

Saskatchewan: A Global Critical Minerals Hub

Saskatchewan: A Growing Critical Minerals Hub Meeting Global Demand

Prince Albert and District
Chamber of Commerce
June 1, 2023

Uranium

Potash

SASKATCHEWAN MINING ASSOCIATION

We help keep the lights on, keep food on the table and provide the raw materials used in the technology people throughout the world need and use every day.

Official Mission Statement:

Advance a safe, sustainable & globally competitive exploration and mining industry in Saskatchewan that benefits all residents of the province

- Over 40 Member companies including producers and exploration companies with projects or operations in Saskatchewan
 - Nutrien, The Mosaic Company, Cameco, Orano, Westmoreland Coal, SSR Mining, K+S Potash Canada, HudBay Minerals, BHP, Denison Mines, Rio Tinto, Star Diamonds, NexGen Energy, Foran Mining and dozens of exploration companies.

Voice of the Saskatchewan mining and exploration industry.



2022 PERFORMANCE HIGHLIGHTS



Safe Production – 14.8 M exposure hours with all Mining Codes lower than “all industry” rate.

Record **value of mineral sales** - ~\$19.5 B

Potash: ~ 23 M tonnes KCl

Metallic: 136,125 troy oz Au (record); first processing of REE ore at Vital Metal lab in Saskatoon; transition of HudBay’s operation from Flin Flon to Snow Lake.

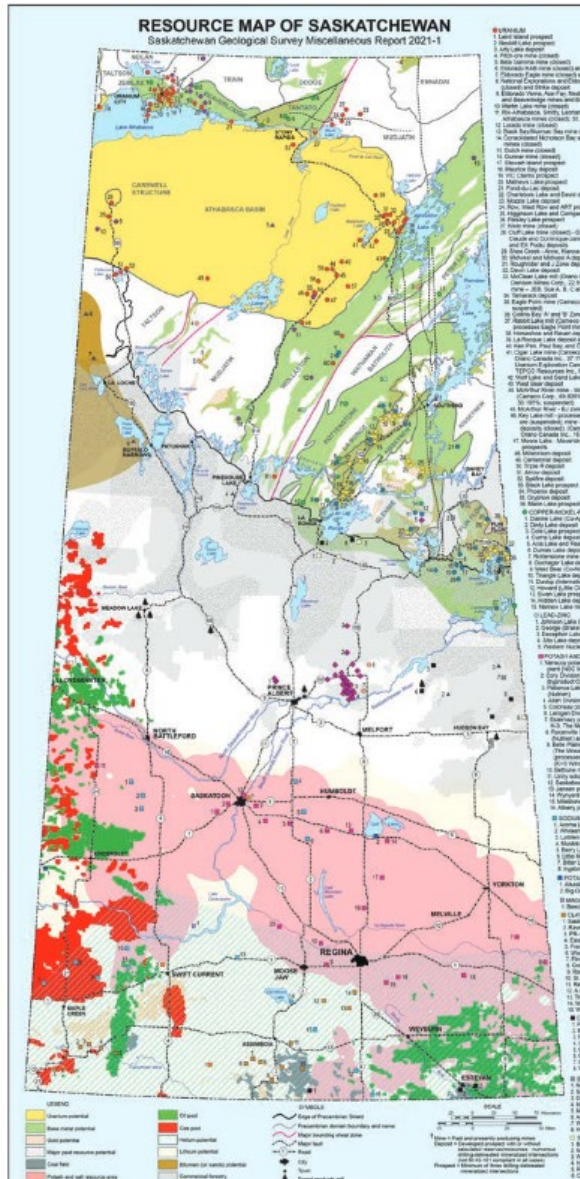
Uranium: 19.2 M lbs U₃O₈ (resumption of production from McArthur – Key in Nov. 2022)

Industrial – Strong sales 7.2 M tonnes thermal coal

Exploration: \$262.5 M



SK: RICH IN MINERAL RESOURCES



- >23 SK mine facilities throughout Saskatchewan
- Geologic Framework is SK Advantage – world class mines and deposits
 - ✓ Potash
 - ✓ Uranium
 - ✓ Diamonds
 - ✓ Gold and Coal
 - ✓ Diverse Potential for Critical Minerals/Battery Minerals (Ni, Li) REE, Chromite, Base metals (copper and zinc), Cobalt;
 - ✓ 23 of Canada's 31 Critical Minerals

SASKATCHEWAN: Canadian & Global Mining Leader



#1
Canadian
Mineral
Investment
Attraction
#3 Global



#1
2022
Potash
Producer
Global
(37%)



#2
2022
Uranium
Producer
Global
(16%)



#1
2022
Value of
Mineral
Product
\$19.5B



#1
Industrial
Employer of
Indigenous
people



#4
2022
Canadian
Expln
\$362.8 M
(10%)
(ON, QB, BC)



**Leading
Client of
Rail and
Vessel
Transport
(Value &
Volume)**



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SK MINING BY THE NUMBERS - 2021

Payroll

>\$1.1 BILLION

From exploration through operations and export, SK companies **support jobs** in every part of the province.



SK mining operations paid more than **\$1.1 billion** to employees in 2021.

Employment

26,247



For every **direct job** in the SK industry, there are at least **two jobs** in the mining supply and service sector.



Taxes

>\$2 BILLION

In 2021 SK mining companies contributed over **\$2 billion** in provincial, federal and municipal taxes, creating government revenue for health care, education and infrastructure development.

12%
of SK GDP



Value of Mineral Sales

\$8.6 BILLION



Top 5 markets

SK Potash	SK Uranium
United States	United Kingdom
China	United States
Brazil	Germany
Indonesia	Netherlands
India	Romania

Community

> \$20.2 MILLION

In 2021 SK mining operations made over **\$20.2 million** in social and community contributions.



Procurement

\$2.2 BILLION

In 2021 SK mining companies purchased **\$2.2 billion** of their total goods and services from Saskatchewan suppliers.



Indigenous

> 368 MILLION

In 2021 Saskatchewan mining operations purchased **\$368 million** of goods and services from Indigenous-owned businesses.



