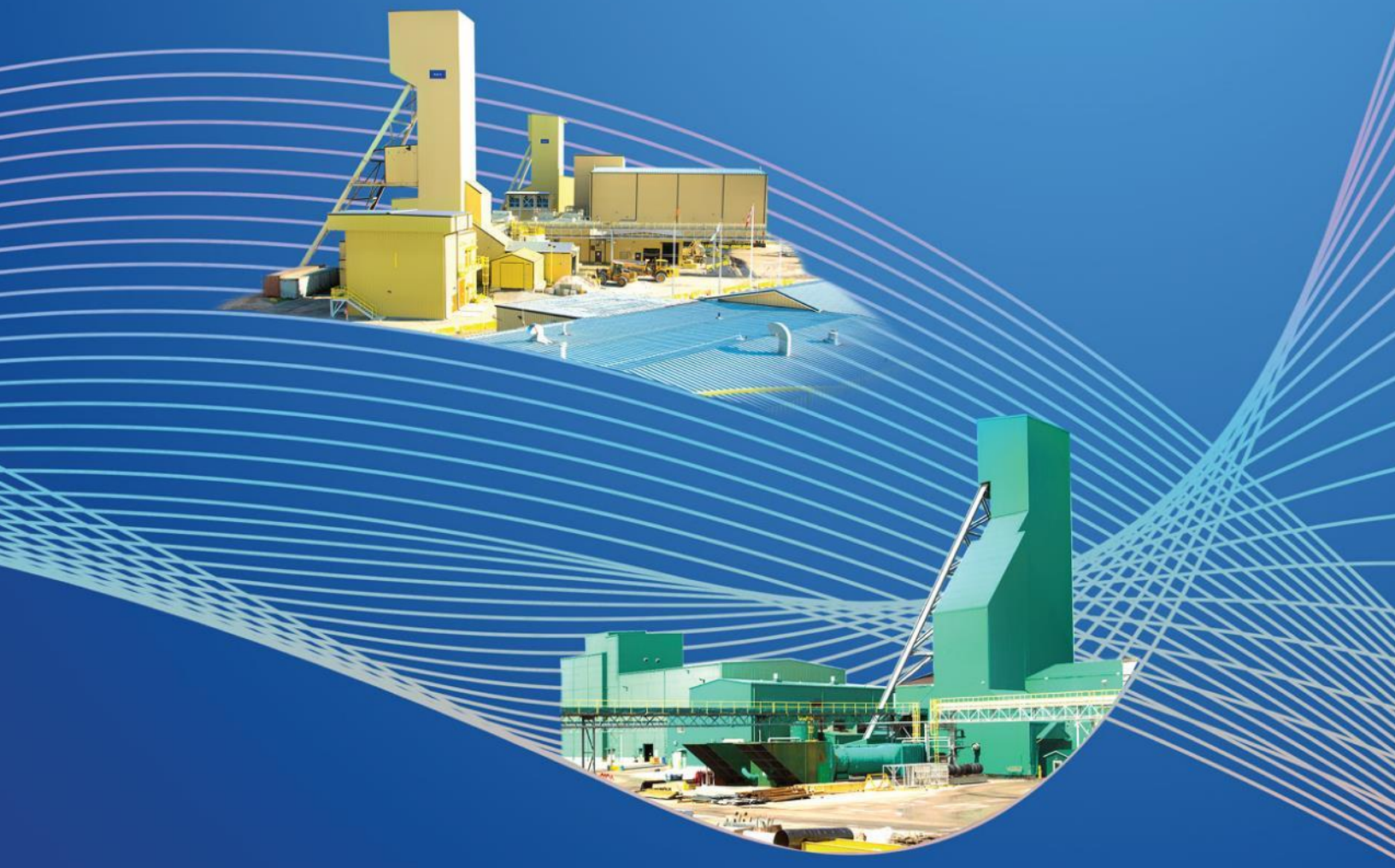
Energizing a clean-air world



Cameco

Investor Presentation

Please note that statements made in this handout, including statements regarding the outlook, company's objectives, projections, estimates, expectations or predictions, contain forward-looking information and statements within the meaning of applicable Canadian and U.S. securities laws. The company cautions that such information and statements involve risk and uncertainty, and that actual results could differ materially from those contained in them. In addition, certain material factors or assumptions were applied in drawing the conclusions or making the forecasts or projections reflected in them. Additional information about the material factors that could cause actual results to differ materially, and the material factors or assumptions that were applied, are contained at the end of this handout.

CCO LISTED TSX

25 YEARS

CCJ LISTED NYSE

Rachelle Girard
Vice-President, Investor Relations, Treasury and Tax
306.956.6403
rachelle_girard @cameco.com

Cameco

www.cameco.com

Q2, 2022

Financial and outlook information as of July 26, 2022
Mineral Reserve and Resource Estimates as of December 31, 2021

Cameco

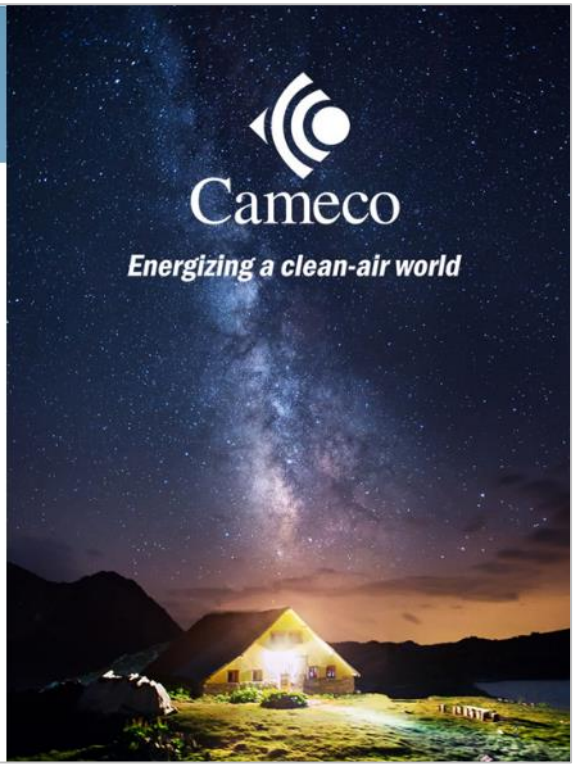
Energizing a clean-air world

Company Overview

Q2, 2022

Right Vision and Strategy

- Our vision is aligned with the world's growing need for carbon-free energy
- Nuclear power can help avoid some of the worst consequences of climate change
- Our strategy is successfully positioning Cameco to achieve our vision



Favourable Uranium Market Fundamentals

Cameco Strategically Positioned

Growing Demand

Global focus on:

- electrification
- decarbonization
- country net-zero targets
- company net-zero targets
- Energy security
- infrastructure investments

Uncertain Supply

- Planned supply curtailments
- Unplanned supply disruption
- Underinvestment in existing capacity
- Underinvestment in new capacity
- Decreasing secondary supply
- Geopolitical and trade policy risk

Cameco in Pole Position

Strategy to capture full-cycle value

- Idled tier-one & tier-two capacity
- Long-term contract portfolio
- Operational flexibility
- Project pipeline – leverage brownfield infrastructure
- More than mining – vertical integration

Cameco Corporation

Competitive Advantages

Contract portfolio

- Long-term diversified contract portfolio with customers around the world, average 22 million pounds per year over the next 5 years in sales
- Contracts have provided price protection and leverage to rising prices

Assets

- Tier-one: low-cost, high-grade mines in Canada and JV in Kazakhstan
- Long-time operator, licensed, permitted with significant reserves and resources
- Vertical integration across the fuel chain, investing in digitization and automation

Financial strength

- Strong balance sheet – ability to self-manage risk and execute strategy

ESG

- Over 30 years commitment and performance: focus on health and safety, environment, community and governance

Net-zero Carbon Targets
Triple Challenge

Energy Poverty

- Lift 1/3 of the global population out of energy poverty

Thermal Replacement

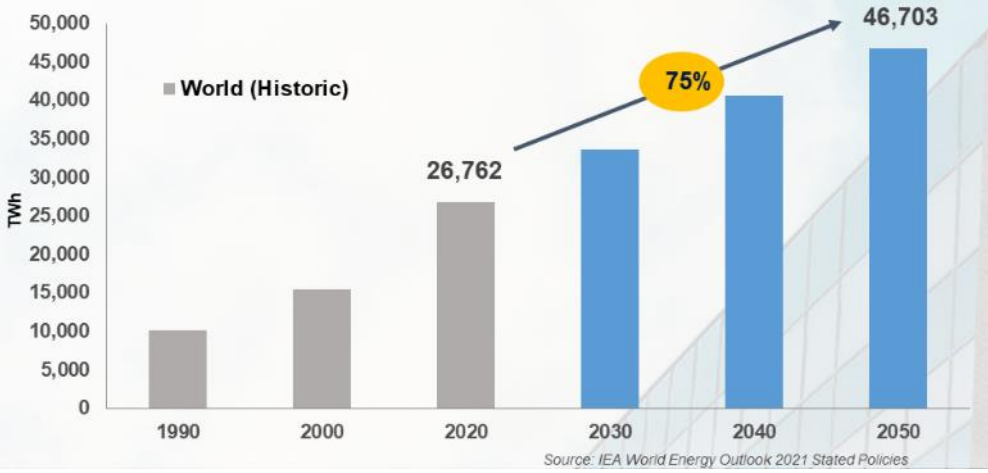
- Replace 85% of grid running on carbon-emitting thermal power with a clean, reliable alternative

Electrifying Industry

- Electrify industries, such as private and commercial transportation, largely powered by carbon-emitting thermal energy today

