

Helium Action Plan: From Exploration to Exports



North American Helium

What is Helium?

Helium is a gas formed by the decay of radioactive elements in the Earth's crust; it migrates towards the Earth's surface where it either gets trapped in a geological formation or is released into the atmosphere. Helium is non-toxic, non-flammable, and has a number of unique properties including: the lowest boiling and liquefaction points of any element (-269 degrees Celsius); low density (light); and, a high ability to conduct heat. As a result, helium often has no substitute.

How is Helium Produced?

There are two principal ways to produce helium: captured as a byproduct of natural gas production; or, extracted from dedicated helium wells in select geological formations.

Currently, over 90 per cent of the world's helium market is supplied by major natural gas producers. In countries like Qatar, Algeria, Russia, and the United States (US), small concentrations of helium are typically found within the natural gas stream (for example, 0.04 per cent helium in the case of Qatar).



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The large scale of natural gas production in these countries allows low overall concentrations of helium to be extracted economically.

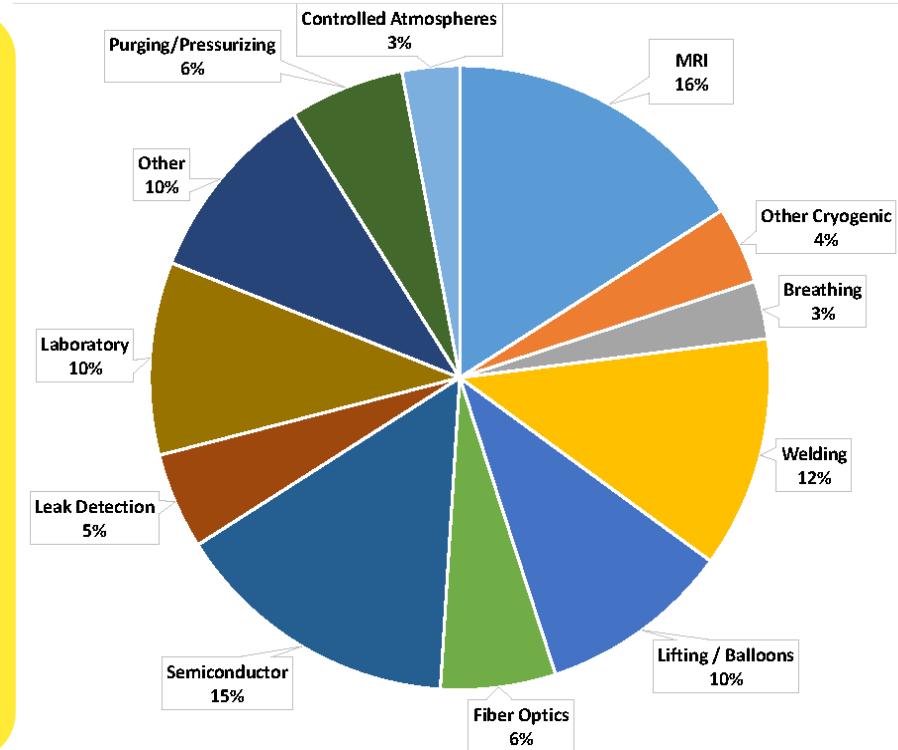
Saskatchewan is one of the few jurisdictions in the world that can support helium production as a standalone sector because the province's geology supports the drilling of dedicated helium wells. Saskatchewan's unique geology offers world-class helium resources, with deposits of up to 2 per cent helium concentrations and promising shows of up to 7 per cent helium concentrations. Generally, 0.5 per cent helium concentrations are the global benchmark for economic recovery from standalone wells.

Saskatchewan's helium deposits are mixed with nitrogen, which makes up nearly all the remaining gaseous mix in these formations.

Nitrogen is not a greenhouse gas (GHG). Therefore, Saskatchewan's helium sector has a low GHG footprint when compared to other jurisdictions that rely on large-scale natural gas production for helium extraction. By the end of 2021, it is estimated that Saskatchewan will account for 1 per cent of global helium production. However, with a unique value proposition of high concentration helium deposits, an excellent regulatory and investment climate, and a low GHG emissions profile, Saskatchewan has tremendous potential to continue increasing market share in the rapidly growing global helium market.

What is Helium Used For?

