INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 7, Issue 6 - V7I6-1364)
Available online at: https://www.ijariit.com

The impact of nuclear energy on the environment

Masouda Ahmadabadi
masoudaahmadabadi@yahoo.com
Balkh University, Balkh, Afghanistan

ABSTRACT

In recent decades, the demand for energy for economic growth has increased and available resources, especially fossil fuels, have fallen sharply. The indiscriminate and increasing use of various energy vehicles such as oil, gas, and coal has drawn the attention of countries to two important problems, namely the depletion of fossil fuels and environmental pollution. Therefore, one of the most important priorities of energy policy is to diversify energy sources and also to find a safe, cheap and emission-free energy source. Nuclear energy is therefore important. In this regard, the main purpose of this article is to investigate the impact of nuclear energy consumption on the quality of the environment in the group of selected countries. The present research is a library research in terms of purpose, causal study in terms of research method, and in terms of research method and nature and method of approaching the inferential problem. The results of estimating the model using the fixed effects method in the group of selected countries in the period 2004-2004 show that nuclear energy consumption has a negative and significant effect on CO_2 emissions as an indicator of environmental quality.

Keyword: *Nuclear Energy, Plant, Environment, Human, Nuclear Pollution*

1. INTRODUCTION

The wave of public attention to environmental issues began in the 1960s, and the main focus of this attention was on industrial pollution due to the growing consumption of fossil fuels by environmental pollutants.

Some environmentalists oppose free trade and economic growth from the perspective of market failure, and call for a shift in energy consumption on the path to economic growth, but others argue for a healthier and more radical environment. Poverty alleviates economic growth.

Increasing energy consumption for economic growth has been a major factor in increasing global warming through the release of carbon dioxide into the atmosphere. Therefore, one of the most important priorities of energy policy is to diversify energy sources and also to find a safe, cheap and emission-free energy source.

Nuclear energy can be responsible in this regard, because firstly, it reduces the instability of oil prices and dependence on oil imports of many countries, and secondly, it prevents the emission of greenhouse gases.

Proponents of nuclear energy argue that nuclear energy is based on facts such as growing energy demand and depletion of fossil resources in the coming decades, zero emissions of nuclear energy pollutants, and lower social costs than other options. Fuels and the world tomorrow will have no choice but to use nuclear energy to supply a significant portion of its energy consumption.
The above shows that the world must move towards new energies and replacing non-fossil fuels.

The main purpose of this article is to investigate the impact of nuclear energy consumption on environmental quality in selected countries. The research of this article has been done to investigate the impact of nuclear energy consumption on the quality of the environment using reliable sources in the form of libraries.

Research Objectives

- Noise pollution and the environment.
- Providing better conditions for people's lives.
- Damages of high noise human pollution.

- Recovery of problems and diseases that arise from pollution.
- Direct and indirect effects of noise pollution.
- Noise pollution assessment.

Nuclear energy is a good alternative fuel source to fossil fuels. But it is important to note that it is true that nuclear energy does not cause carbon pollution, but nuclear pollution and the storage of radioactive material produced in these devices is itself a very important problem that should be considered.

Many researchers believe that using nuclear energy as a carbon-free energy could be a great solution to global warming and energy security for all countries of the world.

Increased and available resources, especially fossil fuel sources, have fallen sharply. Irregular and increasing use of various energy carriers such as oil, gas, coal has attracted the attention of countries to two important problems, namely the depletion of fossil fuels and environmental pollution.

Therefore, one of the most important priorities of energy policy is to diversify energy sources and also to find a safe, cheap and emission-free energy source. Nuclear energy is therefore important.

In this regard, the main purpose of this article is to investigate the impact of nuclear energy consumption on the quality of the environment in the group of selected countries.

Nuclear energy consumption has a negative and significant effect on CO_2 emissions as an indicator of environmental quality.

Research Questions

- What are the sources of fossil fuels?
- What types of gases are called greenhouse gases?
- What kind of energy is called renewable and non-renewable energy?
- What is nuclear energy?
- What is the effect of nuclear energy on the environment?

