Nuclear Energy

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Abstract- *As the economy expands and the population increases, the country will need to generate even more power to meet the growing demand. Resources of energy are experiencing constraints to meet the current demand.But in the past their was natural availability of sources, but increasing the new generation to meet the needs, problem are occurring.All these indicate that for India to be able to meet its growing demand, nuclear and solar power could provide energy security in the long term. But in future the source may be lower.So that in considering the next generation we should have to take steps in generation or availability of the source or being introducing the new methods. The all these indicate that for India to be able to meet its growing demand, Nuclear and Solar power and wind power could provide energy security in the long term.The country is facing energy shortages at present for the connected load. A large population even now does not have access to electricity. So the availability of natural sources must be concentrated.*

I. INTRODUCTION

Energy availability is essential for human development and new generation move economic growth.As population increases and economic growth continues, the demand for energy will further rise. One important mission of the Department of Atomic Energy is to harness nuclear energy as asafe, environmentally benign and economically viable source of electric power to meet the ever increasing energy needs of the world. As the economy grows and more people are provided access to electricity, this gap between demand and supply will further increase. So as soon as to fulfill the demand of energy some source which we have develop. In this paper we are going to focus on Nuclear energy, the research and some new development and desired initial steps to fulfill.

Nuclear energy source
Some methods
Nuclear safety
Cost of nuclear energy

Thus, Nuclear energy, in view of its huge potential and techno-commercial viability, will play an increasingly important role in the future.Nuclear power plants are responsible for 16% of the world electricity production which supply in over 30 countries.The safe and economic operation also of a nuclear power plants must be consider.(1)

II. NUCLEAR ENERGY SOURCE

In a nuclear power plants, heavy atom nuclei are split, thereby converting matter into energy. Most nuclear reactor use enriched uranium as fuel, which is generated by processing natural uranium ore. So main energy source of nuclear energy is uranium, which plays an important role in production of electricity and as well as use in nuclear reactor. With the current forecast for nuclear power growth, it is believed that there is sufficient uraniumas fuel and the infrastructure could be constructed to support the level of growth indicated in the forecasts.

Nuclear energy is typical base-load power technology and it may be competes with other base-load power generation (e.g. coal). Now, a day as considering source may of source is being developing .There are many source but for heat generation there are only two sources. One is the heat produce by nuclear fission and the other by decay of radioactive material that are produce by nuclear fission of nuclear fuel.

The nuclear fission is a process by which a slow moving neutron is absorbed by nucleus of uranium-235 atoms, which turns and splits into fast moving lighter elements (fission production) and free neutron.This is the process creates massive amount of energy in forms of gamma rays and in the forms kinetic energy.

Considerable thorium irradiation experience has been acquired in research reactors.

The programme is aimed to meet the following goals:

- Utilization of thorium as fuel on a commercial scale.
- Attaining higher levels of transparent safety.

Achieving good economic performance as compared to alternate options for energy generation, also some another programming is to extend the use of nuclear power to non-electrical applications in a big way, in particular for desalination and high temperature processing applications , including those for generation of hydrogen or non-fossil fluid fuels.

They are reported in cost categories of resources recoverable at less than USD 40/kilogram of uranium (kgU),

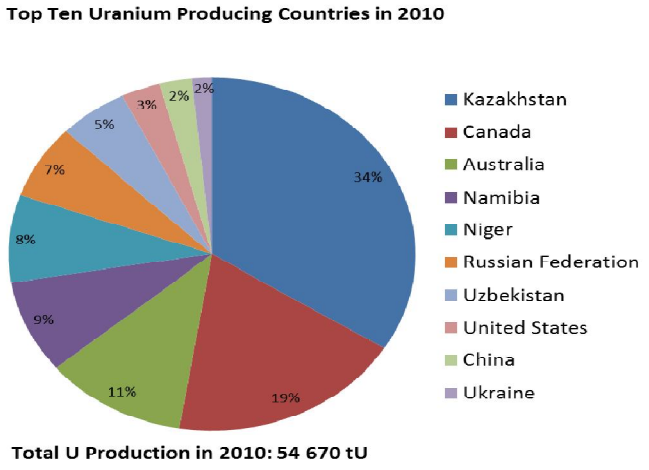
less than USD 80/kgU and less than USD 130/kgU. It should be noted that the current market price for uraniumis about USD 20-30/kgU.(2)

III. MAJOR RESOURCES COUNTRIES IN WORLD

Although many of the countries have large quantity of uranium .As the below list shows resource of the widespread

1) Australia.
2) Kazakhstan.
3) Russian Fed/ Canada.
4) Other countries 4%.

Global Uranium Production increased by 25% between 2008 and 2010.About 13 countries represent approx 96% of total world Uranium resources.