Growing Electricity Generation

By 2050, global demand is expected to increase by 75% from 2020 levels

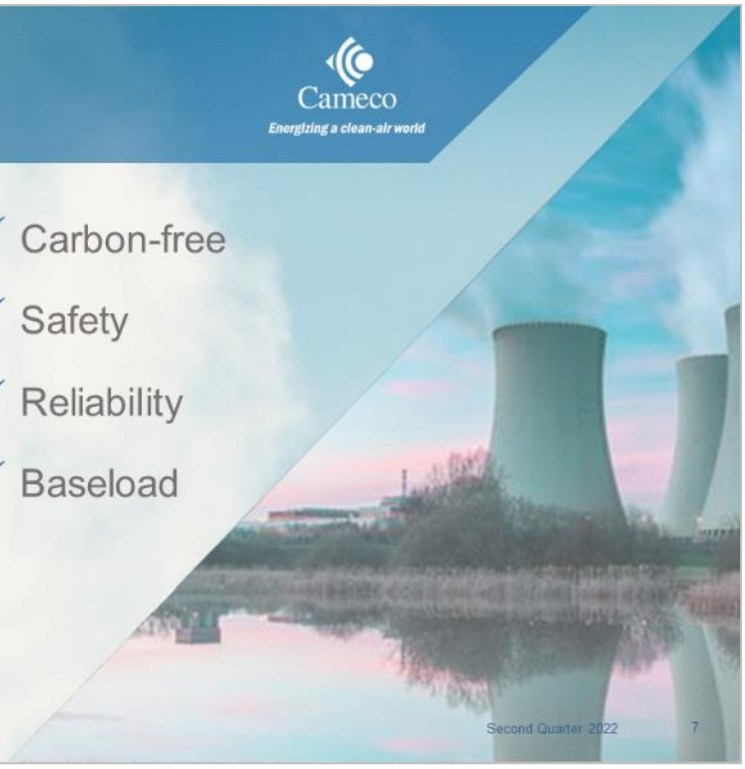


Source: IEA World Energy Outlook 2021 Stated Policies

Attributes of Nuclear

Cameco
Energizing a clean-air world

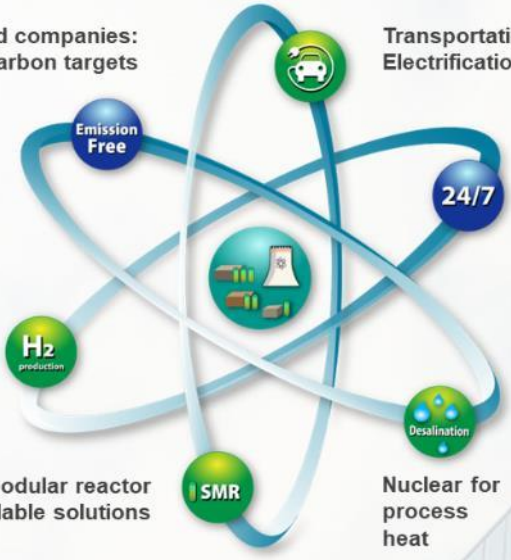
- ✓ Designed to operate for long cycles
- ✓ Strategic inventory to guard against supply disruptions
- ✓ Back-up systems
- ✓ Fewer people required at site
- ✓ Carbon-free
- ✓ Safety
- ✓ Reliability
- ✓ Baseload



Nuclear's Low-carbon Advantage
Expanding Role for Nuclear

Countries and companies: Net-zero carbon targets

Transportation: Electrification and decarbonization



Baseload electricity generation

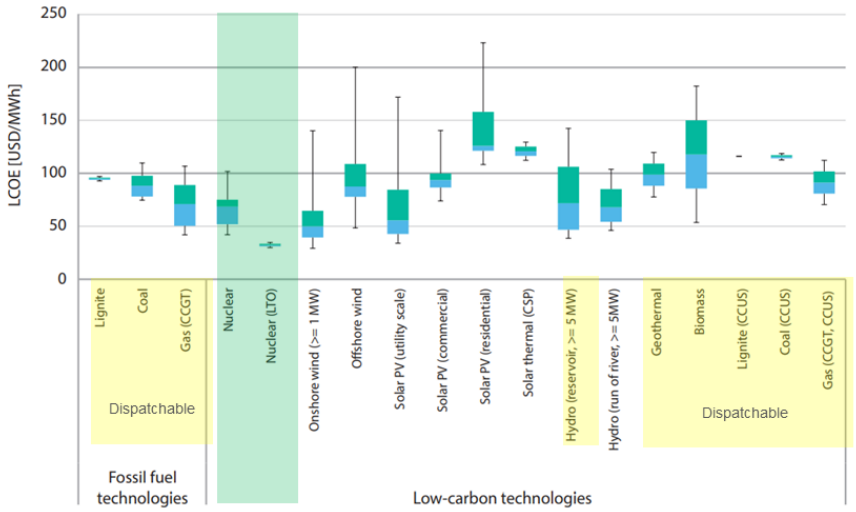
Shifting to low-carbon economy – hydrogen

Small modular reactor - scalable solutions

Nuclear for process heat

Nuclear's Low-cost Advantage
Levelized Cost of Electricity

Cameco
Energizing a clean-air world



"Electricity produced from nuclear long-term operation… is highly competitive and remains not only the least cost option for low-carbon generation… but for all power generation across the board."

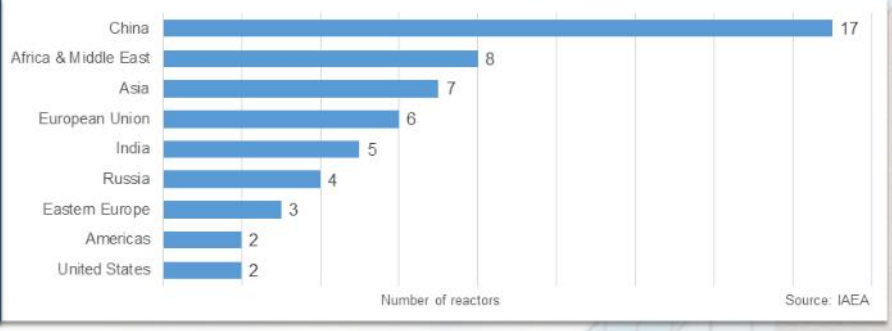
"Nuclear thus remains the dispatchable low-carbon technology with the lowest expected costs in 2025"

- IEA/OECD

IEA (2020), Projected Costs of Generating Electricity 2020, IEA, Paris https://www.iea.org/reports/projected-costs-of-generating-electricity-2020

Uranium Market
Future Growth

54
reactors under construction



China's reactor fleet

Uranium Market Fundamentals
"Best Ever"

Risk is shifting to

Producers	Uranium Customers

Durable demand:
• Decarbonization & electrification
• ESG focus creating electron accountability
• Traditional demand improving (near, mid, long-term)
• Non-traditional demand (SMRs and advanced nuclear reactors)
Demand from financial investors driven by intrinsic value of clean energy uranium
	Uncertain supply:
	• Low prices caused:
	  • Supply curtailment
	  • End of reserve life
	  • Lack of investment in supply
	• COVID & global supply chain challenges
	Origin risk: geopolitical & trade policy issues
	Development risk: unproven assets, cost inflation & schedule delays from COVID & global supply chains, increasing regulatory and ESG scrutiny, inflation

Russian Share of Global Capacity
Geopolitical Realignment

Cameco
Energizing a clean-air world

Fueling Demand
Cameco's Strategic Decisions

Supply Curtailment	Purchasing Spot	Inventory Drawdown
~115 million pounds (100% basis) since 2016 that remain in the ground	~57 million pounds purchased to be placed into contract homes	~20 million pounds in 2018

Uranium market
2021-2022 Spot Price

Cameco
Energizing a clean-air world

Signposts of a Market Shift

Meaningful contracting activity drives price and market improvement

Disciplined Strategy

Full-cycle Value Capture, Driving Results

Strategically aligned contracting discipline

- Strategically patient long-term contracting
- Balanced portfolio
- Leverage to higher prices, protection from low prices

Operationally flexible supply discipline

- Align production with contract portfolio and market signals

Risk-managed financial discipline

- Self-manage risk
- Supports opportunistic investment in nuclear fuel value chain

Operationally Flexible Supply Discipline Key
Align Production with Market and Contract Portfolio

Cameco a demonstrated tier-one producer with proven tier-one assets

Spot is NOT the market	Long-term value focus
• We do not plan production for spot exposure • We are typically over-contracted and are net spot buyers, not sellers • We align production with contract sales commitments	• Diversified, commercial supply • Proven reliable and responsible supplier • Productive capacity underpinned by contract portfolio • Growing contract portfolio & improving pipeline on- and off-market – stretching through 2030s • Investing in operational flexibility • Financially disciplined

Uranium Market Fundamentals
Full-cycle Value Capture

Great assets necessary but not sufficient to capture full-cycle value

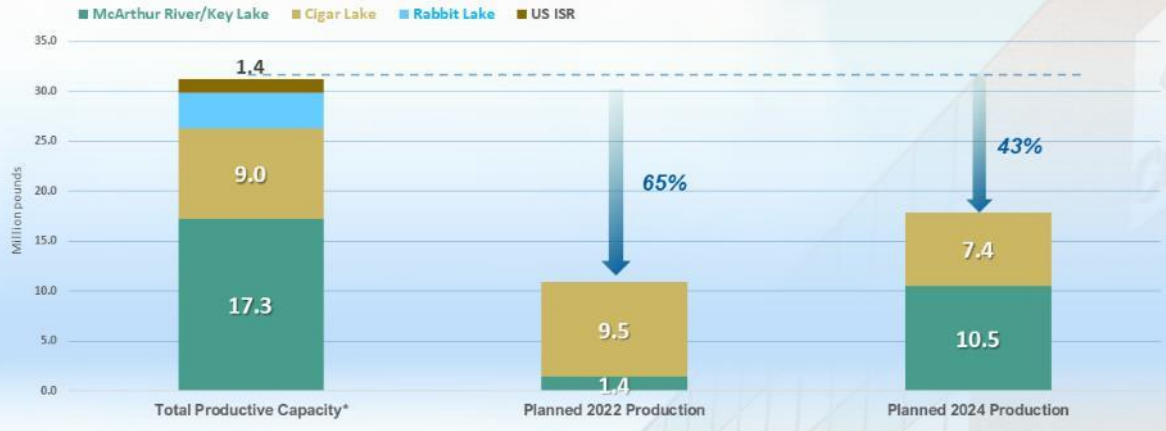
Spot Market	Long-term Market	Incumbent Producer Advantages
• Thinly-traded • One-time, discretionary volumes ***Productive capacity missing the long-term contracting cycle leads to value-destructive, spot-exposed sales***	• Full-cycle value created through long-term contracting • Production capacity must be flexible and timed to align with contracting cycle • Multi-year requirements layered in during periods of above replacement-rate contracting • Leverage to greater returns as prices increase and protected for periods of low prices	• Utilities prefer proven reliable suppliers - tier-one assets demonstrated not promised • Licensed/permitted assets market-aligned with contracting cycle • Diversified sources and vertically integrated services • Proven ESG performance

Improving Uranium Market Fundamentals
The Next Phase

Contract Portfolio and Pipeline	Operational Readiness and Flexibility	Rewarding Investors
• **Growing contract portfolio and robust pipeline** • **Over 45 m lbs** in long-term contracts since beginning 2022 • UF_6 conversion prices at record-highs	• **Preparing assets for operational readiness and flexibility** • **Remain aligned with market and contract portfolio** – need to see further improvement • **2024** planned production about **40%** below productive capacity (100% basis)	• **Rewarding those who have supported our strategy** • Announced **50%** increase to 2022 dividend

Operational Flexibility
Our Tier-one Supply Discipline Continues

Annual Capacity vs. Production (our share)



* Productive capacity includes licensed capacity at Cigar Lake and McArthur River/Key Lake, and it includes planned production volumes at Rabbit Lake and our US operations prior to curtailment in 2016.

