

# AVI COMMENTARY

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## Prospect of Nuclear Technology in Cambodia

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Nuclear technology involves the use of nuclear reactions for various applications. Nuclear technology for peaceful purposes, particularly in the areas of healthcare, agriculture and food safety, and energy, has gained growing interest from the Cambodian government. At the same time, the public has different perceptions about it due to media coverage, popular culture, and personal experiences. This article demonstrates that nuclear technology offers Cambodia transformative potential across key sectors. While there are still risks associated with nuclear technology, advances in technology and safety protocols have significantly reduced these risks. As Cambodia seeks to harness nuclear power, it will be important to ensure that the benefits of nuclear technology are realised safely and responsibly.

### Public Perception Towards Nuclear Technology

Some view nuclear technology through the history of the atomic bombings of Hiroshima and Nagasaki during World War II and the arms race between the United States and the Soviet Union during the Cold War. Also, some have concerns about the potential for nuclear accidents generating tremendous nuclear waste, such as the Chernobyl disaster in 1986 and the Fukushima Daiichi nuclear disaster in 2011. Moreover, others fear radiation exposure which can cause cancer and genetic mutations. However, in recent years, there has been a shift in public perception of nuclear technology towards a more positive acceptance. Still, the supporting rate decreased compared to before the 2011 Fukushima Daiichi nuclear disaster .

Thanks to technological advances, safety protocol improvements, and more cost-effectiveness, nuclear reactors are now designed with advanced safety features that make them more resilient to natural disasters such as earthquakes and tsunamis. Furthermore, nuclear technology has various applications including but not limited to human health, agriculture and food safety, and energy, which are of great benefit. Despite these positive aspects, Cambodia's public opinion on nuclear technology has not been studied to grasp general perception and attitude toward this technology. The public awareness campaign is a promising initiative to inform the publics and obtain their trust as nuclear technology is gradually becoming an inevitable alternative to conventional technologies.

### Current Status of Nuclear Technology in Cambodia

The Cambodian government expressed its interest in expanding nuclear application in medical and agriculture sectors and has signed a country programme framework with IAEA for technical assistance and training. The government views this technology as a promising path for national development. Former Prime Minister Hun Sen had requested IAEA representative

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during a bilateral talk in 2014 to assist Cambodia in developing human resources and draft any laws relevant to manage nuclear technologies, especially in the agriculture and health sector. In addition, the government has sought partnerships with Russia and China on nuclear energy for peaceful purposes since 2015.

However, the application of nuclear technology in Cambodia is still in the formative phase in fields of human health, agriculture and food safety and energy. The country has a few hospitals providing medical oncology services such as: Calmette Hospital with a National Cancer Centre, Khmer-Soviet Friendship Hospital, and Luong Me Hospital specialised in cancer treatment where nuclear technology is being utilised. However, nuclear energy has not been explored as a potential source of electricity source yet. According to the former Director-General of Energy of the Ministry of Mines and Energy, Victor Jona said through Khmer Times: “From now until 2040, we don’t have any plans for any civil nuclear power plant investments. Regarding whether or not we will need nuclear power to generate electricity after 2040, this will depend on current global trends”. While Cambodia lacks local academic programs in nuclear-related fields, some Cambodian students have obtained degrees in nuclear science and technology through foreign government scholarships.

## **Future Prospects of the Use of Nuclear Technology in Cambodia**

### *Enhancing Human Health*

Nuclear technology has numerous applications in human health, including medical imaging, radiation therapy, radioisotope therapy, sterilisation, blood irradiation and radiation detection. Nuclear medicine uses small amounts of radioactive material to diagnose and monitor medical conditions, while radiation therapy and radioisotope therapy use high-energy radiation and radioactive materials to destroy cancer cells. Sterilisation using gamma radiation or electron beam radiation is essential in preventing the spread of infectious diseases and ensuring that medical equipment is safe. Radiation detection equipment measures radiation levels in medical settings to ensure workers are not exposed to dangerous radiation levels. Blood irradiation eliminates the functional and proliferative capacities of T-lymphocytes maintaining other blood components functional and viable, especially erythrocytes, granulocytes and platelets, which is important to tackle transfusion associated graft-versus-host disease (TA-GVHD).

### *Strengthening Agriculture and Food Safety*

Nuclear technology also has key applications in agriculture and food safety, including crop improvement through mutation breeding, pest control using the sterile insect technique, food safety through irradiation to kill harmful bacteria, and soil and water management using isotopic techniques to measure and manage resources. These applications can improve crop yields, reduce the use of harmful pesticides and chemicals, and ensure the safety and quality of food products. Nuclear technology has been used to develop over 3,200 mutant varieties – including numerous crops, ornamentals and trees – which have officially been released for commercial use in more than 210 plant species from over 70 countries according to FAO/IAEA Mutant Varieties Database. Irradiation is useful for preserving fruits, vegetables, and meats, extending their shelf life without the use of harmful chemicals.

### *Energy Security*

Nuclear technology plays a crucial role in securing sustainable energy while offering applications ranging from power generation to comprehensive fuel cycle management. At its core, nuclear power plants produce electricity by harnessing heat to generate steam, which drives turbines without relying on fossil fuels. This process is part of a broader nuclear fuel cycle, encompassing everything from uranium mining and enrichment to reactor operation and

spent fuel handling. As the demand for clean energy grows, the nuclear sector continues to innovate. Emerging technologies such as small modular reactors and advanced fuels are poised to enhance efficiency and safety, reinforcing nuclear energy's position as a key player in meeting future global energy needs sustainably.

In summary, nuclear technology offers significant prospects for Cambodia to improve human health, agriculture and food safety, and energy. Nuclear technology, if implemented with robust safety protocols, regulations, and emergency preparedness, can contribute to Cambodia's sustainable development and socioeconomic progress while maintaining public safety and trust.

*The views expressed are the author's own and do not reflect the views of the Asian Vision Institute.*