, has been ranked first. The regions of Central and South America, North America, Europe and Eurasia, Africa, and Asia and the Pacific are next in ranking with 19.4%, 13.7%, 9.1%, 7.6%, and 2.5% of stabilized world oil reserves, respectively. The most significant changes in the oil reserves in 2014 in the regions and countries of the world are as follows. The average life expectancy of the world's crude oil is estimated to be 52.5 years. According to the oil use in 2014, the life span of oil in Central and South America is more than 100, in the Middle East is 77.8, in Africa 42.8, in North America 34.0, in Europe and Eurasia 24.7, and in Asia and the Pacific is 14.1 years. It should be noted that the life of oil reserves of all OPEC countries, with the exception of Angola, Algeria and Qatar, reaches more than 40 years (5).

Long-term outlook for global oil demand

Table 1 shows the global demand for oil from 1990 to 2012 and the forecast for 2035. This trend will increase by an average of 8 million barrels per day between 1990 and 2020, but this trend will slow down from 2020 to 2035.

2035	2030	2025	2020	2012	2000	1990	Year
101.4	99.5	97.4	95.4	87.4	76.3	66.3	Rate (million barrels per day)

Table 1. Consumption and long-term outlook for global oil demand (drawn using World Energy Outlook, 2013).

According to the above Table 1, it is expected to increase from 87.4 million barrels per day in 2012, with an annual growth of approximately 0.8 percent, to 101.4 million barrels per day by 2035.

To better illustrate the issue, the Figure 3 represents the above results in graphical form. In this figure, the difference in years for the global demand for oil, which is increasing, is easily comparable.

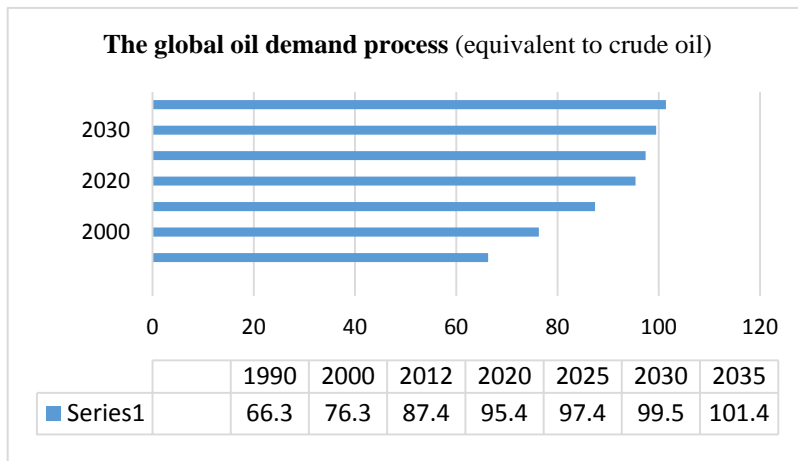


Figure 3. Global oil consumption and demand trend drawn by author using (World Energy Outlook, 2013).

Production of oil products in 2004 and 2012-2014

The world's oil production has had the greatest growth and changes in 2014 compared to 2004, as shown in Figure 4, which indicates a dramatic increase. In this comparison, the Middle East accounts for almost 2.31% of total production in 2014. At the same time, the lowest share belongs to African countries with 9.7%. Chart Figure 4 shows changes in 2013 (in percent) and changes in 2014 (in percentage terms) and the share of the total badge. The average chart lines indicate an increase in global growth in these courses.

