Union Christian College, Aluva, Kerala

(Affiliated to Mahatma Gandhi University, Kottayam)

Organises a **National Seminar** in association with

Atomic Energy Retirees' Association, Kerala (AERAK)

on

Nuclear Energy – Its Generation and Applications

at

MCA Seminar Hall,

Union Christian College, Aluva, Kerala, 683102

on

February 23 and 24, 2023

Organised jointly by**:**

Science Departments, Union Christian College, Aluva,

Indian Nuclear Society (INS), Mumbai,

Nuclear Power Corporation of India Ltd (NPCIL).

& Supported by:

Nuclear Fuel Complex, Hyderabad,

IREL (India) Limited,

The Indian Association for Radiation Protection (IARP), Mumbai.

Preamble

A seminar on nuclear energy has been organised in Union Christian College, Aluva, Kerala, in order to generate awareness and evoke interest in nuclear science among student community in particular, and academicians and public in general. The objective of this seminar is to get an overview of current nuclear programme of India and its application in various technological fields and scientific areas.

Nuclear energy is a clean energy source in comparison with energy generated using fossil fuels. Today, around 10% of the world's electricity is generated by about 440 nuclear power reactors operational in 32 countries worldwide. The contribution of nuclear energies in US is around 20%, while in France it is more than 50% in comparison to India's contribution of around 3%. Presently, India has 22 nuclear power reactors operating in 7 states, with an installed capacity of 6780 MWe. The government has announced a target of tripling its annual nuclear power generation in the next 10 years.

Nuclear power is a large-scale, low-greenhouse gas emission energy source that can continue to make a significant contribution to the Paris Agreement goal of 2˚C and the UN Sustainable Development Goals. Experts have concluded that in order to achieve the deep decarbonisation required to keep the average rise in global temperatures to below 1.5°C, combating climate change would be much harder, without an increased role for nuclear power. Because nuclear power is reliable, it can directly replace fossil fuel plant, avoiding the generation of greenhouse gases. Thus, the right-mix of energy

is required in order to reduce the carbon emission and to meet the long-term energy requirements.

Union Christian College

The Union Christian College (popularly known as UC college), Aluva, one of the first colleges established in the country, is turning 100 this year. The college began with 63 students enrolled in the Junior Intermediate Class in Group III, and affiliated to the then Madras University. Today, it has become a premier higher educational institution with about 2200 students, enrolled in 15 graduate and 14 postgraduate courses in diverse disciplines. The college is now affiliated to the Mahatma Gandhi University, Kottayam, with eight of its departments being Research Centres recognized by the university, providing guidance and resources to more than 120 research scholars. A sprawling green campus spread over 40 acres, the college is located on the banks of river Periyar, about 12 kilometres away from the Cochin International Airport. The college, known for its academic excellence and research potential, strives to produce intellectually competent, morally upright, and spiritually inspired citizens in the service of the nation. The college has been rated as an 'A' Grade institution by the National Assessment and Accreditation Council (NAAC). The college is honoured to inherit the proud heritage of accolades and endorsements from the various eminent leaders of the nation who visited the institution in the past. Mahatma Gandhi visited the college on the 18th of March 1925 and recorded in the visitors' diary his appreciation for the ideal conditions here. The sapling planted by him on the occasion, now a mango tree, is preserved in front of the administrative block as a testimony to the Mahatma's ideals. The college was honoured by the visit of Gurudev Rabindranath Tagore in 1922, who acknowledged in his address to the community his joy at witnessing here the quintessential spirit of his Shantiniketan. The legacy has continued since then with other luminaries like Shri. V.V Giri, Shri. Shankar Dayal Sharma, Dr. A.P.J Abdul Kalam honouring the college with their presence on various occasions. The other prominent personalities who visited the college during its fledgling years include Shri. Jayayaprakash Narayan (1954), Shri. Morarji Desai (1957), Shri. C. Rajagopalachari (1960), Shri. V.K Krishna Menon etc. The college library, which is nine decades old, has a collection of around 83,000 books.

Aluva (formerly *Alwaye*)

Aluva is the second largest town in Greater Kochi City and an important commercial town in Kerala. The town is famous for its festivals, large river banks and temples. It is situated around 15 km from the city centre on the banks of Periyar River. A major transportation hub, with easy access to all major forms of transportation, Aluva acts as a corridor which links the highland districts to the rest of Kerala. Cochin International Airport at Nedumbassery is 11.7 km from Aluva. Aluva is accessible through Rail (Aluva railway station), Air (Cochin International Airport), Metro (Kochi Metro) along with major highways and road lines. Indian Rare Earths Limited, Cochin University of Science & Technology, Cochin Shipyard, FACT are some of the major establishments located near Aluva. Around 12 colleges, including Arts & science and Engineering and 25 schools and educational institutions are located in and around Aluva.

