



**Looking at successful Malaysian research on irradiated banana at the IAEA Labs in Seibersdorf, Austria, last November.**



# Nuke tech potentials

## Datuk Madius Tangau

IN the 1980s, when Malaysia was the world's largest player in the natural rubber industry, there were few rubber glove manufacturers in the country. Medical products including surgical gloves had to be sterilised, most preferably using radiation.

As setting up a sterilisation plant involved high capital and complex technology, there was no such plants in the country. Manufacturers for surgical gloves and medical items were required to send their products abroad for sterilisation, a struggle new entrepreneurs in the industry would face.

The Malaysian Nuclear Agency, or Nuclear Malaysia in short, an agency under the purview of Ministry of Science, Technology and Innovation, was commissioned a gamma sterilisation plant by the government in 1989 for research and providing services such as to these rubber products manufacturers.

Like many other areas in science and technology, nuclear technology is more ubiquitous in our mundane lives than we are aware of. I have shared about biotechnology, nanotechnology, information technology and even space technology. On nuclear energy, an official trip to the International Atomic Energy Agency (IAEA) in Vienna last year further helped me understand how the usage of nuclear is being regulated in Malaysia

creasing agriculture needs and pollution. Nuclear Malaysia has been applying nuclear techniques in assessing the quality of water resources, safety of dams and effects of climate change to the marine ecosystem.

Knowledge in plant genetics had enabled scientists to innovate new varieties of agricultural products to cope with population needs and even adapt to climate change. New traits of plants with superior and desirable characteristics are achieved by exposing the seeds to certain levels of radiation, and are safe for our consumption.

Crops such as rice, bananas, pineapples, kenaf and stevia had been the focus of Nuclear Malaysia. The new rice variety for example, can withstand longer periods of drought.

Worldwide, the preservation of food using radiation is a common technique to ensure fresh food supply and to eliminate wastage. Our Ministry of Health approved of this method under the Food Irradiation Regulations 2011.

In 2011 Nuclear Malaysia irradiated 300 tones of food products and in 2015 it increased to 1000 tones. They are also working with the Ministry of Agriculture to irradiate rambutans and other fruits for export to U.S, so that they are insect-free as required by the U.S. phytosanitary procedures.

The irradiation of food products does

and around the world.

Established in 1972, Nuclear Malaysia's primary role is to carry out research and development (R&D) and as a national service provider in nuclear science and technology. It is well equipped with facilities such as a Nuclear Research Reactor, the only one in the country, Gamma Irradiator, Electron Beam Machine, Radioactive Waste Treatment Centre, and Radioisotope and Radiopharmaceutical Production Facility.

These facilities might sound too technical for the masses but I had no qualms listing them here, as the government advocates transparency in the nuclear facilities we possess.

Nuclear Malaysia had played a substantive role in the socio-economic development of the country. In the case of surgical gloves, three other gamma sterilisation plants had been set up by private entities, adopting Nuclear Malaysia's business model and technology. Export revenue from medical gloves and other sterilised medical devices increased from RM 1.4 billion in 2010 to RM 2.1 billion in 2015.

Nuclear technology's potential in non-destructive testing (NDT) services is widely acknowledged. This means that a product can undergo quality control, monitoring or testing without being damaged. Oil and gas pipes, boilers, pressure vessels, aircraft equipment and ships are some of the products that are tested with this technique.

Seeing a long-term demand for a local NDT industry, Nuclear Malaysia, in collaboration with the IAEA, set up an accredited training and certification program to ensure that the industry meets international standards. Petronas and other petroleum companies no longer had to rely on foreign providers.

Another successful outcome is the 100 NDT companies in the country, providing employment opportunities to more than 1000 certified NDT engineers and technicians.

A significant contribution of nuclear technology is its medical applications, a field known as nuclear medicine. It is used for imaging, and to treat conditions such as hyperthyroidism and thyroid cancer. Nuclear Malaysia has been conducting R&D in nuclear medicine since the start of its operations.

In the early 90s they were routinely producing radiopharmaceuticals that is

not only contribute to our economy but also to environmental sustainability, as the process is chemical-free.

In Cameron Highlands, a powerful, large volume air sampler station, managed by Nuclear Malaysia, analyses the atmosphere for radioactive substances. It could detect nuclear activities in the region, such as a nuclear explosion or minute radioactive pollutants. There are 80 such stations around the world.

Nuclear power is one of the lowest carbon-emitting technologies around to produce electricity affordably and would help mitigate climate change. Nuclear power plants virtually do not emit greenhouse gases.

Despite the higher deployment cost of nuclear power plants and several unfortunate incidents, 30 countries worldwide are operating 444 nuclear reactors for electricity generation and in the meantime, 63 new reactors are under construction in 15 countries.

South Korea for example, although has a smaller land mass compared to Peninsula Malaysia, 25 nuclear power reactors are in operations and three more are on their way. This is an indication that public perception of nuclear power for its economic and environmental potential is still favorable.

In Malaysia, nuclear as a source of energy is under the purview of Malaysia Nuclear Power Corporation in the Prime Minister's Department. The plan is for the country's first nuclear power plant to start operating by 2030.

There are more than 20,000 registered radiation workers in the country. They work in hospitals, manufacturing, airports, ports, research institutes and universities. The Atomic Energy Licensing Board, also under Mosti, requires these workers to wear a monitoring device, where their radiation dose would be analyzed by Nuclear Malaysia and reported to the Licensing Board monthly.

The enormous potential of nuclear technology applications would, like many other scientific fields, pose a substantial demand for nuclear professionals. Currently, Nuclear Science, Nuclear Engineering and Nuclear Medicine courses are offered at public universities.

Moving forward, Nuclear Malaysia plans to expand its R&D by exploring new sources of nuclear power.

We can also look forward to enjoying the advancement in nuclear medicine, as

radioactive compounds for diagnostic and therapeutic purposes, for hospitals throughout the country.

Now over 20 hospitals administer nuclear medicine.

In water resource management, surface and groundwater are threatened by careless usage, population growth, in-

it would also become more affordable.

With more than 30 years of safe and peaceful operation of a nuclear research reactor by the Malaysian Nuclear Agency, this should be a strong case for public confidence in the expansion of nuclear technology applications, especially in nuclear power.