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HOW THE ENERGY SECTOR IS AFFECTING ECONOMIC GROWTH – COMPARING THE UNITED KINGDOM WITH INDIA

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Abstract:

A country's economy depends heavily on energy. Economic productivity and industrial growth depend on the use of energy in modern economies. In a modern economy, energy is responsible for more than one-tenth of the cost of production but accounts for most industrial growth, according to Barney and Franzi (2002). The economy's need for energy has grown at about the same rate as that of wealth. It is a fact that wealth creation is predominantly calculated based on the usage of energy by society. At the beginning of the 19th century, biomass is the preferred choice of fuel. Energy demand in the west and advanced economies increased more rapidly because of rising standards during the end of the 20th century. In most production and consumption activities, energy plays a significant role in economic growth. An analysis of the energy sector components and their impacts on economic progress in two countries, the United Kingdom and India, was conducted based on an analytical approach. It is found in both countries that energy efficiency and foreign direct investment (net inflows) are positively correlated. Both the United Kingdom and India have significant correlations between energy efficiency and GDP (percentage of GDP). Employment rates and energy efficiency go hand in hand in both countries. India's GDP per capita growth (annual %) is positively correlated with energy efficiency (0.447). This study followed only the economic indicators from the World Bank Development Indicators report.

Keywords:

Inflation, Energy efficiency, Consumption, GDP, unemployment, per capita growth

JEL Classification: F39

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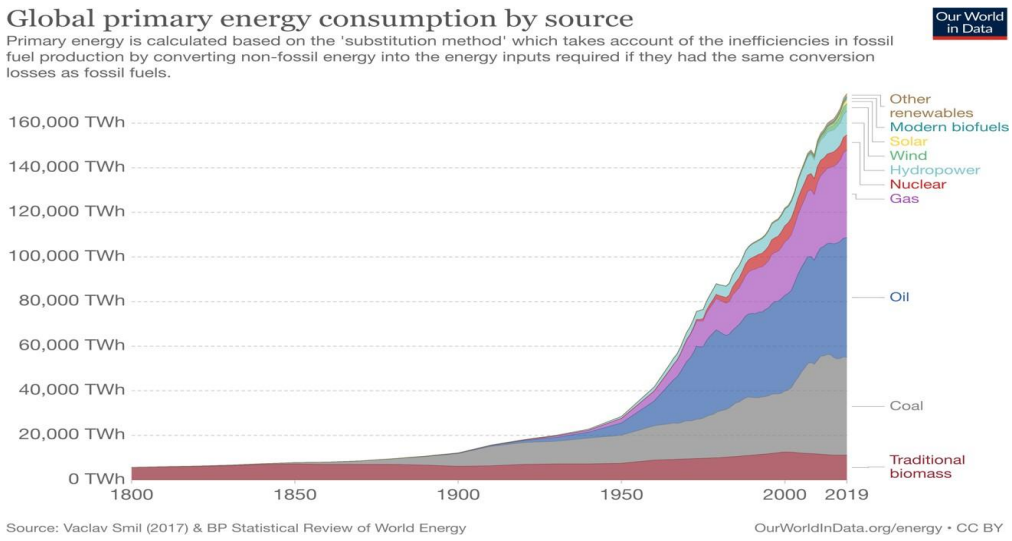
Introduction

World Bank says that energy is the key factor for economic progress across the globe. The energy promotes prosperity for the economies through investment, innovation, and new industries which creates employment. Human labour was replaced by steam-powered machines in the eighteenth century by the industrial revolution. Oil, natural gas, and petroleum were then discovered as new sources of energy. As global energy demand is increasing, most countries depend on the energy industry (Le and Sarkodie, 2020). Energy consumption in 2017 increased by 2.2%, according to British Petroleum (2018). Global energy consumption increased by 0.5 tons per capita because of biomass, and industrialized areas by 2.0 tons per capita. At present, the national average is double that of 4 tons per capita.

Global Energy Consumption by Source

As human history progressed, the energy available changed in the discoveries of new sources, first fossil fuels, then nuclear technology, hydropower, and now other renewable technologies.

