



Alberta  
Innovates  
Energy and  
Environment Solutions

# Annual Report

2014-2015

Alberta 

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## AI-EES Mandate

Alberta Innovates - Energy and Environment Solutions (AI-EES) is the lead agency for advancing energy and environmental technology innovation in Alberta. AI-EES serves as a catalyst for the development of innovative, integrated ways to convert Alberta's natural resources into market-ready, environmentally responsible energy and the sustainable management of Alberta's water resources.

## Vision

Alberta leads the world in developing innovative energy and environmental technologies building on our natural advantages to achieve a socially responsible, diversified and prosperous economy.

## Mission

To increase Alberta’s capacity to develop, adapt and commercialize innovative technologies that maximize the value of the province’s natural and renewable resources while protecting the environment and Alberta’s water resources.

## Values

Innovative – Entrepreneurial – Leaders – Collaborative –  
Trusting and Trustworthy – Respectful

## EXECUTIVE SUMMARY

Alberta Innovates – Energy and Environment Solutions (AI-EES) aims to strengthen Alberta’s research and innovation capacity. AI-EES’ core business is to position Alberta to achieve superior environmental performance while growing and diversifying the energy economy. The Corporation’s 2030 targets are focused on three areas:

- **Greenhouse gas (GHG) reductions:** to be achieved through energy efficiency improvements, deploying low cost CO<sub>2</sub> capture technologies, increasing renewable and low carbon emitting electrical generation options, and through our technical support of the Climate Change and Emissions Management Corporation’s (CCEMC) activities
- **Production and value added:** to be achieved through improved extraction and upgrading to increase the value of bitumen and by concentrating on game-changing waste to bio-fuels initiatives
- **Water and land:** to be achieved through the restoration and reclamation of habitat disturbed by resource development, and by providing the knowledge and innovation to realize the goals of Alberta’s Water for Life Strategy.

### Positioning for the future

Technological innovation is critical to overcoming market challenges, managing risks and growing Alberta’s and Canada’s leadership in energy, climate change, and the environment. Significant dollars are being invested annually by industry and government on environmental monitoring, research, development, and technology deployment -- mostly associated with current technologies. There is a need, however, to accelerate the pace of development and especially focus efforts on new transformational technologies.

As the lead agency for energy and environmental innovation in Alberta, the Corporation develops the right partnerships to deliver on its mandate. AI-EES has a proven history of bringing together decision makers from government and industry, as well as research and technology organizations (including Campus Alberta) to identify and address technology and innovation gaps that can manage external risks and ‘change-the-game’ for Alberta.

It is AI-EES’ role to be steps ahead of emerging issues and it is through relationships and connections with stakeholders, as well as its international technology scouting network, that the Corporation is able to identify issues that could impact Alberta’s competitiveness and reputation. This unique business model allows AI-EES to partner to develop solutions for the biggest challenges facing Alberta’s energy and environment sectors.

### Reporting on Outcomes

Each year, the Corporation evaluates its performance using the five-step ProGrid® methodology<sup>1</sup> and reports on established outcomes and performance measures. This methodology provides a way to measure assets that do not necessarily show up on a balance sheet -- the Corporation’s strategic approach, the effectiveness of staff and the management systems, effectiveness of partnerships and the ability to influence directions, and outcomes relative to the defined targets. The 2014-15 results show little change from the prior year. It is expected that as AI-EES comes closer to its targets, new investments will be required to pilot and demonstrate technology near commercial scale. The funds to invest in reducing the risk to deployment in large scale projects are not yet available.

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<sup>1</sup> Bowman, C. W. (Clem), “Intangibles, Exploring the full Depth of Issues”, Chapter 23, 2005 published by Grafiks Marketing and Communications, Sarnia, Ontario, Canada

In 2014-15, AI-EES invested a total of \$17.5 million in 89 research projects aligned to meet the goals for cleaner hydrocarbons and renewable energy, reduce greenhouse gas (GHG) emissions, and advance the management of tailings and sustainable water initiatives. In its three operating areas AI-EES fine-tuned its major and minor areas of focus based on the ever-changing challenges facing the province and Alberta Government priorities in energy and environment.

