



BUSINESS PLAN

ACCELERATING
INNOVATION

20
16
20
19

Alberta



2016
2019

THE PURPOSE OF THE CORPORATION IS TO
 MAKE STRATEGIC AND EFFECTIVE USE
 OF GOVERNMENT OF ALBERTA FUNDING TO
 MEET THE RESEARCH AND INNOVATION
 PRIORITIES OF THE PROVINCE.

MANDATE (2010)

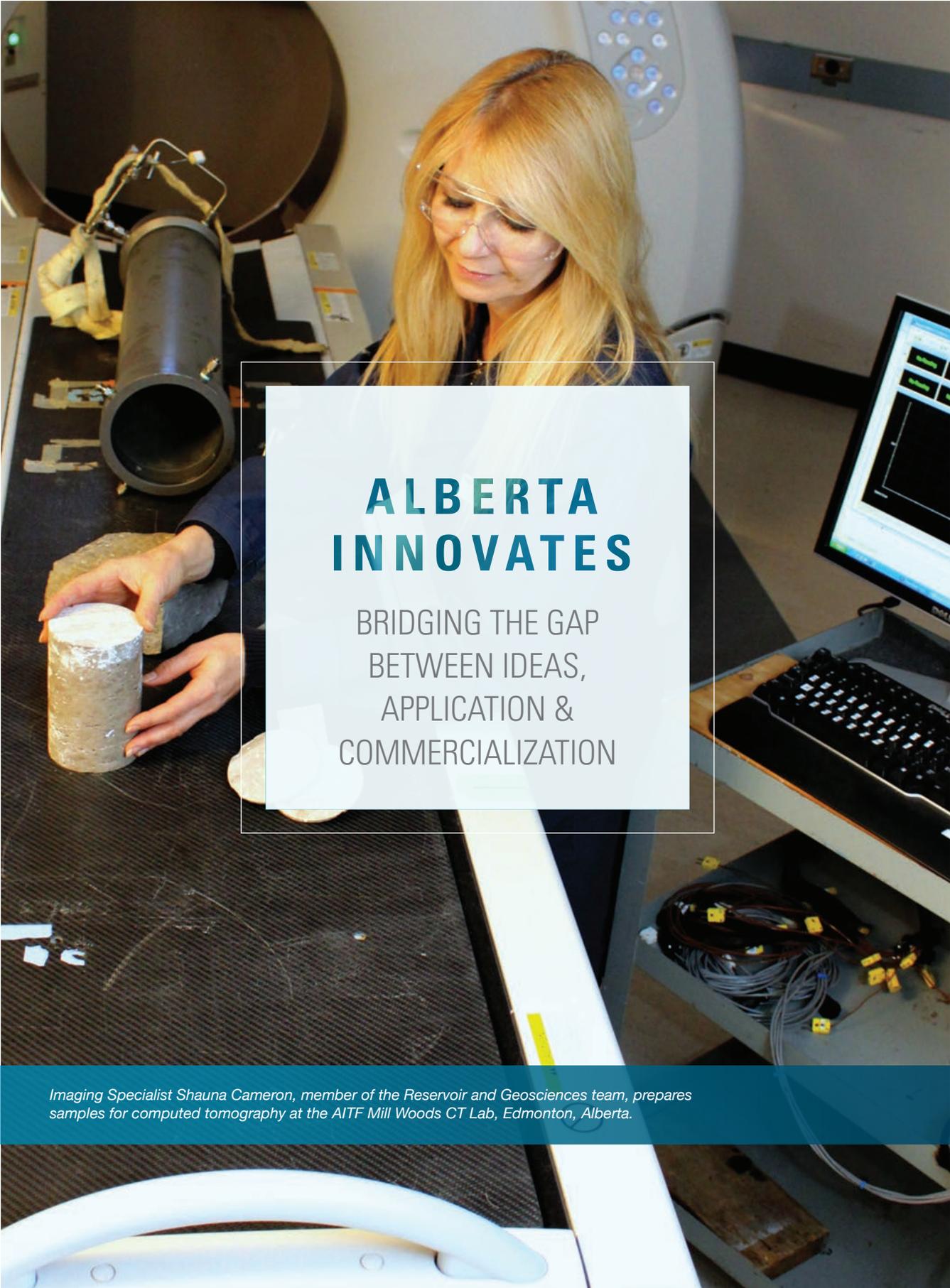
Alberta Innovates-Technology Futures is an integral part of Alberta Innovates – a strategically aligned and integrated provincial research and innovation system. Under the banner of Alberta Innovates, the corporation works with key innovation support agencies, with publicly funded post-secondary institutions, industry and government to further research and innovation in the province and make Alberta more competitive in the global economy.

The Government of Alberta has given the Corporation 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 Government of Alberta 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;
 - any other area determined under the regulations;
- Foster the development and growth of new and existing industries through research and innovation.

AITF 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, intellectual property (IP) and skill transfer within the system, and between academia, industry and government.
- Improved accountability and outcomes through integrated performance monitoring and continuous improvement processes.



ALBERTA INNOVATES

BRIDGING THE GAP
BETWEEN IDEAS,
APPLICATION &
COMMERCIALIZATION

Imaging Specialist Shauna Cameron, member of the Reservoir and Geosciences team, prepares samples for computed tomography at the AITF Mill Woods CT Lab, Edmonton, Alberta.

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AITF operates 1 million sq. ft. of product and process development and scale-up facilities in Edmonton, Calgary, Devon and Vegreville. This also includes a 300 hectare research farm, three greenhouses, and 36 growth chambers.



EXECUTIVE SUMMARY

ALBERTA INNOVATES-TECHNOLOGY FUTURES (AITF) HAS BEEN A KEY PLAYER IN ALBERTA'S INNOVATION SYSTEM SINCE ITS INCEPTION AS THE ALBERTA RESEARCH COUNCIL IN 1921. SINCE THAT TIME, AITF AND ITS SISTER ALBERTA INNOVATES CORPORATIONS HAVE BUILT PORTFOLIOS TO FOCUS ON INNOVATION ACROSS A NUMBER OF KEY AREAS TO SUPPORT ECONOMIC AND SOCIAL BENEFITS FOR ALBERTANS.

Background

Successful commercialization of products and services is the desired outcome of any innovation system, and has been a particular challenge for Canada. Research shows Canada is at the top of Organization for Economic Co-operation and Development (OECD) countries when it comes to the generation of ideas and having a strong talent pool. However the translation of ideas to commercial applications, which is what ultimately generates economic outcomes, is lagging. According to the Conference Board of Canada, Alberta places 15th among the 26 comparator jurisdictions in a survey of OECD countries and earns a “C” grade on overall innovation.

The current economic downturn underscores the urgent need to address Alberta’s innovation performance and diversify the goods and services produced and markets served. We welcome recent changes, such as the creation of the new Ministry of Economic Development and Trade (EDT), and the 2030 Innovation Targets developed by the Province’s Innovation Collaboratories. These changes have elevated the innovation agenda and provide the necessary clarity for AITF to align investments to the 2030 Innovation Targets.

Value Proposition

Working closely with EDT, AITF is uniquely positioned within the Alberta innovation system to support both the public and private sector and increase innovation outcomes for the province. Addressing the gap between ideas, application and commercialization is AITF’s defining purpose. This is accomplished through three primary activities: AITF’s role as a facilitator to enhance collaboration and linkages with industry, small business, academia and government; de-risking innovation through Applied Research expertise; and direct investment in high-potential small and medium-sized enterprises (SME’s). Taken together these activities strengthen Alberta’s economic base by increasing the number of jobs, creating value-add exports, enhancing productivity, and spurring diversification.

Functionally, AITF is organized in three major streams: Campus Alberta/Basic Research, Applied Research, and Commercialization. In each stream, the corporation supports the achievement of Alberta’s 2030 Innovation Targets in the Province’s priority industry sectors. This organizational structure facilitates collaboration between industry, small businesses, government, and Campus Alberta.

Going forward AITF is focused on bridging the gap between ideas and value creation by accelerating the development and adoption of new technology. The following sections highlight AITF’s specific focus areas and the toolset available to support the achievement of the 2030 Innovation Targets.

Commercialization

The Commercialization stream provides support to high-growth potential SMEs by providing:

- Non-dilutive capital to SMEs through multiple programs such as the Industry Associates program which allows SMEs to hire the right skillsets to develop and market their innovative technologies and the Product Demonstration Program which links SMEs to first customers. This ability to directly support SMEs is a competitive advantage for the Province, as public support for innovation in Canada is largely centered around indirect support mechanisms such as Scientific Research and Development (SRED) credits;
- Business mentorship expertise through our Technology Development Advisors and a Capital Access Team which supports Alberta SMEs looking for funding beyond the public sector.

Taken together these initiatives help to accelerate the commercialization activities of Alberta entrepreneurs, and generate strong economic outcomes for the province. This business stream focuses on high-growth potential technology-based SMEs and the results from these programs show the following outcomes achieved on average over the last 4 years:

- One net new job was created for every \$50,000 in funding support;
- SMEs achieved \$4.80 in incremental revenue growth for every dollar funded;
- 81% of the jobs created and 74% of the growth in revenues was outside of the energy sector; and,
- 53% of AITF-supported SMEs exported goods and services compared to 10.4% of Canadian SMEs.

In the upcoming years the Commercialization team will be focused on launching new programs aimed at scaling-up Alberta SMEs, enhanced reporting and improved system integration activities within the Regional Innovation Networks.

Campus Alberta/Basic Research

The Campus Alberta/Basic Research portfolio provides funding in support of early stage research and development activities including:

- Over 40 Chairs across 4 Campus Alberta institutions;
- Multiple Centres of Excellence that act as collaborative hubs where multidisciplinary teams perform research and development work to find solutions to challenges facing industry; and

- More than 400 Graduate Student Scholarships focused in research areas in Information and Communications Technology (ICT), Nanotechnology, and Omics.

Looking ahead, AITF will build greater linkages with industry and move the portfolio towards stronger alignment to sector-focused innovation targets. There is growing recognition of the need to re-focus these programs to also ensure Alberta companies have access to a pool of job ready, highly qualified skilled personnel (HQ/SP) to support Alberta's key industry sectors.

Applied Research

AITF's Applied Research function supports the development of globally competitive businesses by both de-risking and accelerating the adoption of new innovative technologies. The scope and scale of Alberta's Applied Research capacity is unique among Canadian provinces, and the Corporation's focus on innovation in Alberta enables us to identify and support opportunities that may be overlooked by national programs.

Applied Research generates industry-funded research of approximately \$60 million per year through its research and contract services and receives \$33 million per year in provincial funding. These funds are used to:

- Create joint industry and government initiatives, in critical sectors such as food-agriculture and forestry;
- Support more than 600 Alberta-based clients accelerate technology adoption, increasing productivity and competitiveness;
- Maintain access to over one million square feet of research space in four locations (Edmonton, Calgary, Vegreville and Devon); and
- Offer access to expertise of more than 450 technicians and researchers in scientific areas which are a jurisdictional priority for Alberta.

Looking ahead, Applied Research will focus on supporting increased industry competitiveness through reducing production costs, developing value-added products, and increasing access for our SMEs to local and international markets.

Sectors

Activities in the three functional streams are aligned with the provincial government's innovation priorities, and leverage the Corporation's competitive advantages in Alberta's key sectors of energy, environment, food-agriculture, fibre/bio industry and health. Below are some examples of AITF's current activities in each sector:

- Energy – engaged in joint industry research to improve leak detection, measurement and mitigation methods for corrosion in pipeline systems;

- Environment – field testing new approaches and technologies for monitoring greenhouse gas (GHG) reductions, and traditional ecological knowledge;
- Food-Agriculture – facilitating the extension of leading edge science for the livestock industry;
- Fibre/Bio-Industrial – expanding demand for engineered wood products and Oriented Strand Board, particularly in China; and,
- Health – actively participating on the Health Collaboratory to influence the direction of health innovation in Alberta.

During the year AITF, in partnership with EDT, will work on creating a new Sector Office in the area of Emerging Technologies. In each sector, partnerships have been built with relevant government and private sector clients to build synergies and leverage expertise. AITF's sector-focused approach increases the likelihood and speed of outcomes, which drives economic prosperity and the social well-being of communities, companies, and individuals.

Responsive Culture

Creating a culture which is responsive to the needs of the diverse client base we serve is necessary to win the race to innovation. Actions such as reducing the time to process grants to SMEs from over four months to six to eight weeks, increasing the flexibility of Industry Support Programs, and redesigning our largest Applied Research Industry Consortium Program to both increase engagement and share project management responsibilities with industry, are all examples of AITF's commitment to continuous improvement.

AITF's Financial Outlook

Announced in the 2016 Provincial Budget and accompanying the consolidation of the four Alberta Innovates Corporations, is a planned \$45 million reduction in funding from the Government of Alberta to the new Alberta Innovates Corporation. This is due to the current fiscal restraints required of all provincial agencies. The Corporation's leadership, in collaboration with the Government, will manage the budget reduction by searching for cost savings, leveraging partnerships to create value, and where possible extending existing commitments over longer periods of time.