Fig. 1 Various sources of World Primary Energy Utilisation



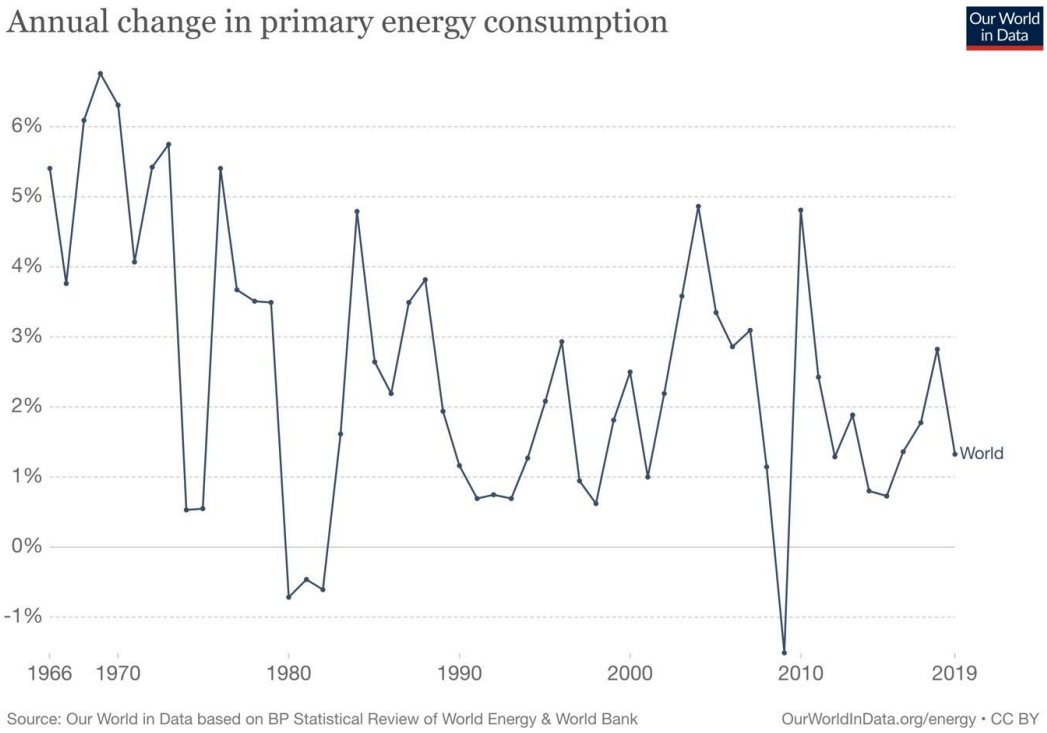
In the chart above, coal and oil are clearly the major sources of energy consumption compared to non-fossil fuels and other renewable sources. The third major contributor to energy consumption is gas, followed by coal and oil.

Global primary Energy Consumption: Annual Change

The use of energy is increasing around the world due to people's wealth and population growth. We will continue to consume more energy globally unless efforts are made elsewhere to improve energy efficiency. A more challenging task is to replace fossil fuels in the energy mix with low-carbon energy to meet this additional demand. The differences are expressed as

a percentage change over the prior years.

Fig. 2



Except for the early 1980s and the financial crisis of 2009, global energy consumption has increased annually for more than half a century. There is a slow pace of energy consumption despite its growth over the years.

Objectives of the Study

Energy's role in the economic growth of the United Kingdom and India will be evaluated over the course of a 10-year period in this study.

(a) Assessing the major energy components in India and the UK that contribute to economic growth.

(b) Comparing India's energy sector with the UK's to determine its economic impact

Methodology of Research

This is a purely analytical study where the researcher examined, compared, and analysed the factors that affect both the UK and Indian energy sectors.

Research Gap

Due to the different structural characteristics, stages of development, methods, and

timeframes examined, there is no consensus regarding the relationship between energy consumption and economic growth. Economic output in final goods does not have a valid econometric relationship with energy consumption. Energy consumption is assumed to be independent of economic production in the hypothesis. Economic growth and energy efficiency have been rarely examined in studies.