- **Very high level of public support:** 2022 Survey of 1000 SK residents indicated 92% are supportive of mining industry



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SK MINING BY THE NUMBERS - 2022

SASKATCHEWAN POTASH

Nourishing the earth

A snapshot of Saskatchewan's potash industry in 2022

Saskatchewan potash is a critical mineral used worldwide as a replenishing agricultural fertilizer to feed the growing global population that is soaring towards an estimated 9.7 billion by 2050.

#1 MYP MINERAL IN CANADA BY VALUE OF SALES
In 2022 Potash from Canada's ROM **\$18,000,000,000** in terms of value of sales.

ECONOMIC CONTRIBUTIONS

FINANCIAL

CONTRIBUTION TO PROVINCIAL GDP:

\$8.6 Billion

(Statistics Canada)

TAXES:

\$5.4 Billion

(Federal, Provincial and Local)

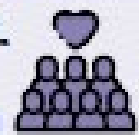


COMMUNITY INVESTMENT

Saskatchewan potash companies invest in community initiatives, programs, and causes that enhance quality of life across the province.

\$35.5 Million

Invested in various communities and Indigenous partnerships.



EMPLOYMENT

For every direct job in the Saskatchewan mining industry, there are **21 indirect jobs** in the mining supply and service sector.

JOBS

5,800

Saskatchewan direct employees



SALARIES

\$896 Million

Total payroll

\$109,720

2022 national average salary of employees in Saskatchewan mining industry – 50% higher than average annual earnings of Saskatchewan workers.



Potash is a valuable resource that has a significant positive impact on the economy of Saskatchewan and its communities.

AMOUNT MINED

23 Million tonnes of POT

Three producing companies – **20% POTASH CANADA**, the world's largest potash producer and exporter, and **20% POTASH CANADA**, the world's largest potash producer and exporter, and **20% POTASH CANADA**, the world's largest potash producer and exporter.



AMOUNT EXPORTED

95%

Major Markets include:



Saskatchewan has the largest and richest potash resources in the world, and could supply the needs of farmers worldwide for several hundred years.

Not only does potash nourish the Earth, it's also used to make industrial products and pharmaceuticals.

SAFETY

Working in one of our seven industries in Saskatchewan, and in Canada.

Last Year Injuries per 1 million hours worked: 1.3



SALES, RESERVES AND EMISSIONS INTENSITY

\$18 Billion in sales

#1 Potash producer in the world.



1/2

Saskatchewan has approximately half the world's potash reserves.



Low Carbon Potash

Saskatchewan potash is made with 50% lower CO2 intensity than potash produced by global competitors.



PROCUREMENT

\$3.1 Billion

Total value procured from all suppliers.



\$1.8 Billion

goods and services procured from Saskatchewan businesses.



\$403 Million

goods and services procured from Saskatchewan Indigenous businesses.

Source: Saskatchewan Mining Association (SMA) and Saskatchewan Potash Producers Association (SPPA). Data is based on 2022 production and sales figures. Figures are estimates and may vary slightly from actual figures.



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@SaskMiningAssoc



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SK MINING BY THE NUMBERS - 2022

SASKATCHEWAN URANIUM

Energizing the world
A snapshot of Saskatchewan's uranium industry in 2022

Saskatchewan is home to the world's highest grade uranium mines.

Saskatchewan uranium is a critical mineral used worldwide to produce the nuclear fuel for **safe, reliable, clean-air electricity**.

Energy Density of Uranium



Fewer than 10 uranium pellets, weighing about 20 grams each, would be needed to power the average Canadian household for a year.

Zero CO₂ emissions

Abundant carbon-free electricity

At the fully licensed capacity of their tier-one operations, Saskatchewan's uranium producers could mine and mill enough uranium every year in the province's north to meet 170%* of Canada's total annual electricity demand with carbon-free nuclear energy.



Cameco Corporation and Orano Canada Inc. are the two companies producing all of Canada's uranium. Both are committed to strong northern partnerships, particularly with Indigenous people, and emphasize safety, environmental protection and socially responsible conduct in every aspect of their businesses.

*Based on 2018 nationwide electricity production of 641 TWh - Source: NRC

ECONOMIC CONTRIBUTIONS

FINANCIAL

CONTRIBUTION TO PROVINCIAL GDP:
\$576.8 Million

(Source: Statistics Canada)

TAXES:
\$181 Million

(Federal, Provincial and Local)



EMPLOYMENT

Uranium mining employs Saskatchewan residents and is indirectly responsible for many more jobs and careers.



JOBS
2,381

Saskatchewan employees including contractors

1,930

Northern site employees and contractors

48% of northern workers are residents of Saskatchewan's north

COMMUNITY INVESTMENT

\$4.8 Million

including local organizations, Indigenous partnerships and scholarships.



PROCUREMENT

\$639 Million

total value procured from all suppliers.

\$448 Million

goods and services procured from Saskatchewan businesses.



\$226 Million

services procured from Saskatchewan Indigenous businesses.



SALARIES

\$289 Million

total payroll

\$109,720

2022 national average salary of employees in Saskatchewan mining industry - 50% higher than average annual earnings of Saskatchewan workers.

SAFETY

Mining is one of the safest industries in Saskatchewan, and in Canada.



Lost Time Injury per 1 million hours worked: 2.6

Statistics have been compiled from information provided by Saskatchewan's two producing uranium mining companies, Cameco and Orano, and the Saskatchewan Mining Association. Government of Saskatchewan and Statistics Canada. All numbers are from 2022.



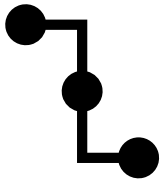
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What are Critical Minerals ?