All four Alberta Innovates Corporations and the Economic Development and Trade are working collaboratively to manage the impact on outcomes. At this time, AITF's portion of the \$45 million reduction is \$13.7 million and will be primarily obtained from reductions in program spending within Basic Research/Campus Alberta and Commercialization.



STRATEGIC COLLABORATION

THE KEY TO THE
EFFECTIVENESS OF
ALBERTA'S INNOVATION
SYSTEM

AITF HAS A LONG HISTORY OF COLLABORATION WITH INDUSTRY, GOVERNMENT AND CAMPUS ALBERTA. SUCH COLLABORATION IS CRITICAL TO THE EFFECTIVENESS OF ALBERTA'S INNOVATION SYSTEM.

BACKGROUND

COLLABORATION EXPONENTIALLY INCREASES BOTH THE SPEED AND THE LIKELIHOOD OF SUCCESSFUL OUTCOMES. THIS IS ACCOMPLISHED BY EXPANDING THE INVESTMENT POOL, RAISING THE QUALITY OF MENTORSHIP AND BUILDING THE NETWORKS NECESSARY TO GET THE RIGHT INFORMATION. ALL OF THESE CONTRIBUTE TO STABLE, SUSTAINABLE ENTERPRISES CAPABLE OF TRANSFORMING THE ECONOMY.

AS A SMALL JURISDICTION, COLLABORATIVE OPPORTUNITIES WITH PARTNERS FROM A VARIETY OF REGIONS AND ORGANIZATIONS HELPS TO RAISE NOT ONLY THE CHANCES OF SUCCESS FOR ALBERTA'S INNOVATORS AND ENTREPRENEURS, BUT ALSO THE PROVINCE'S PROFILE ON THE INTERNATIONAL STAGE.

Economic Development and Trade

With the creation of the Ministry of Economic Development and Trade (EDT), Alberta has raised the profile of, and placed the necessary focus on the need for economic growth and diversification in the province. This demonstrates the priority our government places on job creation, innovation, supporting sectors, attracting investment, and expanding and enhancing market access. AITF is a key partner in achieving this goal through its activities in a number of key economic sectors.

One of the ways in which AITF is working closely with EDT is through the Technology Commercialization Plan, a joint initiative exploring ways to align and integrate key organizations and support systems within the technology commercialization system in Alberta. This initiative is described in more detail in the Commercialization section of this business plan.

Innovation Collaboratories and the Draft 2030 Innovation Targets

The Government of Alberta, through EDT, has established Innovation Collaboratories in the areas of health, energy, environment, fibre/bioindustry, food-agriculture and emerging technologies. Currently, membership comprises of Government of Alberta departments and agencies that make innovation investments and/or deliver programs. These Collaboratories act as a catalyst for innovation within Alberta and provide guidance on Alberta's strategic innovation agenda to focus and align the innovation ecosystem. AITF's Sector Leads are members of their respective Innovation Collaboratories, and AITF's portfolio of investments contributes to all five of these sectors.

Using input from industry, academia, government ministries and agencies, the Collaboratories have developed the Draft 2030 Innovation Targets to focus research and innovation investments in priority areas perceived to have the greatest game-changing value for Albertans. These targets are detailed for each sector in the Competitive Context section of this business plan. Solutions proposed to achieve these targets include technology development and demonstration as well as process innovation. AITF has aligned its business strategies to the 2030 Innovation Targets and Outcomes as outlined in the Draft Alberta Research and Innovation Framework.

AITF can play a key role in supporting accelerated progress towards the 2030 Innovation Targets by: providing sector and technology expertise for improved portfolio management; offering access to pilot facilities and expertise; implementing international and inter-jurisdictional partnership programs; building networks among multi-national enterprises (MNEs) and Alberta's small and medium-sized enterprises (SMEs) and researchers; delivering programs and expertise to support SMEs developing and scaling-up new products or processes; and monitoring progress and impact of investments.

Industry Collaboration

SME Mentorship and Guidance

Recognizing the importance of strategic mentorship and guidance in creating successful, sustainable businesses out of innovations in technology or services, AITF has begun to place increased emphasis on the role played by our Executive Business Advisors (EBAs) and Technology Development Advisors (TDAs). AITF's position in this space is unique – our EBAs do not receive an equity stake in the businesses they mentor, and the SMEs receive these valuable mentorship services at no cost.

The EBA position connects senior executives with a portfolio of later stage SMEs who are in need of executive level support and guidance. All of our EBAs have served in senior executive positions in large private sector companies, and have a broad range of skills, including business management, development and structuring, corporate finance, investment banking, private equity, mergers and acquisitions (M&A), and due diligence, among others. These experienced executives also work with our commercialization team to provide coaching and mentorship, financing solutions, and corporate development support to generate strong growth outcomes for Alberta SMEs.

TDAs are responsible for engaging and advising SMEs in business development and technology development to commercialization activities. As trusted advisors and mentors, TDAs work with SMEs on productivity, innovation, business, marketing, product development, and project management activities. They act as pro-active connectors and navigators for SMEs to access Alberta's Innovation System programs and services, Regional Innovation Networks (RINs), non-government organizations and government resources.

Our EBAs and TDAs play a key role in AITF's strategic shift away from simply "writing cheques" to fund innovation – to developing partnerships through mentors and facilitators to accelerate job growth and economic diversification. AITF has witnessed a tremendous increase in the viability and growth of organizations receiving strategic guidance and mentorship compared to those who receive only financial support. By offering mentorship and leadership to technically-minded SMEs, AITF is able to cultivate sustainable businesses out of innovation, and better deliver on our mandate.

Consortiums

AITF has successfully established several industry consortia aimed at solving industry-specific challenges. These consortiums are designed to de-risk the innovation process by allowing organizations with similar goals to pool resources and solve problems collaboratively.

- **MARIOS (Materials and Reliability in Oil Sands):** Established in 2009, MARIOS is a 31 member R&D consortium which brings together both suppliers and end users. This consortium is managed by AITF and directed by the oil sands sector to tackle materials, equipment, and maintenance and reliability issues. The goal of MARIOS is to develop knowledge and validate technologies to significantly reduce downtime, and improve operational reliability and productivity in the oil sands industry.
- **Alberta Research Council Core Industry (AACI) Research Program:** Established in 1984, AACI is a world class, 12 member R&D consortium managed by AITF and directed by the oil sands industry with the purpose of developing and improving economically viable in-situ recovery technologies for heavy oil and bitumen resources. AACI is credited with creating over \$2 billion in annual economic impact for the Province of Alberta.

While this consortium consists of forward looking players investing in R&D, AITF has taken some proactive steps to ensure AACI's continued relevancy following the dramatic and sustained drop in oil prices. One method of achieving this is through industry partners actively selecting and managing the AACI programs through Strategic Task Groups. This allows AITF to ensure research priorities are in line with the new realities of the oil and gas industry.

- **AMFI (Alberta Manufacturing and Fabrication Innovation):** Established in 2011, AMFI is a professional development program designed to enhance the understanding of modern fabrication and manufacturing technologies through hands-on demonstrations and educational workshops. In 2016-2017, AMFI will operate as a fully functional technology transfer program designed to de-risk and screen advanced technologies for local manufacturers, fabricators, coatings applicators, service companies, and their supply chain partners. AMFI will evaluate and facilitate adoption of new and existing technologies into the Alberta Energy Sector supply chain. The program is funded by a partnership between AITF, the Government of Alberta, and the federal government and works in conjunction with the University of Alberta and industry. To date, AMFI has exposed more than 250 companies to advanced manufacturing technologies from across the world.

Joint Industry Programs (JIPs)

AITF has partnered with several industry participants to develop and test technologies relating to their operations. These joint industry programs (JIPs) act as an alternative to industry consortium programs for participants who prefer small group consultation to help preserve their competitive advantage. Some of these JIPs have been operating for several years. Below is a list of some of AITF's current JIPs:

- **Pipeline Integrity and Corrosion Monitoring Program (PICoM):** In partnership with several pipeline industry participants, AITF is undertaking an evaluation of pipeline cleaning equipment, as well as developing recommended practices for pipeline sludge sampling and transport;
- **Microbial EOR (Enhanced Oil Recovery):** In partnership with energy industry participants, AITF is assessing the applicability of this technology to Alberta reservoirs; and
- **Steam Additives Testing:** In partnership with energy industry participants, AITF is undertaking several research projects to validate the use of chemicals combined with steam for improved recovery of heavy oil and bitumen.

National & International Collaboration

Provincial and Federal Government Collaboration

There is unique opportunity to increase collaboration between federal and provincial partners. Provincially, these partners include our sister Alberta Innovates Corporations and other government agencies. A number of federal funding organizations also operate in a complementary space to AITF, including the Industrial Research Assistance Program (IRAP), National Resource Council Canada (NRC), the Business Development Bank of Canada (BDC), and Sustainable Development Technology Canada (SDTC).

Going forward we intend to focus on increasing opportunities for collaboration to more fully develop these relationships. Recognizing the potential benefits that could result from increasing the frequency and depth of these partnerships – from sharing of information and direction to exploring additional co-funding opportunities – AITF will add more focus on building this capacity over the coming years to enhance the likelihood and impact of positive outcomes for our strategic investments.

Within any collaboration, AITF is committed to maintaining its investment philosophy. This includes determining whether an opportunity is “investment grade” based on a number of factors, including whether it falls within AITF’s scope of strategic focus, areas of expertise and supports the Province’s 2030 Innovation Targets. Once this determination is made, AITF then considers leverage and examines all possible funding structures, including collaboration with our many innovation system partners.

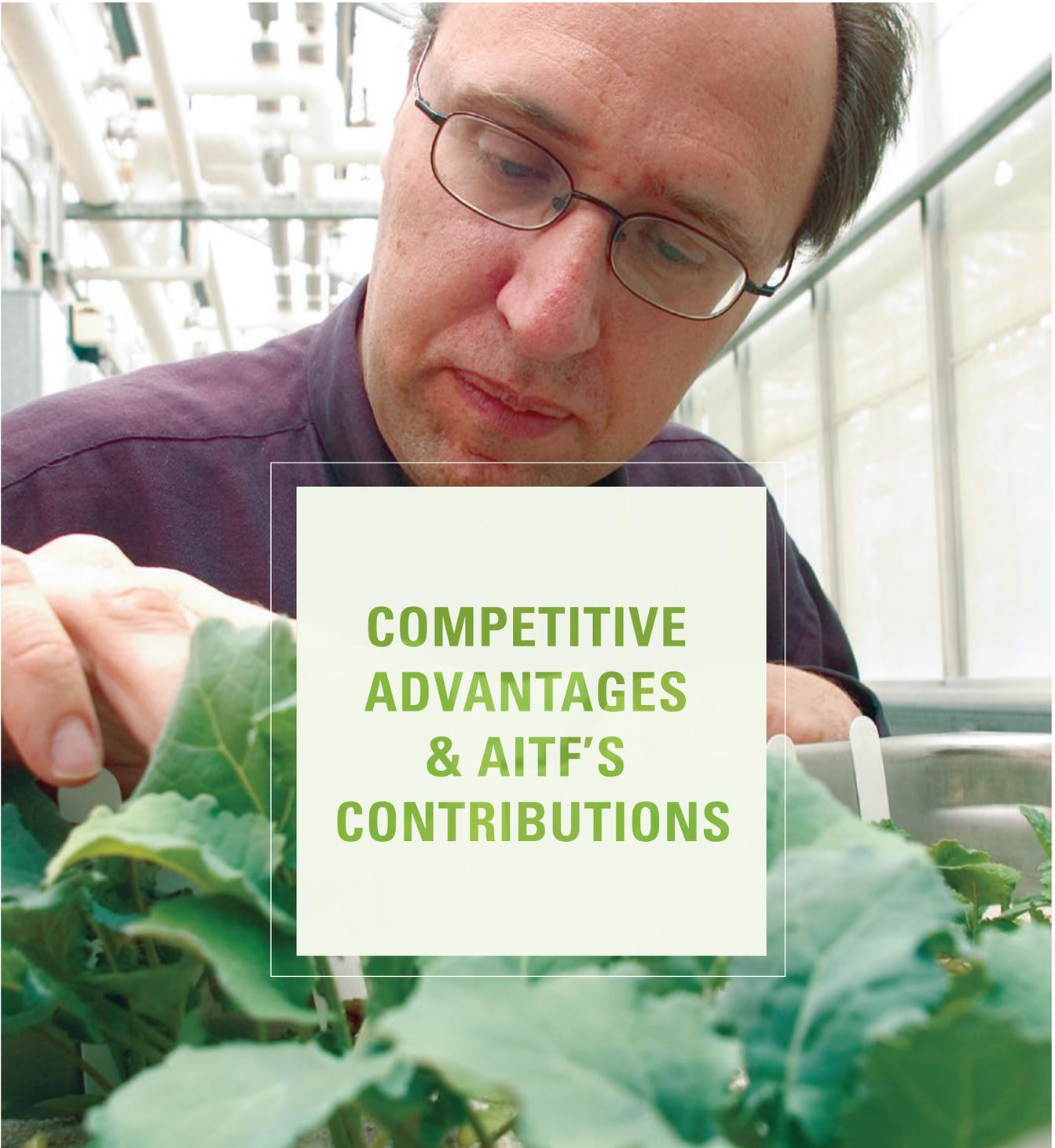
International Collaboration

It is well-recognized that Alberta, as well as Canada as a whole, is a small market. This emphasizes the importance of having strong, stable connections and demand in international markets for our natural resources as well as our knowledge-based products and services. Reliance on international demand also increases economic risk for local enterprises, as global economic trends can have a significant impact on the well-being of local industries. This has recently been demonstrated both in the forestry and the oil and gas sector as decreased demand and/or increased supply has decimated prices and driven producers to reduce operations resulting in lost jobs for Albertans and an overall decrease in economic contribution to the Province.