### Supporting CCEMC and the reduction of GHG emissions

AI-EES provided technical counsel, project adjudication and project management for the CCEMC within a portfolio of 76 active projects in 2014-15 (valued at over \$1.5 billion and a CCEMC commitment of \$208.6 million). The CCEMC projects cover the entire innovation chain with the GHG emission reduction conservatively estimated at about 10.7 megatonnes (MT) by 2020.

### Thought leadership

In 2014-15, AI-EES staff delivered more than 70 presentations related to innovation in energy and environment.

### Communications

AI-EES' continues to raise awareness of its priorities and outcomes as part of Alberta's innovation system. In 2014, the Corporation:

- Was named as a key technology and innovation partner in the mandate letters of three Alberta Ministries
- Hosted stakeholder engagement events targeted to unique and distinct audiences
- Launched new and well-read communication tools
- Expanded its profile through earned media coverage and grew its social media presence through an extended twitter following.

### Knowledge transfer

Sharing outcomes that can lead to the acceleration of commercialization across industry sectors is as important as innovation and advancing technology solutions. This year, steps were taken toward achieving 2014-15 business plan objectives to be a key player in the innovation network, by creating value through the improved facilitation of knowledge, intellectual property, technology and skills transfer.

### Financial performance

In 2014-15, AI-EES operated below budget on both expenditures and revenue. Expenditures were lower than planned due to delays, which are typical in the research sector. This is why AI-EES releases payments related to "milestones" as a means to ensure full project accountability. Also, revenue was lower than anticipated due to fewer hours required to support the CCEMC.

## ACCOUNTABILITY STATEMENT

Alberta Innovates – Energy and Environment Solutions’ annual report for the year ended March 31, 2015 was prepared under the Board’s direction in accordance with the Alberta Research and Innovation Regulation, and the ministerial guidelines established pursuant to the *Alberta Public Agencies Governance Act* (APAGA) – proclaimed June 12, 2013 and the *Fiscal Management Act* – proclaimed April 1, 2013. All material economic, environmental, or fiscal implications of which we are aware have been considered in the preparation of this report.

*Original signed by*

Eric Newell, Chair of the Board

June 25, 2015

## MESSAGE FROM THE BOARD CHAIR

It is my pleasure, on behalf of our Board of Directors and the team at AI-EES, to present our 2014-15 Annual Report to the Government of Alberta and people of this province.

In 2014-15, we continued to advance our mandate by bringing together decision makers from government, industry and Campus Alberta, as well as research, technology and venture capital organizations to develop solutions for a wide range of sector issues. AI-EES is well positioned to support the Government of Alberta's strategic plan and the Alberta Research and Innovation Plan, which is aimed at building a more innovative and competitive Alberta.

At AI-EES, we focus on strengthening Alberta's research and innovation capacity with the ultimate objectives of:

- Improving environmental health through integrated land use and management, and the reduction of greenhouse gas emissions
- Developing cleaner energy while reducing the environmental impacts of energy development
- Pursuing partial upgrading to make oil sands more cost competitive in international markets and eliminating the need for diluent for pipeline transportation
- Diversifying the energy economy by turning waste streams into value added products
- Better managing water resources by supporting Alberta's Water Research and Innovation Strategy.

Each year, the Corporation evaluates its performance using an established methodology (ProGrid) and reports on outcomes and performance measures. This year's results show that with additional resources AI-EES will be on track to achieve its 2030 targets. Taking innovation through to commercialization takes time; AI-EES will soon undertake a disciplined process with its partners to establish its long-term directions (i.e. 2050), showing the Corporation's 30-year planning horizon.

AI-EES' tight focus on energy and the environment and the Corporation's success bringing the right partners together to solve the biggest challenges facing the province, will continue to deliver tangible outcomes for Alberta. However, I am most proud of the fact AI-EES and CanmetENERGY led the establishment of three new national programs in the areas of partial upgrading, tailings and non-aqueous extraction. Equally noteworthy, AI-EES achieved an employee engagement score of more than 90 per cent this past year. This is an outstanding achievement and demonstrates a key reason why this Corporation has been so successful in advancing its mandate in such a short period of time.

On behalf of the Board, I am incredibly proud of all that AI-EES has achieved this past year and look forward to the year ahead.