Financial Strength
Transitioning to Tier-One Run-Rate

Next phase of our supply discipline

- Categorically positive for Cameco
- Expect improving margins and cash flows
  - More tier-one production
  - Fewer spot purchases, ability to pull forward long-term purchases
  - No longer expensing care and maintenance costs or operational readiness costs once a reasonable production rate is achieved
  - Market-related portion of contract portfolio leveraged to higher uranium prices
  - Uncommitted in-ground inventory leveraged to higher uranium prices
- Enviable balance sheet and positioned to self-manage risk
  - Opportunistic investment in nuclear fuel value chain
  - 50% increase to 2022 dividend

Sustainability
Measures of Success

Safe, healthy, rewarding workplace

Industrial Safety
For the **fourth consecutive year, a new performance record** was set in 2021 with improvements to our **Total Recordable Injury Rate.**

Supportive communities

Community Economy
Since **2004**, Cameco has procured over **$4 billion** for services from **northern Saskatchewan businesses.**

Clean environment

Environmental Performance
Fourteen consecutive years with **zero** significant environmental incidents. We test over **85,000 soil, water** and **air samples** each year at our North American operations.

A Tiny Footprint
From **less than seven square kilometers**, our Saskatchewan tier-one operations have the licensed capacity (100% basis) to produce virtually all the uranium used by US nuclear utilities each year in meeting about **20%** of **total US electricity demand.**

100% of our product goes to producing clean, carbon-free, base-load electricity

Focus on Value

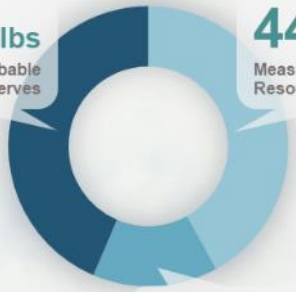
Well Positioned for Future Demand with World-class, Tier-one Assets

Cameco
Energizing a clean-air world

Cameco's Share

464 M lbs
Proven & Probable Reserves

447 M lbs
Measured & Indicated Resources



154 M lbs
Inferred Resources

All values shown, including reserves and resources, represent our share only, unless indicated. Please see Cameco's most recent annual management's discussion and analysis (MD&A) for more information about these reserves and resources.

- ✓ Extensive reserves and resources
- ✓ Diversified supply
- ✓ Decisions driven by profitability

McArthur River

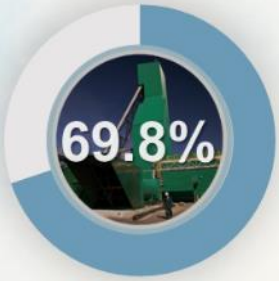
The World's Largest, High-grade Uranium Mine

Cameco
Energizing a clean-air world

Proven and Probable Reserves[1]
275.0 M lbs

Average grade U_3O_8
6.58%

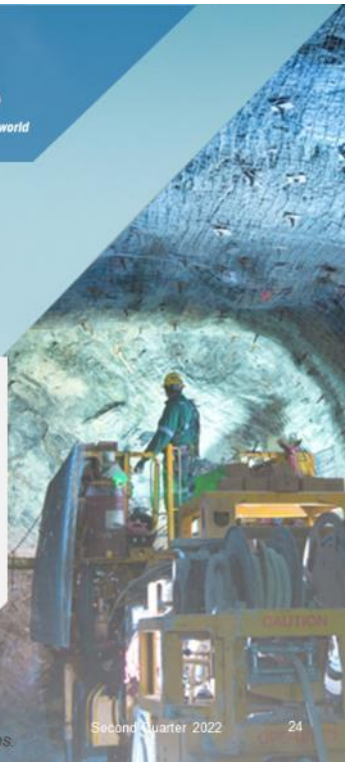
Cameco's Share



Production

2021 production	**0 M lbs**
2022 forecast	**1.4 M lbs**
2024 plan	**10.5 M lbs**

[1] At December 31, 2021
All values shown, including reserves and resources, represent our share only, unless indicated.
See Cameco's 2021 annual management's discussion and analysis (MD&A) for more information about reserves and resources.



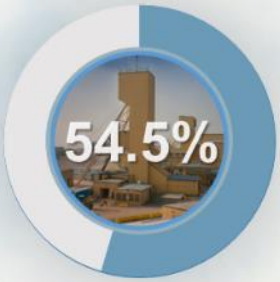
Cigar Lake
Uranium Grades 100 Times the World Average

Cameco
Energizing a clean-air world

Proven and Probable Reserves[1]
76.2 M lbs

Average grade U_3O_8
15.41%

Cameco's Share[2]



Production

2021 production	**6.1** M lbs
2022 forecast	**9.5** M lbs
2024 plan	**7.4** M lbs

[1] At December 31, 2021
[2] Reflects increase in ownership to 54.5% effective May 19, 2022
All values shown, including reserves and resources, represent our share only, unless indicated
See Cameco's 2021 annual management's discussion and analysis (MD&A) for more information about reserves and resources.

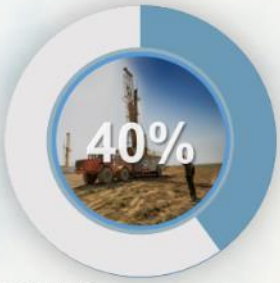
Inkai
A Significant Low-cost Source of Uranium

Cameco
Energizing a clean-air world

Proven and Probable Reserves[1]
112.5 M lbs

Average grade U_3O_8
0.04%

Cameco's Share



Production

2021 production:
9.0 M lbs (100% basis)

2022 forecast:
8.3 M lbs (100% basis)

[1] At December 31, 2021
All values shown, including reserves and resources, represent our share only, unless indicated.
See Cameco's 2021 annual management's discussion and analysis (MD&A) for more information about reserves and resources.

We equity account for our 40% ownership. As such, our share of production is shown as a purchase.

Strong Asset Portfolio

Tier-Two Curtailed Operations

- Rabbit Lake
- US ISR Operations

Advanced Projects

- Millennium
- Yeelirrie
- Kintyre

Fuel Services Division

Refining, Conversion and Fuel Manufacturing

Cameco
Energizing a clean-air world

Blind River Refinery
Port Hope Conversion Facility
Cameco Fuel Manufacturing Inc.

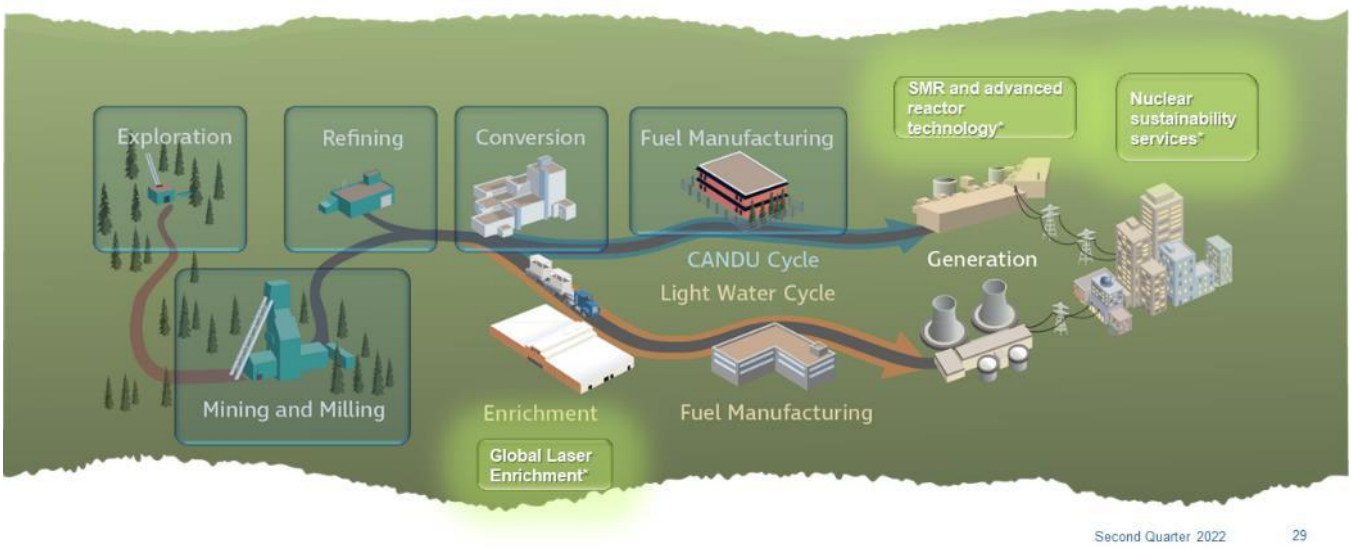
Cameco's Share

Production

2021 production:
12.1 M kgU

2022 forecast:
12.5 M – 13.5 M kgU

Opportunities for Cameco
Vertical Integration and Emerging(*)



