Centre for Air Power Studies (CAPS)

Forum for National Security Studies (FNSS)

Title: NATIONAL SEMINAR ON NUCLEAR POWER

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INAUGRAL SESSION

The Annual National Seminar on Nuclear Power has been a leading event of Centre for Air Power Studies (CAPS) to discuss the issues related to nuclear energy in India. Nuclear power is of utmost salience yet it has unfortunately lacked dedicated attention. This year the "Nuclear Power" seminar was held on 2 March, 2016. Air Marshal Vinod Patney, Director General of the centre, mentioned in his welcome address the pressing reasons why must nuclear power be a preferred source of energy for India?

Nuclear power is an inescapable source in the Indian energy mix. It has emerged as a solution to the pressing problem of generating energy through clean and carbon emission free sources. The Indian energy requirements are rising exponentially. Nuclear power has emerged as a clean, continuous, economically and environment friendly source in contrast to fossil fuel combustion, to meet a country's growth needs. The need for sustainable development is in face of the climate change issues and the visible ill effects of unsustainable ways of meeting energy needs now demands our sincere attempts to adopt alternatives. China has pledged to reduce its carbon intensity by 60% but given growth rate of the Chinese GDP by 2030 suggests an eight fold rise from the present. India similarly has envisioned reducing its carbon intensity by 33% but by 2030 our carbon emissions appears to be twice from the present. This gloomy picture requires an answer and that is available in nuclear power.

However, the present lower market rates of oil does pose an attraction towards non renewable. Yet while recalling the need for energy security for India and the adverse impact of it on environment it is ultimate to avoid the bait. India should and must adopt nuclear power share in its energy mix when signals suggests that the carbon bubble is about to burst. Acknowledging the continuous availability of energy to be a prerequisite for growth the country has envisioned, it becomes urgent to identify challenges and find solutions to them in the path of realization of nuclear power potentials for India. Misperceptions regarding the viability of nuclear power as an alternative needs to be done away, especially when the continuous and ruthless burning of the fossil fuels have resulted irreversible negative impacts and existential dangers for the planet. The other alternative sources like Solar and Wind have not risen as cost effective option which is neither a dependable source of energy generation given the fact that they are not constant, the former depends on the weather and sun rays availability and the latter on the wind flows. In addition both require high battery technology, rare earth minerals, silica and lithium and results in economically infeasible per unit costs. These factors prove nuclear power as a preferred alternative. The nuclear safety concerns though needs to be addressed ensuring highest possible standards. The emerging risk of cyber attack on nuclear facilities deserves a positive attention instead of brushing its probability aside. The need of the hour is appropriate advance planning, institutionalization, discussion, research on safety and security aspects and most importantly identification of vulnerabilities in the system. The future of nuclear security and nuclear safety post the conclusion of the international multilateral effort- the Nuclear Security Summit process in 2016 deserves detailed evaluation.

SESSION- I: NUCLEAR SECURITY CHALLENGES

Chairman: Prof. R B Grover, the Director of the Homi Bhabha National Institute, Trombay, Mumbai.

NUCLEAR SECURITY SUMMIT- ACHIEVEMENTS AND FUTURE

Speaker: Dr. Manpreet Sethi, Senior Fellow, CAPS.

- Nuclear security is not a destination but a journey. The NSS has ensured high levels of commitments. After the concluding summit in 2016 a renewed political consensus is needed instead of tug of war between on the choice of institution to take the charge on the problem.
- The issue of nuclear security is old but urgency has been recent. Since 1978 there were concerns on the threats of nuclear proliferation and assistance was given to states to ensure the technology does not reach "wrong hands".
- The 1980 brought forward the Convention on Physical Protection of Nuclear Materials (CPPNC). This was followed by the 1997 Joint Convention on Nuclear Spent Fuel Management and on the Safety of Radioactive Waste Management.
- Post 2001 the Proliferation Security Initiative (PSI) and the Containment Security Initiatives (CSI) added priority to the issues related to nuclear security. In 2007 the International Convention for the Suppression of Acts of Nuclear Terrorism **(**ICSANT) directly addressed the possibilities and dangers of nuclear terrorism.
- The Nuclear Security Summit process has been highly beneficial overall. It brought in the required political element and needed seriousness and urgency towards nuclear security that was lacking.
- The core assumption of the Nuclear Security Summit was promotion of voluntary national legislations. To facilitate the purpose, legislation on national protection system and sharing of best practices was undertaken**.**
- Some results of the NSS process were, a renewed vigour to ratification of the ICSANT by states, reporting to the UNSCR 1540 Committee, establishment of centres of excellence, elimination of HEU, conversion of HEU research reactors and medical isotope production wherever technically and economically feasible.
- The expectations out of 2016 NSS are, elimination of HEU from all civilian applications, universalization of the all the relevant treaties on nuclear security, and greater sharing of information and best practices.
- NSS has been a success because it has inculcated a habit of constant vigilance. It has designated mechanisms and procedures to ensure nuclear security. The level of

awareness has increased, reporting became an essential element of nuclear security and the NSS has rendered a broader understanding of the issue.

- NSS has though faced set back due to the Russia-US growing tensions which has resulted in falling momentum of the efforts. There are still 63 civilian nuclear facilities in Russia that use HEU.
- Recommendations for the future after NSS, (a) the Head of Government summits to be held every 4 years instead of existing 2 years, (b) Nuclear security should not become a part of the NPT Rev Con Process instead the IAEA ought to take a lead. As the latter is better equipped, experienced and has greater membership and last but not the least nuclear security has been its long performed function.

CYBER THREATS TO NUCLEAR INFRASTRUCTURE

Speaker: Sri Gigi Joseph (SO/H&CISO), Computer Division, Bhabha Atomic Research Centre.