Importance of research:

Nuclear energy is the energy released by the branching of the uranium atom, which is used to generate water vapor and power turbines. Inorganic uranium must be converted to hexafluoride during operation. Of course, it is not only uranium that can be used to produce nuclear energy, for example, nuclear energy can also be produced from plutonium or other radioactive materials. This energy is divided into semi-pure and non-renewable energies. Therefore, waste and its remnants remain in the environment for thousands of years and are very dangerous to the health of living organisms. It should be noted that nuclear energy can be converted to all other energies, but no energy can be converted to nuclear energy.

Research Methods

As the title of this article and the need for scientific information, the research method in this article is library and in addition, it has been referred to reputable internet sites in order to obtain new materials in order to enrich this article as much as possible.

2. LITERATURE REVIEW

The pursuit of nuclear energy to use it to generate electricity began after the discovery in the 20th century that radioactive elements such as radium released large amounts of energy based on mass and energy balance.

. However, this energy could not be controlled because the lifespan of the radioactive elements was very short due to their nature. (The intensity of the energy released is inversely proportional to the half-life of the elements). But the dream of curbing nuclear energy was a bit ambitious, even though the fathers of nuclear physics, including Ernest Rutherford, called it the "moonlight." This situation changed later with the discovery of nuclear fission.

In 1932, James Chadwick discovered the neutron, which became known as a potential tool for nuclear experiments due to its lack of electrical charge. Neutron bombardment of materials helped Frederick Julio Curie and Irene Julio-Curie discover artificial radioactivity in 1934, which produced elements such as radium at a much lower cost than natural radium.

Enrico Fermi, following in their footsteps, focused on slowing down neutrons during research in the 1930s to increase the effect of artificial radioactivity. Experiments with uranium bombardment with neutrons led Fermi to create a new element that had an atomic number greater than uranium and was named plutonium.

But in 1938, German alchemists Otto Hahn and Fritz Strassmann, along with Australian physicist Lisa Meitner and her niece Otto Robert Frisch, conducted experiments on uranium neutron bombardment products to investigate Fermi's claims.

They showed that, contrary to Fermi's statement, relatively small neutrons split the heavy nuclei of uranium atoms into two relatively equal parts. This was a very surprising result: all other forms of nuclear decay involved only small changes in the mass of the nucleus, whereas this involved a complete rupture. Several scientists, including Leo Zillard, believed that if the reaction of the seam released additional neutrons, a spontaneous nuclear chain reaction would occur.

When Frederic Julio Corey raised the issue in 1939, scientists in many countries (including the United States, Britain, France, Germany, and the Soviet Union) persuaded their governments to reach out before World War II. Bring a nuclear bomb to support them in nuclear fission research.

In the United States, where Fermi and Zillard were both immigrants, the first man-made rectifier, the Chicago Pile-1, was invented and became critical on December 2, 1942. This became part of the Manhattan Project, which developed uranium enrichment and built large reactors to produce plutonium for use in the first nuclear warfare, the same warfare that landed on the cities of Hiroshima and Nagasaki.

Figure 1. The first incandescent light bulbs were lit on December 20, 1951, at the Breeder 1 Laboratory Reactor at Argonne National Laboratory. (Wolde-Rufael, Y., 2010)

Unexpectedly, the high cost of the nuclear weapons program, combined with rivalry with the Soviet Union and the desire to expand democracy around the world, put pressure on federal officials to develop a civilian nuclear energy industry to help justify significant government spending.

In 1945, the Pocket Book of the Atomic Age called for nuclear energy to enter everyday objects and, in the future, to become inefficient fossil fuels. The scientific author, David Diaz, stated that in the future there will come a time when, instead of filling a car tank two or three times a week, one can drive an atomic bullet the size of a vitamin's bubble for a year. "In the future, there will be nuclear-powered land-based shuttles, nuclear products, plutonium-heated swimming pools, and so on," wrote Glenn Seaborg, former head of the Atomic Energy Commission.

Britain, Canada and the Soviet Union entered the field in the late 1940s and early 1950s. For the first time, on December 20, 1951, about 100 kilowatts of electricity was generated by a nuclear reactor at the Breeder 1 Laboratory Reactor Power Plant near Arco, Idaho. Also in the United States, research into a nuclear power plant was conducted by testing a reactor developed in 1953.