They are of **strategic geopolitical** importance to **economic and national security**, and are also vulnerable to **supply chain disruption**



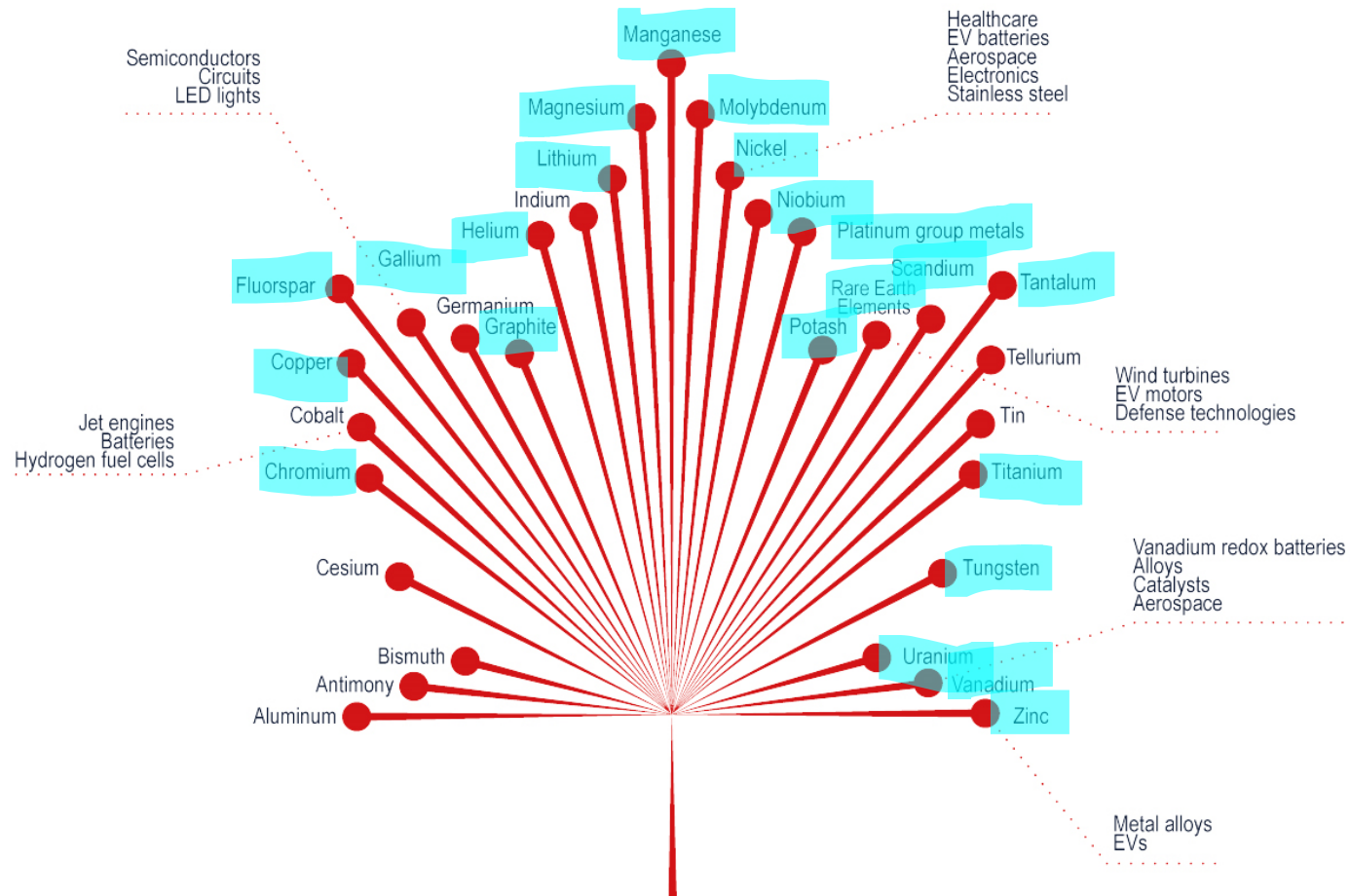
They are key inputs in **clean energy transition** including electrification



They are key inputs into the **digital technology transformation** including electronic devices

Saskatchewan has **23** of Canada's **31** listed Critical Minerals

What are Critical Minerals ?



Saskatchewan has 23 of Canada's 31 listed Critical Minerals

SK CRITICAL MINERALS STRATEGY (CMS)

- Sask has deposits or occurrences of **23 of 31** minerals on Canada's Critical Minerals list
- Different commodity profile than other provinces
- World leading producers of 2 – **potash** and **uranium**
- Past producer of copper, nickel, PGE
- Near – term producer of copper, lithium and REE processing.
- Tailored Saskatchewan CMS Strategy released March 27, 2023 that **builds** on our unique strengths.
- Integrated, whole of government approach that **aligns** regulations and policies with the strategy. Budget 2023-24 identified:
 - Increased investments in exploration incentives
 - Investments in geoscience
 - Improvements to bottlenecks in government system - exploration permitting
 - Investments in REE processing space
 - Investments in financing assistance for Indigenous businesses.



SK's Critical Minerals Opportunities

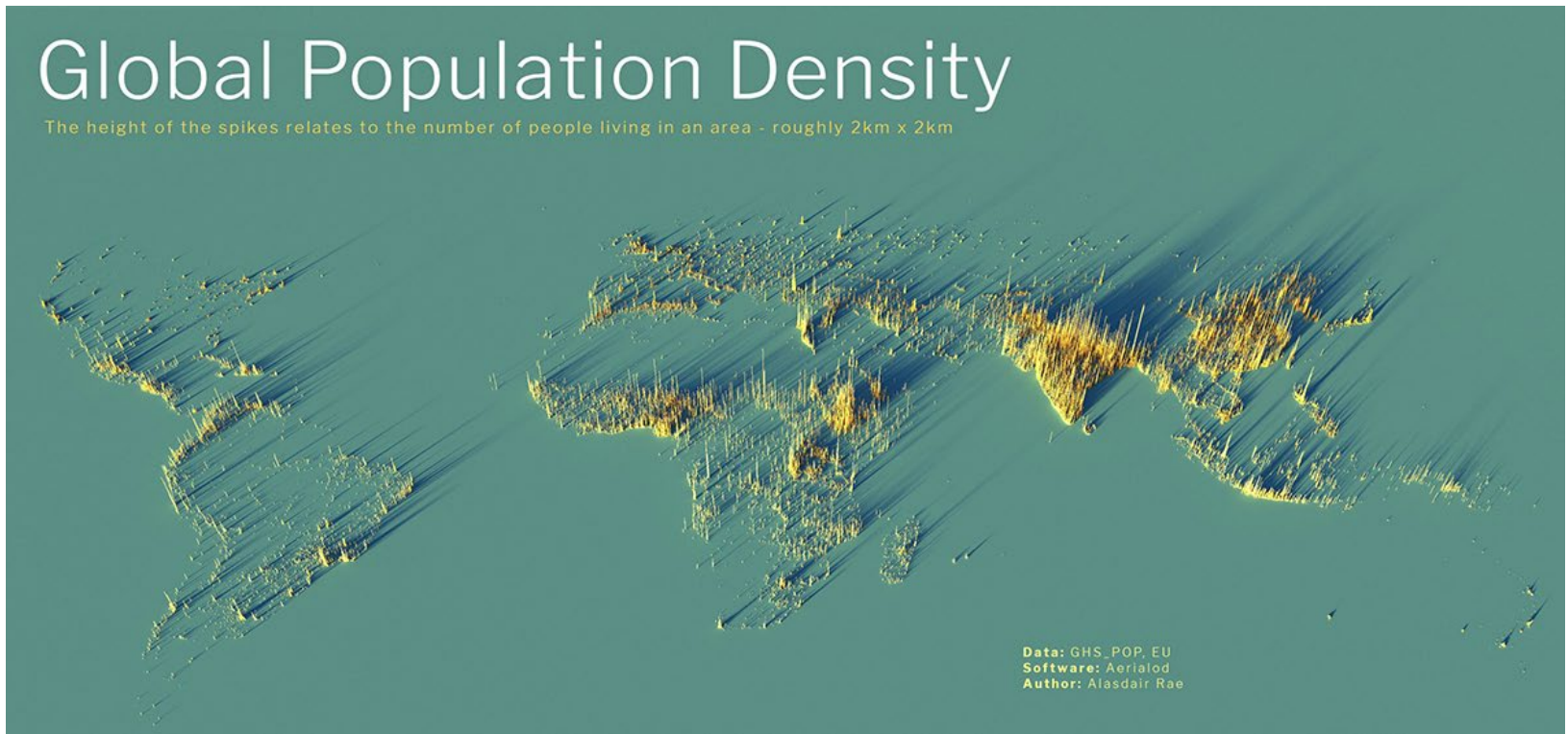
What are the Key Drivers?