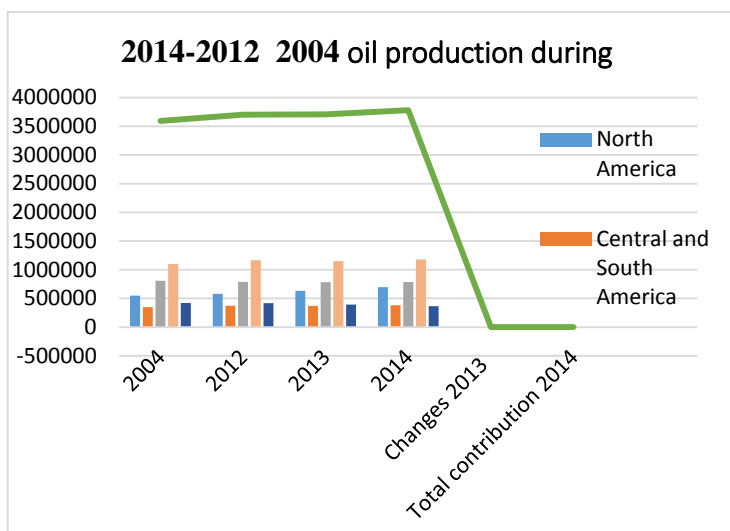


Figure 4. Oil production in 2004 and 2012-2014 drawn by author using (World Energy Outlook, 2013).

Factors affecting supply and demand for oil

Some of the major factors affecting global oil demand more than others are economic growth in different countries, which is a stimulus to increase energy demand, and the other is the growth of the population, both of which are factors affecting demand increase. Saving or increasing the returns, on the one hand, and rising prices, especially consumption fuel in the transport sector, on the other hand, directly reduce demand by decreasing relative consumption. Moreover, the existence of alternative types of energy should also be considered as one of the effective factors on oil consumption.

Fluctuations in crude oil prices and events affecting it

By examining the price of crude oil since its discovery, it has always seemed that there have been significant fluctuations in the price of this strategic commodity for various reasons (including political ones). Figure 5 shows that given the price adjustments based on inflation (2010 dollar), from 1947 to 2011, the crude oil price was below \$ 20.53 during half of the target period. In addition, as it is known, from 1973 to 1981, American control over its domestic oil production led to the difference between the price of imported oil of its refineries and the average price of oil purchased from domestic producers.

Crude oil prices 1947-October 2011

The United States, with its own policy of 1973 to 1981, shown in red in the chart of Figure 5 tried to control its oil price and control it less than the global price.

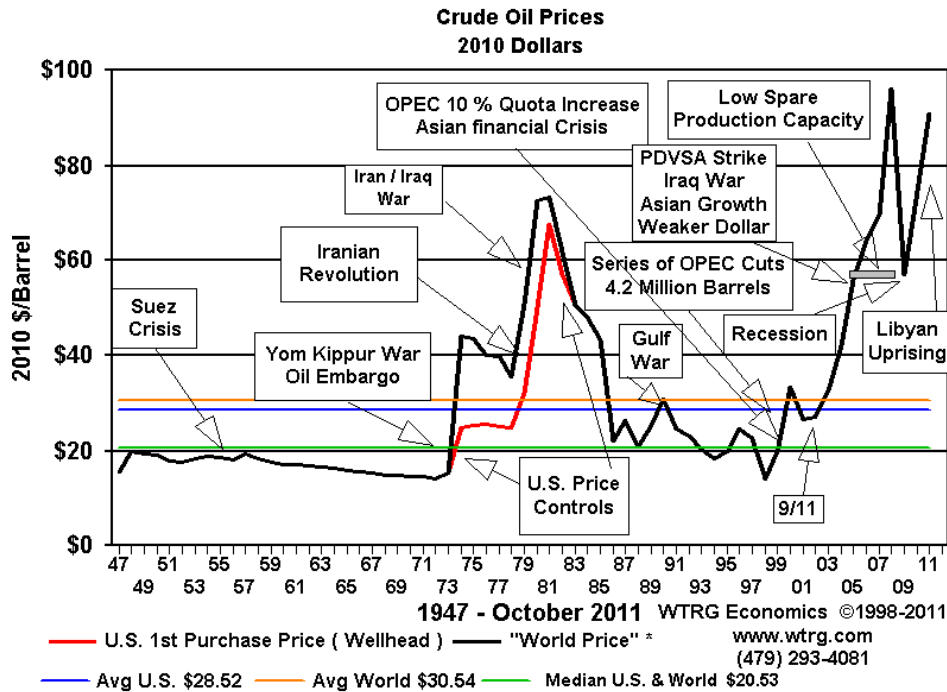


Figure 5. Crude oil prices and events affecting it during 1947-2011.

