OSOS SOBRE TORO

Assessment of Wiluna Uranium Project

2013

A report for Senator Scott Ludlam and
the member groups of the Anti-Nuclear Alliance of Western Australia

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Executive summary

The Wiluna project is presently the most advanced uranium project in West Australia and is poised to commence development pending final approval of its environmental management plan including securing a bond for closure and rehabilitation costs and, importantly, pending financing from a joint venture equity partner.

Our modelling of the project economics suggests a positive net present value (NPV) of $A 34Mn, however, this does not include any closure costs for the project. There has been no official closure cost estimate submitted by Toro Energy that we are aware of.

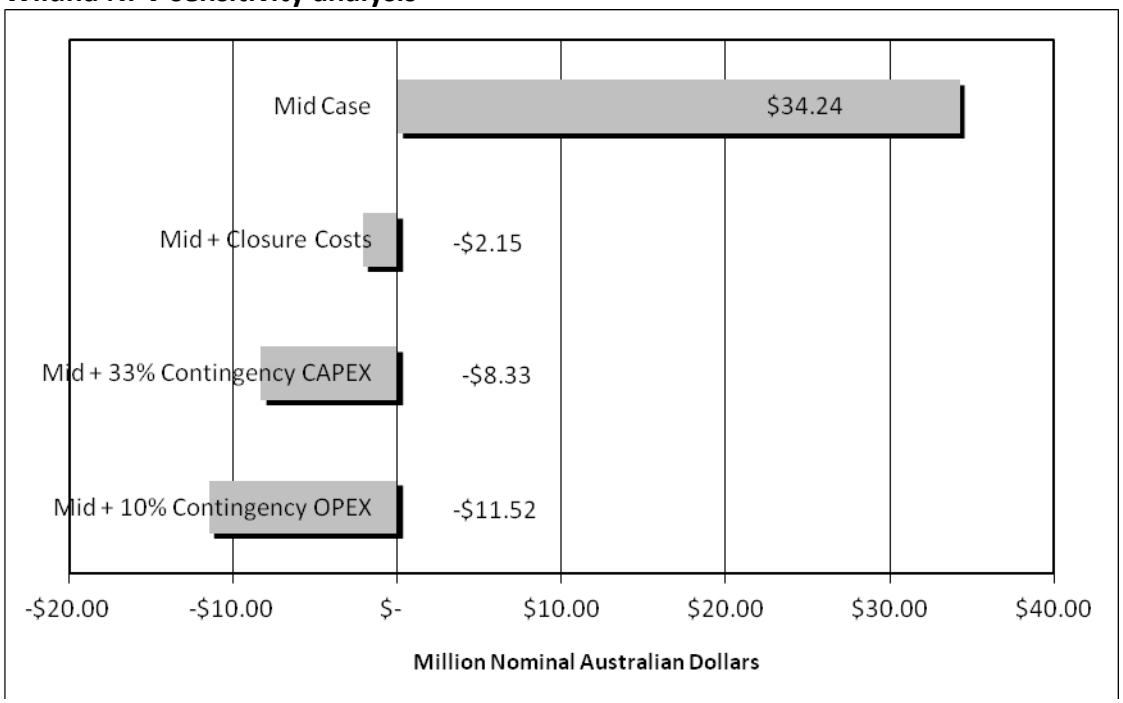
We conducted an NPV sensitivity analysis and concluded that:

- Adding a closure cost to the model based on closed uranium mines in Europe and the USA will almost certainly deliver negative NPV even if incurred at the end of the project in 2029. Applying the low end of the range of global benchmark closure costs of $A10.3/lb U3O8 would result in a nominal closure cost of $A223Mn in 2029, which applied to our Mid case results in NPV $A -2.15Mn.

- An increase in capital contingency costs (excluding any closure costs) in the model from 13% (assumed by Toro Energy) to 33% would also deliver negative NPV ($A -8.33Mn).

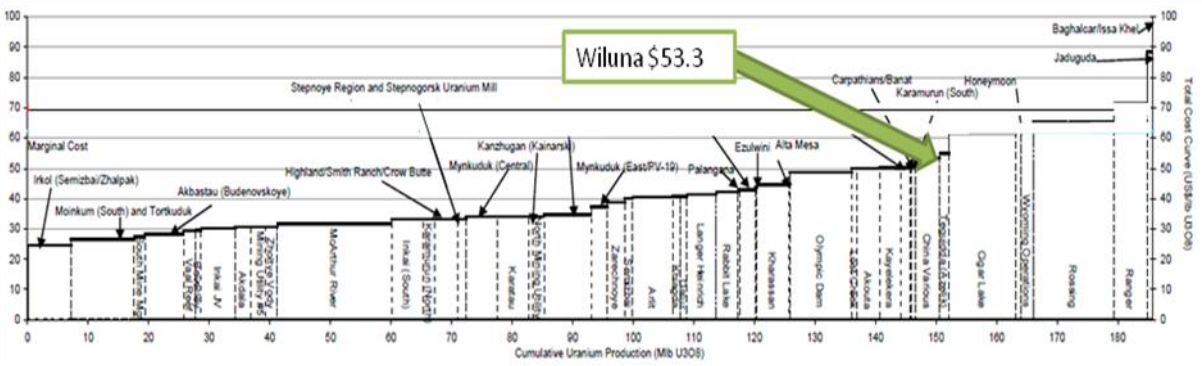
- A 10% increase in operating costs per annum from the modelled Mid case (excluding any closure costs) would deliver a negative NPV ($A -11.52Mn).

Wiluna NPV sensitivity analysis



Under our modelling, the principal reason for Wiluna's high sensitivity to changes in operating or capital costs is owing to the modest resource endowment and the consequent lack of scale or size. As a result, our estimate of the project's position on the mine production cost curve is perilously high, suggesting the project would be highly vulnerable, indeed unviable, in the event of sustained lower long-term contract prices in the next decade. By any measure, whether on a cash cost or total economic cost basis, our estimates suggest Wiluna is a high-cost project relative to existing mines as well as most greenfield and brownfield projects.

Uranium total economic costs 2015 (Nominal USD per pound U3O8)



Source: (BMO Capital Markets 2012) and Economists at Large analysis

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Introduction

About Wiluna and Toro

Toro Energy, a junior mining company with a suite of five uranium deposits in West Australia, Northern Territory and Namibia, is on the cusp of the financial investment decision (FID), and is seeking financing and final environmental regulatory approval for its Wiluna project in West Australia. The Wiluna project is comprised of two principal deposits, Lake Way and Centipede. Adjacent Toro Energy orebodies including Millipede, Dawson Hinkler Well and Nowthanna could be developed and replace the depleted output from Wiluna.