While the Fibre/Bio-Industrial sector has begun to recover, the oil and gas sector continues to struggle with low demand and an over-abundance of supply. On the positive side, recent successes demonstrate the huge opportunities available to local firms when they are able to network with international knowledge hubs without having to relocate their operations. Opportunities are also available for organizations that look beyond raw goods to develop value-added products that are more resilient to market fluctuations.



Technologists in AITF's Edmonton facility use an X-Ray diffractometer to provide characterization of powdered samples. Non-destructive analytical methods are used to identify and semi-quantitatively determine crystalline phases in unknown samples.



COMPETITIVE ADVANTAGES & AITF'S CONTRIBUTIONS

Ralph Lange, Program Leader in Ecosystems & Plant Sciences, performing diagnostic testing for Canola plants and seeds in Vegreville facility.



THE FOLLOWING SECTIONS OF THE BUSINESS PLAN OUTLINE AITF'S CONTRIBUTIONS TO INNOVATION IN THE PROVINCE THROUGH ITS KEY OPERATIONAL AREAS. THE CORPORATION FACILITATES BASIC RESEARCH, APPLIED RESEARCH, AND COMMERCIALIZATION FOR SECTORS IDENTIFIED AS KEY PRIORITY FOCUS AREAS BY THE GOVERNMENT OF ALBERTA.

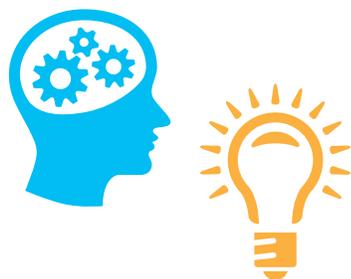
AITF accelerates the creation of value for Albertans by bridging the gap between idea and impact





CAMPUS ALBERTA/ BASIC RESEARCH

Hooman Hosseinkhannazer, engineer with Norcada Inc., holds a custom-fabricated membrane device in the nanoFAB research facility at the University of Alberta



CAMPUS ALBERTA / BASIC RESEARCH

BACKGROUND

A KEY ELEMENT OF THE INNOVATION CURVE IS BASIC, OR PURE RESEARCH, WHICH IS TYPICALLY FOCUSED ON THEORETICAL HYPOTHESES. THE TRADITIONAL CONCEPTION OF BASIC RESEARCH IS THE PURSUIT OF NEW KNOWLEDGE AND DISCOVERY UNFETTERED BY THE DEMANDS OF ITS FUTURE APPLICATION TO THE NEEDS OF COMMERCE OR SOCIETY.

HOWEVER, THERE IS INCREASING ACKNOWLEDGEMENT ON THE PART OF POLICY MAKERS AND ACADEMIA OF THE BENEFITS THAT CAN BE ACHIEVED BY INVESTING IN BASIC RESEARCH WITH STRATEGIC CONSIDERATION, AT THE OUTSET OF PROJECTS, OF THE WAY IN WHICH THE KNOWLEDGE COULD BE USED. IT IS THE ROLE OF AITF'S CAMPUS ALBERTA/ BASIC RESEARCH TEAM TO WEIGH INVESTMENT DECISIONS FROM THE PERSPECTIVE OF BOTH SCIENTIFIC PROMISE AND THE SOCIAL AND ECONOMIC BENEFITS THAT WILL BE DERIVED FROM RESEARCH INITIATIVES.

Value Creation through Science and Technology Projects

Basic Research's primary end clients are Alberta's priority industry sectors. Value is generated when AITF successfully connects the strategic intent to solve sector derived challenges, with the capacity to generate technology based solutions found within Campus Alberta, and manages activities toward outcomes that benefit Alberta. The tools at our disposal include funding for Chairs and Research Centres that are aligned to industrial needs and platform strategies.

Reflective of the need to improve successful outcome driven investments in Campus Alberta, AITF will undertake assessment, redefinition and continuous improvement of many current processes in the upcoming year. The majority of these will be directed to better incorporate consideration of sector defined actionable challenges or problems, and redefine some investments to better reflect a project-based approach to research management. Improving active account management with regard to investments will ensure that all projects receive both the benefit of clear direction and access to an aligned innovation system where additional services, expertise, and infrastructure reside.

Value Creation through Human Resources

The second primary channel for value creation is support for training and development of HQ/SP and to maximize placement and retention in Alberta, thereby increasing the knowledge-based workforce and capacity to solve economic and societal problems facing the sectors. This is important to Alberta's innovation system, as these are the researchers and technology specialists that drive innovation for industry. Basic Research utilizes a variety of tools to achieve this outcome, including support for graduate students with scholarships, funding for post-doctoral fellowships, and supporting Alberta's youth in education and experience in science and technology entrepreneurship through the Youth Technopreneurship Program.

In particular, linking the development of HQ/SP and other AITF-supported research projects will become a higher priority. In terms of youth programs, there is an opportunity to greatly improve upon existing processes by providing not only funding to young people wanting to start a business but also support educational experiences, mentorship, scholarships and access to other AITF services that will greatly improve the likelihood of achieving success, in terms of both educational and entrepreneurial outcomes.

Value Creation through Platform Technologies

Basic Research generates value through its management of the platform technologies within AITF and in collaboration with its direct and indirect strategic partners. The three platform technology areas are Information and Communications Technologies (ICT), Nanotechnology, and 'Omics' (an encompassing term containing many life sciences). Technologies based on these platforms have the ability to cut across multiple industrial sectors and have the potential to provide a single solution to multiple challenges. In terms of platform investment, AITF has supported Chairs, research Centres, and highly skilled researchers across all three, but only in nanotechnology are there supports for dedicated platform projects and facilities. Currently, these facilities operate independently. This presents a considerable opportunity for optimization by seeking alignment and synergies.

In the upcoming year, an area of focus will be to ensure that the new strategies and action plans effectively focus on those areas where platform technology investments will lead to the best possible outcomes for Alberta. This includes identifying ways in which research projects, skilled people and facilities in these areas can address the 2030 Innovation Targets, and generate the next generation of technological solutions.



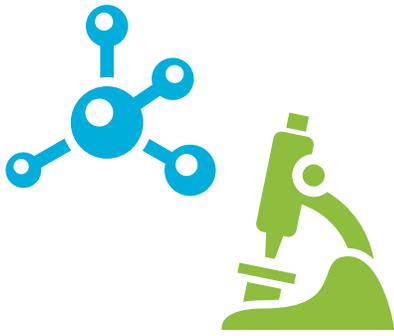
Senior Research Technologist Dean Rolheiser monitors the drying process for CNC (Cellulose Nano-Crystals) in AITF Mill Woods CNC pilot plant, Edmonton, Alberta



APPLIED RESEARCH

ACCELERATING
TECHNOLOGY ADOPTION

Senior Research Technologist Marshall McKenzie, Ecosystem and Plant Sciences, selects seeds for a germination trial at the AITF Greenhouse in Vegreville, Alberta



APPLIED RESEARCH

BACKGROUND

AITF'S APPLIED RESEARCH STREAM IS A UNIQUE HUB OF INNOVATION AMONGST CANADIAN PROVINCES. BOTH LARGE AND SMALL INDUSTRY CLIENTS ARE ABLE TO ACCESS MORE THAN 450 RESEARCHERS, TECHNICIANS AND SUPPORT STAFF, OVER ONE MILLION SQUARE FEET OF RESEARCH SPACE AND CAPITAL INFRASTRUCTURE FOCUSED ON THE NEEDS OF ALBERTA'S PRIMARY INDUSTRY SECTORS. AITF'S FOCUS IS TO LEVERAGE THIS SPECIALIZED EXPERTISE, FACILITIES AND EQUIPMENT TO DE-RISK RESEARCH AND DEVELOPMENT FOR INDUSTRY AND GENERATE THE MAXIMUM BENEFIT FOR ALBERTA.

The intersection between private and public partnership, highly qualified personnel and its direct application on the current needs of industry supports is a vital component for innovation. Applied Research directly supports Alberta-based companies in their efforts to de-risk and accelerate the adoption of technologies in their businesses. This collaborative partnership increases productivity, competitiveness and economic value for the province. With more than 600 clients, AITF has established deep industry connections across its key sectors to provide a bridge between industry and government partners. These relationships enable our staff to facilitate connections among SMEs, multi-national enterprises (MNEs), large Canadian resource companies, industry groups and consortiums, and other government organizations. For example, AITF's consortiums link industry players to collectively resolve their common issues, and attracts government and private investment for scale-up of high-potential innovations. These collaborative endeavors are discussed more fully in the previous section of this business plan.

De-risking and Acceleration

AITF's Applied Research capacity supports accelerated development and adoption of innovative technology into our primary sectors, which results in improved competitiveness, efficiency, and environmental performance. These operations are aligned with the government priorities identified through the Collaboratory process, and AITF has a key role to play in establishing programs that support these priorities and targets.

These activities are of particular importance to early-stage small enterprises that receive little to no additional support from industry or government. AITF helps these organizations develop their ideas while also exposing their leaders and concepts to potential partners. With AITF and industry backing, these SMEs have an increased probability of developing their products to the pilot or demonstration stage, at which point additional investment is more likely. While not all investments result in success, AITF has a well-defined process for evaluating and funding ideas and projects, and has witnessed this successful progression on a number of occasions.

Increased Investment & Leverage

Opportunities are present for partnership funding and commitment through the cluster effect of a larger ecosystem which includes the private and both the provincial and federal public sector.

Approximately two thirds of the funding for Applied Research operations is provided by industry for JIP programs as well as individual projects. The balance of provincial funding is directed toward strategically important sectoral initiatives including many JIPs.

Unique Perspective

AITF acts as an objective participant in Alberta's innovation sector as neither a government nor industry representative. This means that the Province has a unique benefit of an external viewpoint on sensitive matters such as policy and regulation, complete with objective and local scientific expertise to evaluate and validate decisions. This results in a competitive advantage for Alberta in the form of balanced governance to maximize benefit for all.

Going forward AITF is working to better bridge the gap between ideas, application and commercialization by leveraging its Applied Research operations with funding programs with Campus Alberta partners and SMEs.



Our corrosion engineering program assesses materials performance in corrosive environments and evaluates integrity management solutions for the energy industry. Here, an engineer is conducting a specialized sour service test using electrochemical analysis.



COMMERCIALIZATION

ACCELERATING
OUTCOMES FOR SMEs

A water sample is tested using the Wilson Analytical Hardened Fluorescent Spectrometer at Caradan Chemicals, Nisku, Alberta.



COMMERCIALIZATION

BACKGROUND

ALBERTA IS KNOWN FOR ITS HIGH ENTREPRENEURIAL AMBITION, WHICH IS SUPPORTED BY AN A+ RATING FROM THE CONFERENCE BOARD OF CANADA. THE PROVINCE HAS INTERNATIONALLY COMPETITIVE UNIVERSITIES, ENGINEERING SCHOOLS, HOSPITALS, AND TECHNICAL INSTITUTES, AND IS KNOWN FOR PRODUCING WORLD CLASS SCIENTIFIC RESEARCH.

COMMERCIALIZATION BRINGS INNOVATION TO THE MARKET AND AITF SEEKS TO INCREASE COMMERCIALIZATION BENEFITS – JOBS AND REVENUE FOR SMES – FOR ALBERTA VIA ITS INDUSTRY SUPPORT PROGRAMS, MENTORSHIP CAPACITY AND REGIONAL INNOVATION NETWORK. OVER THE LAST TWO YEARS, BY LEVERAGING BEST PRACTICES FROM OTHER JURISDICTIONS, WHICH COMBINED WITH A WEALTH OF INDUSTRY RELEVANT EXPERIENCE, AITF AND EDT HAVE REVAMPED THE PROGRAMS FOCUSED ON TECHNOLOGY COMMERCIALIZATION.

Technology Commercialization Plan

This joint initiative between EDT and AITF is exploring ways to align and integrate key organizations and support services within the technology commercialization system in Alberta. The goals of these strategic partnerships are to increase the success rates of SMEs, support employment growth in technology sectors, create new revenue streams, and ultimately diversify the economy.

