

# PakAtom

Newsletter of the Pakistan Atomic Energy Commission

January 2021 - September 2021

## Chairman PAEC Highlights Nuclear Technologies Contribution to Pakistan's Development

Chairman Pakistan Atomic Energy Commission (PAEC) Muhammad Naeem, HI, SI, during his address at the 65<sup>th</sup> General Conference of the International Atomic Energy Agency (IAEA) highlighted the contribution of nuclear technologies to Pakistan's socio-economic development. The conference was held in Vienna from September 20-24.

He said that Pakistan strongly supports the Agency's role in promoting the peaceful uses of nuclear science and technology in accordance with its motto "Atoms for Peace and Development".

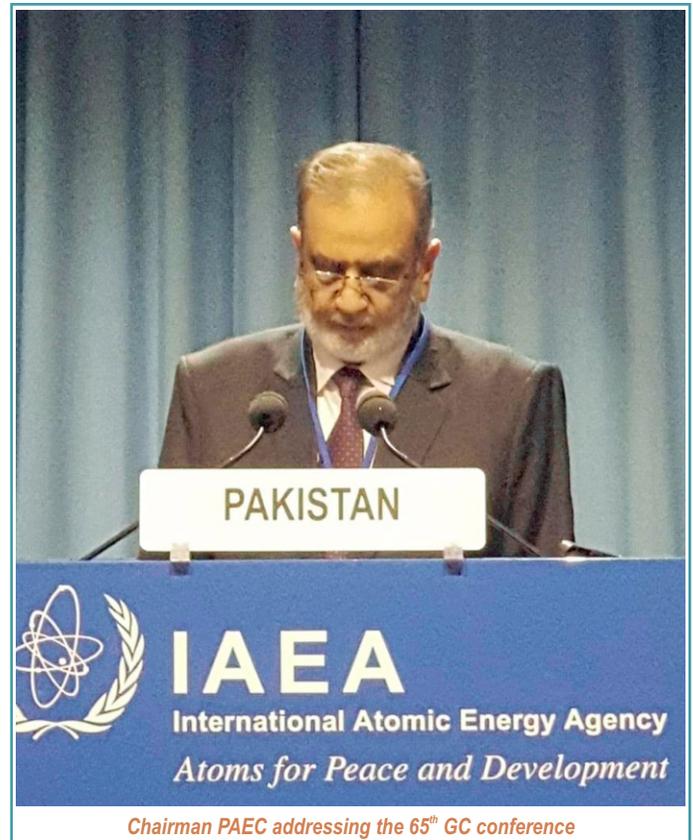
He stated that Pakistan is forging ahead to expand the share of nuclear power in the national energy mix not only to meet its growing energy needs but also to mitigate the impact of climate change as nuclear power is a carbon free and reliable source of energy.

He recalled that Pakistan had achieved another milestone with the inauguration of its sixth and the largest nuclear power plant of 1100 megawatts, Karachi Nuclear Power Plant K-2.

Another such power plant K-3 is expected to become operational in April 2022.

Reaffirming Pakistan's commitment for running a safe and secure civilian nuclear programme, he said that Pakistan has placed all its nuclear power plants and research reactors under IAEA Safeguards.

He further said that nuclear applications are also being used in Pakistan of health, agriculture, industry and environmental protection.



Pakistan is among the founding members of the IAEA and regularly serves on its board of Governors. It has not only benefited from but also contributes to the Agency's technical cooperation programme over the years aiming at promoting the peaceful uses of nuclear energy.

## Pakistan Elected to IAEA Board of Governors

In a major diplomatic achievement at global level Pakistan has been elected to the International Atomic Energy Agency (IAEA) Board of Governors for 2021-2023.

The 65<sup>th</sup> General Conference of the IAEA has elected Pakistan by acclamation to serve on the IAEA's Board of Governors for the term 2021-2023.

Ambassador Aftab Ahmad Khokhar who also attended the GC said Pakistan's election to the IAEA's Board of Governors is recognition of the country's contribution to the

promotion of peaceful uses of nuclear technology in a safe and secure manner, as well as its commitment to the global objective of nuclear non-proliferation.