In 2010 year the total uranium production from mines was 54670 tonnes. Total identified uranium resources are ~ 7.1 Mt U and have increased by 12.5 % since 2009, but costs of production have also increased.(3)

Country	Tonnes	%
Australia	1 738 800	24.5%
Kazakhstan	819 700	11.6%
Russia	650 300	9.2%
Canada	614 400	8.7%
United States	472 100	6.7%
South Africa	372 100	5.2%
Namibia	518 100	7.3%
Brazil	276 700	3.9%
Niger	445 500	6.3%

IV. METHODS

As sources are available, there are also many methods or process to form a product or electricity. “Nuclear desalination is defined to be the production of potable water from seawater in a facility in which a nuclear reactor is used as the source of energy for thedesalination process. Electrical and/or thermal energy may be used in the desalination process.More than ten thousand reactor/years of operating experience have been accumulated over the past 5 decades. Over 150 reactor/yearsof operating experience on nuclear desalination have been accumulated worldwide. The desalination processes can be divided into two types: processes using electricity and processes using heat.Reverse osmosis is by far the most widespread type of membrane based desalination process. Energy consumption is the lowest among all options for seawater desalination, making it most cost efficient in regions with high energy cost”.The chain reaction is used in the nuclear process.A dual purpose plant or co-generation plant consists of a nuclear reactor and a desalination system coupled to the reactor, sharing common systems and facilities, producing both, fresh water and electricity.

V. USES

There are many uses and applications, but we will see some of them which are as follows.

1) Nuclear weapons.
2) Nano-nuclear technologies.
3) Nuclear power which also use in nuclear submarines.
4) Generation of the electricity.
5) Tomorrow nuclear electric power plants will also provide power for vehicles for cleaner transportation. Etc.

VI. COST FACTOR

“Over a wide range of power sources and regional conditions, the difference between the water productions costs well is less or high as compared to the process but the total integrated plant availability has a pronounced effect on the watercosts. For example, by increasing it from 52% to 84% (variation of 32%), the water cost reduces from 1.33 to 0.91 $/m3 (about to 32%)”.As compared to other energy such as solar energy ,wind energy, thermal energy, etc. nuclear energy is being some costly due to the mining, separation, conversion, reprocessing, waste disposal. The nature of nuclear energy generating costs allows for significant increases in the costs of uranium before the costs of generating electricity significantly increase.(5)

VII. NUCLEAR SAFETY

Nuclear safety can be divided by focus into the safety of plant design and operation and the safety of material

handling, and by phenomenon into safety for the prevention of radioactive exposure and safety for the prevention of critical accidents. The safety of plant design and operation, particularly the prevention of critical accidents, was first addressed in the US safety regulations for nuclear power plants and other civilian uses of nuclear power stipulated in the 1954 Atomic EnergyAct, and standards were the other term "nuclear security" does not appear explicitly in its Statute, the IAEA uses asa working definition of nuclear security "the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other maliciousacts involving nuclear or other radioactive substances or their associated facilities."(6)

VIII. WASTE MANAGEMENT

The technology for dealing with low and intermediate level radioactive wastes from nuclear a power plant has been well-established and the processes for treatment and disposal are in practice for the past several decades meeting the regulatory requirements. Sustainability of nuclear power depends on management of long lived wastes. Only limited amount of waste material is obtained because the uranium is obtaining by mining and milling technologies, or uranium exploration. The quantity of such high level wastes to be managed is relatively small. For example, the high level waste generated by a 1000 MW station is of the order of one ton per year.The wastes generated during operation of nuclear power plants are of a very low activity level.

IX. MERITS OF NUCLEAR POWER PLANTS

Nuclear power is an intense source of energy and the transport infrastructure needed for nuclear fuel is very small. About 10,000 MW nuclear power capacity needs only about 300–350 tons of fuel per annum, as against 35–50 million tons of coal needed for a coal fired thermal power station of the same capacity requiring about a shipload or 20 trainloads per day to transport the coal. Nuclear power is environmentally benign and the life cycle of Greenhouse Gas emissions of nuclear power are comparable to that of wind and solar photovoltaic power or other different energy . Nuclear power can be a major facilitatorin de-carbonizing the energy sector and the same has been well recognized in the country's Integrated Energy Policy.(1)

X. ADVANTAGES

A large share of nuclear electricity produced today is generated by generation 2nd reactor,and power plant being constructed are mostly from generation 3rd .As the large amount of electricity being produced, and for nuclear weapons and nuclear technologies it also hold good. Economical and operational aspect should be optimized. In fact, this is one such thing nuclear power plants pride themselves on is the fact that they do not produce any environmentally hazardous emission. As there are many advantages and dis-advantages, nuclear power energy and weapons will play an important role in new generation.

XI. DISADVANTAGES

There are also dis-advantages in which the nuclear fission is one of the most dangerous processes known to man. There are so many things that can go wrong with this or many other processes such as over-heating of reactor. The main factor is availability of fuel for nuclear reactor is generally not seen as an it is limiting factor.It also have capital cost than the other power plants. The public perception of nuclear energy is not very positive in many other countries.

XII. CONCLUSION

Today nuclear power effect is one way or another, but we have discussed about the nuclear energy, production, methods, cost estimates, some sources or availability of energy or uses. Nuclear power has an important role to play in the country's energy scenario, complementing generation from other sources in the near term and providing energy security in the long term. The challenge is to develop and commercially deploy technologies of fast and new advance reactors in a big way to increase the installed nuclear power capacity in the country.

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