Data & Indicators

World Bank energy indicator database for 1991 to 2019 was used to conduct the survey (World Development Indicators | Databank, 2021). An adjustment for savings was calculated by evaluating energy depletion (percentage of GNI), coal rents were calculated by calculating a percentage of GDP, fuel exports were calculated as a percentage of goods exported, fuel imports were calculated as a percentage of goods imported, and natural gas rents were calculated as a percentage of GDP. A variety of economic indicators were examined, including GDP growth per capita, gross capital formation, inflation, consumer price inflation, unemployment, and foreign direct investment.

Data Analysis Techniques

The Indian and United Kingdom energy sector indicators were compared and analyzed. An analysis of selected energy indicators and economic indicators was conducted to obtain findings and test hypotheses for the study period, 1991-2019.

Hypothesis Testing

Hypothesis One

H0: FDI, and net inflows (percentage of GDP) from the energy sector in the United Kingdom and India are insignificant.

H1: FDI, and net inflows (percentage of GDP) from the energy sector in the United Kingdom and India are significant.

Hypothesis Two

H0: As GDP per capita (in percent) increases in India and the UK, the energy sector does not show significant differences.

H1: As GDP per capita (in percent) increases in India and the UK, the energy sector shows significant differences.

Hypothesis Three

H0: Compared to India, the UK's energy sector does not differ in terms of gross capital

formation (% of GDP).

H1: Compared to India, the UK's energy sector differ in terms of gross capital formation (% of GDP).

Hypothesis Four:

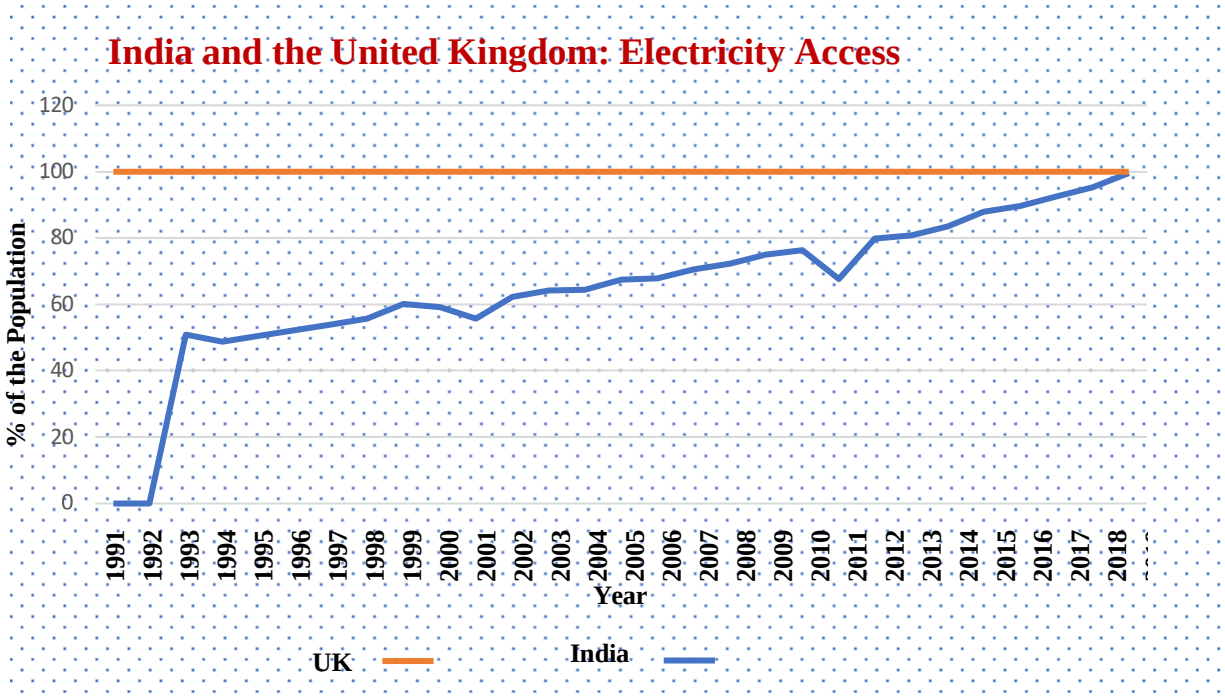
H0: Energy sector effectiveness (India and UK) does not show a significant relationship between inflation and consumer prices.

