

WNA's Worldwide Overview and Outlook of Global Uranium Mining Supply and Demand - 11685

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Abstract – This paper presents the WNA's worldwide nuclear industry overview on the anticipated growth of uranium mining supply and demand. Given the expansion of nuclear power, world uranium production must grow quickly to meet increasing demand. Uranium market has sound supply up to 2015-20 but meeting demand becomes likely more challenging thereafter. Primary production of uranium supply (i.e. mining) needs to rise sharply to meet rising market demand. Production in the major uranium producing countries, such as Canada and Australia, will be expanded, but the most important increases in the near term are likely to come from Kazakhstan and current African producers. As shown herein, this trend is well engaged. As time goes on, in situ leaching (ISL) is expected to represent a greater share of uranium production, but conventional mining is expected to remain dominant in overall volume terms. Uranium production is also likely to emerge in some new countries, mainly in Africa. Building on a WNA policy on uranium mining called *Sustaining Global Best Practices in Uranium Mining and Processing – Principles for Managing Radiation, Health and Safety, Waste and the Environment* which has been issued in early 2008, this paper also introduces a new WNA initiative which aims at gradually establishing - between miners (suppliers) and utilities (buyers) of uranium - a common international reporting standard in these areas for uranium mine sites and to subsequently promote it. One of the main goals is to establish a process to allow demonstration of continued strong performance in line with the WNA policy. This initiative also covers for uranium miners' effort in sustainable development (SD) as well in corporate social responsibility (CSR).

1. Global Growth in Uranium Supply and Demand¹

1.1 Overall Context

Figure 1 shows the current worldwide distribution of nuclear power plants (NPPs) and of uranium mining production centres. From this, it can be seen that nuclear power generation is mainly concentrated in North America, Western Europe and Japan whereas uranium mining production is concentrated in Africa, Australia, Canada and Central Asia.

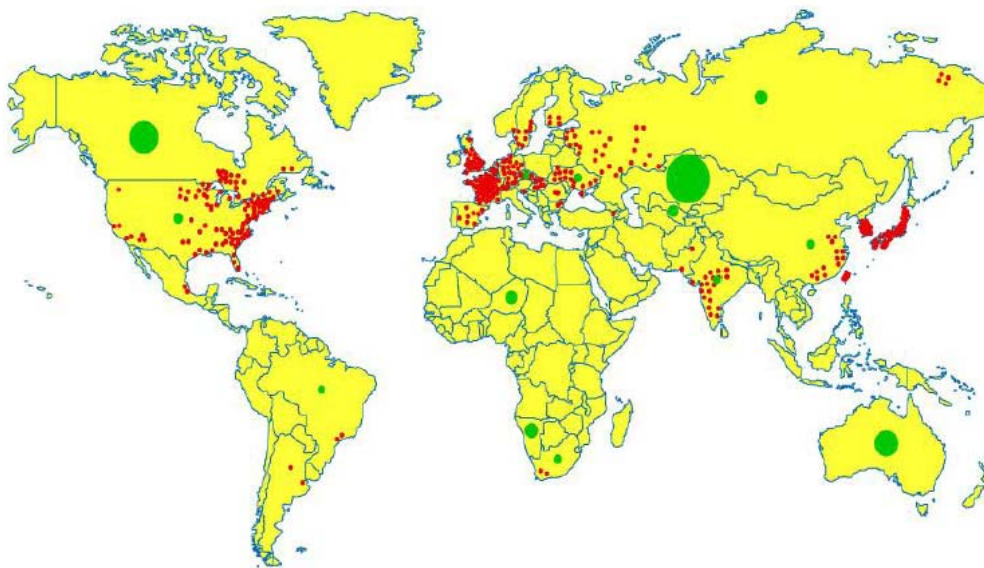


Figure 1: Worldwide distribution of nuclear power reactors and of uranium mining production centres.

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¹ Data from the WNA Market Report (2009) which is the world reference of the global nuclear fuel market on supply and demand [1].

Through their global nuclear trade association - the World Nuclear Association (WNA) - each two years suppliers and buyers of uranium reach a consensus on the global demand (requirement) and supply of uranium. This exercise resulted in high and low estimates of uranium demand and supply that revolve around a reference case. The reference case for nuclear power generation is expected to shoot up from the current 372 Giga-watt (Gw) to about 600 Gw by 2030 (see Figure 2). The corresponding low and high predictions in nuclear power generation range from about 280 and 800 Gw are by 2030 (see Figure 3). Without surprise, as shown in Figure 2, a lot of nuclear power growth is expected from Asia and especially from China and India.

