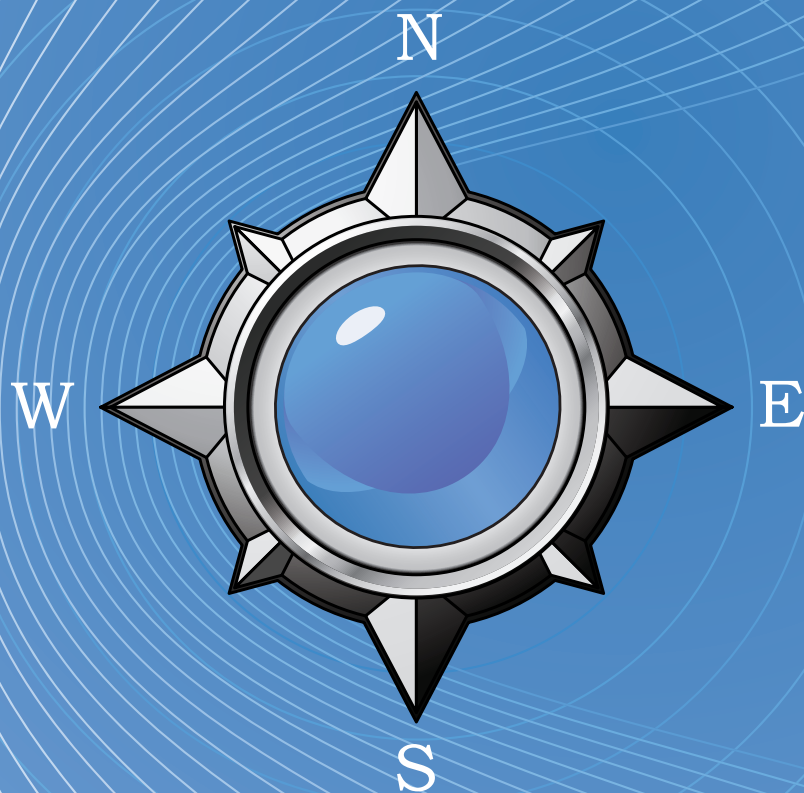


ALBERTA
RESEARCH &
INNOVATION
PLAN 2012



ALBERTA

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Executive Summary

The *2012 Alberta Research and Innovation Plan* (ARIP) reflects the relevant role of research and innovation in advancing the Government of Alberta's (GoA) vision, which is focused on investing in families and communities, securing Alberta's economic future, and advancing world-leading resource stewardship—reflecting Alberta's social, environmental and economic responsibilities.

The first section of the ARIP describes the role of Alberta Enterprise and Advanced Education (EAE) in coordinating the research and innovation system through a shared leadership approach. This section provides an overview of the main mechanisms used to ensure collaboration and alignment across the research and innovation system.

Following the shared leadership overview, the ARIP outlines three guiding strategies used to coordinate Alberta's research and innovation system in alignment with broad GoA direction.

The ARIP then introduces the policy environment underpinning the research priorities described in the final two sections of the document. The policy environment includes relevant policies (e.g., strategies, frameworks, and action plans) that directly inform research and innovation priorities in the province.

Next, the ARIP outlines the Alberta research and innovation system's key outcomes and themes, which are grounded in the key GoA directions. This section includes opportunities that have been collaboratively identified by the Portfolio Advisory Committee (PAC) and the Alberta Innovates corporations. The core intent of this section is to illustrate how coordination and alignment of the research and innovation system's efforts can support key outcomes. Coordination and alignment will bolster the enabling role that research and innovation plays in addressing challenges and finding solutions that advance the GoA vision.

As an annual document, the ARIP's outcomes and themes will continue to be refined, particularly in light of the anticipated impacts of results-based budgeting and the program review process, now underway.

The final section outlines the mandates and priorities of the four Alberta Innovates corporations distilled from the corporations' 2012-15 business plans. It also provides information on the Alberta Innovates corporations' competitive context and collaborations.

Lastly, the appendices include additional context on the GoA policy environment and performance measurements relevant to Alberta's research and innovation system.

Introduction and Context

The GoA has expressed a compelling vision for Alberta's future. This vision is grounded in investing in families and communities, securing Alberta's economic future, and advancing world-leading resource stewardship—reflecting Alberta's social, environmental and economic responsibilities.

The GoA vision ensures that government is prepared and able to address immediate challenges and opportunities while achieving its long-term direction of making Alberta an innovative, prosperous and engaged province.

The GoA also recognizes that a strong provincial research and innovation system enables Albertans to creatively solve critical problems and implement solutions. This recognition is founded on the understanding that an aligned and coordinated system of research and innovation connects a culture and community of collaboration, creativity and excellence across the province's higher-education, business and government sectors. Investing in Alberta's research and innovation system assures a focus on economic resiliency and environmental responsibility driven by Alberta's engine of innovation—people.

The ARIP reflects the relevant role of research and innovation in advancing the GoA vision and priorities. The ARIP is designed to share information across PAC ministries, and provides guidance to the Alberta Innovates corporations and Campus Alberta institutions with the aim of enhancing Alberta's existing research strengths through collaborations with stakeholders in the research and innovation system. Alberta's research strengths reside in the areas of energy and environment, bioresources and health, as well as in the core areas of omics, nanotechnology and information and communications technology (ICT).

The ARIP contributes to the GoA vision by capturing and articulating the province's key outcomes of: Effective Resource and Environmental Management; Broadened Economic Base; and Resilient, Healthy Communities. The key outcomes in turn support the three research and innovation themes: Managing Cumulative Effects; Developing Alberta's Bioeconomy; and Enabling Individual/Community Health and Resilience.

The ARIP's key outcomes and themes will continue to be refined, particularly in light of the anticipated impacts of results-based budgeting and the program review process, now underway.

Research and Innovation Shared Leadership

A shared leadership model is integral to Alberta's research and innovation system. Shared leadership enhances the engagement, alignment, and accountability among entities within the research and innovation system. Using a shared leadership approach, EAE engages ministries across the GoA, and facilitates the collaboration of ministries with the Alberta Innovates and Campus Alberta systems. This shared leadership model is comprised of the following key mechanisms:

- The Alberta Research and Innovation Plan;
- The Portfolio Advisory Committee;
- Alberta Innovates corporations' Business Planning;
- Campus Alberta's Comprehensive Institutional Planning;
- Multi-national Enterprise Attraction; and
- The Alberta Innovates Connector Service.

EAE has a principal role in coordinating the advancement of the three core strategies expressed in the ARIP to strengthen research and innovation in the province. The ministry's responsibilities include directly supporting and facilitating collaborative innovation initiatives in the areas of energy, environment, the bioeconomy and health, as well as in the core areas of omics, nanotechnology and ICT.

The ARIP is a key document produced annually by the EAE to assist with information exchange and collaboration among GoA ministries, Alberta Innovates and Campus Alberta. The ARIP is developed to convey the government's research and innovation themes to the Alberta Innovates corporations. In turn, the ARIP communicates those themes and the Alberta Innovates corporations' research priorities to Campus Alberta institutions.

EAE facilitates collaborative engagement across GoA ministries through the PAC, which is an advisory body comprised of Treasury Board and Finance, Environment and Sustainable Resource Development, Health, Energy, Agriculture and Rural Development, and EAE. The PAC provides advice on research funding allocations, and areas of strategic collaboration within the research and innovation system. The PAC ministries provide input on the government's research and innovation thematic priorities.

Alberta Innovates corporations work with EAE through annual business planning and reporting cycles to express current research priorities and achievements. Alberta Innovates corporations' priorities are informed by the unique relationship each corporation has with their sector stakeholders, as well as by information provided from the PAC. Priorities identified through Alberta Innovates business planning are used to inform the annual renewal of the ARIP.

EAE also provides Campus Alberta institutions an opportunity to respond to the ARIP by articulating research priorities in their Comprehensive Institutional Plans (CIPs). The research components of CIPs express the existing and potential capacity of each institution to inform and influence the priorities articulated in the ARIP.

Outside of Alberta, and in consultation with the Alberta Innovates corporations and GoA ministries, EAE leads targeted multi-national enterprise attraction, and brand building and marketing activities.

Finally, through the Alberta Innovates Connector Service, EAE develops relationships and facilitates communication with innovative businesses, entrepreneurs, researchers, investors and business service providers to support access to Alberta's research and innovation system.

Alberta Research and Innovation Plan Strategies

The ARIP supports the research priority themes identified by GoA ministries and the GoA strategic policy documents.

Three core strategies are being pursued to strengthen the research and innovation system and to contribute to social, environmental and economic benefits for Albertans. These strategies are:

1. Building Research Capacity;
2. Focusing on Targeted Areas; and
3. Developing a Dynamic and Aligned Learning and Research and Innovation System.

1. *Building Research Capacity:*

Maintaining a strong base of research strengths in Alberta

Broad-based research excellence provides the expertise and support for a full spectrum of research and innovation—from generating new ideas through to commercialization and providing solutions to specific challenges.

Two interrelated areas of support are required to maintain excellence in research capacity:

People: Recruit, retain and develop skilled and talented people for the system:

- It is critical to recruit, retain and develop a broad range of skilled and talented people to ensure Alberta has the capacity to address existing and emerging challenges and opportunities; and
- Alberta requires the fundamental scientific and technical expertise to find technological solutions to challenges, and the expertise to effectively apply and disseminate those solutions.

Research Infrastructure: Build, enhance and sustain leading-edge infrastructure:

- Talented and skilled people require leading-edge infrastructure to discover and create new knowledge and develop potential solutions for Alberta's challenges;
- Infrastructure supports and enables research excellence and creates the capacity to train Alberta's talented workforce with the skills to contribute to the knowledge driven economy; and
- Investments in core infrastructure provide a base from which researchers can address priority questions of importance. Alberta has identified three core areas of primary importance—omics, nanotechnology and ICT—that present opportunities for advancement across all of the province's areas of research strength in energy and environment, bioresources and health.

2. *Focusing on Targeted Areas:*

Strategically building on a strong base of research

Alberta has research strengths across Campus Alberta, and has developed research and innovation excellence in key jurisdictional research domains. Building on this capacity, the province has elected to remain focused on targeted areas of research and innovation in alignment with Alberta's jurisdictional strengths. From a research and economic perspective, a targeted focus on jurisdictional strengths will assist Alberta's international competitiveness, impacting the prosperity and quality of life of Albertans.

Actions to advance the establishment of targeted international excellence include:

- **Identify and invest in strategic research initiatives that add value:** Investments must be made in areas with significant potential to add value to the province. The GoA, Campus Alberta, Alberta Innovates corporations and industry are working collaboratively to identify the challenges and the potential for solutions to ensure that funding is strategically directed to areas with the biggest potential benefits; and
- **Pre-commercialization and knowledge transfer capacity:** Alberta requires the facilities and talent to make the most of new discoveries—whether through commercialization, company development, or the implementation of new policy or regulatory frameworks—to capture the full value of solutions and new knowledge.

3. *Developing a Dynamic and Aligned Learning and Research and Innovation System:*

GoA, Campus Alberta and Alberta Innovates corporations operating as a system to advance research and innovation

Every competitive jurisdiction in the world is pursuing a strategy of broad-based excellence and targeted initiatives that support regional development. The strategies articulated above are the precursors for success for any jurisdiction. Alberta is pursuing these strategies with intention and focus.

Alberta's systematic and strategic approach differentiates the province from other jurisdictions by its aligned learning and research and innovation system, which is grounded in strength and excellence. Through efforts to solidify the province's dynamic and aligned system—a system that brings together Alberta Innovates corporations and Campus Alberta to work with the provincial government to address challenges

and translate ideas into solutions—Alberta expects to become a preferred destination for key industries world wide.

