

O 14. INVESTIGATION OF THE CHANGE IN THE USE RATES OF NON-RENEWABLE ENERGY RESOURCES, WHICH HAVE A MAJOR ROLE IN AIR POLLUTION IN KONYA PROVINCE, BY YEAR

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ABSTRACT: In the universe we live in, air pollution is now reaching the level of affecting not only living life but also the entire cycle on an objective basis. Therefore, it is necessary to realize pollutant factor limits with strict measures with global unity. Establishing incentive policies for the use of renewable, clean energy resources with global unity will ensure a healthier society and a strong economy. Almost all scientific authorities agree that the world is getting warmer and that this warming has a negative impact on air quality and the life cycle. This situation, called global climate change, is seen as one of the biggest environmental and socioeconomic phenomena threatening our century. In this context, "the effects of greenhouse gases on climate change" is a topical issue in today's world and occupies a very large place in today's air pollution population. Among a number of factors that cause air pollution, the most important ones are undeniably non-renewable energy sources. The aim of this study is to investigate the role of non-renewable energy sources, which are among the biggest parameters causing air pollution in Konya province, and how much the usage rates have changed over the years.

Keywords: Konya, Air Pollution, Non-Renewable Energy sources

1. INTRODUCTION

Konya has 2.75% of Turkey's total population with a population of 2,296,347 as of 2022. It ranks 7th among 81 provinces in terms of population and gross domestic product (GDP) (2.1% of Turkey's GDP), and is the largest province in Turkey in terms of surface area. Konya province is a city with 13 organized industrial zones, 9 of which are active, and a total of 77 industrial sites, including 17 small industrial sites. Especially the industrial enterprises operating in Konya have a lot of sectoral diversity in terms of the number of workplaces. Konya has 45% of the domestic market in the metal processing. It can produce 90% of the parts used in tractors and 100% of the parts used in agricultural machinery and holds 65% of the domestic market in this field. In the automotive sub-industry sector, more than 70% of the parts and equipment of many brand models are produced in Konya. Konya provides 10% of Türkiye's grain production. Ethyl alcohol production alone meets 56% of our country's needs. 20% of the city's electricity consumption is met by renewable energy sources. In Konya, which has made significant progress in sectoral diversity, the number of enterprises registered in the industrial registry, which was 8,439 in 2020, reached 9,044 as of 2021. Rapid economic growth, urbanization, population growth and increasing welfare levels in our country cause an increasing need for energy (ÇŞİDB, 2018; ÇŞİDB, 2019; ÇŞİDB, 2020; ÇŞİDB, 2021; ÇŞİDB, 2022). Our limited natural resources have become unable to meet our unlimited needs. Increasing the number of sensitive consumers by ensuring that our people adopt a sustainable lifestyle, Our first duty is to ensure efficient use of our natural resources by preventing waste, to focus on renewable energy sources in every field rather than those that cannot renew themselves, and to reduce environmental risks and contribute to the economy (KTO (Konya Ticaret Odası), 2022). Cities where population, production and consumption are dense have high vulnerability due to their effects on air pollution. Cities affect not only their own borders, but also a large area with which they interact as a result of activities such as trade and transportation. Cities where economic activities and assets are concentrated are also exposed to disaster risks caused by air pollution and experience significant socio-economic losses. The population of cities around the world continues to increase rapidly, and it is predicted that the urban population will be 8.5 billion in 2030, accounting

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for more than 70% of the total world population. In Turkey, while the total population increased 4.5 times between 1940 and 2022, the population living in cities increased 11.5 times until 2007, which was before Law No. 5747. In Turkey, in 2022, the ratio of those living in provincial and district centers to the total population was reported as 93.4%, and the ratio of those living in towns and villages to the total population was reported as 6.6%. Based on these data, it can be seen that the majority of the population lives in cities. In order to meet the ever-increasing needs in cities, the use of non-renewable energy sources, especially fossil fuels, is starting to increase every year. As a result of these uses, the world's own resources are coming to the point of depletion, and as a result of its use, it causes air pollution at visible levels and threatens living life. It is aimed to provide an infrastructure regarding the inventory, usage areas and usage rates of non-renewable energy resources by conducting a literature study in order to determine both the use of non-renewable energy resources, the quantitative change over the years and the negative impact on air pollution in this process sector (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

