International Journal of Engineering Science Invention (IJESI)
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org ||Volume 8 Issue 05 Series. IV || May 2019 || PP 39-42

Nuclear Power Plant Accidents and Climate Change

R. Pavithra[1], K. Ramesh[1] and V. Brindha[2]
[1](*Department of Physics, Vivekanandha College of Arts and Sciences for Women (Autonomuous), Elayampalayam, Namakkal, India. 637205)*
[2](*Department of Chemistry, Vivekanandha College of Arts and Sciences for Women (Autonomuous), Elayampalayam, Namakkal, India. 637205)*
Corresponding Author: Pavithra

Abstract: *The global warming frequently is caused by greenhouse gases and nuclear wastages. Nuclear energy is main source of generate an electricity at the same time De carbon method can be maintained. Nuclear fission, fusion give significant to diminish radiation emission. Global temperature increases by 2℃ In 2009, CO_2 level is 39.6%, in 2025 to 2065, CO_2 level is reduced by 26.1%. The nuclear waste management is synchronized and forbidden by international atomic energy agency (IAEA) started on 1968. The Nuclear Industry at shipping port going expansion of ATF used to safety management for Nuclear Power Plant.*

Keywords *- nuclear fission reaction, climate change, Paris climate change conference, nuclear waste, nuclear reactor.*

Date of Submission: 26-05-2019 Date of acceptance: 08-06-2019

I. INTRODUCTION

Nuclear power is presently a significant factor of energy safety and global economic development [11]. Nuclear energy source is essential for our world. Nuclear energy is seen as a major prospect for the decarburization of global economic due to its low carbon system. International governments give to control global warming. Paris climate change conference held on 2015 about scheming global warming. Nuclear technology is only developed GHG emission free energy source able of replacing fossil fuel energy source in the given time scale safely ,economically, reliably and in a sustainable way [8]. Nuclear fission reactor in the civil sector, considerable knowledge has also been accumulated in the military sector. Shipping port was designed to be a civilian nuclear power plant. It was weary. The large pressurized water reactor constructed at the time the first intended solely for commercial operation. The PWR was the s1w, the land based prototype reactor for U.S navy's, nautilus submarine on march 30, 1953 an reactor power of 50-70 MW [2]. Would entail that the reactor core be much larger than the previous naval reactor cores.

II. Global Warming Causes

Green house gases in the atmosphere created by human activities. GHG is increases concentration the international community to instantaneously effect political progress & discus about controlling. They can select scenarios A, B, C, D. Scenarios held around 2025-2100. The global average surface warming in the 21st century and subsequent period would mainly depend on the cumulative emission of CO_2 . The air temperature range per 1000 Gtc. Group 3 provided the most viable scenario to achieve the goal of keeping the global temperature rise until 2100 within 2℃ compared with an industrial level. To limit the GHG concentration to 450ppm CO_2 . It will reduce net zero in 2100. This report also assessed the improvement and technical choice in transport, building, human settlements, infrastructure spatial planning under this goal. The mass of emitted CO_2 obtained by coal combustion amounts to up to three times the mass of coal used so every year storing twenty billion tons of CO_2 are measured. The coal industry to continue burning coal this create an effect of climate change.[8]

2.1 Decarbonizes in nuclear power:

The nuclear energy had greatly the increase of rate of global warming recorded in the past four decades, as its use prevented the release of oven 60 billion tons co_2 after 1970. It is currently estimated that nuclear power is preventing the yearly discharge of 1.2-2.4 Gt co_2 emission globally, assuming that, without this process, more than 2400 TWh significance of nuclear power would be formed by natural gas incineration. Nuclear power is considered to be an essential involvement to the decarburization of the global energy system. Now a day's average level of co_2 emission in electricity generator is currently 15 g co_2/kwh. Similarly this value can be more than 70 times equal emission generated by oil, gas, coal compare to wind power emission. In Paris conference has during china their lack of scientist join to give the ideas. The conference team is low

carbon technology and low greenhouse gas emissions developments (UNFCCC, 2015). Scientific uncertainty inevitably exist s in observation, impact assessment and projection of climate change (fu, 2007). In order to climate change renovation is needed in key sectors such as energy, industry, transport, fossil fuel etc. future nuclear growth will need an extension of the fuel cycle.[11]

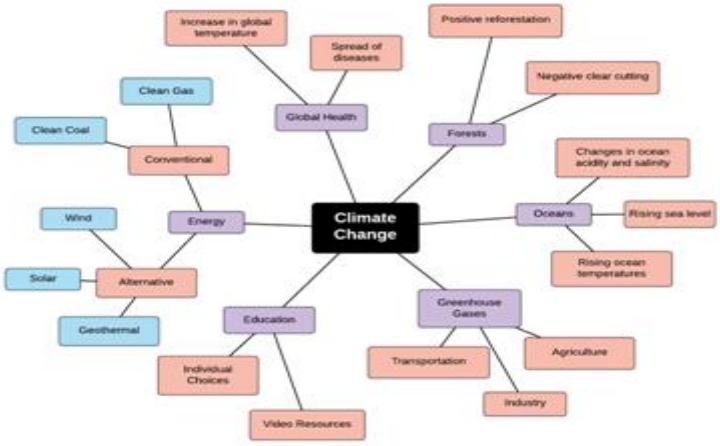

Fig.1 climate changes for various sectors.