The development of Alberta's dynamic and aligned learning and research and innovation system is grounded in the following principles that create an environment that is open and conducive to innovation and collaboration:

- **Enhance pan-Alberta collaboration:** Sharing information will enhance the understanding of the full range of research and innovation activities being undertaken. GoA ministries, Alberta Innovates corporations and Campus Alberta institutions are committed to working collaboratively and with industry and other stakeholders to develop complementary capabilities that will increase the strength and capacity of Alberta's competitive position;
- **Optimize resources:** Consolidating the efforts of government and other funders to identify areas of shared interest for co-investment creates opportunity in areas of impact through which Alberta can build internationally competitive research strength. From a base of excellence, and through focused, collaborative investment, Alberta will be advantageously positioned to attract and maximize national and international funding; and
- **Enhance entrepreneurialism:** The alignment of Alberta Innovates corporations and Campus Alberta brings together learning, research and application, management and technical skills training, and new knowledge and commercialization, into a system that will create a culture of inquiry and entrepreneurialism. A culture that fosters the acquisition of commercial skills, financial abilities and business acumen will enable Alberta to move from a solid economy to a resilient, diversified knowledge-driven economy for future generations.

Policy Environment

An integrated and evolving policy environment underpins all GoA ministry research priorities and Alberta Innovates corporation research priorities. The policy directions of this environment set out the province's objectives to address Alberta's key challenges and opportunities. These policies often involve several GoA ministries with related and complementary responsibilities in support of the GoA's broader vision and mandate. To be effective, policies and related government initiatives are developed with the flexibility to accommodate change, allowing established policy to adapt and new policy to emerge as necessary.

In conjunction with the directions, priority themes and outcomes expressed in the following section, this policy environment informs the intention and direction underpinning Alberta's research and innovation system. The following list of GoA policies underpins the themes expressed in the ARIP (see appendix A for details):

- Alberta Livestock and Meat Strategy;
- Alberta Nanotechnology Strategy;
- Alberta's 2008 Climate Change Strategy;
- Alberta's Action Plan: Bringing Technology to Market;
- Alberta Competitiveness Initiative;
- Alberta's Health Research and Innovation Strategy;
- Getting Value from Every Fibre: Making the Most of Alberta's Lignocellulose Resource;
- Land-use Framework;
- Launching Alberta's Energy Future: Provincial Energy Strategy;
- Making the Food-Health Connection, An Alberta Framework for Innovation;
- Responsible Actions: A Plan for Alberta's Oil Sands; and
- Water for Life, A Renewal.

Alberta Research and Innovation System: GoA Directions, Key Outcomes, and Themes

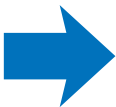

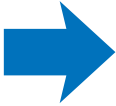

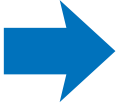

GoA ministries operate in areas of shared responsibility, which are integral to enhancing prosperity and quality of life for Albertans. This collaborative environment puts emphasis on the development and delivery of joint initiatives that bridge knowledge and resources within the various GoA ministries to effectively achieve the key outcomes of the Alberta research and innovation system in the short, medium and longer term. The GoA policy environment, identified on page 7, provides the underpinning for an effective research and innovation system—one that coordinates efforts and resources in alignment with the GoA collaborative research themes detailed in this section. An effective research and innovation system is critical to facilitate the pursuit of the GoA’s broad directions of advancing world-leading resource stewardship, securing Alberta’s economic future and investing in families and communities.

The collaborative efforts of Alberta’s research and innovation system contribute to the development of policy and regulations; the identification of potential growth sectors; and the generation of solutions for industry challenges and social benefits.

The PAC ministries, in consultation with the Alberta Innovates corporations, have identified themes that require research focus to address and advance key research and innovation system outcomes—to effectively manage Alberta’s natural resources; to support economic development; and to support the social, health and cultural environment that enables Albertans to thrive.

Table 1 illustrates the relationships among the GoA’s directions and key outcomes to which the Alberta’s research and innovation system contributes, and themes that can be addressed through research and innovation. The themes identified in this chart are further developed below with an overview of each followed by a range of associated opportunities for advancement by research and innovation.

Table 1: Relationship among GoA Directions, Key Outcomes, and Themes

GoA Directions		Key Outcomes		Themes
Advancing World Leading Resource Stewardship		Effective Resource and Environmental Management		Managing Cummulative Effects
Securing Alberta’s Economic Future		Broadened Economic Base		Developing Alberta’s Bioeconomy
Investing In Families and Communities		Resilient, Healthy Communities		Enabling Individual/Community Health and Resilience

Managing Cumulative Effects

Cumulative effects can be defined as the combined environmental effects of past, present and reasonably foreseeable land-use activities, over time. The environmental impact occurring from multiple activities on a land base can accumulate and exacerbate the additional effects of any one particular action. The cumulative effects of land-use activities on the environment may also have social and health implications that require consideration to sustain the well-being of Albertans.

Cumulative Effects Management Systems (CEMS) are approaches to address the combined or cumulative effects of multiple activities and high rates of development that are experienced in Alberta. CEMS involve integrating land-use planning, modifying the implementation of development to mitigate impact, and using environmental and social impact assessments to benchmark and monitor land-use activities. These CEMS are based on our understanding of environmental risk and socioeconomic values, and are used to set and manage environmental objectives.

Alberta's resource sectors are operating in a competitive environment with increasingly scarce resources to sustain long-term economic viability and performance. Research and innovation will support increased productivity, mitigate impacts on the environment and human health and provide a stronger social license to operate.

Opportunities

1. Environmental and social thresholds need to be understood in order to make informed land-use decisions.
 - Focus on water quantity and quality issues, with consideration for food safety and human health, as well as environmental health;
 - Maintain a social license or public trust, while maintaining an economic competitive advantage;
 - Translate new knowledge to the regulatory environment;
 - Meet or exceed performance related to national and international environmental benchmarks; and
 - Understand and inform public perceptions with science-based knowledge.
2. Effective tools (e.g., monitoring systems and models) are needed to understand and inform cumulative effects and land-use decisions through risk, environmental and social assessments:
 - Reduce uncertainty in existing tools;
 - Inform our ability to meet environmental targets through monitoring data (based on thresholds);
 - Inform trade-off decisions with a strong information base;
 - Advance effective data mining and interpretation; and
 - Ensure modeling and scenario development includes economic, social and environmental criteria.
3. Next-generation technologies are needed to help understand and minimize cumulative effects:
 - Design energy systems to respond to environmental challenges (e.g., GHG emissions);
 - Ensure land-use decision-making is responsive to new resource opportunities, including new technologies that enable the extraction of resources that were previously inaccessible or uneconomical;
 - Enable the regulatory system to incent the development of new market opportunities in the context of environmental protection;
 - Increase understanding of non-point source pollution; and

- Develop improved technologies to assist in climate change adaptation.
4. A strong understanding of what we monitor and the cause and effect relationships within and among the environment, the economy and society is needed.
- Understand the impacts of cumulative effects on human health and the food system, with particular focus on aboriginal and remote communities and vulnerable populations;
 - Increase the understanding of multiple scales of interaction (i.e., local, regional and global) among multiple resources and activities; and
 - Ensure land-use management decisions incorporate the potential impacts on northern and aboriginal communities, which include new economic opportunities, such as training for new types of employment.

Developing Alberta's Bioeconomy

The growth of the bioeconomy is based on Alberta's wealth of biological resources. This growth represents a significant opportunity to diversify the economy and improve environmental and economic sustainability. The bioeconomy refers to using biomass feedstocks (such as crops, trees and municipal waste) as the basic building blocks for chemicals, materials and energy. Alberta has an opportunity to incorporate its biomass resources, using existing infrastructure and energy capability (skills, knowledge and infrastructure), into the current energy supply chain, bolstering Alberta's position as a global energy leader.

Integrated industrial biorefining has the potential to enhance biological resource-based sector value-chains and diversify lines of business. Maximizing the value of Alberta's biomass resources through emerging products and processes will not only create immediate economic opportunities for producers and rural communities, but will also have the potential

to diversify and transform biological resource-based sectors into an increasingly significant contributor to the overall Alberta economy. In addition, the bioeconomy offers a response to the growing demand for renewable resource-based solutions to environmental concerns.

Opportunities

1. Activities of the existing energy industry (e.g., petrochemical value-added products) and the bioenergy industry need to be aligned to create a culture of shared opportunity rather than competitive sectors:
 - Achieve seamless integration of energy sources (e.g., differing energy sources contributing to the grid);
 - Work collaboratively to mitigate environmental impacts (e.g., water sharing);
 - Explore opportunities in co-generation;
 - Determine common challenges and the appropriate balance of energy sources and products; and
 - Explore bioenergy as one path to demonstrate the province's commitment to clean energy.
2. The food industry needs to address the health implications of food security, quality and safety, particularly in the context of poverty reduction:
 - Increase the nutrient density and health qualities of foods;
 - Explore research contributions to improving food security for vulnerable populations (e.g., remote communities, low-income people and aboriginal communities); and
 - Inform government policy initiatives to influence food manufacturers (e.g., healthier products).
3. Risks and opportunities with respect to climate change and sustainability need to be addressed:

- Understand and respond to risks of changing climate factors (e.g., crops that are no longer productive or new crops that could not be grown previously); and
 - Find balances for the use of biomass resources in the bioeconomy, food production, and sustaining the productivity of the land base, including biodiversity.
4. There is a need to understand and optimize the highest value use of biomass for the individual producer, the Alberta public and stewards of the resource—based on scientific and objective assessments:
- Determine the true resource potential of biomass (e.g., physical potential of the biomass, carbon intensity, transport, water use, air quality and life cycle analysis);
 - Understand the business case and potential return on investment for the range of potential uses for the resource;
 - Understand the range and value of drivers to develop the bioeconomy, beyond the economic business case (e.g., sustainability of rural communities; unintended health effects; market drivers; diversification of product streams);
 - Investigate new technologies that could unlock the economic potential of the resource that cannot currently be realized; and
 - Address ethical and regulatory considerations associated with the development of the bioeconomy.

Enabling Individual/ Community Health and Resilience

Alberta's strength lies with its citizens and communities. Health services, education, social programs and community engagement all play important roles to influence the province's health and social outcomes and thereby support the strength of its citizens and communities.

Alberta's health system and its innovative approach to health service delivery will promote wellness, prevent and treat illness and address the factors that create barriers to good health. Education inspires and enables Albertans to achieve success and fulfilment as engaged citizens with an entrepreneurial spirit. Social supports are key elements in strengthening family and community life by providing shared experiences and needed resources.

Albertans want their communities to be welcoming, vibrant and safe. They want to feel a strong sense of inclusion and engagement within their communities, where they can participate in all aspects of community life. Given the importance of Alberta's health and social agenda, a clearly defined role for research and innovation in this area will support improved health and social outcomes for Albertans.

Opportunities

1. Continued focus on food quality, water quality and land use is needed, as these issues affect the health of Albertans and the social fabric of Alberta's communities:
 - Develop additional tracking systems and acceptable limits in the system, to enhance assurance and improve processes to achieve health and social outcomes;

- Optimize farm animal health status and welfare standards, food products and practices, and food quality, safety and security;
 - Investigate social license related to mass production and related thresholds (e.g., air quality and intensive livestock farming);
 - Develop new commercially competitive health food, food products and pharmaceuticals from plants; and
 - Conduct climate change modeling of communities in relation to health impacts and adaptation.
2. A greater link is needed between economic development and improved, health, social and community resiliency outcomes:
- Design more resilient communities through a proactive analysis of related issues, including mapping the key economic, environmental and social factors and strengths of resilient communities in the face of challenges such as boom/bust cycles, extreme weather and stochastic events such as fire;
 - Identify factors that impact the acceptability of new technologies in communities;
 - Inform the creation of economic opportunities for producers and rural communities;
 - Identify effective uses of our competitive advantages to achieve economic strengths which will benefit the social health of communities; and
 - Increase clarity in the differences between rural economies and urban economies with respect to social impacts (e.g., community design).
3. There is a need to achieve new efficiencies and a greater effectiveness for a sustainable health care system:
- Address health inequities and inefficiencies through a focus on the social determinants of health;
 - Understand the optimal balance between preventative and responsive strategies to achieve health outcomes;
 - Investigate key drivers of the health care system: efficiency, effectiveness, outcomes, population health and demographics;
 - Investigate how to increase community and individual ownership of health issues; and
 - Explore rural and urban differences in access and use of health care, and the role of technology in improving health care delivery and access.

