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Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.isrj.org

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"NUCLEAR ENERGY AND RELATED LAWS IN INDIA – AN ANALYSIS OF BRIEF AWARENESS SURVEY OF COMMON PERCEPTIONS"

Nitish Nawsagaray[1] and Priyanka Manoj Jawale[2]
[1]Assistant Professor, ILS Law College, S.P. Pune University. Pune, Maharashtra.
[2]LL.M., MBL (NLSIU), UGC NET, PhD Scholar, Department of Law,
S.P. Pune University. Pune, Maharashtra.

ABSTRACT:

Energy has become very essential component for the GDP and the overall growth of the Nation. It is now well known truth that; global economics and politics go hand in hand. "The question of energy supply is, and will always be, the center of all power politics and the base of all economic activity. It is self-evident that energy policy is a political problem and not primarily a technological one". Though we are aware of many energy producing resources, but it all has certain limitations, few advantages and disadvantages. For simple understanding these energy resources are divided in to two categories as commercial and non-commercial energy resources.

KEY WORDS:

Nuclear Energy, Laws, Nuclear Power, India, Survey.

INTRODUCTION:

Commercial energy resources constitute Coal, Petroleum, Natural gas, Hydro, Wind, Solar, other renewable forms of energy and the nuclear energy. Along with this, we have certain traditional energy resources, which include but not limited to biomass such as fuel wood, crop-residue and animal-waste. All these can be considered to be non-commercial energy resources. They are more applied on domestic front uses. Data about availability of non-commercial energy resources and their usage is not so well documented as compared with the commercial energy resources.

In India we have many commercial energy resources such as coal, oil, natural gas, etc. Despite India is the third largest coal producing country of the world, County's requirements of coking coal is almost entirely fulfilled by imports. Also the non-coking coal is being increasingly imported in order to blend it with Indian coal having high ash content and use in power plants at certain coastal locations due to commercial reasons. Energy demands are so high which cannot be fulfilled by just exploring coal. To meet the increasing demand, the government has permitted private sector participation in the field oil and natural gas. India also has the hydro-electric potential which is mostly located in the northern and north-eastern regions of the country. The estimated potential of non-conventional renewable energy resources in our

country is not adequate to fulfill energy demand. Small Hydro and Biomass Power have secondary potentials. Waste to Energy has also become the important components for generating energy. All these resources are increasingly used in remote areas. Remarkable progress has been made in the field of wind and solar power.

India is considered to be fourth largest energy consumer in the world. But even though having all these options all over India power cuts are among the major issue. Due to the less or inadequate supply of electricity, agriculture and other industries affect badly which directly hamper the economic growth of the region. In present analysis we are mainly concerned with the use of nuclear energy, its growth and development as a commercial form of energy. Also this paper deals with the regulatory and safety mechanism, legal foundation associated with the development of nuclear energy in India. After this background in the end of the paper we are dealing with the analysis of brief survey conducted on this area.

EMERGENCE OF NUCLEAR ENERGY:

Italian scientist 'Fermi' and his colleagues in the year 1934 found out that uranium produced much higher radioactivity and through its nuclear fission reactions it emits strong energy than any other element. Process of such controlled chained reactions is used for the civilian purpose for generating nuclear energy. Nuclear energy is all about controlling an energy source with a very high densi¬ty . After the Second World War, establishment of the United Nations Organization and emergence of nuclear era both happened almost at the same time. Destructions resulted due to the use of nuclear bombs at Hiroshima and Nagasaki forced world to rethink about the peace and security at large. It highlighted need to discuss the use of nuclear energy. The United States President D. Eisenhower in his address "Atoms for Peace " led foundation for the establishment of the International Atomic Energy Agency (IAEA) which is now working for civil use of nuclear energy.

This paves the way for peaceful use of atomic energy. In his speech he said, that "if the fearful trend of atomic military build-up can be reversed, this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind. Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power-starved areas of the world. Thus the contributing Powers would be dedicating some of their strength to serve the needs rather than the fears of mankind". Thus, Peaceful application of nuclear energy for power generation is the main mandate of nuclear power plants, as a contribution for sustainable development.