- Inside the Department of Atomic Energy (DAE) a dedicated division on cyber security was established in 2001 known as Computer & Information Security Advisory Group (CISAG). Its responsibilities are to provide recommendations and guidelines to all units and its CISO.
- The four pillars of nuclear industry are safety, security, safeguards and emergency preparedness.
- The cyber security threats are qualitatively different from other threats as- (a) threat is to sensitive data, (b) sabotaging of nuclear facility, (c) unauthorized removal of nuclear materials through system hacking.
- The chief problems in cyber domain are data theft, virus/Trojan, defacing web pages and denial of service.
- In the age of mass media the impact of any cyber attack is magnified by rumours, ill-informed reporting of the issue by media and gross miscalculations of the damage occurred.

- In the BARC there is high level isolation of the computers from internet to reduce the dangers. In addition there is a secure network access system. Except the antivirus rest all the systems are indigenously designed and used.
- One lesson learnt from the Iranian Stuxnet attack was that confidentiality should lead to self identification of the Critical Digital Assets (CDA). Identification of a compromise of the system only can lead to a check for safety, security and emergency preparedness, etc.
- Any variation on any of the system in nuclear facilities is immediately reported. The system conducts a behavioural analysis to track inconsistencies, if any, in everyday functioning of the nuclear plant systems.

THREAT OF NUCLEAR TERRORISM & INDIA'S RESPONSE

Speaker: Dr. Sitakanta Mishra, Assistant Professor, School of Liberal Studies, PDPU, Gandhinagar.

- The Fifth Horseman a movie in the 1970's by Larry Collins and Dominique Lapierre introduced the world to the apprehension of nuclear terrorism. The fictional story of Libyan leader Gaddafi holding New York City hostage with the nuclear threat impacted the actual French civilian nuclear reactors sale to Libya.
- Two divergent opinions are there on the subject of nuclear terrorism. One accepts that the threat of nuclear terrorism is real and incidents are waiting to happen. The other opinion furthers that the possibility of it has receded given the rigid institutional controls.
- There has been no successful precedent of nuclear terrorism yet nuclear security related incidences have been recorded in Tokyo in 1995, Brazil in 1987, Moscow in 1995, USA in 2002, UK in 2006 and South Africa in 2007.
- There are two variants, the one with low probability but high consequences is termed as nuclear terrorism and the other which has comparatively higher probability with low consequences is known as radiological terrorism.
- India has not had any precedent of nuclear terrorism yet given the unique set of challenges it faces, naxalism, terrorism, unstable neighbourhood, approximation to

golden crescent and golden triangle, the possibility of nuclear terrorism can never be denied.

- India's official position on the issue was pronounced by PM Manmohan Singh in 2012 in Seoul NSS where he accepted that a credible threat does exists which makes nuclear security important. The Ministry of External Affairs claimed that India is not a stranger to nuclear security with a layer protective envelope of threat assessment.
- India doesn't use HEU for nuclear energy plants. It has a SCOMET list that corresponds with international export control framework. The Global Centre for Nuclear Energy Partnership GCNEP has also been a well acknowledged Indian contribution to the NSS.
- Overall, India's approach to nuclear security is comprehensive and all inclusive.

SESSION-II: INDIA AND NUCLEAR POWER

Chairman: Air Marshal Vinod Patney SYSM PVSM AVSM VrC (Retd) Director General, CAPS.

Special Talk: Prof. R B Grover, the Director of the Homi Bhabha National Institute, Trombay, Mumbai.

INDIA'S GAINS IN NUCLEAR POWER 2010-2015 AND CHALLENGES AHEAD

- India was isolated from the world community since the 1974 on nuclear technologies. The situation enabled India to indigenously develop a wide range of reactor technologies. The Indo-US Civilian Nuclear Cooperation was end of nuclear isolation, an acknowledgment of the fact that the Indian capabilities and self sufficiency were noticed by the international community.
- The nuclear deal or the Indo-US Civilian Nuclear Cooperation resulted in relaxation of the Nuclear Suppliers Group (NSG) guidelines, and Indian entry into a wide range of bilateral agreements with Kazakhstan, Namibia, South Korea, Canada, Australia, Sri Lanka etc. in addition to NCA's with France, USA and Russia.
- On the supply side of electricity in India a common basis of comparison is needed to choose the best out of the available sources in question. A judicious mix has to be

attained keeping in mind the health impacts and the environmental impacts of the source.

- India has progressed substantially in the process of partitioning through which long term nuclear waste is systematically managed. The Arihant and the PFBR moving towards first criticality can be counted as some recent achievements of BARC.
- The nuclear deal has opened doors for us not just to fetch uranium for our reactors but also to multi stake holder scientific and technological collaborations like India's full partnership in the ITER project, collaboration with the Laser Interferometre Gravitational-Wave Observatory (LIGO) and Fermi laboratories, partnership in the Joule Horowitz Reactor (JHR). These have brought India closer to attaining required familiarity and expertise with the next generation technologies.
- Experiments with the probable use of natural uranium and the Slightly Enriched Uranium (SEU) in PHWR are in swing.
- Accelerator driven system can be counted as one chief area of BARC expertise.
- The challenges ahead are ensuring precision in IPR transactions ensuring our autonomy of decision making, arriving at technical terms and conditions that are mutually acceptable, the physical security of nuclear materials and facilities, human resource while ensuring both quality and quantity requirements, site selection and public acceptance to nuclear power.
- India has got the technology to enrichment of nuclear fuel for itself and to export PWR to other states. It solely depends on the economics and comparative advantage of doing it. Certainly there is no technological hurdle for India but economics.