Well-positioned
Assets, Portfolio and Vertical Integration

Cameco
Energizing a clean-air world

Tier-one Assets
- Licensed, permitted, long-lived, proven
- Expansion capacity

Exploration portfolio
- Leverages brownfield

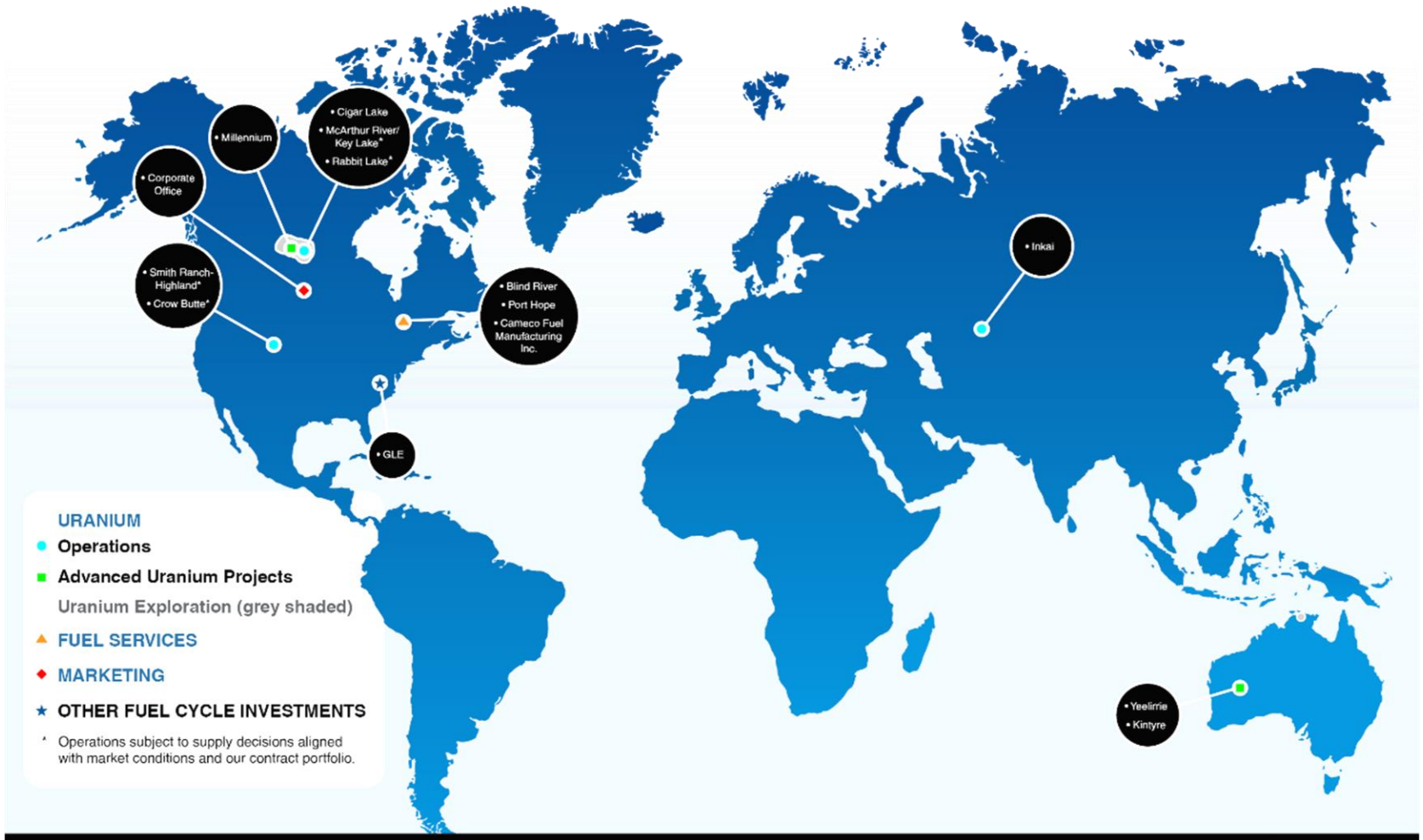
Tier-two Assets
- Potential value in the future

Vertical integration
- Across the fuel cycle
- And exploring opportunities


Cameco
Energizing a clean-air world
CCO
LISTED
TSX
25
YEARS
CCJ
LISTED
NYSE
Cameco

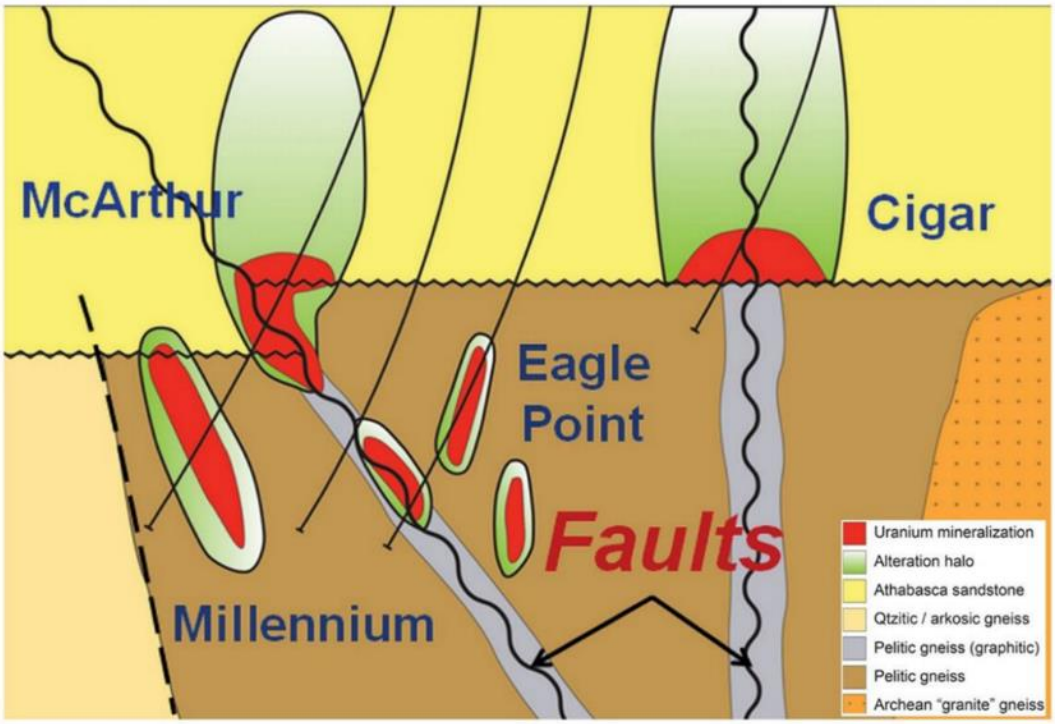
Additional Information, Maps and Reference Figures