H1: Energy sector effectiveness (India and UK) shows a significant relationship between inflation and consumer prices.

Findings

Electricity Access (in percent to the population):

Generally speaking, electricity access refers to how many people have easy access to electricity on a regular basis. Not every country and region has equal access to electricity, and the level of access may indicate the level of development of that country or region. This means that access to power serves as a good substitute for other indicators of wealth. Access to electricity, for example, improves education, recreation, health, comfort, protection, and productivity in a country. (Energy Education, 2021)



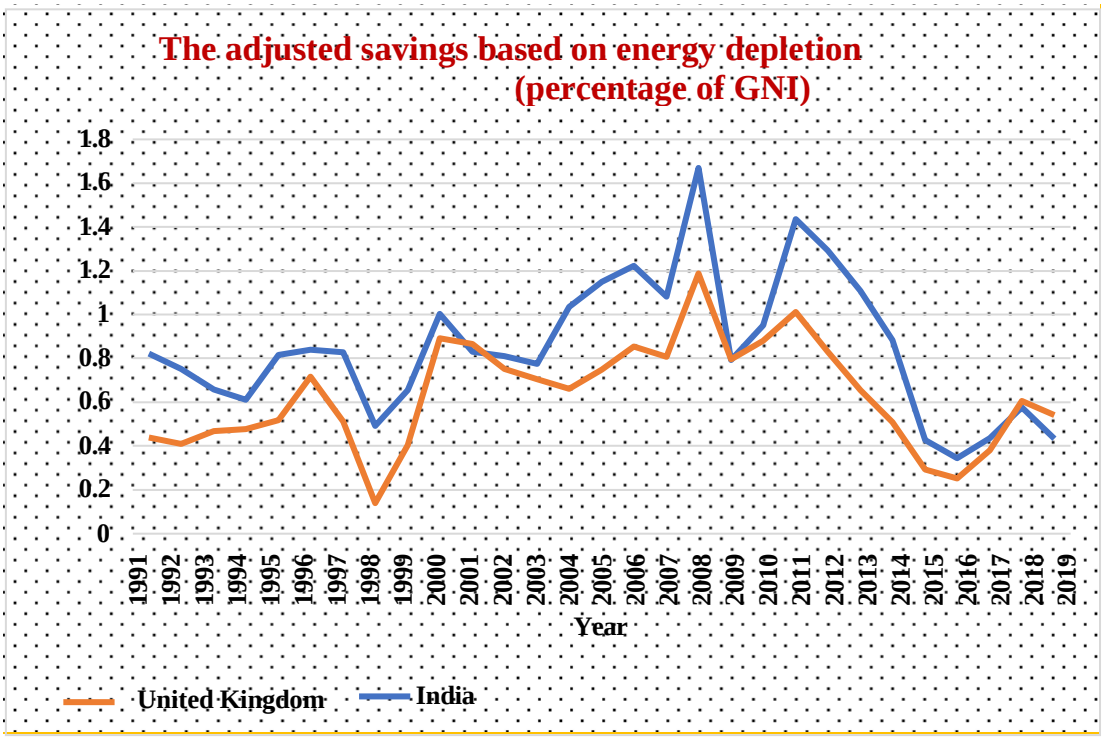
Source: *World Bank*

The above figure shows the comparative linear graph between India and the UK on access to

electricity. According to the study, the United Kingdom achieved 100% access to electricity, whereas India had 50% access to electricity in 1993 and 99.6% in 2019. In spite of a steady increase, there have been two steep increases during the period of study: 55.8% in 2001 and 67.6% in 2011.

Adjusted Savings: Energy Depletion (% of GNI):

Energy depletion describes the relationship between the stock value and the lifetime remaining. Natural gas, crude oil, and coal are among these energy sources.