2. MATERIALS AND METHODS

In this study, the use rates of non-renewable energy resources, which are an important problem on the planet in Konya province, will be investigated, their effects on air pollution will be examined, and the findings will be discussed and the results will be discussed by revealing the official values in quantitative terms. The detailed content of the subject of the research is to examine the rapid increase in the world's population, the increase in the level of industrialization with the development of technology, and the emergence of more energy needs, and their role in air pollution. Energy consumption, which is an indicator of the development level of countries, has become an important issue that must be kept under control. In order to use energy effectively in industry and industry, efficient use of existing energy production systems, finding cheap and clean energy sources alternative to fossil-based energy sources, minimizing and eliminating negative environmental impacts are among the topics that are intensively researched today. Fossil-based energy resources are used extensively in all cities around the world to meet most of their energy needs, either directly or by converting them into electrical energy. Fossil-based energy production and use cause many negative effects on human and environmental health. The use of fossil fuels for heating, power generation, in motor vehicles, industrial processes and by burning solid fuels are the main sources of air pollutants released into the atmosphere in cities. The most common pollutants in the urban environment are sulfur dioxide (SO₂), nitrogen oxides (NO or NO₂, often called NO_x), carbon monoxide (CO), ozone (O₃), particulate matter (PM) and lead (Pb). It is exceeding. As a result of the emission of CO₂, which is the inevitable product of the combustion technology on which fossil fuel use is based, the amount of CO₂ in the atmosphere has increased approximately 1.3 times in the last century and is gradually increasing. In the next 50 years, this amount is likely to increase 1.4 times compared to today. Due to the greenhouse effect caused by carbon dioxide in the atmosphere, the world's average temperature has been 17.23 °C in the last century. In addition, the use of fossil-based solid fuels for heating is an important source of these pollutants. Air pollution in our cities increases, especially with the beginning of the warming period. Using low-quality coal for heating, not using appropriate combustion systems, applying incorrect combustion techniques and not performing regular operating maintenance of the boilers used are the main causes of air pollution caused by heating in winter. Since 2021, in the regions where solid fuel use has been intense in Konya province, under the leadership of the Ministry of Environment, Urbanization and Climate Change and Konya Metropolitan Municipality Climate Change and Zero Waste Department, natural gas installations have been installed in the houses of lower socioeconomic levels that receive coal aid under the name of clean transformation, and the use of solid fuel has been terminated (ÇŞİDB, 2018; ÇŞİDB, 2019; ÇŞİDB, 2020; ÇŞİDB, 2021; ÇŞİDB, 2022). Concrete steps have been taken to improve air quality. The areas of use of non-renewable energy resources in Konya are discussed in three main categories: industry, transportation and housing.

Sulfur dioxide (SO₂), a colorless gas released as a result of the use of non-renewable resources, is oxidized as sulfate and sulfuric acid after reaching the atmosphere. It forms droplets or solid particles that can be transported over great distances along with other pollutants. SO₂ and its oxidation products are removed from the atmosphere by dry and moist deposition (acidic rain). Another pollutant parameter is nitrogen oxides (NO_x). The sum of nitrogen monoxide (NO) and nitrogen dioxide (NO₂) creates nitrogen oxides (NO_x). Nitrogen oxides are generally (in 90% case) exhaled as NO. It is formed as a result of the reaction of NO and NO₂ with ozone or radicals (such as OH or HO₂). NO₂ is one of the

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most important air pollutants in urban areas as it is the type of nitrogen oxide that affects human health the most. Nitrogen oxide (NOX) emissions occur from human-created sources. Carbon monoxide (CO), released as a result of the use of solid fuel, which is the leading non-renewable energy source, is an odorless and colorless gas. It occurs as a result of the incomplete combustion of carbon in the fuel structure. CO concentrations typically reach their highest value during cold seasons. It reaches very high values in cold seasons (Konya Valiliği & Konya Büyükşehir Belediyesi, 2013-2019).

