ISSUE BRIEF

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NUCLEAR TECHNOLOGY FOR SOCIO-ECONOMIC DEVELOPMENT IN PAKISTAN

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Nuclear technology brings military terms to mind and triggers a feeling of fear but it can stimulate hope as well because the peaceful uses of nuclear technology have been facilitating the lives of people for decades.[1] Pakistan has a noteworthy history of using nuclear technology for peaceful purposes. Nuclear technology is playing an important role in the development of socio-economic growth of Pakistan besides usage in agriculture, medicine, energy, textile and many other sectors.[2] For instance, nuclear energy is an effective, environment-friendly alternative and Pakistan is increasingly relying on it, which shows the national determination and devotion toward the effective implementation of a peaceful nuclear programme. Pakistan is ambitious about increasing the usage of nuclear energy and is currently expanding its infrastructural capabilities to fulfil those goals. For this, the government aims to invest more in research and development programmes under

1 Tooba Ghaffar, "Pakistan Less talked about Peaceful Uses of Nuclear Energy," Global Village Space, October 27, 2020, https://www.globalvillagespace.com/pakistans-less-talked-about-peaceful-uses-of-nuclear-technology/.

2 Ibid.

the Nuclear Energy Vision-2050.[3] The Karachi Coastal Power Project is part of this programme that aspires to produce 40,000 MW of electric power by 2050.[4]

Pakistan established the Atomic Energy Commission (PAEC) in 1956 for the peaceful usage of nuclear technology.[5] The PAEC, with the help of a Canadian firm, established its first nuclear power plant during the 1960s called Karachi Nuclear Power Plant (KANUPP) and Pakistan became one of the few countries that were generating electricity by using nuclear reactors.[6] Regardless of many restrictions and embargos, Pakistan established four nuclear power plants at Chashma – Chashma Nuclear Power Plant (CHASNUPP), CHASNUPP 1, CHASNUPP 2, CHASNUPP 3 and CHASNUPP 4, which collectively are producing 1228 MWe of electricity.[7] Besides this, Pakistan also has two more nuclear power plants operational in Karachi – K2 and K3. These plants now have the collective capacity to generate 3,256 MW of electricity.[8]

It is a common narrative that pursuing nuclear technology was just a drain of resources but figures showed that Pakistan's peaceful use of nuclear technology helped the country to add 1,200 billion rupees ($7.4 billion) to its national treasury.[9] Exports play a fundamental role in the economy of Pakistan and as our exports are chiefly (70 per cent) comprised of agriculture thus efforts in this sector are directly contributing to Pakistan's development. The PAEC is using nuclear technology to improve the efficiency and productivity in the agriculture sector by introducing, "new crop varieties, pest control technologies, plant nutrition and water management, animal health and productivity and food decontamination and preservation."[10] By using new breeding techniques, The PAEC has developed almost 125 crop varieties that are stress-tolerant and have wider adaptability to harsh weather, to achieve the United Nations Sustainable Development Goal (SDG) of eradicating hunger

3 Yasir Hussain, "Energy Security and Nuclear Programme," *The News*, May 28, 2021, https://www.thenews.com.pk/print/840832-energy-security-and-the-nuclear-program.

4 Usman Ali Khan, "Pakistan's Nuclear Program for Peaceful Purposes," *Eurasia Review,* September 29, 2022, https://www.eurasiareview.com/24092021-pakistan-nuclear-program-for-peaceful-purposes-oped/.

5 "Pakistan's Peaceful Purposes of Nuclear Technology," Strategic Vision Institute, https://thesvi.org/pakistans-peaceful-application-of-nuclear-technology/.

6 Muhammad Rizwan, "Nuclear Power: an Efficient Alternative," *The news*, December 8, 2020, https://www.thenews.com.pk/print/755298-nuclear-power-an-efficient-alternative/.

7 "Nuclear power in Pakistan," *World Nuclear Association,* March 2022, https://world-nuclear.org/information-library/country-profiles/countries-o-s/pakistan.aspxl/.

