

## Original Paper

# Sustainable Development, Electricity Generation and Renewable Energy substitution in Middle East Countries and Cooperation of Iran

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### **Abstract**

*The energy category over the world has been considered as Coal, Natural Gas, Hydro, Nuclear, Wind, Oil and Solar PV by means of 38%; 29%, 16%; 10%and %5 respectively. Where the main reserve holders of Russia, Iran, Qatar, U.S.A. and Saudi Arabia r, have regarded natural gas as an alternative of energy. In which Iran is in the second position after Russia. Where the electricity generation has been considered by China, U.S.A, India, Russia, Japan and Canada respectively and Iran is in the 14<sup>th</sup> place. Besides renewable energy, capacity installed over the world is in terms of GW-2019 has been defined by China, U.S.A, and Brazil, India, and Germany respectively. However, solar power installed in Middle East Countries and Africa (MENA) is in terms of Terra watt-hour per year by Algeria, Libya, Saudi Arabia, Egypt, Morocco and Tunisia. Whereas solar power markets has been classified by China, India, Japan, Australia, Mexico, Turkey and Netherland in GW-2018 respectively Iran has been considered for the energy resource of Oil as 25%, Natural Gas as 69%, and Hydroelectricity as 6% in 2018 as the main respectively. China, U.S.A., India, Japan and Australia have respected the solar power market consideration in GW-2018 as the most important countries. Other considerations for CO2 emission over the globe has been made by China (27.2%), U.S.A (14.58%), India (6.82%), Russia (4.68%), Japan (3.33%) and, Germany (2.21%) as the most important ones.*

### **Keywords**

*Sustainable Development, Renewable Energy, Energy Category over the world, Solar Power installed, Middle East Countries, Power Market, and CO2 Emission*

## 1. Introduction

The renewable energy and solar energy is mostly important for its efficiency and cost, therefore each country should work out its resources and needs of energy by sectors to find out the Place, importance and necessity of solar energy Especially in Middle East countries and Iran. Where fossil fuels release emissions impacts as a toxic to flora, fauna and human health. Besides some of these emissions may be changing the earth's climate. By means of effects and suspected risks for humans and ecosystems. In the years there after renewable were further supported based on variety of agreements ranging from its contribution to securing energy supply to strength the electricity supply and providing the first real market opportunity to develop band products. Middle Eastern countries will have the most success adopting renewables if they develop their own technologies, as is being done by several research institutes in the Gulf, or alternatively acquiring global technology companies in this industry. Present trends in the use of renewable worldwide continue, the world could witness, in several years, a decline in the demand for hydrocarbons. Thus, Middle Eastern oil and gas producers may find that locally developed renewables products and technology would help limit the impact of the decline in hydrocarbon consumption both at home and abroad. The most prominent agreement nowadays is the contribution of renewable and other alternatives to compensate the climate change. In this study natural gas, consumption for electricity generation over the world and in Middle East countries is as an alternative of energy. Other considerations has been made for the knowledge of renewable energy promotion and applications in relation of the rise up of energy consumption, to support projects for advanced renewable energy.to find its place globally for feasibility, cost and efficiency especially in Middle East Countries.