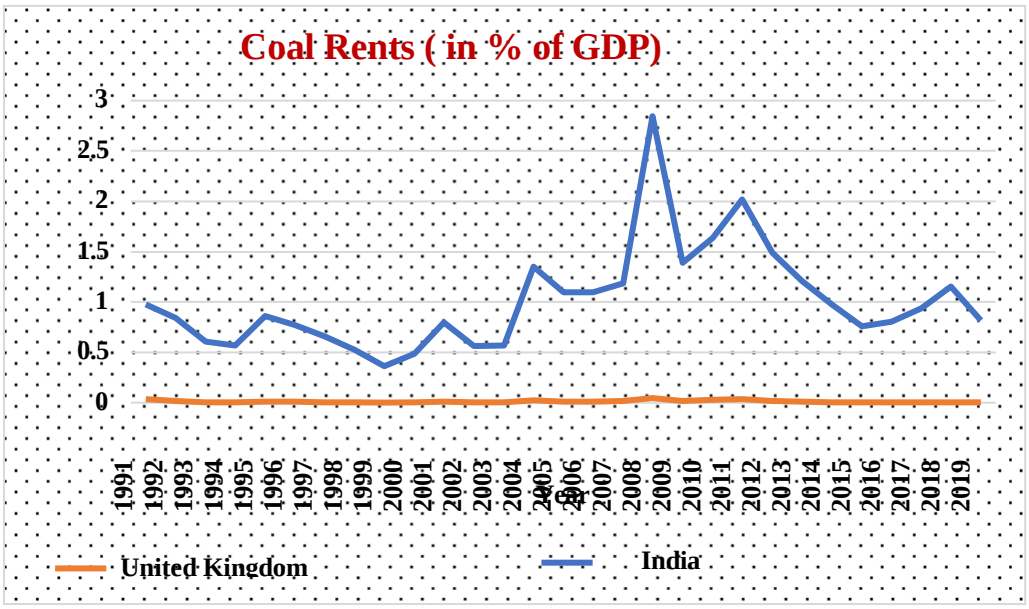


Source: *World Bank*

The graph indicates that, except in 2001 and 2019, India has an advantage over the United Kingdom during the study period. According to the 11th five-year target, India added approximately 55,000 MW between April 2007 and March 2012. UK's adjusted savings: energy depletion (% of GNI) was the lowest (0.01392%) among EU countries in 1998 due to its low import dependency.

Coal rents (% of GDP):

In coal production, coal rents consist of the difference between hard coal prices at world markets and total production costs. Natural resources may have an impact on sustainable development, and coal rents play a major role in both developed and developing economies.