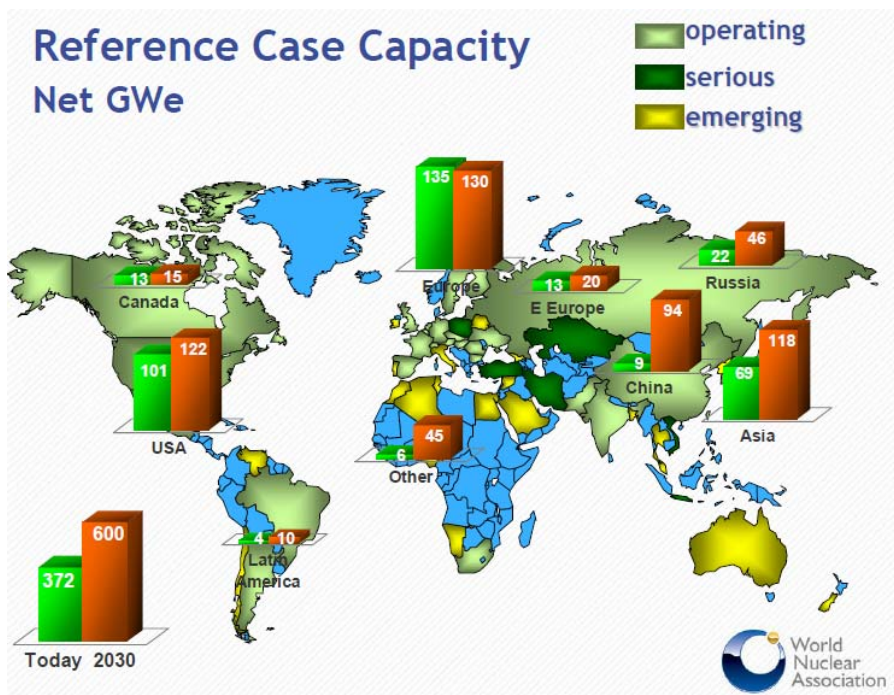


Figure 2: Evolution of the reference case nuclear power capacity by 2030.

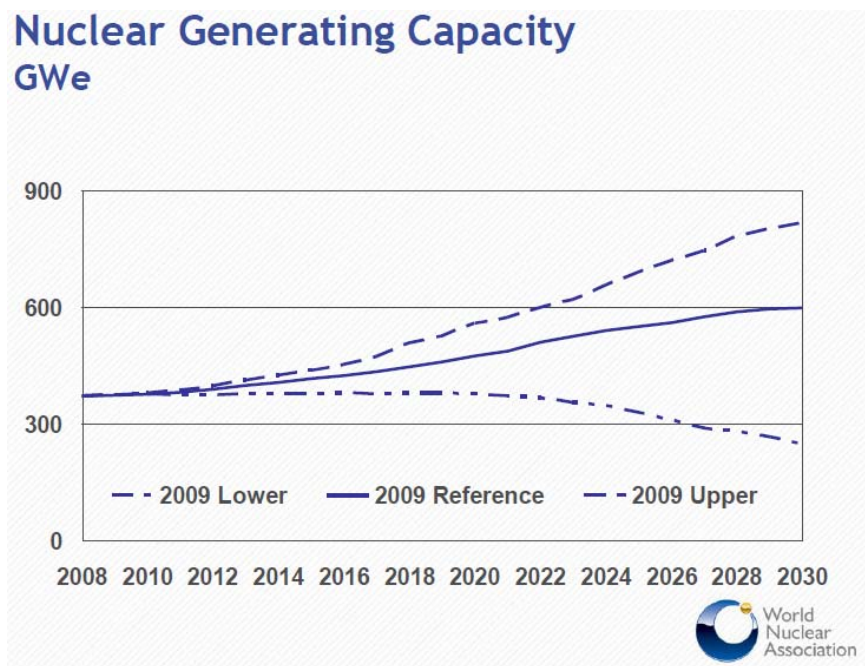


Figure 3: Evolution of nuclear power capacity from currently to 2030.

1.2 Overview and Outlook in Uranium Mining

Given the expected expansion of nuclear power over the coming decades, world uranium production must grow quickly in order to meet increasing demand. Secondary supplies, such as ex-military materials, will be a major part of the market for some time to come, but they are gradually diminishing in significance. World uranium requirements will likely rise from around 68,000 tonnes annually today to 85,000 tonnes and beyond by 2020 (see Figure 4).