In line with the materials and methods used in the study, the usage areas, rates and changes over the years of non-renewable energy resources that cause air pollution by releasing these pollutants are given in the findings section with materials such as graphics and tables. Within the scope of this research, the materials used are year-end activity reports shared by official institutions, status reports, economic reports, simulations made on the web, monitoring parameters, panels, TUIK data, files shared by private companies that play a role in the distribution and sale of energy resources, and periodical data. reports, information sharing documents between institutions, books, magazines, articles and theses on the subject were used.

3. RESEARCH FINDINGS

Quantitative changes in the non-renewable energy resources natural gas, diesel, gasoline, LPG, fuel oil, kerosene and coal, which were discussed within the scope of the research, in the last 5 years were examined as a result of the annual activity reports shared by the Energy Market Regulatory Authority. The data obtained are classified and presented below in graphs and tables.

3.1. Natural Gas Usage

In Figure 1 usage of natural gas in Konya during the last 5 years is given. When we examine the amount of natural gas sold and used in Konya in the last 5 years, we see that there is an increase of 42.8%.

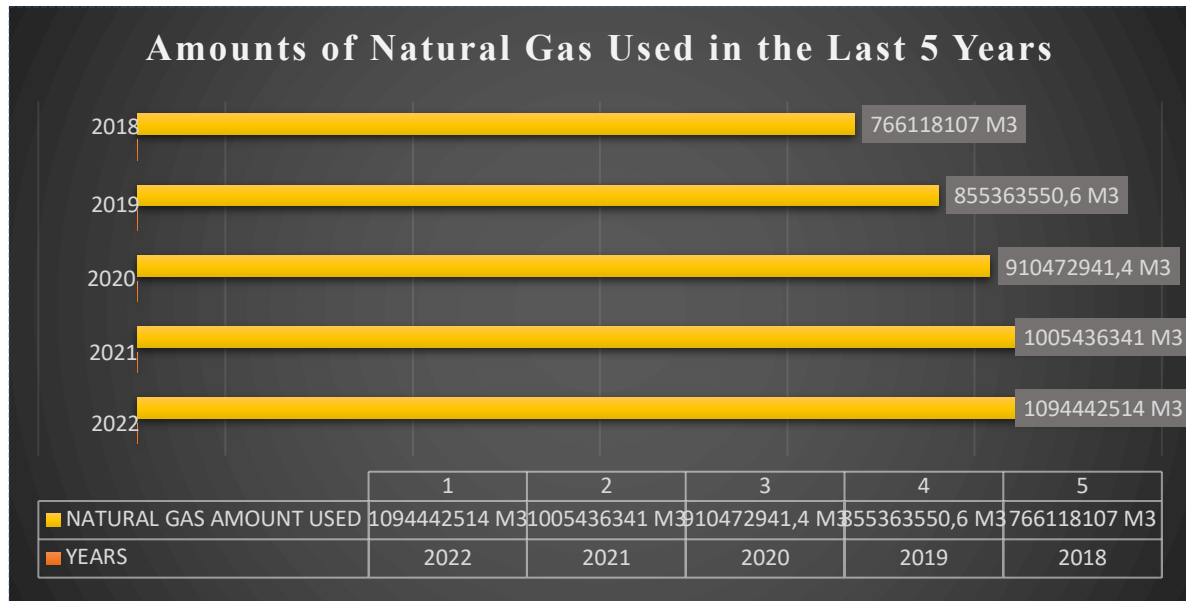


Figure 1. Schematic Representation of Natural Gas Usage by Years (TUIK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

3.2. Diesel Usage

In Figure 2 usage of diesel in Konya during the last 5 years is given. The use of diesel fuel in Konya has fluctuated in the last 5 years, and the amounts have varied depending on the farmer's crop style and working status.