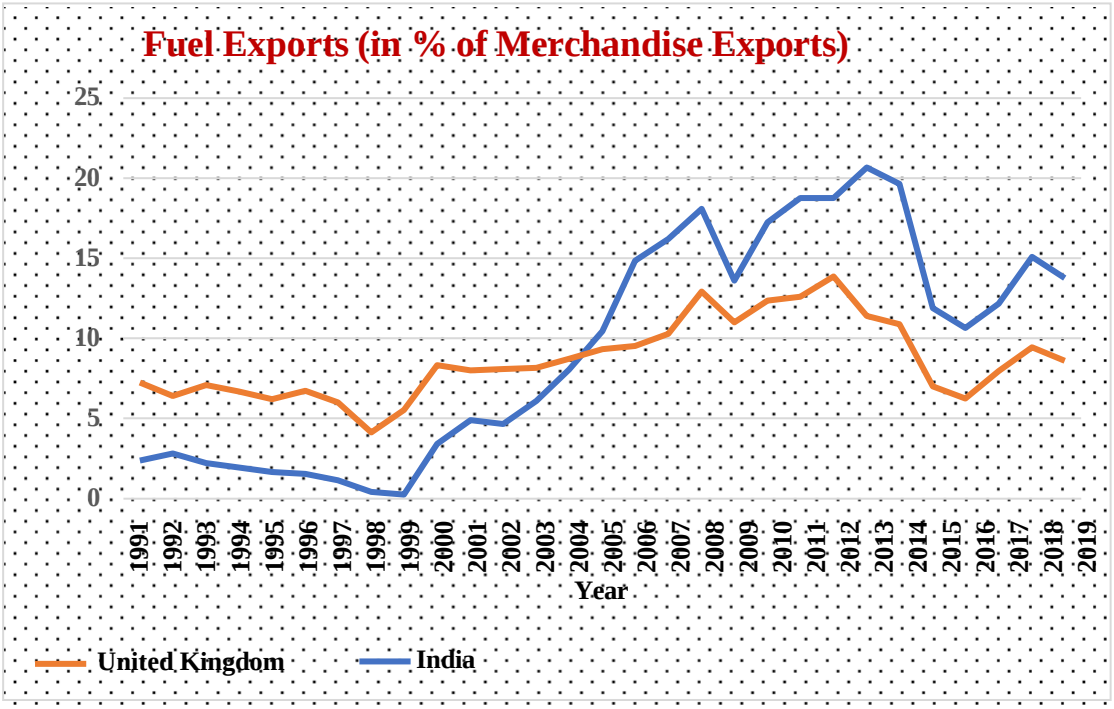


Source: *World Bank*

The above figure shows that coal rents (% of GDP) in India have been very high during the period under review. A rent of 2.85% was recorded in 2008, and rent of 0.35 % was recorded in 1999. In the United Kingdom, coal rents were negligible and below 0.1% during the study period. A large share of coal rents in an economy challenges sustainable development.

Fuel Exports (% of Merchandise Exports):

Materials such as mineral fuels, lubricants, and related products are included in fuel exports. Most oil-producing countries benefit from a positive trade balance due to exports of fuel.

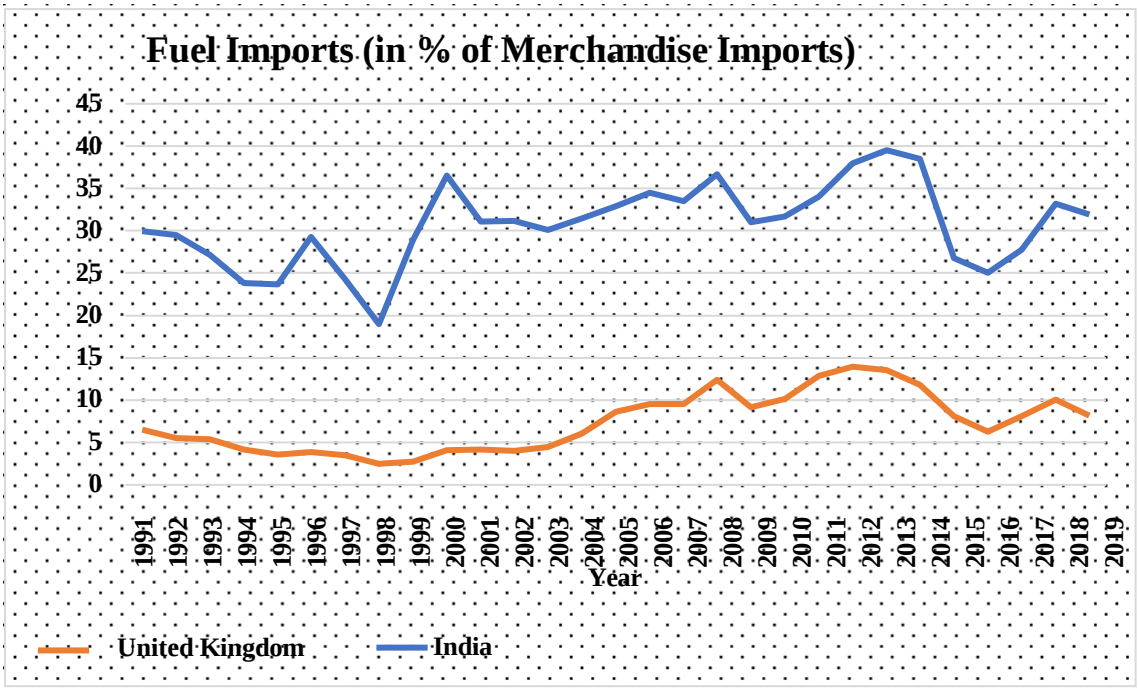


Source: *World Bank*

Interestingly, the chart shows that the United Kingdom dominated from 1991 to 2005, while India bypassed the United Kingdom between 2005 and 2019. In 2013, the UK's fuel exports accounted for just 11.42% of its total merchandise exports, while India's fuel exports accounted for 20.67%. In 2019, the U.K. exported 8.60% of its fuel, while India exported 13.78% of its total merchandise.

Fuel Imports (% of Merchandise Imports):

Materials such as mineral fuels, lubricants, and related products are included in imports of fuels. For most developing economies, fuel imports are a significant factor in the negative trade balance.