Worldwide there are now 440 nuclear power reactors operating in 31 countries and producing a combined capacity of 367 gigawatts electric, or about 16% of the world's supply of electricity. IAEA estimated that at least 60 new nuclear plants will be constructed in the next 15 years. Given the world's growing demand for electricity, however, this added capacity will still account for only 17% of global electricity use . Global climate change and the 2005 entry into force of the Kyoto Protocol to the United Nations Framework Convention on Climate Change have spurred new thinking about the potential value of nuclear energy by both environmental groups and the nuclear energy industry.

Recently, several prominent environmentalists have publicly supported nuclear energy, including former Anglican bishop Hugh Montefiore, a long-time trustee of Friends of the Earth, and Patrick Moore, cofounder of Greenpeace. There is ample of literature which suggests that nuclear energy has potential to fulfill all future energy needs and support living standard of human beings. People suggest that slowly world will become dependent on the nuclear energy , and developing countries could not afford to ignore this energy source.

BARRIERS IN THE GROWTH OF NUCLEAR ENERGY:

Mr. Dwight Eisenhower, the President of the United States of America had said, "That the American people share my deep belief that if a danger exists in the world, it is a danger shared by all; and equally, that if hope exists in the mind of one nation, that hope should be shared by all" . Nuclear age is the global concern and not belongs to a particular nation's growth and prospect. It is interrelated to each other in many aspects considering the one world concept.

Global Safety concerns:

Though nuclear energy has many advantages over other energy options but they are not without drawbacks. There are environmentalists who propagate nuclear as a clean source but at the same time there are few who also oppose its growth and demand closure of this industry due to hazardous nature associated with it.

Nuclear energy is considered to be clean and pollution less energy source, but there are many other issues associated with it. The construction, operation and maintenance of nuclear power plants are very technical matter and cost associated with it is higher as compare to other energy sources. Also mining and purifying raw Uranium is not a very clean and easy process, it necessitate much specialized staff to look after. It requires highly qualified staff because; improper functioning of nuclear plants and its spent fuel can lead to disasters like meltdown, radiation, health and environmental hazards due to its toxic nature. There is always a risk associated with its storage and transportation.

Nuclear accidents:

The fear of nuclear accidents is considered to be major barrier for the growth of the nuclear energy and its acceptance is also challenged by it. Most recent nuclear accident, which in response to the earthquake, the nuclear reactors at the Fukushima site were all safely shut down, but subsequent power outages caused by the tsunami resulted in a failure of the cooling systems, eventually leading to a release of radioactive material across four units, has created noise at world at large. While the full extent of radiation leakage is difficult to be determined, lethal levels of radiation had been detected at the site, raising concerns about the scale of the impacts, particularly for workers. The accident had been rated as a level 7 "major accident" on the International Nuclear and Radiological Event Scale (INES), having been revised from a level 5 event to the most serious level on INES, used to describe an event involving a major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures .

The nuclear accidents brings back the justice, legal and ethical issues surrounding the safety of nuclear power and the consequences when something goes wrong. Issues like contamination, environmental degradation, displacement, health and safety to next generations and natural resources are topic to the forefront of debate. Such accidents have led many governments to review their nuclear energy risk governance and safety procedures.

DEVELOPMENT OF NUCLEAR ENERGY IN INDIA:

Since 1944, Dr. Homi Bhabha, started taking efforts for spreading awareness about the poor condition of applied research in India, and proposed for the establishment of sound research facilities in the country. The Atomic Energy Establishment was set up at Mumbai in 1957 and renamed as Bhabha Atomic Research Centre (BARC). Plans for building the first Pressurised Heavy Water Reactor (PHWR) were finalised in 1964. The Indian Atomic Energy Commission (AEC) established in 1948, is the main policy body. The Nuclear Power Corporation of India Ltd (NPCIL) is responsible for design, construction,

commissioning and operation of thermal nuclear power plants. In India Department of Atomic Energy (DAE established in 1954), Government of India carries out the Nuclear energy programme. The DAE includes NPCIL, Uranium Corporation of India Ltd (UCIL, mining and processing), Atomic Minerals Directorate for Exploration and Research (AMD, exploration), Electronics Corporation of India Ltd (reactor control and instrumentation). The DAE also controls the Heavy Water Board for production of heavy water and the Nuclear Fuel Complex for fuel and component manufacture.