The world's oil consumption trend

As illustrated in Figure 2, oil consumption in the world has risen overall, except in cases where it has declined for various reasons (Figure 6).

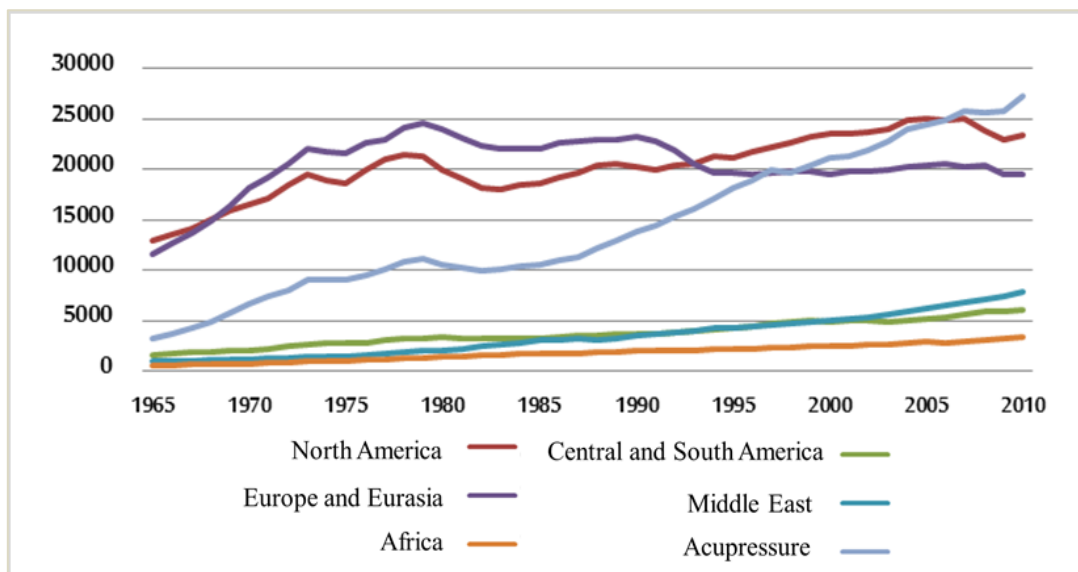


Figure 6. World oil consumption during 1965-2010.

Comparison of crude oil with other essential commodities

According to the monthly OPEC report for 2011 on the Basic Goods Index from 2009 to 2011 in Figure 7, despite fluctuations influenced by different months and years, crude oil has seen a dramatic upsurge compared to other essential commodities such as fuel, metals, food, and non-fossil goods.

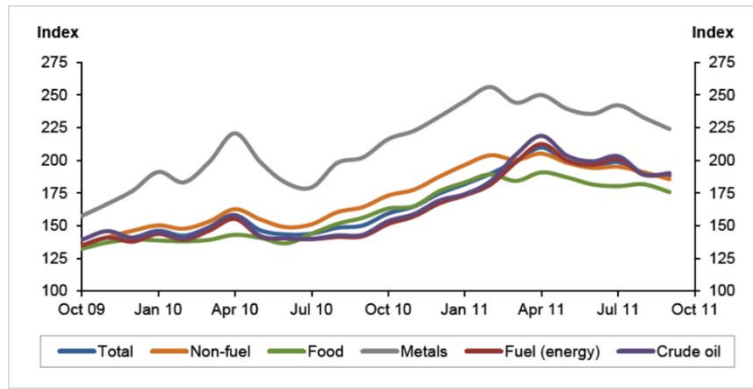


Figure 7. Major commodity price indexes, 2009-2011.