Global Presence Map



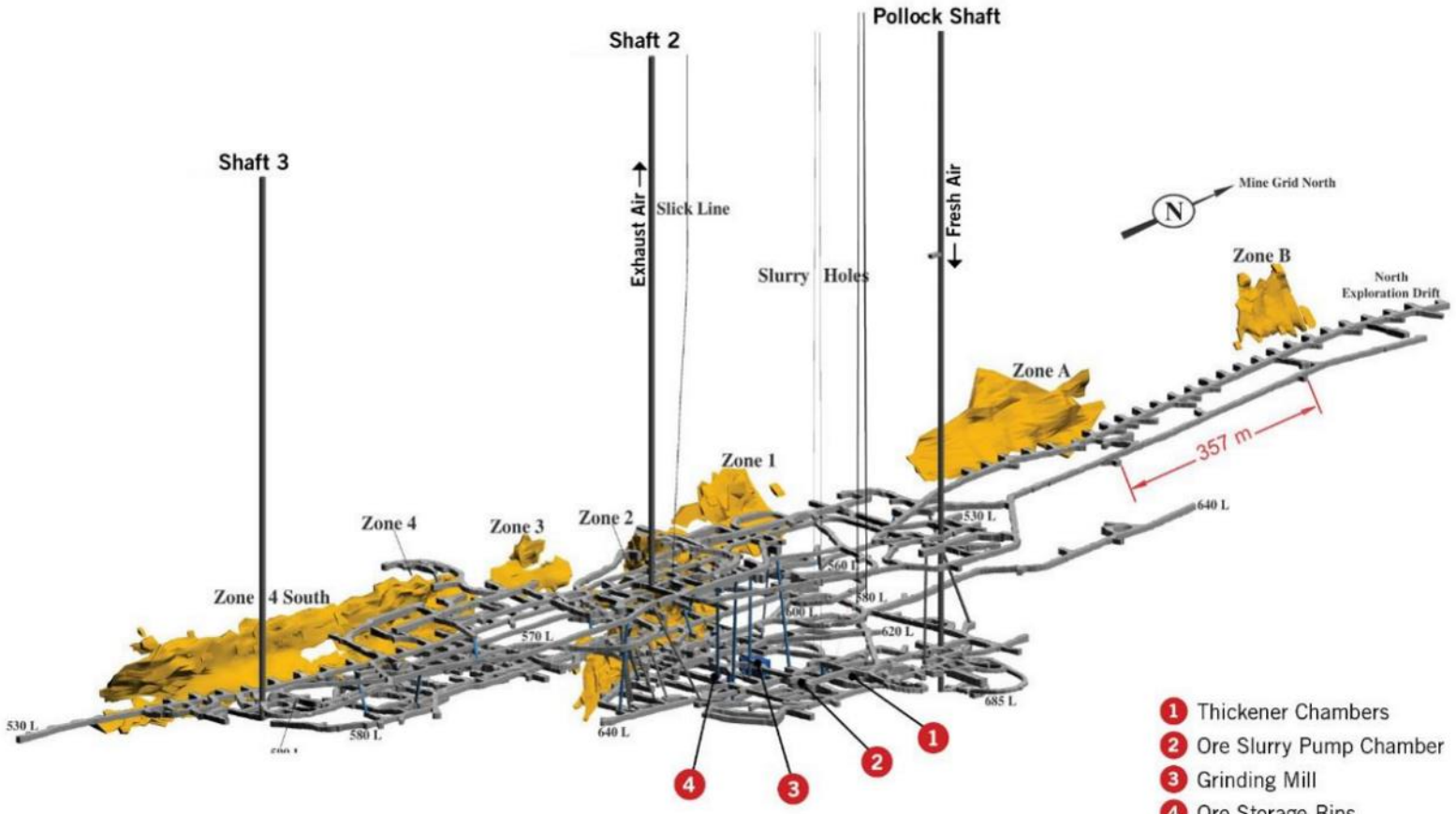
Cameco

Athabasca Uranium Deposit Model



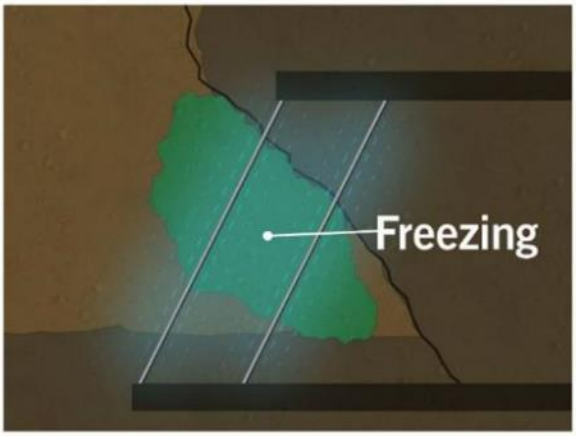
Cameco

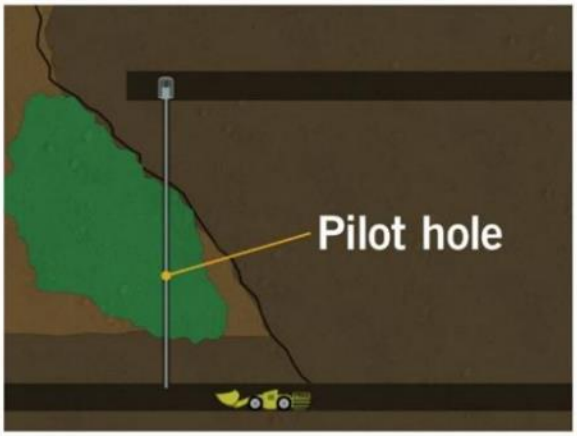
McArthur River - Underground Map

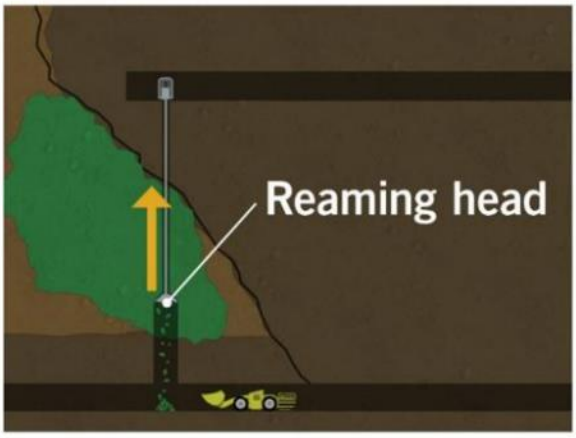


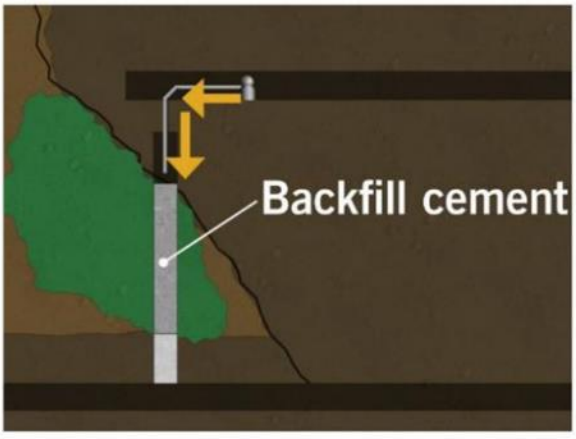
Cameco

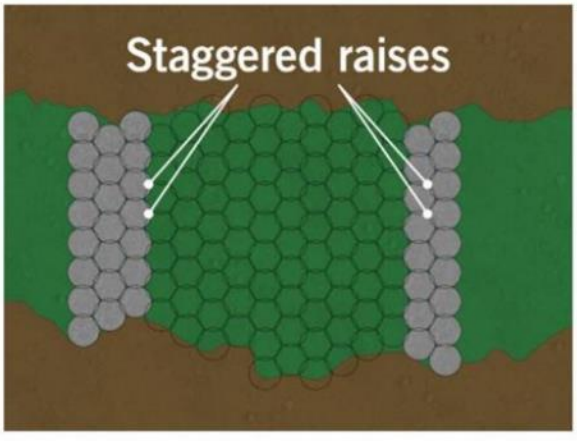
McArthur River - Raise Bore Mining System