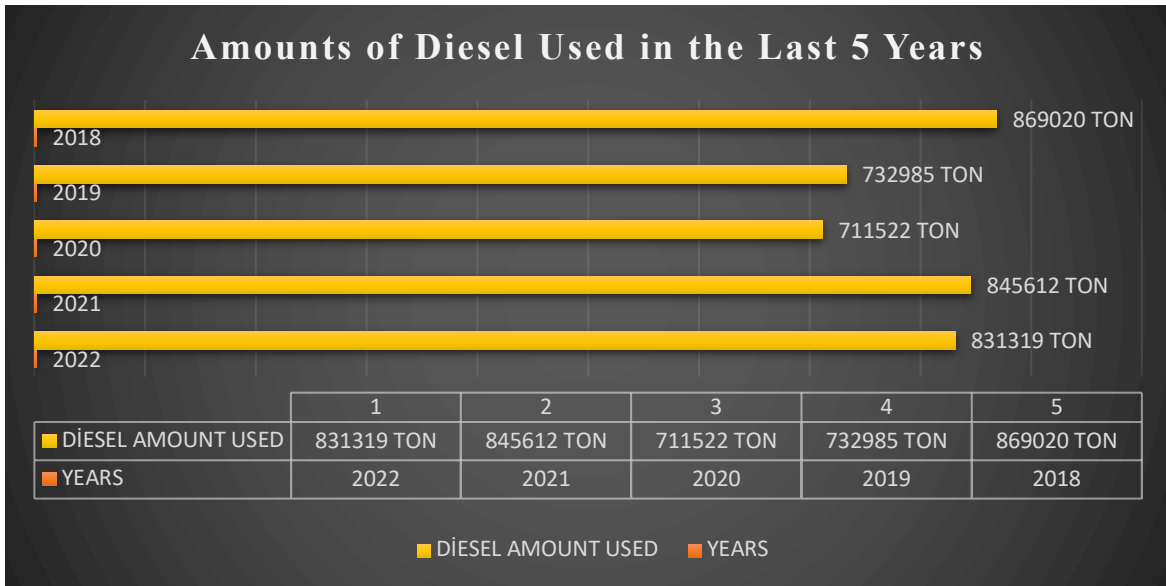


Figure 2. Schematic Representation of Diesel Usage by (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

3.3. Gasoline Usage

In Figure 3 usage of gasoline in Konya during the last 5 years is given. When we examine the amount of gasoline sold and used in Konya in the last 5 years, we see that there has been an increase of 34.5%.

