The MNB Interview

BIOGRAPHY

Juan Carlos Lentijo
Director of the IAEA’s Division of Nuclear Fuel Cycle & Waste Technology

The International Atomic Energy Agency

Juan Carlos Lentijo joined the International Atomic Energy Agency (IAEA) in June 2012 as Director of the Division of Nuclear Fuel Cycle & Waste Technology in the IAEA Department of Nuclear Energy. He has 30 years of experience in the field of nuclear energy and radiation. Before his appointment to Vienna, he was Technical Director for Radiation Protection at the Spanish nuclear regulatory authority, Consejo de Seguridad Nuclear (CSN). In 2011, he was the Mission Team Leader of an IAEA international expert mission to Japan that addressed remediation issues of large contaminated areas off-site the Fukushima Daiichi nuclear power plant. Earlier in his career, he worked at CSN as Project Manager of nuclear power plants with boiling water reactors and was the Resident Inspector of CSN at the Cofrentes Nuclear Power Plant. He held the positions of CSN Deputy Director for Emergencies & Physical Protection and Deputy Director for Environmental Radiation Protection. He has an Industrial Engineer’s degree from the Technical University of Madrid and undertook specialised training at national and international institutions, such as the US Massachusetts Institute of Technology, the Belgian Nuclear Research Centre SCK-CEN, and Spain’s Ciemat and Tecnatom.

Nuclear fuel cycle – cradle to grave

THE INTERNATIONAL ATOMIC Energy Agency’s (IAEA’s) Division of Nuclear Fuel Cycle & Waste has a wide range of responsibilities from uranium mining through to final disposal. MNB editor Judith Perera spoke to Division Director Juan Carlos Lentijo about its current work and future plans.

JP: Please would you outline the areas covered by your Division?

JCL: The Division covers a wide range of areas in the fields of nuclear fuel cycle and waste technologies, as well as research reactors. That means that we have to deal with activities covering the whole range of the nuclear fuel cycle from “cradle to grave”. In other words, we work on everything from uranium mining and production to the management of spent fuel and radioactive wastes and advanced fuel cycle concepts, including reprocessing. Additionally, the Division has to deal with the activities in the research reactor field, including the wide range of existing concepts and designs of research reactors and associated fuel cycles.

JP: What do you see as the key issues in the areas of uranium production and exploration?

JCL: In my view, there are several issues related with the uranium exploration and production. The leading issue related with the assurance of uranium supply is the need to continuously update the knowledge of the existing resources of uranium worldwide. One of our most significant activities in this area is the periodical publication of Uranium: Resources, Production & Demand, the so-called Red Book, in cooperation with the Nuclear Energy Agency of the OECD. This also includes the responsible use of mining and production practices and technologies aimed at minimising the environmental and social impacts of such activities. Uranium production from processing non-conventional resources is an issue of growing interest.

JP: And in fuel fabrication?

JCL: In the area of fuel fabrication, there is a permanent need to enhance the design and manufacturing technologies and to optimise the fuel performance in the normal operation of the facilities. Now, the Fukushima Daiichi accident calls for additional issues related to the behaviour of the nuclear fuel under severe accident conditions. These will require new engineering and R&D programmes focussing on the development of robust fuels with enhanced safety margins.

JP: And in the management of spent fuel and waste?

JCL: The management of spent fuel and the management of radioactive wastes are key areas for the development of a sustainable nuclear programme. Waste management is a technically mature area. The main issues here are those related to the assistance to IAEA member states in the design and implementation of a strategy that better suits their specific needs for the management of radioactive waste. In the area of the spent fuel, the current key issues are the promotion of disposal as a feasible and technologically suitable option, as it has been proven by some specific projects on underground facilities, and of long-term storage technologies. Of course, spent fuel reprocessing is an option that deserves being considered to enhance sustainability of nuclear energy from the economic and environmental perspectives.

Additionally, the Fukushima Daiichi accident has raised several issues to assess and enhance the resistance of spent fuel storage facilities under extreme situations, such as those that could be triggered by natural events. Finally, public acceptance is always a matter of maximum interest in the area of spent fuel and waste management.

JP: Can you outline the issues relating to research reactors?

JCL: Research reactors have played, and currently continue to play, an important role in the areas of education and training. But many
research reactors worldwide are underused due to several factors, including lack of sufficient financial resources. At the same time, some research reactors are part of the basic infrastructure for the production of radioactive isotopes, such as molybdenum-99 used in nuclear medicine. The assurance of the production of these isotopes is a matter of high priority.