Alberta Innovates Corporations: Strategic Research and Innovation Priorities

Launched in 2010, Alberta Innovates includes four provincial corporations that receive support from the GoA to be catalysts of innovation by building on Alberta's strengths in the bioresources, energy and environment and health sectors. The four Alberta Innovates corporations are:



The following sections express the research and innovation directions and business context developed by each of the Alberta Innovates corporations in their 2012-15 business plans. This section presents the official mandates provided to the corporations from the Minister of EAE, in addition to the collaborations, competitive context, and research initiatives articulated by each corporation as they annually assess their strategic and operational directions. Further details on the Alberta Innovates corporations are available through their respective business plans.

Alberta Innovates - Bio Solutions



**Alberta
Innovates
Bio
Solutions**

Mandate

Alberta Innovates - Bio Solutions (AI-Bio) will meet the research and innovation priorities of the Government by providing leadership and coordination for research and innovation that supports the growth and diversification of Alberta's agriculture, forest and life sciences sectors.

The GoA has given AI-Bio the following responsibilities as set forth in the Alberta Research and Innovation Regulation:

Support for the economic and social well-being of Albertans, bio-industries (life sciences, agriculture and forestry) research and innovation activities aligned to meet GoA priorities, including activities directed at the development and growth of the bio-industries sectors, the discovery of new knowledge and the application of that knowledge.

AI-Bio will create value through:

- Increased effectiveness and integration of planning, funding and service delivery;
- Alignment of programs and investments toward priority areas and outcomes;
- Increased program and investment focus on key areas relevant to agriculture and forestry, genomics and other life sciences, nanotechnology, food and nutrition; and
- Improved facilitation of knowledge, intellectual property (IP) and skill transfer within the system and between academia, industry and government; and Improved accountability and outcomes through integrated performance monitoring and continuous improvement processes.

AI-Bio will integrate a disciplined research and innovation process into government policy for sustainable development.

AI-Bio aims to be the driver for the implementation of bio-industries activities in Alberta through integrated and disciplined research and innovation processes. AI-Bio will conduct its activities with the following specific goals:

- Supporting enhanced performance and productivity in Alberta's agricultural, forestry and biorelated strategies through research, innovation and technology development;
- Providing proactive leadership on key initiatives; and
- Co-coordinating overlapping research plans and supporting activities between GoA ministries with a research and innovation focus on bio-industries.

Collaborations

Innovative thinking and results in forestry, agriculture and related life science sectors will be achieved through integration and collaboration across provincial organizations (e.g., other Alberta Innovates corporations, GoA ministries, Alberta Livestock and Meat Agency), disciplines, sectors and stakeholders. AI-Bio is working collaboratively across the Alberta Innovates system and with industry stakeholders to respond to the increasingly complex challenges facing Alberta.

AI-Bio takes its operating principle of partnership very seriously. In an atmosphere of integrated, multi-sectoral initiatives, success will be based on ensuring connectivity with all key collaborators. AI-Bio's goals directly link to the ARIP and relate to the specific directions of the GoA, where:

- Investments in food for health and prion research address investing in the health of families and communities;
- Work in ecosystem services directly influences the ability of the province to advance its world-leading resource stewardship; and
- The leadership role played by AI-Bio in building the Alberta bioeconomy contributes to securing Alberta's future.

AI-Bio will continue to work with the GoA ministries on the PAC who have identified the bioeconomy as a primary opportunity in economic development.

AI-Bio seeks partners with expertise and capacity to deliver. They continue to make significant investments with Campus Alberta institutions to ensure support for excellent science and the conditions for knowledge transfer. Alberta benefits from the facilities and expertise within Campus Alberta and government research facilities (federal and provincial). AI-Bio is also committed to partnering with their Alberta Innovates colleagues where appropriate and necessary. The success of AI-Bio is based on the remarkable contributions of their partners and stakeholders.

Competitive Context

The global food system will experience unprecedented pressure over the next 40 years. It is believed that the global population will increase from nearly seven billion today to eight billion by 2030, and probably to over nine billion by 2050. Alberta is uniquely positioned to meet increasing domestic and global demand for agricultural commodities such as meat, wheat and canola, quality healthy food products, and global leadership in building food security.

On the production side, global competition for land, water and energy are intensifying, while the effects of climate change are becoming increasingly apparent. Alberta has natural assets in agriculture and forestry, which are mature industries with significant technical expertise and established infrastructure. These assets create an opportunity for further development of products and services within the agriculture, food and forest sectors for export to existing and untapped destinations.

The world biochemicals market has been predicted to grow from 20 to 25 per cent in 2010 and to 45 to 50 per cent in 2025. Expansion of the bioindustrial component of Alberta's bioeconomy will provide value-added opportunities to grow our agricultural and forest sectors in an economically and environmentally sustainable way, offer green products and green solutions to augment our petrochemical industry, and enhance rural development through new jobs and globally competitive businesses. Alberta's next wave of greenhouse gas (GHG) emission reduction and mitigation strategies is also focused on bioindustrial technologies and products, and could result in significant reductions.

The environment provides a significant emerging opportunity for diversification, differentiation, innovation and a new competitiveness. This includes the development of a CEMS as identified in the Land-use Framework, and a focus on the growing interest and demand for the enhanced provision of a wide

array of ecosystem services. Ecosystem services are the benefits that people obtain from the environment, including such things as air and water filtration, energy, food and fibre production and recreation. Markets for ecosystem services offer potential transformation and innovation in land management and have been identified as promising elements of Alberta's future environmental and resource management systems.

Finally, Alberta has built excellent capacity in neuroscience over the last 35 years and in protein structure science over the last 60 years. The province is one of the few jurisdictions in the world that could blend its capacity in prion and neuroscience research to understand how human and animal protein misfolding diseases happen and to discover potential therapies for them. New investments can build upon that unique opportunity to Alberta's and Canada's advantage.

Research and Innovation Initiatives

AI-Bio supports activities at different stages of the innovation spectrum. This ranges from discovery of new knowledge, to application of that knowledge, and knowledge translation or commercialization across their five priority research areas: Sustainable Production, Quality Food for Health, Advancing the Bioeconomy, Ecosystem Services, and Prion and Prion-like Neurological Diseases.

1. Sustainable Production

Research and innovation contributes to sustainable production, through new knowledge and technologies that reduce the cost of production and/or add value to commodity products in an environmentally sustainable manner. This in turn contributes to enhanced productivity, profitability and competitiveness of the sectors. Sustainability refers to the ongoing economic, environmental and social benefit associated with

responsible management of Alberta's natural resources for the prosperity of future generations. Sustainable practices ensure that biological systems remain diverse and productive over time.

Priority Actions

- Research leading to innovations that support agriculture and forest industries' social license to operate, by optimizing environmentally sustainable production systems;
- Genetic selection/improvement and growth of forest species with qualities required for higher value products;
- Selection and development of re-vegetation materials and solutions for reclamation of disturbed boreal forest lands and abandoned industrial sites;
- Increase in yields by 30 per cent in barley and pulse crops by 2020 with 30 per cent improvement in water and nutrient use efficiency via collaboration with industry players and technology suppliers;
- Develop biomarkers to identify 3 desirable traits for food and animal feed for each barley and pulses by 2017;
- Improved efficiency of livestock production through the application of emerging technologies such as genomics;
- Enhanced quality and safety and differentiation of meat and meat products through development of specific quality attributes;
- Development of agronomic packages that optimize the expression of market-driven traits in agriculture and forest crops;
- Selection and development of forest species and agricultural crops resistant to pests (weeds, pathogens and insects) and/or development of pest/health surveillance and management systems; and
- Continued AI-Bio investment in two Alberta Innovates Centres: Livestock Gentec and Phytola.

2. Advancing the Bioeconomy

Alberta's current production of bioindustrial products, such as biochemicals, biomaterials, and bioenergy products, uses feedstock from agricultural and forest biomass and municipal solid wastes. Research and innovation supported by AI-Bio in the area of the bioeconomy will be focused on the development of new bioindustrial products and processes, and the growth of the bioindustrial sector.

Priority Actions

- Lead the development and implementation of the Bioeconomy Initiative (BioE Initiative), an integrated provincial science and innovation strategy for bioindustrial development, in collaboration with Alberta Innovates - Technology Futures and Energy and Environment Solutions, Alberta Agriculture and Rural Development, Alberta Environment and Sustainable Resources Development, Alberta Energy and the industrial sector of Alberta;
- Facilitate the advancements in science and innovation that allow the development of bioindustrial growth opportunities in three broad areas: biomaterials, biochemicals and bioenergy including liquid fuels;
- Develop collaborative working relationships between research agencies, government, and industry to use financial, human, and infrastructure resources in the forest, agriculture, and oil and gas areas to spur cross-sector innovation e.g., Bioeconomy Alberta Team, Alberta Biomaterials Development Centre, Biorefining Conversions Network);
- Provide data and analysis for science-based policy recommendations that will improve policy or reduce policy constraints that effect bioindustrial development in Alberta; and

- Develop relationships and networks to spur cross-sector innovation amongst agriculture, forestry and oil and gas sectors.

3. Quality Food for Health

Changes in diet can improve health, and specific foods/diets can assist in the prevention or treatment of certain chronic diseases. Alberta has a rich agriculture industry, which produces a variety of products that can be processed into foods, ingredients, functional foods, natural health products and bioactive compounds that provide enhanced health benefits and position Alberta businesses to participate in the growing global market.

Food safety also continues to play a critical role with respect to public health, market access, and competitiveness. Safety of food products continues to present challenges as new pathogens emerge. The ability to rapidly trace products to their origin will contribute to consumer confidence in today's food production systems.

Priority Actions

- Accelerate research and technology development that will lead to the introduction of new innovative, competitive, healthy food products, ingredients, beverages and supplements into the Canadian and global marketplace;
- Research to support reformulations of existing commonly consumed foods to improve the healthfulness of these products or to conform to new health guidelines or regulations or inform new policy;
- Develop biomarkers to identify 3 desirable traits for healthy food from barley, pulses, and other Alberta agricultural commodities by 2017;
- Optimize protein quality of pulses and barley for human nutrition by 2020;

- Grow Alberta’s knowledge and development of innovative food processing and packaging technologies;
 - Complete the consultative process to identify unique research and innovation opportunities in food safety. These may include pathogen reduction strategies, innovative processing technologies, food safety training and development of highly skilled people;
 - Foster knowledge translation of new science and technologies to Alberta’s small and medium food producers, processors and manufacturers; and
 - Increase research capacity and infrastructure in the specific areas where Alberta has competitive strength in food and health or food safety.
- Create a science-based value proposition for ecosystem services in Alberta through investment in innovation (science, knowledge, systems, and business models) and the creation of institutional capacity:
 - Develop an ecosystem services assessment protocol;
 - Lead development and delivery of multi-disciplinary, cross sector applied proof of concepts; and
 - Establish a “Centre of Excellence” for ecosystem services and environmental innovation.
 - Working with Alberta Innovates - Energy and Environment Solutions, Alberta Innovates - Technology Futures, industry, and GoA stakeholders, develop and execute a strategy to focus on diversification through the core engine of Alberta’s economy, the energy sector, based on providing environmental solutions and enhancing ecosystem services.