Comprising of 35 members, the IAEA Board of Governors is one of the two highest policy-making organs of the IAEA, along with the annual General Conference.

The IAEA Board of Governors considers applications for membership, approves safeguards agreements and the publication of the IAEA's safety standards.

# PAEC Wins Three Prestigious IAEA Awards

The International Atomic Energy Agency (IAEA) and the UN Food and Agriculture Organisation (FAO) jointly conferred awards on Pakistan's Nuclear Institute for Agriculture and Biology (NIAB) and five of the country's scientists.

NIAB and the scientists have been given the awards in recognition of "Pakistan's advancement in the application of nuclear technology for the achievement of Sustainable Development Goals, including food security". Among the Pakistani recipients of the awards, NIAB bagged



Chairman PAEC receiving best Institute award for NIAB, Faisalabad

Outstanding Achievement Award, a team of scientists from Pakistan Atomic Energy Commission won Team Achievement Award and Young Scientist Award was decorated upon Dr. Muhammad Kashif Riaz Khan from NIAB, PAEC in recognition of major achievements in plant mutation breeding and related bio-technologies during 2021.



Dr. M. Kashif Riaz receiving the award from IAEA Chief

## IAEA and Pakistan Atomic Energy Commission Sign Agreement for the Peaceful Use of Atomic Energy

Regulators and users of nuclear technology from Africa, Asia and the Pacific will soon be able to tap into the Pakistan Atomic Energy Commission's (PAEC) 50 years of experience in managing nuclear power and application projects, thanks to newly concluded agreements between the IAEA and PAEC.

"I congratulate PAEC on the signing of these Practical Arrangements, which will enhance collaboration between the Agency and PAEC, and will help share Pakistan's expertise with Member States around the world, particularly from Africa," said Deputy Director General Liu Hua. "These Arrangements are an effective example of South-South cooperation, implemented through established IAEA mechanisms."

"This Practical Arrangement will provide a forum for all African countries in the region for collaboration in the field of agriculture, human health, training and regulatory affairs under the ambit of IAEA," said Muhammad Naeem, Chairman of PAEC. "Pakistan has greatly benefitted from the technical cooperation programme of the IAEA, and now we are in a position to provide technical support to other Member States," he added.

The Practical Arrangements, signed on 24 September, are the first signed between the two parties and cover a three-year period (2021-2024). They provide a framework for cooperation in the areas of the peaceful uses of nuclear technologies.

The agreement identifies the following activities in which cooperation may be pursued:

Collaboration with relevant national institutions, laboratories, medical institutions and research centres through the PAEC.

Exchange and dissemination of information, including publications and sharing of experiences and best practices in the area of food and agriculture, nuclear medicine, radiation oncology, medical physics, radioisotope applications, nuclear education and other areas of peaceful uses of nuclear science and technology that may be agreed upon by the parties.

Both the IAEA and PAEC have agreed on a plan of action which includes key activities and timelines.



Chairman PAEC and DDG IAEA signing the practical arrangements

# Pakistan Showcases Gains in Peaceful Use of Nuclear Technology at Vienna, Austria



*PAEC team participating in the 65<sup>th</sup> IAEA General Conference, Exhibition and side line events at Vienna*

Pakistan showcased its achievements in the peaceful uses of nuclear technology before the global community at the IAEA headquarters in Vienna on the sidelines of GC.

The exhibition showcased Pakistan's achievements in the peaceful uses of nuclear technology in diverse fields such as power generation, health, agriculture, industry and environmental protection.

Chairman of the Pakistan Atomic Energy Commission (PAEC) Muhammad Naeem and Head of Turkish Nuclear and Mineral Research Agency (TENMAK) Prof. Dr Abdulkadir Balikci inaugurated Pakistan's national exhibition stand at the annual General Conference of the International Atomic Energy Agency (IAEA).

IAEA's Deputy Director General and Head of the Department of Nuclear Sciences and Applications Najat Mokhtar also attended the inauguration. Najat Mokhtar, addressing on the occasion, said that Pakistan had made

great strides in harnessing nuclear technologies for pursuing socioeconomic development. She appreciated Pakistan's decades-long collaboration with the IAEA.