Figure 4 shows the three WNA reactor uranium requirements scenarios to 2030 (in tonnes of uranium), with strong growth apparent in both reference and upper scenarios in the 2020s, when new reactor build programs should be well underway in many countries [1].

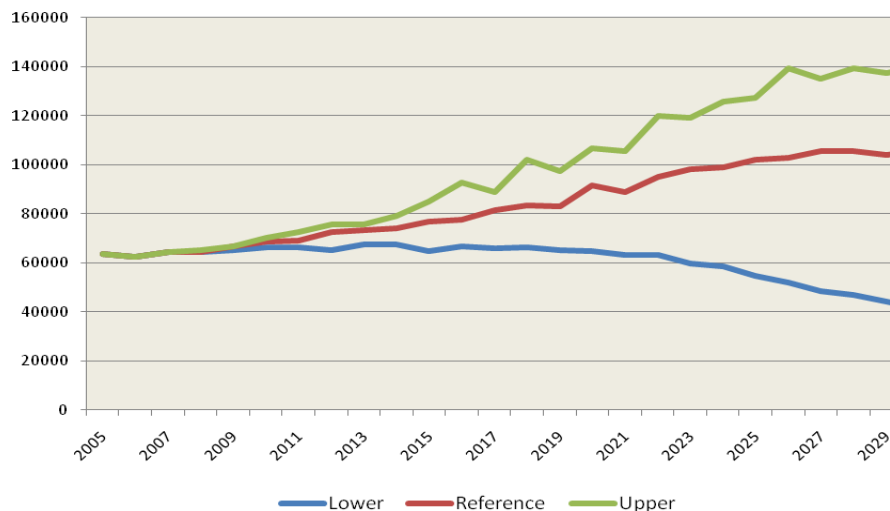


Figure 4: WNA uranium requirements scenarios (in tonnes of uranium)

The reference scenario assumes the continuation of recent trends – better reactor economics and public acceptance of nuclear and increased benefit for nuclear for environmental and energy security of supply reasons. The upper scenario has much faster growth in new reactor numbers, particularly after 2020, whereas the lower scenario makes pessimistic assumptions for nuclear, with very few new reactors and many closures of existing reactors.

Figure 5 shows the global distribution of uranium resources from which uranium requirements are to be met.

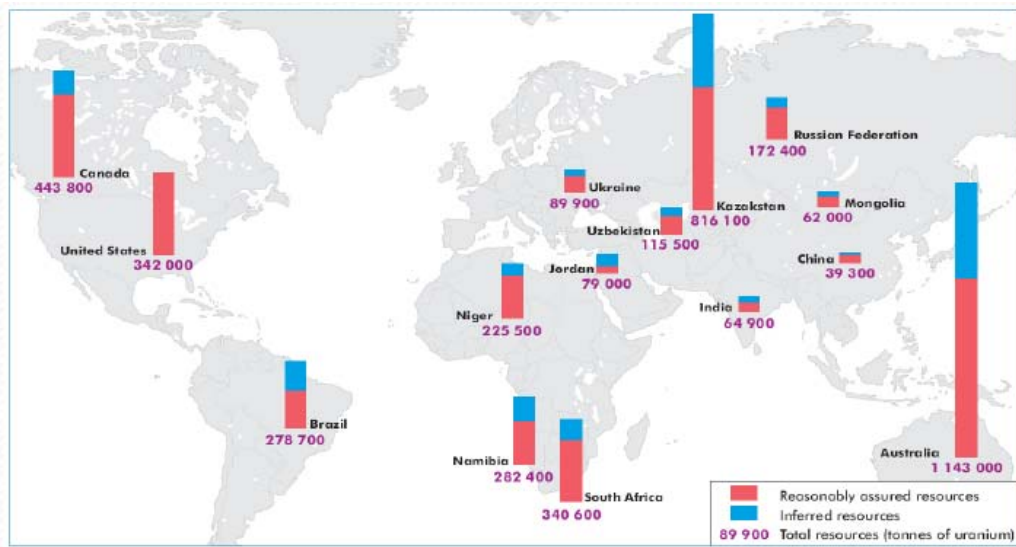


Figure 5: Global distribution of uranium resources.

Figure 6 shows the history of uranium production and demand (in tonnes of uranium) in the western world since 1945 [1].