4. Ecosystem Services

Ecosystem services are the benefits that people obtain from ecosystems, including such things as air filtration, water filtration, fresh water, energy, food, fibre production and recreation. Ecosystem services are enhanced through the choices society makes regarding land use and management. Integrated resource management and cumulative effects management can be used to enhance ecosystem services. Developing solutions to environmental problems and the provision of key services associated with healthy ecosystems are opportunities for Alberta to position itself as a global leader. Research and innovation supported in the area of the ecosystem services will be focused on the enhancement of ecosystem services through market-based approaches; developing bio-based environmental services; and documenting environmental integrity.

Priority Actions

- Biological GHG management program and projects, in partnership with Climate Change and Emissions Management Corporation (CCEMC).

5. Prion and Prion-Like Neurological Diseases

AI-Bio through the Alberta Prion Research Institute (APRI), a program area within the corporation, supports basic and applied research and development in the areas of prions and prion-like neurological diseases. APRI supports international quality research carried out by investigators in academic, government and industrial settings. It also supports forums, and university-industry and policy fellowship programs to stimulate the translation of research knowledge for use by industry and policy makers. In addition to supporting the discovery of new knowledge, APRI has been the primary agent of building a significant world-class capacity in Alberta for prion and prion-like neurological research. Through its grants and contracts, it also supports the training of student and postdoctoral trainees in its focal areas.

Priority Actions

- Developing an improved understanding of the processes involved in prion disease to inform risk management and policy around the management of these diseases;
- Targeting investment towards problems of livestock industries and wildlife managers to enable a reduction in industry costs, more effective disease control in the wild, and development of potential new products;
- Building on Alberta's strengths and opportunities to develop new insight into prion-like neurodegenerative diseases, with the potential for long term application in prevention, treatment and products; and
- Attracting additional funding to leverage AI-Bio's investment in prions.

Alberta Innovates - Energy and Environment Solutions



Mandate

Alberta Innovates - Energy and Environment Solutions (AI-EES) will serve as the research, innovation and technology implementation arm for Government of Alberta ministries in energy and environment, applying world-class research and

innovation management strategies to preserve and enhance Alberta's economic, environmental and social well-being.

The Government of Alberta has given AI-EES the following responsibilities as set forth in the Alberta Research and Innovation Regulation:

Support the economic and social well-being of Albertans, energy and environment research and innovation activities aligned to meet Government of Alberta priorities, including, without limitation, activities directed at the development and growth of the energy and environment sectors, the discovery of new knowledge and the application of that knowledge.

AI-EES will create value through:

- Increased effectiveness and integration of planning, funding and delivery of research and innovation programs;
- Alignment of programs and investments toward priority areas and outcomes;
- Improved facilitation of knowledge, IP, technology and skill transfer within the system, and between academia, industry and government;
- Improved accountability and outcomes through integrated performance monitoring and continuous improvement processes; and
- AI-EES will integrate a disciplined research and innovation process to inform government policy and regulations for sustainable development.

AI-EES promotes the implementation of energy and environmental technologies in Alberta and will conduct its activities with the following specific goals:

- Supporting enhanced performance and productivity in Alberta's energy and environmental sectors through research, innovation and technology development;
- Providing proactive leadership to support implementation of the research and components on key Government of Alberta Strategies; and
- Co-coordinating research plans and supporting activities among GoA ministries with a research and innovation focus on energy and the environment.

Collaborations

As the lead agency for energy and environmental research in Alberta, AI-EES brings together decision makers from government and industry as well as research and technology organizations, to develop solutions for the biggest challenges facing Alberta's energy and environment sector. A fundamental component of AI-EES is to better address government priorities by building stronger synergy and connections among the Alberta Innovates corporations, government ministries, industry groups, postsecondary institutions and other stakeholders.

To build and enhance collaboration and leverage resources, AI-EES developed a mechanism with Treasury Board and Finance, Environment and Sustainable Resource Development, Energy, and Enterprise and Advanced Education to facilitate, coordinate and promote technology innovations, which are important from a policy development and strategic business planning perspective.

AI-EES provides strategic advice, technology adjudication and project management for the CCEMC. AI-EES is intimately involved with, and has staff assigned to participate in, all of the CCEMC funded projects and programs. In many cases, AI-EES has provided funding in early project work, with subsequent funding from CCEMC for large project demonstration. By being the connector between the government's direct investments in energy and environment and the indirect investments funded by the CCEMC, AI-EES ensures strong collaborations in technology demonstration.

AI-EES works closely with Campus Alberta and with Alberta Innovates – Technology Futures (AI-TF), AI-Bio, and Alberta Innovates – Health Solutions (AI-HS) to build research capacity in Alberta. AI-EES and AI-TF have a long history of working together on many projects, and a recent partnership with AI-Bio has been established to focus on bio-energy, waste and biomass to produce bio-fuels and biological sinks. In

addition, AI-EES and AI-HS are collaborating in the area of healthy aquatic systems and impacts of climate change on humans.

AI-EES maintains strong industry collaborations through membership and Board presence with various associations. Finally, most AI-EES projects have funding from industry partners, and AI-EES staff work closely with industry to develop ideas for research and innovation, and launch co-funding opportunities.

Competitive Context

Alberta is part of the global economy, and as such is affected by global markets, the price of oil and natural gas, the desire for a clean environment, and public perceptions.

Alberta has the largest reserves of hydrocarbons in the world, and the world will continue to rely on hydrocarbons as a major fuel source for decades to come, so it is imperative that these sources are developed with minimal impact on the environment.

Alberta relies on the energy industry for much of its prosperity. In 2010-11 Alberta revenue from oil sands and conventional oil accounted for the major part of Alberta's non-renewable resource revenue. Nevertheless, Alberta is a price taker in terms of oil and natural gas. We do not set world prices for oil, and our economic success often mirrors the highs and lows of the oil and gas markets.

One substantial energy challenge is that more than two-thirds of the oil, even in the best managed conventional pools, is left in place using today's technology. However, with the advent of advanced hydrofracturing techniques applied to tight oil reservoirs Alberta's conventional oil has witnessed a major increase in production over the past year. Yet, without better technology to reduce environmental risks, the growth in tight oil production will be constrained.

At the same time, there are indications that the growth in oil sands production will be hampered by decline in demand and volumetric restriction on Alberta bitumen to market. Currently available technology does not create competitive product quality or commercial recovery of Alberta's unconventional hydrocarbon resources in relation to competing sources.

Alberta has large biomass, wind, solar and geothermal resources, as well as world-class deep coal deposits. The province produces and consumes vast amounts of hydrogen. We have an extensive energy infrastructure and the right expertise needed to research, develop, operate and maintain the latest installations to take advantage of all of our natural resources.

Alberta has a great and highly diverse landscape. We have water, mountains, deserts, and plains. We expect our environment to be clean, and we expect our government to protect our environment. This includes responding to GHG emissions, oil sands tailings ponds, and the overall use and disposal of water. The role and importance of water to the future of Alberta cannot be underestimated. Its connection to human health and well-being, to ecosystem health and sustainability, to the extraction of Alberta's energy resources, to agriculture and forestry and the unique beauty of the Alberta landscape demands concerted effort and attention to assure the Province's future wealth and environmental prosperity.

Research and Innovation Initiatives

AI-EES has four strategic areas of research and innovation focus for 2012-13. These strategic areas are: Energy Technologies, Renewable and Emerging Resources, Environmental Management, and Water Resources.

1. Energy Technologies

Alberta's energy resources require novel technologies for efficient, clean extraction and production, and to improve the quality of the derived products. To produce the resources, more energy is required, and that means that there is greater production of emissions and use of water. The world is demanding that energy resources be developed in a clean, environmentally sustainable manner.

Recovery and Processing

AI-EES is supporting the development and demonstration of key technologies that will be incorporated into two or more pilots/demonstrations of sustainable bitumen and heavy oil recovery, and processing and upgrading technologies.

Focus includes:

- Research and piloting next generation heavy oil and bitumen extraction and recovery technologies; and
- Research into piloting next generation upgrading and conversion technologies.

Clean Carbon

AI-EES is supporting the development and demonstration of the key technologies that will be incorporated in one or more clean coal/carbon demonstration plants converting low-value fuels into electricity, hydrogen, heat and chemicals with minimal adverse impact on the environment and the capability of capturing CO₂.

Focus includes:

- Canadian Clean Power Coalition research and development program;
- Evaluation of next generation gasification, gas cleaning, carbon capture and storage (CCS), and

power generation technologies;

- Coal beneficiation;
- Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies;
- Research and development on the conversion and utilization of coke, coal biomass and blended feedstocks;
- Underground coal gasification with CCS;
- Joint program with NRCan/CanmetEnergy on advanced polygeneration technologies for converting; and
- Low grade coal, oil sands coke and petroleum residues into high value fuels and chemicals.

Evaluation and Development

AI-EES monitors the industry outlook and is supporting the development and review of key technologies for future recovery opportunities.

Focus includes:

- University of Calgary Tight Gas Research Chair;
- Resource characterization studies in commercial process optimization and transition, tight oil, shale gas and marginal resources;
- Development of industry best practices; and
- Economic feasibility studies.

2. Renewable and Emerging Resources

Renewable and emerging energy resources will play an increasingly important role in the global energy mix: Alberta must stay engaged in these technologies, where it has a natural advantage. Alberta has large biomass, wind, solar and geothermal resources, as well as world-class deep coal deposits. Timely

“innovation” investment in this area could lead to new industries, a revamped manufacturing sector, renewable energy infrastructure, trained professionals and rural sustainability.

Renewable Energy

Demonstrate novel geothermal and bioenergy technologies which utilize municipal solid waste, forestry and agricultural residues, and produce power, hydrogen and liquid fuels.

Focus includes:

- Waste to fuels demonstrations including the Edmonton Advanced Energy Research Facility and small, decentralized waste to fuel pilots throughout rural areas;
- Detailed geothermal mapping and creation of roadmaps to encourage the development of geothermal field trials;
- Advanced energy storage to allow greater deployment of renewable energy;
- Developing hydrogen from alternatives and accessible sources such as renewables (biomass, solar) and nuclear energy, and including hydrogen separation and CO₂ storage;
- Modeling to assist government in creating policies and regulations that would accelerate the deployment of energy efficient and renewable energy technologies that would reduce Alberta’s GHG emissions; and
- Develop two or more nanotechnology innovation initiatives in the energy and environmental sectors.

Emerging Resources

Demonstrate novel underground coal gasification technologies, with CCS and develop new technologies that convert synthetic gas to fuels and other value-added products.

Focus includes:

- Underground coal gasification pilots to create value from deep coal resources that cannot be mined; and
- Investigate the use of nuclear fusion and fission in electricity and oil sands production.

- Tailings water treatment technology development and demonstration;
- Tailings solids reclamation; and
- Thermal in-situ water conservation.

Enhanced Ecology

The Enhanced Ecology program is designed to provide environmental stewardship for Alberta through research and technical innovation and collaboration.

Focus includes:

- Environmental monitoring (air, water, and land use) technologies;
- Lifecycle analysis for oil sands development, power generation, renewable and emerging resource utilization;
- Land Reclamation and Management;
- Biodiversity management; and
- Sustainability index development.

Carbon Capture and Storage

Four core technologies:

- Carbon capture technologies including chemical absorptions, dry absorption, and membrane separations;
- CO₂ enhanced oil recovery;
- Carbon storage in saline aquifers; and
- Monitoring, measuring, and verification.

Our technology focus has shifted from carbon storage to carbon capture in the last year. Further, AI-EES has made carbon capture a focus in the CCEMC program. In addition to focusing on carbon capture, AI-EES will take the initiative to identify and help remove barriers in CO₂ enhanced oil recovery.