Helium is a rare and non-renewable resource that can be segmented into three general product types: crude helium gas (less than 99 per cent purity); processed Grade A helium gas (over 99 per cent purity); and liquid helium (made from Grade A helium gas). Crude helium is typically used as a lifting agent, whereas Grade A helium gas and liquefied helium are used primarily in advanced technology sectors. As global growth in these advanced technology sectors continues to accelerate so does the demand for helium.



Kornbluth Helium Consulting

The Global Helium Growth Opportunity

Unlike most globally traded commodities, helium is not currently traded on commodity exchanges. This means all helium sector transactions are executed through private commercial agreements, making market transparency somewhat limited. However, helium is a well-understood commodity, with over a century of commercial use; industry experts estimate the current global market is worth over \$7 billion annually and is expected to nearly double in size by 2030.

The US is the world's largest helium consumer and is projected to become a net helium importer for the first time in nearly a century. Also, as of October 2021, Canada and the US have identified helium on their respective national lists of critical minerals for economic and national security (helium is the only non-mineral on the lists). In 2020, the Canada-US Joint Action Plan on Critical Minerals Collaboration

was signed to coordinate efforts on developing critical supply chains within North America. The European Union, Japan, South Korea, China, India and several other countries have growing helium demand and are seeking to reduce reliance on helium imports from unstable regions.

Saskatchewan offers an abundant, stable and reliable source of helium that is not reliant on being sourced as a byproduct of natural gas production. Other jurisdictions, however, are also aware of the growth in helium demand. To capitalize on the sector's future growth, Saskatchewan must take advantage of the current window of opportunity and scale the province's existing production and processing capacity, or risk losing the initiative to others.

Helium in Saskatchewan Today

Currently, Saskatchewan's helium sector is concentrated in southwest Saskatchewan. At present, there are many active helium companies holding more than 500 combined helium leases and permits for exploration and production activities, which encompasses over 4 million hectares of land – a figure that has quadrupled since 2018 and continues growing. By the end of 2021, Saskatchewan expects to have up to 20 active helium wells, with dozens more in the drilling and planning phases. In addition, North American Helium's new Battle Creek Purification Facility began operating in April 2021. With an investment of more than \$30 million and participation in the province's [Oil and Gas Processing Investment Incentive \(OGPII\)](#) it is Canada's largest helium purification facility.

In 2016, the Saskatchewan Geological Survey published an in-depth analysis of helium deposits in southwestern Saskatchewan and will publish an expanded version of the study for all of southern Saskatchewan in November 2021. Together, these studies incorporate data from more than 6,500 gas analysis tests. The analysis confirms that Saskatchewan has world-class helium resources – a conclusion affirmed by regular growing year-over-year investments in the province.

Saskatchewan's Growth Plan: The Next Decade of Growth

Released in November 2019, the Growth Plan identifies supporting the development of the helium sector as a provincial priority that can assist in achieving the Plan's 30 Goals for 2030, such as creating 100,000 new jobs, increasing the value of provincial exports by 50 per cent and economic diversification.

Following the release of the Growth Plan, the Government of Saskatchewan formed a working group tasked with conducting comprehensive stakeholder engagement consultations with a broad range of companies, including those active in the province's helium sector, global helium distributors, and international investors. This collaborative approach was crucial in identifying emerging investment opportunities across all segments of the helium value chain, current barriers to sector growth, and specific sector development priorities where government action should be focused.

The stakeholder engagement process informed the Government of Saskatchewan's commitment to developing and implementing new policies and programs, to grow Saskatchewan's helium sector value chain from exploration to exports.



Action Plan Areas of Focus

Exploration

Scaling-up exploration activities and the availability of high-quality geological data is needed to drive production investment and attract new companies and investors to Saskatchewan.

Production

Enhancing helium production economics in Saskatchewan is critical to securing increased investment in a highly competitive sector and taking advantage of the province's unique geology to produce helium from dedicated wells in large and small pools alike.

Innovation

Fostering innovation commercialization in the field is a must. As demonstrated in Saskatchewan's larger established natural resource sectors, deploying new technologies in the field is critical to overcoming technical barriers and unlocking new opportunities to develop and bring resources to market.

Processing

Building-out Saskatchewan's helium purification and liquefaction capacity is fundamental to sector growth as it transforms crude helium gas into Grade A helium and liquefied helium, which are premium products needed by advanced technology sectors.

Export Infrastructure

Establishing conditions for liquefaction capacity and infrastructure investments in the province is critical to maximizing export growth. Grade A helium gas can be trucked to markets in North America but only liquid helium can be loaded on ships for export to overseas markets.