In 1953, then-US President Dwight D. Eisenhower delivered a speech on the subject of the atom for peace, emphasizing the urgent need to develop the peaceful use of nuclear energy at the United Nations. This continued with the reform of nuclear energy activity in 1954, which led to the rapid deconstruction of US reactor technology and the development of the private sector.

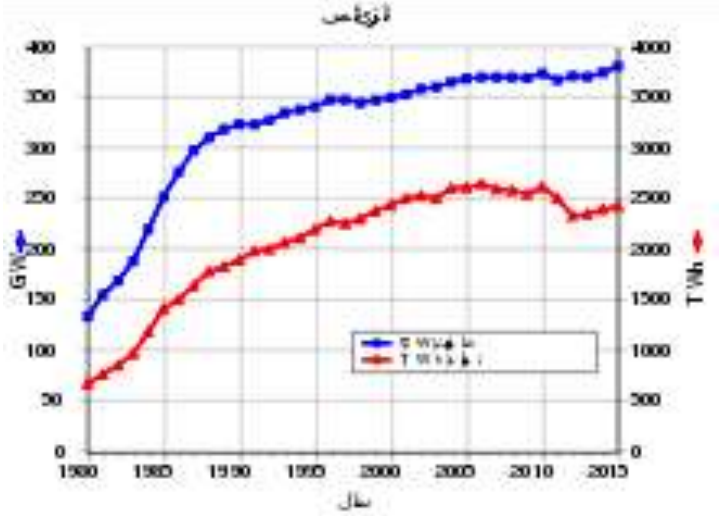

Figure 2. History and plan of global use of energy resources, 1990-2035

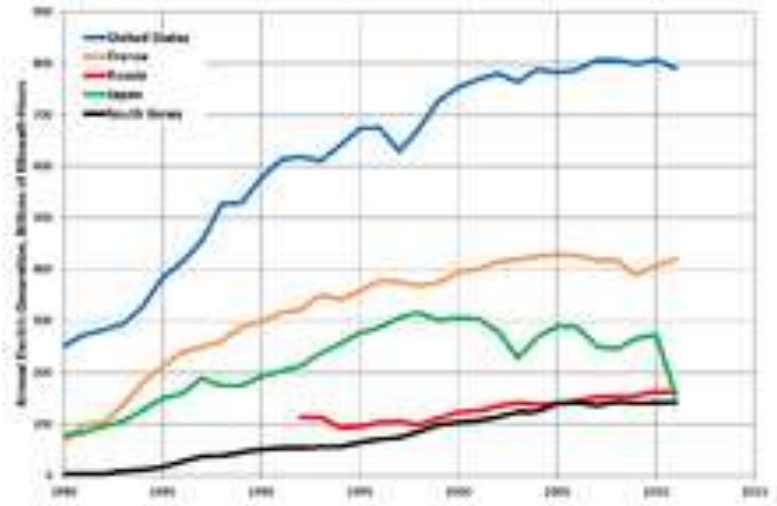

Figure 3. Nuclear Energy Capacity and Production, 1980-2010

3. NUCLEAR ENERGY AND ITS EFFECTS ON THE ENVIRONMENT

Nuclear energy is the use of heat-generating nuclear operations to generate useful heat and electricity. The term includes nuclear fission, radioactivity, and nuclear fusion. Today, nuclear fission of actinide group elements in the periodic table generates most of the nuclear energy required by humans using radioactive operations, which primarily meet human needs in the form of geothermal energy and isotopic heat-electric generator.

Nuclear power plants, apart from their share of the Navy's nuclear fission reactors, provided about 7.5 percent of the world's energy and 13 percent of the world's electricity in 2012. In 2013, the International Atomic Energy Agency reported that there were 437 active nuclear reactors in 31 countries, although not all reactors generated electricity.

In addition, there are more than 140 naval vessels that use about 180 rectors to power their cores. After 2013, the achievement of net added energy through the melting of stable nuclei, with the exception of melting energy sources such as the sun, has created a continuous space for physical and engineering research. Nuclear energy is a type of energy produced by nuclear decay, nuclear fission, or nuclear fusion, and its basis can be described by the equation $2\ \Delta m.c = \Delta E$. (Ebrahimpour, 1387).