2050

1. Growing Global Population
2. Food and Clean Energy Security
3. Climate Change & Net Zero Emissions
4. Geopolitics & Supply Chain Security



Critical Mineral Drivers: Population



MINERS MATH = > FOOD > CLEAN ENERGY ON < LAND

Critical Minerals Drivers: Sustainable Food and Clean Energy Security

1. Food Security:

In the next **40 years** the equivalent of all of the food produced in the **last 10,000 years**

- Crop production must increase by 70% by 2050
- >productivity from <land
- Canadian potash produced with 50% fewer emissions than global competitors

2. Energy Security

- Globally, 1 billion people still live without electricity.
- Nuclear energy is clean and baseload
- SK uranium generated 306 B kw hours of clean electricity = 28 M homes for a year



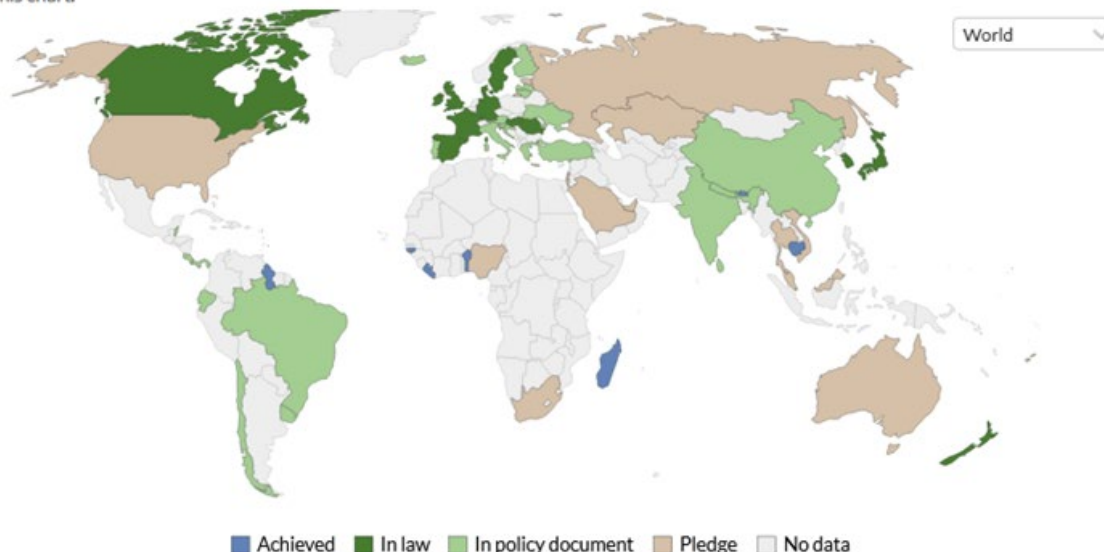
Critical Minerals Drivers Climate Change

Status of net-zero carbon emissions targets

The inclusion criteria for net-zero commitments may vary from country to country. For example, the inclusion of international aviation emissions; or the acceptance of carbon offsets.

To see the year for which countries have pledged to achieve net-zero, hover over the country in the interactive version of this chart.

Our World
in Data



Source: Net Zero Tracker. Energy and Climate Intelligence Unit, Data-Driven EnviroLab, NewClimate Institute, Oxford Net Zero. Last updated: 2nd November 2021.
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

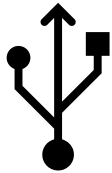
- Emerging markets for SMR -grid decarbonization and industrial heat
- Growing global acknowledgement that no net-zero without nuclear – strong nuclear growth
- Nuclear has **lower life cycle emissions** per gigawatt hour; **smaller footprint, higher energy density** than renewables; better **safety** record

Drivers: Clean Energy & Technology Transition

Critical Minerals Needed For:



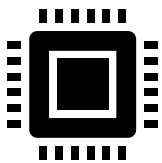
- Generation



- Transmission



- Storage



- Technology

Critical Minerals Drivers: Geopolitical Supply Chain Security

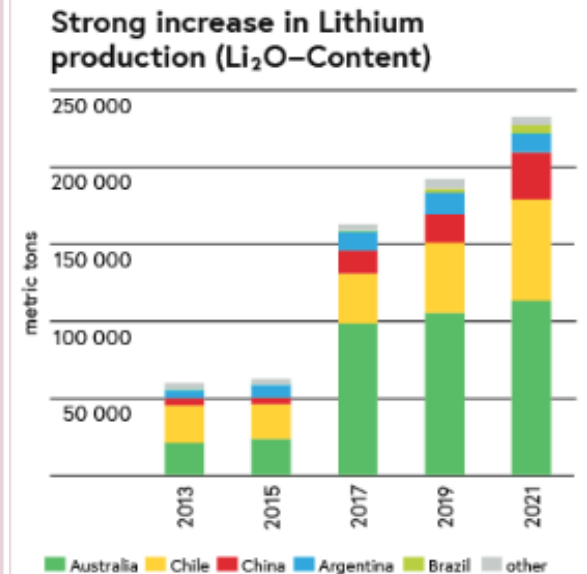
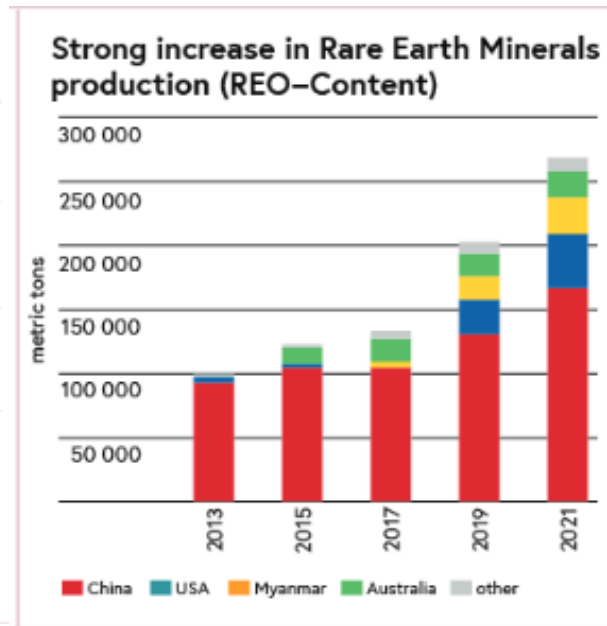
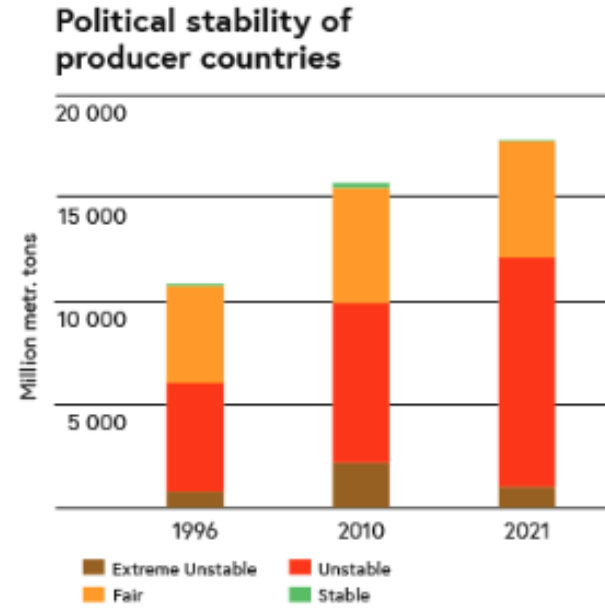
Geopolitical Security of Supply Chain

- Growing awareness of supply chain vulnerabilities for materials that are building blocks for technology and net-zero carbon future.
- World Bank - 500% increase of production of green minerals to produce clean technology essential to limiting global T rise to 2 C – including electrification of transportation.
- Sanctions on Belarus potash related to ongoing human rights violations (2020)
- Russia's 2021 invasion of Ukraine and resulting potash sanctions; shipping disruptions; exacerbated food and clean energy supply chain - Ukraine and Russia as food supplier to Europe and Africa. Russia's global gas exports (e.g. Germany);
- China's aggression towards Taiwan – major computer chip manufacturer



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Drivers: Geopolitical Risk & Supply Chain Security



Source: World Mining Data 2023

Supply v. Demand Opportunity

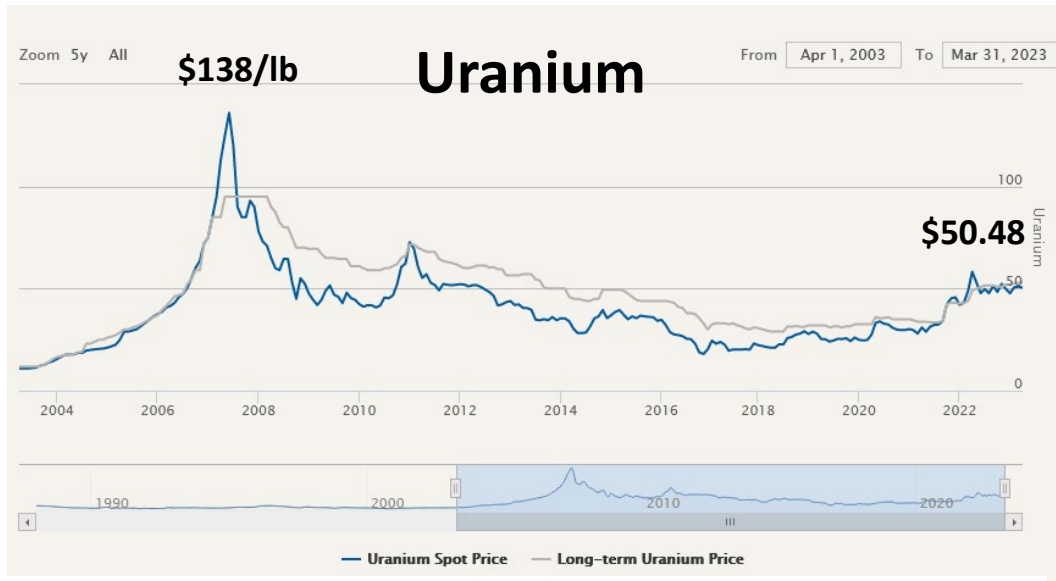
- ↑ Increase current global output of minerals by **6x**
- ↑ Nationalization
- ↑ Mergers and Acquisitions