In its capacity as an integrator and facilitator, AITF's collaborative partners include EDT, the Innovation Collaboratories, the Regional Innovation Networks (RINs), Regional Economic Development Alliances (REDAs), Campus Alberta institutions, and other technology commercialization system players and stakeholders. By coordinating the activities of these diverse organizations, AITF is helping to develop a stronger technology commercialization system in Alberta that is outcome-oriented, efficient, and highly accessible.

In recognition of the critical importance of the technology commercialization function to growing Alberta jobs and globally competitive commerce, AITF has partnered with EDT to strategically invest in high demand industry support programs and as a result of this increased focus, funding for these activities increased by \$5.0 million per year, on an ongoing basis from January 2016.

The following areas represent significant gaps in the technology commercialization and the scale-up stages of the innovation curve in Alberta. These have been identified as key issues by AITF and as a result, the Corporation has taken an active position in addressing them.

Mentorship and guidance

AITF's Commercialization Associates Program supports SMEs to hire the management and marketing skill-sets required to address commercialization challenges and realize opportunities necessary to implement technology and transform ideas and inventions into goods and services. Building on feedback from previous participants of the program, AITF has implemented significant changes to increase flexibility and better align skills and experience with what individual SMEs require.

Recognizing the importance of strategic mentorship and guidance in creating successful, sustainable businesses out of innovations in technology or services, AITF has begun to place more and more emphasis on the role played by our Technology Development Advisors. TDA's act as pro-active connectors and navigators for SMEs to access Alberta's Innovation System programs and services, Regional Innovation Networks (RINs), Non-Government Organizations and Government resources.

The Corporation is excited to strengthen our capacity to lead with one-on-one mentorship support versus program funding. This business plan invests in the addition of seven additional TDA's across the province, with four of these positions starting in the first quarter of the fiscal year.

Access to Venture Capital

Access to late stage funding from private sector strategic and financial investors is essential to enable companies to first commercialize and then successfully scale-up within the Province.

Unfortunately, Alberta currently scores a "D" grade from the Conference Board of Canada in the area of venture capital (VC) investment. This has the effect of not only reducing financial investment in Alberta SMEs but also limits access to the qualitative benefits that often accompany VC financing, including managerial expertise, entrepreneurial experience, industry knowledge, and networks of customers, suppliers, and other funders.

EDT has worked heavily in this area to attract venture capital firms to Alberta. AITF is working in tandem with the Ministry's activities, and other partners such as Alberta Enterprise Corporation and the Business Development Bank of Canada to address this gap. In addition, AITF provides direct mentorship and capital access expertise to late stage SMEs. The driving purpose of these programs is to help high-growth potential Alberta SMEs transition into attractive investments for late stage capital investors, including strategic investors and commercial banks, which is necessary for scale-up.

Continuous improvement

AITF reviews and refines programs on a recurring basis to ensure they continue to meet the needs of Alberta SMEs. Over recent years, AITF has focused on increasing the flexibility of our industry support programs while at the same time enhancing our due diligence process for evaluating investment decisions. These changes were undertaken following significant consultation with SMEs and entrepreneurs. In the upcoming business year, AITF will continue to actively improve and tweak programs when necessary.

In support of continuous improvement and evolution to meet the needs of Alberta's innovation system, AITF will maintain its annual practice of conducting customer surveys. Based on in-depth feedback from past clients, as obtained through these surveys, major changes are already underway for the R&D Associates program in the fall of 2016. Looking ahead, we will continue to use this information to make relevant and timely changes to our services for industry, Campus Alberta, government, and SMEs.

Global Partnership Program

Alberta's goals for innovation are consistent with national and international objectives: to build globally competitive enterprises, resulting in job creation economic growth, and a higher quality of living for all. To achieve this, Alberta's innovation system must build multi-lateral relationships to enhance our global economic connectivity and enable Alberta SMEs to leverage both R&D and investment from other jurisdictions.

In collaboration with EDT, AITF leverages national and international relationships to develop key targeted business-to-business and research to commercialization opportunities with priority regions around the globe. In Canada, AITF has a strong relationship with Ontario where we leverage the Ontario Centres of Excellence to deliver on mutually beneficial projects for Alberta and Ontario. New in 2016, AITF manages key priority relationships with the State of Jalisco in Mexico and the Province of Zhejiang in China. These programs are designed for business-to-business matching for product development, commercialization of technology, joint ventures and the ability to launch new products into each other's markets.

Linking SMEs into the supply chain

Building a localized supply chain for Alberta's major industries is imperative to unleashing the potential of Alberta entrepreneurs to service larger companies. This expansion of market opportunities for local organizations is having a significant positive impact on the economic prosperity of the Province.

AITF supports this objective at a number of stages in the innovation curve. At the Applied Research stage, we provide facilities where SMEs and large industry players can test their technology and process innovations. At the commercialization stage, AITF helps to link SMEs with their first customer through the Product Demonstration Program (PDP) as well as the pilot Alberta Small Business Innovation and Research Initiative (ASBIRI). These programs and initiatives help position Alberta SMEs to be successful vendors for larger companies.

SECTORS

FOOD-AGRICULTURE
FIBRE/BIO-INDUSTRIAL
ENERGY
ENVIRONMENT
HEALTH
EMERGING TECHNOLOGIES

Chemical Technologist Brittany Orfino prepares canisters for testing Volatile Organic Compounds (VOCs) in the Analysis and Testing Services lab at the AITF Vegreville, Alberta Research facility.

SECTORS

THE FOLLOWING SECTION PROVIDES A CURRENT STATE OUTLOOK ON THE PROVINCE'S KEY INDUSTRY SECTORS, INCLUDING BOTH CHALLENGES AND OPPORTUNITIES, AND THE DRAFT 2030 INNOVATION TARGETS WHICH PROVIDE CLARITY OF PURPOSE FOR THE INNOVATION ECOSYSTEM. A LISTING OF KEY PARTNERS THE CORPORATION WORKS WITH, AND ITS SPECIFIC CONTRIBUTIONS WITHIN EACH SECTOR ARE ALSO OUTLINED.

SECTOR OFFICES

AITF's Sector Offices in Food-Agriculture, Fibre/Bio-Industrial, Energy, Environment, Health and Emerging Technologies – acts as facilitators between industry, governments, agencies, Collaboratories, and other partners. The purpose of the Sector Offices is to direct activities that lead to achieving the 2030 Innovation Targets set by the Province's Innovation Collaboratories. This entails a deep understanding of local as well as global and macro-economic factors impacting Alberta's industries. The Sector Offices leverage this understanding when working collaboratively with internal and external partners to align funding and execution.

By defining strategies that will lead to the achievement of innovation goals, the Sector Offices are able to focus their investments in programs and projects with a high likelihood of achieving appreciable progress towards the provincial targets. These investments comprise the portfolio of each Sector Office. At this time, AITF's sector offices are new and staffed with a small group of highly experienced individuals who rely heavily on the delivery areas of AITF (Campus Alberta/Basic Research, Applied Research, and Commercialization). The Sector Offices have a particularly strong reliance on Applied Research as historically many of the programs directly linked to industry sectors were managed by this team.

Over the coming years, commercialization is an increasing focus area for the Sector Offices, and they will play a key role in connecting SMEs with: MNEs to strengthen the supply chain, mentors to support operational and strategic planning, and investors to support product development and scale up. The Sector Offices will bring SMEs into the Applied Research facilities to further explore and develop their innovative technologies. At the same time, building tangible linkages with Campus Alberta is critical, and will be achieved by encouraging talented researchers and technicians from AITF to work more directly with post-doctoral students and experienced researchers within Campus Alberta.



FOOD-AGRICULTURE SECTOR

Sector Outlook

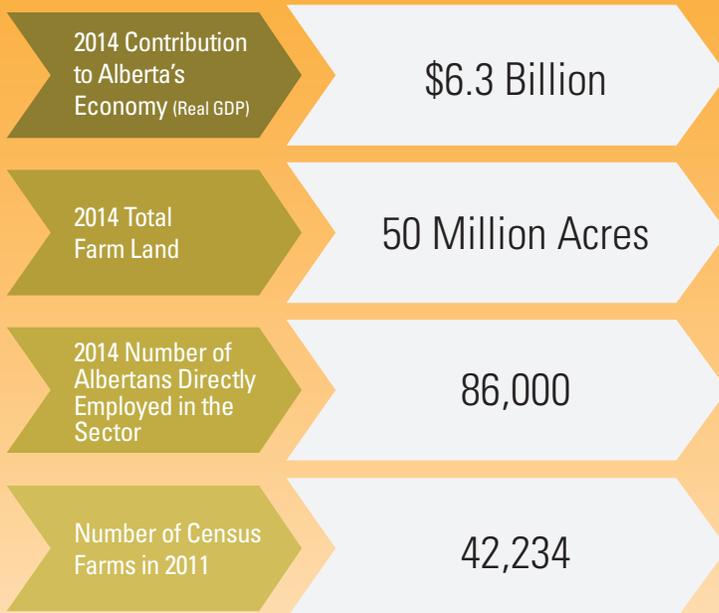
Alberta's diverse landscape supports a variety of agricultural products and services. According to Statistics Canada data, Alberta contributed almost 20% (\$8.8 billion) of Canadian Food-Agriculture exports of \$46.0 billion in 2013. Canola, wheat and barley make up the province's three largest revenue-generating crops while cattle (beef and dairy), hogs and poultry represent the largest livestock markets. According to statistics from the Alberta Ministry of Agriculture and Forestry, this represents approximately 50 million acres of farm land and \$12.3 billion in total farm cash receipts, which was split evenly between crop and livestock production.

A number of challenges face the food-agriculture industry, and society as a whole, as the sector works to sustainably increase productivity and competitiveness while continuing to meet the public's expectations for food safety and security. Western Canada, with Alberta being a key food-agriculture component, is projected to be one of four to six surplus food supply regions for the estimated world population of 9.5 billion, an increase of 2.3 billion, by 2050. This is a tremendous opportunity for the province as we look to grow and diversify our economy.

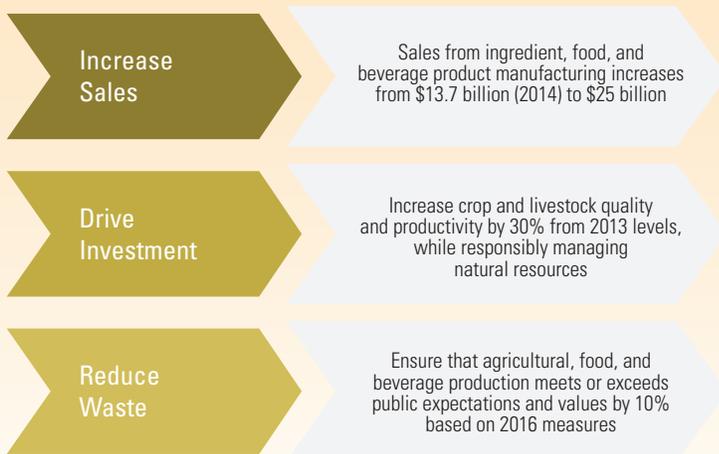
To capture these opportunities, continuous improvements in environmentally friendly production, food processing technologies and product quality by Alberta's crop, livestock and value-added industries are essential. To be successful, Alberta must remain committed to the development of a long-term sustainable food-agriculture industry which returns dividends in the form of improved quality of life in our rural communities and a diversified and resilient provincial economy. AITF will continue developing programs and technologies that will assist Alberta's food and agricultural industry to serve local and global markets and build on Canada's number one global rating in food safety.

Both industry and the research community are required to seize and leverage changing global consumer preferences for higher value consumer goods, including health conscious options such as organic, non-genetically modified, and gluten-free foods. Other noteworthy trends are the popularity of ethnic foods and demand for instant access to production information by consumers and industry. Changes to the trade landscape with agreements such as the Trans-Pacific Partnership will create opportunities that a nimble and responsive Alberta Food-Agriculture sector can realize.

Key Sector Statistics



Draft 2030 Innovation Targets



Partners*

ALBERTA'S AGRICULTURE AND FOOD INDUSTRY ASSOCIATIONS AND COMMISSIONS
 CANOLA COUNCIL OF CANADA / FOOD PROCESSORS AND MARKETERS
 LIVESTOCK GENTEC / MINISTRY OF AGRICULTURE AND FORESTRY / PRIVATE INDUSTRY

*Partial List of AITF's Partners in this sector



AITF'S CONTRIBUTION

AITF's efforts contribute to those of the Ministry of Agriculture and Forestry, which shares common goals with AITF's Food-Agriculture sector. AITF's Sector Offices and Applied Research programs are focused on near term outcomes in the following areas:

- Utilization of the latest tools to develop cereal and oilseed crop varieties that are more resilient to environmental stress; evolving plant disease challenges and consumer quality demands;
- Exploring a partnership opportunity with the Ministry of Agriculture and Forestry to position AITF's Vegreville location as a Provincial Crop Centre of Excellence;
- Investment in crop and industry diversification research for industrial hemp and flax fibre utilization in value-added textiles and biocomposite materials;
- Facilitation of industry, Campus Alberta institutions and government partners to address the number one challenge of food-agriculture industry, i.e., food safety, security and quality;
- Facilitating the extension and acceptance of the newest leading edge science for livestock with a particular emphasis on the beef industry; and
- Focus on developing supply chain opportunities for SMEs to service the food-agriculture industry, and become successful enterprises in the globalized local marketplace.