These deposits are part of the Archean Norseman-Wiluna greenstone belt in Western Australia and are located 960 km north-east of Perth in a semi-arid environment with low rainfall. Uranium mineralisation at Wiluna project is found in sheet-like superficial calcrete deposits located at a depth of two to ten metres at or below the water table. These deposits were formed where uranium-rich granites were deeply weathered in a semi-arid climate. Yeelirrie, owned by Cameco, is the world's largest superficial calcrete deposit and is 20 km from Dawson Hinkler Well.

Challenges and opposition

The Wiluna project has faced challenges on many fronts. Firstly, environmental groups and the WA Greens are opposed to the project based on concerns including:

> *Environmental impacts on the conservation of endemic Tecticornia flora species and Stygofauna species; the identification and assessment of relevant impacts of the full mine water supply for the Lake Way open pit; and inadequate assessment of relevant impacts of proposed creek diversions through uranium pit works at both the proposed Lake Way and the Centipede uranium mine sites.* (CCWA 2013)

The second major challenge facing the project is financial. Toro Energy is a small, junior mining company that requires $A 269 Mn to develop the mine. We believe this initial capital cost excludes the closure and clean up costs associated with returning the affected area to an environmentally sustainable level. The estimated closure cost is $A 150m to be held as a bond.

Most greenfield mines in developed countries have closure costs embedded in their project economics and such bonds are not unusual. This is important as:

> *Research shows that almost 70 per cent of the mines that have closed over the past 25 years in Australia have had unexpected and unplanned closures* (Laurence 2002)*. That is, they have closed for reasons other than exhaustion or depletion of reserves. These include:*
>
> - *economic, such as low commodity prices or high costs that may lead a company into voluntary administration or receivership;*
> - *geological, such as an unanticipated decrease in grade or size of the ore body;*
> - *technical, such as adverse geotechnical conditions or mechanical/equipment failure;*
> - *regulatory, due to safety or environmental breaches;*
> - *policy changes, which occur from time-to-time, particularly when governments change;*
> - *social or community pressures, particularly from non-government organizations;*

- *closure of downstream industry or markets; and*
- *flooding or inrush.*

> *Poorly closed and derelict (orphaned and abandoned) mines provide a difficult legacy issue for governments, communities and minerals companies and, ultimately, tarnish the mining industry as a whole…Poor planning and inadequate financing commonly increase the costs of closure and decrease overall profitability, hampering a company's ability to develop new projects.* (DITR 2006)

Area environmental history

Public, traditional owner and regulatory concerns around the Wiluna project are influenced by experience with the Yeelirrie uranium deposit, located only 80 km south-west of Wiluna. In the 1980s, Western Mining Corporation (WMC) dug several trial pits at Yeelirrie, extracting about 130,000 tonnes of ore. The pilot processing plant was in Kalgoorlie, but the tailings were dumped back at the mine site in several dams. Estimated U_3O_8 production was around 195 tonnes.

In its 1996 Environment Progress Report, released in July 1997, WMC admitted leaving a contaminated trial uranium mine exposed to the public, with inadequate fencing and warning signs, for more than 10 years.

WMC said there was inadequate signage warning against swimming in a dam at the site, which was found to be about 30 times above World Health Organisation radiation safety standards and admitted that people used the dam for "recreational" purposes including swimming, but did not drink the salty water.

WMC said it had "no record of whether uranium ore or contaminated products inside the exposed drums were removed". However, a further 1996 inspection revealed that "uranium ore from the site was also found to have been used to repair nearby roads".

For more information on Yeelirrie, see (CCWA 2010; SEA-US Inc 2000; Lawson 2010; World Nuclear Association 2013; Cameco 2012).

Given this history and public interest in uranium, a keen interest in the capacity of Toro Energy to realise environmental and rehabilitation standards is not surprising.

About this report

Senator Scott Ludlam and the member groups of the Anti-Nuclear Alliance of Western Australia are concerned about the uncertainties around financial viability of the project and the ability of the company to finance the closure costs, whether these occur at the end of the proposed mine life of 10 to 14 years or an early closure for any of the reasons outlined above.

Based on these concerns for the sustainable development and financial viability of the project, Senator Scott Ludlam and the member groups of the Anti-Nuclear Alliance of Western Australia have commissioned Economists at Large to prepare an independent assessment of the financials of the proposed mine and to identify and quantify the critical uncertainties and sensitivities of the project.

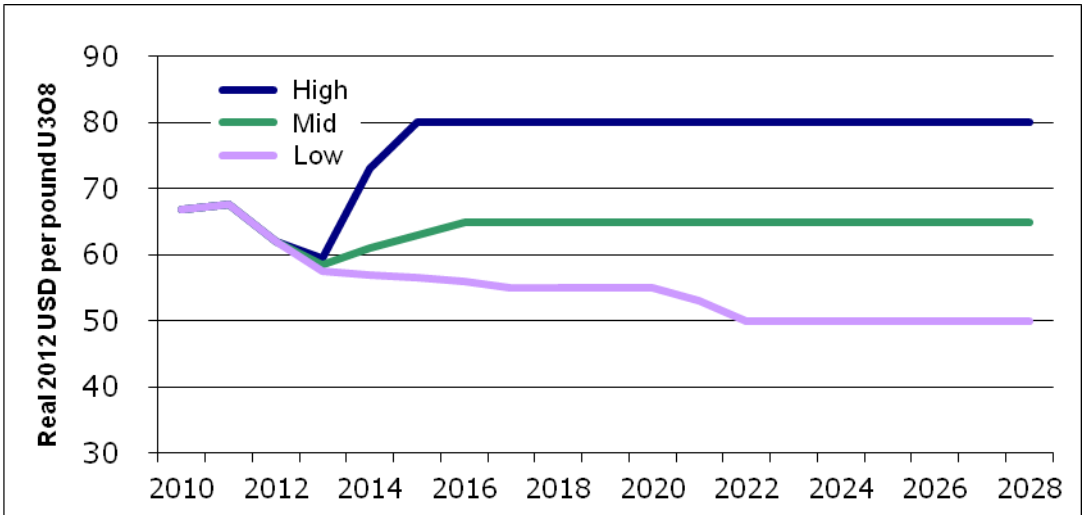
Key Economic Assumptions

Uranium price forecasts

Our assessment of the Wiluna project incorporates the short and long term uncertainties around the key economic parameters. With respect to uranium market prices, this is defined as the long-term contract price between utilities and miners as reported by UxC and Trade Tech, USA-based uranium consultancies. While there is low price transparency on specific contract prices across the uranium industry, there is ample historic data on benchmark long-term contract prices as well as credible production cost curve forecasts that inform the expected long-term incentive price to induce new supply. And given the absence of an off-take JV partner and the small scale of output, Wiluna would most likely not obtain financing without a secure off-take agreement for all of its production and, thus, would probably not be exposed to spot market price risk.