III. Nuclear Power Plants

Nuclear energy is a higher energy source compare to another energy source. Nuclear power produced an electricity per year 200-300GWe of power capacity. Light water reactor and pressure water reactor are used to generate a power. LWR is a type of thermal neutron reactor that uses normal water as divergent to heavy water. LWR typically boiling water reactor, pressurized water reactor, and supercritical water reactor. The PWR is started 1950s in US, under name of VVER [7]. Samuel Untermeyer 2 to enlarge the BWR at US national reactor testing station, this test name BORAX experiments [7]. The world nuclear reactor is CP-1, X10etc. Were effectively reached criticality, uranium enhancement. The low power (Lopo) reactor at critical mass of U_{235} to produce 2the atomic bomb cannot be consider light water reactor [7]. They use uranyl sulfate salt dissolved in water. The first aqueous homogeneous reactor and first reactor using uranium as fuel and ordinary water as a moderator. Nuclear reactor consists of nuclear fuel and control elements. The pellet rod like pencil thin nuclear fuel rod, about 12 feet (3.7) long it was coated like hafnium or cadmium that ready to capture neutrons. Typically 20 rods are arranged in reaction. Hot water can be poured thought steam power can generate until then hot water passed though cooled. Reactor temperature exceeds 2200

cooling water will breakdown into hydrogen or oxygen which can expose mixture, decay heat is a major risk factor in LWR reactor. Every nuclear generating station spews about two-third of the energy it burns inside its reactor core into the environment. Nuclear fission is the most water intensive method of the principal thermoelectric generation options in terms of the amount of water withdrawn from sources [wiki].

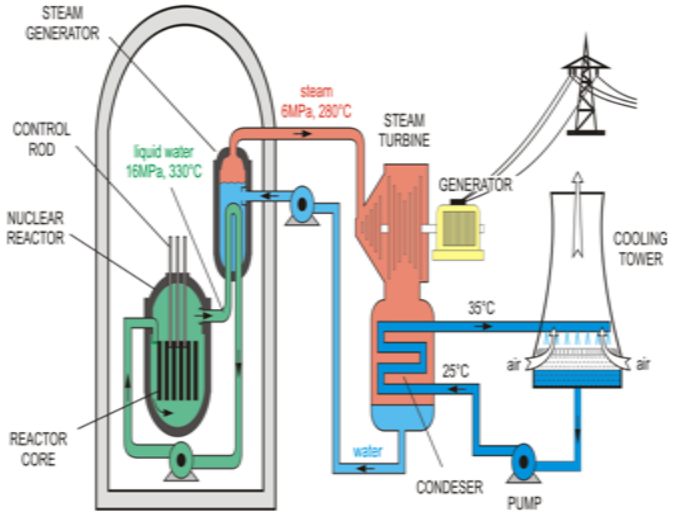

Fig. 2 Nuclear power plant reactor

3.1 Nuclear Reactor Accident:

The past decades have proved that nuclear accidents can cause critical local, regional or global contamination. There were approximately 20 nuclear accidents worldwide in commercial and military reactors, which were linked to reactor core melting caused by cooling capacity system failures. Analysis of the INES scale rating of these accidents which groups nuclear events in seven classes based on their severity. The Chernobyl accident of April 26th, 1986 is known as the most severe nuclear disaster in civil nuclear power history .Considering the large explosive release of radioactive material into the environment, as a result of human errors. The explosion of reactor 4 caused the uncontrolled release of a considerable amount of radioactive isotopes in to the atmosphere for ~10 days, which, due to atmospheric dispersion. The most important released radio nuclides were ^{137}Cs and ^{131}I, and it is estimated that ~30% of the reactor core content of ^{137}Cs, and 60% of ^{131}I was transferred into the atmosphere. Radioactive contamination with ^{137}Cs can be considered the accident's most drastic impact form (environmental persistence-30 year half-life), especially in former Soviet Union, where most of the ^{137}Cs deposition on the ground occurred, distributed in Belarus (40%), the Russian Federation (35%) and Ukraine (24%). At the same time, ^{131}I was a problematic radioactive isotope due to the fast transfer to the human food chain via the transfer to pasture grass and subsequently to cow milk, despite its much lower persistence (8 half-life). The Fukushima Daiichi accident (Japan) of March 11th, 2011, due to the Tohoku earthquake (magnitude 9.0) and subsequent tsunami that caused a power outage and the cooling system failure of reactors 1,2, and 3, is considered the second most severe nuclear event in history after Chernobyl. In the last instance, considering the release of ^{137}Cs into to environment due to the partial melting of the reactor cores in the days following the tsunami, it is estimated the total value reached 37 PBq, which represents -44% of Chernobyl emissions. An important particularity of the Fukushima accident is that most of the radionuclides (about 80%) were deposited in the Pacific ocean, thus becoming a possible threat for main ecosystems, and implicitly terrestrial waters and ecosystems was another possible threat for the public health. However, a recent study indicates this accident does not impose a significant radiological risk to the global public except for the Japanese nation. Considering the case of the radioactive isotope ^{137}Cs, representative due to its long persistence in the environment, it was found that, due to atmospheric dispersion, 8% would be deposited within a 50-km radius around the source, 30% within 500km, 50% within 1000km, and 25% within 2000km. therefore, considering that over 90% of ^{137}Cs fallout will be transported within a 50km radius around the source, as well as the fact that considerable amounts of radioactive particles will be deposited at distances of up to 2000km, it can be concluded that any major nuclear accident could potentially cause significant environmental consequences regionally and even globally.[11]