Speaking on the occasion, Pakistan's Permanent Representative to the IAEA Ambassador Aftab Ahmad Khokher highlighted the ways in which nuclear technology was contributing to Pakistan's socio-economic development and paid tribute to scientists and engineers of the Pakistan Atomic Energy Commission.

The exhibition stand remained functional during the entire week of the IAEA's General Conference and was visited by international delegates, staff of the IAEA and other interested visitors. As a founding member of the IAEA, Pakistan has enjoyed longstanding mutually beneficial cooperation with the organisation mandated to promote the peaceful uses of nuclear technology.



*Dr. Kashif Riaz briefing the visitors at PAEC stall*



*Chairman PAEC Muhammad Naeem and Head of TENMAK Prof. Dr Abdulkadir Balikci inaugurating Pakistan's national exhibition stand at the annual General Conference of the IAEA in Vienna*

## HMC-3 & WASO Get Certification for Design of Nuclear Safety Class Equipment and Structures

PAEC pursuing its vision of self-reliance and indigenization in nuclear technology for peaceful purposes, achieved yet another milestone to receive design license certificates of its two organizations; Heavy Mechanical Complex-3 (HMC-3) and 'Works and Services Organization'(WASO). The design license certificates were awarded to HMC-3 and WASO in a prestigious ceremony held at PNRA HQ for the design of nuclear safety equipment and structures of nuclear installations after the successful completion of all the regulatory requirements including assessment of design capabilities and quality programme. Chairman Pakistan Nuclear Regulatory Authority (PNRA) presented the certificates to Chairman PAEC.

HMC-3 and WASO are playing a vital role in the



Chairman PAEC receiving certificates from Chairman PNRA

development of national nuclear power programme and provision of technical support to operating nuclear power plants. This certification will enable these organizations to design the safety class equipment and structures which will ultimately reduce the dependency on foreign vendors in this critical area.

Addressing on the occasion, Chairman PAEC Mr. Muhammad Naeem (H.I, S.I) lauded efforts of PNRA and thanked for awarding design license certificates to two design organizations of PAEC. He praised Almighty Allah that Pakistan moved one more step towards indigenization for achieving sustainable national nuclear power programme by enhancing its capabilities to design the nuclear safety class equipment and structures. The Chairman reiterated that PAEC has maintained a high standard of quality and safety at its nuclear installations and vowed to comply with the national and international standards. He further said, "The landmark we achieved today will further strengthen Pakistan's indigenous nuclear power program and self-sustainability in peaceful use of nuclear technology."

Speaking on this occasion, Chairman PNRA Mr. Zaheer Ayub Baig (H.I) emphasized the importance of safety and quality in the design of nuclear installations. He highlighted that PNRA has already awarded manufacturing license for safety class equipment to HMC-3 and expected that PAEC would ensure the compliance of national and international safety standards and the practices in vogue in nuclear industry worldwide.

## PAEC Develops Indigenous ICU Ventilator

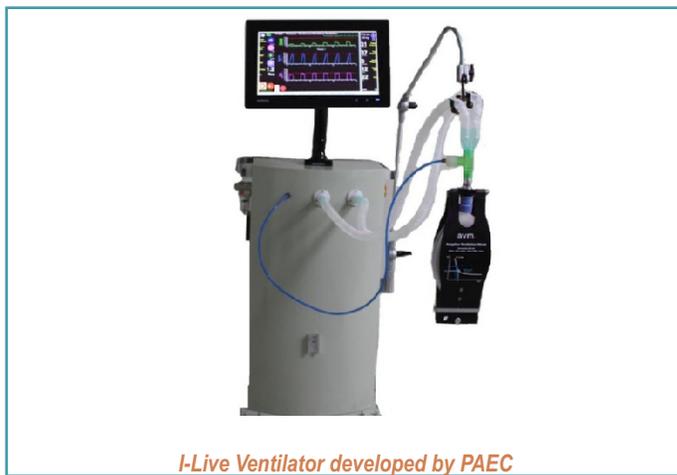
Living up to nation's expectations amid third wave of COVID-19 pandemic, Pakistan Atomic Energy Commission (PAEC) announced to have indigenously developed its own Intensive Care Unit (ICU) Ventilator named "i-LIVE".