The price forecast is calculated in real 2012 US dollars per pound U3O8. We have created three deterministic cases that depict an expected or 'Mid' case, and Low and High cases that frame or 'bound' the predicted range of uncertainty around long-term real prices. Our preference is to define our expected or most likely as the 'Mid' case rather than employ the usage of 'Base' case. Confusion can arise around the definition of 'Base' since it poses the immediate question 'Based on what?' In contrast, the 'Mid' case is our expected case with the implication that the assumptions are neither conservative nor optimistic, but are what is expected or is most likely. The High and Low price forecasts are defined as plausible, sustainable prices over the longer term, not a peak or trough contract price that may occur briefly during a business cycle or following a nuclear accident, for example.

Figure 1: Long-Term Uranium Price Forecast (Real 2012 US Dollars per pound)



Source: UxC, Trade Tech, (UraniumOne 2012) to 2013, forecasts Economists at Large analysis

Mid case

The Mid case assumes a modest rise in real prices from $USD 58.50/lb in 2013 to $US 65/lb in 2016. Thereafter, long-term prices remain flat in real terms at $US 65/lb to 2030. The medium term supply-demand market fundamentals are expected to tighten soon as Japanese nuclear power restarts commence in late 2013 and new reactors in China, Russia and South Korea come onstream. Secondary supply will tighten, as has been long expected, as the US-Russian re-processed nuclear fuel program ends in 2014. Primary mine supply growth will be subdued as major projects including Olympic Dam, Trekkopje, and Imouraren have been delayed or postponed indefinitely owing to higher than expected development costs against a low price environment. Our long-term real price forecast is broadly in line with forecasts by leading analysts in the uranium market. The leading consultancy on long-term mine production costs in the uranium industry, (CRU Group 2009), predict that the long-term incentive price to induce the restart of high-cost mines as well as induce new mine supply is around $US 70/lb in nominal terms which, when adjusted for inflation, is about $US 65/lb. (See also Morgan Stanley 2012)

High case

The High case assumes a more rapid pace in Chinese new builds to 2020 owing to buoyant energy demand growth and further displacement of new coal builds. Continued progress in already committed Japanese new builds in tandem with successful implementation of Fukushima radioactive wastewater plan allows for modest uranium demand growth from new builds and no new closures except for reactor retirements. South Korean, Russian and Indian announced new builds are ramped up on schedule in the 2016-2020 period. The current regime of higher cost inflation across major uranium producers in Canada, Australia and Kazakhstan pushes long-term incentive prices to $US 80/lb, the long-term real price forecast in this scenario.

Low case

The Low case assumes a more measured, slower pace of new reactor builds especially in China and in Russia. Japanese new builds that were already under construction prior to Fukushima are postponed indefinitely and Japan elects to drawdown its significant inventory stockpile for existing reactors substituting for primary supply. Global economic growth is lower than expected owing to a combination of a more stagnant slowdown in Europe and the UK, and lower Chinese energy demand growth as capital investment slows much further than in the 2010-2013 period, possibly due to a Chinese property bubble burst or serious correction. High cost projects succumb to low prices and are canceled as larger players' margins are squeezed and smaller players are unable to obtain financing or long-term off-take contracts. Because the uranium market is highly integrated across the supply chain from mine through to enrichment and power, mine production costs may be effectively 'shared' across the value chain and, in the event of low uranium prices, marginal or loss-making mines may remain open longer than expected to 'wait out' the price recovery. Lower-cost secondary supply sources may also enter the market. In this scenario, we would expect long-term incentive prices to fall to $US 55/lb – the long-run marginal costs of the major producers that comprise about 65 percent of total primary supply.

Inflation and exchange rate forecasts

Inflation

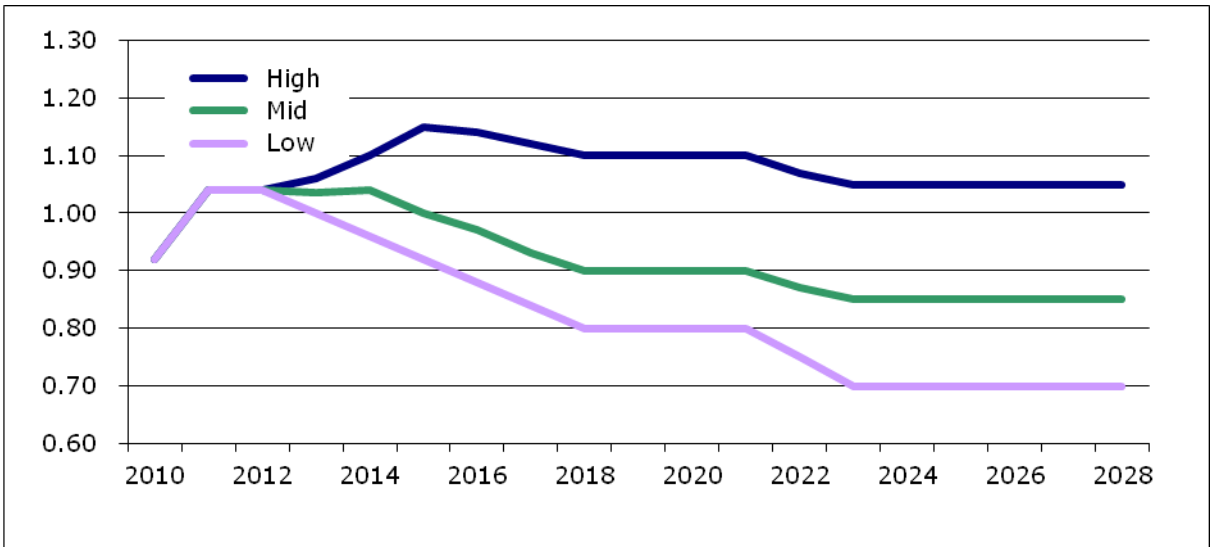
In the Mid case, Wiluna operating and capital estimated costs in 2012 from (Toro Energy 2013) have been adjusted for inflation based on the Australian CPI Index. The near term inflation rate forecast to 2016 is based on a review of the RBA and IMF World Economic Outlook (WEO) forecasts in April 2013. We assume that inflation remains in the range of 2.4% to 2.7% per annum and that the long-term inflation rate is 2.5%. The predicted range of uncertainty around long-term inflation rates assumes a sustained low inflation rate of 2% per annum in the Low case and a sustained high inflation rate of 3.5% per annum beyond 2018 in the High case.