## 2. Material and Methods

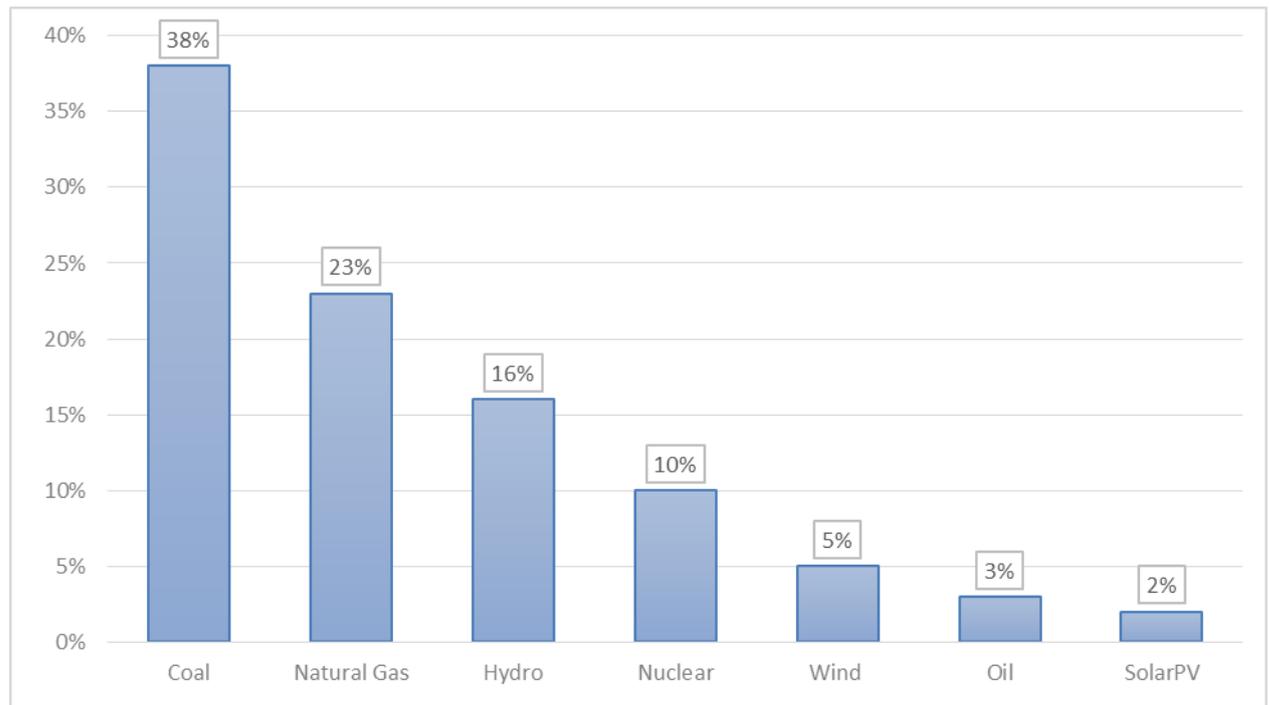
Effort has been made for data processing of “eia-2018” and “European commission-2019” web site. Besides the annual reports of energy web site of “www.eai/sustainable development in Iran”. Other survey were made through annul periodical journals to achieve CO<sub>2</sub> emission and energy conniptions in Middle East countries, oil reservation over the world and global CO<sub>2</sub> emission as a whole.