In each atom, there are particles of latent energy through which the various components of the atom are joined together, so the nucleus of the atom is considered a source of energy that is released when the atom is split. The energy contained in the atomic nuclei of some elements (such as uranium) can do the same thing as burning large amounts of oil and gas when released, but burning oil and gas creates environmental problems and produces large amounts of greenhouse gases.

Nuclear energy is one of the safest and cleanest energies that can compensate for the shortage and even vacuum of fossil fuels. There are several methods for generating electricity, including water, wind, solar, tidal, geothermal, and nuclear.

In a heating device, heat is generated by burning primary energy sources such as coal, oil or gas, and the heat generated in the boiler evaporates the water. The resulting steam, after turning the turbine in the condenser, turns into water and returns to the boiler. The rotation of the turbine causes the power generator shaft to rotate and power to be generated.

How to generate electricity in a nuclear power plant In nuclear devices, after nuclear fission, nuclear energy is released in the form of heat. The resulting heat, like heating devices, can be used to generate electricity.

A nuclear device essentially works like a fossil (thermal) device, except that in an atomic device, heat is not generated by burning coal, oil, or gas, but is generated through the fission of the atomic nucleus.

The flow of water transfers this heat to the steam generator, where the water is converted to steam, from the first stage, and the resulting steam circulates the turbine and thus the power generator, and then turns into water in the condenser. In the second stage, this water is returned to the steam generator and the returned heat is absorbed and released by the cooling water in the third stage, when the steam is converted into water in the condenser.

There are different types of nuclear devices. One of the most advanced is the nuclear device with a pressurized water reactor.

After the voltage increases, the electricity generated in the atomic device is transferred to the consumption areas by high-voltage transmission lines in increasing converters, where the voltage is reduced to the required level by reducing converters and is provided to the consumer. This increase and decrease Voltage is due to reduced losses in power transmission lines.

In addition to generating electricity, the nuclear device has other benefits and applications, including desalination of seawater. It is possible to connect to each unit of the 1000 MW nuclear device, a salt water desalination unit with a capacity of 100,000 cubic meters per day, and the saline water is directed from the sea to the saline water desalination unit by a pump.

In this device, the heat generated by the reactor is used to distill water. Distilled water turns into drinking water after some steps. Excess liquids are returned to the sea, and drinking water enters the distribution network. The resulting fresh water can be used for agricultural, urban and industrial purposes.

4. URANIUM AND ITS ROLE IN THE NUCLEAR SYSTEM

The nucleus of an atom is made up of particles called protons and neutrons. A proton has a positive electric charge and its value is equal to the negative charge of an electron, while a neutron has no electric charge, in other words it is neutral.

Protons and neutrons are joined together by some kind of binding energy, the released energy is used as heat.

Uranium is also a heavy element and has a lot of binding energy. The amount of energy released during the branching of the uranium nucleus is very high, and for this purpose, uranium is used to fuel the nuclear reactor.

For comparison, the amount of uranium energy in the 80-ton nuclear reactor is equal to the amount of energy in 17 million barrels of crude oil.

On a small scale, the energy from burning a 12-gram uranium fuel tablet is equivalent to the energy from burning one ton of coal, two and a half tons of wood, and 17,000 cubic feet of natural gas.

In uranium, which is the fuel of the nuclear device, there is restrained energy. This energy is used as thermal energy after the release of the released nucleus. (Hojjat, 2006)

The question for some is how to split an atomic nucleus that is much smaller than a grain of sand?

A neutron is able to collide directly with the nucleus of an atom, and after being absorbed by the atomic nucleus, it splits it in two. The parts of the branch are separated with high energy, thus releasing thermal energy.

As neutrons increase, more nuclei branch off, more neutrons are released, and as a result, a chain reaction begins. The greater the number of branched nuclei, the more heat is released.

The heat generated can be used to generate steam and thus turbine circulation. When operating an atomic device, radioactive waste is generated in the form of liquid and solid gas.

To protect the environment, the amount of radioactive material that enters the environment must be less than the specified amount. In the nuclear system, the reactor building and its ancillary facilities are under control, and radioactive materials are produced only in the controlled parts.