The modeling allows for a discrete mine cost inflation forecast to reflect the significant rise in mining costs across labour, capital equipment, and fuel in the Australian mining sector in the past decade. Whilst we have not employed this mine cost inflation forecast in our Mid case, we have tested the sensitivity of the project cash flows using this higher long-term mine inflation forecast.

Exchange rates

The USD:AUD exchange rate forecast is especially relevant since market prices are in US dollars and Wiluna operating costs are in Australian dollars. Capital cost estimates have been reported by Toro Energy in Australian dollars and, thus, have not been adjusted for exchange rates.

Figure 2: Australian Dollar Exchange Rate Forecasts (USD:AUD)



Source: Historic – RBA, forecasts - Economists at Large analysis

In the Mid case, we expect the Australian dollar to fall to parity with the US dollar by 2015, the first year of production at Wiluna. Thereafter, the exchange rate weakens steadily to 0.90 to the US dollar by 2018 and gradually falls to 0.85 by 2023 as Chinese industralisation reaches maturity. The

expected range of uncertainty around long-term exchange rates assumes that in the High case, exchange rates remain very strong against the US dollar rising to 1.12 by 2017 and then retreating to 1.05 by 2023 over the long-term. In the Low case, we assume that exchange rates reach parity with the US dollar in 2013, weaken to 0.80 by 2018 and continue to weaken to a long-term rate of 0.70 by 2023.

Note that in some High and Low revenue estimates calculations, described below, we also use a mid-point exchange rate between the Mid-High and Mid-Low rates.

Discount rate

In all cases – High, Mid and Low – we have assumed a 12% nominal discount rate based on the weighted average cost of capital of benchmark mining companies of comparable size with no constraints on access to capital markets. Sensitivity testing of the Mid case at 10.5% and 13.5% is also presented in figure 7 below.

Taxes

We have assumed that Wiluna would be subject to an ad valorem royalty payment of 5% per annum that includes a deduction for transport costs based on WA policy for mineral concentrates:

> *An ad valorem or value-based royalty is calculated as a proportion of the 'royalty value' of the mineral. The royalty value is defined as:*
>
> *"in relation to a mineral other than gold, means the gross invoice value of the mineral less any allowable deductions for the mineral"*
>
> *Both the "gross invoice value" and "allowable deductions" are defined in the Mining Regulations 1981(WA) as follows:*
>
> *Gross invoice value - in relation to a mineral, means the amount, in Australian currency, obtained by multiplying the quantity of the mineral, in the form in which it is first sold, for which payment is to be made (as set in invoices relating to the sale) by the price for the mineral in that form (as set out in those invoices).*
>
> *Allowable deductions - in relation to a mineral, means -*
>
> *The amount, in Australian currency, of any costs in transporting the mineral, in the form in which it is first sold, incurred after the shipment date by the person liable to pay the royalty for the mineral.* (WA DMP 2011)

This would result in about $A 95Mn in royalties over the life of the project. However, on a present value basis, total royalties would be $A 43Mn. In the Mid case, we have excluded all other federal or state taxes from the project cash flows.

Production assumptions

A shallow open pit would extract uranium using a continuous miner cutting a 25cm bench and using a GPS/gamma logger for pit floor grade mapping. The total material moved per annum would be 7.24 million metric tonnes (MT) and assumes a 3.8 waste to ore strip ratio and annual ore production of 1.51 MT per annum with an average head grade of 716PPM U3O8 for the first 10 years of production. The mine plan assumes a cut-off grade of 250PPM or higher U3O8. Because the deposit lies below the water table, groundwater control systems and an in-pit tailings deposition and storage area would be constructed. Progressive pit rehabilitation would occur during the mine life. The Centipede deposit would be mined initially followed by a shift to the Lake Way deposit (Toro Energy 2013).

The processing plant will be near the Centipede deposit and recovered ore from the Lake Way deposit will be transported to the plant via dedicated haul road. A conventional alkaline agitated leach process with direct precipitation would be employed to produce 1.28 MT per annum processed ore to a 500PPM U3O8 cut-off grade that assumes an 85% recovery rate (Toro Energy 2013).

In all cases – Mid, Low and High – we have assumed the aforementioned technical assumptions for the mine and plant according to Toro Energy estimates as at November 2012 (presented in Toro Energy 2013). We have assumed production commences as at 1 Jan 2015 and achieves target mill recovery rate of 82% and reaches the 85% recovery rate by 2017. This seems a slightly optimistic assumption given that during the start up phase at most mining operations, the recovery rate is lower than the theoretical recovery rate for the first year or two as the plant ramps up.

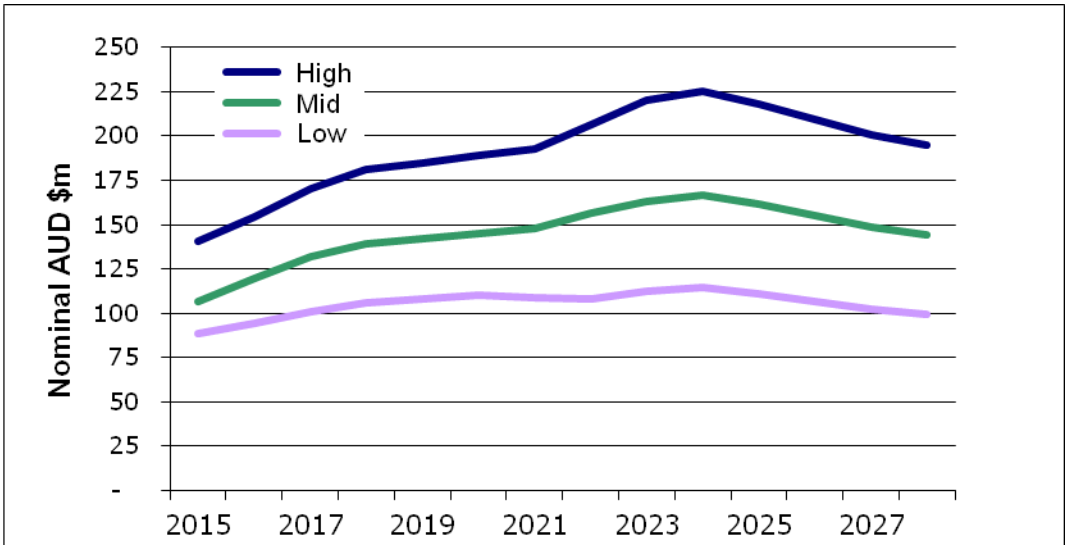
We have also assumed that the head grade of 716PPM declines beyond 2025 as the Lake Way mine nears the end of its life. Indeed, there is uncertainty about the economic viability of the project beyond ten years because of the drop in the uranium head grade and the impact this would have on expected revenue.