## 3. Discussion and Results

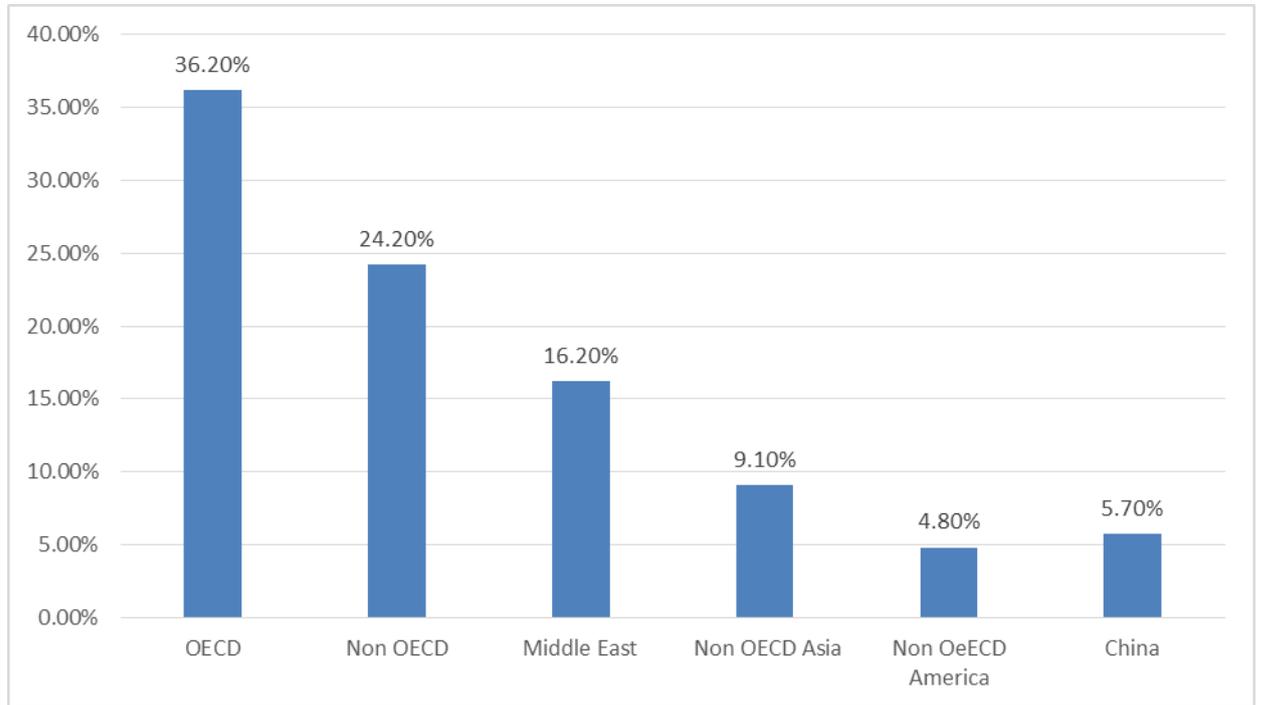
Effort has been made for classification work out of crude oil reserved by Venezuela, Saudi- Arabia, Canada, Iran, Iraq, Kuwait, and United Arab Emirate as the greatest resource values (via IEA-2019); Where the energy categorization over the world has been considered as Coal, Natural Gas, Hydro, Nuclear, Wind, oil and Solar PV by means of 38%, 23%, 16%, 10%, 5%, 3% and 2% in 2018, (Figure 1). Where natural gas as an alternative of energy has been regarded by the main reserve holders of Russia, Iran, Qatar, U.S.A. and Saudi-Arabia (Figure 2). Considering Iran is in the second position after Russia in this aspects; But Gas consumption has been classified to China, Middle East, North America, other Asia Pacific, India, Africa, Latin America and Europe By means of 123, 80, 73, 66, 27, 20 and 18

(bcm) respectively. But the electricity generation over the world based on multi resource has been regarded by china, U.S.A., India, Russia, Japan, Canada, South Korea, Brazil and France (2019) respectively (Figure 3), Therefore China is the biggest Gas consumer over the word. Other Consideration for renewable energy capacity installed over the world (in terms of GW-2019) has been defined by China, U.S.A, Brazil, India and Germany respectively (Figure 4). But the sustainable development consideration in Middle East Countries has been considered by Algeria, Libya, Saudi Arabia, Egypt, Morocco and Tunisia in terms of Terra Watt /year, (Figure 5). Where Iran has been considered for the energy resource of Oil as 25%, Natural Gas as 69%, Hydroelectricity as 6% in 2018 respectively. Other global solar power market has been considered by China, U.S.A. India, and Australia, by means of 43%, 10%, 8%and 6% respectively. Figure 6