Sincerely,

*Original signed by*

Eric Newell, Chair of the Board

June 25, 2015

## RESULTS ACHIEVED

### Based on the corporations' goals, outcomes and performance measures

To meet its goals, AI-EES is continuously improving its business processes and performance metrics. As a result, new measures have been introduced in the 2015-18 Business Plan (aligned to 2030 targets) and will be used for reporting in the next edition of the AI-EES Annual Report.

In 2014-15, AI-EES invested in several initiatives that promote partnerships and assist in addressing Alberta's key challenges and advancing its leadership in Energy and Environment:

- A total of \$17.5 million in 89 research projects aligned to meet the goals for cleaner hydrocarbons and renewable energy, reduce greenhouse gas (GHG) emissions, and advance the management of tailings and sustainable water initiatives
- The total value of these projects over their lifetime is approximately \$312.2 million, of which AI-EES will have provided \$82.9 million. This is an approximate leverage factor of 2.8
  - Energy Technologies strategic area invested \$5 million (28% of total) in 23 projects
  - Renewables and Emerging Technologies invested \$3.3 million (19% of total) in 15 projects
  - Water and Environmental Management invested \$9.3 million (53% of total) in 51 projects (this includes projects from the Water and Tailings and Alberta Water Research Initiative restricted funds)
- Worked with the Alberta Government and agencies to co-develop research projects that will inform policy and ministry strategies: AI-EES invested \$2.5 million in 15 Technology Informing Policy projects
- AI-EES supported the development of innovation capacity by investing \$7.7 million at universities (University of Alberta, University of Calgary, University of Lethbridge, University of Waterloo, University of Regina, and the Norwegian University of Science and Technology). This included funding for two Centres, 12 Chairs, and 36 individual research projects.

### Energy technologies | Highlights in 2014-15

#### Bitumen Value-Added

- AI-EES' oil sands competitiveness study Phase 2 brought together the governments of Alberta and Saskatchewan and six companies to determine the bitumen crude qualities needed in refineries in Asia, North America and Europe and evaluate technologies capable of producing these desired product qualities
- AI-EES, working with the Ministries of IAE and Energy, completed a study to screen and evaluate new modular gas-to-liquid (GTL) technologies to convert low value natural gas to high value liquid products. The study was instrumental in attracting industry participation in the Phase 2 study to evaluate and select sites and technologies and conduct preliminary technical and economic feasibility
- AI-EES originated a study conducted at the Alberta Sulfur Research Limited to examine the efficacy of visbreaking of bitumen using acidic compounds to improve its quality
- The CarbonSaver Technology pilot to produce hydrogen directly from natural gas is being tested at the Irving refinery in New Brunswick. AI-EES is supporting the project and evaluating progress for applications to field upgrading of bitumen in Alberta
- AI-EES launched research projects at Alberta universities to build a platform for future partial upgrading technologies and is supporting industrial chairs in bitumen upgrading and petroleum thermodynamics

- AI-EES is managing on behalf of the CCEMC a multimillion dollar/multiyear demonstration project of partial upgrading technology.

### Advanced Recovery

- AI-EES is partnering with industry to manage on behalf of the CCEMC, four multimillion dollar/multiyear demonstration projects involving pilots on solvent recovery and electrical heating pilots
- AI-EES encouraged growth of the Institute for Oil Sands Innovation and has embarked on an initiative to promote a new AI-EES - CanmetENERGY initiative focused on non-aqueous extraction. The first stage is to build a continuous flow pilot plant to test a hybrid solvent aqueous process developed under the AI-EES supported Industrial Research Chair in Oil Sands Engineering at the University of Alberta
- A major emphasis for AI-EES is in enhancing oil sands operations, which it fosters through support of the AACI Program, the Institute for Oil Sands Innovation and Industrial Research Chairs in reservoir geomechanics, reservoir simulation, energy and environment systems engineering and petroleum microbiology. Taken together these initiatives are transformative and will result in production operations that use much less water, consume less energy, generate lower GHG emissions and lower operating costs.