3. Environmental Management

In today's world the challenges and opportunities in energy and environment are closely interconnected. The production, processing and use of energy resources will always lead to some environmental impacts, be it water consumption, GHG emissions, or land and ecological disturbance.

A goal of AI-EES' Environmental Management programs is to develop the technologies and management practices to balance resource development and environmental protection. This is the essence of sustainable development.

Oil Sands Tailings and Water Management

The Oil Sands Tailings and Water Management program aims to enable the industry to achieve the long-term objectives set out by Energy Resources Conservation Board and Alberta Environment and Sustainable Resource Development. The knowledge gained by AI-EES' participation in this research and development is made available to policy makers and regulators for effective tailings management policy and regulation development.

Focus includes:

- Mature fine tailings treatment and solidification technology development and demonstration;

4. Water Resources

Water is a key underpinning of Alberta's development. Resolving the challenges related to water – its availability or scarcity, its quality, its impact on the health of Albertans, its use by industry, and its role in sustaining healthy environments – will be compelling factors in decisions that shape the future of the province. Ensuring Alberta has the quality and quantity of water, where it is needed and when it is needed to support our quality of life, the health of our communities, families, economy and the environment is the impetus behind the Water Resources strategic area.

Water Security, Risk and Vulnerability

- Ensure Albertans have ongoing secure access to 'safe' water for people, nature and the economy. This requires expanded knowledge and an improved understanding of the qualitative and quantitative aspects of Alberta's dynamic water supplies, storage systems and the interaction between surface water and groundwater systems;
- Capitalize on new approaches and technologies to collect, analyze and interpret water data and build the information and knowledge for ongoing adaptation to changing conditions; and
- Develop a focused approach to the unique water security issues for rural Albertans and aboriginal communities.

Watershed Stewardship and Ecosystem Management

- Develop a comprehensive scientific understanding of the opportunities to meet and improve the health of aquatic and riparian ecosystems while meeting other critical water needs in society and the economy; and

- Promote improved and sustainable water management outcomes through collaborative and integrated decision-making processes with openly accessible scientific data collection and analysis focused on basin-specific goals and objectives.

Conservation, Efficiency and Productivity of Water Use

- Improve water use efficiency;
- Take an integrated and 'systems' approach to water challenges; and
- Develop improved valuation, full cost accounting, and creative use of economic instruments to further drive water conservation and wise choices in water use.

Alberta Innovates - Health Solutions



Mandate

Alberta Innovates - Health Solutions (AI-HS) will support research and innovation activities to improve the health and wellbeing of Albertans and create, through innovation, health related social and economic benefits for Albertans. It provides leadership for Alberta's health research and innovation enterprise by directing, coordinating, reviewing, funding and supporting research and innovation.

As stated in the Alberta Research and Innovation Act and Regulation, the Government of Alberta has given AI-HS the following responsibilities:

Support, for the economic and social well-being of Albertans, health research and innovation activities aligned to meet Government of Alberta priorities, including, without limitation, activities directed at the development and growth of the health sectors, the discovery of new knowledge and the application of that knowledge.

AI-HS will create value through:

- Investing in excellence based on the standards for world class health research;
- Focusing investments in areas of priorities that support our strengths and/or provide a unique opportunity (jurisdictional advantage) for Alberta;
- Optimizing the capture of health, societal and economic benefits from investments in health research through innovation;
- Demonstrating accountability and impact of investments in health research through performance management; and
- Enhancing the potential to support and facilitate private sector health research and innovation in the province.

Furthermore, AI-HS will be a priority-driven, proactive, outcomes-focused health research and innovation management organization, with focus on increasing knowledge, contributing to capacity building, improving health and related social outcomes, enhancing efficiency and effectiveness of the health system and providing economic benefits in Alberta. The major focus will be on making quality investments relevant to system needs and priorities.

Collaborations

In planning the direction for its evolution, AI-HS continues to make partnership development a key to its activities. This approach is being used in all aspects of the business of AI-HS, from the engagement of the key stakeholder groups in defining the needs and setting the priorities under which funding initiatives are developed, to the ways in which AI-HS finds partners who share these priorities and are interested in jointly supporting them.

Priorities set out by the Alberta Government, and departments whose interests are relevant to the activities of AI-HS are being used to develop opportunities for joint initiatives that enhance the effectiveness within the health research enterprise. Working through partnerships and collaborations with other Alberta Innovates corporations, the health sector, private industry, and the post-secondary institutions, AI-HS will continue to understand health sector needs (gaps in knowledge, policy, practice) and develop opportunities in priority thematic areas that will result in not only the discovery of new knowledge, but also in its transfer and application for the benefit of Alberta.

Opportunities to partner within the Alberta Innovates framework on projects and initiatives are encouraged and economies of scale and efficiency gains in administration are expected. AI-HS will work closely with the other Alberta Innovates corporations to develop cross sectoral approaches to Alberta challenges that require such inter-disciplinary approaches or which provide for opportunities to create synergies.

Funders are increasingly looking to collaboration and partnership models for their investments in research, and AI-HS is no different. AI-HS understands that partnering, based on shared objectives and priorities will lead to arrangements that maximize the effectiveness of efforts across multiple organizations;

and accelerate the potential impact of research and innovation investments.

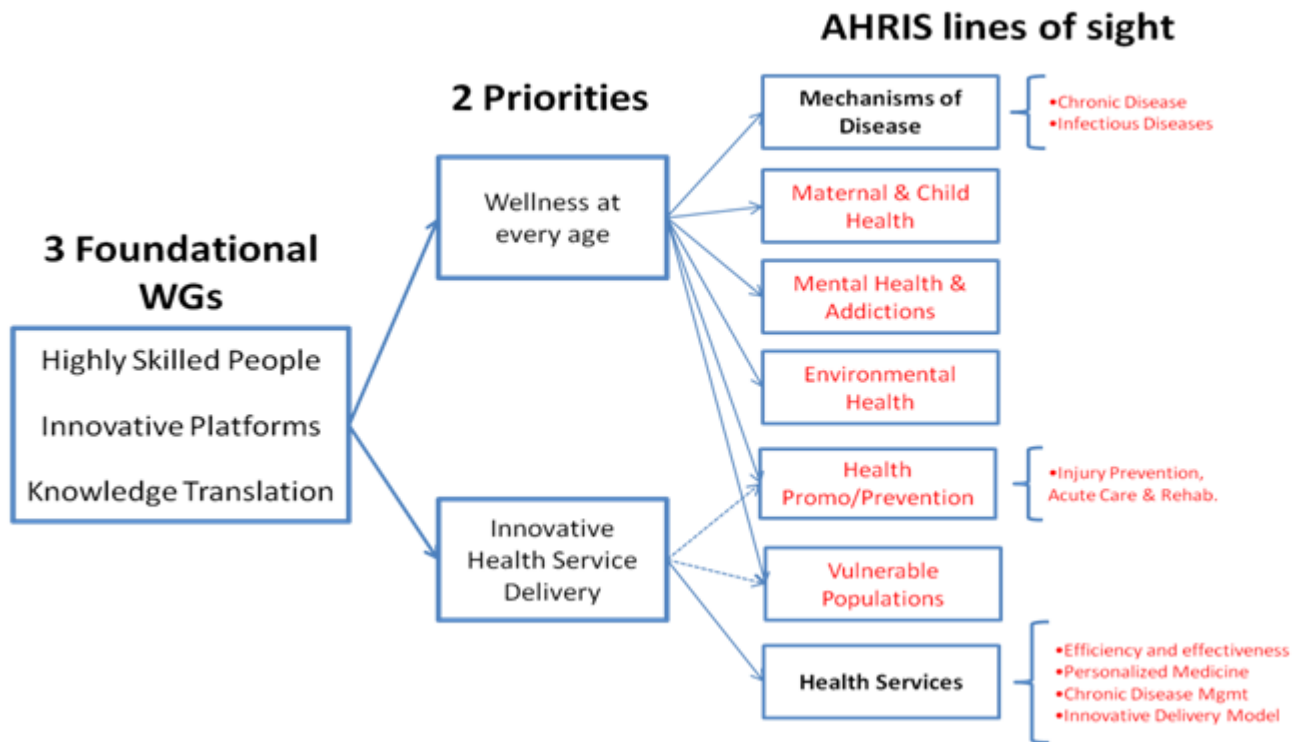
The model of organizational partnership has also increasingly been transferred at the research level. Individual researchers working on health issues or questions in isolation are increasingly rare. Research is more and more about networking, collaborating, partnering and; therefore, the new funding models provide support for teams (multi-disciplinary and inter-disciplinary), groups, institutes, centres, or networks addressing research topics in a more collective or collaborative fashion and from a variety of perspectives.

Competitive Context

Looking to the future, the planning challenge is not as much about choosing the right destination, as it is about defining the right direction, the right course for moving forward. With this directional context in mind, AI-HS has defined its evolving research and innovation context from the perspective of “trends in health research” based on national and international trends in research funding priority setting, collaborations and partnerships, and research investment evaluation.

Some of the trends which are evolving in health research in Canada, and around the world and which AI-HS is considering in order to position itself to ensure Alberta’s competitive advantage in the future include:

- **Increased focus and priority setting**
Health research investment approaches are shifting away from strictly focusing on awarding people, projects, or proposals, where identifying “quality research” (i.e. top rated) is the only step in the investment strategy. New funding opportunities have been developed focused on supporting more strategic aspects of the health research landscape



Source: Stay on Course, the Alberta Innovates – Health Solutions 2012-15 Business Plan.

¹Three Working Groups (WGs) focused on foundational activities or enabling directions defined in AHRIS have been established to articulate an initial strategic portfolio of activities for AI-HS.

(i.e. infrastructure support by the Canada Foundation for Innovation for example, support of the Canada Research Chairs program, support of a defined area of interest like health services research through the creation of the Canadian Health Services Research Foundation of Genome Canada, new Signature Initiatives like the Patient Oriented Research Strategy, from the Canadian Institutes of Health Research). Alberta is pursuing this direction with adoption as its strategic framework of the 10 year plan called Alberta’s Health Research and Innovation Strategy (AHRIS), released in August 2010;

- **Alignment, coordination, collaboration and partnership**

Both research funding agencies and research providers are moving towards collaborative efforts and partnerships with all stakeholders to

take advantage of increased efficiencies related to leveraging both financial and knowledge resources where shared objectives and priorities exist.; and

- **Return on the research investment: monitoring and measuring**

The health research funding model is shifting towards a more business-like approach where research is increasingly being not only reviewed on the basis of the scientific merit or quality of the proposal, but also approved and managed on the basis of providing evidence to meet defined needs, or expected outputs, innovation and outcomes. Under this model, not only is the due diligence important at the front end of the process, but the funder and the research funding recipients are expected to agree on the objectives of the research, milestones and deliverables, and measures of progress. Increasingly, funders are dedicating significant resources to monitoring individual

projects, as well as the aggregate outcomes from their investments in research.

Research and Innovation Initiatives

In arriving at its priority areas for research and innovation investments, AI-HS was fully guided by the strategic framework of AHRIS. To support this framework, the AI-HS Board of Directors developed a Strategic Implementation Process that became completely operational during the 2011-12 fiscal year.

That Process was built on the AHRIS-based matrix of priorities below and used the enabling directions of AHRIS as its foundation. AI-HS has therefore taken action in the enabling directions of Highly Skilled People (HSP), Innovation Platforms (IP*), and Knowledge Translation (KT) and have aligned budgetary allocations to these directions.

AHRIS provides the following definitions and actions for the enabling directions of HSP, IP*, and KT:

1. Highly Skilled People

Highly Skilled People are a critical mass of highly talented researchers, innovators, and entrepreneurs throughout the health research and innovation system with diverse backgrounds to tackle present and emerging health challenges and generate significant advances in wellness and health systems.

