

Strategically harnessing the full potential of research reactors

By Aleksandra Peeva

Research reactors have the power to influence science, education, industry and medicine, but tapping into their full potential takes strategic planning. Although some of the 224 research reactors currently in operation across 53 countries are used to their full capacity, several are underutilized.

“Many research reactors were built to address an immediate need at that time. Now, many years later, their mission statement must be reviewed,” said Nuno Pessoa Barradas, Research Reactor Specialist at the IAEA.

Many of today’s operational research reactors were built during the 1950s and 60s when they were a new tool, and many countries were interested in exploring and discovering their potential. Now that this potential is better understood and new applications are being developed, it has become widely recognized that some research reactors could be better utilized to harness their full potential.

Many countries are now actively collaborating to maximize the use of existing research reactors, and some have already built, or are planning to build, new research reactors with plans for maximum utilization.

The aim is to fully harness the benefits of these powerful tools for many uses, such as developing nuclear power programmes, pursuing research and development, providing analysis and irradiation services and producing radioisotopes to be used in medicine and industry.

Over the last 5 years, experts and officials from over 40 countries have received support from the IAEA in setting priorities and improving business plans for more than 50 research reactors. These plans typically involve assessing the national and regional needs for the research reactor’s potential services and products, prioritizing these needs and matching them to the reactor’s capabilities and defining the objectives for a reactor’s long-term, sustainable operation.

Improving sustainable use

In early 2019, the IAEA launched an expert review mission in Italy, where an international team of experts reviewed the University of Pavia’s 250 kW TRIGA Mark II research reactor. The mission was focused on improving the sustainable use of the research reactor.

The core of the TRIGA Mark II research reactor at the University of Pavia.

(Photo: N. Pessoa Barradas/IAEA)



The team assessed the strategic plan and corresponding action plan for the university's reactor and evaluated the level of its utilization. This was based on key performance indicators and on opportunities and constraints that could further limit the development of the reactor's services and products, as well as on areas for improvement for the effective, efficient and sustainable utilization of the facility.

The experts concluded that the research reactor is a well-utilized facility that plays an important role in national socio-economic development, as well as in medicine, archaeology and materials science, among other areas. They also provided recommendations and suggestions to further enhance the utilization of the facility, including feedback on the facility's strategic plan, as well as the development of outreach and communication activities and the expansion of educational activities.

"Utilization and strategic planning are areas of particular importance to us and our stakeholders," said Andrea Salvini, Manager of the University of Pavia's research reactor. "The IAEA mission helped us to zoom in on strengthening our user community and enhancing our scientific capability in new areas."

The experience gained from the mission in Pavia is expected to help the IAEA further

strengthen its response to requests from countries to help them improve research reactor use, including through a new service called the Integrated Research Reactor Utilization Review (IRRUR).

"The mission provided valuable insights and could be replicated to assist countries in developing efficient national strategies for effective utilization and sustainable operation of research reactors. This is particularly relevant for organizations that may not have the capabilities to perform an integrated assessment," Pessoa Barradas said.

Review missions are one of several avenues through which the IAEA helps countries to improve the sustainable use of their research reactors. In early 2019, the IAEA also launched an e-learning course to provide guidance on developing strategic planning for efficient and sustainable utilization of different facilities operated by national nuclear institutions, including research reactors. The course is based on a 2017 IAEA publication entitled Strategic Planning for Research Reactors. This goes hand-in-hand with IAEA-supported training courses, expert and fellowship visits and workshops on research reactor applications, as well as technical meetings and publications. Many of these resources can be accessed through the Research Reactor Information Hub, hosted on the IAEA CONNECT platform.

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