

INTRODUCTION

Nuclear energy generates about one quarter of electricity used in the OECD members & the share of it in the global supply of electricity's just sixteen percent. The contribution of other power resources is more than nuclear energy in any given timeline. The simple reason behind this is the risk to health it causes to people around the Nuclear Power Plant.

Nuclear energy generation is a full-fledged technology that makes huge contribution to power generation around the globe. The advancement of nuclear power, is more essential in industrialized members of the OECD & other countries that are developing. The overall experience of the countries globally, surpasses 12000 reactor-years, & 90% of these reactors are in OECD members. One signal of technological advancement is the existence of Nuclear form of energy, that has been kept an eye on by many international organisations for decennium. The standard global unit capability factor for all operational reactors is BTW almost none to or above eighty percent over the last decennium, that reached upto eighty four percent in the year 2004 & 2005.

NUCLEAR DEVELOPMENT SCENARIO

Nuclear power is singular essential element of generation of global power & supply of electricity & future advancement in this field can be enquired only in the framework of worldwide power supply & demand analysis. Expert energy analysts state initial energy growth in demand is inevitable due to anticipated rising economic & population advancement. Even though the dramatic power efficiency enhancement were already seen by analysts, economic & social drivers will lead to drastic power demand growth rates. The IPCC scenario which covers a huge range of projects in future at least a doubling of global primary power usage by 2100 & rises up to almost six or higher, in the lack of such measures aspiring at lowering consumption. ¹

Various organisations & projects conducted by them

¹ <http://www.lse.ac.uk/GranthamInstitute/faqs/role-nuclear-power-energy-mix-reducing-greenhouse-gas-emissions/>

- *Scenarios of IEA:*

The book World Energy Outlook 2006, (published by IEA, 2006) two scenarios of power & the electricity supply & demand in 26 years from 2004 are taken into consideration always. These scenarios are based on the current regulations of the government & gives a business-as-usual case & the other scenario assumes that the respective governments will enforce the regulations recently under consideration to address supply security threat & global climate change risks.

In either scenario population upswing – one percent each year average since 2004 to 2031 & the economical advancement- three point four percent each year Gross Domestic Product enhancement for the world- are also pushing power & energy demands. In reference scenario, power demand rises by fifty percent & the generation of electricity almost doubles in 26 years.

Even though the measures assumed to be enforced in the alternative scenario will decrease total energy demand by almost ten percent in 2030 as compared to the reference scenario, it would not succeed in stabilising fossils consumption & therefore, would not be enough to decrease GHG emissions from power consumption.

All the countries are so much dependant on the hydrocarbons, it will not even change by 2030 & the world will still be 50% dependant on it. While nuclear power & renewable energy sources could contribute about twenty percent to the total initial energy supply in the world. & therefore the CO₂ emissions from energy production & usage would become 2x by 2030 in comparison to the 1990 level in scenario & will rise by more than sixty five percent in the alternative scenario.

- Scenario of IPCC

International Panel for climate change carried out a very comprehensive & precise assessment of the energy & the GHG release scenarios up to 2100 (IPCC, 2000). The motive behind the endeavour was to give alternative image of the future development & to analyse the relative influence of several driving forces on power demand & GHG emissions. It is emphasised in the report that truth is very rare to be similar to any of the single scenario consisted of in the assessment.

“The 3 scenarios provided in this report were shortlisted to display varying future. They don't give the extremes of range included in the IPCC assessment in regard of power demand but cover the whole range of GHG release alternatively to other scenarios.”

The scenario A1G & A1T are identified by the fast growth in economy with huge decrease of the regional variations in per capita income, with global population increasing in the mid-century however reducing thereafter, & by fast introduction of more effective scientific methods. The basic & major difference BTW the two types of scenarios is the dependence on fossils with A1T identified by the perception that the regulation aiming at the enforcing sustainable power mixes are acquired broadly while A1G presumes that individual policies are not enforced or maybe not be proper & that hydrocarbons, still have an upper hand in the supply mix.