Revenue estimates

Mid case

In our Mid revenue case, we have applied the Mid uranium price and Mid exchange rate forecasts to our production assumptions described above to derive annual revenue on a nominal $A basis. Annual revenue is estimated to be $A 106Mn in 2015 and rising to $A 144Mn by 2028 assuming a fourteen-year mine life.

Figure 3: Wiluna Project Revenue Forecasts (Nominal AUD $m)



Source: Economists at Large analysis

High case

We have also captured the range of uncertainty on Wiluna's revenue stream. In our High revenue case, we have assumed the High uranium price forecast in conjunction with the Mid-Low Australian exchange rate forecast. Annual revenue is predicted to rise from $A 141Mn in 2015 to $A 225Mn in 2024 and then falling to $A 195Mn in nominal terms by 2028.

Low case

Conversely, in our Low revenue case, we have assumed the Low uranium price forecast in conjunction with the Mid-High Australian exchange rate. Note however, that in the Low revenue case it would be highly likely that the mine life would be shortened to ten years or even less given the economics of the project and prospects for a sustained low revenue stream beyond 2024. Annual revenue is forecast to rise from $A 89Mn in 2015 to $A115Mn by 2024 and then fall in nominal terms thereafter to $A 99Mn in 2028.

It is worth noting that unlike many commodities, there is no correlation between global benchmark uranium prices and the Australian exchange rate. Moreover, the Wiluna project is minuscule in comparison to Tier I assets such as McArthur River and Cigar Lake in Canada and is a price taker with no bargaining power to influence long-term contract pricing. Thus, our revenue forecasts can be reasonably tested to flex the range of uncertainty by incorporating the nature of divergent contract prices and Australian exchange rates.

Cost assumptions

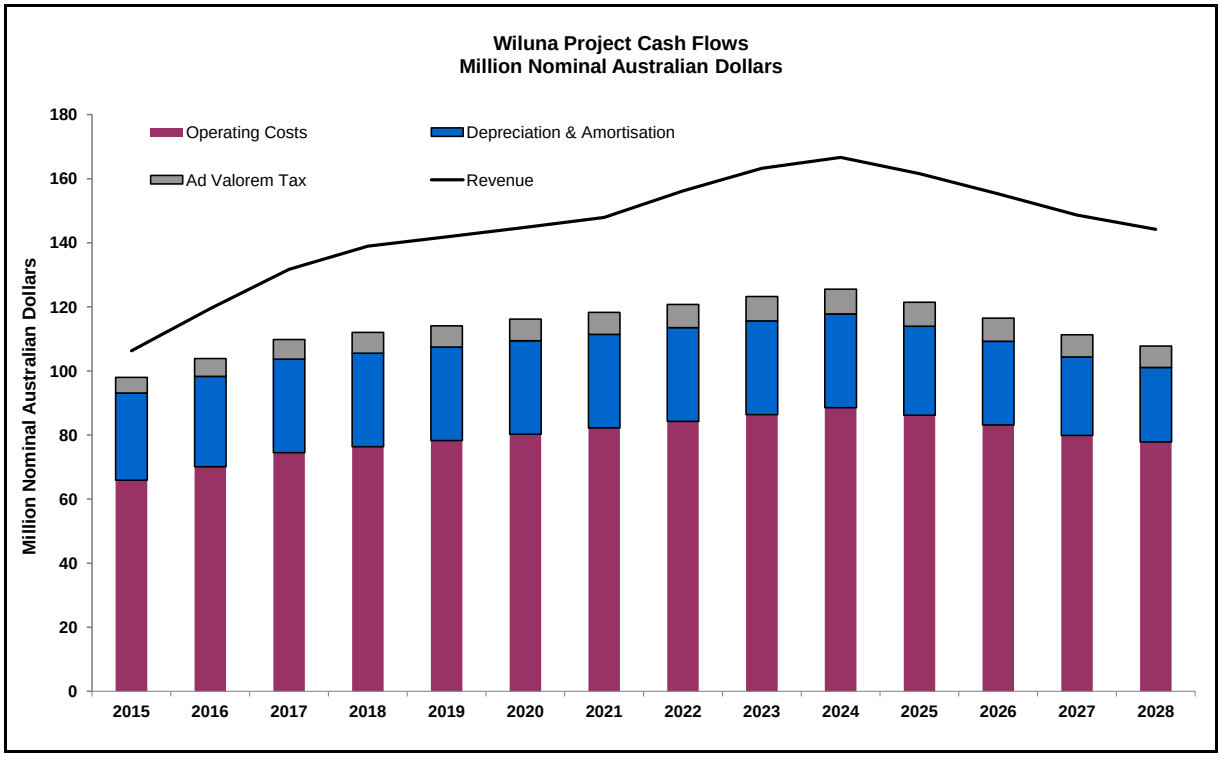
Operating costs

An independent estimate of operating costs using a mine cost engineering model that derives the man-hours, fuel, supplies and equipment and transport per tonne of ore for the Wiluna project is outside the scope of this analysis. We have input the operating costs as described in (Toro Energy 2013). Operating costs have been provided in nominal US dollars per pound U3O8 in 2013 and are broken into mining, milling and other costs. We have allocated 80% of these 'other' costs to the transport of concentrates to port and 20% to corporate overheads.

To derive the nominal operating costs in Australian dollars in 2015, the first year of production, we converted the Toro Energy estimates into Australian dollars using the Mid exchange rate forecast and adjusted for inflation over the 2013-2015 period using an Australian GDP deflator. The nominal operating 'cash' cost in 2013 of $A 35.7/lb rises to $A 41.2/lb in 2015 – the actual operating cost at the start of production.