### Renewables and Emerging Technologies | Highlights in 2014-15

#### Municipal Solid Waste-to-Value-Added

- Hosted a BioProducts workshop to identify and attract the most promising bio-products technology providers (as identified by a Jacobs Consultancy study) to Alberta by engaging them with feedstock providers, oil and gas companies, and researcher providers
- To address information gaps for converting waste into valuable products:
  - Collaborated with the Tri-Municipal region (i.e. Parkland, Stony Plain and Spruce Grove) on a front-end engineering design study working towards the construction of a showcase facility for converting municipal solid waste (MSW) into valuable products
  - A unique decision-analysis model was developed in partnership with the University of Alberta to help municipalities with the siting for new landfills, as well as evaluating value-added options versus landfilling. This model could be used by the municipalities in making decisions regarding the utilization of their MSW. This study also included the assessment of the amount of MSW generated in the Province through the development of GIS maps
  - Supported a University of Calgary study regarding an advanced thermal treatment to turn MSW into liquid fuels and bio char, and integrating this with biological treatment. Such technologies could convert 80 per cent of Alberta's municipal solid waste into valuable products
  - Commissioned an Alberta biowaste inventory study to develop a comprehensive biowaste database, which will be publicly available
  - Developed an Information Management system to inform project developers about the location, technology and capacity of Alberta's biofacilities
- A discussion paper titled *Zero Organic Waste in Alberta: Policy Recommendations* was completed and shared with government departments. Its objective was to review similar policies in other jurisdictions and recommend policies for a Zero Organic Waste Innovation Strategy in Alberta. A combination of the best available technologies and policies could divert organic wastes and eventually lead to a landfill-free Alberta

- Generated scientific information of GHG generation potential of landfilled wastes to help Alberta Environment and Parks to refine its landfill gas GHG quantification protocol
- Formed a working group to develop a Bioenergy Technology Roadmap for Alberta, to identify the most relevant technology and policy-gaps that need to be addressed in order to provide a foundation for establishing a vibrant and sustainable bioenergy industry.

### **Energy Storage and Renewable Energy**

- Issued a \$2 million Call for Proposals titled “Next-Generation Energy Storage Technologies for Accelerating the Deployment of Intermittent Renewable Electricity in Alberta,” which resulted in 54 responses and approval of six novel energy storage projects
- Collaborated with AdvEn Solutions (University of Alberta spinoff) and Lockheed Martin to accelerate the commercialization of a breakthrough battery storage technology with improved performance and lower cost. This promising battery technology has applications for electricity storage, electric vehicles, and electronic devices such as mobile phones
- Invested in a solar photovoltaic research project with the University of Alberta, to develop thin, nanotech-based solar cells which can be sprayed or rolled onto a surface or even woven into fabric, making them cheaper to manufacture and making solar energy more accessible to everyone
- A CO<sub>2</sub>-enhanced geothermal study was initiated at the University of Alberta to investigate the feasibility of using carbon dioxide (instead of water) as a working fluid for making use of Alberta’s deep geothermal reservoirs. This study could lead to a field pilot that would allow Alberta to harness a greater geothermal resource for electricity generation, and sequester carbon dioxide in the process.

### **Technology Intelligence & Systems Modelling**

- A technology intelligence study on Solid Organic Waste technologies was successfully completed. Over 100 technology developers from across the world were assessed for their suitability for converting solid organic waste into valuable products. Based upon a set of key intelligence parameters, the top 5 companies best suited for Alberta feedstocks and climate were identified
- A second technology intelligence study was initiated on high-temperature steam assisted gravity drainage (SAGD) oil-water separation technologies designed to identify technologies that have the potential to treat in situ oil sands produced water at elevated temperatures (~120 Celsius) and at greater than atmospheric pressure (> 500 kPa). Such technologies would reduce heat losses currently associated with cooling the produced water to the conditions required for oil-water separation, and then re-heating the separated water to convert it into steam
- Completed modelling studies on the assessment of energy efficiency improvements options for Alberta’s residential, commercial, transportation, mining and agricultural sectors. The intent was to identify the most cost-effective options for GHG reductions. For example, in the residential sector the best options are to replace regular furnaces with high-efficiency furnaces and to improve the insulation in walls and windows
- Completed a study on the techno-economic and life cycle assessments of transportation of diluted bitumen (Dilbit) and synthetic crude oil (SCO) by rail and pipeline. Engineering based models were developed to calculate the cost and GHG footprint of the two modes. The study results are being used by the oil and gas industry and the government to make investment decisions and policy formulation.