FIBRE/BIO-INDUSTRIAL SECTOR

Sector Outlook

Canada's forest industry has faced – and overcome – some of the most challenging market and economic conditions in its history. The Fibre/Bio-Industrial sector is under pressure as commodity products are increasingly subject to the global commodity downturn which can significantly impact capacity and employment in Alberta. In recent years, Alberta has been competing against producers that are either closer to the market or able to grow fibre more quickly. The massive contraction in the US housing market (the largest export destination for Alberta lumber and panels) in the previous decade resulted in mill closures and slowdowns across Canada, and while the market is recovering, total exports have yet to return to pre-2007 levels.

However, the recent decline in the exchange rate between the Canadian and US dollars has been positive for the sector, due to the fact that most commodity products are traded in US dollars. Faced with these fluctuations, forest product companies recognize that to maintain their long-term viability and remain globally competitive they need to build on their existing strengths as producers of traditional forest products and practitioners of sustainable forest management practices while also finding new and value-added products.

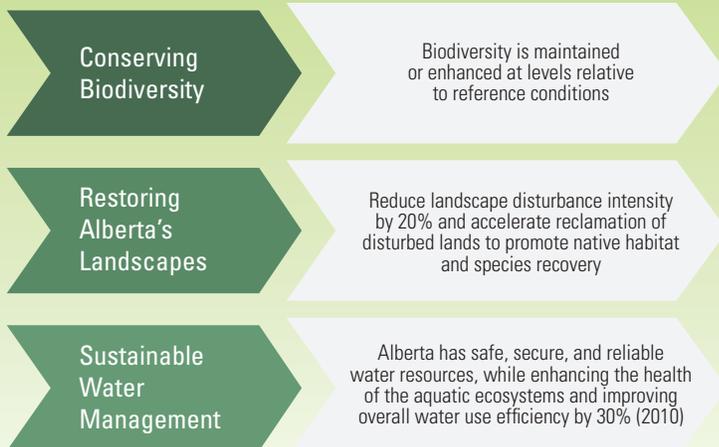
Innovative strategies are needed to enhance productivity and efficient value recovery, to diversify and add value to products to compensate for comparatively high labour and logistics costs, and provide income stability while managing the environment for future generations. The forest sector has been recognized as a foundation for the emerging bio-industrial sector due to its ability to efficiently manage and deliver fibre. There are, however, still many process development, economic, and product optimization issues that must be addressed before this emerging sector can come to fruition. As a result, the industry is seeking specialized facilities and expertise within the public infrastructure to help design, develop and demonstrate new bio-refining processes and products as well as produce highly skilled scientists, engineers and technologists for bio-based processing. The creation of these facilities and technical services is vital to the establishment of this new industrial sector in Alberta.

While the forest industry has historically and continues to invest significant capital in facilities to improve production efficiency and safety, operating alongside Alberta's oil and gas sector has meant that this sector has not been a primary focus for government and private sector investment. Given that the forest industry is a vital economic driver for more than 50 Alberta communities, many of which are highly dependent on the industry for employment, sustaining this sector is critical for ensuring the health and vibrancy of Alberta's rural heartland. With the renewed emphasis on diversification in the province, AITF plans to add additional capacity to meet the needs of the sector in the upcoming year.

Key Sector Statistics



Draft 2030 Innovation Targets



AITF'S CONTRIBUTION

AITF's efforts are centered on developing, demonstrating and helping de-risk, at the lab and pilot scale, the commercial applicability of leading-edge, economically viable technologies in the forest sector. Within this area, we are focused on pulp and paper and the by-products of the pulping process as well as engineered wood products. AITF works directly with companies and other researchers to improve competitiveness by identifying opportunities to diversify production into higher margin products and expanding market reach into new segments and new geographic regions through the following:

- Strengthen industrial partnerships with forest product companies and uptake industries to address real world opportunities and challenges with commercial implications;
- Establish the Alberta Forest Products Innovation Consortium to inform and coordinate activities related to forest products;
- Deepen relationships with national partners, including FP Innovations, Natural Resources Canada, the National Research Council, and Western Economic Diversification to leverage resources in support of activities of mutual interest and benefit;
- Develop strategic relationships with provincial partners, including the Alberta Forest Products Association (AFPA), Forest Resource Improvement Association of Alberta (FRIAA), Foothills Model Forest, to address Alberta-centric environmental challenges with bio-industrial solutions;
- Commercialize products using Cellulose Nano-Crystals (CNC), and discover new uses for lignin and biochar applications; and
- Expand demand for AITF licensed engineered wood products and Oriented Strand Board, particularly in China as they have banned all tree harvesting in their Country and Alberta's Industry is in a comparatively advantageous position to service this significantly increased global market.

Partners*

ALBERTA INNOVATES – BIOSOLUTIONS / ALBERTA AGRICULTURE AND FORESTRY
 ALBERTA ECONOMIC DEVELOPMENT & TRADE / PRIVATE INDUSTRY
 NATURAL RESOURCES CANADA, INCLUDING CANMET ENERGY
 CAMPUS ALBERTA, INCLUDING UNIVERSITY OF ALBERTA, UNIVERSITY OF CALGARY AND NAIT
 FP INNOVATIONS

*Partial List of AITF's Partners in this sector



ENERGY SECTOR

Sector Outlook

Alberta has a diverse energy portfolio, which includes natural gas, conventional oil, coal, minerals, and the oil sands. Located mainly in the Athabasca and Cold Lake areas, Alberta's oil sands are the third-largest proven crude oil reserve in the world after Saudi Arabia and Venezuela. The sector provides opportunities for companies involved in the support of extraction and processing energy resources as well as critical supply chain service companies. Alberta's energy exports generate billions of dollars in revenues every year and are critical to the province's economy.

There are three major challenges facing Alberta's energy sector: global competition, location, and environmental stewardship.

First, Alberta's energy market is impacted by the global markets, in particular the low comparative cost of fracturing in the US and the low cost of Middle East oil producers. To remain viable the industry must identify efficiencies and drastically reduce input costs. On a similar front, Alberta's natural gas industry is exploring ways to improve well-economics by reducing the cost of exploration and increasing well productivity through technology and process improvements. As a whole, technology development and adoption as well as process improvements are key components to increasing the competitiveness of Alberta's oil and gas industry. The urgency of maintaining global competitiveness has only increased as the price of oil continues to fall from more than \$100 per barrel in 2014 to approximately \$50 per barrel in 2015 and to as low as \$30 per barrel in 2016.

The second major challenge is that Alberta's resources, including the energy sector, are landlocked. Transportation costs significantly limit market access and decrease margins for Alberta producers, an issue not faced by other oil suppliers with greater access to pipeline and port infrastructure.

The third challenge identified for the energy sector is the global energy transformation towards a lower carbon future and the drive towards greenhouse gas reduction. Several technical challenges must be overcome for the energy industry to remain competitive while being environmentally conscious. The quality of air, water and land must be carefully monitored and managed, and efforts can be constrained by infrastructure, production inputs including natural gas, and recovery and processing methods, all of which are being explored to identify implementable opportunities for improvement. AITF's Energy Sector group works closely with our Environment Sector group to identify opportunities to enhance outcomes through collaboration.

Through advancements in technology and innovation, SME's and large producers in the sector are positioning themselves to become vital suppliers of technologies and services to the global marketplace.

Key Sector Statistics

2014 Gross Revenues from All Hydrocarbons

\$112 Billion

2014 Energy Resource Exports

\$91 Billion

Albertans Employed in the Upstream Energy Sector

133,000

2014 Oil Sands Reserves

166 Billion Barrels

Draft 2030 Innovation Targets

Reduce GHG Emissions

Support Alberta's climate change goals by accelerating solutions to reduce methane emissions by 45% by 2025 and ensure a dynamic portfolio of GHG emission reduction technologies

Increase Value & Market Access

Support the successful commercialization of new value-added products to increase the market value of Alberta's oil and gas exports by 25% and expanding access to market

Improve Oil Sands Efficiency

Oil sands production efficiency and economics improve by decreasing: fresh water use by 50%, GHG emissions by 50% on a per bbl basis, and supply cost of bitumen to be globally competitive

Renewable Energy

Renewable sources, like wind and solar, will contribute up to 30% of Alberta's electricity generation

Partners*

ALBERTA DEPARTMENT OF ENERGY / ALBERTA INNOVATES CORPORATIONS
CANADA'S OIL SANDS INNOVATION ALLIANCE / ECONOMIC DEVELOPMENT AND TRADE CLIMATE
CHANGE AND EMISSIONS MANAGEMENT CORPORATION / INDUSTRY ASSOCIATIONS
NATIONAL RESEARCH COUNCIL

*Partial List of AITF's Partners in this sector



AITF'S CONTRIBUTION

The Energy Sector Office is committed to investing in Applied Research programs which help to reach Draft 2030 Innovation Targets found in the Alberta Research and Innovation Framework. Our researchers have a long history of providing R&D for the energy industry, and have a deep understanding of characteristics of energy reserves in Alberta. In addition, AITF has the specialized expertise, facilities and equipment for in-situ recovery of heavy oil and bitumen and surface mining processes.

AITF is contributing to the resolution of the key issues discussed in the energy sector outlook – global competitiveness, logistical challenges, and environmental management – through programs in its Applied Research stream.

- Programs focused on addressing logistical challenges include Pipeline Integrity and Corrosion Management (PICOm), a Joint Industry Program, which facilitates collaborative R&D projects to improve detection, measurement and mitigation methods for corrosion in pipeline systems. AITF's Energy Sector Applied Research stream also supports R&D around spill response for pipelines, and leverages the internationally recognized expertise of its wholly-owned subsidiary, C-FER, to support innovation in this area;
- The Materials and Reliability in Oil Sands (MARIOS) consortium. The goal of MARIOS is to develop knowledge and validate technologies to significantly reduce downtime and improve operational reliability and productivity in the oil sands industry. The consortium links oil sands producers, materials and equipment suppliers, fabricators, and technology providers to collaboratively solve industry-wide problems. SMEs are subsidized by AITF to enhance exposure and sharing of innovative ideas and technologies;
- AACI, an in situ heavy oil research and development consortium that partners industry with government to advance field focused technologies. Work within this program involves identifying and evaluating improvements in operating practices and developing new exploitation strategies;
- AITF has entered into a multi-year collaborative agreement to work with the Heilongjiang Academy of Sciences to collaboratively pursue research and development of new products from the oil and bitumen resources in Daqing Oilfield, China's largest oilfield.



ENVIRONMENT SECTOR

Sector Outlook

In a natural resource driven province, managing the environment is both a challenge and an opportunity for the public and private sector. Although Alberta continues to battle the ‘dirty oil’ stigma, it has also garnered a reputation for excellence in water treatment and waste management. Alberta’s environmental products and services industry is the core business of approximately 1,300 companies with estimated revenues of \$2.8 billion annually.

Globally, annual financial investment in greenhouse gas mitigation is \$360 billion, with approximately one-quarter coming from public sector organizations. In comparison, in 2013 global investment in fossil fuel exploration was \$674 billion. Forecasts suggest that effective climate management will require a significantly higher commitment to meet global climate change targets. Budgets for Environment and Climate Change Canada estimate annual spending between \$980 million and \$1 billion until 2018 with the expectation that this will be used to leverage private sector investment.

Environmental stewardship and protection is a growing global industry, as evidenced by the increasing frequency of collaborative global dialogue and commitments by governments to aggressively support climate change action. Predictions around the cost to effectively address global climate challenges indicate the need to invest trillions of dollars, not the billions currently committed, into infrastructure. This emphasizes the need for governments across the world to work in partnership with each other as well as with the private sector to leverage resources and accelerate innovation. Alberta is well positioned for leadership in this economy, as we have experience in these types of government-private enterprise partnerships, and solutions developed here can be applied globally.

In November 2015, Alberta announced the core elements of its Climate Leadership Plan, the implementation of which is expected to strengthen Alberta’s economy and make Alberta one of the most environmentally-responsible energy producers in the world. The key elements of Alberta’s plan are:

- setting a province-wide price on CO₂ emissions;
- phasing out the use of coal for power generation;
- increasing the contribution from renewable power;
- capping CO₂ emissions from oil sands production at 100 Megatonnes by 2030; and
- reducing methane emissions associated with oil and gas production by 45 percent by 2025

Alberta’s innovation system is currently working with EDT and other Ministries to recommend an approach for supporting the technology and innovation component of Alberta’s Climate Leadership Plan.