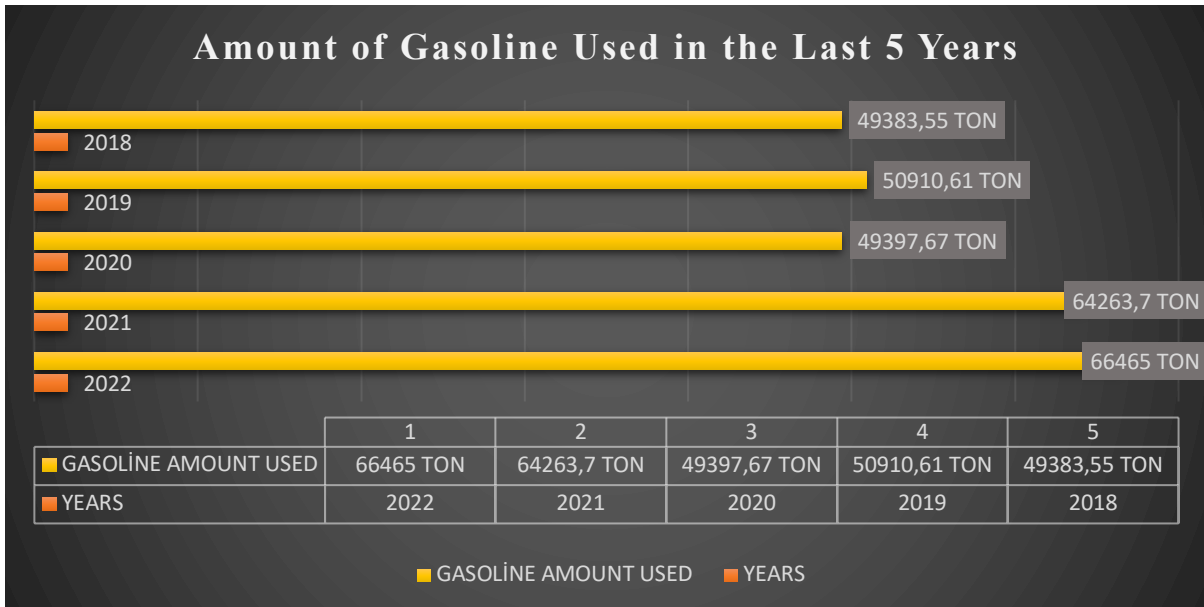


Figure 3. Schematic Representation of Gasoline Usage by Years (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

3.4. LPG Usage

In Figure 4 usage of LPG in Konya during the last 5 years is given. LPG usage in Konya has fluctuated in the last 5 years, with increases in some periods and decreases in other periods.

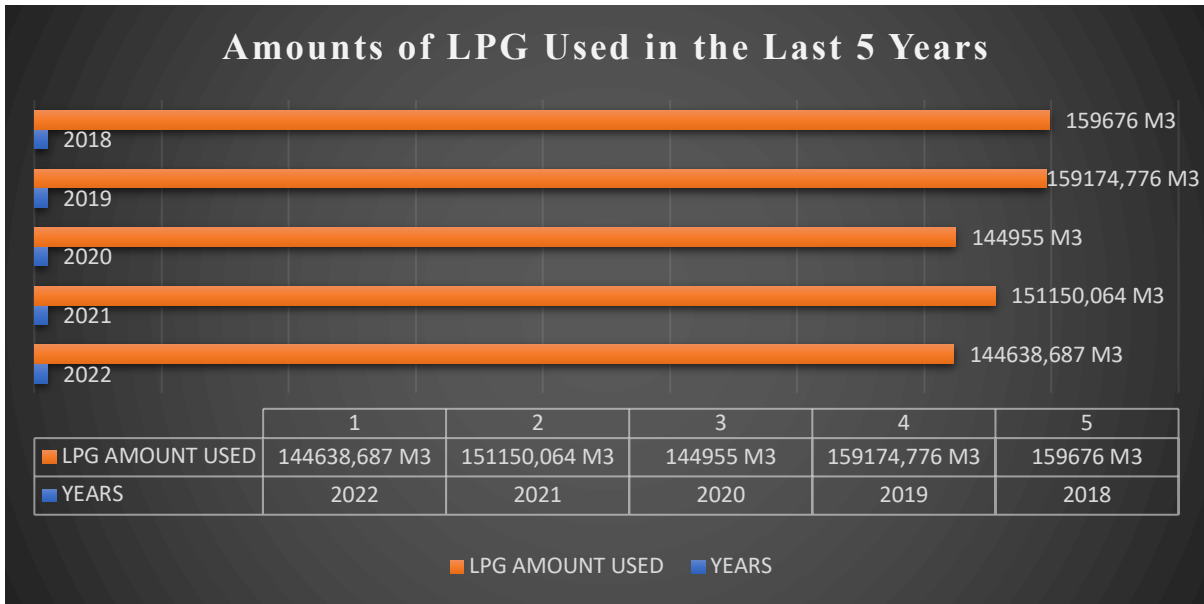


Figure 4. Schematic Representation of LPG Usage by Years (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

3.5. Fuel Oil and Kerosene Usage

In Figure 5 usage of fuel oil and kerosene in Konya during the last 5 years is given. Fuel oil use in Konya has increased by 64.2% in the last 5 years and gas oil use has decreased by 47.5%.