One of the common errors in investment valuation is the omission of the effect of inflation on the project's operating costs quoted in the pre-feasibility and feasibility stage. In the case of Wiluna, there is an increase of $A 5/lb in nominal operating costs which affects its position on the cost curve vis a vis competitors. Operating costs rise on a nominal basis to $A 56.8Mn in 2028 reflecting Australian CPI at 2.5% per annum over the longer term beyond 2015.

Figure 4: Wiluna Project Cash Flows (Nominal AUD $m)



Source: Toro (2013) and Economists at Large analysis

Capital costs

Capital costs have been input for the Mid case based on Toro Energy (2013) and expressed in nominal Australian dollars in 2013. Around 60% of the capital costs are attributed to the processing plant whilst the remainder is allocated to the power station, EPCM (engineering, production and construction management), plant infrastructure, a mine village and a borefield. Total capital costs are estimated at $A 238.4Mn. There is an explicit contingency cost added to the capital costs of $A 31Mn or 13% of unadjusted capital costs. Thus, total capital costs including contingency are estimated to be $A 269 Mn as at 2013.

Sustaining capital costs have been estimated at $A 4.5/lb based on benchmarking analysis for comparable uranium mining projects. Capital has been depreciated using the unit of production methodology that is widely employed across investment valuation in the mining industry.

Closure costs have not been input in the Mid case in the absence of reliable, credible data from Toro Energy in their environmental post-closure plans as part of their approvals process. However, we have tested the sensitivity of adding closure costs to the project economics in our modeling results section below.

Modelling results

Drawing together the assumptions for our most likely scenario, we derived an NPV for the Mid case at $A 34.24Mn. Note that this does not include a closure cost at this stage, a key sensitivity discussed further below.

The 'uncertainty envelope' between the High and Low NPV cases is large. The High case NPV is estimated at $A 193.9Mn. Importantly, the High case includes a closure cost of $A 223Mn as well as a higher inflation rate (4.9% per annum) for operating costs consistent with the historic trend in the Australian mining sector. The Low case NPV is expected to be $A -156.6Mn and does not include any closure costs.

Figure 5: NPV case summary (AUD $m)

Case	NPV
High	193.9
Mid	34.24
Low	-156.6

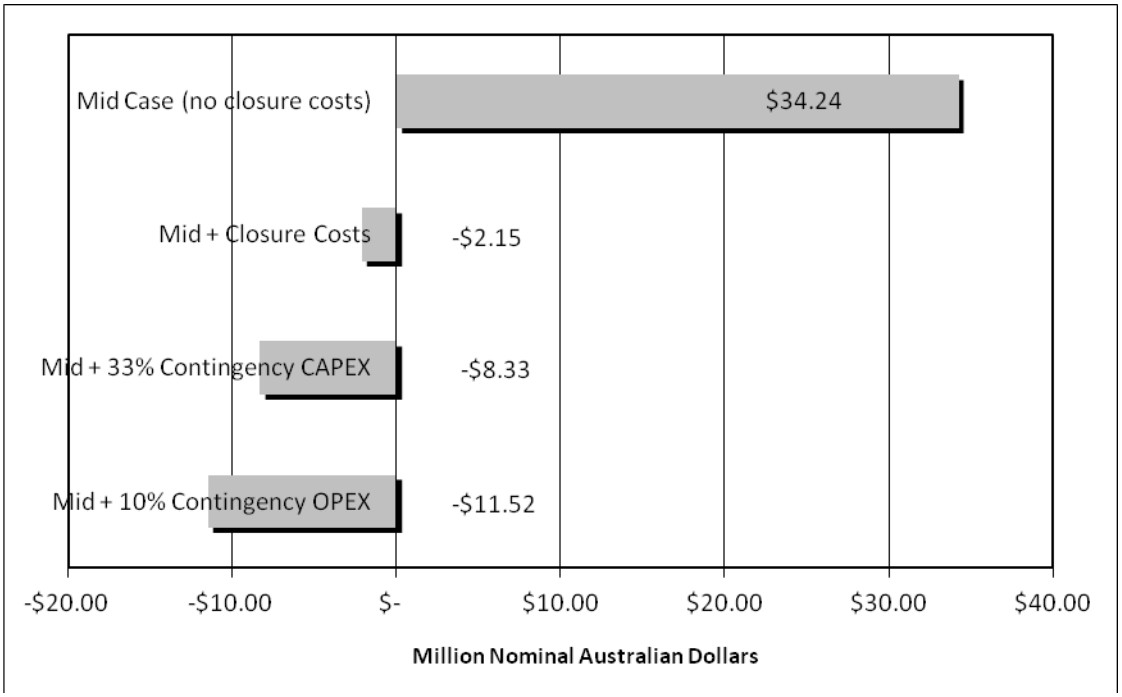
We recognize that the difference between High NPV and Low NPV cases is wider than the norm, where the probability range is usually defined as between 25% (Low), 50% (Mid) and 75% (High). Indeed, these NPV cases are probably better defined as 10% (Low), 50% (Mid) and 90% (High) and reflect the extreme range of all possible NPV outcomes. The principal reason for this wide range of outcomes is the high sensitivity of the project to market prices and Australian exchange rates. Unlike many Australian commodities, prices and exchange rates are independent from one another, making more narrow estimates difficult.

There is, however, an indirect relationship between uranium prices and the Australian exchange rate, since they are both dependent to some extent on Chinese industrialization and energy demand. Further modeling of this relationship is outside the scope of this assessment, but warrants further analysis to quantify the correlation across mineral commodity prices including uranium.

Key sensitivities

In addition to price and exchange rate sensitivities, our model suggests the Wiluna project is particularly sensitive to information on its closure costs and rehabilitation bond requirements, as well as capital and operating expenses.