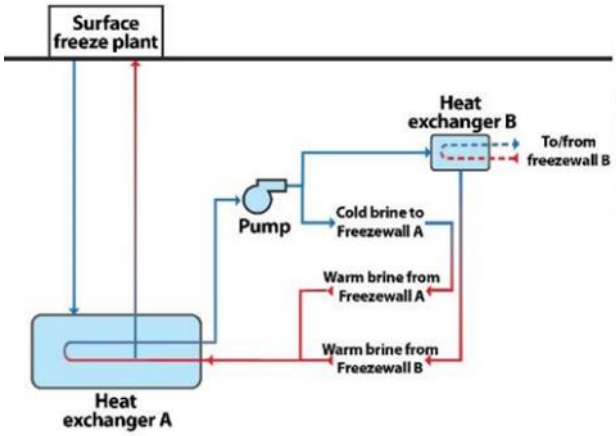




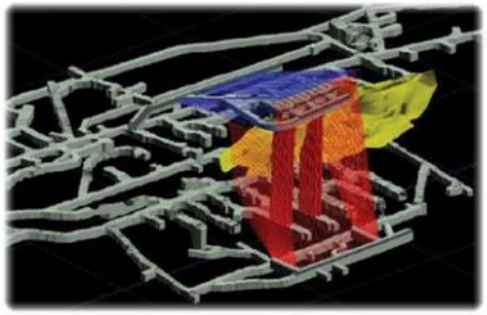


Cameco

McArthur River - Ground Freezing



Cathedral freezewall

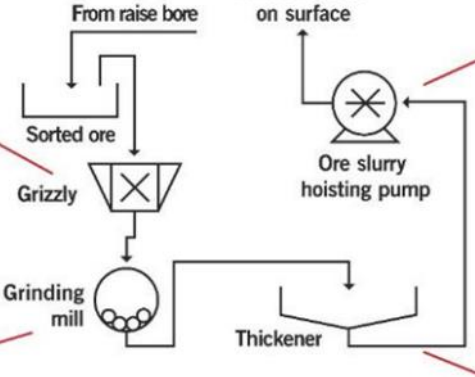


Cameco

McArthur River - Underground Ore Processing

Grizzly screen

Grinding mill

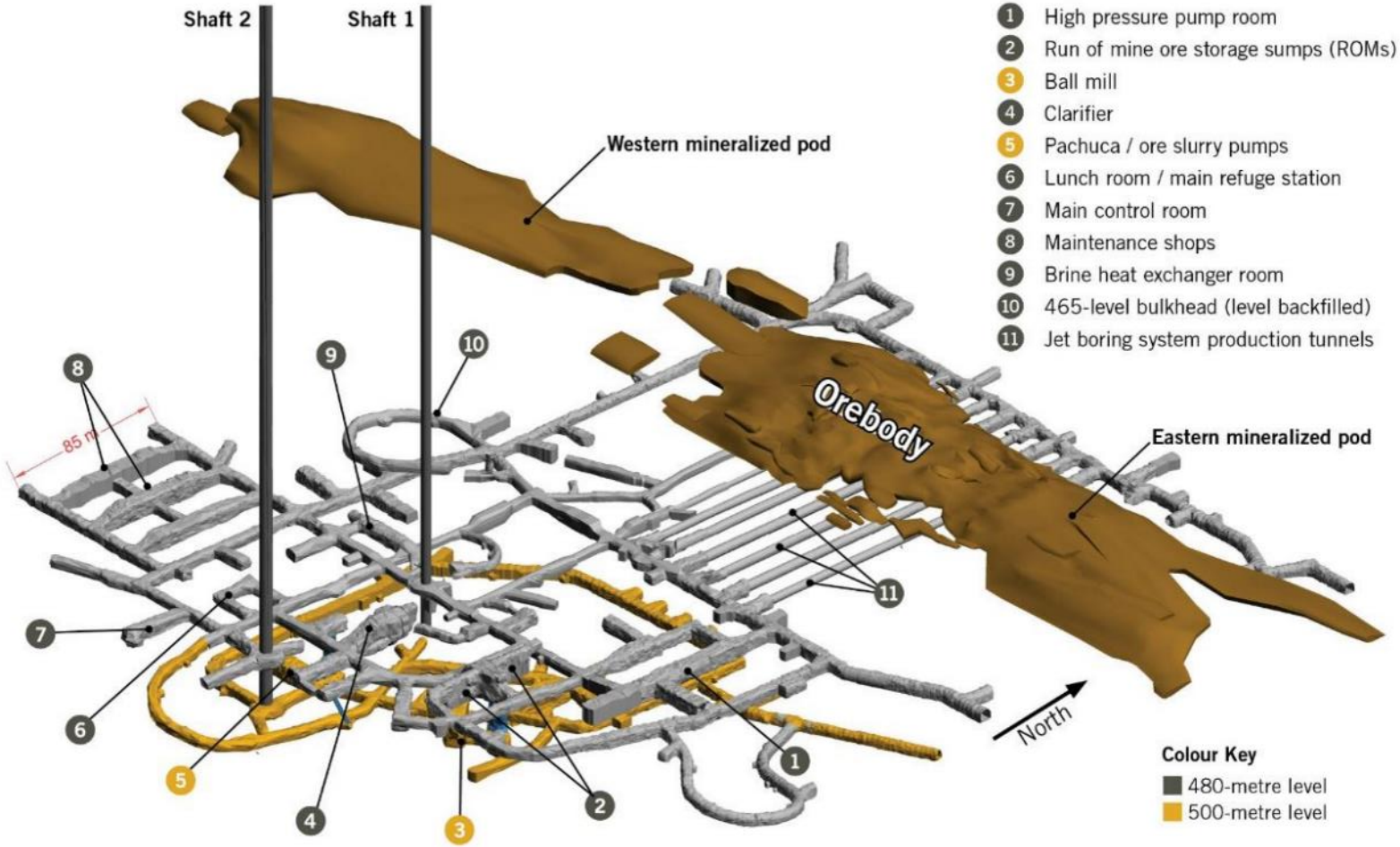


Ore slurry hoisting pump

Thickener

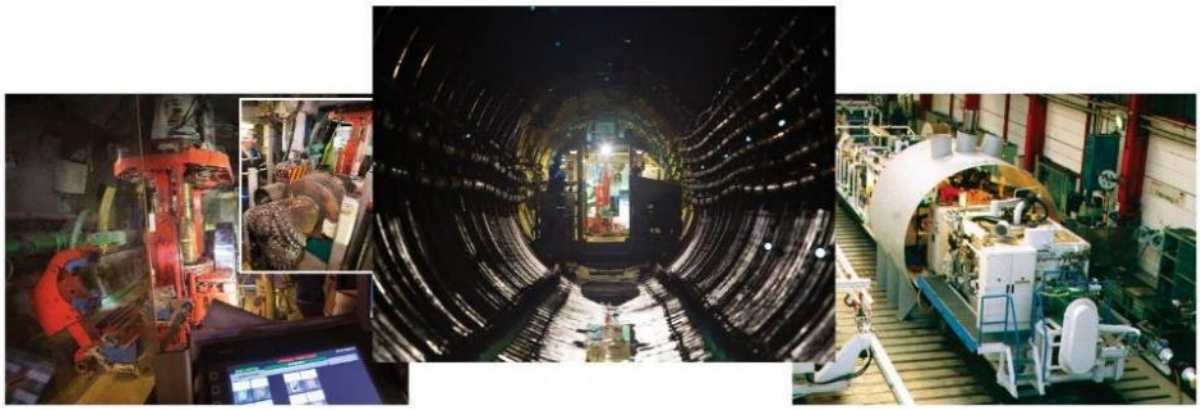
Cameco

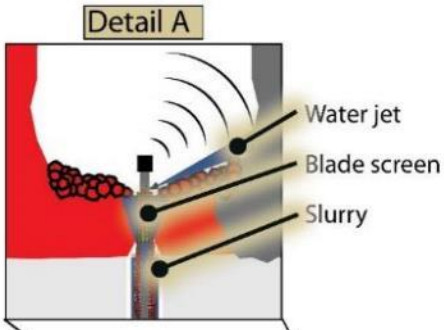
Cigar Lake - Underground Map



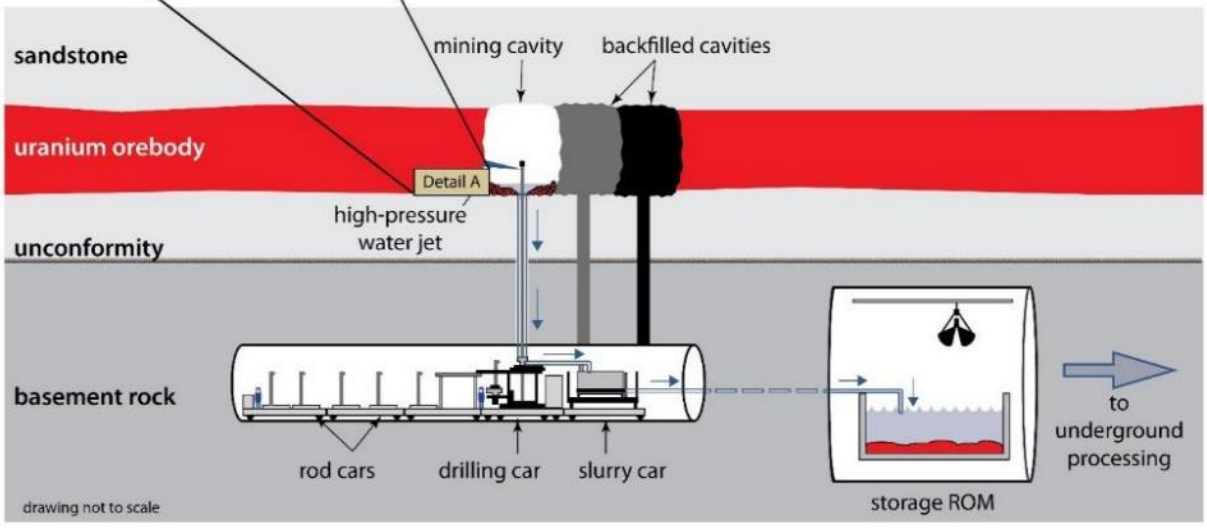
Cameco

Cigar Lake - Jet Bore Mining System (JBS)



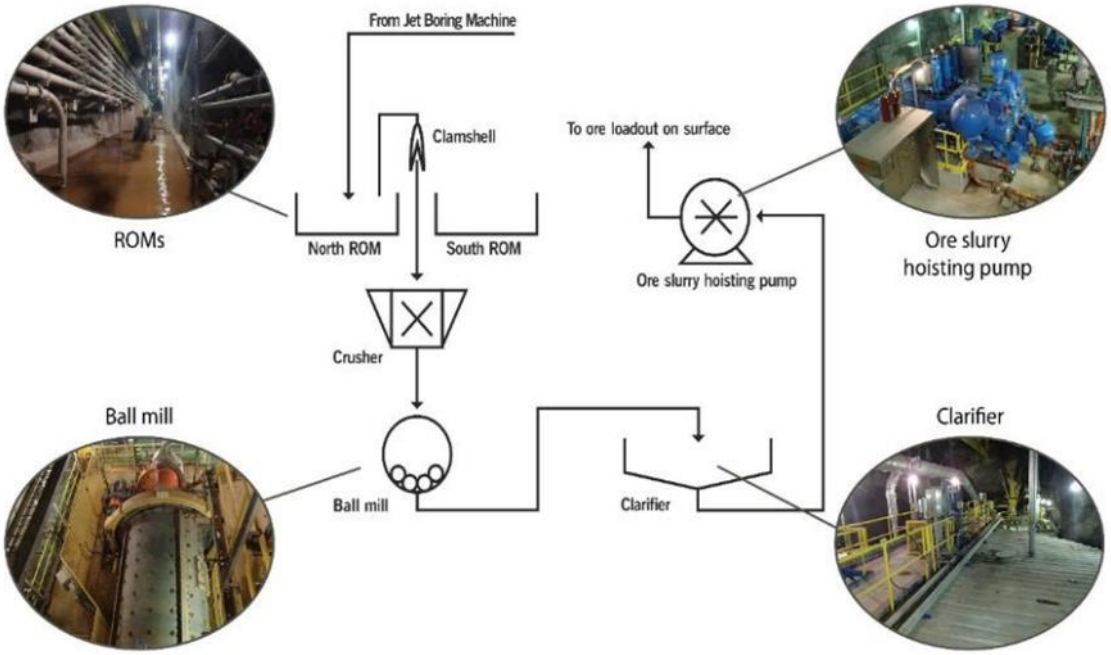


- Orebody frozen prior to mining
- Ore removed using high-pressure water jet
- Cavity monitored using survey equipment
- Cavity backfilled with concrete
- Ore slurry contained to control radiation, eliminate dust



Cameco

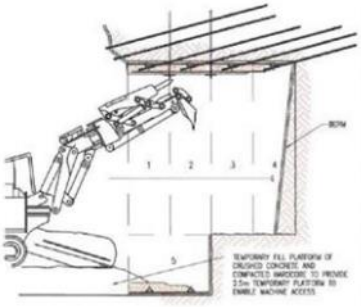
Cigar Lake - Underground Ore Processing

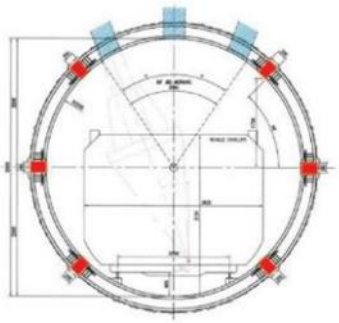


Cameco

Cigar Lake - New Austrian Tunneling Method (NATM)

Top-Heading Internal Support





Invert Internal Support

Advantages

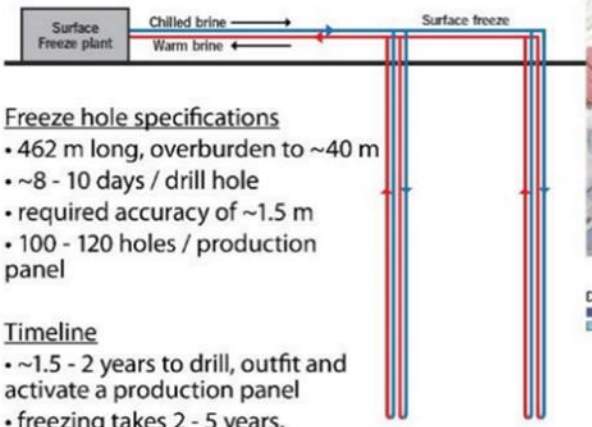
- Adaptive ground support, varies with rock strength
- Smaller amount of area open and unsupported ground at any given time
- Yielding elements absorb stress in a controlled, measured manner

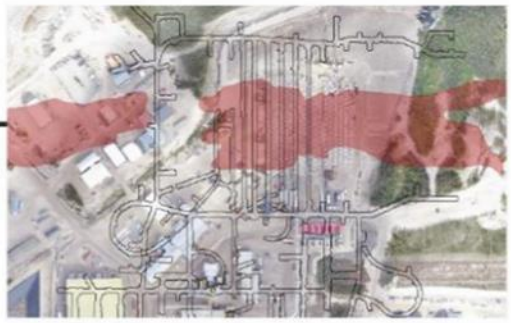
Comparison

- Overall time to develop a cross cut similar to tunnel boring
- NATM advance rate is slower, but setup and finish steps are faster
- Costs are similar between the two methods

Cameco

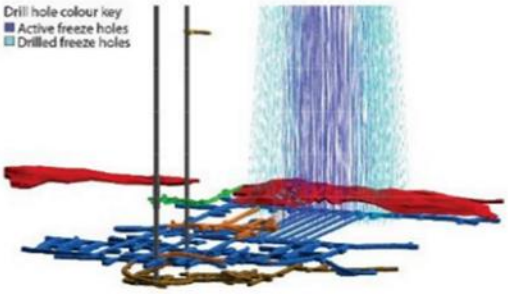
Cigar Lake - Surface Freezing





Freeze hole specifications
- 462 m long, overburden to ~40 m
- ~8 - 10 days / drill hole
- required accuracy of ~1.5 m
- 100 - 120 holes / production panel