Electricity demand in India is increasing rapidly, and the 1052 billion kilowatt hours gross produced in 2011 was more than triple the 1990 output, though still represented only some 750 kWh per capita for the year. India has a streamlined nuclear power program and expects to have 20,000 MWe nuclear capacities on line by 2020. It aims to supply 25% of electricity from nuclear power by 2050 . After doing assessment of India's future electric power needs, available resources for it ranging from coal, natural gas renewable sources, wind and others to nuclear power we can certainly draw a conclusion that nuclear energy has potential to address all needs with good economic options .

The present indigenous nuclear power plants are of Pressurized Heavy Water Reactor (PHWR) type, having heavy water as moderator and coolant, and working on the once-through-cycle of natural uranium fuel. A three-stage nuclear power programme has been chalked out in the Department of Atomic Energy to systematically exploit all these resources in India.

Regulatory Mechanism in India:

Regulations and safety related issues are taken care by Atomic Energy Commission (AEC) and the Department of Atomic Energy (DAE). DAE was set up to encompass research, technology development and commercial reactor operation. The current Atomic Energy Act is 1962, and it permits only government-owned enterprises to be involved in nuclear power. The Atomic Energy Regulatory Board (AERB) comes under the AEC but is independent of DAE. It is responsible for the regulation and licensing of all nuclear facilities and their safety and carries authority conferred by the Atomic Energy Act for radiation safety and by the Factories Act for industrial safety in nuclear plants.

In April 2011 the government announced that it would legislate to set up a new stronger and more independent and autonomous Nuclear Regulatory Authority of India that will subsume the AERB. In September 2011 a bill, The Nuclear Safety Regulatory Authority Bill was introduced to the Lok Sabha, it was also drawn up in response to events at Fukushima and aims to establish several new regulatory bodies. In addition to this, in August 2012 parliamentary report from the Comptroller and Auditor General (CAG) on the AERB pointed out serious organisational flaws and numerous failings relative to international norms. So, in coming future we can accept some new more stronger and stricter regulatory norms at national level for nuclear safety and radiation issues.

Primarily India's nuclear industry was largely without the technical and scientific support from IAEA and its safeguards. However, in October 2009 India's safeguards agreement with the IAEA became operational. Now the government has confirmed that 14 reactors will be put under the India Specific Safeguards Agreement. Following 2005 agreement on nuclear energy cooperation between US and India has pave the way for more advancement in this field and allowed other countries like Canada, UK, and France as well to extend their cooperation. In December 2006 the US Congress passed legislation to enable nuclear trade with India .

India's Efforts for Radioactive Waste Management:

In India radioactive wastes from the nuclear reactors and reprocessing plants are treated and stored at each site. Waste immobilisation plants (WIP) are in operation at Tarapur and Trombay and

another verification plant was commissioned by BARC in 2013 at Kalpakkam for wastes from reprocessing Madras (MAPS) used fuel. The WIPs use borosilicate glass, as like in Europe. At BARC research on final disposal of high-level and long-lived nuclear wastes in a geological repository is in progress.

NATIONAL LEGAL FRAMEWORK AND SIGNIFICANT PROVISIONS:

India has set certain targets for its development. The major part of this development is dependent on the energy supply, for that production of energy based on nuclear technology has become inevitable for the growth of a nation. The use of nuclear energy for the peaceful purpose is structurally quite well settled in India.

Acts:

The national legal structure with respect to the nuclear energy is based on the certain Acts, Rules, Notifications and various guidelines. India has two major Acts in the field of nuclear energy. The first amongst it is, The Atomic Energy Act 1962, which was once amended as well (Atomic Energy (Amendment) Act 1987 (N0. 29 of 1987). And the other very important and debatable is 'The Civil liability for Nuclear Damage Act 2010'. For the implementation of these acts and to focus in with more safety and detailed manner we have certain rules.

The Atomic Energy Act 1962 is silent about liability or compensation in the event of any kind of nuclear accident. India is not a party to some of the relevant international nuclear liability conventions. All civil nuclear facilities in India are owned and must be majority-owned by the Central Government, so the liability issues arising from these installations are its own responsibility. The Civil Liability for Nuclear Damage Act 2010 also focuses on third party liability. This act was debated a lot in the context of strong national awareness of the Bhopal disaster (19840). In case of any nuclear accident, the 2010 Act places responsibility with the operator, and limits total liability to 300 million SDR (about US$ 450 million) or such higher amount that the Central Government may specify by notification. Operator liability is capped at Rs 1500 crores or such higher amount that the Central Government may notify, beyond which the Central Government is liable. However, after compensation has been paid by the operator or by its insurers, this act also allows the operator to have legal recourse against the supplier as well.