Figure 6: Wiluna NPV Sensitivity Analysis



Source: Economists at Large analysis

Closure costs

The absence of a closure plan in our Mid and Low case NPV allows for the sensitivity analysis around varying scenarios for post-closure cleanup costs. The following brief is an overview of the Wiluna project current stance in respect to their closure plan prepared by (Allens Linklater 2013) on 4 April 2013:

> *Yesterday's EPBC Act approval is subject to 36 conditions, which are similar to the conditions imposed on the implementation of the Wiluna proposal by the WA Minister for Environment.*

Environmental management plan

A number of the EPBC Act conditions require the preparation and submission of additional plans, including a detailed 'Environment Management Plan' (EMP). The EMP must:

- *specify the compliance criteria and trigger levels to be used in monitoring and managing potential impacts on the environment, particularly ground and surface water and the flora and fauna dependent on these water sources; and*
- *set out detailed parameters for the management of exposure of workers and the public to radioactive releases from the Wiluna Project and include a 'mine closure plan'. The mine closure plan must specify that the environmental outcome to be achieved indefinitely post mine closure is that:*
    - *the mine site is physically safe for the public, as well as plants and animals, and is physically stable and non-polluting; and*
    - *include closure outcomes that are consistent with this overarching environmental outcome.*

In this way, the details of mine closure and rehabilitation (including criteria specific to closure outcomes, safety assessment and modeling and timing of progressive rehabilitation) must be ascertained and included in the EMP before the Project commences.

Tailings storage facility

The EPBC Act approval requires the design of the tailings storage facility cover to be reviewed and endorsed by an independent scientific expert who has been approved by the Federal Minister. This must also occur before the Project commences and is consistent with a growing involvement of independent scientific experts in EPBC Act assessment and approval processes.

Rehabilitation bond and security

The EPBC Act approval decision for the Wiluna Project contains conditions that relate to the sufficiency of rehabilitation bond or security arrangements. These conditions enable the Federal Minister to:

- *request and receive information about rehabilitation security/bond arrangements;*
- *require the person carrying out the Wiluna Project to obtain quotes for the cost of rehabilitation from a third party approved by the Federal Minister to ensure any rehabilitation bond or security is sufficient; and*
- *enter into further financial arrangements with the WA Government and/or enter into a bond with the Federal Minister, where the Federal Minister determines that the existing arrangements are not adequate to cover the full cost of rehabilitation.*

While not typically included in conditions on approvals at the Federal level, these conditions are similar to conditions imposed by the Federal Minister on approval decisions for other uranium mines in Australia.

Each of the EPBC Act approval decisions for the Four Mile uranium project, Beverley uranium mine extension project and more recent approval of the Olympic Dam expansion project in South Australia included conditions that enable the Federal Minister to request and receive information in relation to rehabilitation bonds and require additional security to ensure the costs of 'full' rehabilitation can be met. It seems likely that similar conditions will be seen in future EPBC Act approval decisions for activities involving uranium mining.

Other conditions

With the exception of the conditions referred to above, the other conditions are generally similar to those attaching to the approval of other mining or major projects, and include conditions relating to the management of Indigenous cultural heritage, record keeping, reporting and auditing requirements, as well as a general power for the Minister to require variations to plans required by conditions where he or she considers it is in the interests of the environment.

It is unclear whether the $A 269 capital costs reported by Toro include provision for in-pit tailings storage and rehabilitation, and are essentially an annual recurring closure cost that effectively reduces the closure costs post-2028 at the end of the mine life. Until detailed costs of the environmental management are available, it is impossible to make any assessment of their total closure costs.

In the High NPV case we have assumed an $A 223Mn closure cost in 2029 held as a security bond that is derived from an $A150Mn security bond in 2014 and adjusted for inflation. This closure cost equates to around $A 10.3/lb U3O8 and is broadly comparable to the closure costs of uranium mines in Europe and the USA. For example, the range of closure costs at other mines in 2011-12 is estimated at $US 10.8/lb U3O8 in Czechoslovakia to $US 14.7/lb U3O8 in the USA (Wise Uranium Project 2013).

As our modeling of the Mid case returns NPV of $A 34.24m, any closure bond greater than this amount required up front would turn NPV negative. In the above Mid case + closure costs we include the $A 223Mn closure cost in year 2029 of the model, which still returns negative NPV of $A -2.15Mn. Note that including the closure cost in 2029 is contrary to the stated position of the WA government, which is that a 100% “performance bond for mine rehabilitation” will be required before commencement (Hansard 2012).

Capital and operating costs

Our model suggests that the Wiluna project economics are particularly vulnerable to even modest increases in either operating or capital costs. For example, when we add a 10% contingency (increase) in total operating costs in every year of production to our Mid case (ie excluding closure costs), NPV is negative ($A -11.52Mn). And when we increase the capital cost contingency from 12.85% to 32.85% in our Mid case, NPV is also negative ($A -8.33Mn).

This analysis suggests that the project has significant downside risk owing to its relatively high operating and capital costs that are, in part, related to the resource endowment itself.

Discount rate

Adjusting the nominal discount rate to 10.5% and 13.5% gives the following results in our model. These apply to the Mid case, with no consideration of closure costs.

Figure 7: Discount rate sensitivity testing

Nominal discount rate applied to Mid case	NPV (AUD $m)
10.5%	60.22
12%	34.24
13.5%	11.94

Wiluna's competitive stance in the U_3O_8 market

Pulling the (macro)economic lens back to a global (uranium) context, our modeling suggests Wiluna is at a distinct competitive disadvantage to other greenfield projects and, indeed, to brownfield expansions at existing uranium mines.

Firstly, the resource endowment itself of the two deposits is small relative to much larger projects in Canada and Kazakhstan. For example, a Tier I asset in the global mining industry is defined as a superior resource endowment with an average mine life of 20+ years and relatively high ore grades throughout production. Wiluna may only have a mine life of 10 years and Toro Energy's Dawson Hinkler Well and Nowthanna deposits have low indicated resources (1.77 MT) but moderate inferred resources (30.51 MT), implying Toro Energy will need to make further investments over the next decade to 'prove up' these resources in order for a brownfield expansion of the operation. The project currently has no support from any other uranium mining in the vicinity of Wiluna. Yeelirrie would be a major uranium mining operation if developed and one would expect some synergies to arise in respect to infrastructure and, possibly, transport of concentrates.

The market concentration of uranium miners in the global market is very high, comparable to iron ore and to metallurgical coal. Around 4 producers control about 70% of total primary uranium supply following a period of further consolidation in the 2009-2012 period. Vertical integration has been a legacy of the market for decades as well owing to the safety and national security risks as well as the security of supply required for the ramp up period for new nuclear reactors.

Toro Energy is neither a major player nor vertically integrated with an enrichment facility or a utility. It is, therefore, a price taker with little to no bargaining power around its long-term contract price. Indeed, Toro would be subject to full market forces/risk from the major players' benchmark long-term contracts.