Actions

- Establish knowledge transfer expertise in “research-intensive” hospitals and primary care service delivery organizations;
- Enhance cross-disciplinary research and innovation in areas of strategic priority through team research grants programs (**AI-HS Lead**);
- Explore the development of an Alberta academic health sciences centre concept to increase informed

health service delivery planning and to facilitate the intricate linking of education, research and clinical practice that takes place in both academic and the service delivery settings (**AI-HS Contributor**);

- Enhance research capability in emerging areas that have direct application potential to health policy, practices, services or products (**EAE Lead, AI-HS Contributor, AI-TF Contributor**);
- Recruit and retain world-class health system, product design, management and research talent to Alberta (**EAE, AI-HS, and AI-TF Contributors**); and
- Participate in national and international networks that will enable Alberta to benefit from global advancements in health (**AI-HS Lead in Research**).

Under the HSP direction AI-HS has taken a leadership role in the following:

- Collaborative Research and Innovation Opportunities have been developed to enhance cross disciplinary activity in areas of strategic thematic priorities through team granting mechanisms. Three levels of funding support (Projects, Programs and Teams) are intended to offer opportunities for researchers and end-users to work collaboratively in defining the activity on the basis of the link between the needs of the decision-makers and the expertise of the researchers to optimize the value proposition for the investment;
- Translational Health Chairs are being offered through a collaborative mechanism with the academic institutions to recruit world class research talent to Alberta;
- Catalyst and Translational granting processes are also in place to support industry partnership and the opportunity to add real value to great ideas through research and innovation projects; and
- Sustainability funding is being provided to retain such world class talent in the province.

2. Innovation Platforms

Innovative Platforms are technological and organizational environments conducive to discovery and knowledge development that will help fuel innovation.

Actions

- Enhance Alberta’s clinical trials program and address barriers by improving the process for the recruitment of patients and by developing a streamlined research ethics review process (**AI-HS Lead**);
- Establish a provincial biobanking system with clear standards of practice for the collection, storage, labelling and accessing of biological samples;
- Develop and implement an “Alberta Genomics for Health” plan in support of the emerging field of personalized medicine/health (**EAE Lead, AI-HS Contributor**); and
- Improve Alberta’s health informatics capability by:
 - building on existing informatics and bicomputing capability in support of health systems research and advances in personalized medicine/health (**EAE Lead**);
 - improving the collection of and access to anonymized health care data and information to enable research in areas of strategic priority and policy issues;
 - supporting the linkage of health data with other data on education, income, and housing to support research into the social determinants of health; and
 - building on and sustaining the Alberta Health Research Database (**EAE Lead**).
- Enhance targeted technology and product development programs to support innovative preventative, diagnostic and therapeutic

technologies and health products (**AI-HS and, AI-TF Contributor**); and

- Support centres of excellence and networks in critical disciplines that support the emergence of innovative health policy, practice, products and services (**AI-HS Lead**).

Under the IP direction AI-HS has taken a leadership role in the following:

- AI-HS is working at the provincial level with the key stakeholder groups to streamline both the ethics review processes and clinical trials programs to reduce the barriers to effectiveness and improve the recruitment of patients to clinical research; and
- AI-HS is also interested in working with other key stakeholders to establish an integrated bio banking system with clear standards of practice.

3. Knowledge Translation

Knowledge Translation represents a culture of shared inquiry and knowledge translation at all levels of the health and health research systems, directed at delivering innovative policies, programs, practices, products and services that address Alberta’s strategic health research and innovation priorities.

Actions

Practice and policy

- Establish knowledge translation programs in support of innovation and implementation of best practices within service delivery organizations, including clinical practice (**AI-HS Contributor**);
- Foster strong relationships between researchers and users of health research, with particular emphasis on growing the culture of evidence-informed decision-making within the decision and policy-making processes of the health system (**AI-HS Lead**); and

- Ensure use of research evidence in making policy decisions on health technologies, services and health system issues by taking actions such as expanding Alberta's health technology assessment capacity and coordination.

Commercialization

- Accelerate the movement of discoveries and new applications into commercial products and services by:
 - developing partnering opportunities among organizations, including industry, committed to the development of commercially viable health products and services;
 - attracting and retaining entrepreneurial talent with experience in commercializing health research opportunities (**AI-TF Lead**); and
 - establishing a health innovation office to accelerate the movement of research to the marketplace (**AI-TF Lead**).

Health Literacy

- Engage the public in discussions on health research and technology advances and challenges, bringing in talented researchers, industry leaders, ethicists and thought leaders to support public awareness, engagement and debate on various health research and technology challenges (**AI-HS Lead**); and
- Support strategic and operational research into factors that will result in sustained, effective behaviour change in individuals, in order to improve or maintain health status (**AI-HS Lead**).

Under the KT direction AI-HS has taken a leadership role in the following:

- AI-HS is working with key industry partners to accelerate the movement of discoveries and new applications into commercial products and services;

- AI-HS also continues to support knowledge translation programs in support of innovation and implementation of best practices within service delivery organizations; and
- AI-HS also fosters through its program delivery activity, strong relationships between researchers and users of research knowledge by embedding and reinforcing the importance of knowledge transfer activities in all of its programs and activities.

Finally, it should be noted that AI-HS is also continuing to support the Alberta Heritage Foundation for Medical Research legacy activity through the Investigator Awards, Polaris Award and Interdisciplinary Team Grants, and is aligned with the objectives and thematic areas set out in AHRIS.

Alberta Innovates - Technology Futures



Mandate

The Government of Alberta has given Alberta Innovates - Technology Futures (AI-TF) the following responsibilities:

- Support, for the economic and social well-being of Albertans, research and innovation activities targeted at the development and growth of technology-based sectors and aligned to GoA priorities, including, without limitation, activities directed at the commercialization of technology and the application of knowledge.
- Meet the research and innovation priorities of the Government in the following areas or in a combination of the areas:
 - agriculture;
 - forestry;
 - energy;
 - the environment;
 - health; and
 - any other area determined under the regulations.
- Foster the development and growth of new and existing industries through research and innovation.

AI-TF will create value through:

- Increased effectiveness and integration of planning, funding and service delivery;
- Alignment of programs and investments toward priority areas and outcomes;
- Improved coordination between business, technical and networking services;
- Increased program and investment focus on commercialization and product development;
- Improved facilitation of knowledge, IP and skill transfer within the system, and between academia, industry and government; and
- Improved accountability and outcomes through integrated performance monitoring and continuous improvement processes.

Collaborations

Alberta Innovates – Technology Futures (AI-TF) provides the integrated, end-to-end support needed to turn ideas into commercially viable products and services and to support the application of innovation to benefit Alberta. With AI-TF help, entrepreneurs, companies of all sizes, researchers, post-secondary institutions and investors come together to solve problems and create the circumstances for business success.

AI-TF works in conjunction and in collaboration with the Alberta Innovates corporations, government, post-secondary institutions and industry, supporting them in various ways:

- AI-TF is the corporation assigned the responsibility for the application and commercialization of technology, and as such must collaborate with the other Alberta Innovates corporations to ensure technologies are applied or commercialized for the benefit of Alberta;
- The AI-TF Innovates Centres of Research Excellence (iCORE) division engages in cross platform research that is important to and informed by the other three Alberta Innovates corporations, as well as by industry and PAC Ministries;
- With a complement of more than 500 scientific, technical, engineering and professional staff, AI-TF provides “fee for service” applied research services to over 900 industry and government clients, including the other Alberta Innovates corporations, valued at approximate \$80 Million per year;
- AI-TF provides direct support to hundreds of small and medium businesses through the Bringing Technology to Market Voucher, Industry Associates, and other programs. AI-TF also manages a voucher program for Alberta Innovates - Bio Solutions. AI-TF also collaborates with other economic development organizations at the federal (IRAP), provincial and municipal levels to leverage investments and outcomes for its clients and partners; and
- AI-TF, through its Centres and Regional Network programs, works closely with industry and industry associations, colleges and universities, and other economic development organizations to support approximately 2000 companies annually.

The following three themes focus and guide AI-TF’s management approach with respect to fulfilling the corporation’s mission and mandate. Each theme will impact the future collaborations AI-TF establishes and maintains:

- **Improving Internal Capacity and Capability**

A central area that affects the entire organization is culture. The organization is continually adopting a more customer-centric and outward-looking view. Part of this involves acquiring and increasing capacity in certain business functions including customer management, strategic marketing, entrepreneurship, deal cultivation and channel development;

- **Focusing and Streamlining Programs and Policies**

Going forward, AI-TF is committed to delivering on its mandate, streamlining its program and service offerings, and continuing efforts to cooperatively and collaboratively work with the other parts of the Alberta Innovates system to collectively meet the needs of stakeholders, citizens and the GoA; and

- **Getting Closer to the Customer**

In addition to providing technical expertise, AI-TF will work to develop additional business expertise necessary to serve the needs of young technology companies in Alberta. This includes developing programs that increase services and access to sales expertise, marketing experience, and people with channel development experience and relationships. By getting closer to the customer, AI-TF will be able to serve as a vehicle for informing other Alberta Innovates stakeholders about what the market really needs and wants.

Competitive Context

Current prosperity in Alberta depends on the sale of energy to the United States – a situation that leaves the province vulnerable. While the protection and growth of our vital energy resource-based revenue stream is essential, there is an increasing need and urgency for strategies that demonstrably nurture the new sector growth Alberta requires for competitive positioning in international markets, beyond energy.

Opportunities also exist to develop technical innovations enhancing the environmental image and cost-competitiveness of Alberta's heavy oil industries. Platform technologies of ICT, nanotechnology and omics could be leveraged to achieve best practice environmental management processes supporting the orderly and responsible development of the oil sands.

Alberta's growth is constrained by a general scarcity of skilled labour. Heavy demand in the energy sector and challenges in labour attraction and retention to Alberta make it difficult to meet non-energy sector labour needs. Innovations leading to increased labour productivity and more cost-effective industrial processes would clearly be of assistance in this tight labour market.

Within the context of long-term planning, the energy, food and material needs of China and other potential new markets offer the possibilities for knowledge collaborations and foreign capital attraction for Alberta.

Pressing global demands for effective resource and environmental management processes and practices, and approaches that support enhanced health and wellness may be opportunity areas for diversified growth. In response to these needs a number of themes have emerged from the GoA focusing on environmental, economic and health concerns. Innovation and research investments in the demand areas of cumulative effects, environmental monitoring, the bioeconomy and health may result in enhanced demand for Alberta-based research and innovation services.

Alberta's significant biological resources support consideration for the growth of the bioeconomy while we achieve environmental and economic sustainability. Innovative utilization of Alberta's biomass feed stocks for chemical, material and energy production in ways that engage our existing infrastructure and capabilities may be a means to enhance Alberta's position as a global energy leader.

Finally, with much of the provinces' new economic growth attributed to small and medium-sized enterprises (SMEs), products and services supporting commercialization and new business development should focus more specifically on growing our SMEs, not just to supply local demand but with a goal that many become globally competitive leaders in their niche market areas.

Research and Innovation Initiatives

AI-TF operates with three divisions that are evolving to leverage continually improved collaboration between AI-TF and its government, post-secondary and industry partners: the Innovates Centre of Research Excellence (iCORE) division, the Business Innovation Services (BIS) division, and the Applied Research Centres (ARC) division. Each division is supported by a range of portfolios, and research and innovation initiatives.