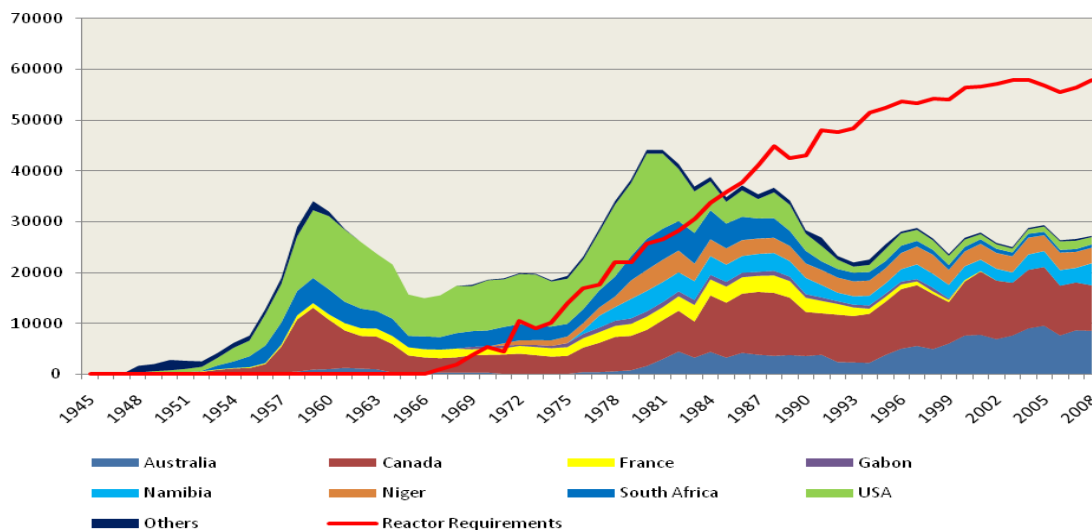


Figure 6: Historic western world uranium production and demand (in tonnes of uranium)

World production still lags significantly behind demand at around 50,000 tonnes per annum (with secondary supplies contributing the balance of 15,000 - 20,000 tonnes) but the trend of production is now strongly upwards.

Uranium mine utilization is currently high, and as capacity increases year over year, actual production is expected to be at least 90% of the full capacity level. Relative to 2009 production, WNA reference case production estimates show 12% higher in 2010, 20% higher in 2011 and 28% higher in 2012. The significant additions to capacity in this timeframe are expected from the ramp up to near full capacity of new producing mines, particularly in Kazakhstan and African countries such as Namibia, Niger and Malawi. Production should also ramp up in Australia and the United States with the addition of new but small-scale facilities, while there should also be some expansion of current production centres in Russia and Uzbekistan. Figure 7 shows the 2009 WNA reference case production scenarios (in tonnes of uranium) for current, planned, under development and prospective mines [1].

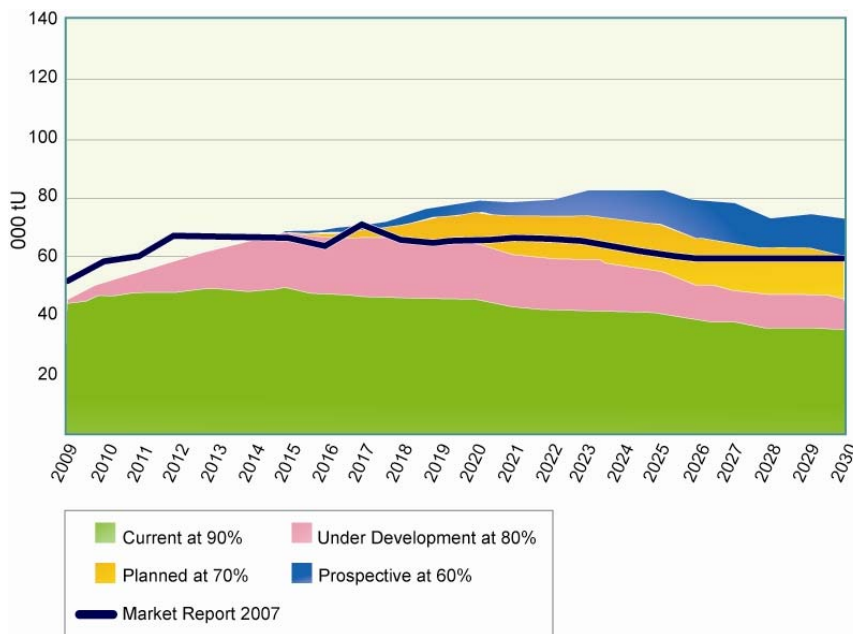


Figure 7: WNA uranium production scenarios (in tonnes of uranium)

Kazakhstan is implementing substantial uranium growth plans, and KazAtomProm has entered into several joint ventures with Western companies, including Cameco, UrAsia (now Uranium One) and Areva as well as JVs with the Japanese and Russians. Kazakhstan uranium production surpassed that of Canada in 2009 and continued to rise sharply in 2010, with total production of almost 18,000 tU. A target of over 25,000 tU has been announced but production growth may well now slow somewhat, and it could be 2014 or 2015 before this annual level is achieved.