3.2 Nuclear Waste And Its Risk Analaysis:

Nuclear fuel from uranium 235 and plutonium 239 nuclear fission contains a long-lived nuclear waste [9]. Nuclear waste radioactive materials derive three type's high level radioactive waste, intermediate radioactive waste, and low level radioactive waste. In geological format high level waste volume 3%, radioactive content 95%. High level waste can remain highly radiation for 1000of year. Nuclear waste storage sometimes makes accident. The calamitous risk potential if control fails which in nuclear reactor can be brought overheated fuels melting it large amount of fission products into the environment. On 2011 Japanese tsunami which hurt Fukushima 1 nuclear power plant, ensuing hydrogen gas exposal. Nuclear accident also creates global warming. We can try to control nuclear accident. We can spend waste nuclear fuel for military weapons' [10], normally fuel element filled in zirconium coated pellet it can releases and detonation of hydrogen release and produce amount of fission product to causes an accident. Zricaloy-2 and zricaloy-4 materials for safety performance for long years [2]. High leave radioactive liquid storage tank. It was double shell stainless steel tank. The cooling water can be purity to measure a radiation level used to belt radiation sensor tank to avoiding sea water pollution. GEN4 fission reactor tolerates naturally radioactive materials [4]. High leave radioactive liquid storage tank. It was double shell stainless steel tank. The international atomic energy agency (IAEA) has described, in non-reactor nuclear facility implelementation probability safety assessment procedures used to nuclear waste storage method. [11]

IV. Conclusion

As nuclear energy is high efficiency in our world. India has 22 nuclear reactors in operate in 7 nuclear power plants and its current production is 6,780mw [wiki]. The power cannot be emitted co_2 but nuclear accident to created global warming. Nuclear waste materials are dangerous to create global warming. Nuclear waste fuels reuse vehicles charges, uranium pellets are modify by zricaloy-4 materials [2], cooling water storage tank safety uses this all are maintained nuclear accident can be control [6]. To controlling Nuclear power plant accident. These solutions are help to reduced small quantity of global warming causes.

References

[1]. V. Knapp, D. Pevec, M. Matijevic, The potential of fission nuclear power in resolving global climate change under the constraints of nuclear fuel resources and once through fuel cycles, Faculty of electrical engineering and computing, department of applied physics, university of Zagreb, unska3, 10000 zagreb, Croatia. Energy policy 38 (2010).

[2]. Zeses Karoutas, Jeffery Brown, Andrew Atwood, Lars Hallstadius, Edward Lahoda, Sumit Ray, Jeffrey Bradfute, The maturing of nuclear fuel: past to accident tolerant fue,.Westinghouse electric company, USA. Progress in Nuclear Energy (2017)1-11.

[3]. Michael J. Ford, Ahmed Abdulla, M. Granger Morgan, David G. Victo, Expert assessments of the state of U.S. advanced fission innovation, Department of engineering and public policy, Carnegie mellon unive, Energy Policy108(2017)194-200.

[4]. Massimo zucchetti, Fission power, fusion power and conversional power plants. Radioactivity, radiotoxicity, radioactive waste, Fusion Engineering and Design (2018).

[5]. Vladimir Knapp, Dubravko Pevec, Promises and limitations of nuclear fission energy in combating climate change, University of Zagreb of Electrical Engineering and Computing, Unska 3, 10000 Zagreb, Croatia, Energy Policy 120(2018)94-99.

[6]. S. Zou, Y. Kuang, Dewen Tang, Zan Gua, Shoulong Xu, Annals of Nuclear Energy, 119(2018)106-116.

[7]. Federation of American scientist's early reactor, Retrieved 2012- 1230.

[8]. Yu Hong- yuan, Z. Song-Li, Advanced in climate change research 6 (2015)56-66.

[9]. R.A. Karam, Karl Z.Morgan, Environmental Impact of Nuclear Power, Pergamon 556.

[10]. Remus pravalie, Georgeta Bandoc, Nuclear energy: Between global electricity demand, worldwide decarbonisation imperativeness, and planetary environmental implications, Journal of Environmental Management, 209 (2018) 81-92.

[11]. Yun Gao, The 2℃ global temperature target and the evolution of the long term goal of addressing climate change from the United Nations frame work convention on climate change to the Paris agreement, Engineering, volume3, April 2017 page number 272-278.

Pavithra" Nuclear Power Plant Accidents and Climate Change" International Journal of Engineering Science Invention (IJESI), Vol. 08, No. 05, 2019, PP 39-42