The ventilator has been developed by a PAEC team of diligent scientists and engineers applying all essential quality standards and regulatory requirements whereas doctors from PAEC Hospital Islamabad provided valuable input during its development process. Besides passing through all internal reviews and testing, the "i-LIVE" ventilator also successfully passed the independent reviews and testing conducted throughout the development lifecycle by the evaluation team from Pakistan Innovation and Technology Center (PITC), Pakistan Engineering Council (PEC). Moreover, extensive clinical trials of i-LIVE were also conducted at Jinnah Hospital Lahore under the supervision of senior doctors, bio-medical engineers and medical researchers. It is pertinent to mention that the ventilator successfully passed all stages of engineering evaluation and medical validation.

This is a giant leap towards self-reliance in designing and manufacturing of the life-saving equipment. The exercise opens new avenues for multidisciplinary experts from various fields like software, hardware, mechanical, bio-medical engineering, medical and quality management to

come together and serve the nation in distinct ways. The contribution is also aligned to Pakistan's vision of knowledge-based economy and geo-economic strategy.

Chairman PAEC, Muhammad Naeem (HI, SI) congratulated PAEC scientists, engineers and doctors for this great achievement and assured that once the DRAP gives a green signal, massive production of PAEC-developed ICU Ventilator, i-LIVE, will be commenced immediately to meet the ever-growing need of hospitals for this crucial equipment in the context of Corona pandemic.



i-Live Ventilator developed by PAEC

# Chairman NEPRA Lauds PIEAS Role in National Development

PIEAS organized a lecture on Journey of National Electric Power Regulatory Authority (NEPRA) in Pakistan, which was arranged in collaboration with the office of Member (Power), PAEC, for students and faculty of PIEAS. Mr. Tauseef H. Farooqi, Chairman, NEPRA, delivered the lecture.

Mr. Farooqi highlighted the role and responsibilities of NEPRA in Pakistan and briefly introduced the functioning of NEPRA.

Praising the role of PIEAS in providing trained manpower to the national power sector, Chairman NEPRA said that PIEAS has a leading role in national development. The lecture was attended by over 100 participants and was greatly appreciated.

After the lecture, Chairman NEPRA visited a few academic laboratories at PIEAS and appreciated the academic environment and infrastructure available at PIEAS.



Group photo of the participants with Chairman (NEPRA), Member Power (PAEC) and Rector PIEAS

Member (Power), PAEC, Mr. Muhammad Saad Ur Rehman, PoP; and Rector, PIEAS, Dr. Nasir M. Mirza; presented shield and books to honorable chief guest.

# Nuclear Institute of Agriculture (NIA) Tando Jam Participates in Sindh Expo

The Sindh Livestock Expo 2021 was organized by Livestock & Fisheries Department, Govt. of Sindh at Hyderabad. The Livestock and Agri-based sectors were invited to participate in the Expo to foster growth in these areas. This mega event was inaugurated by Chief Guest of the Expo Mr. Syed Murad Ali Shah, Chief Minister of Sindh. In his speech, Mr. Murad Ali Shah urged the audiences to disseminate the knowledge of agriculture sector up to grass root level in order to boost up economy of the country. He further exhorted to promote the agro-based commodities and livestock in order to improve the livelihood of common man. The participants included farmers, researchers and the representatives from various public & private sectors from various parts of the country visited the Expo stalls and showed their interest.

NIA Tando Jam displayed agriculture based exhibits in the exhibition. The participants including progressive farmers and businessmen visited the NIA stall and actively showed their interest in the various products of NIA such as the seeds of different new crop varieties, bio-control technology and other services provided by NIA like water, fertilizers and soil analysis etc. More than 500 participants visited the stall who were thoroughly briefed regarding innovative technologies exploited in Nuclear Institute of Agriculture (NIA), Tando Jam. Participants were also informed that due to climatic changes insect pests and diseases are the major threat to the cultivated crops. So far with the passage of time, NIA has evolved and released 35 varieties of different crops viz., wheat (15), rice (7), cotton (5), sugarcane (5), mungbean (1), lentil (1) and brassica (1) for the general cultivation in the province of Sindh. These varieties are being successfully cultivated over significant area in Sindh

province. The wheat varieties Sarsabz, Kiran-95, Khirman and NIA-Amber have been the popular varieties in Sindh.