In order to reduce the amount of radioactivity, gaseous materials, such as gases emitted from the cooling water of the first stage, are passed through charcoal filters, or stored for a long time in special containers. This is because over time, the effect of radioactivity decreases.

When the amount of radioactivity in these gases is less than a certain amount, they are diluted, sent into space through the chimney, and the air contaminated with radioactive material in the rooms of the controlled area, after being treated by special filters, is sent into space by the chimney.

Radioactive wastes are collected and stored temporarily, and in the next stage, these evaporated liquids and radioactive solids are left behind. The treated water is returned to the sea and the remaining materials are treated according to the established rules (Adamantiades, A., Kessides, I., 2009)

Figure 4. Shockproof enclosures

Solid radioactive materials, such as exhaust fuel assemblies, are removed from the device inside the shockproof and fireproof chambers. Other radioactive solids, such as filters, clothing, and cleaning products, are packaged in barrels and operated in accordance with existing regulations.

To ensure that the radioactivity of all materials removed from the controlled area is harmless to the environment, the radioactivity of excess liquids, gases and solids is constantly measured.

When operating the device, its surroundings are constantly monitored for radioactivity.

Special attention is paid to safety issues in the planning, design, construction and operation of nuclear devices. Fences and automatic safety systems prevent any adverse effects on personnel and the environment, even when the greatest predictable accident occurs. .

From the beginning of planning and design operations, scientists and experts ensure that they can control even the rarest accident and its consequences, such as earthquakes and ...

The components of each system are tested regularly to ensure that it is functioning properly. The nuclear plant is currently one of the safest industrial facilities. (Amir Teymouri, 2009).

5. SAFETY FENCE IN THE NUCLEAR DEVICE

One hundred percent of the radioactive material produced by nuclear fission remains inside the crystal lattice of nuclear fuel, and Fence One is inside Fence Two.

- Anti-pressure and anti-leak pipes, made of a kind of alloy under the conium, enclose the fuel pellets and prevent the release of the resulting radioactive material from the nuclear branch.
- The pressure vessel of the reactor, which is made of steel parts, forms a fence that is completely resistant to heat and beam pressure. (Mostafapour, 2006)
- Biological protection, which is more than one meter thick and made of reinforced concrete, is protection against rays coming out of the chamber under the pressure of the reactor.
- Steel safety sphere covers all nuclear systems that contain radioactive materials, and this protection prevents the release of radioactive materials even during the most dangerous events.
- The reactor building, which is made of concrete with a thickness of about two meters, is considered a protection against external factors.
- According to the rules, the maximum amount of radiation allowed in the vicinity of nuclear devices is equal to 1.5 millimeters.
- The amount of radiation received from a device during one year of operation is less than one percent of the amount of radiation received from nature.
- In one hour of flying, the amount of radiation received is approximately equal to the amount of radiation received during a year of living near a nuclear device.
- Radiation sources are used in medicine, especially radiography. The TV and night owl colors also emit some light. Ferguson, C.D., 2007).
- The fission reaction of the atomic nucleus generates heat, which is used to generate steam. The generated steam generates electricity by rotating the turbine blades.
- Melting energy as an energy source is a way to escape the energy crisis in the coming years, given the fuel used in this operation, which is almost endless in the world.
- In addition, this energy causes the least damage to nature in terms of environment and does not leave long-lived waste like nuclear fission.
- In the melting method, tritium atoms (two hydrogen isotopes) combine under suitable conditions to form a heavier atom called helium.
- This also produces neutron particles and a large amount of heat, which is used to heat water and convert it to steam.
- The steam generated spins the turbine blades and eventually generates electricity.

6. CONCLUSION AND RECOMMENDATIONS

The major impact of fossil fuels on the Earth's environment is a growing problem that has led the world community to achieve better fuels or clean fuels. Therefore, the international community has chosen nuclear fuel as an alternative fuel. Nuclear power plants can be called the most important application of nuclear technology that generates electricity without producing polluting gases due to waste and radioactive contamination of human society. They have ahead.