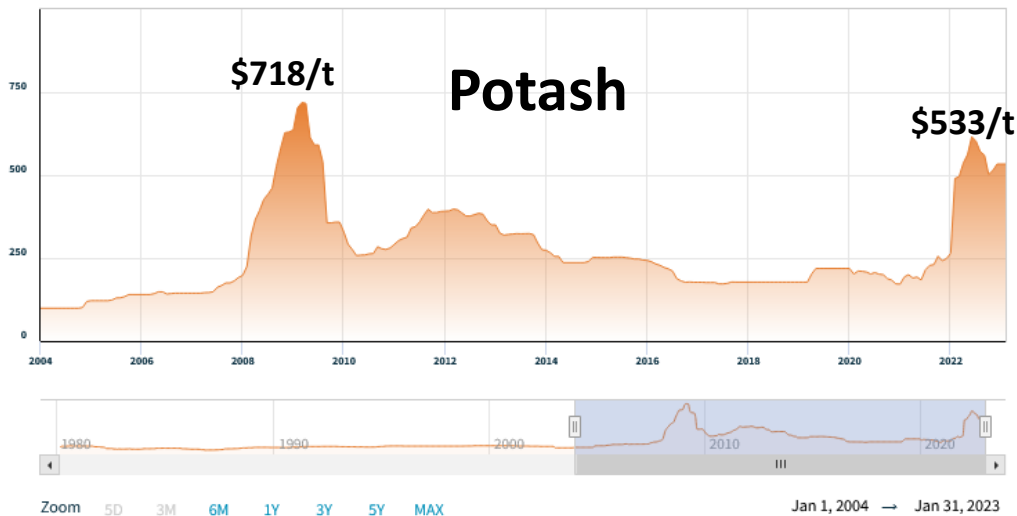
Source: SME Meeting the World's Future Mineral Needs

Global Potash and Uranium Outlook

Commodity Prices



- 10 year decline in commodity prices; low inventory; strengthening of spot/contract
- Well positioned to bring in lowest cost additional product to global market with both uranium and potash



Critical Minerals: Potash

- 100% of Canadian Production; 37% global production
- 10 producing mines
 - (7 underground; and 3 solution)
- 3 producing companies:
 - Nutrien (6) Mosaic (3) K+S Potash Canada (1)
- 2022 production – 22 M t KCl valued at \$ > 18 B
- Pre-Production:
 - BHP 2026 (4.35 M t KCl Phase 1)

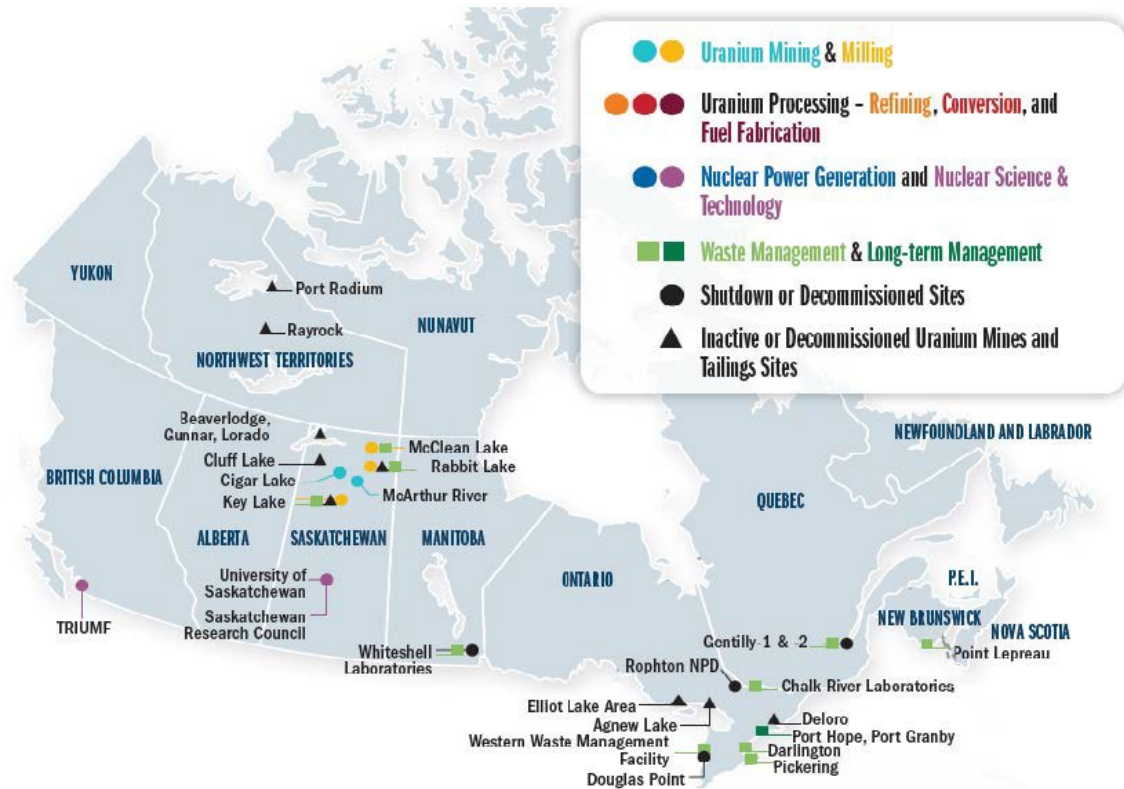


Critical Minerals: Uranium



- 100% of Canadian production; 16% global production in 2022
- 2 operating mines by end of 2022
 - Cigar Lake Mine/McClean Lake Mill
 - McArthur River Mine/Key Lake – world's largest, high grade mine announced temp. suspension - July 2017 – Feb 2022; production (Nov 2022)
 - Eagle Point/Rabbit – production suspended in 1Q 2016
- 15.3 M lbs U₃O₈ in 2022; values of sales \$1 Billion
- Pre-Production:
 - Denison – Phoenix ISR
 - NexGen - Arrow – feasibility study

Build on Existing Pan-Canadian Nuclear Supply Chain



ECONOMIC



\$5B to the economy; **30,000 direct jobs**. **\$26B** investments to refurbish Ontario's fleet.



1.4B uranium exports annually; powers **1 in 17** American homes.