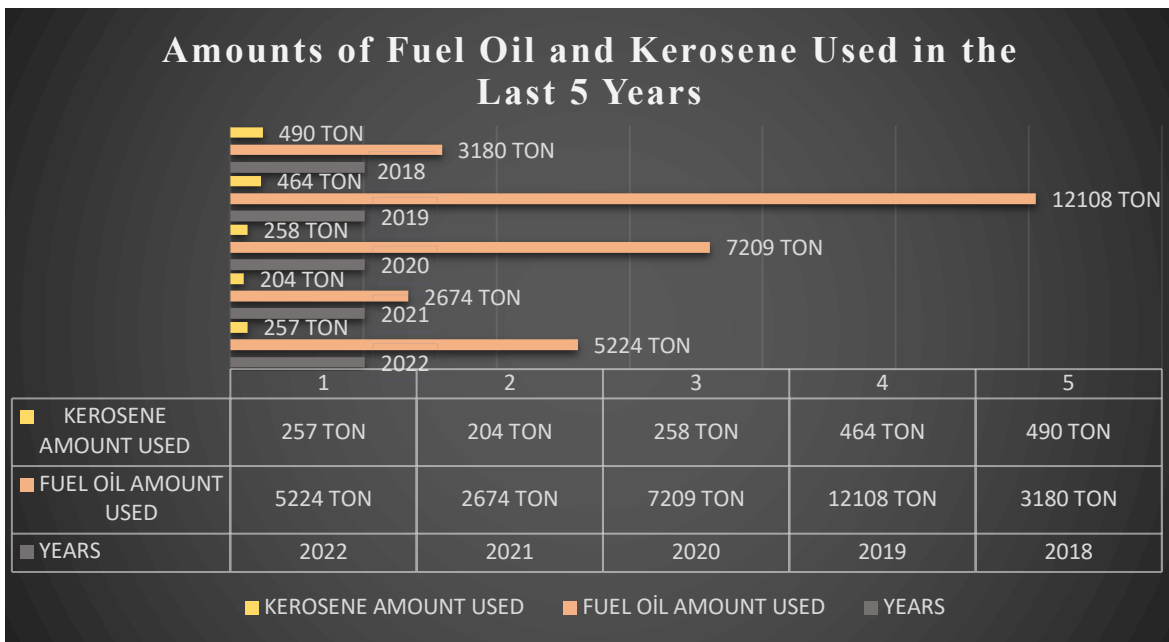


Figure 5. Schematic Representation of Kerosene and Fuel Oil Usage by Years (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

3.6. Coal Usage

In Figure 6 usage of coal and kerosene in Konya during the last 5 years is given. In Konya province, the amount of coal usage in residences and industries (domestic + imported) has decreased by 42.7% in the last 5 years.

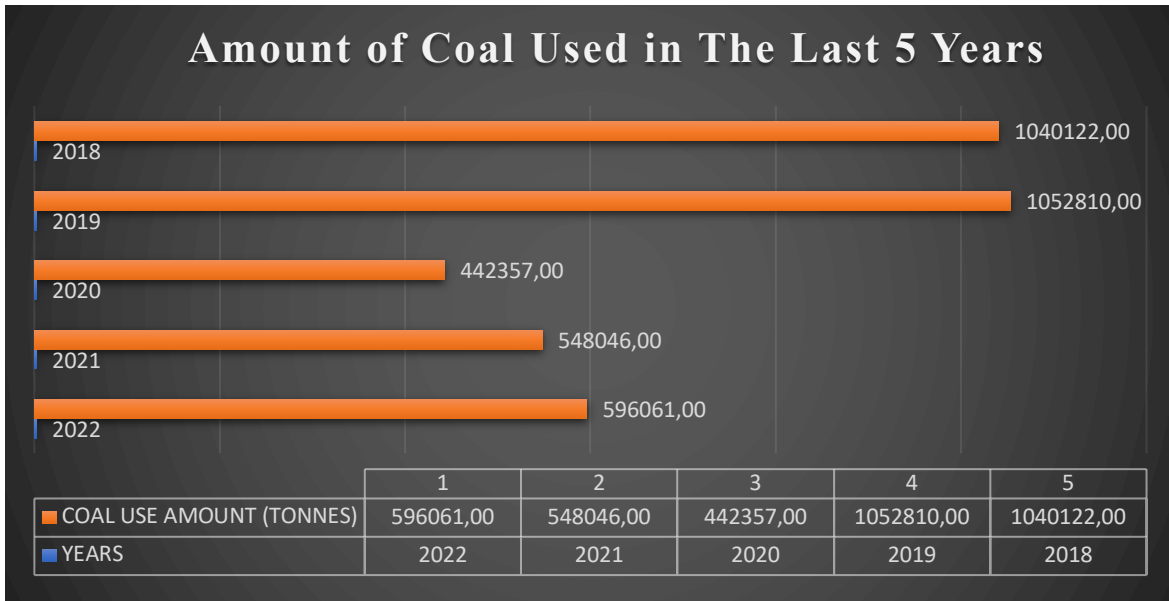


Figure 6. Schematic Representation of Coal Usage by Years (TUİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