Rules and Notifications:

Alongside with these acts we have certain rules ranging from radiation safety, disposal of radioactive waste to Control of Irradiation of Food. These rules are; Radiation Protection Rules-1971, Atomic Energy (Arbitration Procedure) Rules-1983, Atomic Energy (Working of the mines, minerals and handling of prescribed substances) Rules-1984, Atomic Energy (Safe disposal of radioactive wastes) Rules-1987, Atomic Energy (Factories) Rules-1996, Atomic Energy (Control of Irradiation of Food) Rules-1996, Atomic Energy (Radiation Protection) Rules-2004, Civil Liability for Nuclear Damage Rules-2011, Atomic Energy Radiation Processing of food and allied products rules-2012.

The another important point here is to note down that, the radioactive wastes are covered under the provisions of Atomic Energy Act and rules made there under. So, for radioactive wastes the 'Hazardous wastes (Management and Handling) Rules-1989' will not be applicable . Also, the Environmental Protection Act, 1986 have notified AERB as the authority to enforce directions and procedures as per Atomic Energy Act with respect to radioactive substances.

There are certain notifications along with some rules. These notifications deals with Rule no. 13

of Atomic Energy (Working of the mines, minerals and handling of prescribed substances) Rules- 1984, and notification on Schedule of prescribed substances under Atomic Energy Act, 1962.

Guidelines:

For more clarity in execution of certain important aspects, the Government has framed certain guidelines from time to time. In February 2006 government released guidelines for the Nuclear Transfers (Exports) and in 2011 for the prescribed substances. In June 2010 and in April 2013, Guidelines released for the implementation of arrangements for co-operation concerning peaceful uses for Atomic Energy with other countries. There are again some guidelines for 'application fee prescribed for grant for authorization' under 2010 guidelines.

NON DOCTRINAL PART: - ANALYSIS OF BRIEF SURVEY ON NUCLEAR ENERGY AND ITS LAWS

Objective of the research:

At this backdrop researcher intended to analyze the awareness of nuclear energy laws in India and general understanding of nuclear energy sector. For this research population is various professionals, who also have basic legal qualification and experience.

Research Methodology adopted:

Researcher adopted questioner technique to analyze view point and awareness of nuclear energy laws, and general understanding of nuclear energy sector. In this survey, the questioner has total 10 questions. Each question was offered with three option answers to choose from. These questions were asked through electronic mode that is, data is collected through emails responses.

These emails were sent to the total number of 60 personnel which is research sample. Out of these total 60 respondents, 57 persons responded. So un-responded 3 person's samples, researcher has considered as a limitation to the research analysis and didn't wait to have their late responses for the final analysis. This final analysis of the research topic is now out of 57 samples. Out of these 57 respondents there is only one respondent who has skipped answering few questions, rest all questions were attempted by all the respondents.

RESEARCH QUESTIONS ALONG WITH THE SURVEY REPOSES AND ITS ANALYSIS:

Following are the ten questions along with their options which were asked and below that is the analysis of all responses.

1.Have you heard of nuclear or atomic energy before?

a) Yes

b) No

c) May be

Analysis of the responses received for question number 1: Out of Total 57 responses, 56 respondents responded with option no. a) that is 100 % respondents have heard about Nuclear or Atomic energy. Only one respondent opted to skip this question.

Option Number	Total percentage (%)	Total no. of responses received.
a)	100 %	Total responses- 56
b)	-	
c)	-	

2.Do you know that nuclear energy is used for generating electricity?

a) Yes, I know
b) No, I don't know
c) Not sure

Analysis of the responses received for question number 2: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. 89.29 % responses (50 respondents) know that nuclear energy is used for generating electricity. Negative response were given by 7.4 % that is 4 respondents and 3.5 % response, that is 2 respondents are not sure about nuclear energy is used for generating electricity.