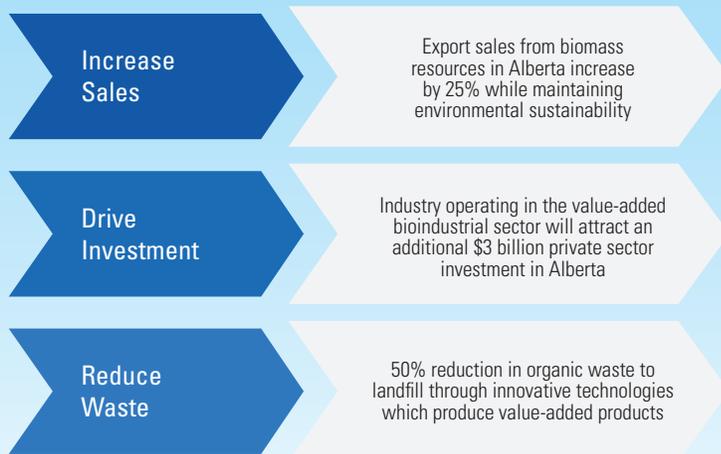
The innovation system is critical in achieving Alberta’s environmental goals, and meeting the Climate Leadership Plan in particular as it will require dramatic energy efficiency and carbon intensity improvements in the production of Alberta’s resources (and particularly our energy sector). For example, meeting the oil sands emissions cap will drive significant changes in knowledge base and current technologies, such as driving improvements in bitumen production, including next generation SAG-D and solvent-based extraction and other alternatives for steam generation processes.

Revenues generated through Alberta’s carbon tax will be re-invested in technology innovation (as well as other priorities such as reducing the impacts associated with the phase out of coal). The Alberta expert panel on climate change has recommended that the province take greater risks in funding breakthrough technologies that would position the province as a global leader. Alberta’s Climate Leadership Plan provides an opportunity for Alberta’s innovation system to significantly increase its impact and support the Province’s current sectors as well as emerging sectors (such as the “cleantech” sector).

Key Provincial Sector Statistics



Draft 2030 Innovation Targets



Note: Base year is 2015 unless otherwise stated.



AITF'S CONTRIBUTION

Within the environment sector, AITF's contribution is:

- Technical expertise to government and industry related to the integration of air, land, water and biodiversity considerations for Alberta government policies, regulations and monitoring systems;
- Providing advanced decision support systems to Integrated Resource Management System (IRMS) partners for cumulative effects management, drawing on provincial, national and international expertise;
- Building markets for ecosystem services in targeted sectors (e.g. agriculture) and applications (biodiversity, water), helping to diversify the economy and position existing markets for future opportunities;
- Field testing of new approaches and technologies for monitoring, greenhouse gas (GHG) reductions, other air, land and water impacts as well as making effective use of indigenous wisdom and traditional ecological knowledge;
- Specialized analytical capabilities, equipment and infrastructure for emerging environmental issues (e.g. aquatic and terrestrial mesocosm facilities, naphthenic acids analysis);
- Pilot-scale facilities for biogas and thermochemical processing and technology de-risking;
- Leadership of JIPs and consortia related to environmental management approaches and supporting mechanisms to engage Alberta SMEs in provincial environmental priorities (e.g. TECTERRA for geomatics sector) and to link MNEs and SMEs around provincial priorities.

Partners*

ALBERTA BIODIVERSITY MONITORING INSTITUTE / ALBERTA DATA PARTNERSHIPS
 ALBERTA ENVIRONMENT & PARKS / CANADA'S OIL SANDS INNOVATION ALLIANCE
 CLIMATE CHANGE AND EMISSIONS MANAGEMENT / CORPORATION (CCEMC)
 ECONOMIC DEVELOPMENT & TRADE / TECTERRA
 PETROLEUM TECHNOLOGY ALLIANCE OF CANADA

*Partial List of AITF's Partners in this sector



HEALTH SECTOR

Sector Outlook

To Canadians, healthcare is both a social benefit and an economic asset. The health sector directly and indirectly supports more than two million workers in hundreds of communities across the country, oversees sophisticated infrastructure and procurement of advanced technology, and supports leading-edge research with significant commercial potential. In Alberta, health care costs are predominantly driven by two factors: population growth and an aging population.

Public and private partnerships are viewed as a potential way to improve the effectiveness of the healthcare system. AITF views the engagement of industry and the private sector as critical to maximizing health and socio-economic benefits that accrue when technologies are adopted at scale.

Currently, Alberta's health system is focused on acute intervention as opposed to preventative medicine. The Draft 2030 Innovation Targets are attempting to shift this focus. This is an important step forward and has the potential to dramatically reduce costs and improve the health and well-being of Albertans.

The recognition that existing and new health data can be used to drive research that will lead to improved health outcomes has the potential to transform the way health is perceived and healthcare is delivered in Alberta. While this shift is still a work in progress, it is anticipated that investment in data infrastructure and deployment of electronic medical records, in conjunction with statutory or regulatory reform, will drive clinical data uses. This 'opening up' will lead to an environment where Alberta SMEs can create analytical tools and applications to analyze, present and use this data to improve care, health outcomes and manage the upward trend of health care costs to Albertans.

Alberta is known for excellence in medical teaching, clinical research and clinical practice but finding innovative pathways for new health and medical technologies that are developed in Alberta still present many challenges. However, more can be done to support and promote our SME environment in this sector. Working collaboratively with Alberta Health Services (AHS) as a partner and/or technology adopter is key for innovators seeking prototype demonstration and early application experience at scale.

Key Sector Statistics

Annual Burden
to Alberta's
Economy

\$9.7 Billion
(PLUS NON-REIMBURSED EXPENSES)

Albertan's
Employed

240,600

Number of
Facilities/
Operations

400

Other Key
Indicators

7-9%
POPULATION GROWTH, AGING POPULATION COST GROWTH

Draft 2030 Innovation Targets

Improve
Robustness
of Health Data

100% of human health data, social determinants of health data, and health-related data in the province are secure, linked, and readily accessible to improve outcomes and enable decision making and research

Improve
Quality of
Care

Alberta has a high performing health care system with a per capita cost at or below the Canadian average and improved service quality and health outcomes

Reduce
Burden of
Disease

Innovative chronic disease management decreases the disease burden of Albertans, including a 10% decrease in avoidable mortality and a 10% improvement in quality adjusted life years for Albertans with chronic disease

Health &
Wellness
Innovation

Alberta to become a top 10 location for research, development and commercialization of health and wellness innovations in North America, leading to social and health benefits for Albertans and beyond



AITF'S CONTRIBUTION

AITF's focus is on the commercialization of products and services that meet Alberta's health needs. Our activities are primarily directed to late stage medical product development, commercialization and access to markets.

- Providing knowledge and advisor services in regulatory requirements (ISO 13485, ISO 9001) and stage-gate project management to assist clients develop their products and services through to commercial market;
- Utilizing the RINs and TDAs to connect with geographically distant clients;
- Actively building networks among MNEs, SMEs, researchers and the investment community through and with system partners including Alberta Innovates – Health Solutions (AIHS), BioAlberta, Alberta Health Industry Association (AHIA), and TEC Edmonton's Health Accelerator;
- Working to influence the direction of health innovation in Alberta through active participation in the Health Innovation Collaboratory, and other strategic initiatives led by government partners.

Partners*

ALBERTA CENTRE FOR ADVANCED MNT PRODUCTS (ACAMP)
ALBERTA HEALTH INDUSTRY ASSOCIATION (AHIA) / ALBERTA INNOVATES HEALTH SOLUTIONS
ALBERTA MINISTRY OF ECONOMIC DEVELOPMENT & TRADE / ALBERTA MINISTRY OF HEALTH
BIOALBERTA / CAMPUS ALBERTA / STRATEGIC CLINICAL NETWORKS / TEC EDMONTON
WESTERN ECONOMIC DIVERSIFICATION

*Partial List of AITF's Partners in this sector



EMERGING TECHNOLOGIES

Sector Outlook

AITF has created a new sector office for Emerging Technologies to support Economic Development and Trade (EDT), Campus Alberta, and Industry who explicitly expressed a need to generate more value from Alberta's investments in the areas of Information and Communications Technologies (ICT) Nano technology, and 'Omics'. Upon extensive consultations with stakeholders, EDT and AITF have jointly articulated a vision for innovation platforms as follows:

Capitalize on platform technologies-enabled solutions to support a diversified 21st century knowledge intensive economy, to mitigate adverse environmental impacts and to maximize societal benefit.

The sector office will support EDT's strategic intent to capitalize on platform technology investments by focusing on convergent opportunities that will solve Alberta's priority sectors innovation challenges. Similar to Alberta's other key priority sectors, EDT has identified Draft 2030 Innovation Targets in the Alberta Research and Innovation Framework (ARIF). Additional platforms and convergent opportunities may arise over time and be added to this portfolio (e.g. materials engineering, clean tech, photonics, quantum computing).

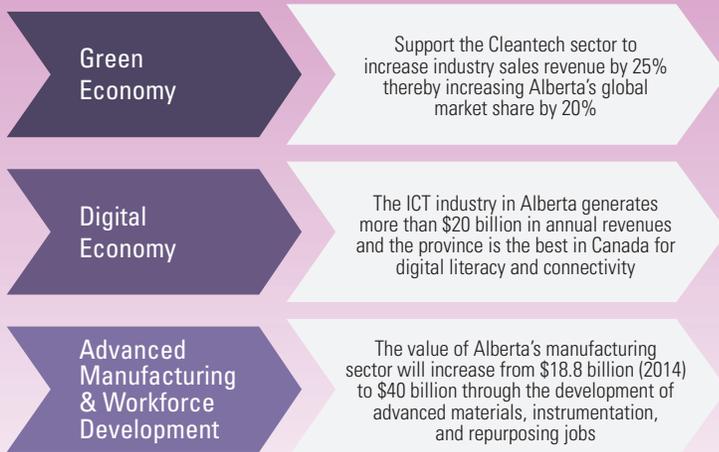
The goal is to accelerate the adoption and commercialization of emerging technologies in our core industrial and health sector to improve competitiveness and effectiveness while supporting the growth of globally competitive technology clusters. The Sector office will focus on the existing innovation system portfolio of investments and initiatives in the ICT, Nano, and 'Omics' areas with the mandate to help better integrate, leverage and streamline investments, in support of other sector strategies and programs, and define and execute strategies and programs targeting convergent opportunities for Alberta (e.g. Internet of Things, sensing and analytics).

The need to better coordinate and leverage emerging and advanced technologies across the historic Alberta innovates sectors can be highlighted by the following examples: Developments in genomics may lead to advances in crop development within the Food and Agriculture Sector, the Fibre/Bio-industrial Sector, the Health Sector and even the Energy Sector; while developments in sensor technologies and analytics have applicability in environmental monitoring, energy production, and health. The Emerging Technology sector office will work closely with the other sectors to raise awareness of developments and their potential. Emerging Technology will also gather research and technology requirements from other sectors to ensure investments are aligned to fulfill their needs. Formal processes for cross-sectors convergent engagements will be developed over 2016-17 fiscal year.

Key Provincial Sector Statistics



Draft 2030 Innovation Targets



Partners*

PRIVATE INDUSTRY AND ENTREPRENEURIAL GROUPS

ACAMP - ALBERTA CENTRE FOR ADVANCED MNT PRODUCTS

TECTERRA / CYBERA / AICML – ALBERTA INNOVATES CENTRE FOR MACHINE LEARNING

NRC – IRAP, WD / SERVICE ALBERTA / ALBERTA DATA PARTNERSHIP / CAMPUS ALBERTA & RIN

*Partial List of AITF's Partners in this sector



AITF'S CONTRIBUTION

The recently created Sector Office of Emerging Technologies is engaging with stakeholders in the process of assessing strategic opportunities and developing associated execution plans, leveraging wherever possible existing resources and programs of the Alberta Innovates Corporations. Opportunities being explored at present include:

- Leverage existing provincial and AITF investments in Alberta Centre for Advanced MNT Products (ACAMP), Nano Accelerator, ASBIRI, NanoFab (UofA) Chairs and commercialization programs to include new capabilities to foster the ongoing development of microelectronics design and manufacture in Alberta Working in collaboration with private sector partners the aim is to provide new market opportunities and the HQ/SP schooled in Alberta to work in a commercial setting to support local SME needs.
- Develop a plan to support the implementation of an Internet of Things Industrial Interoperability Demonstration Lab, with simulations of key industrial processes including the Digital Oilfield. Partners such as Tecterra, ACAMP, AICML and private sector partners will contribute the geospatial, electronic and artificial intelligence technology across resource management sectors.
- Support the ongoing work of the Environment and Health Sector Offices in detailing data systems and Data Analytics requirements in the Health system and for Integrated Resource, Land and Environmental Management to direct campus Alberta and SME funding support to addressing identified requirements.
- Design programs and projects that maximize synergies and SME engagement by leveraging a coordinated approach of existing provincial and federal investments in the emerging technology space to support the multiple initiatives ongoing in AITF's sectors including: pipeline monitoring; reservoir monitoring and modeling; IRMS; environmental monitoring; precision farming; livestock genetics and Health.



RISK ASSESSMENT

Senior Research Engineer Jonathan Heseltine of C-FER Technologies in Edmonton, Alberta, investigates cement alternatives to improve the integrity of steam injection wells in the oil sands.

