

Energy Portfolio

Powering Alberta's Energy Future Through Innovation

About Alberta Innovates

Innovation is the catalyst for sustainable jobs, economic and community strength, improved health and environmental benefits. Alberta Innovates leads and accelerates innovation from discovery to use across all sectors in all parts of the province. As Alberta's largest research and innovation agency, we are uniquely positioned to propel great ideas forward to improving the lives of Albertans today and for generations to come.

Alberta Innovates believes the research and innovation (R&I) ecosystem is stronger and more sustainable when it is broadly representative of the overall diversity of the community. Efforts are made to ensure that all interested and qualified parties have an equitable opportunity to participate and contribute to the ecosystem, with inclusive processes at every stage.

Energy Portfolio Overview

Energy is a cornerstone of Alberta's economy, contributing significantly to economic growth, exports, investment, and employment while providing the energy required to power communities, industries, and essential services. As global energy systems evolve in response to increasing energy demand, decarbonization objectives, technological advancements, and changing market dynamics, Alberta has a unique opportunity to strengthen its position as a global energy leader through innovation and technology development.

The Energy Portfolio aims to accelerate the development, demonstration, and adoption of innovative technologies that support a reliable, affordable, secure, and sustainable energy future. Through strategic investments in research, technology development, pilot projects, and collaborative partnerships, the portfolio seeks to address critical energy system challenges while enhancing Alberta's economic competitiveness and global leadership in energy innovation.

The portfolio aligns research and innovation with government priorities and industry needs by focusing on two key areas: **Energy Sources** and **Energy Systems**. Strategic investments in these areas are intended to bridge technology gaps, improve energy production and delivery, enhance system efficiency and resilience, and support the development of a more integrated, flexible, and sustainable energy future.

Details of investment and research priorities for the Energy Portfolio's two focus areas are outlined below.

Innovation Areas

1. Energy Sources

Energy Sources focuses on the development and deployment of technologies that produce reliable, affordable, and sustainable energy to meet growing domestic and global demand. This includes innovations in renewable energy sources such as wind, solar, hydroelectric, geothermal, and bioenergy, as well as emerging and alternative energy technologies including hydrogen production, small modular reactors (SMRs), nuclear energy, and hybrid energy systems.

The focus area supports the development of innovative materials, components, processes, and technologies that enable efficient energy generation and conversion. This includes advancements in photovoltaic materials, turbine and generator components, fuel cell materials, catalysts, membranes, advanced coatings, thermal management systems, electrolyzers, reactor materials, and other enabling technologies that improve performance across renewable, hydrogen, nuclear, bioenergy, and emerging energy platforms.

Investment priorities include technologies that improve energy conversion efficiency, operational reliability, grid integration, durability, environmental performance, and scalability. Areas of interest include advanced energy-generating materials, next-generation generation technologies, energy storage integration, high-performance catalysts and electrolyzers, innovative reactor and fuel technologies, digital monitoring and optimization tools, emissions reduction solutions, and novel system architectures that strengthen Alberta's energy competitiveness while supporting lower-emission energy production.

Innovation themes:

1.1 Hydrocarbons

Supports innovations that improve the production, conversion, utilization, and environmental performance of hydrocarbon-based energy resources. This includes technologies related to oil, natural gas, natural gas liquids, refining and upgrading processes, low-emission hydrocarbon production, methane reduction, carbon management integration, process optimization, advanced materials, catalysts, and digital solutions that improve efficiency, reliability, and sustainability across the hydrocarbon value chain.

1.2 Electricity

Supports technologies that generate electricity from renewable, nuclear, and emerging energy sources. Areas of interest include solar, wind, hydroelectric, geothermal, bioenergy, nuclear and SMR technologies, hybrid generation systems, distributed generation, energy conversion technologies, advanced power generation materials and components, and integrated energy storage solutions that improve reliability, affordability, and sustainability.

1.3 Emerging Energy Pathways

Supports emerging energy generation pathways and enabling technologies that do not fit within traditional hydrocarbon or electricity classifications. This includes hydrogen production, fuel cells, synthetic fuels, energy carriers, waste-to-energy technologies, thermal energy systems, hybrid energy platforms, and other novel approaches that contribute to Alberta's evolving energy landscape.

2. Energy Systems

Energy Systems focuses on the technologies, infrastructure, and processes required to transport, distribute, store, manage, and optimize energy safely, efficiently, and reliably throughout the energy value chain. As energy systems become increasingly diverse, interconnected, and digitalized, innovation is needed to ensure the effective movement of electricity, fuels, hydrogen, carbon, and other energy carriers from production facilities to end users.

