DIIS POLICY BRIEF JUNE 2015

Governing uranium globally

A SHIFTING MARKET MEANS NEW DEMANDS FOR URANIUM SECURITY

Recent shifts in the global uranium market introduce new challenges for export controls, physical protection, tracking and trade of natural uranium.

New suppliers and consumers are entering the global uranium market, shifting centres of production to countries with limited nuclear regulation and consumption to countries that have otherwise remained outside of the global nuclear supply chain. Meanwhile long-standing uranium consumers such as Japan and Germany are scaling back their reliance on nuclear power, while the ambitious nuclear energy programmes of China and Russia may soon increase global demand. These shifting geographies are

RECOMMENDATIONS

- The IAEA should make clarifications to the starting point of safeguards widely available to the public, industry, states and stakeholders.
- Digital improvements for updating and modernising national nuclear material databases as well as tracking methods should be implemented.
- IAEA and states should cooperate and coordinate further to assure a comprehensive approach to uranium security.
- Industry should express their commitment to non-proliferation and nuclear security by incorporating these principles as tenets of corporate sustainability.

backdropped by an evolving structure of international nuclear treaties that have grown to include a range of security applications. At the same time, technological advances in uranium processing are producing a purer product, prompting the International Atomic Energy Agency (IAEA) to re-clarify where in the nuclear fuel cycle material accountancy begins. As the uranium market is becoming increasingly global, the international treaty system is also expanding into one markedly different from three to five decades ago, placing more verification responsibilities for the IAEA along with new obligations for state regulatory authorities, industry and facility operators.

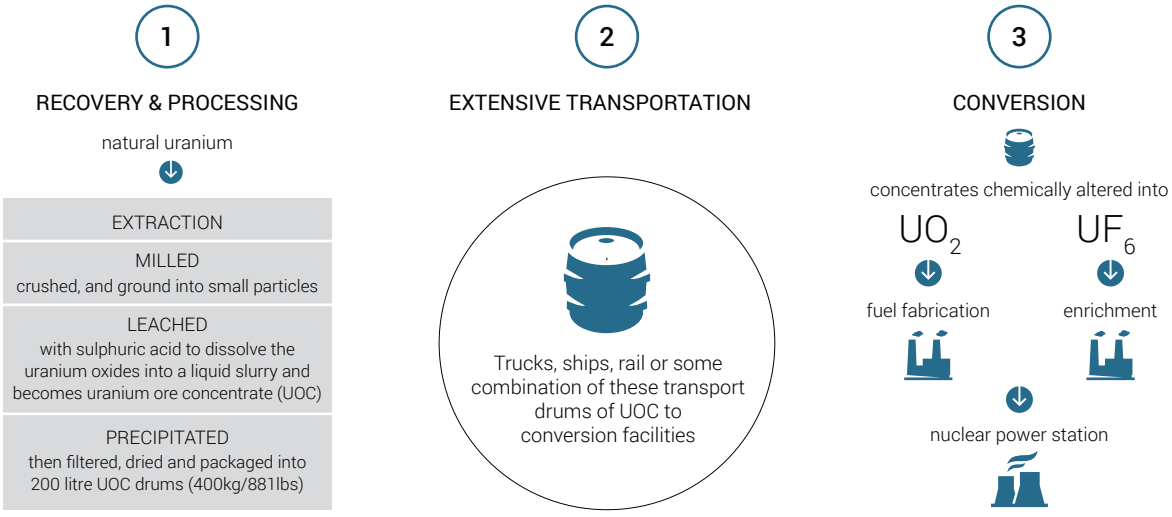
The Governing Uranium project is a global research effort studying the effects of these changes on the governance of uranium trade, specifically the production, processing and transport of uranium ore concentrates (UOC) to the conversion facility. In total, 15 uranium producing and consuming countries were studied, representing 85 percent of global uranium production and 70 percent of consumption.

The three rules of real estate apply to uranium: location, location, location. This means that, even though the uranium market is global, export controls and nuclear security are local (that is, national). As the civilian nuclear fuel cycle expands geographically and treaty requirements expand in scope, there is a greater need for harmonisation of regulations across states, particularly for transport security, physical protection and tracking of materials. As a whole, suppliers and consumers in today's global nuclear market are required to manoeuvre in a far more complicated regulatory landscape than ever before. The following recommendations are based on the three levels: the IAEA, states and national regulators, and industry.