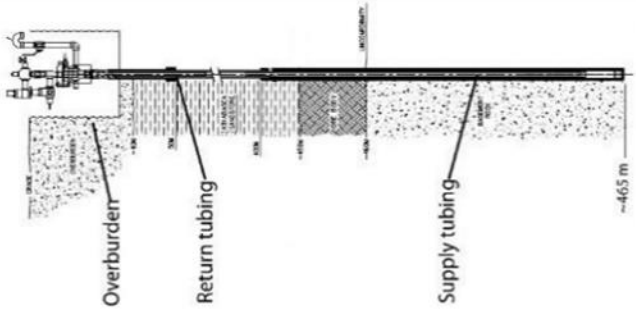
Timeline
- ~1.5 - 2 years to drill, outfit and activate a production panel
- freezing takes 2 - 5 years, depending on hole spacing and ground conditions



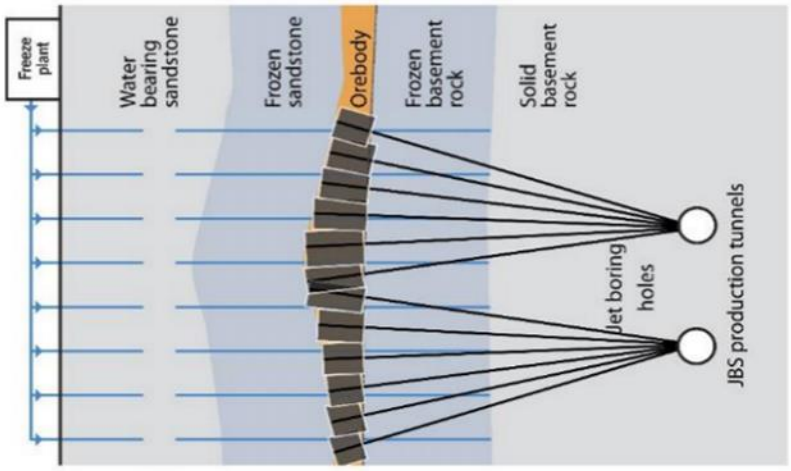
Cameco

Cigar Lake - Surface Freezing Detail

Freeze hole detail

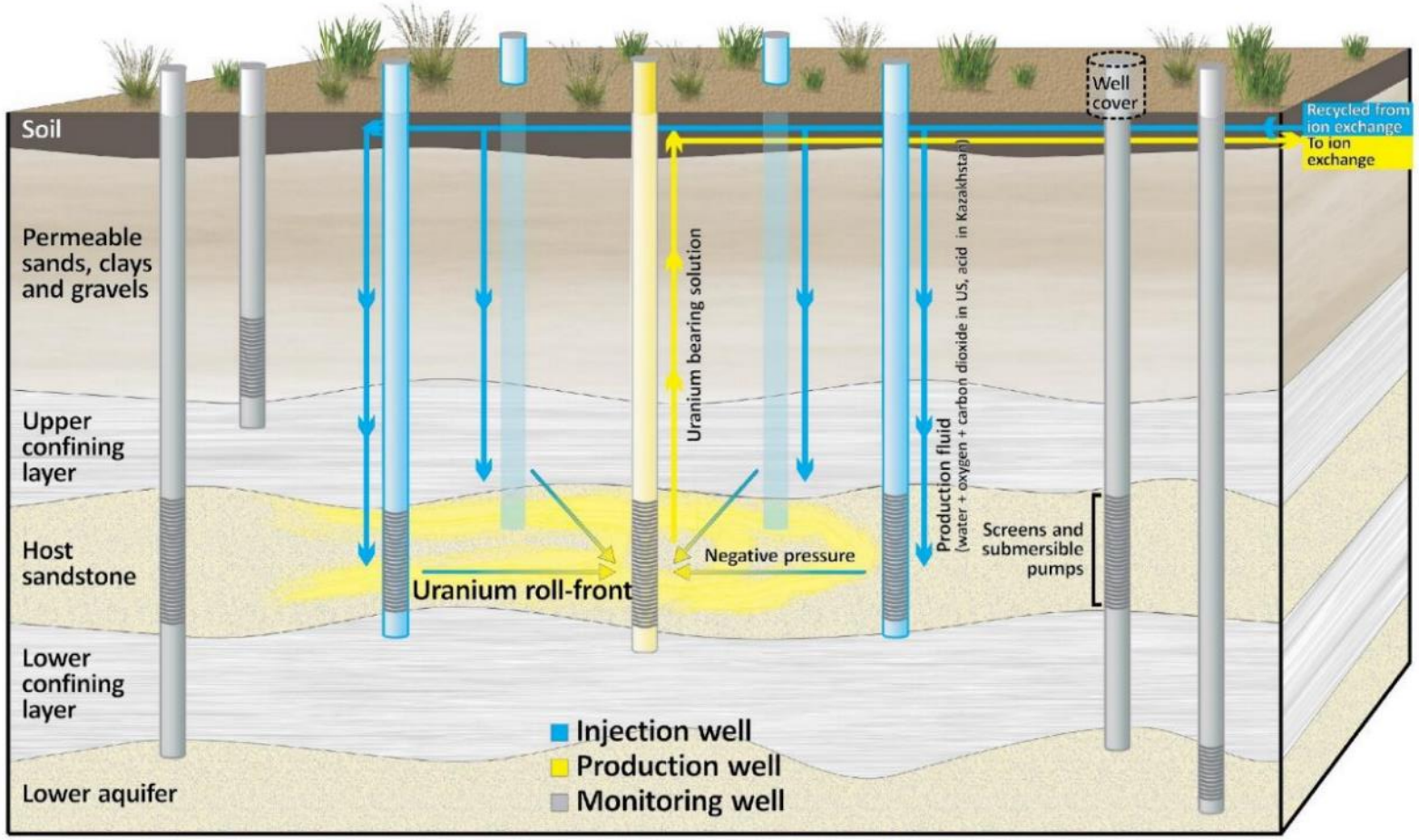


Surface freeze cross section



Cameco

In-Situ Recovery Process



Cameco

Mineral reserves

As of December 31, 2021 (100% – only the shaded column shows our share)

PROVEN AND PROBABLE

(tonnes in thousands; pounds in millions)

		PROVEN			PROBABLE			TOTAL MINERAL RESERVES			OUR SHARE RESERVES	
PROPERTY	MINING METHOD	TONNES	GRADE % U_3O_8	CONTENT (LBS U_3O_8)	TONNES	GRADE % U_3O_8	CONTENT (LBS U_3O_8)	TONNES	GRADE % U_3O_8	CONTENT (LBS U_3O_8)	CONTENT (LBS U_3O_8)	METALLURGICAL RECOVERY (%)
Cigar Lake	UG	271.0	15.90	95.0	177.5	14.67	57.4	448.5	15.41	152.4	**76.2**	98.5
Key Lake	OP	61.1	0.52	0.7	-	-	-	61.1	0.52	0.7	**0.6**	95
McArthur River	UG	2,139.6	6.97	328.9	575.1	5.13	65.1	2,714.7	6.58	393.9	**275.0**	99
Inkai	ISR	264,001.7	0.04	226.9	80,459.5	0.03	54.3	344,461.2	0.04	281.2	**112.5**	85
Total		**266,473.4**	-	**651.5**	**81,212.1**	-	**176.8**	**347,685.5**	-	**828.2**	**464.3**	-

(UG – underground, OP – open pit, ISR – in situ recovery)

Note that the estimates in the above table:

- use a constant dollar average uranium price of approximately $50 (US) per pound U_3O_8 except Inkai, where an average uranium price of approximately $35 (US) per pound U_3O_8 was used by JV Inkai
- are based on exchange rates of $1.00 US=$1.25 Cdn and $1.00 US=425 Kazakhstan Tenge

Our estimate of mineral reserves and mineral resources may be positively or negatively affected by the occurrence of one or more of the material risks discussed under the heading *Caution about forward-looking information* beginning on page 31, as well as certain property-specific risks.

Please see our mineral reserves and resources section of our most recent annual information form for the specific assumptions, parameters and methods used in the estimate of Cigar Lake, McArthur River, and Inkai mineral reserves.

Metallurgical recovery

We report mineral reserves as the quantity of contained ore supporting our mining plans and provide an estimate of the metallurgical recovery for each uranium property. The estimate of the amount of valuable product that can be physically recovered by the metallurgical extraction process is obtained by multiplying the quantity of contained metal (content) by the planned metallurgical recovery percentage. The content and our share of uranium in the table above are before accounting for estimated metallurgical recovery.

Caution About Forward-Looking Information

Statements contained in this handout include statements and information about our expectations for the future. When we discuss our strategy, plans and future financial and operating performance, or other things that have not yet taken place, we are making statements considered to be forward-looking information or forward-looking statements under Canadian and U.S. securities laws. They represent our current views and can change significantly. These statements are based upon a number of material assumptions, which may prove to be incorrect. Actual results and events may be significantly different from what we currently expect because of the risks associated with our business. We recommend that you review our most recent annual and any subsequent quarterly management's discussion and analysis for more information about these assumptions and risks. You should also review our current annual information form, which includes a discussion of other material risks that could cause actual results to differ significantly from our current expectations. Forward-looking information is designed to help you understand management's current views of our near and longer-term prospects, and it may not be appropriate for other purposes. We will not necessarily update this information unless we are required to by securities laws.

Examples of forward-looking information that may appear in this handout include: our expectations regarding future world electricity consumption and costs; our expectations regarding the demand for nuclear energy, the anticipated number of new reactors and the benefits of nuclear power; statements regarding uranium supply, demand, consumption, production, long-term contracting, prices and market conditions, the reasons for those expectations and the risks associated with them; our ability to respond to changing market conditions; our plans and outlook; production forecasts and other expectations regarding our uranium properties and our fuel services division; mineral reserve and mineral resource estimates; the outcome of litigation or other disputes, including disputes with tax authorities; and our market position and prospects for increasing shareholder value.