8 Ibid.

9 "Nuclear Skill helped Pakistan to Earn $7.4B," *Anadolu Agency,* May 29, 2020, https://www.aa.com.tr/en/economy/-nuclear-skill-helped-pakistan-to-earn-74b-/1857356.

10 "Pakistan Atomic Energy Commission (PAEC)," https://paec.gov.pk/index.aspx.

and malnutrition.[11] The PAEC also organised programmes to educate the farmers to increase agricultural productivity. Institutes of agriculture and biotechnology of PAEC have developed technologies to acquire economic gains from the saline land and areas with water scarcity by providing plant materials and technologies to reduce water loss.[12] Also, for decreasing the use of pesticides, the PAEC, together with the International Atomic Energy Agency (IAEA), has built laboratories to breed insects for combatting pests and for detecting and reduction of pollutants in water.[13]

The PAEC is also successfully using nuclear technology in the health sector. The PAEC has created 19 Atomic Energy Cancer Hospitals (AECH) where more than 0.7 million patients are treated annually, which is almost 80 per cent of total cancer patients in Pakistan.[14] The hospitals are also working for raising awareness regarding cancer as it is highly curable if diagnosed in time. The nuclear energy sector has also been a source of employment generation in different sectors like medicine, agriculture and industry, helping in the socio-economic progress of the country.[15] The nuclear programme of Pakistan is effectively contributing to the welfare of the people and towards the attainment of the SDGs, these achievements are a matter of national pride.

The civilian programme of nuclear resources is working with its affiliated institutes. Pakistan promotes and shares best practices in nuclear security through its three affiliated institutes, the Pakistan Centre of Excellence for Nuclear Security (PCENS), the National Institute of Safety and Security (NISAS) and the Pakistan Institute of Engineering and Applied Sciences (PIEAS), which actively engage with the international community to promote nuclear security and safety.[16] Pakistan through its centres of excellence has been arranging training sessions and programmes for domestic as well as regional personnel from organisations about nuclear safety and security. The PCENS advances programmes for training in nuclear safety and response whereas NISAS works for providing comprehensive training for effective regulatory operations. PIEAS offers academic courses about

11 Asma Khalid, "Pakistan's Nuclear Energy Programme for Sustainable Development," Centre for Contemporary and Strategic Research, January 26, 2021, https://cscr.pk/explore/themes/energy-environment/pakistans-nuclear-energy-programme-for-sustainable-development/.

12 PAEC.

13 Ibid.

14 Hasan Ehtisham, "Pakistan as a Developed Nuclear Power," Global Village Space, May 26, 2022, https://www.globalvillagespace.com/pakistan-as-a-developed-nuclear-power/.

15 Syed Abdul Hadi, "The Tale of Pakistan's Civil Nuclear Programme," Global Village Space, May 20, 2022, https://www.globalvillagespace.com/the-tale-of-pakistans-civil-nuclear-program-for-peaceful-purposes/.

16 Rabia Javed, "Pakistan's Nuclear Energy: An Effective Alternative," *Pakistan Today*, May 27, 2021, https://www.pakistantoday.com.pk/2021/05/27/pakistans-nuclear-energy-an-efficient-alternative/.

nuclear security to coach coming generations to take up nuclear security responsibilities.[17] PIEAS and IAEA are working in partnership on three essential areas of "modelling and simulations with verification and validation capabilities, experimental nuclear engineering, and education and training." Member states are working to help out IAEA with research and training involving nuclear technologies, nuclear science and their security applications.[18]

Pakistan is working with the collaboration of the IAEA to expand its civilian nuclear programmes to combat energy crises in Pakistan and also to lower the temperatures of the globe by two degrees in the next 30 years.[19] Nuclear energy is environmentally friendly and does not cause any harm to the environment like fossil fuels since its carbon dioxide (CO2) emission is zero.[20] This makes nuclear energy the most economical, reliable, and environmental source of power.