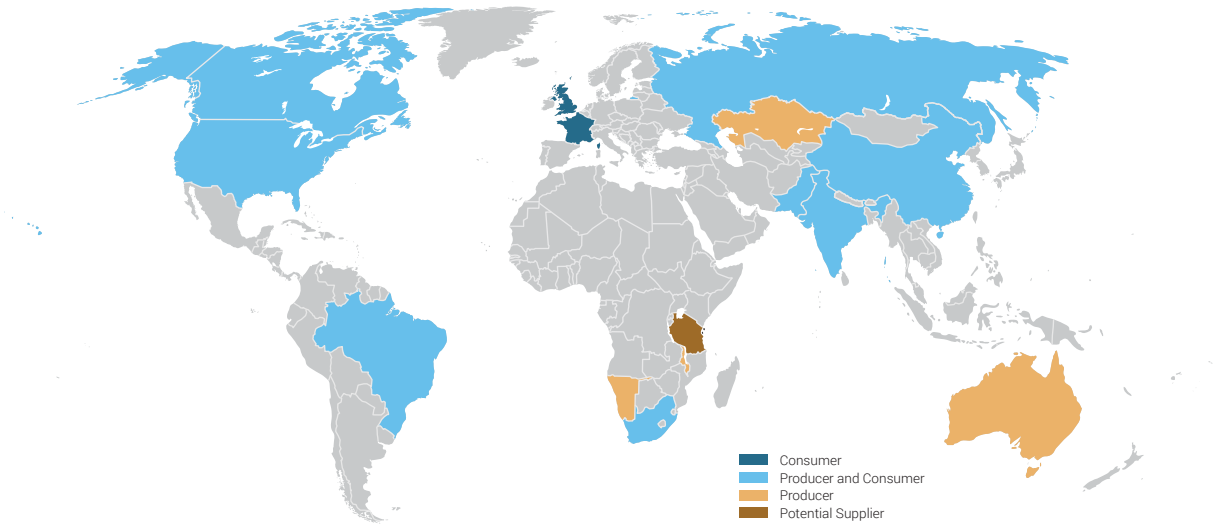
Make the starting point public

Paragraph 34(c) of INFCIRC/153, commonly referred to as 'the starting point of safeguards,' states that when nuclear material that is pure enough to be fabricated or enriched leaves the plant or process stage, full material accountancy and control must be applied and reported to the IAEA. This has been historically interpreted as the output of conversion plants (i.e. UO_2 or UF_6). In 2003, the IAEA reinterpreted paragraph 34(c) for the first time with Policy Paper 18 affecting safeguards implementation in non-nuclear weapons states with refining/conversion facilities and a comprehensive safeguards agreement. This reinterpretation brought full safeguards forward to the production of uranyl nitrate or the first practical point earlier. Ten years later, the IAEA further clarified paragraph 34(c) with Policy Paper 21, bringing safeguards upstream to drums of UOC that is 'pure' and suitable for fuel fabrication. The revised definition creates new obligations for state regulatory authorities, industry and facility operators. However, States, industry and stakeholders cannot access the new definition without going first to the IAEA. It makes the process unduly bureaucratic and mysterious. PP21 in its entirety does not need to be made public, but any clarifications to INFCIRC/153, particularly to its starting point — which is when full safeguards obligations under the Treaty on Nuclear Nonproliferation (NPT) kick in — should be made widely available for the public, industry, states and stakeholders.

THE NUCLEAR FUEL CYCLE



URANIUM PRODUCERS AND CONSUMERS STUDIED



Adding security and safeguards to UPSATs

In 1995, the IAEA initiated the Uranium Production Site Appraisal Team (UPSAT) programme to assist States to improve the operational and safety performance of uranium production facilities. Although not frequently requested (only two have been held to date), UPSATs provide valuable advice on the health, safety, environment and social licensing for proposed or ongoing development resource programmes and their implementation. Future missions would be further strengthened by including experts on security and safeguards in the review team to ensure better '3S' (safety, security and safeguards) coordination. Their inclusion would strengthen the peer review of a state's policies, procedures and practices across the uranium production cycle. This is particularly relevant with the introduction of PP21 potentially capturing more source materials in a supplier country. Aditionally, the eventual entry into force of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM) will extend provisions to the protection of UOC in domestic use, storage and transport.