The conversion programmes for nuclear fuel from research reactors, from highly enriched uranium (HEU) to low enriched uranium (LEU), is one of the key issues driven by the policies on security and non-proliferation. Hence, the back-end activities in the fuel cycle of research reactors are a matter of priority.

**JP: How big is the problem of recovering used radioactive sources and what are the main issues?**

**JCL:** There are some countries without appropriate infrastructure for the safe and secure management of the radioactive sources after their operational life. In these cases, it is necessary to identify the inventory of the high activity disused sources and then to design and implement a specific programme for their recovery and safe management. In most cases, the most adequate option is the return of the sources to supplier countries. The IAEA offers services to assist member states in identifying disused sources and their subsequent safe management.

**JP: You were involved in the Agency’s assessment of and response to the situation in Japan after Fukushima. Can you describe the work undertaken?**

**JCL:** I took part in the international fact finding mission to Japan, in May 2011, and I had the honour to lead the remediation mission to Japan in October 2011. The first one was aimed at obtaining an initial set of conclusions as lessons to learn in the areas of external events, the management of severe accidents and the radiological consequences and emergency response. The mission on remediation obviously was focussed on the assessment of Japan’s programme for the remediation of the large off-site areas that were contaminated by the accident. This mission concluded with a number of lessons learned and identified areas of good progress, and also made some recommendations to enhance the remediation programme. Detailed reports of both missions are on the web site of the IAEA.

**JP: What do you see as the main lessons and outcomes of this event – for you personally and for the Agency?**

**JCL:** In my view, the most important lesson from this accident is the confirmation that nuclear safety has to be considered always as a matter of maximum priority in the use of nuclear energy, as an effective way to prevent the occurrence of accidents or to mitigate the consequences. Safety is a continuous process of learning and enhancing the technology and the operational practices. The IAEA and its member states have prepared an Action Plan to strengthen nuclear safety through concrete activities covering twelve areas. The implementation of this Action Plan is the best way to enhance nuclear safety worldwide.

**JP: I believe you are in the process of developing your Division’s programme for 2014-15. What do you see as the main priorities?**

**JCL:** Yes, we are currently preparing the programme of activities and budget for the cycle 2014-2015. This programme will be one of the main tools for the Agency to fulfil its mission in this period. This is an iterative process with the purpose to optimize the allocation and the use of the Agency’s resources. We are considering some areas to propose priorities that would have to be discussed at several levels of the organization before they finally get approved. Some important areas for the future work of the Division include the support of newcomer countries and, of course, the activities related to the IAEA Action Plan on Nuclear Safety, such as the management of severely damaged nuclear fuel, decontamination and decommissioning of facilities after an accident, and the remediation of off-site contaminated areas. Another issue that will be considered in the planning is the promotion of the disposal concept for spent fuel.

**JP: How can your Division best help newcomer countries considering embarking on uranium production and/or a nuclear power programme?**

**JCL:** The IAEA provides several services to help those countries considering a new nuclear power programme or to expand their current nuclear power capabilities. These services are aimed at assisting the member states in developing the necessary infrastructure and in capacity building. The Integrated Nuclear Infrastructure Reviews (INIR), the Nuclear Energy System Assessments (NESA) or nuclear knowledge management are examples of these services. The Division of Nuclear Fuel Cycle & Waste Technology contributes to these services with its specific competences. In the field of the uranium production, the Division is in charge of providing specific services to assist interested countries, such as the Uranium Production Site Appraisal Team (UPSAT) missions or the World Distribution of Uranium Deposits (UDEPO) database.

**JP: Is final disposal of waste technically possible today or is it still being developed?**

**JCL:** The characteristics of radioactive waste are well known, which is a prerequisite for safe and secure disposal of wastes. Disposal has been a real option for the final management of low and intermediate level wastes for a long time. There are many repositories around the world, using different concepts and technologies, to dispose of these wastes. Usually these facilities are at, or near, the surface, but some intermediate level waste that contains long lived radioactivity requires disposal at greater depths, in the order of tens of metres to a few hundred metres.

**JP: Does this include high level waste?**

**JCL:** Yes. There are several projects that lately have contributed to prove that deep geological disposal could be a real option for the safe management of high level radioactive waste. The principle of geological disposal is to isolate the waste deep underground, e.g. in granite, salt or clay formations. The waste is placed in an underground facility with a system of natural and artificial barriers to prevent radioactivity from escaping. Recently we have seen very important progress in this field, in the Onkalo underground characterisation facility in Finland.
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