To avoid the attack of the new pests and insects indiscriminate use of pesticides is advocated worldwide. Injudicious use of the chemicals has led detrimental effects on human health and natural fauna. Participants were further briefed that 45% area of sugarcane crop has been treated with bio-control technology and are saving more than 400 million rupees annually against the utilization of pesticides which is the core issue of the day. This technology is safe for environment and natural fauna.

On the final day of the Sindh Livestock Expo, Mr. Bilawal Bhutto Zardari, Chairman, PPP visited the Expo event and reiterated to improve livestock and agri-based sectors.



Dr. Niaz Hussain Khuhro briefing the visitors at PAEC stall

# PWI Launches New 4-Week Welding Inspector Level-Basic Course

The 1<sup>st</sup> course of WIL-B successfully concluded with participants from DOS, K2/K3, NEW-2, and PN Dockyard.

WIL-B was designed as per the guidelines (IAB 041r4-16) of International Institute of Welding (of which PWI is a regular member since 2000) and ISO-17024 besides fulfilling the prerequisites of ISO 9001-2015. WIL-B, is the first part of the series of three courses, others being Welding Inspector, Level-Standard and Comprehensive. WIL-B consists of two modules: Welding technology and Welding Inspection. WIL-B is more extensive than any previously offered PWI courses of the similar nature.

Director (PWI), while briefing DG SES, the Chief guest and audience, told that PWI is the only institute in Pakistan that is offering different levels of welding inspection courses along

with various courses of basic/ advanced levels in welding technology. He said that preparations are being finalized to get this course accredited from Pakistan National Accreditation Council (PNAC).

Through PNAC accreditation PWI will be the recognized as the Certification Body at National/ International levels.

Participants applauded the efforts of PWI faculty, planning and coordinating team and found the course very beneficial. Mr. M. Saleem Pitafi, DG (SES) congratulated Director (PWI) and his team for successfully launching this course and assured his full support for their future plans. He advised the course participants to apply the knowledge gained from this course in their assignments.



Photo of the participants with DG, SES

## ICCC Workshop on ISO 19443:2018

Instrumentation Control and Computer Centre (ICCC) organized a two-day workshop to impart awareness about International Standard ISO 19443:2018, Quality management systems - Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector supplying products and services important to Nuclear Safety (ITNS).

ISO collaborates closely with the IAEA and ISO 19443:2018 is the first ever ISO standard specific to nuclear industry with additional principles of quality management including; nuclear safety culture, determination of ITNS items and activities, graded approach to the application of quality requirements.

ICCC is ISO 9001:2015 certified organization since February 2018 and aims to achieve ISO 19443:2018 certification. The mission of ICCC is indigenous design and development of I&C based systems for national industries and nuclear power plants. In line with PAEC vision of 8800

MWe nuclear energy, ICCC envisions total indigenous modernization and upgrading of I&C Systems of Nuclear Power Plants by the year 2025 with focus on quality and safety.

Realizing the vital need of ISO 19443:2018 based Quality Management System for organizations involved in supply chain of ITNS products and services, the workshop was jointly organized by Quality Management Division (QMD), ICCC and DQM (PAEC).

There was appreciable participation from PAEC establishments, PNRA and Certification Services of Pakistan (CeSP).

The participants appreciated the event and requested to share workshop material which was provided to extend awareness of ISO 19443:2018 and achieve the national objectives.

# Chashma Unit-4 Achieves Top Position Worldwide on WANO's Performance Indicators Ranking

Chashma Nuclear Power Generating Station (CNPGS) Unit-4 (C-4) has achieved Performance Indicators (PIs) Index value of 100 [i.e. maximum] and attained top position in worldwide nuclear power plants industry as ranked by World Association of Nuclear Operators (WANO) for 2<sup>nd</sup> Quarter of 2021. It is for the first time in the history of PAEC that any of its plant has been ranked first among worldwide Nuclear Power Plants. To maintain a healthy competition and liveliness in performance monitoring of nuclear power plants on the globe, WANO issues its PIs report quarterly

on its website. Index value is a composite performance indicator that is calculated based on results of different WANO performance indicator values for longer periods (i.e. from 01-03 years).