Nuclear pollution occurs when the by-products of a nuclear interaction, whether man-made or natural, are left in the environment or in the vicinity of human habitats. The three main types of radioactive transmitters are: Alpha, beta and gamma rays. Of these three rays, the effect of alpha particles (which is actually a helium atom) is the least and the effect of gamma rays is the most.

Nuclear waste is divided into three categories: low-level, extra-uranium and high-level. Various processes have been performed to reduce the radioactivity of stored by-products. Some of the best ways to do this are compression, various chemical operations, glassmaking, preservation, and storage. The Japan earthquake and the explosion of an atomic bomb released large amounts of radioactive material. Radiation is permanent. Which can cause irreparable damage such as some effects on tissue such as cheloide, cataract, cataract, leukemia, cancer, embryonic development, cell destruction, etc? The use of nuclear energy must be handled more carefully

In this article, issues such as the initial history of radioactivity, units of radioactivity, introduction of radioactive materials (radioactive), types of radiation and permissible amount of radioactive radiation absorption, uranium, nuclear reactors and nuclear

waste, methods of disposal of atomic waste, effects of radioactive materials Humans, the effects of radioactive materials on the natural ecosystem, the Chernobyl accident, the definition and effects of nuclear weapons, the atomic bombings of Hiroshima and Nagasaki, and nuclear disarmament are briefly stated.

Its purpose is to recognize the dangerous effects of nuclear material on the entire planet and to warn governments and scientists about nuclear pollution. Thermal pollution, hazardous radiation, waste and nuclear waste have exposed the entire environment to serious hazards.

It has faced the human race with painful deaths and acute and chronic diseases. All living things: plants, animals and all environmental environments including the atmosphere, land, climate and in fact the entire planet is threatened. The results of this study show that the most serious problem of nuclear energy is the proper and appropriate use of radioactive waste. The use of power plants can ensure environmental safety regulations, it is essential.

Nuclear disarmament and the complete destruction of nuclear weapons is the best guarantee for war prevention and the use of nuclear weapons. Governments and scientists are responsible for protecting the present and future generations from the great dangers of nuclear issues.

7. REFERENCES

[1] Ebrahimpour, Razieh, 2008, A Study of the Causal Relationship between Energy Consumption and Economic Growth, Master Thesis, Azad University of Tabriz.
[2] Amir Teymouri, Somayeh and Sadegh, Khalilian, 2009, Study of economic growth and gas emission in OPEC CO2 member countries Kuznets environmental curve approach, Quarterly Journal of Environmental Sciences, Year 7, Number 1.
[3] Lee, chien-chiang,yi-bin chiu, 2010, nuclear energy consumption, oil price, and economic growth:Evidence from highly industrialized countries.
[4] Ebrahimpour, Razieh, 2008, Investigating the causal relationship between energy consumption and economic growth, Master Thesis, Azad University of Tabriz.
[5] 4- Hojjat, Seyed Saeed, 2006, Nuclear energy, a suitable method to deal with the greenhouse effect. The first specialized conference on environmental engineering.
[6] 5- Mostafa Pour, Manouchehr (2006), A Study of the Relationship between Electricity Consumption and Economic Growth in Iran (1978-2007), Master Thesis, Shiraz University
[7] Adamantiades, A., Kessides, I., 2009. Nuclear power for sustainable development: current status and future prospects. Energy Policy 37, 5149–5166.
[8] Toth, F.L., Rogner, H.H., 2006. Oil and nuclear power: past, present, and future. Energy Economics 28, 1–25.
[9] Vaillancourt, K., Labriet, M., Loulou, R., Waaub, J., 2008. The role of nuclear energy in long- term climate scenarios: an analysis with the World-TIMES model. Energy Policy 36, 2086–2097.
[10] Ferguson, C.D., 2007. Nuclear Energy: Balancing Benefits and Risks. Council of Foreign Relations, CRS No. 28.
[11] Elliot, D., 2007. Nuclear or Not? Does Nuclear Power Have a Place in Sustainable Energy Future? Palgrave Macmillan, Houndmills, Basingstoke.
[12] Wolde-Rufael, Y., 2010. Bounds test approach to cointegration and causality between nuclear energy consumption and economic growth in India. Energy Policy 38, 52–58.