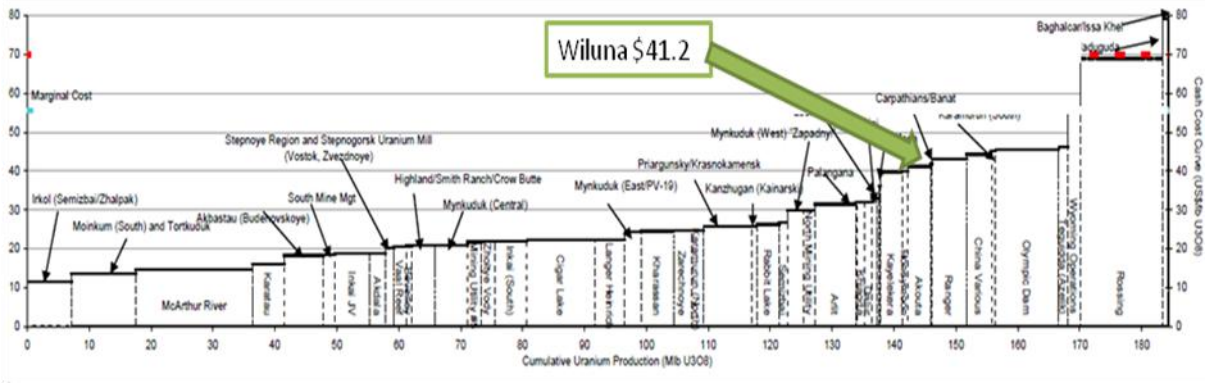
The project would probably rely solely on these long-term contract prices because of the high risk to project cash flows should Wiluna have any exposure to spot market prices. This reinforces the particular economic vulnerability of the project economics in that Wiluna is obliged to be risk averse and, thus, cannot enjoy any upside reward when spot prices rise significantly above long-term contract prices. Major players including Cameco tend to have a mix of 60:40 for long-term contracts

against spot market in their portfolios to capture the spot price volatility including the expected recovery in the 2014-2018 timeframe.

Toro Energy does not have a JV partner at present and, given the high level of vertical integration, we believe the project is unlikely to be developed without a JV partner that is involved in the enrichment or nuclear power generation segment of the uranium value chain.

How does Wiluna measure up against competing greenfield and brownfield projects in respect to the global production cost curve in 2015? According to leading investment bank research from BMO Capital Markets, our estimates of Wiluna's cash costs are positioned at the 75th percentile of the cost curve. The central investment valuation rule of thumb is that a mining project – any commodity - should be positioned in the second quartile of the cash cost curve.

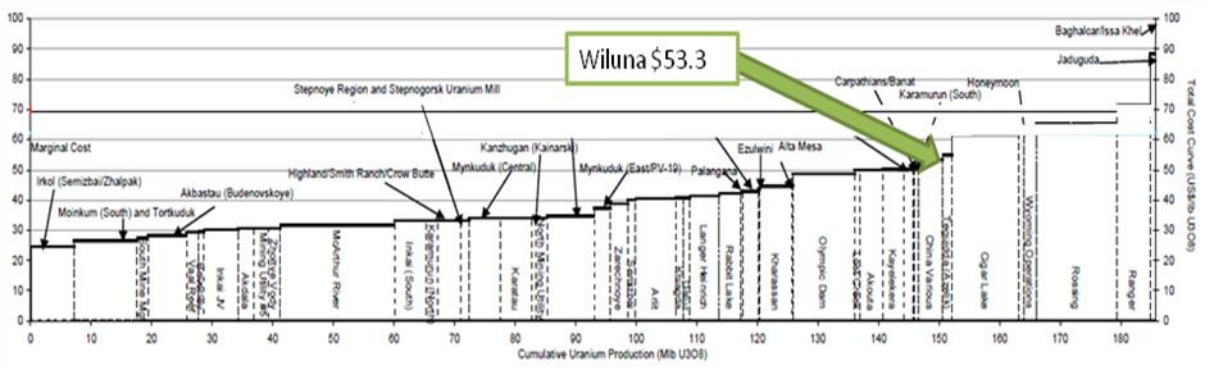
Figure 8: Uranium cash costs 2015 (Nominal USD per pound U3O8)



Source: (BMO Capital Markets 2012) and Economists at Large analysis

The second measure of project viability is to ascertain the position on the cost curve in respect to total economic costs. The investment valuation rule of thumb for total economic costs is that a project should be in the 67th percentile or lower for viability. Under our model, Wiluna is estimated to sit at the 80th percentile of the total economic cost curve in 2015.

Figure 9: Uranium total economic costs 2015 (Nominal USD per pound U3O8)



Source: (BMO Capital Markets 2012) and Economists at Large analysis

As a side note, in Canada, the Saskatchewan government has recently announced that it will be restructuring the provincial mineral royalty regime owing to the marked decline in competitiveness of its uranium and potash projects owing to rapid cost inflation (Reuters 2013). A drop in the royalty tax for a major geologic concentration of uranium reserves would improve the cost structure for future projects there, all other things being equal.

Conclusion

Our model suggests the economics of the Wiluna project are risky. While our mid case returns a positive NPV, uncertainty on closure costs and high sensitivity to U3O8 prices, exchange rate, capital and operating costs suggest real caution should be applied.

To reframe our assessment, it is interesting to explore what would need to occur in order to return a positive NPV under our model and the probability of these key assumptions:

- a closure cost well below global benchmark closure costs for uranium mines in other developed economies;
- a structural change in long-term uranium contract prices from the historic price trend that reflected sustained tight market fundamentals and permanent shift in bargaining power from the utilities to major miners. The trend towards consolidation would gradually be reversed in this scenario as well.
- Australian exchange rates would fall to lower long-term equilibrium rate (0.70) to the US dollar reflecting slower economic growth in part owing to lower Chinese industrial output and domestic consumption.
- Cost inflation across the mining sector would ease over the next few years to broadly reflect inflation in other sectors of the economy – a reversal from the trend over the past decade.
- Ramp up of the project including the mining and milling efficiency and recovery rates would be on time and within budget without any technical snags.

Any combination of these assumptions would give the model a greater probability of returning a positive NPV. We believe, however, probability of most or all of these discrete events occurring is low.

The Wiluna project's lack of scale and high sensitivity to changes in operating or capital costs means our estimate of its position on the mine production cost curve is perilously high. The project would be highly vulnerable under our model, in the event of sustained lower long-term contract prices in the next decade. On both a cash and total economic cost basis our model suggests Wiluna is a high-cost project that will struggle to compete against either existing mines or most greenfield and brownfield projects.

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