Nuclear medicine: a vital but troubled industry

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Life begins at 40, but not for a small and ageing fleet of nuclear reactors vital for millions of life-saving medical procedures each year and using material that could go in an atomic bomb.

Ahead of this week's Nuclear Security Summit in Seoul, there has been scant progress in addressing the concerns surrounding this other major use of atomic technology, despite the problems being known for years, experts say.

For almost all the world's medical isotopes, used to diagnose cancers and other diseases in 30 million procedures every year, the world relies on eight research reactors, all but one of which is four decades old or more.

These reactors produce "irradiated targets", which then go to five main producers of the most commonly used isotope, known as Mo-99, which decays into a radiopharmaceutical known as Tc-99, used once every second in procedures worldwide.

Of these eight reactors, the "big five" in Belgium, Canada, France, the Netherlands and South Africa, responsible for as much as 95 percent of global supply, are between 45 and 54 years old.

The other three are in Poland, 38 years old, the Czech Republic, 55, and in Australia, the youngster in the family at just five. There are also dozens of smaller plants around the world, including one in Iran, meeting domestic needs.

In its draft Nuclear Safety Review 2012 seen by AFP, the UN atomic agency says that the five main reactors have all reported "age-related problems", meaning expensive repairs and production halts that have played havoc with global supply.

This is despite the wake-up call of 2009-10 when Canada's National Research Universal (NRU), the biggest single producer and the main US supplier, shut for 15 months for repairs.

The High Flux Reactor in the Netherlands was also out of action for five months at the same time, creating major supply problems.

"That crisis is over but the broader concerns still remain," Ed Bradley, a nuclear engineer from the International Atomic Energy Agency's Research Reactors division, told AFP.

It is not just supply. Reliance on these facilities also raises bigger worries.

With the exception of OPAL in Australia and half of the Pelindaba plant's capacity in South Africa, the remaining production capacity uses highly enriched uranium (HEU), which can be used to form the core of a nuclear bomb.

In 2007, armed men broke into Pelindaba, which at the time housed enough HEU for 30 nuclear weapons. Although they stole no radioactive material, the incident highlighted the potential risks.

To tackle these security and supply concerns, recent years have seen a concerted international drive to diversify the number of producers and to switch to much less risky low-enriched uranium (LEU).

This has borne some fruit, said Tilman Ruff, a University of Melbourne

professor and a senior member of the International Campaign to Abolish Nuclear Weapons and of International Physicians for the Prevention of Nuclear War.

Pelindaba's production is half LEU, Canada scrapped plans for two new HEU reactors, and newer plants in Australia, Argentina and Indonesia may export more. Research into alternatives to reactors also looks promising.

But a great deal remains to be done.

"Governments have generally been complacent and lacking in leadership and willingness to provide financial support," Ruff told AFP.

European conversion to LEU has been slow, while Canada's main Tc-99 maker Nordion has signed a deal with a firm in Russia, home to the world's biggest HEU stockpile, to supply it with uranium targets once NRU shuts for good in 2016.

The main reason for the lack of progress is economics, according to a 2010 Organisation for Economic Co-operation and Development (OECD) study that concluded that LEU-based production was "currently not supported by the market."

One reason, the report from the OECD's Nuclear Energy Agency said, was that the main reactors were originally built using government money and continue to be effectively subsidised, thereby putting off new entrants to the market.

For Ruff, part of the blame also lies with his fellow doctors, who he says have "not played an active and constructive leadership role."

"Most doctors are still unaware of where the isotopes they use for their

patients come from," he says.

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