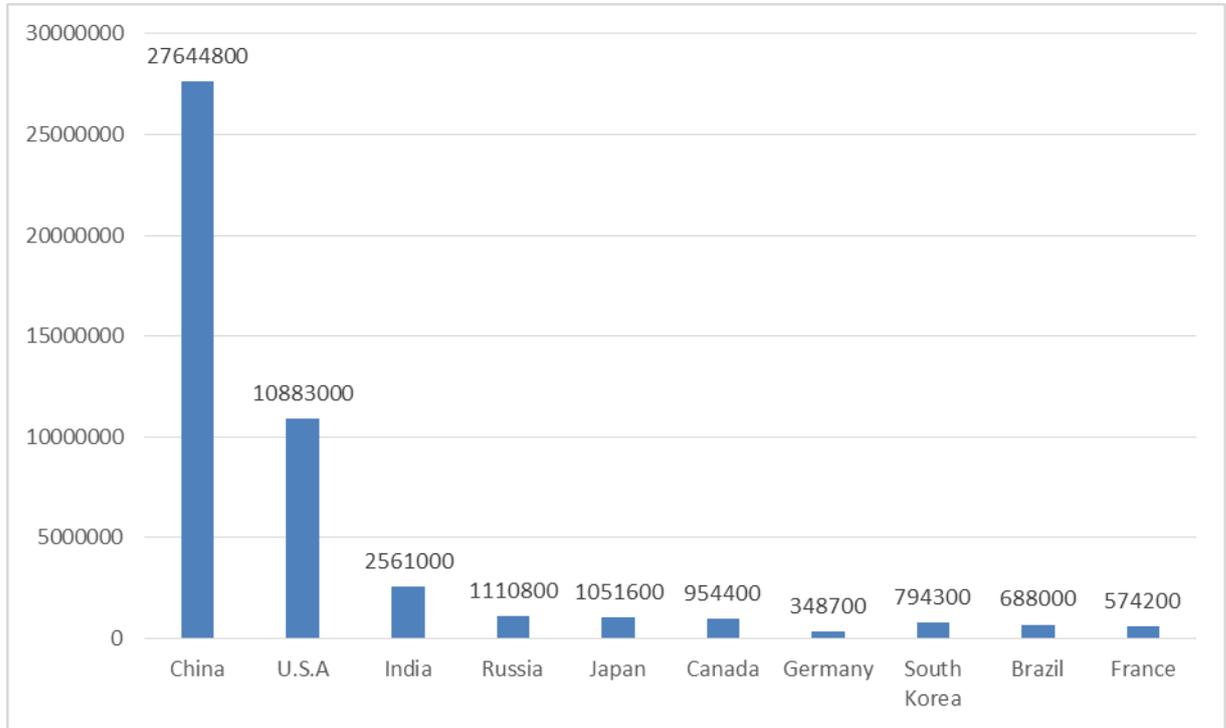
While consideration for CO2 emission over the globe has been made by China (27.2%), U.S.A (14.58%), India (6.82%), Russia (4.68%), Japan (3.33%) and Germany (2.21%) as the most important ones (Figure 7), and the price of gasoline in certain countries has been defined by Algeria, Egypt, Iran, Kuwait and Turkmenistan from 0.37 to 0.29 dollars., Iran has been considered for its great substitution of natural gas and hydroelectricity for cooperation since 2003. In the other hand Iran has been considered for the energy resource of Oil as 25%, Natural Gas as 69%, and Hydroelectricity as 6% in 2018 respectively (Figure 8). Therefore, Iran has been considered for its great substitution of natural gas and hydroelectricity for cooperation since 2003 Figure 8.



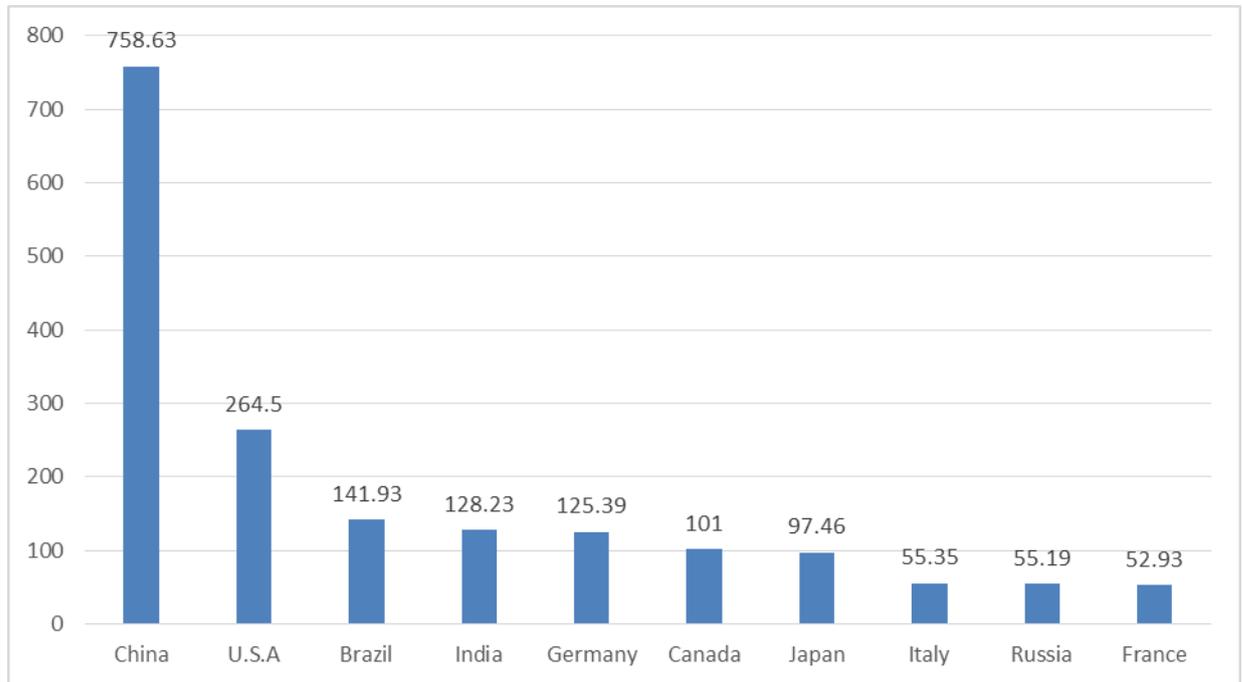
**Figure 1. Energy world Category Featured 2018**