Forecast of demand for oil by 2035

Demand forecasting is affected by economic, political, demographic, technical and technological issues. Forecasts in Figure 8 show that in the coming years, the development of Asian countries will have the greatest impact on demand.

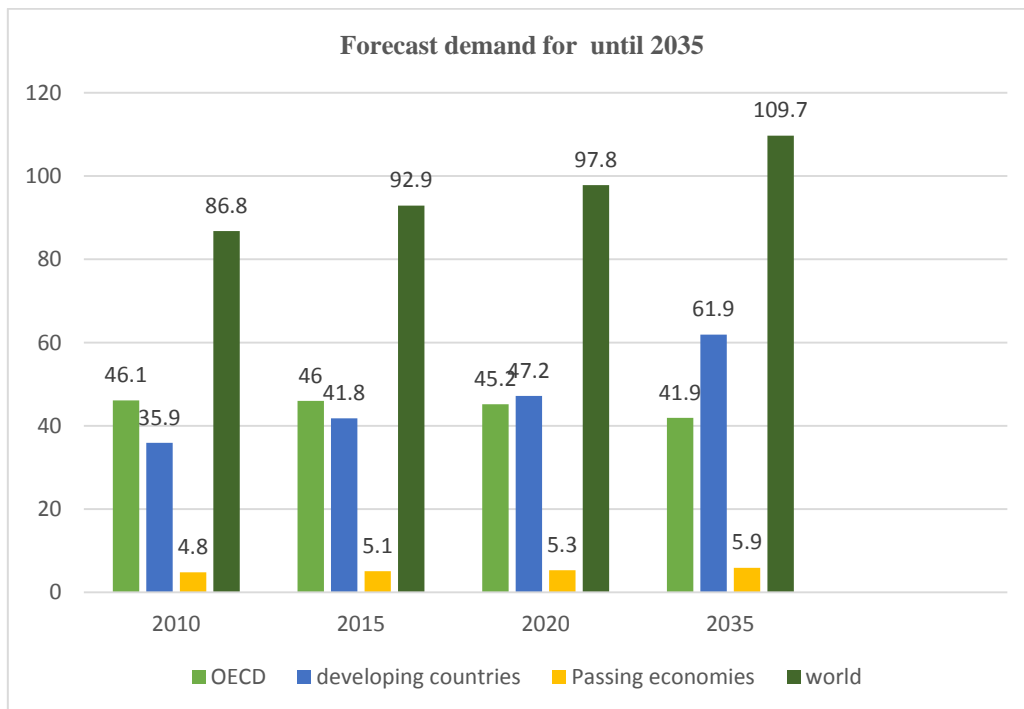


Figure 8. Outlook for oil demand by 2035 drawn by author using (OPEC, 2011).

Forecast of oil supply up to 2035

Supply forecasting, similar to demand, is affected by effective economic, political, demographic, technical, and technological issues. Figure 9 shows that in the years to come, especially by 2030, the supply of oil is significant, although it is lower than its demand and non-OPEC countries will have the largest impact on and contribution in demand.