Option Number	Total percentage (%)	Total no. of responses received.
a)	89.29 %	50 - responses
b)	7.4 %	4 - responses
c)	3.5 %	2 - responses

3.Do you feel energy needs are increasing with the growth of population? And energy plays important role in development?

a) Yes, energy needs are increasing and energy plays important role in development
b) No, energy needs are not increasing, and energy has no important role in development.
c) Yes, energy needs are increasing, but energy don't plays important role in development.

Analysis of the responses received for question number 3: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. 91.7 %, (51 respondents) Opted for option a) that is 'yes', energy needs are increasing and energy plays important role in development. Only one respondent (1.79 % responses) opted for negative opinion of option b). And 7.14 % responses that is 4 respondents said, 'yes, energy needs are increasing, but energy don't plays important role in development'.

Option Number	Total percentage (%)	Total no. of responses received.
a)	91.7 %,	51 responses
b)	1.79 %	1 response
c)	7.14 %	4 responses

4.Do you know other forms of energy sources? Are you aware of advantages and disadvantages of these other energy sources?

a) Yes, I know other energy sources and their advantage and disadvantages.
b) No, I don't know other forms of energy sources and their advantages and disadvantages.
c) Yes, I know other forms of energy sources but I am not aware of their advantages and disadvantages.

Analysis of the responses received for question number 4: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. 67.27 % responses (37 respondents) says, yes they know other energy sources and their advantage and disadvantages as well. 3.64 % responses (2 respondents) don't know about it. And 29.09 % that is 16 responses says that, they know other forms of energy sources but not aware of their advantages and disadvantages.

Option Number	Total percentage (%)	Total no. of responses received.
a)	67.27 %	37 responses
b)	3.64 %	2 responses
c)	29.09 %	16 responses

5.Do you know that, nuclear power plants are creating or generating electricity?

a) Yes, I know.
b) No, I don't know.
c) I am not sure.

Analysis of the responses received for question number 5: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. 83.64 % that is 46 responses know that, nuclear power plants are creating or generating electricity. On the contrary 7.27 % (4 responses) are not aware of such thing. 9.09 % that is 5 responses are not sure whether nuclear power plants are creating or generating electricity.

Option Number	Total percentage (%)	Total no. of responses received.
a)	83.64 %	46 responses
b)	7.27 %	4 responses
c)	9.09 %	5 responses

6.Do you know how nuclear power plants work? Are you aware about rules, regulations, and laws associated with nuclear power plants?

a) Yes, I am aware about how nuclear power plants work, and I am aware about rules, regulations and laws associated with it.
b) No, I don't know anything about working of nuclear power plant. And I don't know about rules, regulations and laws associated with it.
c) Yes, I know how nuclear power plants work. But I don't have much knowledge about laws, rules and regulations associated with it

Analysis of the responses received for question number 6: This question is attempted by all the 57 respondents. Only 15.79% responses (9 respondents) are aware about how nuclear power plants work, and are also aware about rules, regulations and laws associated with it. Whereas largely that is 42.11 % that is 24 responses are not aware of anything. And equal number of responses that is 42.11% (24 responses) says yes, they know how nuclear power plants work, but don't have much knowledge about laws, rules and regulations associated with it.

Option Number	Total percentage (%)	Total no. of responses received.
a)	15.79%	9 responses
b)	42.11 %	24 responses
c)	42.11%	24 responses

7.Do you know in India, we have Atomic energy commission, Department of atomic energy and atomic energy regulatory board (AERB)? Do you know what work these authorities do?

a) Yes, I am aware of these authorities in India and also know what kind of work they do.

b) No, I don't know about these authorities and their work.
c) Yes, I know very little about these authorities but I am not much aware about their work.

Analysis of the responses received for question number 7: This question is attempted by all the 57 respondents. 31.58 % (18 responses) says they are aware that, In India; we have Atomic energy commission, Department of atomic energy and atomic energy regulatory board (AERB) and also, they know what work these authorities do. 24. 56 % responses (14 respondents) say they don't know about these authorities and their work. And the maximum, 25 responses that is 43.86 % says that, they know very little about these authorities but not much aware about their work.

