

Questions on notice, Victorian Legislative Council nuclear prohibition inquiry

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Rare Earths

In relation to Mr Limbrick's question which I took on notice about potential for armed conflict arising because of competition over rare earth minerals generated by demand related to sources of renewable energy generation, I have obtained advice from Professor Andrew Blakers, Professor of Engineering at the Australian National University and an expert on energy systems. Prof Blakers advises that there is no possible monopoly on any material in the renewable energy supply chain. A shortage could conceivably occur for a period until alternative materials or alternative supply of a mineral is achieved, but the required minerals are very widely distributed.

For the silicon solar cell, the required minerals are everywhere. A solar panel needs silicon, a glass cover, plastic, an aluminium panel frame, copper and aluminium electrical conductors and small amounts of other common materials. These materials are what our world is made of. Recycling the panel materials at the end of their life adds only slightly to larger existing recycling streams.

Theft of nuclear materials

The best publicly available international database of nuclear and other radioactive material that has been lost, stolen, or is otherwise out of regulatory control is the Global Incidents and Trafficking Database and Annual Reports prepared by the James and Martin Center for Nonproliferation Studies (CNS) for the Nuclear Threat Initiative. It can be found here: <https://www.nti.org/analysis/articles/cns-global-incidents-and-trafficking-database/>

Between 2013 and 2018 there were 1035 incidents documented in this database. Even with this large number, it is very unlikely to be a complete listing.

The most recent annual report is the 2018 Annual Report, published in July 2019: <https://www.nti.org/analysis/articles/cns-global-incidents-and-trafficking-database/>

Some key points from this report are the following:

- In 2018, 156 incidents were identified, across 23 countries;
- One 2018 incident was particularly serious – the loss of 1 gram of weapons-grade plutonium from a university laboratory in Idaho;
- Reporting is highly variable between countries;
- Transportation creates the greatest vulnerabilities, especially when materials are unattended;
- In 2018, human failures were responsible for 98 incidents, 63% of the total;

- Between 2013 and 2018, 11 incidents involving plutonium were documented, and 3 involving (weapons usable) highly enriched uranium (HEU);
- In 2018, five definitive cases of intentional trafficking of nuclear and other radioactive materials were recorded, in Europe, Ukraine, and Russia.

The IAEA maintains an Incident and Tracking Database, but it is confidential, and reports by states are voluntary. About 60 states do not report to this database. Even publicly known incidents are only included in this database if also reported by the state in question. There are also often considerable lags in reporting. The most recently available public document from this database is a 2020 Factsheet <https://www.iaea.org/sites/default/files/20/02/itdb-factsheet-2020.pdf>

It includes the following information. Between 1993 and 2019, 290 incidents related to trafficking or malicious use of nuclear and other radioactive material occurred, including 12 involving HEU, 2 involving plutonium, and 5 involving plutonium beryllium neutron sources. The IAEA Factsheet contains the following alarming statements:

“A small number of these incidents involved seizures of kilogram quantities of potentially weapons-usable material. ... In some of these cases, there were indications that the seized materials were samples from larger unsecured stockpiles. Some of these incidents involved attempts to sell or traffic these materials across international borders. ... there are a few significant cases that appear more organized, better resourced and that involved perpetrators with a track record in trafficking nuclear/radioactive material.”

The largest quantity of weapons-usable fissile material reported over this period that I am aware of (documented by Prof Frank Barnaby, former director of the Stockholm International Peace Research Institute) was 40kg of weapons-grade uranium seized in Odessa in 1993.