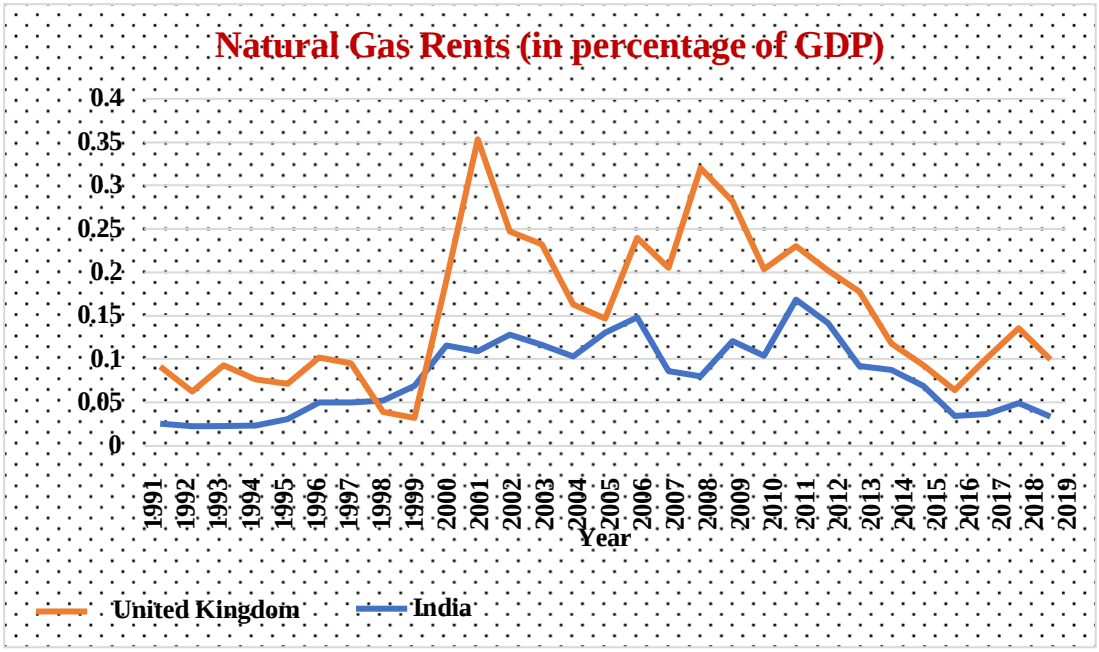


Source: *World Bank*

The percentage of fuel imported from India over the study period was much higher than that from the United Kingdom as a whole. India's fuel imports as a percentage of merchandise imports amounted to 31.88 percent in 2019, up from 29.92 percent in 1991. It appears that India is more dependent on fuel imports than the United Kingdom, even though it appears a slight increase in percentage terms. Due to the growth in fuel imports, India must find other energy sources in order to protect its foreign exchange reserves.

Natural gas rents (% of GDP):

The rent on natural gas is calculated as the difference between its production cost and its market price.