1. Innovates Centre of Research Excellence

Designed to address specific GoA priorities and grant funding, iCORE functions to optimize Alberta's research investments. Through iCORE, the expanding knowledge base in Alberta is being effectively aligned and applied to priority areas of need in the health, energy, environment and bio-industrial sectors based on the platform areas of ICT, nanotechnology, omics and engineering. iCORE funds 41 Strategic Chairs and 17 Industry Chairs in the platform areas. To grow Alberta's capabilities within this strategic framework, a key responsibility of iCORE is the active attraction and recruitment of top global

and promising mid-career researchers working in our priority areas. Working collaboratively with the BIS division, iCORE ensures this world-class talent forms the foundation for the inter-disciplinary teams comprising the Alberta Innovates Centres. In creating the foundation of world-class industry/academic research capacity required to drive commercialization and enhance economic diversification in Alberta, iCORE's operational scope encompasses the following:

Strategic and Industrial Chairs

- ICT;
- Nanotechnology; and
- Omics.

Strategic Support

In alignment with AI-TF's mandate, iCORE provides visiting professor support, fostering international cooperation funding and the development and execution of workshops and events.

Accelerators

iCORE invests in strategic areas that bring a depth of technical resources (people, facilities, and equipment) supporting the capacity for long-term research in breakthrough areas holding the potential for technology commercialization over time. Included are programs to investigate the potential of collaborative groups, which may ultimately result in new research centres.

Key initiative:

- Nanoaccelerator.

Graduate Student Scholarships

Graduate Student Scholarships are designed to attract the very best young talent by topping up Natural Sciences and Engineering Research Council awards

for Canadian students and awarding scholarships to exceptional international students, as well as support for post doctoral students in the platform areas.

2. Business Innovation Services

The BIS division manages a wide range of programs and services that originated in Alberta Ingenuity and the department of EAE as elements of the 2008 Alberta's Action Plan: Bringing Technology To Market Strategy (e.g., Vouchers, Industrial Associates, nanoWorks, Regional Innovation Network, etc.). BIS focuses on the commercialization aspect of AI-TF's mandate helping to establish and grow new, knowledge-based businesses and industries. The division also facilitates the commercialization of technologies belonging to Technology Futures and its partners.

BIS provides services addressing the full spectrum, from research through to commercialization development, with initiatives that include applied research through to prototype application, and entrepreneurial and small business development and support. The Innovates Centres fall within the operational scope of BIS—ensuring continuity along the development funding, direct business connection and technology development path. The BIS function is expected to evolve to: achieve ever stronger linkages with Alberta companies at all levels (entrepreneur to large multi-nationals); re-evaluate existing and possibly create new programs; and to provide expertise and support to other AI-TF and stakeholder organizations in the areas of customer relationship management, partnerships and alliances, marketing and channel development, and finance and investment readiness. In support of the 2000 companies AI-TF supports, portfolios and key initiatives being pursued under BIS are:

The Innovates Centres

- Centre for Machine Learning;
- Alberta Centre for Advanced Micro and Nano

Technology Products (ACAMP);

- TECTERRA;
- Biovantage; and
- Alberta Glycomics Centre.

Investments and Development

Enables technologies that originate from within AI-TF and from Alberta companies, through funding opportunities, IP management, and technology deployment services.

Key initiatives:

- Technology deployment for AI-TF's research and development services;
- IP management and advisory for Alberta Innovates; and
- Management of technology development funds.

Regional Innovation Network

Emerging, integrated province wide system providing SMEs, innovators and entrepreneurs with services and resources. Regional Innovation Networks unite educational, economic development, research and other organizations to collaborate, share knowledge, and provide resources and services to SMEs.

Key initiatives:

- Regional Network development;
- Technology development advisors;
- Matching support for Campus Alberta; and
- TRILabs.

Nano

Build research and commercial capacity in the priority area of nanotechnology for the province of Alberta.

Key initiatives:

- nanoAlberta;
- nanoWorks;
- nanoBridge;
- Alberta Centre for Advanced MNT Products funding; and
- Wealth creation (new and transformed industry).

Industrial Development

Provide much needed support to Alberta-based companies which aid in the acceleration of their commercial success, and makes global reach a possibility. They absorb some of the risk that often prevents companies from growing their business.

Key initiatives:

- Vouchers;
- Enterprise Program; and
- Youth Technopreneurship.

Strategic Partnerships

Assist Alberta based businesses to bring quality ideas to market faster by testing and proving their new technology products and services in a real-life setting as well as liaising with key internal and external partners.

Key initiatives:

- Product Demonstration Fund; and
- Other partnership programs as developed in collaboration with EAE.

3. Applied Research Centres

ARCs provide over 900 large to mid-sized companies and government agency clients with technical expertise and services primarily on a fee-for-service basis. Over 400

research scientists, engineers and technical staff provide services in five primary facilities occupying about 1 million square feet of laboratory and office space. Serving Alberta's leading economic sectors to enhance business competitiveness, accelerate the commercialization of new technologies and build commerce, the ARCs offer a range of services to: de-risk technology development/ investment for industry; develop and commercialize leading-edge technology for industry uptake within a 3-5 year timeframe; and active collaborations with industry and government consortia to investigate technology and innovation for the long-term benefit of Alberta. About 40% of the ARC's work relates to the energy sector as its research roots were founded in the initial efforts to develop the oil sands, including AOSTRA and 27 years of experience in the AACI program.

Advanced Materials

Provides materials research and development, testing and precommercialization services to the energy, manufacturing, natural resources, and supply sectors.

Key initiatives:

- Materials and Reliability in Oil Sands; and
- Alberta Metal Fabrication Innovation Program.

Industrial Sensors Technology

Develops sensors, measurement and analytical solutions for the petroleum sector (currently) to help reduce production losses, improve efficiency and reduce environmental impact.

Key initiatives:

- Industrial Sensors Technology—development/ deployment; and
- Development of Measurement and Sensors Manufacturers Strategy.

Bioresource Technologies

Applies knowledge and expertise in biology, agronomy, engineering and molecular plant breeding to develop sustainable, and customized bio-product applications for commercialization.

Key initiatives:

- Alberta Biomaterials Development Centre; and
- New fibre products for emerging markets— Working with industry to supply panel board (based on AI-TF IP) to large markets (75 million housing starts over the next 5 years).

Heavy Oil and Oil Sands

Offers specialized expertise, facilities and equipment in the areas of recovery technologies, surface separation technologies, production technologies, engineered materials, and mining and extraction.

Key initiatives:

- Improved heavy oil and bitumen recovery;
- AACI research consortia focused on in situ recovery of heavy oil and bitumen;
- Extensive collaborative, focussed research on in situ recovery of heavy oil and bitumen;
- Processing of surface mined oil sands;
- Processing of tailings;
- Improved oil and gas recovery from low permeability reservoirs;
- Development of enhanced characterization methods for low permeability rocks;
- Enhancing access to tight oil and gas;
- Developing tight oil and gas enhanced recovery processes;
- Surface separation and upgrading;
- Improved surface processing of steam-assisted gravity drainage (SAGD) and other thermally

produced fluids;

- Water treatment for SAGD and other thermal processes;
- Breakthrough upgrading technologies;
- Enhanced production technologies;
- Testing of multiphase flow meters, down hole control elements etc; and
- Collaborative development and testing of production tools and equipment.

Fuels and Lubricants

Provides specialized characterization services to help solve difficult processes and evaluate new equipment and products for the oil and gas and renewable fuels industry sectors.

Key initiatives:

- Analytical petroleum laboratory;
- Refined petroleum products;
- Renewable fuels;
- Upstream petroleum and phase behaviour; and
- Quality assurance centre.

Clean Energy

Helps Alberta achieve the outcomes defined in the Climate Change Strategy through a combination of client defined projects and technology development programs.

Key initiatives:

- Biogas innovation;
- Biomass polygeneration;
- Chemical looping combustion for CO₂ capture;
- Power integration; and
- Energy genomics.

Environmental Analysis Services

Provides comprehensive contaminant monitoring services, specializing in the analysis of organic and inorganic compounds in water, wastewater, air, soil, sludge, solids, waste oil, solvents, sediment and biological tissues; develops novel methods for testing and commercialization.

Key initiatives:

- Maintain and enhance high-end labs with low detection limits and an extensive array of testing capabilities;
- Develop unique capabilities for the testing of air, water, soil, sediment, plant and animal tissue;
- Develop state-of-the-art methodologies to satisfy government, industry and SME environmental monitoring needs; and
- Supporting the development of Alberta's new Environmental Monitoring Framework.

Land and Water Management

Builds sustainable resource management capacity through research development and deployment of scientifically valid land and water management tools.

Key initiatives:

- Land reclamation and remediation;
- Integrated water management; and
- Environmental planning and economics.

Geosciences and CO₂ Storage

Works with clients and other technology providers to characterize, model and monitor geological sites where fluids are being injected or where innovative energy recovery technologies are being explored. Current initiatives are focused on field pilots for CO₂ storage, CO₂ enhanced oil recovery and geothermal energy opportunities.

Key initiatives:

- Geological characterization;
- Modelling and risk assessment; and
- Geological monitoring.

Wildlife Ecology

Undertakes applied research on biodiversity, wildlife species, vegetation, and natural processes to maintain healthy sustainable ecosystems on a managed land base.

Key initiatives:

- Monitoring biodiversity in Alberta through the Alberta Biodiversity Monitoring Institute;
- Developing technologies and approaches for ecological conservation; and
- Helping Aboriginal communities build capacity for environmental management.

Health

Health programs support economic growth and diversification through effective environmental management and development of new products and technologies that boost health.

Key initiatives:

- Microbial fermentation;
- Nonclinical services; and
- Disease monitoring.

C-FER

C-FER Technologies is a wholly owned subsidiary of AI-TF, which is focused on facilitating the use of leading edge technology by oil and gas and pipeline operators. The Edmonton facility contains a unique, world-class laboratory, in which full scale equipment qualification

testing can be performed at high pressure, temperature and load conditions, as well as sour environments.

Exploration and Production

Three engineering departments which collectively provide engineering, testing, analysis and training services to improve hydrocarbon resource recovery and address the design, integrity, efficiency and safe operation of wells constructed in challenging environments.

Key initiatives:

- Production operations;
- Drilling and completions; and
- Engineering services.

Laboratory Projects and Services

Manage facilities and provide technical services capabilities in support of Exploration and Production and Pipeline and Structures Division projects.

New Technology Venture

Strategic growth planning and program development. Provide business development support to other divisions.

Pipeline and Structures

Two engineering departments, which provide expertise in areas of integrity management and risk assessment, risk based and limit states design and maintenance planning, analysis of pipeline incident data and analysis and mechanical testing of pipeline and structural systems.

Key initiatives:

- Pipeline integrity management; and
- Pipeline design and construction.

Conclusion

The ARIP is developed annually to provide direction and guidance to PAC ministries within the GoA, the Alberta Innovates corporations, and Campus Alberta institutions. This plan fosters alignment and coordination within Alberta's research and innovation system and facilitates a culture and community of collaboration, creativity and excellence across the province's higher-education, business and government sectors.

Each year the ARIP is renewed to outline key components of Alberta's research and innovation system; express the core strategies being pursued to strengthen the research and innovation system; capture and articulate the province's research priorities; and provide an overview of the research and innovation directions being pursued by the Alberta Innovates corporations.

The *2012 ARIP* is a key mechanism to support collaboration among PAC ministries, the Alberta Innovates corporations, and Campus Alberta institutions. Consistent with earlier years, ARIP's three core strategies are:

1. Building Research Capacity;
2. Focusing of Targeted Areas; and
3. Developing a Dynamic and Aligned Learning and Research and Innovation System.

The province's research priorities are captured in the following three themes:

- Managing Cumulative Effects;
- Developing Alberta's Bioeconomy; and
- Enabling Individual/Community Health and Resilience.