The Helium Action Plan Vision:

Saskatchewan will strive to produce 10% of the world's helium by 2030.

Economic Benefits of Achieving the Vision:

- Create 500+ new permanent full-time jobs and support thousands of construction and services sector jobs.
- Grow to 150+ dedicated helium production wells.
- Generate annual exports worth more than \$500 million.
- Build up to 15 purification and liquefaction facilities.

New Programs and Policies

Saskatchewan has recently taken a number of steps to support growth in the helium sector, such as the aforementioned helium resource studies in southern Saskatchewan and the inclusion of helium processing facilities in the OGPII program. The Helium Action Plan's new policy and program commitments seek to build on these successes with 10 new actions.

Exploration

- ***Comprehensive Provincial Resource Reserves Study:*** The Government of Saskatchewan will collaborate with industry to execute a comprehensive study of the province's helium resources and reserves (proven, probable and/or possible). This study will be a critical step in scaling-up exploration activity and attracting investment, as high-quality reliable information on the specific locations and scale of all of the province's helium deposits are key investment considerations that only publicly available government-sourced data can deliver on the broad provincial scale.
- ***Leveraging Oil and Gas Sector Data:*** The Government of Saskatchewan will update the province's Integrated Resources Information System (IRIS) to digitize and streamline helium gas analysis reporting from all wells in the oil, gas, and helium sectors. The current process is manual, which creates significant administrative barriers for industry to easily and quickly submit helium gas analysis data in a functional form for government to publish for widespread industry use in planning exploration activities.
- ***Exploratory Well Drilling:*** The Government of Saskatchewan offers an exploratory well drilling program to the oil and gas sector to encourage companies to explore and develop new pools and plays. This program will be expanded to support exploratory well drilling in the helium sector.

Production

- ***Reducing Administrative Cost:*** The Government of Saskatchewan will expand IRIS to automate helium production reporting and royalty payments administration for industry, bringing the helium sector into the existing efficient automated royalty administration system already in place for other resource sectors.
- ***Enhanced Geoscience Information:*** The Government of Saskatchewan will review and enhance recognition of eligible exploration costs for helium tenure work expenditure requirements, to accelerate the creation of targeted geoscience information at potential well drilling locations. Having targeted high-quality geoscience data is critical to drilling success and creating a more growth-oriented tenure work expenditure regime facilitates new well drilling investments.
- ***Regulatory Excellence:*** Unlike many competing jurisdictions, Saskatchewan has a well-established helium regulatory regime already in place. The province's focus on outcome-based regulations allows for targeted reviews in priority areas identified by industry, like helium well spacing requirements and confidentiality provisions to ensure best practices in maximizing resource recovery and encouraging new drilling investment.

Innovation

- *Driving Innovation Investment:* The Government of Saskatchewan will expand the [Saskatchewan Petroleum Innovation Incentive \(SPII\)](#) program to include eligible new-to-Saskatchewan innovations in the helium sector. The expanded program will support a broad range of innovation commercialization projects across all segments of the helium sector value chain.
- *Prioritizing Unique-to-Saskatchewan Innovations:* The Government of Saskatchewan will establish a Helium Innovation Commercialization Working Group that includes industry stakeholders and government agencies. The working group will focus on the pilot deployment of new technologies that are critical to the unique features and opportunities in Saskatchewan's helium sector, including different scales of helium purification and liquefaction equipment, the economic development of small pool single well production sites, enhanced GHG emissions management practices, and specialized helium transportation equipment.

Processing

- *Single Well Processing:* Saskatchewan's geology offers a considerable number of smaller helium pools that can sustain one dedicated helium production well. Unlike larger pools with numerous wells in close proximity that can be tied into a large centralized purification facility, single well production sites require specialized onsite purification equipment to be economically viable. The Government of Saskatchewan will review the helium royalty regime to ensure that the unique investment competitiveness conditions of single well production sites are fully accounted for when calculating royalty rates.

Export Infrastructure

- *Advancing Liquefaction Hubs:* The Government of Saskatchewan will lead in establishing a coalition of municipal, provincial and federal agencies together with helium companies and investors from around the world that are dedicated to partnering around the goal of building helium liquefaction capacity in Saskatchewan. This effort will involve assessing the potential to develop integrated export-oriented helium processing hubs in Saskatchewan, including assessing the viability of specific potential site locations and the strategic advantages of large-scale helium storage in underground caverns.