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# Undiscovered resource evaluation: Towards applying a systematic approach to uranium

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Evaluations of potential mineral resource supply range from spatial to aspatial, and everything in between across a range of scales. They also range from qualitative to quantitative with similar hybrid examples across the spectrum. These can compromise detailed deposit-specific reserve and resource calculations, target generative processes and estimates of potential endowments in a broad geographic or geological area. All are estimates until the ore has been discovered and extracted. Contemporary national or provincial scale evaluations of mineral potential are relatively advanced and some include uranium, such as those for South Australia undertaken by the State Geological Survey. These play an important role in land-use planning as well as attracting exploration investment and range from data- to knowledge-driven approaches. Studies have been undertaken for the Mt Painter region, as well as for adjacent basins.

The process of estimating large-scale potential mineral endowments is critical for national and international planning purposes but is a relatively recent and less common undertaking. In many cases, except at a general level, the data and knowledge for a relatively immature terrain is lacking, requiring assessment by analogy with other areas. Commencing in the 1980s, the United States Geological Survey, and subsequently the Geological Survey of Canada evaluated a range of commodities ranging from copper to hydrocarbons with a view to security of supply. They developed innovative approaches to, as far as practical, reduce the uncertainty and maximise the reproducibility of the calculations in information-poor regions. Yet the approach to uranium was relatively ad hoc and incomplete (such as the US Department of Energy NURE project). Other historic attempts, such as the IAEA-NEA International Uranium Resource Evaluation Project (IUREP) in the 1970s, were mainly qualitative.

While there is still no systematic global evaluation of undiscovered uranium resources, attempts are being made to calculate uranium supply up to and beyond 2030-2060. In part, these projections are based upon expanding known resources either currently in advanced exploration, feasibility or production. However given that lead-in times from exploration to discovery and exploitation, are relatively long for uranium projects, and few mines have currently projected lives beyond a decade or two, the supply calculations are necessarily partly based upon resources that are not yet known with any confidence. Few countries report undiscovered resources to the OECD-NEA/IAEA "Redbook", but how these figures are calculated is unknown and likely involves a range of techniques with variable degrees of robustness. Surprisingly these figures for undiscovered resources only marginally exceed those for known resources, and this has profound implications for long-term security of supply. Progress towards globally assessing these replacement resources should commence immediately, and some countries, such as China and the United States have started on a country scale. There is a requirement for an integrated and consistent approach that is best done using statistically and geoscientifically robust methods already proven successful for other commodities (such as copper) using existing uranium databases (such as the IAEA UDEPO database).

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