The following research and innovation initiatives derived from the Alberta Innovates corporations' 2012-15 business plans contribute to the advancement of Alberta's environmental, economic and social well-being:

Bio Solutions:

1. Sustainable Production
2. Advancing the Bioeconomy
3. Quality Food for Health
4. Ecosystem Services
5. Prion and Prion-Like Neurological Diseases

Health Solutions:

1. Highly Skilled People
2. Innovation Platforms
3. Knowledge Translation

Energy and Environment Solutions:

1. Energy Technologies
2. Renewable and Emerging Resources
3. Environmental Management
4. Water Resources

Technology Solutions:

1. Innovates Centre of Research Excellence
2. Business Innovation Services
3. Applied Research Centres

The integration encouraged by the ARIP strengthens and supports efforts to achieve the GoA vision to support families and communities, secure Alberta's economic future, and advance world-leading resource stewardship.

Appendices

Appendix A: Government of Alberta Strategic Policy Context

The following listing of GoA strategic policy documents provides the context for the research and innovation priorities reflected in the ARIP.

[Alberta Livestock and Meat Strategy – Building the Future for Alberta Meat Products](#)

The Alberta Livestock and Meat Strategy provides a foundation to turn Alberta's meat industry into a world-class, international competitor with a high quality, differentiated product. Alberta can take the lead in marketing products that are 'superior' in the eyes of the consumer. The goals of the strategy are to immediately inspire and involve the participants, direct limited resources strategically, and in the mid-term, create tangible benefits through enhanced supply chain cooperation.

[Alberta Nanotechnology Strategy - Unleashing Alberta's Potential](#)

The Nanotechnology Strategy complements the province's long range plans for the growth of a knowledge-based economy. To take advantage of the province's traditional economic strengths, the Nanotechnology Strategy focuses on improving the products and processes which have already established Alberta as a global competitor. The most significant anticipated gains through the added value of nanoscale advances are in the areas of Energy and the Environment, Health and Medical Technologies, and Agriculture and Forestry.

[Alberta's 2008 Climate Change Strategy](#)

Alberta's Climate Change Strategy takes Alberta's unique position as an energy supplier to the rest of the world as

a starting point. The strategy reflects the government's commitment to maintaining a healthy economy and Albertans' quality of life while addressing the challenge of climate change. The Climate Change Strategy outlines actions and expected results in the areas of conserving and using energy efficiently, implementing CCS and greening energy production.

[Alberta's Action Plan: Bringing Technology to Market](#)

The Alberta's Action Plan will assist Alberta entrepreneurs in getting more of their ideas off the research bench and into consumers' hands. Each of the actions outlined in the Action Plan is intended to assist Albertans in capturing the value of ideas and keeping the benefits in Alberta.

[Alberta Competitiveness Initiative](#)

In 2010, the Alberta government created the Competitiveness Council as part of the ongoing work under the Alberta Competitiveness Act. The Council is made up of government and industry leaders who are looking at ways to improve Alberta's ability to compete in a global economy.

The Council's work included developing a framework for measuring Alberta's competitiveness to compare Alberta's performance with that of other jurisdictions. The inaugural benchmarking Report on Alberta's Competitiveness was released in December 2010. The Council is also identifying actions to be taken to increase Alberta's competitiveness overall and in four specific sectors – agriculture (grains and oilseeds); manufacturing; financial services; and petrochemicals/chemicals.

Improvements in innovation and productivity will be critical to sustaining Alberta's future competitiveness and prosperity.

[Alberta's Health Research and Innovation Strategy](#)

AHRIS, grounded in the strategic direction of Vision 2020, provides a high-level framework to guide health research investments and decision-making in the province over the next ten years. It will directly shape the business planning processes of key health research organizations in Alberta's health research and innovation system by providing a strategic approach to health research investment, capitalizing on the strengths Alberta has established through past investments, and encouraging effective translation of knowledge in all areas of policy and practice, to capture the benefits of Alberta's investments in health research.

[Getting Value from Every Fibre: Making the Most of Alberta's Lignocellulose Resource](#)

Getting Value from Every Fibre, the Alberta Fibre Roadmap report describes a future for Alberta that will capitalize on the province's significant fibre resources with strategies to give the province a competitive edge and attract investors. The strategies presented in the report will help to guide implementation of Alberta's emerging bioeconomy, creating new value from forest and agricultural resources, and providing new economic opportunities in rural Alberta.

[Land-use Framework](#)

The Land-use Framework sets out an approach to manage public and private lands and natural resources to achieve Alberta's long-term economic, environmental and social goals. It provides a blueprint for land-use management and decision-making that addresses Alberta's growth pressures. The Land-use Framework complements Alberta's water and air policies to manage the impact of growth in balance with Albertans' social and environmental goals.

[Launching Alberta's Energy Future: Provincial Energy Strategy](#)

The Provincial Energy Strategy outlines the plan for Alberta's energy future. It builds on Alberta's strengths, addresses challenges, and charts a strategic path to ensure clean energy production, wise energy use, and sustained economic prosperity.

[Making the Food Health Connection – An Alberta Framework for Innovation](#)

Making the Food-Health Connection – An Alberta Framework for Innovation lays out an overarching provincial approach to increase innovation in health and food and to guide future investments leading to food and health innovations. The Framework identifies key actions to improving the translation of knowledge gained through research into policy and products, while fostering Albertan populations and creating opportunities for Alberta businesses to excel in the area of food and health innovation.

[Responsible Actions: A Plan for Alberta's Oil Sands](#)

The GoA's long-term vision for the oil sands is that development occurs responsibly, sustains growth for industry and the province over the long term, and is done in a manner that enhances Albertans' quality of life. As such, Responsible Actions: A Plan for Alberta's Oil Sands provides a platform to balance development with environmental protection, social responsibility, and economic success. It outlines a strategic approach to responsible development of the oil sands resource.

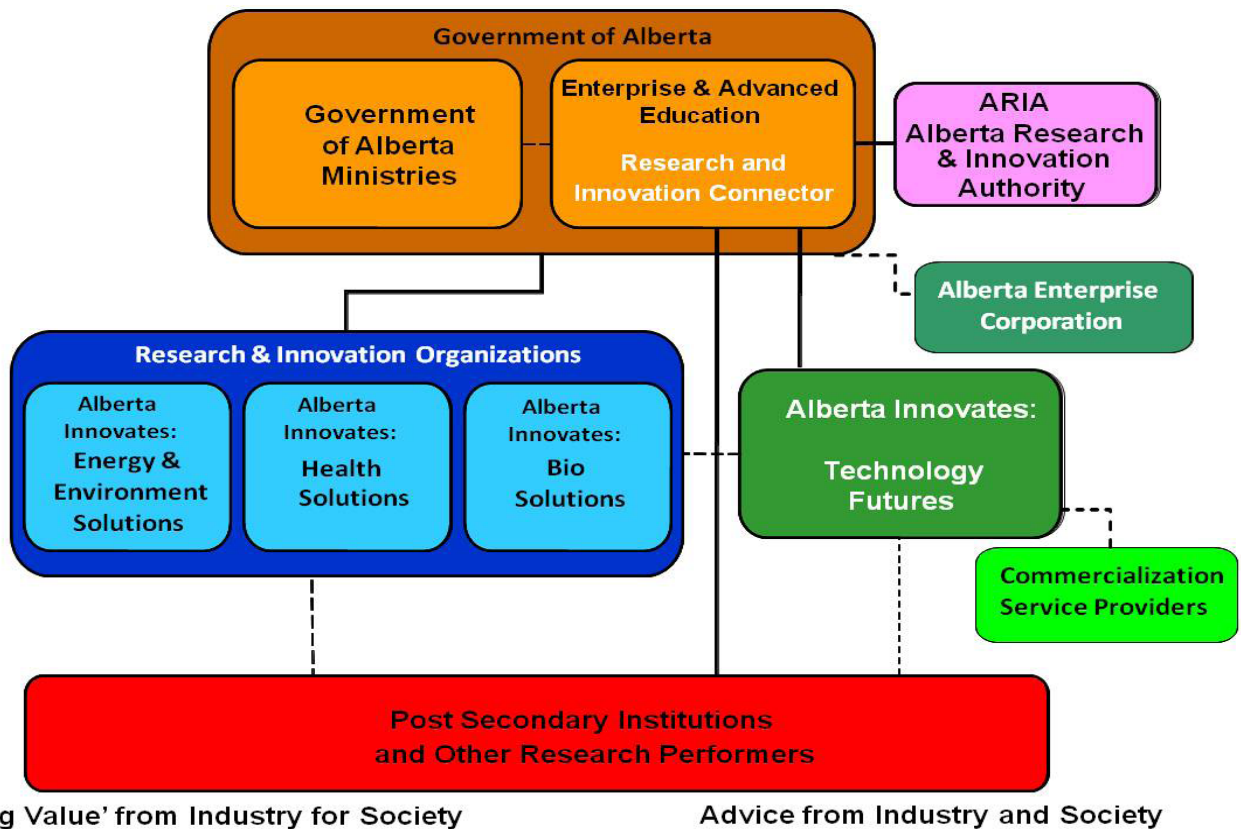
[Water for Life – A Renewal](#)

Water for Life: Alberta's Strategy for Sustainability has been the vehicle for managing Alberta's water resources since 2003. In Water for Life – A Renewal, the GoA continues to build on the good work already undertaken, and reaffirms its commitment to the Water for Life approach for the wise management of Alberta's water quantity and quality for the benefit of Albertans now and in the future.

Appendix B: Alberta's Research and Innovation System

Alberta Innovates has been designed to enhance the province's role as a world leader in using science to seek and deploy solutions.

On January 1, 2010, under the banner of Alberta Innovates, the Alberta government implemented a framework to provincially fund a set of research organizations to be catalysts of innovation building on Alberta's strengths in the bioresource, energy and environment and health sectors.



As represented in the diagram above, the Alberta Innovates system is led by EAE to enable dynamic interplay with other GoA departments and Campus Alberta institutions, as well as with industry, innovation support agencies, and other non-profit organizations. Together, these groups are aligning efforts to achieve a research and innovation system that builds on a foundation of highly skilled people in support of the province's vision of prosperity and quality of life in Alberta.

Appendix C: Performance Management

Broadly speaking, research and innovation contributes to Albertans' prosperity and quality of life, that is to say, research and innovation contribute to the achievement of the following three key outcomes:

- Effective Resource and Environmental Management;
- Broadened Economic Base; and
- Resilient, Healthy Communities.

EAE will continue to develop approaches to monitor and evaluate Alberta's research and innovation systems success in achieving desired outcomes, and to inform decision making and system directions.

As well, collaborative work is underway with the Alberta Innovates corporations to implement a set of common performance measures that can be used to gauge and report on their performance collectively and consistently.

The common performance measures will be based on a set of enabling outputs including:

- Investments in Research and Innovation;
- Knowledge mobilization;
- Talent growth; and
- Collaboration.

Appendix D: Acronyms

AACI	Previously known as the AOSTRA/ARC CORE Industry
EAE	Enterprise and Advanced Education
AHRIS	Alberta's Health Research and Innovation Strategy
AI-Bio	Alberta Innovates - Bio Solutions
AI-EES	Alberta Innovates - Energy and Environment Solutions
AI-HS	Alberta Innovates - Health Solutions
AI-TF	Alberta Innovates - Technology Futures
APRI	Alberta Prion Research Institute
ARC	Applied Research Centres
ARIP	Alberta Research and Innovation Plan
BDS	Business Development Service
CCEMC	Climate Change and Emissions Management Corporation
CCS	Carbon Capture and Storage
CEMS	Cumulative Effects Management System
CO ₂	Carbon Dioxide
GHG	Greenhouse Gas
GoA	Government of Alberta
HSP	Highly Skilled People
iCORE	Innovates Centre of Research Excellence
ICT	Information and Communications Technology
IP	Intellectual Property
IP*	Innovative Platforms
KT	Knowledge Translation
PAC	Portfolio Advisory Committee
SAGD	Steam-Assisted Gravity Drainage
SME	Small and Medium-sized Enterprises

* Innovative Platforms is one of AI-HS' three enabling directions

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Government of Alberta ■