This innovation area supports innovations in electricity transmission and distribution systems, grid modernization, energy storage technologies, smart grid solutions, hydrogen transportation and storage infrastructure, carbon capture utilization and storage (CCUS) infrastructure, pipeline technologies, fuel distribution networks, and integrated energy management systems. It also includes digital technologies, data analytics, automation, cybersecurity solutions, and advanced control systems that improve reliability, resilience, efficiency, and interoperability across energy networks.

Investment priorities include technologies that strengthen energy infrastructure, enable the adoption of emerging energy solutions, improve system flexibility and resilience, reduce emissions, and optimize energy delivery and utilization. Areas of interest include grid modernization, distributed energy resource integration, long-duration energy storage, hydrogen logistics and storage solutions, advanced monitoring and diagnostic systems, predictive maintenance technologies, integrated energy systems, and digital solutions that support real-time system optimization. Examples of Alberta Innovates initiatives aligned with this focus area include the Alberta Smart Grid Consortium, which advances collaborative innovation in modern electricity systems.

Innovation themes:

1.1 Hydrocarbons

Supports technologies and infrastructure that enable safe, efficient, and reliable transportation, storage, distribution, and management of hydrocarbon-based energy resources. This includes pipelines, compression systems, storage facilities, fuel distribution networks, leak detection technologies, monitoring systems, digital asset management solutions, and integrated approaches that improve operational efficiency, reliability, safety, and environmental performance.

1.2 Electricity

Supports innovations that enhance transmission, distribution, storage, monitoring, and management of electricity. Areas of interest include smart grids, advanced transmission and distribution infrastructure, grid modernization technologies, distributed energy resource integration, microgrids, long-duration energy storage, demand management systems (Advanced Metering Infrastructure, AMI), grid cybersecurity, automation, and digital solutions that improve reliability, resilience, and system optimization.

1.3 Integrated Energy Systems

Supports infrastructure and system-level technologies associated with emerging energy carriers and integrated energy networks. This includes hydrogen transportation and storage, CCUS networks and infrastructure, thermal energy distribution systems, integrated multi-energy systems, energy management platforms, sector coupling technologies, and other innovative solutions that enable a more flexible, interconnected, and lower-emission energy system.

Energy Portfolio Expected Outcomes

The Energy Portfolio aims to strengthen Alberta's position as a global energy leader by accelerating the development and adoption of innovative technologies that improve energy production, delivery, reliability, affordability, and sustainability. By de-risking transformative technologies and supporting collaboration between industry, academia, government, and innovation partners, the portfolio will enable the development of a resilient, competitive, and lower-emission energy future.

The expected outcomes are:

- **Technical Advancements:** Advance research, development, demonstration, and adoption of innovative energy technologies that improve performance, efficiency, reliability, scalability, and sustainability across the energy value chain.
- **Energy Security and System Reliability:** Enhance Alberta's ability to provide reliable, resilient, and affordable energy through innovations that strengthen generation capacity, transmission networks, energy storage, and integrated system operations.
- **Industry Collaboration:** Foster cross-sector collaboration among industry, technology developers, researchers, utilities, Indigenous communities, and other stakeholders to accelerate innovation adoption and address complex energy challenges.
- **Talent and Capacity Development:** Strengthen Alberta's innovation ecosystem by supporting partnerships between industry and academia that develop highly qualified personnel, technical expertise, and future energy leaders.
- **Economic Growth and Competitiveness:** Stimulate economic growth, attract investment, create high-value jobs, support commercialization opportunities, and enhance Alberta's competitiveness in domestic and international energy markets.
- **Environmental Benefits:** Reduce emissions and environmental impacts through the deployment of cleaner energy technologies, energy efficiency solutions, low-carbon infrastructure, and technologies that support sustainable energy production and utilization.
- **Social Benefits:** Improve quality of life and community resilience through reliable access to affordable energy, support for regional economic development, workforce opportunities, and technologies that contribute to a sustainable and prosperous future for Albertans.

How to Apply

The portfolio uses a continuous intake process, as described in the applicable application guide. In addition, periodic calls for proposals may be issued to address specific strategic priorities and emerging opportunities within Alberta's energy sector. Each call for proposals will identify targeted themes, eligibility requirements, evaluation criteria, and application timelines.

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