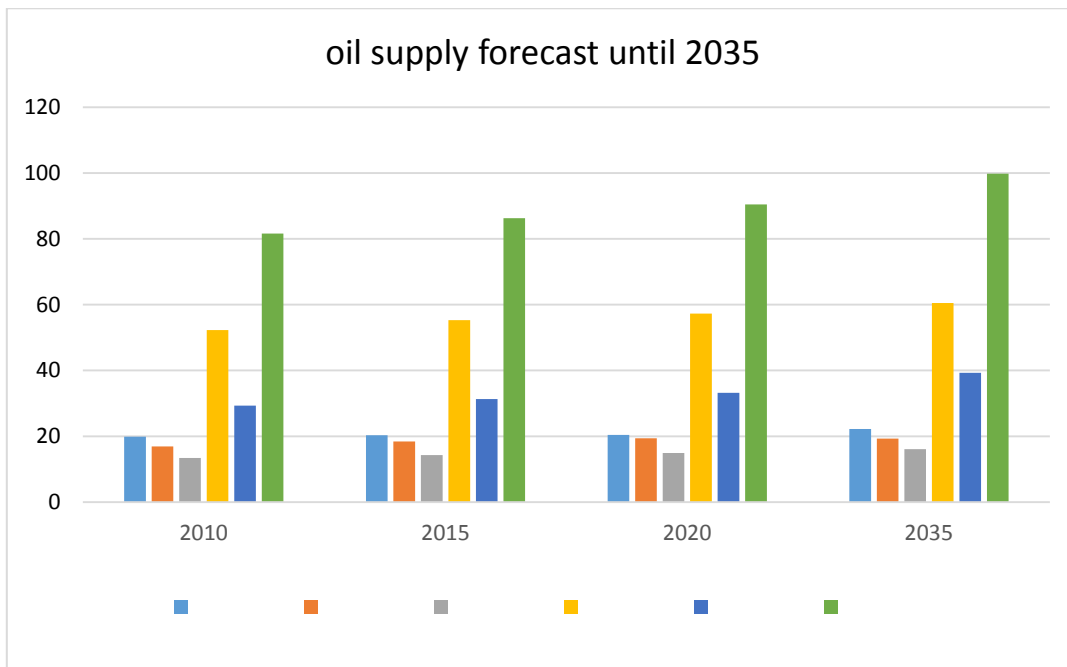


Figure 9. Oil supply forecast by 2035 (drawn by author using (OPEC, 2011)).

Comparison of supply and demand by 2035

According to Figure 10 the demand and supply outlook is remarkably different.

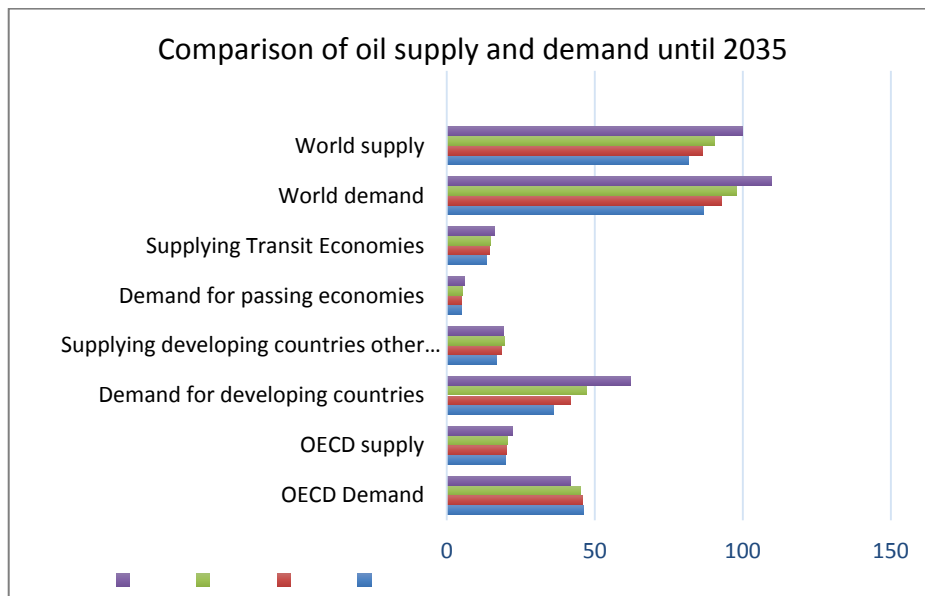


Figure 10. Outlook for oil supply and demand up to 2035 drawn by author using (OPEC, 2011).

Comparison of oil supply and demand forecast comparisons from 2010 to 2035

According to Figure 11, the comparison of oil supply and demand forecasts from 2010 to 2035 has a bullish trend, with the second-order equation being as follows.