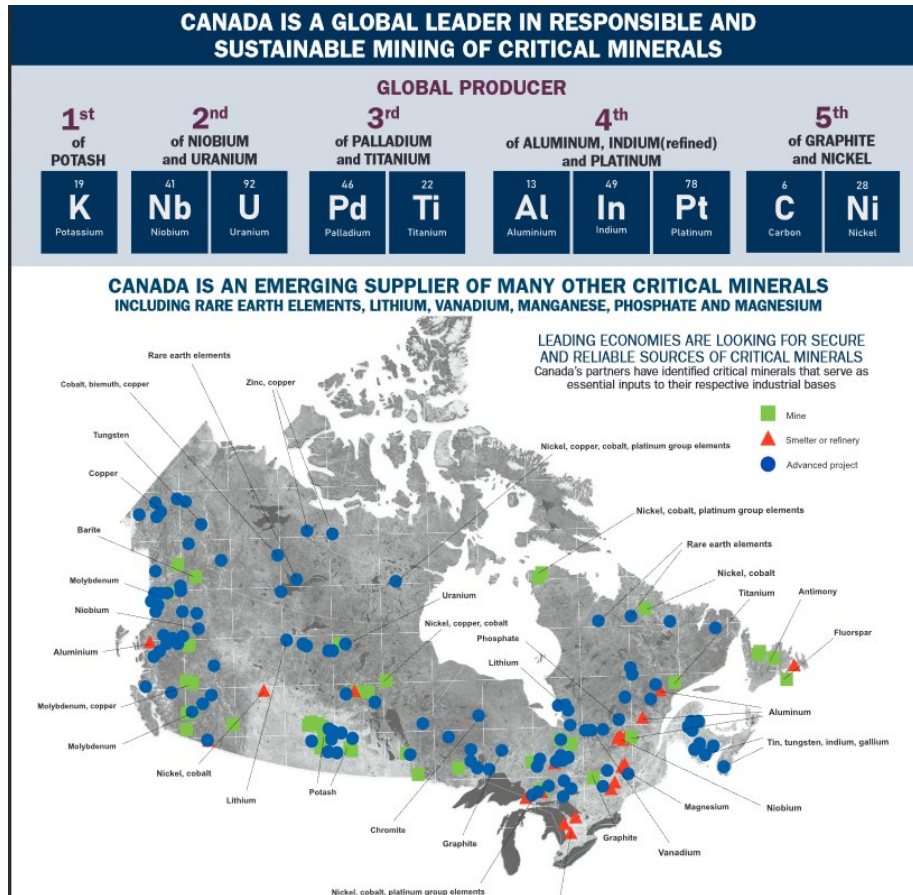
19 home-grown CANDU reactors for **15% of Canada's electricity** – 60% in ON, 33% in NB.
30 CANDU reactors around the world – 5% of global installed capacity.

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Emerging Opportunities:

Critical Minerals, Electrification & Battery Minerals, REE, Diamonds



Clean Energy & Tech Minerals: Copper

Development/Pre-Production

Copper- Foran Mining:

- Copper required as key component of most clean energy technologies and electrification
 - EV require 4X Cu than conventional ICE
 - Global requirement – in next 25 years have to produce as much Cu as in the last 5000 years.
 - Where will Cu come from? 40% global copper from higher risk SA countries.
- McIlvenna Bay Mine– Target Carbon Neutral Production.
- Hardrock VMS base metal deposit (smaller footprint)
 - 25.7 M t at 2.51% CuEq
 - 18 yr initial LOM; deposit open
 - Concentrated on site; truck to Flin Flon, shipped by rail to Canadian smelters
- Construction expected to start in 2023



Clean Energy/Battery & Tech Minerals: Lithium & REE

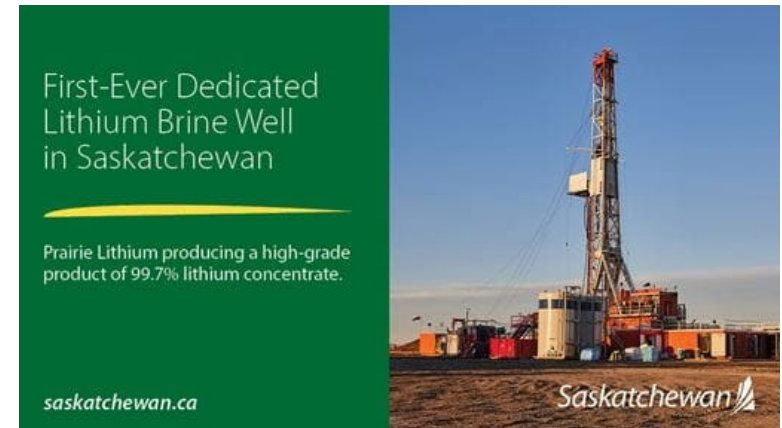
Development/Pre-Production/Production

Lithium: Arizona Lithium: *

- Lithium brines within Willison Basin, southern Saskatchewan (W Estevan)
- Leveraging Oil and gas technology and skilled workforce

Rare Earth Elements: SRC & Cheetah Minerals/Vital Minerals

- First Rare Earth Mine in Canada – Nechalacho, NWT (June 2021)
- SRC and Vital metals REE processing facilities in Saskatoon – first in North America & will serve GLOBAL markets
- Mid-stream manufacturing components for electrification/batteries/technology
- **Value added: Minerals to Metals to Batteries**



Other Mineral Production: Coal & Gold

Coal

- SK primary source of baseload power supply (30%)
- Lignite coal strip mines in the Estevan & Coronach areas (Westmoreland Mining Holdings LLC)
- Clean Coal Technology Project Estevan (\$1.4B) (CCS capture 4.3 M tonnes CO₂ since 2014 = capture emissions from >1 M cars)
- Exploring other non-thermal purposes



Gold

SSR Mining - Seabee Gold Operation & Santoy Mine

- Surpassed 1 M oz Au production Aug 2012; closing in on 2 M oz
- 2021 – record gold production of 118,888 troy oz.
- 2022 – record 136,125 tr oz production