Updating and modernising nuclear databases

Even though UOC is considered 'pre-34(c)' material, there are annual safeguards reporting requirements for UOC exports and imports, which do not require full material accountancy and control. Accordingly, it is incumbent on states to have a system to account for all UOC within a state. The evolving IAEA safeguards system has led to an increase in the provision of information, timing of submissions, and the requirement to submit reporting directly to the IAEA.

Establishing integrated digital inventory control systems will provide the IAEA with near real-time accountancy data; enable the IAEA to be more effective in planning inspections and analysing declarations. Accompanied by standardised nuclear material accounting forms, record keeping and guidance documents by national regulators, such systems will provide industry with clear information on how new reporting requirements are to be met.

Adopting digital tracking methods

Conversion facilities amass large volumes in their storage lots given the majority of global UOC travels through a handful of commercial converters (in Canada, China, France, Russia, United States). Drums can be stored at conversion plants for long periods (upwards of five to ten years). As markings weather and become unreadable, there is a risk that operators are not certain whether drums they feed into the conversion process are obligated material or not. To this end, while industry is able to detect the loss or theft of a single UOC drum within one to thirty days at mines, mills or during transport, the tracking of the lifetime of a drum is hampered by a reliance on ledger labelling and unique identifiers that are painted on using stencils or pre-printed labels. The use of digital tracking systems would alleviate the backlog and inventory challenges at conversion plants. This will become increasingly so as Policy Paper 21 safeguards material considered pure at the drum level. Barcoding could provide a handle on inventories, whether obligated or not under international (and bilateral) safeguards.

A comprehensive approach to uranium security

The CPPNM, as well as IAEA Nuclear Security Series No. 13, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev5), state that natural uranium should be protected in accordance with "prudent management practice." Neither however describes what would be considered 'prudent' practice. The IAEA has recently drafted a technical document (tecdoc) entitled 'Nuclear Security in the Uranium Extraction Industry' which aims to provide States and operators with advice for defining and implementing a nuclear security regime for the protection of UOC against unauthorised removal. The tecdoc suggests that measures based on risk assessments and a graded approach should begin when uranium is being or has been concentrated, purified and transported. National reviews that would take into account the tecdoc would enhance approaches to ensure a comprehensive system that addresses outsider threats (physical protection measures) insider threats (inventory controls) or both (transport security measures).

Nuclear security culture and engagement

While most attention of the Nuclear Security Summits have focused on restricting the highest risk material, there is a growing awareness for security measures — and an accompanying security culture — to be applied across the entire nuclear fuel cycle. This is particularly relevant as the number of ratifications of the 2005 Amendment to the CPPNM moves towards the required two-thirds of States Parties for its entry into force. This requires more interaction between industry and governments to encourage a nuclear security dialogue across stakeholders. This could include greater consultation and coordination with industry on national threat assessments and any changes to threat levels which is vital for operators to appropriately design and implement security systems. It also encourages greater confidence and transparency in communicating to the public and other stakeholders that industry and regulators have systems in place to respond to a security incident at any stage of the nuclear supply chain.

Bilateral nuclear cooperation agreements

Employing bilateral nuclear cooperation agreements provide additional treaty assurances of peaceful uses. These state-to-state agreements usually allow for bilateral reporting mechanisms, information sharing, and prior consent for transferring, enriching or reprocessing of the material.

Benchmarking non-proliferation performance

Companies along the nuclear supply chain can strengthen the global nuclear regulatory regime through engagement, material stewardship and traceability approaches. Private actors share a responsibility in being able to know where their uranium is sourced; how it is mined; the social and environmental impact of mining and transport operations, as well as provide assurances that uranium has not been lost or accidentally diverted along the supply chain. For non-proliferation to be a fully effective tenet of corporate sustainability, it will need its own set of committed companies, standards-based performance indicators, and knowledgeable investors and consumers.

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Cover photo: Workers load nuclear fuel shipping containers onto heavy cargo trucks. Greg Webb © IAEA

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