4. RESULTS AND DISCUSSION

LPG , fuel oil are among the non-renewable energy sources that play a major role in air pollution in Konya province. Oil , kerosene and coal usage amounts were examined on the basis of the last 5 years. In Table 1 summary of the utilization of non-renewable energy sources in the last 5 years. The new investments made by natural gas distribution companies, especially the new industrial zones built in Konya in the last 5 years, the new routes they opened, the number of new subscribers gained and the increasing annual production tonnage in the industry, have caused the amount of natural gas to increase by 50% compared to 5 years ago. When we look at the changes in the amount of diesel, it is seen that since the agricultural sector uses diesel mainly both locally and on a country basis, farmers have had difficulty in allocating diesel, considering the economic conditions over the years, and there is not much of an increase in diesel, and even a decrease in its use from time to time. When we look at other non-renewable energy sources, we see that there has been a one-third increase in gasoline in the last 5 years. When we look at the upward momentum in the population and vehicle market, we see that this increase is associated with the increase in gasoline prices. Fuel fuel has the highest percentage increase but its usage is at more reasonable levels compared to other sources. Oil, on the other hand, is preferred both in industrial facilities and in residences because it is more cost-effective compared to natural gas, and has increased by 64% in the last 5 years. Finally, when the data of coal use in Konya province in the last 5 years is examined, it is seen that there is a decrease of 42.7 %. The reasons for this decrease are Local Environmental Board's decision to ban the use of coal in industrial facilities in the center of Konya, and in the last 2 years, under the leadership of the Ministry of Environment, Urbanization and Climate Change and the Konya Metropolitan Municipality Climate Change and Zero Waste Department, the houses in the lower socioeconomic levels, which received coal aid under the name of clean transformation, were given to the houses in lower socioeconomic levels. It appears that the natural gas installation is being installed. The main reason for the decrease in coal use, especially in the central region of Konya, is directly due to these two reasons.

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Table 1. Utilization of Non-Renewable Energy Sources in the Last 5 Years (TÜİK, 2023; EPDK, 2018-2022a; EPDK, 2018-2022b, EPDK, 2018-2022c).

YEARS	AMOUNT OF NATURAL GAS USED	AMOUNT OF GASOLINE USED
2022	1094442514 M3	66465 TON
2021	1005436341 M3	64263,7 TON
2020	910472941,4 M3	49397,67 TON
2019	855363550,6 M3	50910,61 TON
2018	766118107 M3	49383,55 TON
	AMOUNT OF DIESEL USED	AMOUNT OF FUEL OİL USED
2022	831319,00	5224 TON
2021	845612,00	2674 TON
2020	711522,00	7209 TON
2019	732985,00	12108 TON
2018	869020,00	3180 TON
	AMOUNT OF KEROSENE USED	AMOUNT OF LPG USED
2022	257,00	144638,687 M3
2021	204,00	151150,064 M3
2020	258,00	144955 M3
2019	464,00	159174,776 M3
2018	490,00	159676 M3
	AMOUNT OF COAL USED	
2022	596061	
2021	548046	
2020	442357	
2019	1052810	
2018	1040122	

5. CONCLUSIONS

In this study, the changes in the non-renewable energy resources used in Konya province in the last 5 years was examined. When the necessary studies and regulations are made, the usage of non-renewable energy sources can be reduced and the air quality can be contributed to the improvement. There are still fossil resources that their usage is increasing. If we want to improve air quality and limit the greenhouse gas emissions that accompany with pollutants, which are becoming a bigger problem day by day, we need to focus heavily on renewable energy sources.

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