Looking further out, there remains a possibility that some of the traditional mines, such as Rossing in Namibia and ERA's Ranger mine in Australia may close as reserves are gradually exhausted, but exploration has tended to result in the potential to further extend mine life to beyond 2020. In addition, both these facilities are investigating the addition of heap leaching to cut costs. At Olympic Dam in Australia, BHP Billiton is still considering a significant expansion, which could more than triple the output of uranium, with increased production beginning as early as 2016. A firm decision to proceed has not been made yet, with the results of the feasibility study to be completed by the end of 2011. In the past, BHP Billiton has discussed a further expansion, doubling production again.

In Canada, the life of Cameco's Rabbit Lake mine has been extended by several years, while licensed capacity at McArthur River has been increased to 8,500 tU following regulatory approval. The commissioning of the new Cigar Lake mine has been pushed back several years by technical issues, but it is now expected to come on stream beginning in 2013, with a ramp up of production thereafter. Russia continues with its plans to greatly expand production capacity both through the development of domestic production centers and production centers in Kazakhstan, Uzbekistan, and Mongolia. It is also on the acquisition trail, with ARMZ's purchase of a majority stake in Uranium One.

In situ leaching (ISL) – an unconventional recovery technique now led by the Kazakh operations and used elsewhere – is now representing a greater share of uranium production, up to around one third. This is a viable way of developing amenable low-grade uranium deposits with limited environmental disturbance provided that operations stay clear from ground water contamination issues. That said, conventional mining (open-pit mines and underground mines) is expected to remain dominant in volume terms, particularly as Cigar Lake (underground) and additional mines in Namibia and Niger (largely open-pit) come into operation.

It is likely that uranium production will now begin in some additional countries, notably in Africa, to follow Malawi. Examples include the Central African Republic and the Congo. Although the recent trend of production getting concentrated in big mines in a limited number of countries will continue, there is undoubtedly room in a growing market for new producers.

1.3 Summary

Given the expansion of nuclear power, world uranium production must grow quickly to meet increasing demand. Uranium market has sound supply up to 2015-20 but meeting demand becomes likely more challenging thereafter. Primary production of uranium supply (i.e. mining) needs to rise sharply to meet rising market demand. Production in the major uranium producing countries, such as Canada and Australia, will be expanded, but the most important increases in the near term are likely to come from Kazakhstan and current African producers. As shown earlier, this trend is well engaged. As time goes on, in situ leaching (ISL) is expected to represent a greater share of uranium production, but conventional mining is expected to remain dominant in overall volume terms. Uranium production is also likely to emerge in some new countries, mainly in Africa.

2. WNA Initiative to Demonstrate Strong Performance in Uranium Mining

Building on a WNA policy on uranium mining called *Sustaining Global Best Practices in Uranium Mining and Processing – Principles for Managing Radiation, Health and Safety, Waste and the Environment* [2] which has been issued in early 2008, a new WNA initiative aims at gradually

establishing - between miners (suppliers) and utilities (buyers) of uranium - a common levelled playing field in these areas for uranium mine sites with a view to demonstrate continued strong performance. This initiative also covers for uranium miners' effort in sustainable development (SD) as well in corporate social responsibility.

This initiative regroups an increasing number of utilities and miners that closely cooperate on the standardization of routine reporting for uranium mine sites with a view to establish a common international reporting standard and to subsequently promote it widely. One of the main goals is to establish a process to allow demonstration of continued strong performance in line with the WNA policy. Such a common reporting process at the international level also offers the dual advantage of covering more uranium miners and of limiting the burden of this coverage on uranium miners. It is anticipated that such information would be particularly helpful as a complement to utilities resources for their interactions on uranium supply with their local stakeholders. WNA will be pleased to report on the progress achieved on this initiative at a later time once further implementation experience will be gained.

REFERENCES

[1] WORLD NUCLEAR ASSOCIATION, The Global Nuclear Fuel Market, Supply and Demand 2009-2030, WNA, London (2009).

[2] WORLD NUCLEAR ASSOCIATION, Sustaining Global Best Practices in Uranium Mining and Processing – Principles for Managing Radiation, Health and Safety, Waste and the Environment, WNA, London (2008).