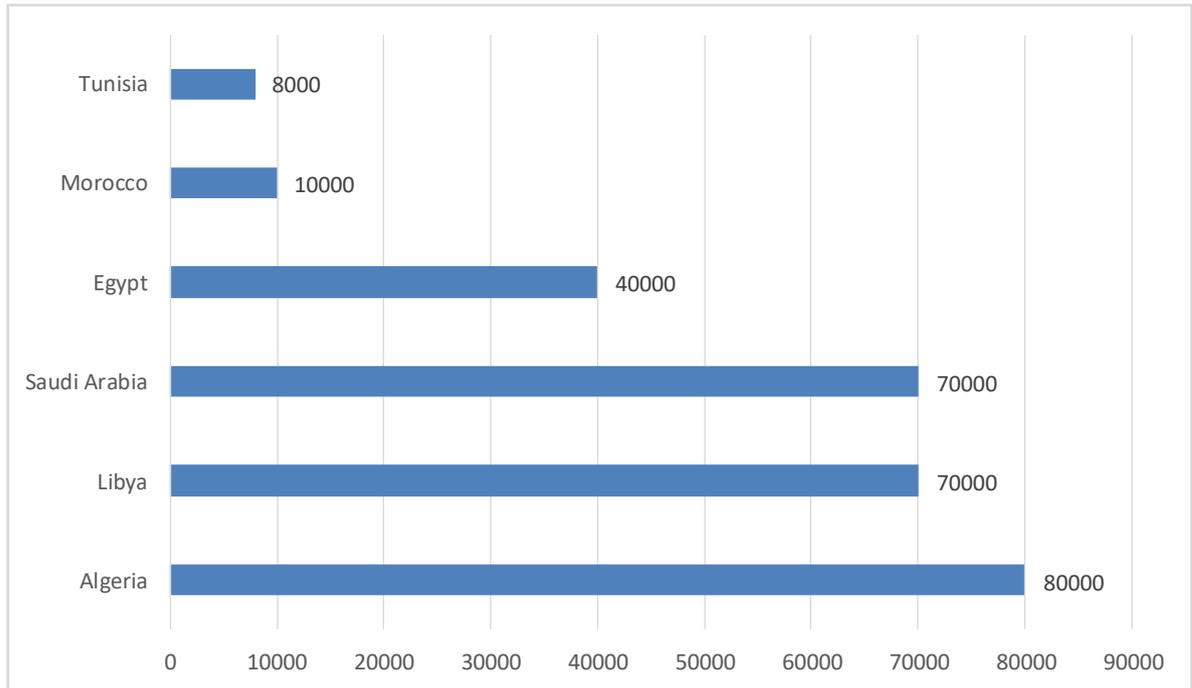
**Figure 2. Natural Gas Production over the World**



