Argentina – through its technology company INVAP - has proudly won the international tender for a nuclear research reactor and radioisotope production facility for medical uses in The Netherlands.

This is a milestone in the history of national technology since Argentina manage to enter the competitive European nuclear-technology market.

Exporting high value-added technology strengthens our position as a trustworthy country in the nuclear field for peaceful purposes. Furthermore, this achievement markedly shows Argentina's scientific and technological capacity, which will in turn favor the country's international and commercial relations worldwide.

Client, Tender, Winners

The Client: Pallas Foundation from The Netherlands. By means of a thorough and comprehensive evaluation procedure, they have selected INVAP's commercial and technical proposal as the winning tenderer.

It is worth mentioning, that this is the second time, INVAP wins the PALLAS Reactor international tender; the first time being in 2009. Unfortunately, due to the global economic crisis at the time, the project was interrupted by Dutch authorities.

In July 2015, there was a second invitation to tender; and a new offer was submitted in March 2017, bidding against French and South Korean companies. This time, INVAP associated with TBI Holdings B.V., a Rotterdam-based conglomerate, which will add up its expertise in civil engineering works, construction, system assembly, and local regulations.

INVAP will be in charge of the reactor's design, plant engineering integration, nuclear safety, as well as its licensing process, which includes construction, operation, and the technological equipment supply, in full compliance with the high standards and regulations set by the International Atomic Energy Agency (IAEA) of the United Nations. INVAP has vast experience in the development of nuclear research reactors and over the years has cemented its position as major competitor in the nuclear field worldwide; being responsible for the outstanding ten-year operation of the OPAL reactor built by INVAP in Australia.

With Headquarters in San Carlos de Bariloche, Argentina, INVAP boasts a 40-year trajectory in the domestic market and over 30 years in the world market. Its main projects have been developed in the fields of nuclear, aerospace, government and defense, and industrial technology, alternative energy sources, information and communication technology, and technological services. INVAP has designed and constructed research reactors and radioisotope production facilities in different countries, as well as low orbit earth observation satellites and telecommunication satellites, several industrial plants, radar systems, and nuclear medicine centers.

PALLAS: A Need for the European Market

The PALLAS reactor will replace the High Flux Reactor (HFR), in Petten, The Netherlands. The HFR is owned by the European Commission and is operated by the Nuclear Research and Consultancy Group (NRG). It became operational in 1956 and will be shut down as soon as the PALLAS reactor becomes fully operational. The PALLAS reactor will be built in Petten, a town 60 km northeast from Amsterdam near the coast of the North Sea, landscape of which is characterized by sand dunes and tulip fields.

Currently, the HFR provides 70% of the radioisotopes used in nuclear medicine by European hospitals, being one of the largest radioisotopes producers worldwide. Thus, the PALLAS reactor, with a 40-year lifetime expectancy, shall need to cope with vital supplies for the twenty-first century medical practices in Europe and the rest of the world, as soon as it becomes operational.

The Importance of Team Playing

Special emphasis is made on the fact that the key to our success is not only INVAP's exceptional trajectory, but also the essential support of the Argentine Government, local authorities, and the Governor of the Province of Rio Negro, Mr Alberto Weretilneck.

Another significant contribution is the support of the National Government and Mr President Mauricio Macri throughout all negotiations, as well as the Minister Head of Cabinet and the Ministry of Energy and Mining through the Undersecretary of Nuclear Energy, and the unrestricted support and close bonds with the National Atomic Energy Commission (CNEA).

INVAP is proud to work in close cooperation with all members of the Argentine Scientific and Technological field. Our achievements are the result of INVAP's constant collaboration with several related organizations and institutions throughout more than four decades.

This project reinforces a key concept for the company's development: a "business model" which relies on Argentina's talents to carry out technology projects and to further compete in international markets.

Environmental Protection

The Netherlands has the strictest environmental and safety controls, in accordance with the European Community's high standards and regulations. The social license obtained in this country clearly shows the capability and excellence of both INVAP and TBI.

During the fourth edition of the Nuclear Security Summit, INVAP received an award from the US Nuclear Energy Institute on account of its nuclear security achievements. On the other hand, TBI is in compliance with the Rotterdam Climate Initiative (RCI) regulations on the reduction of CO_2 emissions.

Reactor's Key Features: Safety and Innovation

PALLAS reactor will be noted for being safe and innovative. It will be designed to endure extreme and adverse conditions. It will also meet IAEA's guidelines as well as Dutch legal requirements, while implementing PALLAS's safety, health, environment and quality policy (SHEQ).

Its innovative design will provide PALLAS reactor with great operational flexibility and availability. The reactor's core will be set up to produce different types of radioisotopes, which will make it more effective and able to adapt to the market changes that may come due to, either the demand for radioactive tracers, or the need to develop new products.

PALLAS reactor will only use low-enriched uranium (LEU) fuel elements.

Stages

The first phase of the project will consist of the reactor's design, preparation of licensing documentation and formal application of the construction license. The second phase includes the detailed design, construction management, equipment and component supply, obtaining the operational license, system installation, testing and its implementation and operation. INVAP will also provide all the supplies required to operate the future plant, as well as the operators' technical training.

The safety studies in order to obtain the construction license granted by the Dutch Nuclear Regulatory Authority will include aspects related to the environment, nuclear safety, and compliance with the applicable Dutch and European legislations, among other optimal solutions that guarantee a high level of reliability, availability and performance.

Radioisotopes and their Multiple Uses in Medicine

The scope of radioisotopes applications in medicine is often unknown. In nuclear medicine, radioisotopes are used either for diagnosis or therapies, 90% being diagnosis.

One of their main advantages is identification of molecular activity in the body, thus avoiding the need for more invasive practices. Besides, they have a great potential to detect quickly and safely diseases at their onset, which often means saving time, thus allowing greater survival chances.

Nowadays, approximately 10,000 hospitals worldwide use radioisotopes, with a yearly intervention average of over 40 million medical interventions.

Thanks to this technology, physicians, scientists and health professionals have achieved great progress in the following areas:

- Understanding the dynamics of several diseases.
- Fast discovery and development of new drugs.
- Improvement in the selection of a specialized treatment for each patient.
- Accurately evaluating the patient's response to new treatments.
- Discovery of new ways to identify individuals with high risk of serious illnesses

Different types of radioisotopes allow making an imaging diagnosis of thyroid-gland, bones, heart, liver and brain diseases, among others. These medical interventions include computed tomography, magnetic resonance imaging, positron-emission tomography (PET), and computer-controlled X-rays.

Radiotherapies are mostly used for internal and external radiation in oncology. Internal radiation or brachytherapy consists of placing radioactive implants next to or inside the tumor to reduce the destruction of healthy cells. Radioisotopes are used to treat thyroid cancer, non-malignant thyroid disorders, early stage prostate cancer, leukemia, breast cancer, neuroendocrine cell tumors, and also as a palliative to reduce pain in bone cancer, among other uses. External radiation therapy is a new kind of therapy used to control spreading in pancreas and ovarian cancer, melanomas and malignant brain tumors, among others.

Radioactive tracers are also useful to examine the blood flow in the brain, check the liver, lungs, heart and kidneys function, and evaluate the growth of bones, with a diagnostic purpose.

In biochemical analysis, radioisotopes are useful to label molecules in external biological or in-vitro samples. Pathologists employ associated radioisotopes to determine components in blood, serum, urine, hormones, antigens, and several drugs. Furthermore, gamma irradiation is applied to sterilize medical products and supplies, such as syringes, gloves, clothes and medical instruments, and, radiation of smaller gamma irradiators is used to treat blood for transfusions, among several other practices.

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