INDIAN NUCLEAR SOCIETY (INS), MUMBAI

The Indian Nuclear Society is a registered professional body of nuclear scientists, engineers and technologists in India, with its headquarters at Mumbai and branches at Hyderabad, Kalpakkam, Rawatbhata, Mysore and Narora. It has more than 5,000 life members and 80 corporate members on its roll. The Society aims to promote advancement of nuclear science and technology together with the other sciences & arts and to aid in the integration of several disciplines constituting Nuclear Science, Engineering and Technology. The Society also aims to create awareness among general public about the benefits of atomic energy to mankind. The Society so far has conducted twenty-five annual conferences, several seminars and special lectures. The INS also regularly conducts technical workshop for industry. To recognize outstanding contributions made by individuals and industries in the field of nuclear science and technology, the Society has instituted annual INS awards since the year 2001.

ATOMIC ENERGY RETIREES' ASSOCIATION, KERALA (AERAK)

Atomic Energy Retirees' Association, Kerala was formed in 2009 by the retirees from Department of Atomic Energy (DAE) settled down in different parts of Kerala. Started by a group of 50 likeminded and committed persons in the year 2009, this association now has over 250 multi-disciplinary members like Engineers, Scientists, Administrators and Technicians. The Organization, since its inception, is very active in social, medical and cultural fields. Besides being a forum for get-together, objective of the association is to create awareness on the advantages and benefits of Nuclear Energy to the Public at large. There are not many nuclear institutions located in Kerala. We thought it is our earnest duty to spread awareness, exposing the myths and fears in public psyche. For the above purpose, Association conducts awareness programme on nuclear energy at various schools and colleges of Kerala.

ABOUT THIS SEMINAR

The United Nations recognises climate change as “the most systemic threat to humankind” and it is generally considered as the most significant and urgent sustainability challenge. Climate change is resulting from increasing concentrations of CO_2 in the Earth’s atmosphere. Given that three-quarters of anthropogenic CO_2 emissions result from the burning of fossil fuels for energy, the main focus should be on energy technologies that emit only small amounts of CO_2 per unit of energy. The International Energy Agency (IEA) noted that achieving a net-zero greenhouse gas emissions by 2050 will require doubling the nuclear power worldwide. Further, UN estimates that the world's population will grow from 7.6 billion in 2017 to 9.7 billion by 2050. The process of urbanisation will result in approximately two-thirds of the world's people living in urban areas by 2050. Growth in the world's population and economy, coupled with rapid urbanisation, will result in a substantial increase in energy demand over the coming years. The challenge of meeting rapidly growing energy demand, whilst reducing harmful emissions of greenhouse gases, is considerable.

Besides the use of nuclear power for electricity production, wider application of direct use of nuclear heat as process heat with temperature exceeding 800^{o}C appears feasible in the future when nuclear energy will not only meet the increasing demands of electricity but also will be used for the production of fresh water by desalination and production of hydrogen both by electrolysis and by thermo-chemical splitting of water. Nuclear techniques are used to support national nutritional programmes too. Irradiation can make food safer by killing contaminants that can cause food poisoning. And nuclear techniques can check whether agrochemicals have been used properly and pose no health risks. Radiology is used to diagnose and manage diseases, and radiotherapy to treat and cure it. Countries use nuclear techniques to improve crop varieties which leads to increased production of better food. The nuclear technique can be used to control pests that can destroy fruit and kill livestock and derive methods to diagnose and prevent animal diseases. Sterilization of sealed medical products and use of radiopharmaceuticals in nuclear medicine are important spin-off nuclear energy. Freshwater is a limited resource. Using nuclear science, countries can manage their scarce water resources better. Scientists use nuclear techniques to study the key threats to the marine environment and advise countries on how to prevent pollution and mitigate its consequences. In space technology, nuclear reactors could also be used to provide astronauts with a reliable source of surface power for extended exploration missions and a possible sustained human presence on other planetary bodies, supplying power for decades without need for refuelling. Thus, Nuclear technologies help to ensure the fundamental needs are met for an ever growing and developing global population.

This seminar will provide a forum for scientists and engineers to engage in dialogue on the role of nuclear energy in the transition to clean energy sources and its contribution to sustainable development and climate change mitigation.

OBJECTIVES

It is high time to spread awareness on nuclear energy and its applications, among the public, especially among young students of science and engineering. This seminar is proposed to address the myths about the use of nuclear energy especially among the younger generation. Thus, the principal objective is to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world.

WHO CAN ATTEND THIS SEMINAR?

Faculty and students from high schools, arts, science and engineering colleges of central Kerala and professionals and engineers in the industry in and around Aluva are the target group of this seminar.

EXHIBITION

In connection with the seminar, an exhibition on Nuclear Energy shall be arranged on February 23rd and 24th, 2023 at Union Christian College, Aluva. Materials, models and posters from NPCIL and IRE will be displayed in the exhibition. Experts from Department of Atomic Energy will interact with students and visitors.