Risk Assessment

As part of AITF's Enterprise Risk Management process, management actively manages the risks which could adversely impact the ability to deliver on the organization's business plan. The following significant risks were identified by senior management:

1. Declining revenue streams due to current economic environment from both industry and government clients.

AITF funds its mandate for the Province of Alberta through two revenue streams – contract research for commercial enterprises and government clients, and funding from the Government of Alberta. Contract research revenues account for almost a third of the corporation's income, which is highly concentrated with a relatively small number of oil and gas sector clients. During strong economic times this revenue stream enabled AITF to maintain and improve its capacity to provide critical support services to Alberta industry and government. While there is increasing pressure on both revenue streams, the long term nature of research and innovation requires AITF to sustain critical human and infrastructure assets in place. It is management's belief that the province has not likely seen the full impact of the downturn. If the economic decline continues, it will put significant strain on the organization. Over the last 2 years, contract research revenues have declined by approximately 11%, this is despite a large one time contract earned at AITF's wholly owned subsidiary, C-FER Technologies. Contract research revenues are budgeted to decline by an additional 10% in the upcoming fiscal year.

POTENTIAL IMPACT: **MEDIUM**

LIKELIHOOD OF OCCURRENCE: **HIGH**

Mitigation strategy:

AITF's business plan and budget has been carefully developed, balancing short term fiscal pressures with the long term demands of research and development. Discretionary expenses have been reduced, and additional controls have been put in place to monitor AITF's financial position month to month.

During these challenging times, a strong focus on business development and support of our clients will be maintained. Staff has been encouraged to think of out-of-the box solutions and maintain flexibility, acknowledging current fiscal pressures while still protecting long term outcomes. Our business support for resource based clients has switched towards helping companies come down the cost experience curve.

2. Aging workforce and succession planning in critical areas.

Many AITF staff are highly-specialized in terms of skills and experience which is not easily reproduced or replaced. As a result, hiring decisions must be strategic and candidates must meet the technical requirements of a knowledge-based work environment. Nationally, at the university level STEM (Science Technology Engineering Math) fields represent just 24.5% of all fields of study, 53.5% of earned doctorates (PhDs) and 25.8% among master's degrees in 2016¹. These statistics demonstrate the limited talent pool for which AITF competes with private industry and other government bodies and agencies. While the current downturn and layoffs has increased the pool of candidates, it is critical to note that highly skilled professionals are also highly mobile. If uncertainty is high in Alberta, and opportunities are seen as being more plentiful in other regions of Canada, or other countries, talent can easily migrate.

POTENTIAL IMPACT: **MEDIUM**

LIKELIHOOD OF OCCURRENCE: **MEDIUM**

¹ Statistics Canada: Postsecondary Student Information System (PSIS) Report, November, 2015

Mitigation strategy:

Management has actively identified the key positions and individuals whose loss would pose the greatest risk to AITF; the business plan and budget allows for the prudent replacement of key individuals as they choose to retire. The extensive lay-offs in the energy sector in particular may increase the current pool of highly qualified candidates available for recruitment. The organization, in partnership with EDT and Campus Alberta is also looking to adopt flexible work arrangements, which would provide increased opportunities to train and develop new graduates in STEM fields within AITF's Applied Research team.

3. Coordination of activities within Alberta's innovation system

In the last five years the research and innovation landscape has changed significantly, and increasingly Alberta's needs to take an integrated, cross-sectoral approach to respond to complex challenges such as climate change and structural shifts in our energy sector. Increased coordination, amongst system players is needed to drive the outcomes required of the innovation system.

POTENTIAL IMPACT: **MEDIUM**

LIKELIHOOD OF OCCURRENCE: **MEDIUM**

Mitigation strategy:

Through the Innovation Collaboratories, significant strides are being made in developing a cross government approach to setting research and innovation priorities, which have been formalized in the Draft 2030 Innovation Targets. These targets will be used by the Alberta Innovates corporations and Campus Alberta to focus activities. While AITF strongly supports the Collaboratory model, we recognize the challenges posed by large group collaboration. As members of their respective Innovation Collaboratories, AITF's Sector Leads will contribute their leadership skills, knowledge and align AITF's resources to the priority areas perceived to have the greatest game-changing value for Albertans. Sector leaders and management are held accountable to outcomes by AITF's independent Board of Directors. The newly announced consolidation of the four Alberta Innovates Corporations, will significantly contribute to improved coordination and collaboration within Alberta's innovation system.

4. Aging capital and technology infrastructure

AITF operates over one million square feet of product and process development and scale-up facilities in Edmonton, Calgary, Devon and Vegreville. This includes a 300 hectare research farm, three greenhouses, and 36 growth chambers. In addition to our facilities, AITF also possesses a substantial inventory of research equipment with an estimated replacement asset value of about \$100M. The purpose of our facilities and capital assets is to accelerate the adoption of innovation and new technology into our primary sectors, which leads to improved competitiveness and financial performance of Alberta industry. However, as detailed in our Capital Plan, AITF has limited sources of capital and is heavily dependent on the Government of Alberta for capital funding to maintain the required facilities and infrastructure for the applied research side of our business. With the current economic downturn, management has made the strategic decision to under invest in capital in the current year, with an eye to reversing this trend in the near future. It is critical to note, such actions are not without significant downside. When capital investment is short-term oriented, and focused on the maintenance of current capacity, it limits AITF's ability to provide meaningful, and game-changing research and development support to Alberta businesses.

POTENTIAL IMPACT: **MEDIUM**

LIKELIHOOD OF OCCURRENCE: **MEDIUM**

Mitigation strategy:

AITF in partnership with the Collaboratories and EDT will work to determine priority areas for Applied Research capital maintenance and investment. Management will actively advocate for and ensure current capital supports these strategies and is funded accordingly. A long term Planned Capital Expenditure Plan and replacement strategy will be initiated to ensure AITF's technological and physical assets remain relevant in the market place.

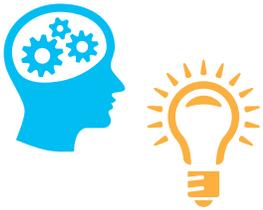
CORPORATE GOALS & PERFORMANCE MEASURES

WHAT GETS MEASURED GETS DONE – AS A RESULT BOTH PUBLIC AND PRIVATE SECTOR ORGANIZATIONS DEVELOP GOALS AND KEY PERFORMANCE INDICATORS (KPI's) TO COMMUNICATE PRIORITIES TO STAKEHOLDERS AND HOW THEY WILL BE MEASURED. IN THE INNOVATION SPACE, DEVELOPING MEANINGFUL KPI's IS PARTICULARLY CHALLENGING FOR MANY ENTITIES.

Goals

The recent clarity of purpose achieved by the innovation ecosystem in Alberta has allowed AITF to evolve its KPI's designed for the three functional business streams – Campus Alberta/Basic Research, Applied Research and Commercialization. Looking ahead, monitoring key performance metrics and demonstrating the value from AITF's diverse portfolio is a key priority of management.

CAMPUS ALBERTA/BASIC RESEARCH



AITF will leverage its relationships with industry partners and post-secondary institutions to focus investments towards the achievement of the 2030 Innovation Targets. As a result the expected outcomes and measures below showcase a movement away from measuring numbers of individual projects and programs funded by AITF to the quantification of industry collaboration, retention of knowledge within the Province, and the alignment of investments to the 2030 Innovation Targets.

While AITF is pleased with the evolution of the measures in Campus Alberta/Basic Research as compared to the past, additional progress is required to report on the impact and progress towards achievement of the 2030 Innovation Targets. AITF looks forward to working with Innovation System Partners to contribute to outcome centric key performance measures within Campus Alberta/Basic Research focused innovation investments.

GOAL 1: Increase the development of use-inspired research and retention of knowledge.

| Expected Outcome | Outcome Measure |
|---|---|
| 1.1 Strong collaborative partnerships with Industry | a. Percentage of Chairs with financial contributions from the private sector b. Ratio of private sector funding to AITF funding for Chairs |
| 1.2 Investment alignment toward 2030 Innovation Targets | a. Percentage of Chair funding aligned with the 2030 Innovation Targets |
| 1.3 High-quality, graduate and post graduate training in areas directly contributing toward the 2030 Innovation Targets | a. Percentage of Graduate Student Scholarship (GSS) recipients working in areas directly contributing toward the 2030 Innovation Targets |

| Outcome Measure | Actual 2015-16 | Target 2016-17 | Target 2017-18 | Target 2018-19 |
|--|----------------|----------------|----------------|----------------|
| 1.1a Percent of Chairs on projects with financial contributions from private sector | 40% | 40% | 50% | 60% |
| 1.1b Private sector to AITF funding ratio for Chairs | 1 to 1 | 1 to 1 | 1.5 to 1 | 2 to 1 |
| 1.2a Percent of Chair alignment with the 2030 Innovation Targets | 88% | 88% | 95% | 100% |
| 1.3a Percent of new GSS recipients working in areas directly contributing toward the 2030 Innovation Targets | 80% | 80% | 100% | 100% |

Joint Research and Innovation Initiatives with other Alberta Innovates Corporations –

Within Basic Research / Campus Alberta portfolio, AITF has a number of key joint projects with its sister Alberta Innovates Corporations. A few key examples are:

Cellulose Nano-Crystals (CNC) 2.0 Challenge with Alberta Innovates Bio-Solutions (AI-BIO)

AITF and AI-BIO have collaborated to provide funding for R&D projects that advance the knowledge and use of CNC, an advanced biomaterial. The new program is intended to support early-stage work to demonstrate technical feasibility of CNC in high-value applications with potential for commercialization. AITF and AI-BIO will support up to eight projects and provide each applicant with the following – up to \$25,000 in funding, up to one kilogram of CNC from AITF's pilot plant, access to AITF's researchers, capacity and facilities.

Climate Change & Emissions Management Corporation (CCEMC) / Ingenuity Lab with AI-BIO

AITF Chair Carlo Montemagno is receiving additional funding from the AI-BIO CCEMC program for a two-year project that aims to optimize a scalable engineering system that uses industrial GHG emissions to generate high value chemicals compatible with Alberta's petrochemical infrastructure.

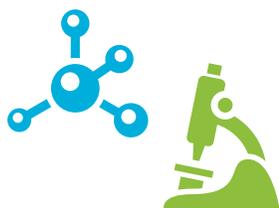
Livestock Gentec with AI-BIO

Livestock Gentec is an AI-BIO centre based at the University of Alberta. Livestock Gentec was created in 2010 to continue the Alberta Bovine Genomics Program's research and bring the commercial benefits of genomics to the Canadian livestock industry. AITF provides support to this endeavour through annual funding and board participation.

Various Alberta Innovates Corporations

AITF Chairs Co-funded with Other Alberta Innovates Corporations

Five Chairs within AITF's Strategic and Industry Chair program are co-funded by AIHS or Alberta Innovates Energy and Environment Solutions (AIEES). Their primary research areas include renewable solar energy, clean energy extraction, prevention and early detection of disease, bio-molecular simulation, and drug discovery.



APPLIED RESEARCH

Looking ahead, AITF is working to better integrate the activities of Applied Research within Alberta's Innovation System. As a result the outcomes and KPI's outlined below are focused on measuring the degree of joint industry and government research and alignment of activities to the 2030 Innovation Targets. This represents an important shift for the Corporation. Previously, KPI's for Applied Research were centered on the amount of revenues earned versus the quality of joint industry research and alignment to key provincial priorities. In the upcoming year, further refinements are anticipated to be made to the KPI's within Applied Research.

GOAL 2: Accelerate the creation of economic, environmental and social value through joint industry and government investments and partner collaboration.

| Expected Outcome | Outcome Measure |
|---|---|
| 2.1 Strong collaborative partnerships with Industry | a. Percentage of total contract research revenues from Joint Industry projects |
| 2.2 Support the achievement of 2030 Innovation Targets* | a. New programs launched to support the attainment of the 2030 Innovation Targets |
| 2.3 Responsive, customer-centric research organization | c. Annual client retention rate |
| | d. Number of clients served during the fiscal year |

* 2015-16 revenues and programs were tracked against Sector Grand Challenges as the 2030 Innovation Targets were still under development

| Outcome Measure | 2015-16 | Target 2016-17 | Target 2017-18 | Target 2018-19 |
|--|---------|----------------|----------------|----------------|
| 2.1 Percentage of total contract research revenues from Joint Industry and government projects | 33% | 37% | 42% | 47% |
| 2.2 Annual client retention rate | 60% | 60% | 60% | 62% |
| 2.3 Number of clients served during the fiscal year | 600 | 650 | 750 | 850 |

Joint Research and Innovation Initiatives with other Alberta Innovates Corporations –

Within AITF's Applied Research portfolio, AITF has a number of key joint projects with its sister Alberta Innovates Corporations. A few key examples are:

Biochar with Alberta Innovates - Bio Solutions (AI-BIO)

Biochar is a carbon-rich solid produced by pyrolysis of biomass residues having many high-value applications in the agroforestry, environmental, and energy sectors. AITF and AI-BIO support customers and industrial partners aiming to develop and commercialize biochar-based products.