The second scenario(B) scenario is identified by the significant decreased economic growth as compared to the first section of the scenarios (A) scenarios but in reality the similar pattern of population, fast alterations in economic structures towards service & information economy with decrease in material intensity, & by forceful introduction of cleaner & more resource efficient technologies.

In a report published by “Scientific American” it was stated: Indeed, there is evidence: the highest drop in the pollution records in France was seen in the 1970-1980 when that country transitioned from use of fossil fuels to nuclear power plants for the generation of electricity, reducing its greenhouse emissions by roughly 2 percent per year. The countries around the world need to drop its global warming pollution by 6% yearly to avoid dangerous greenhouse effect in estimated of Hansen & his co-authors in a recent paper in PLoS one.²

China is leading the world in new nuclear reactors, with 29 currently under construction & another 59 proposed, according to the World Nuclear Association. Also China has never confined itself specifically to the typical reactors that employ uranium fuel rods & water; it is built everything from heavy water reactors originally designed in Canada to a small test fast reactors.³

FEATURES OF NUCLEAR ENERGY

² <https://www.scientificamerican.com/article/how-nuclear-power-can-stop-global-warming/>

³ Ibid

This kind of power is produced by controlled nuclear fission & nuclear fusion reaction. The nuclear fission power produced by thermal neutron reactors is used around the globe in commercial & utility applications.

The Uranium is the main fuel for the nuclear fission activity to produce power. Shot by a neutron, a ^{235}U nucleus split into two lighter nuclei, large amount of energy is released, & multiple neutrons are also released at the same time, which are used to split other ^{235}U nuclei. This phenomenon is known as a nuclear chain reaction. The nuclear fission doesn't produce GHG.⁴

The greenhouse gas release in nuclear power production is very relevant subject when we consider all the stages of clean fuel cycle, which include milling & mining, enrichment, conversion, electricity generation, waste disposal. This whole cycle is called nuclear energy chain. A fuel cycle is also called nuclear energy chain. The nuclear power chain generates Greenhouse gas release indirectly in construction & the operation & maintenance of the facility, mostly due to the use of fossil fuels & raw or processed materials.

COMPARISON OF GREENHOUSE GAS EMISSIONS FOR NUCLEAR POWER & OTHER ENERGY CHAIN

In the beginning of 1990's the IAEA, & the eight international partners started an inter-agency project for comparative assessment of different energy sources. Taking in consideration the entire downstream & upstream energy chain for electricity generation, nuclear energy emits 40-100 x carbon dioxide less than the present used fossil fuel chain, also less than hydro, biomass, wind. Greenhouse gas emissions in case of nuclear power chain are due to use of fossil fuels in the extraction, enrichment or uranium processing & to fuels used in the production of cement & steel for production of reactors & other fuel cycle facilities. These kind of emissions are negligible as compared to those from the direct use of fossil fuels for the generation of electricity, can be lowered even more by energy efficiency improvements.⁵

⁴<https://reader.elsevier.com/reader/sd/pii/S1674927811500188?token=C2D261F3020DE04A290CEFC02EBBD4ECD0F0CF30B8549ABFA064B5DED5F6651E4580DA5390F2D80979CDC900BB7B474A>

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<https://reader.elsevier.com/reader/sd/pii/S1674927811500188?token=C2D261F3020DE04A290CEFC02EBBD4ECD0F0CF30B8549ABFA064B5DED5F6651E4580DA5390F2D80979CDC900BB7B474A>

ENVIRONMENT IMPACTS

Nuclear energy boosts various benefits to the world. One of these benefits is that it produces fewer emissions than the traditional power sources such as fossil fuels. Coal is one example of fossil fuels that is polluting the environment. America's largest environment protection organisation- Sierra Club (2007) coal generates twice as much of the global release when compared to other sources of energy like gasoline. But coal companies state that coal energy production is going to cure America's energy problem, although in reality coal has been causing innumerable problems in regard to the environment like increasing carbon emissions costly conversion process. It is being said that clean coal causes double the greenhouse gas release than regular gas ever does.