Apart from collaboration in the energy sector, Pakistan and IAEA along with the partnership with the Food and Agriculture Organisations of the United Nations (FAO), are working in the cotton and textile industry of Pakistan. Cotton, silk, and linen are fashion-associated textiles used all over the world and Pakistan's textile industry contributes 8.5 per cent to Gross Domestic Product (GDP).[21] For years, severe Climate Change has affected the production of cotton in Pakistan but through this collaboration, new and improved varieties of cotton were released by the Nuclear Institute of Agriculture and Biology (NIAB), which are resistant to harsh weather improving the production of cotton by 30 per cent since 2016.[22]

Thus, the perception of nuclear technology as a source of destruction is incorrect because it has dual use and can bring immense benefits to humanity as well. Pakistan has shown a great potential to use nuclear technology for peaceful purposes which has not been given enough credit.[23] Often Pakistan's nuclear weapons programme is highlighted. While nuclear weapons ensure Pakistan's security, less highlighted is the fact that Pakistan is one of the 30 countries in the world, which is

17 Aabha Dixit, "Pakistan's National Center of Excellence Contributes to Sustaining Nuclear Security," IAEA, January 18, 2017, https://www.iaea.org/newscenter/news/pakistans-national-centre-of-excellence-contributes-to-sustaining-nuclear-security/.

18 Shant Krikorian, "New IAEA Collaborating Center in Pakistan to Assist in Applications of Nuclear Technologies," IAEA, December 5, 2019, https://www.iaea.org/newscenter/news/new-iaea-collaborating-centre-in-pakistan-to-assist-in-applications-of-nuclear-technologies/.

19 Rabia Javed, "Pakistan's Nuclear Energy: An Effective Alternative," *Pakistan Today*, May 27, 2021, https://www.pakistantoday.com.pk/2021/05/27/pakistans-nuclear-energy-an-efficient-alternative/.

20 Ibid.

21 Carley Willis, "Cotton in Pakistan: How Nuclear Techniques are helping the Textile Industry," IAEA, January 22, 2021, https://www.iaea.org/newscenter/news/cotton-in-pakistan-how-nuclear-techniques-are-helping-the-textile-industry /

22 Ibid.

23 Amber Afreen Abid, "Pakistan Peaceful use of Nuclear Technology," *Eurasia Review News & Analysis,* "May 31, 2022, https://www.eurasiareview.com/31052022-pakistans-peaceful-uses-of-nuclear-technology-oped/

using its nuclear programme for civilian purposes. Thus, Pakistan is using nuclear technology for its socio-economic development and progress. It is in the position to even assist other regional countries in benefiting from peaceful uses of nuclear technology.[24]

Pakistan has a spotless record of the safety and security of its nuclear power plants. It is a responsible nuclear state and can also benefit through global nuclear commerce to a great extent and should be given open access to it, based on its remarkable achievements in the civil nuclear field.[25] The nuclear vision 2030 and 2050 have put the country on the right path to realising its potential but Pakistan seeks cooperation with the international community for unlocking its full potential and acquiring sustainable energy, economic, medical, agricultural and environmental benefits from nuclear power.[26] Pakistan has an inherent interest in safe and efficient uses of nuclear energy and will continue to upgrade and invest in this sector.[27] Thus, Pakistan needs to work with the same commitment toward its civilian nuclear program in every sector, especially in the energy sector where nuclear energy is essential to alleviate the supply and demand crises. [28]

24 Mufliha Noor, "Pakistan's Successful and Peaceful use of Nuclear Energy," *Technology Times,* November 27, 2020, https://technologytimes.pk/2020/11/27/pakistans-successful-and-peaceful-uses-of-nuclear-energy/.

25 Ibid.

26 Ms. Ghazala Yasmin Jalil, "Pakistan's energy outlook", *Institute of Strategic studies Islamabad,* April 29, 2021, https://issi.org.pk/issue-brief-on-pakistans-nuclear-energy-outlook/.

27 Mufliha Noor, "Pakistan's Successful and Peaceful use of Nuclear Energy," *Technology Times,* November 27, 2020, https://technologytimes.pk/2020/11/27/pakistans-successful-and-peaceful-uses-of-nuclear-energy/.

28 Asma Khalid, "Pakistan's nuclear energy programme for sustainable development", *Centre for strategic and contemporary research,* January 26, 2021, https://cscr.pk/explore/themes/energy-environment/pakistans-nuclear-energy-programme-for-sustainable-development/