Improving water and nutrient use in barley and wheat with AI-BIO

AI-BIO and AITF are partnering in a project looking at the relationship between resilience to nutrient and moisture stress and root architecture. This project has identified varieties that differ for drought stress resistance and nitrogen use efficiency, knowledge that will allow identification of genes that can be used to develop barley and wheat varieties that yield well in stressful conditions.

Predictive Ecosite Mapping with Alberta Innovates Energy and Environment Solutions (AIESS)

AI-BIO, AIEES and Environment Solutions, and EDT supported the Predictive Ecosite Mapping Project. Ecosite information is needed by industry, government, and others for land-use planning, reporting on the status of biodiversity, and for industry to obtain development approvals. This project piloted a new way for creating this natural resource inventory by applying machine learning techniques to digital elevation data and existing ecosite information provided by industry partners. The mapping platform will be commercialized by a commercialization partner.



COMMERCIALIZATION

AITF manages a diverse array of programs focused on supporting technology based SMEs to achieve commercial success. The KPI's in this business stream are concentrated on measuring the growth in revenues and jobs created by AITF-funded SMEs and the Corporations support of these SMEs.

GOAL 3: Accelerate commercial success for Alberta SMEs and entrepreneurs through an integrated commercialization system.

| Expected Outcome(s) | Outcome Measure(s) |
|--|---|
| 3.1 Effective deployment of commercialization initiatives | a. Aggregate Net Promoter Score of SMEs ¹ |
| 3.2 Regionally accessible business mentorship expertise | a. Percentage of AITF-funded SMEs who found TDA's to be helpful b. Percentage of AITF-funded SMEs who received assistance from a TDA |
| 3.3 Sustainable job creation by technology-based SMEs | a. Net jobs created by AITF-funded SMEs subsequent to funding |
| 3.4 AITF-funded SMEs are able to raise follow-on capital from private sources ² | a. Ratio of net follow-on funding raised subsequent to AITF's funding support |

¹ The 'Net Promoter Score' was assessed by a customer survey conducted by an independent-third party. It represents the net percentage of customers who are 'Promoters' of AITF and is calculated as follows: (% of AITF Promoters) - (% AITF Detractors). An NPS Score of 50 or greater is considered to be excellent.

² Private investments include the following: Venture capital, angel investment, strategic & foreign investment, loans and shareholder investment. An investment is considered to be 'follow-on', only if it was secured after AITF's initial investment in the SME.

| Outcome Measures | Actual 2015-16 | Target 2016-17 | Target 2017-18 | Target 2018-19 |
|--|------------------|------------------|------------------|------------------|
| 3.1a Aggregate Net Promoter Score of SMEs | 65 | 65 | 65 | 65 |
| 3.2a Percentage of AITF-funded SMEs who found TDA's to be helpful | 93% | 58% | 65% | 65% |
| 3.2b Percentage of AITF-funded SMEs who received assistance from a TDA. | 53% | 85% | 85% | 85% |
| 3.3a Net jobs created by AITF-funded SMEs subsequent to funding | TBD ¹ | TBD ¹ | TBD ¹ | TBD ¹ |
| 3.4a Ratio of net following-on funding raised subsequent to AITF's funding support | TBD ¹ | TBD ¹ | TBD ¹ | TBD ¹ |

¹ AITF collected the data to report on this measure for the first time in 2015-16 based on a survey conducted of SMEs funded over the last three years, however since we do not have year-over-year trending available it is difficult to set targets for individual years. We will work to set these targets in the upcoming year. Regardless reporting on Actual results will be showcased in our Annual Report.

Joint Research and Innovation Initiatives with other Alberta Innovates Corporations –

Alberta Innovates-Technology Futures is actively working with Alberta Innovates – Health Solutions in developing the Alberta Small Business Innovation and Research Initiative. This program is designed to enable Alberta Small and Medium Enterprises (SMEs) in developing solutions to identified industry and public sector challenges, including those in the Health Sector.

Budget

Alberta Innovates-Technology Futures

Consolidated Statement of Operations for all Funds

Three Year Financial Plan (\$ in thousands)

| | Comparable | | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 2014-15 Actual | 2015-16 Budget | 2015-16 Actual | 2016-17 Budget | 2017-18 Target | 2018-19 Target |
| Revenues | | | | | | |
| Government Transfers | | | | | | |
| Government of Alberta Grants | 41,940 | 41,722 | 40,422 | 37,880 | 37,880 | 37,880 |
| Restricted Provincial Funds | 42,962 | 48,082 | 43,800 | 43,232 | 43,232 | 43,232 |
| Restricted Provincial Funds- Prior Year | 536 | 7,596 | 6,867 | 13,051 | 13,327 | 8,101 |
| Other Provincial Funds | 10,407 | 10,230 | 11,217 | 11,560 | 12,369 | 12,987 |
| External Contract Revenue | 55,614 | 50,046 | 54,556 | 43,457 | 46,499 | 48,824 |
| Contract Revenue from Province of Alberta | 3,495 | 4,077 | 4,032 | 4,104 | 4,391 | 4,611 |
| Product Sales | 4,375 | 2,731 | 1,746 | 976 | 1,044 | 1,096 |
| Other Revenue | 870 | 790 | 479 | 500 | 525 | 551 |
| Total Revenue | 160,199 | 165,274 | 163,119 | 154,760 | 159,267 | 157,282 |
| Expenses | | | | | | |
| Line of Business | | | | | | |
| Applied Research | 104,682 | 96,643 | 97,479 | 88,592 | 91,080 | 92,193 |
| Basic Research | 41,286 | 40,389 | 39,064 | 30,993 | 30,668 | 28,717 |
| Commercialization | 22,089 | 31,759 | 25,679 | 39,041 | 38,632 | 36,175 |
| Total Expenses | 168,057 | 168,791 | 162,222 | 158,626 | 160,380 | 157,085 |
| Net Operating (Deficit)/Surplus | (7,858) | (3,517) | 897 | (3,866) | (1,113) | 197 |
| Loss (Gain) on Disposal of Capital Assets | 54 | - | 36 | - | - | - |
| Annual Operating (Deficit)/Surplus | (7,912) | (3,517) | 861 | (3,866) | (1,113) | 197 |
| Capital Investment and Net Change in Capital Assets | | | | | | |
| New Capital Investment | 4,847 | 4,796 | 4,932 | 6,285 | 6,500 | 6,500 |
| Less: Amortization | (4,613) | (5,258) | (4,684) | (5,059) | (5,110) | (5,212) |
| (Loss)/Gain on Disposal/Write-down | (54) | - | (36) | - | - | - |
| Net Increase (Decrease) in Capital Assets | 180 | (462) | 212 | 1,226 | 1,390 | 1,288 |
| Change in Net Assets | | | | | | |
| Accumulated Surplus, Beginning of Year | 53,710 | 45,401 | 45,798 | 46,659 | 42,793 | 41,680 |
| Annual Operating (Deficit)/Surplus | (7,912) | (3,517) | 861 | (3,866) | (1,113) | 197 |
| Accumulated Surplus, End of Year | 45,798 | 41,884 | 46,659 | 42,793 | 41,680 | 41,877 |

Alberta Innovates-Technology Futures

2016-17 Key Outcomes

\$ in thousands

| Line of Business | Total 2016-2017 Budget (\$'000) | Key Outcomes of the Alberta Research and Innovation System | | | |
|-------------------|--|--|--|--|--|
| | | Drives the growth and diversification of the economy (\$'000) | Enables the cost- effective discovery, development and production of natural resources (\$'000) | Mitigates environmental impacts (\$'000) | Enhances the health and well-being of Albertans (\$'000) |
| Commercialization | \$39,041 | \$14,794 | \$10,559 | \$11,400 | \$2,288 |
| Applied Research | \$88,592 | \$33,570 | \$23,961 | \$25,869 | \$5,192 |
| Basic Research | \$30,993 | \$11,744 | \$8,383 | \$9,050 | \$1,816 |
| TOTAL | \$158,626 | \$60,108 | \$42,904 | \$46,320 | \$9,294 |

* Research and innovation initiatives should be the same as those listed in the budget table above.

AITF Capital Plan and Leasing Arrangements

Capital Requirements

AITF occupies a significant inventory of research and office facilities, most of which are owned and operated by Alberta Infrastructure. AITF operates over one million square feet of product and process development and scale-up facilities in Edmonton, Calgary, Devon and Vegreville. This includes a 300 hectare research farm, three greenhouses, and 36 growth chambers. In addition to our facilities, AITF also possesses a substantial inventory of research equipment with an estimated replacement asset value of about \$100 million. AITF has persistent, ongoing requirements to maintain, update, reconfigure, and expand our innovation infrastructure to meet the applied research, sector, and provincial priorities.

Capital planning and investment needs are categorized into two streams – Applied Research and Corporate Capital.

- Applied Research: Industry and public sector clients access AITF's world class scientists and technologically advanced facilities required to test and adopt new technology.
- Corporate capital: Investments provide integrated systems (particularly IT systems) with the appropriate safeguards to support and sustain the ongoing operations of AITF.

Capital funding has traditionally come from two sources: internal AITF funding for research equipment and Alberta Infrastructure funding for program accommodation projects. As the Government of Alberta steers the province through turbulent economic times, AITF recognizes the need to create efficiencies and generate value to maximize capital utilization. AITF has invested approximately \$6 million of internal research equipment capital funding to subsidize high priority accommodation projects. AITF has been working closely with the EDT and Trade to develop an innovation infrastructure planning and budgeting process with a view to address the capital shortfall. In addition, an asset management system is being implemented at AITF to ensure effective utilization and management of our assets for priority programs.

The 2016-17 business plan recognizes the challenges posed by the current operating funding from the government and the weakening in demand for contract research. Nonetheless, AITF will continue to invest at previous levels to maintain our ability to support our clients with the latest research equipment and to upgrade aging assets.

AITF will also request additional funding from EDT and Alberta Infrastructure. In the 2016-17 planning cycle AITF has requested \$6.75 million for 2 major capital projects which are detailed in the Three Year Capital Priorities of this business plan. At the time this business plan was written AITF was awaiting final consideration for this funding.

Looking to the future

Despite needing additional funding for capital investment in the upcoming year AITF will be working on building an inventory of Applied Research and Corporate capital assets, determining the utilization of key assets, and building a long term capital plan with an eye to the direction and priorities of AITF, the larger innovation ecosystem, and sustainability of Alberta's Applied Research capacity.

2016-2019

Three-Year Capital Plan Funding Priorities

\$ in thousands

| Projects by Location | Type of Project | Project Scope and Justification | Proposed Timeline | 2016-17 Estimate | 2017-18 Target | 2018-19 Target | 3-Year Total | Funding Sources |
|---|----------------------------|---|------------------------------------|------------------|----------------|----------------|--------------|---|
| Devon – AITF | | | | | | | | |
| Alberta – Canada Collaboratory in Cleaner Oil Sands Development Memorandum of Understanding | Major Capital | MOU strategic capital plan implementation to support immediate and longer-term space requirements of AITF and NRCan. Total Project Cost: \$103.5M Note: 2016-17 estimate is for addressing AITF priority safety issues. | 2 to 60 months | \$6,000 | \$24,000 | \$58,000 | \$88,000 | Potential: EDT, Alberta Infrastructure, GOA |
| Edmonton – AITF | | | | | | | | |
| Sector Office Collaborative Work Environment Development | Major Capital | Redevelop knowledge centre sector office space to create a work environment that engages people and inspires collaboration. Total Project Cost: \$1.9M | 2 to 24 months | \$750 | \$1,124 | \$0 | \$1,874 | Potential: EDT, Alberta Infrastructure, GOA |
| Calgary – AITF | | | | | | | | |
| AITF Calgary Program Expansion | Major Capital | Redevelop high head and administrative space to support the effectiveness and growth of Calgary programs aligned to provincial priorities in the SME's, Petroleum, Environment and Water Management programs. Total Project Cost: \$11.6M | 24 to 60 months | \$0 | \$0 | \$1,400 | \$1,400 | Potential: EDT, Alberta Infrastructure, GOA |
| All Sites – Miscellaneous | | | | | | | | |
| Program Equipment, Minor Facility Projects and Corporate Systems | Ongoing Capital Investment | Miscellaneous corporate systems and equipment identified from annual budgeting process. | 2 to 12 months (project dependent) | \$6,285 | \$6,500 | \$6,500 | \$19,285 | Potential: AITF, EDT, Alberta Infrastructure, GOA |
| | | | | \$13,035 | \$31,624 | \$65,900 | \$110,559 | |

Commercial Lease Arrangements

| Location | Size | Termination date | Scope of Operations |
|-----------------------|--------------------|------------------|--|
| 1. Victoria | 5,030 square feet | July 31, 2018 | Water Characterization Group |
| 2. Edmonton Pylypow | 12,925 square feet | June 30, 2019 | Space to support operations of AITF Industrial Sensors group |
| 3. C-FER East Pylypow | 36,650 square feet | March 31, 2019 | Engineering Consulting and Full Scale Testing for C-FER's Pipelines and Structures |

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