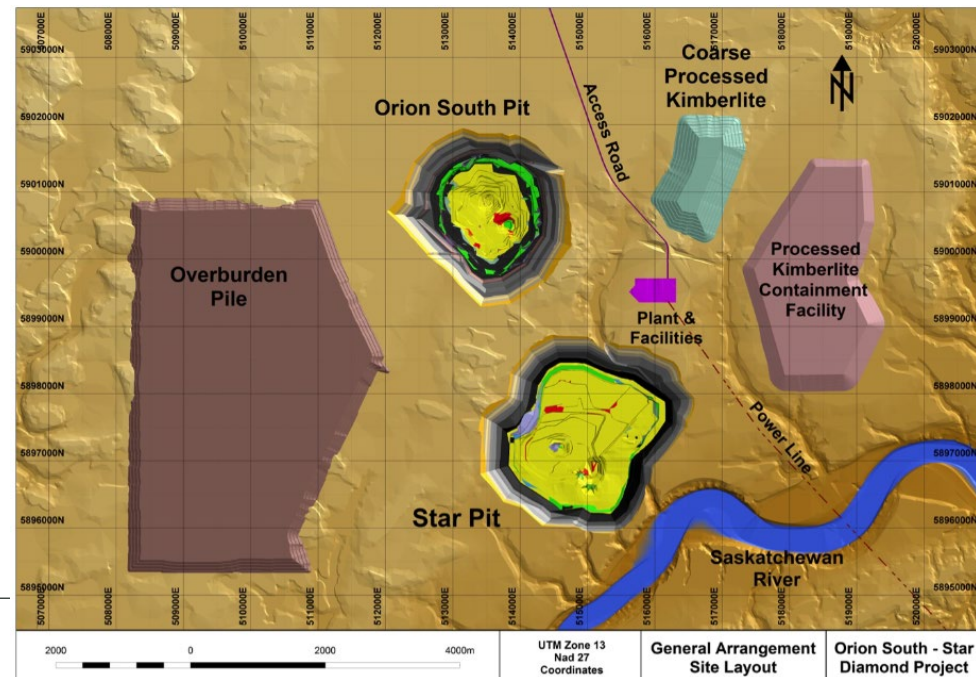


Other Notable Minerals: Diamonds

Development/Pre-Production

Star Diamond/Rio Tinto Expl Canada JV - Fort a La Corne (FalCon Project)

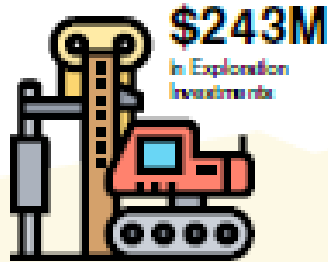
- Central Saskatchewan; east of PA
- 2018 PEA – 66 M carats of diamonds with 38 year Mine Life
- Large contiguous diamond bearing kimberlite field (Star, Orion)
- Fully permitted



EXPLORATION INVESTMENTS THROUGH THE SUPPLY CHAIN

SMA conducted a survey of Exploration Members in 2021 to better understand how their 2019 exploration investments were distributed in northern Saskatchewan and amongst the supplier ecosystem.

* 158 companies representing \$712 M in exploration expenditures and 60 different programs in exploration in response to its results from 2019 Saskatchewan Geological Survey Exploration Expenditure Survey.



Employment



>1000
Direct Full and Part-time Employees



\$33M
Direct Payroll



>1000
Indirect Contractors

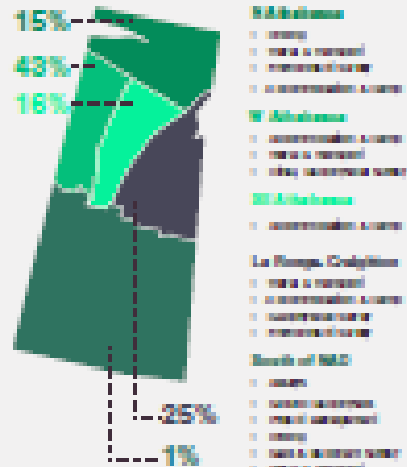
Community Engagement



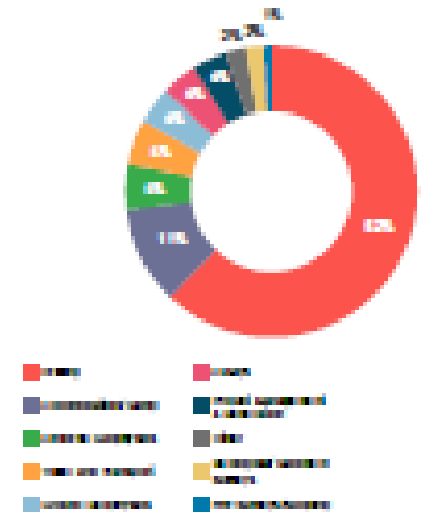
\$10.4M
Related Expenditures



Exploration Investment by Region



Mineral Exploration Spend by Activity



Key Activities and Suppliers

>120
Different Businesses



36
From Northern SK



On average, exploration programs involved 110 different suppliers per project.





Education Outreach Program



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2022 Impact

Connected with...

> **5000** Students
> **750** Teachers
> **80** Communities



“Thank you so much for giving me this opportunity. One of the most interesting, relevant and engaging PD ventures I’ve been on. I feel more worldly from having this experience!!”
– Tracy Huckell, Esterhazy High School

GeoVenture Program

Seeing is believing! A week long opportunity for educators to explore SK’s mineral resources through workshops, industry presentations, mine/mill tours and free curriculum resources

13 Teachers

Orano: McClean Lake, KSPC: Bethune,
Westmoreland: Poplar River,
Mosaic: Colonsay, SRC: Diamond Lab



New This Year!

Partnered with SaskCode to develop a Mining Robotics Kit. The “Fly Away Birdy” challenge launched in December.

120 Students



Renewal of Energy & Mines 10, 20, & 30 curriculum with the Ministry of Education.

Created a Teachers Pay Teachers website page with all of our FREE resources.

> **900** Downloads



Potash Kits

> **200** Mailed

25 Divisions

New! **5** Part Video Series



Events

30

Workshops & Career Fairs

300

Visitors at Family Safety Zone

Minerals And Products

Explore the stages of the mining cycle through curriculum correlated hands-on pavilions! Discover exciting career opportunities. Learn how we use the products of mining in our daily lives.

Beauval, SK

250 Students

14 Communities



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2022 FALL & WINTER

THE OFFICIAL PUBLICATION OF THE
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MAGAZINE

**FEATURE:
A GLOBAL
ENERGY
AND FOOD
SECURITY
LEADER**

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DRIVEN BY
INNOVATION**

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**SASKATCHEWAN:
A GROWING
CRITICAL MINERALS HUB**

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Questions?

**SK Mining Week:
53rd ERMRC Saturday,
June 3rd, Prairieland
Park, Saskatoon**



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