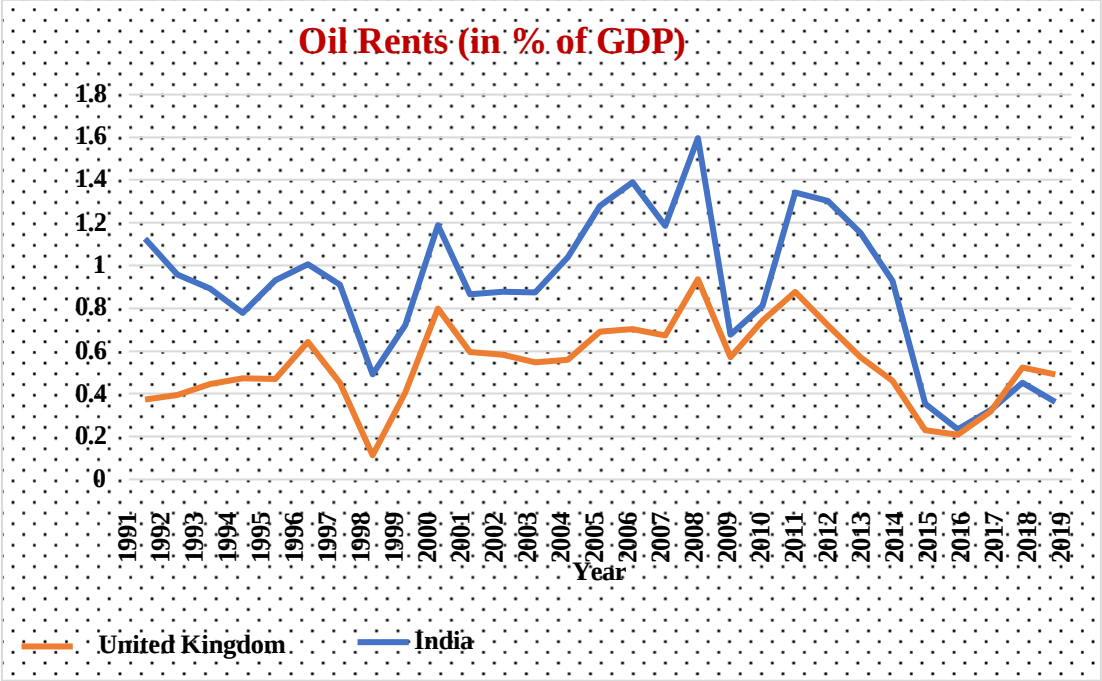


Source: *World Bank*

The above figure shows, the UK's natural gas rent (% of GDP) is higher than that of India throughout the study period, with the exception of 1998 and 1999. Because the United Kingdom's coal plants emit less carbon dioxide than typical coal plants, its natural gas rent as a percentage of GDP is slightly higher than India. It was observed that the UK recorded the highest natural gas rent (0.35%) (% of GDP) in 2001, while the UK experienced the lowest rent (0.03%) in 1999. In 1991, India had the lowest rate of 0.026 percent and the highest rate of 0.17 percent in 2011.

Oil rents (% of GDP):

An oil rent is calculated as the difference between the cost of producing crude oil and its value at local prices.



Source: *World Bank*

As of 2019, the United Kingdom has a higher oil rent (% of GDP) than India. Since 2016, India has had a higher oil rent (% of GDP) than the United Kingdom (Chart-4.7). Indian oil prices (as a percentage of GDP) have been higher than UK oil prices since 2016. The UK, on the other hand, has grown from 0.37% in 1991 to 0.49% in 2019.

An overview of the findings

There is a greater efficiency in the UK's energy sector than that of India, when it comes to electricity supply, fuel imports, and natural gas rents (percentage of GDP). Compared to the UK, the Indian economy performs better on adjusted savings based on GDP, coal rents, and fuel exports. A World Bank report on economic indicators was used as the basis for the study.

Foreign direct investment (as a percentage of GDP) and energy efficiency have a strong positive linear relationship in both the United Kingdom and India. Gross capital formation (percent of GDP) and energy efficiency have a significant positive linear relationship in India and the UK. It has been found that energy efficiency correlates negatively with unemployment, which is measured as the percentage of the total labor force that is unemployed. India's GDP per capita growth (annual%) is positively related to energy efficiency (0.447). There is, however, no significant relationship between them in the United Kingdom. Even though energy sector efficiency and inflation have been negatively correlated (-.361), the correlation is not statistically significant.

Resulting Policy Implications

Economic and financial development must be sustained in certain ways. It appears that policies and technologies that promote energy efficiency are needed, as well as an improvement in energy efficiency in some industries and diversification of energy sources, particularly in developing countries. Increasing energy efficiency, decreasing carbon emissions, and achieving sustainable economic growth all require fast-paced development of markets and financial institutions. In order to achieve these goals, we will also need sustainable and green finance. A balance must be struck between energy efficiency and sustainable economic and financial development in India's strategies.

Conclusion

The development of energy is an integral part of the development of the economy as a whole. The increase in the supply and use of energy services has revealed the importance of energy in economic development. Due to the increased use and supply of energy services, economic development has emphasized the importance of energy as a causative factor. Nevertheless, in industrialized and developed countries, energy consumption continues to increase despite improvements in energy efficiency and other constraints.

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