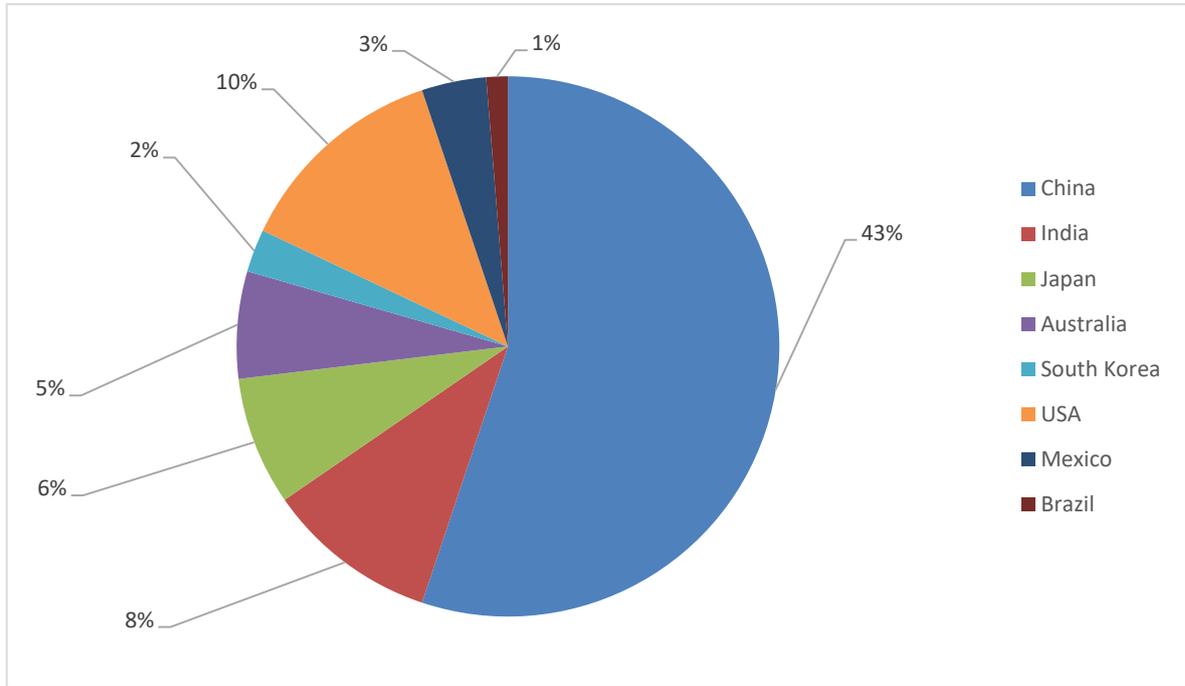
**Figure 3. Electricity Generation over the World (Gwh)**