Option Number	Total percentage (%)	Total no. of responses received.
a)	31.58 %	18 responses
b)	24. 56 %	14 responses
c)	43.86 %	25 responses

8.Do you know these above authorities are working on safety standards and issues of nuclear power plants in India?
a) Yes, I am aware
b) No, I am not aware
c) I don't know much

Analysis of the responses received for question number 8: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. 46.43 % (26 responses) are aware that, these above authorities (from question no. 7) are working on the safety standards and related issues of nuclear power plants in India. 14 responses (25.00%) say they don't know anything about it. And 16 responses that are 28.57 % clearly say that, they don't know much, and denied taking yes or no stand.

Option Number	Total percentage (%)	Total no. of responses received.
a)	46.43 %	26 responses
b)	25 .00%	14 responses
c)	28.57 %	16 responses

9.Do you know in India we have laws on civil use of nuclear energy? Are you aware of civil liability for nuclear damage act 2010, which deals with the safety of nuclear plant and in case of any accident at nuclear power plant this act deals with compensation and liability aspects.
a) Yes, I am aware about nuclear energy laws in India, and I know 2010 act as well.
b) No, I am not aware about any laws relating to nuclear energy in India.
c) I know little that, we have laws relating to nuclear energy in India, but I am not aware about 2010 act.

Analysis of the responses received for question number 9: This question is attempted by all the 57 respondents. Surprisingly very less, that is only 13 responses (only 22.81 %) are aware about nuclear energy laws in India, and knows 2010 act as well. Whereas 21 respondents that is 36.84% responses clearly says that they don't know anything about this. Remaining 23 responses that is 40.35% say that they know little that, we have laws relating to nuclear energy in India, but are not aware about 2010 act.

Option Number	Total percentage (%)	Total no. of responses received.
a)	22.81 %	13 responses
b)	36.84%	21 responses
c)	40.35%	23 responses

10.Do you know anything about accidents took place at nuclear power plants if yes, then please do write about which nuclear accident do you know and its place? From what information source you come to know about that accident?

a) No, I don't know anything about nuclear power plants accident
b) I am not sure whether I know accident relating to nuclear power plant or accident was about something else.
c) Yes, I am aware, (The place of nuclear accident is ----------)

Analysis of the responses received for question number 10: Out of Total 57 responses, 56 respondents responded and 1 respondent skipped this question. Surprisingly in 25 responses that are 44.64 % responses said No, they don't know anything about nuclear power plants accident. 13 responses that is again good number of respondents that is 23.21 % says that, they are not sure whether they know accident relating to nuclear power plant or accident was about something else. Only 18 responses (32.14 %) answered positively that they are aware about the nuclear power plants accident. All these 18 respondents are aware about Fukushima Daiichi nuclear disaster (2011- Japan) and come to know about it through electronic and print media only. Out of these 18 responses only 2 responses talked about Chernobyl disaster (1986). Unexpectedly only 1 respondent talked about these infamous nuclear accidents including above two and the Three Mile Island accident (1979). And the source of this information was school GK book as well as media.

Option Number	Total percentage (%)	Total no. of responses received.
a)	44.64 %	25 responses
b)	23.21 %	13 responses
c)	32.14%	18 responses

FINDINGS OF THE SURVEY:

There is a huge debate on the development of nuclear energy sector. Also there is much agitation that people are doubtful about safety concerns of nuclear power plants. It's actually very surprising that legally literate people are also not aware about the legal mechanism which is available for safety and regulation of this sector in India.

In this non doctrinal project all 57 respondents were aware and heard something about Nuclear or atomic energy. 89.29 % respondents know that nuclear energy is used for generating electricity. Energy needs are increasing and energy plays important role in development was opted by 91.7 %. Only 1.79 % said No, energy needs are not increasing, and energy has no important role in development. Whereas 7.14 % that is 4 responses said, 'yes, energy needs are increasing, but energy don't plays important role in development. 67.27 % research population says that, yes they know other energy sources and their advantage and disadvantages. And 29.09 % that is 16 responses says that they know other forms of energy sources but not aware of their advantages and disadvantages. 83.64 % know that, nuclear power plants are generating electricity. On the contrary 7.27 % are not aware of such thing and 9.09 % are not sure about it.