EXPECTED OUTCOME

1) Get an overview of the current nuclear energy program in the country.
2) Exposure to the challenges involved in nuclear power generation.
3) Information about application of nuclear technology in the fields like agriculture, biology, medicine etc.
4) Exposure to the industrial applications of nuclear technology.
5) Opportunity to interact with senior nuclear scientists in the country.
6) Research and Development in Nuclear Field as a career option.

THEME AREAS

a) Nuclear fission and fusion
b) Technologies in nuclear power generation
c) Combating climate change using nuclear power
d) Radioisotopes
e) Nuclear Medicines
f) Nuclear materials
g) Thorium Utilization
h) Rare Earths an its uses

REGISTRATION

A nominal fee of Rs 100/- will be charged from the student delegates from all institutions. Research Scholars and Faculty from other colleges / institutions will be charged a nominal fee of Rs. 200/-.

TRAVEL & ACCOMMODATION

Expenditure for travel and accommodation must be borne by the participants. We are happy to book accommodation for the participants on request.

National advisory committee

1. Dr. M.I. Punoose (Principal, Union Christian College)
2. Rev. Thomas John (Manager, Union Christian College)
3. Dr. Dinesh Srivastava (Distinguished scientist, Chairman & Managing Director, NFC, Hyderabad)
4. Shri. A. Veeramani (General Manager and Head, Rare Earths Division, IREL (India), Aluva)
5. Shri. Satyawan Bansal (Vice President, Indian Nuclear Society (INS)
6. Shri. G.D. Mittal (Secretary, INS)
7. Dr. M.G.R. Rajan (Member, INS EC)
8. Dr. C.V. Krishnan (Retd Professor, Stony Brook University, USA)
9. Dr. M.R. Iyer (Retd. Head RSSD, former IAEA Professional)
10. Dr. K. Muraleedharan (CSIR Emeritus Scientist & former Director, CGCRI, Kolkata)
11. Dr. Susan Eapen (formerly of BARC, Adjunct Professor, Dept of Biosciences, UC College)

Local Organising Committee

1. Dr. M. AnilKumar (Academic Dean & Head, Department of Botany, UC College, **Convenor**)
2. Dr. Mayank Verma (Member, INS EC)
3. Shri. Kishor Agrawal (Joint Secretary, INS)
4. Shri. O.P. Rai (Treasurer, INS)
5. Dr. T.R. Govindan Kutty **(Joint Convenor)**
6. Dr. Sareen Sarah John (Head, Department of Biosciences, UC College, **Organising Secretary**)
7. Dr. A.V. Alex (Director, School of Computer Applications, UC College)
8. Dr. Manu Punnen John (Head, Department of Physics, UC College)
9. Ms. Minu Joys (Head, Department of Chemistry, UC College)
10. Ms. Rima Joseph (Head, Department of Zoology, UC College)
11. Dr. R. Reshmi, Asst. Professor (Department of Physics, UC College)
12. Dr. Simi Pushpan, Asst. Professor (Department of Chemistry, UC College)
13. Dr. Anumol Jose, Asst. Professor (Department of Botany, UC College)
14. Ms. Merin Rejoy, Asst. Professor (Department of Biosciences, UC College)
15. Shri. K.R. Viswambharan, (President, AERAK)
16. Dr. K.K. Surendranathan
17. Shri. K.V. Das (Vice President, AERAK)
18. Shri. N. Sankaranarayanan
19. Shri. K.G. Panicker

20. Dr. S. Krishna Prasad
21. Dr. T.S. Muraleedharan
22. Shri. K. Unnikrishnan
23. Dr. A. Venugopalan
24. Dr. M.P. Rajan
25. Dr. K.G. Samuel
26. Shri. K.K.P. Nair (Secretary, AERAK)
27. Shri. G.M. Nair (Treasurer, AERAK)

Invited Speakers

1. Dr. Arun K Nayak, BARC, DAE
2. Shri. Umed Yadav, NPCIL
3. Dr. Archana Sharma, BARC
4. Shri. Satyawan Bansal, AERB
5. Shri. A. Veeramani, IREL, Aluva
6. Dr. G. Sugilal, BARC
7. Dr. M R Iyer, BARC (retd), IAEA
8. Dr. S V G Menon, BARC (Retd)
9. Dr. Susan Eapen, BARC (Retd)
10. Dr. Shagos G S, Aster Medicity, Kochi
11. Dr. Vijay Harish S, Rajagiri Hospital, Aluva
12. Dr. Drisya K, University of Calicut
13. Dr. Rhine Kumar A K, CUSAT, Kochi
14. Dr. Midhun C V, University of Calicut
15. Shri. Amritesh Srivastava, NPCIL
16. Shri. G D Mittal, INS, Mumbai
17. Dr. M. Anilkumar, UC College, Aluva
18. Students' session