**Figure 4. Renewable Energy Capacity Installed over the World (GW-2019)**



**Figure 5. Solar Power in Middle East and Africa**



**Figure 6. Global Solar Power Market (GW), 2018**

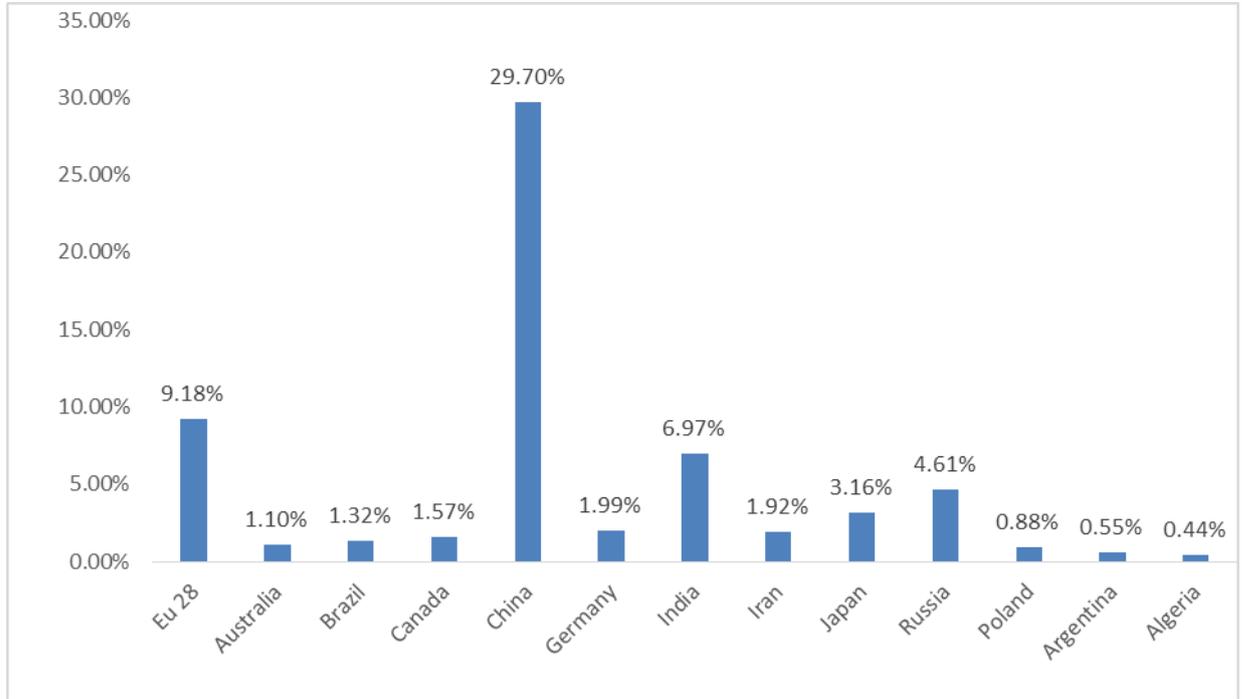


Figure 7. CO2 Emission by Countries (2018)

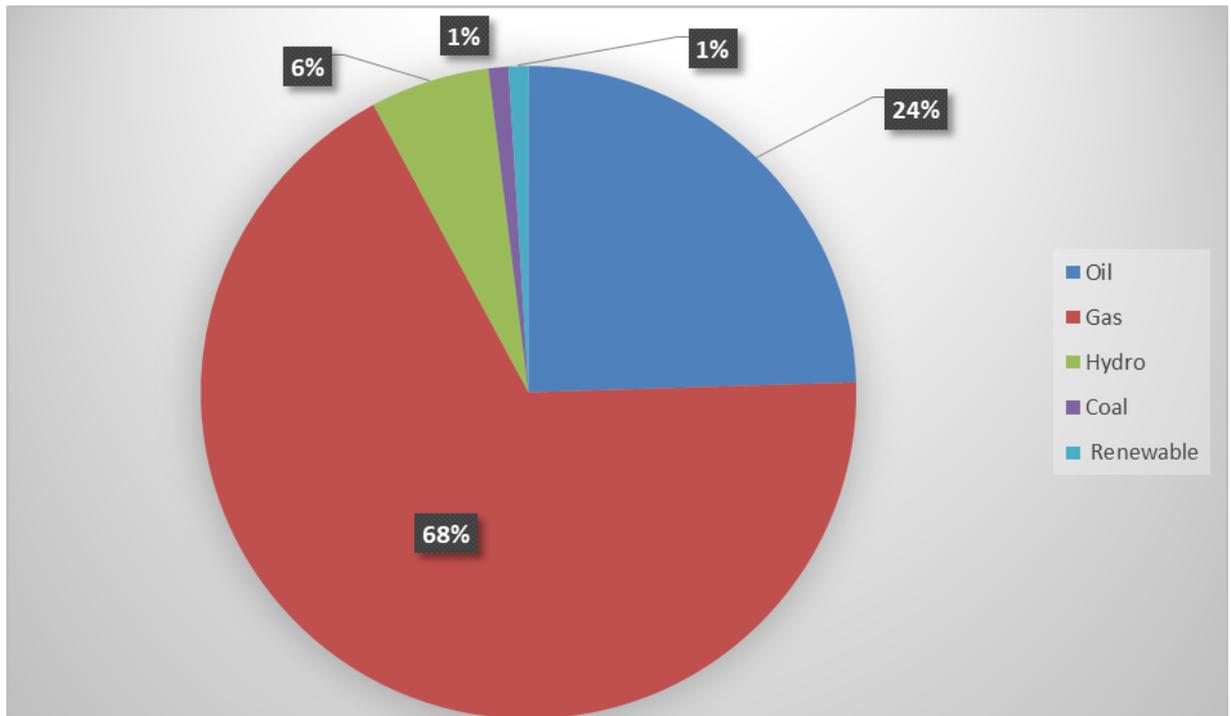


Figure 8. Energy Resources Category in Iran

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