A research report by Harvard's Centre for Health & the Global Environment has produced that states that coal causes 80% of the United States' warming emissions. The contribution of particulates to climate change has until currently been underestimated.

The wildlife federation focusing on oil & gas hazards that have occurred BTW 2000 & 2010 within the United States. The never ending search for power has had a deep effect on the environment that will affect the generations to come.

The founder & chief scientist of green Spirit Strategies (Moore) states that- Nuclear power is one solution to problem of greenhouse gas emission. An investment in the sector of nuclear energy will go very far to reducing this reliance on fossils & reducing CO2 emissions from energy generation. He also states that nuclear power will be the solution to secure US' energy problem & meet the demand & supply of the nations.

Other benefit of nuclear power will be energy security for the United States of America, which means the promise of sustainable energy for the future generations. US military planners have been working to prepare for this future, but have estimated that within the next 20 years the energy demand will increase 50% of what it is as of now. So many ideas have been put forward about how to solve this problem, however nuclear power seems to be the best possible solution. As has been stated previously, nuclear power plants are able to decrease emissions, but also

would be able to meet energy demands. Securing energy for the next generation is vital for well being of the USA. Other sources of power, such as natural gas & oil & even coal are non-renewable sources of energy, that have been projected to last only for the next hundred years. When these resources of power become scarce, states will fight in order to have the resources they are in need of.⁶

CONCLUSION: HOW NUCLEAR POWER FIGHTS CLIMATE CHANGE

Nuclear energy which is means energy taken from fission, has the least carbon footprint of around 15-5- gCO₂/KWh (PDF). By comparison, the average footprint of Gas generation is around 450 gCO₂/ KWh & that of coal power generation is around 1050 gCO₂/KWh. This can become a part of global decarbonisation process, with certain countries depending on the the nuclear power more heavily than others to cut their emission. The 10 worst emitters of GHG globally must use nuclear power currently the largest source of low-carbon electricity in OECD.⁷

As per the IEA, nuclear power currently contributes to the carbon release reductions from power sector of about 1.3 to 2.6 gigatonnes every year. The IEA's 2015 Technology Roadmap report states that to meet the Paris Agreement target of not exceeding a two degree celcius rise in the tempreture, worldwide nuclear capacity will need to more than double from current levels to reach 930 GW in 2050.

China has recently built 24 more reactors, which will contribute to a reduction in coal- fired generation, with consequent cuts in emissions. In the EU, the European Sustainable Nuclear Industrial Initiative, is being established as a part of European Strategic Energy Technology Plan (SET plan), which aims to raise the development of low carbon technologies. The boom in cheap gas supplied from fracking in the United States is reducing the profitability of nuclear power, prompting concerns that nuclear plants will be decommissioned prematurely, negatively affecting CO₂ release reduction targets.⁸

⁶<https://digitalcommons.liberty.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1478&context=honors>

⁷ <http://www.lse.ac.uk/GranthamInstitute/faqs/role-nuclear-power-energy-mix-reducing-greenhouse-gas-emissions/>

⁸ <http://www.lse.ac.uk/GranthamInstitute/faqs/role-nuclear-power-energy-mix-reducing-greenhouse-gas-emissions/>

In the United Kingdom, the committee on climate change has initiated that new nuclear power plants- also well carbon storage & capture- would be important in order to gain sufficient cuts in annual emissions to meet the Fifth Carbon Budget reduction targets.⁹

There are also some major concerns in regard to nuclear power plants, its not all rainbows & butterflies. Public concern about safety of nuclear energy has raised after the Fukushima Daiichi accident which was triggered by the tsunami in Japan 2011 march. This accident promoted safety reviews & pledged to move far away from nuclear in some countries. Another concern can be the long term storage of nuclear wastes, only some countries have started building permanent storage facilities.¹⁰

⁹ Ibid

¹⁰ Ibid

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