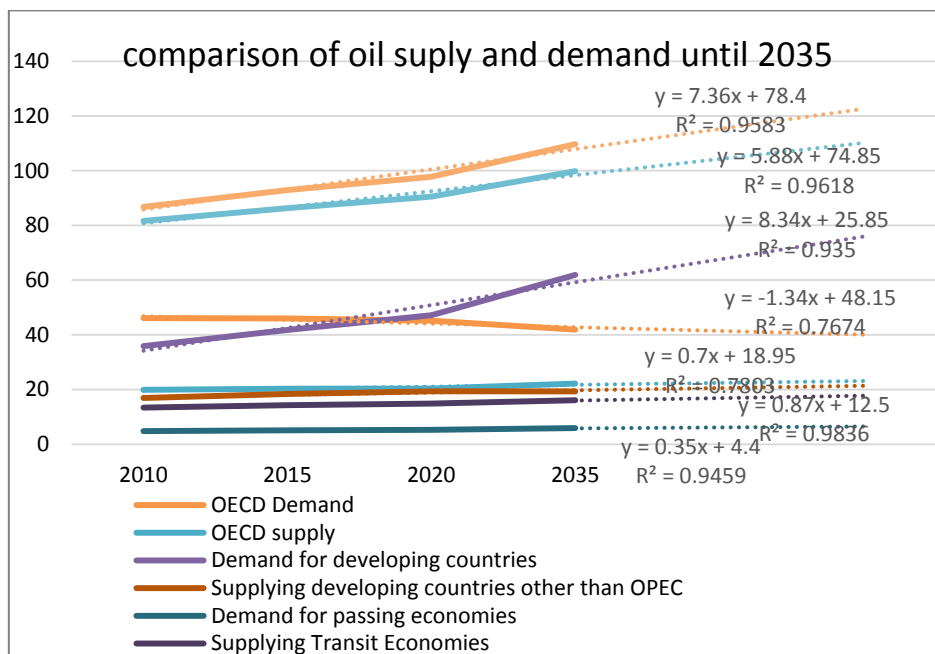


Figure 11. Comparison of supply and demand forecasts from 2010 to 2035.

Diagram analysis

Summary of comparison of supply and demand forecasts for oil from 2010 to 2035. Demand of OECD countries has a negative coefficient and a second-order linear equation $y = -1.34x + 48.15$, indicating a divergent and decreasing coefficient, but the supply of these countries is increasing, while demand of developing countries has a second-order linear equation $y = 8.34x + 25.85$ and supply of developing countries has a second-order linear equation $y = 0.82x + 16.45$. The second-order linear equation coefficient indicates the difference between demand and supply for developing countries. The global oil demand is on the rise, and has a second-order equation $y = 7.36x + 78.4$ that has positive convergence. Oil supply trend is on the rise and its prediction figure has a second-order equation $y = 7.36x + 78.4$, which has a positive convergence coefficient.


Conclusion

With increasing growth of energy consumption, especially oil, throughout the world, despite all the extensive research and investment that has been made around the world to produce alternative and renewable energies, oil and gas consumption has continued to prevail in recent years, and the economic dependence of countries on the supply of oil and gas is still on the rise. Increasing world population in the future and, consequently, increasing energy demand has raised concern for economic development and the availability of alternative sources considering the limited energy sources and its excessive consumption. Factors affecting global oil demand more than others are economic growth of different countries, which is a stimulus to increase energy demand, and the other is the growth of the population, both of which are factors affecting demand increase. Saving or increasing the returns, on the one hand, and rising prices, especially consumption fuel in the transport sector, on the other hand, directly reduce demand by decreasing relative consumption. At present, the oil industry is very widespread, and it has always a significant cash flow. In the coming years, especially until 2030, the supply of oil is significant, although its amount is less than demand. Meanwhile, non-OPEC countries have the most impact on and contribution in demand. The results of the paper show that simultaneously with economic growth, demand for oil is directly linked to this growth in different countries, and its supply will increase. This, in spite of attempts to replace oil, continues to play the most important role in supply and demand.

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