

Education and Training at Research Reactors: Sharing the Experiences from Europe with Asia and Africa

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More than 770 research reactors have been built and operated since 2 December 1942 when the first reactor Chicago pile-1 reached first criticality. Nowadays approximately 250 research reactors in 56 countries are still in operation. Research reactors together with power generating reactors (power reactors) are the most common nuclear installations in the world. A research reactor can be used in a wide range of nuclear activities, from supporting nuclear technology (nuclear power generation) through nuclear science, neutron activation analysis, radioisotope production, neutron imaging up to and education and training.

Research reactors are most widely used for education and training, according IAEA research reactor database 164 reactors from 247 in operation declare that a reactor is used for education and training. This trend began at the early stage of development of research reactor in mid-fifties of the last century when the first research reactors were built and many of them were specifically designed for education and training, for example for education of first generations of students in reactor physics (the first ARGONAUT reactor, February 1957) or to train the first generations of nuclear engineers in the USA (the first AGN-201, January 1957) as well as the TRIGA reactors (the first reactor in May 1957) where T in the reactor name means training.

Research reactors are excellent tools for experimental education and training and hands-on activities in wide range of nuclear activities, such reactor physics, nuclear safety, radiation protection, neutron application or neutron science. Education and training at research reactors has long tradition in Europe where it is several decades regular part of educational processes at universities in France, Czech Republic, Austria, Slovenia, Hungary, Germany, Italy or Finland. Several European research reactors have bilateral agreement of collaboration in nuclear education and training with research reactors and Africa and Asia, but the most collaboration is carried out under various IAEA activities and projects.

Four-years IAEA TC project RAF/4/022 (2009 to 2013) and two years IAEA TC project RAF/1/1005 (2014 to 2015) both focused on African research reactors and its users from Africa, allowed carrying out several activities in nuclear education and training where experiences from European research reactors were successfully used. Based on experiences from EERRI –Eastern European Research Reactor Initiative dedicated IAEA questionnaire has been developed where the capabilities and needs in nuclear education and training in Africa are described in details. One regional workshop and one regional training course were also organised with strong involvement of lecturers from European research reactors. Regional workshop on enhanced use of research reactors for education and training purposes was organised in Rabat at Moroccan TRIGA reactor in 2013 which was attended by 12 participants from 7 African countries (Algeria, Egypt, Ghana, Libya, Nigeria, Sudan and Tunisia). Regional training course on the safety of research reactors was also organised in Rabat in 2014 which was attended by 12 participants from 7 African countries (DRC, Egypt, Ghana, Libya, Nigeria, South Africa and Sudan). Another ongoing project where European research reactors are involve in Africa is Internet reactor laboratory where French reactor ISIS will serve as host reactor for broadcasting of education to several African countries.

Similarly as in Africa, several European research reactors established bilateral collaboration with research reactors in Asia. During IAEA regional workshop on education and training practices with research reactors organised in 2012 in Prague the first contacts between European research reactor and research reactors in South - East Asia have been established. Under IAEA PUI project the first regional training course with strong involvement of lecturers from European research reactors was organised in Selangor at Malaysian TRIGA reactor in 2013. This training course on education and training to support nuclear power program in APEC economies attended 30 participants from Malaysia and Thailand. The second South - East Asia regional course was named “Nuclear School Experiments on Reactor Physics and Neutron Applications for Asia-Pacific Region”. In this course for the first time two research reactors from two countries were involved. The course was organised in 2015 in Selangor at Malaysian RTP reactor and in Jogjakarta at Indonesian KARTINI reactor. The nuclear school was attended by 11 participants from 7 Asian countries (Bangladesh, Cambodia, Indonesia, Iraq, Malaysia, Thailand and Vietnam). European experiences also have been used during development of reactor experiments at Malaysian RTP reactor for students from Malaysian universities.

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