CNPGS has been striving hard to achieve this goal for all Units and C-4 is first in the PAEC to achieve this great distinction. C-4 also crossed world median value in last quarter of the year 2020 that was also a major milestone.



*A view of Chashma Unit 1 to 4*

## Commencement of Intensity Modulated Radiotherapy at AECH - INOR Abbottabad

Atomic Energy Cancer Hospital (INOR), Abbottabad has upgraded its radiotherapy services and has started providing 3D conformal radiotherapy (with photons and electrons) after successful installation and commissioning of a new linear accelerator in April 2021.

Only six months after starting 3D conformal radiotherapy, INOR became fully capable of providing an advanced technique of radiotherapy i.e. Intensity Modulated Radiotherapy (IMRT). In this regard, a patient of Head and Neck cancer has been first time treated with this state of the art technique at INOR.

Keeping in view the objective of radiotherapy, IMRT is superior to 3D conformal radiotherapy to provide more accurate dose to tumor while minimizing dose to the normal healthy tissues in close proximity of tumor, thus reducing unwanted radiation side effects.

IMRT is very effective in treating cancers in the Head & Neck, Pelvis and the areas where critical organs are lying close to tumor.

INOR is the first public sector hospital in KPK to provide IMRT.



*Setting phantom for PSQA of IMRT plan*

# PM Inaugurates K-2 Nuclear Power Plant



*Prime Minister Imran Khan inaugurating the Karachi Nuclear Power Plant Unit-2 (K-2)*

Prime Minister Imran Khan was the chief guest at the virtual inauguration ceremony of Karachi Nuclear Power Plant Unit 2 (K-2) with 1,100 megawatt capacity. The K-2 Nuclear Power Plant is a state-of-the-art generation III nuclear power plant equipped with internal and external security and accident prevention as well emergency prevention and response capabilities.

The operational period of this plant is 60 years, extendable for another 20 years. Construction of the plant began in November 2013 and after formal approval from the Pakistan Nuclear Regulatory Authority (PNRA), nuclear fuel was installed on December 1, 2020. The technical test portal, which included various tests, was connected to the national grid at the end of February and on March 18, 2021 to gradually increase power generation.

Six nuclear power plants are operating under the management of Pakistan Atomic Energy Commission. Two nuclear power plants are located near the coast of Karachi. Karachi Nuclear Power Plant K-1 and Karachi Nuclear Power Plant K-2 while four nuclear power plants (C-1 to C-4) are operational at Chashma .

So far Pakistan's power generation from nuclear sources was about 1,400 MW. After the inauguration of K-2, with an increase of 1,100MW, it is almost doubled. The K-3 nuclear power plant with the same production capacity is still in the final stage of installation and is expected to generate electricity early next year after undergoing commissioning process.

Addressing the ceremony, the Prime Minister said he is happy to inaugurate K-2 Nuclear Power Plant, established with the Chinese cooperation, on the special occasion of 70<sup>th</sup> anniversary of Pakistan-China diplomatic ties.

He also said the plant will provide 1100MW of clean energy to Pakistan, which is of vital importance for Pakistan that has been facing adverse impacts of global warming. The prime minister expressed confidence that the project will greatly benefit Pakistan in respect of technology transfer and training of the youth in addition to supply of clean energy.

He said Pakistan and China have a unique relationship, which is getting fortified with every passing day. He emphasized on further enhancement of people to people contacts. He said the scope of CPEC is being expanded from the connectivity and power sector projects to establishment of economic zones.

Speaking on the occasion, the Chairman of the China Atomic Energy Authority said that the power plant was being inaugurated on the 70<sup>th</sup> anniversary of the establishment of diplomatic relations between Pakistan and China.

He said China and Pakistan have been extending support to each other and cooperating in various fields. He said the two countries have also been cooperating in the peaceful use of nuclear technology. He hoped that bilateral cooperation would further expand in the future.