Only 15.79% are aware about how nuclear power plants work, and aware about rules,

regulations and laws associated with it. Whereas largely that is 42.11 % are not aware of any such legal mechanism. And equal number of responses that is 42.11% says yes, they know how nuclear power plants work, but don't have much knowledge about laws, rules and regulations associated with it. So in short we can say total 57.90% of the responses are unaware about laws, rules and regulations associated with nuclear power plants and its administration. 31.58% say they are aware that in India we have Atomic Energy Commission, Department of Atomic Energy and Atomic Energy Regulatory Board (AERB). And these respondents also know what work these authorities do. 24. 56 % don't know about these authorities and their work. And the maximum that is 43.86 % says they know very little about these authorities but not much aware about their work. Along with this 46.43 % are aware that, these above authorities are working on the safety standards and issues of nuclear power plants in India. 25 .00% don't know anything about such authorities. And 28.57 %, say they don't know much, and denied taking yes or no stand. So we can say 53.57% of the population is unaware about the authorities working in the area of nuclear energy in India. Surprisingly from all these legally literate sample population, very less that is only 22.81 % of it is aware about nuclear energy laws in India, and also knows 2010 act as well. Whereas 36.84% respondents clearly say that they don't know any law in this field. 40.35% say that they know little that, we have laws relating to nuclear energy in India, but are not aware about 2010 act.

44.64 % responses said, No, they don't know anything about nuclear power plants accident. 23.21 % say that they are not sure whether they know accident relating to nuclear power plant or accident was about something else. Only 18 responses that are 32.14 % answered positively that they are really aware about the nuclear power plants accident. All these 18 responses say that they are aware about Fukushima Daiichi Nuclear Disaster (2011- Japan) and come to know about it through electronic and print media only.

To conclude we can say that all respondents were aware about the nuclear energy. Maximum respondents feel that energy needs are increasing with the population and nuclear energy is a source for generating electricity. As compare to other energy sources nuclear energy and its advantages and disadvantages are unknown to the maximum respondents. Similarly people don't have knowledge about how nuclear energy and nuclear power plants work. Maximum respondents are unaware about the officials, authorities who are taking care of safety and liability aspects of our countries nuclear energy programme. Though all these respondents were from legal background but, very less that is only 22.81 % are aware about nuclear energy laws in India, and also knows 2010's Civil Liability Act. 77.23 % respondents are not aware and not sure about the available legal structure in this country. Almost half (44.64 %) of the respondents are not aware about any nuclear accident took place in the world. Only few 18 responses that are 32.14 % are aware about nuclear accidents, particularly about the Japan's Fukushima Accident and knows about it from media.

CONCLUDING REMARK

This is now well understood fact that nuclear energy has potential to offer us enormous energy. But at the same time important aspect is, to be eligible to handle it properly. To be attentive while working with nuclear power plants is inevitable. Even if there is a single mistake then it will cost heavily, not only to us but also to the future generations that too without considering their willingness for availing such energy source. The Royal Society and The Royal Academy of Engineers of the United Kingdom in their study on the role of nuclear energy in generating electricity have referred to Morrison's projections of world energy requirement. To meet increasing energy requirements, policy decisions to speedily develop and utilize all types of energy resources at our command need to be taken

and implemented. Nuclear energy is not the only option to match up with the expected energy requirements but it certainly has potential to fulfill the gap as compare to other energy resource.

Another analysis is that, people know nuclear disasters mainly though media. Media has responsibility to clearly mention about the facts and reasons behind such nuclear disasters, as it's the main source of information. Respondents who knew about Japans nuclear accident, they knew that it was very disastrous nuclear power plants accident, but unfortunately not a single respondent was aware that the said accident took place not because of any technical or manmade deficiency at the nuclear power plant but accident took place due to the natural calamity that is Tsunami followed by earthquake was the reason for that accident. Media can play important role in spreading awareness. People should understand the subject before giving reactions especially when the subject matter is of national importance.

In India large population is aware about the development of nuclear energy but due to lack of awareness and actual knowledge of this field people are misguided. Even legally literate population is unaware about the available legal protection in this field. So how can we expect awareness from lay man? We must have unbiased reporting of the development in the field of nuclear energy, clear picture should be informed to the people at large. People should be made aware that why this energy source is opted and with what protections. If this can be done then we can surely see positive picture in the growth of nuclear energy sector. Also this will turn out to be more effective to make government and authorities more accountable for their actions, this will make nuclear energy sector more safe and alert.