The material risks that could cause actual results to vary include: uranium prices decline due to reduced demand for nuclear energy or other causes; we are not successfully able to manage our costs, risks and operations; we are adversely affected by changes in currency exchange rates, interest rates, royalty rates, or tax rates; our production costs are higher than planned; necessary supplies are not available, or not available on commercially reasonable terms; our estimates of production, purchases, costs, cash flow, decommissioning, reclamation expenses, or our tax expense prove to be inaccurate; we are unable to enforce our legal rights under our existing agreements, permits or licences; we are subject to litigation or arbitration that has an adverse outcome; there are defects in, or challenges to, title to our properties; our mineral reserve and resource estimates are not reliable; there are unexpected or challenging geological, hydrological or mining conditions at uranium properties; we are affected by environmental, safety and regulatory risks, including increased regulatory burdens or delays; necessary permits or approvals from government authorities cannot be obtained or maintained; we are affected by political risks; we are affected by a widespread health crisis, terrorism, sabotage, blockades, civil unrest, social or political activism, accident or a deterioration in political support for, or demand for, nuclear energy; we are impacted by changes in the regulation or public perception of the safety of nuclear power plants; government regulations or policies that adversely affect us, including tax and trade laws and policies; our uranium or other suppliers or purchasers fail to fulfil commitments; development, mining or production plans are delayed or do not succeed for any reason; the risk our estimates and forecasts prove to be inaccurate; the risk our strategies are unsuccessful or have unanticipated consequences; we are affected by natural phenomena, including inclement weather, fire, flood and earthquakes; operations are disrupted due to problems with facilities, the unavailability of reagents, equipment, operating parts and supplies critical to production, equipment failure, lack of tailings capacity, labour shortages, labour relations issues, strikes or lockouts, underground floods, cave-ins, ground movements, tailings dam failures, transportation disruptions or accidents, or other development and operating risks.

We have made material assumptions regarding: our ability to manage our costs, risks and operations; sales and purchase volumes and prices for uranium and fuel services; trade restrictions; that counterparties to our sales and purchase agreements will honour their commitments; the demand for and supply of uranium; the construction of new nuclear power plants in various

countries and the relicensing of existing nuclear power plants not being more adversely affected than expected by changes in regulation or in the public perception of the safety of nuclear power plants; our ability to continue to supply our products and services in the expected quantities and at the expected times; production levels; costs, including production and purchase costs; the success of our plans and strategies; market conditions and other factors upon which we have based our plans and outlook; spot prices and realized prices for uranium; tax rates and payments, royalty rates, currency exchange rates and interest rates; the successful outcome of any litigation or arbitration claims; our decommissioning and reclamation expenses; the reliability of our mineral reserve and resource estimates; our understanding of the geological, hydrological and other conditions at uranium properties; the success of development, mining and production plans; our and our contractors' ability to comply with current and future environmental, safety and other regulatory requirements, and to obtain and maintain required regulatory approvals; and operations not being significantly disrupted as a result of a widespread health crisis, political instability, nationalization, terrorism, sabotage, blockades, civil unrest, breakdown, natural disasters, governmental or political actions, litigation or arbitration proceedings, the unavailability of reagents, equipment, operating parts and supplies critical to production, labour shortages, labour relations issues, strikes or lockouts, underground floods, cave-ins, ground movements, tailings dam failure, lack of tailings capacity, transportation disruptions or accidents, or other development or operating risks.

General DIsclaimer

This Investor Handout does not constitute an offer to sell, or a solicitation of an offer to buy, any securities. It is not intended for distribution in any jurisdiction where its distribution would be prohibited by law. In providing this Investor Handout, we do not undertake any obligation to update it, and the information contained in it is subject to change. Any information from a third party source that is quoted in this Investor Handout should not be considered to be adopted or endorsed by Cameco, and has not been independently verified by us. This Investor Handout does not contain all information important for investors, and you are urged to review Cameco's annual, quarterly and other disclosure documents available on our website and at www.sedar.com.

Important information for US investors

We present information about mineralization, mineral reserves and resources as required by National Instrument 43-101 – Standards of Disclosure for Mineral Projects of the Canadian Securities Administrators (NI 43-101), in accordance with applicable Canadian securities laws. As a foreign private issuer filing reports with the US Securities and Exchange Commission (SEC) under the Multijurisdictional Disclosure System, we are not required to comply with the SEC's disclosure requirements relating to mining properties. Investors in the United States should be aware that the disclosure requirements of NI 43-101 are different from those under applicable SEC rules, and the information that we present concerning mineralization, mineral reserves and resources may not be comparable to information made public by companies that comply with the SEC's reporting and disclosure requirements for mining companies.

Qualified persons

The technical and scientific information discussed in this presentation for our material properties (McArthur River/Key Lake, Cigar Lake and Inkai) was approved by the following individuals who are qualified persons for the purposes of NI 43-101:

MCARTHUR RIVER/KEY LAKE

- Greg Murdock, general manager, McArthur River/Key Lake, Cameco
- Alain D. Renaud, chief geologist, technical services, Cameco
- Biman Bharadwaj, principal metallurgist, technical services, Cameco

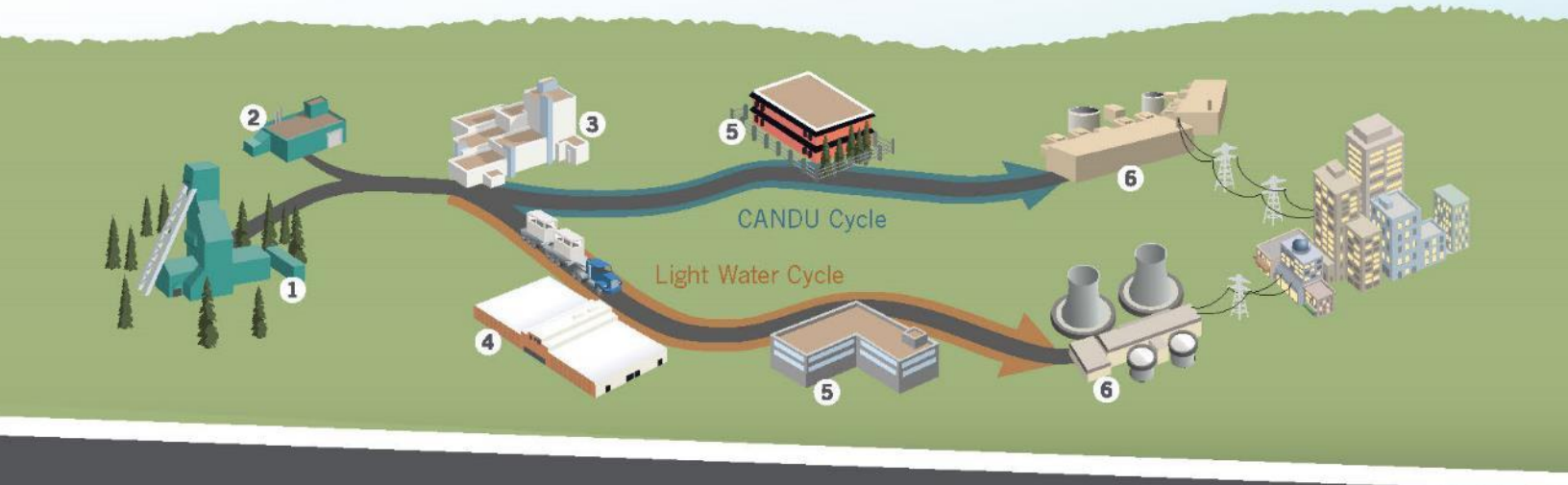
CIGAR LAKE

- Lloyd Rowson, general manager, Cigar Lake, Cameco
- Scott Bishop, director, technical services, Cameco
- Alain D. Renaud, chief geologist, technical services, Cameco
- Biman Bharadwaj, principal metallurgist, technical services, Cameco

INKAI

- Alain D. Renaud, chief geologist, technical services, Cameco
- Scott Bishop, director, technical services, Cameco
- Biman Bharadwaj, principal metallurgist, technical services, Cameco
- Sergey Ivanov, deputy director general, technical services, Cameco Kazakhstan LLP

The nuclear fuel cycle



1 Mining

Once an orebody is discovered and defined by exploration, there are three common ways to mine uranium, depending on the depth of the orebody and the deposit's geological characteristics:

- *Open pit mining* is used if the ore is near the surface. The ore is usually mined using drilling and blasting.
- *Underground mining* is used if the ore is too deep to make open pit mining economical. Tunnels and shafts provide access to the ore.
- *In situ recovery (ISR)* does not require large scale excavation. Instead, holes are drilled into the ore and a solution is used to dissolve the uranium. The solution is pumped to the surface where the uranium is recovered.

1 Milling

Ore from open pit and underground mines is processed to extract the uranium and package it as a powder typically referred to as uranium concentrates (U_3O_8) or *yellowcake*. The leftover processed rock and other solid waste (*tailings*) is placed in an engineered tailings facility.

2 Refining

Refining removes the impurities from the uranium concentrate and changes its chemical form to *uranium trioxide* (UO_3).

3 Conversion

For light water reactors, the UO_3 is converted to uranium hexafluoride (UF_6) gas to prepare it for enrichment. For heavy water reactors like the CANDU reactor, the UO_3 is converted into powdered *uranium dioxide* (UO_2).

4 Enrichment

Uranium is made up of two main isotopes: U-238 and U-235. Only U-235 atoms, which make up 0.7% of natural uranium, are involved in the nuclear reaction (fission). Most of the world's commercial nuclear reactors require uranium that has an enriched level of U-235 atoms.

The enrichment process increases the concentration of U-235 to between 3% and 5% by separating U-235 atoms from the U-238. Enriched UF_6 gas is then converted to powdered UO_2.

5 Fuel manufacturing

Natural or enriched UO_2 is pressed into pellets, which are baked at a high temperature. These are packed into zircaloy or stainless steel tubes, sealed and then assembled into fuel bundles.

6 Generation

Nuclear reactors are used to generate electricity.

U-235 atoms in the reactor fuel fission, creating heat that generates steam to drive turbines. The fuel bundles in the reactor need to be replaced as the U-235 atoms are depleted, typically after one or two years depending upon the reactor type. The used – or spent – fuel is stored or reprocessed.

Spent fuel management

The majority of spent fuel is safely stored at the reactor site. A small amount of spent fuel is reprocessed. The reprocessed fuel is used in some European and Japanese reactors.

Energizing a clean-air world