## Water and Environmental Management | Highlights in 2014-2015:

### Water Management

- Invested in studies in South Saskatchewan River Basin management, source water protection, and water supply as a function of climate variability, which are all contributing to ensure a future water supply for a growing population and economy in Alberta. Studies were also sponsored to provide an improved understanding of urban and rural waste water treatment options, and the by-products of water disinfection processes. This will contribute to the goal of ensuring quality water supply at the community level
- Research in aquatic ecosystems (rivers, lakes, and wetlands) has supported, or is providing information for policy development to protect the health of aquatic ecosystems
- Research in groundwater quality baseline, recharge mechanism, and contamination by arsenic and pesticides research will lead to the protection of groundwater quality and sustainable use of groundwater resources
- Investments in a new Irrigation Demand Model, recycling and reuse of water from SAGD operations, and the treatment of processed water from mining operations are assisting us in achieving improvements in the conservation efficiency and productivity (CEP) of water use across the province.

### Land Restoration

- AI-EES supported new research that shows atmospheric deposition rates of metals and polycyclic aromatic hydrocarbons (potential carcinogen) in north-eastern Alberta seem to be comparable to levels detected in reference and rural settings elsewhere in the world and are lower than previously reported for the Athabasca oil sands region. However, deposition rates do increase with proximity to the oil sands mines and upgraders
- Acoustic recording devices and motion sensor cameras (innovative monitoring systems) are being tested under the Alberta Biodiversity Conservation Chair program. The research program, supported by AI-EES, is providing new insights into patterns and abundance of species in Alberta. Data from the new monitoring systems suggests some species in Alberta are not as rare as previously thought
- AI-EES support aided in the calibration and operational deployment of the state-of-the-art DiAL LIDAR unit in 2014 for monitoring GHG emissions by Environment and Parks and Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA). AI-EES is also building a portfolio of projects to enhance the scientific understanding and develop the best practices in managing atmospheric deposition, wetlands, land disturbance, ecosystem health, biodiversity conservation, environmental monitoring, and restoration ecology.

### Tailings Management

- Technologies such as in-line dewatering and electro kinetic settling are being demonstrated and will reduce and minimize the generation of mature fine tailings. These studies are at the research pilot stage and will move to actual field demonstrations in the next two years
- Research is being conducted through an NSERC industry research chair to treat tailings water for safe release into the environment. Industry development in this area has been initiated for field demonstration of the technologies.

## **GHG Management**

- Through AI-EES and the CCEMC, 10 carbon capture technologies are being developed that offer the potential to reduce carbon capture cost by 50 per cent. Four of the technologies are being tested at a field pilot stage and others at laboratory development stages
- Through CCEMC funding, AI-EES has assisted technology deployment to reduce fugitive emissions in natural gas production and improve energy efficiency. In total, emission reduction of more than 100,000 t/yr CO<sub>2</sub>e were achieved.

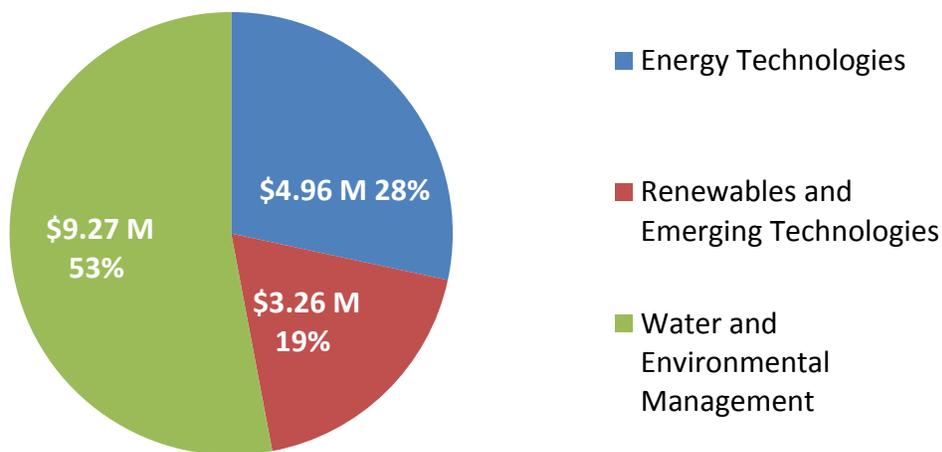
## PERFORMANCE MEASURES

### Maintaining a balanced portfolio

**Goal Statement: AI-EES maintains a balanced portfolio of projects in its three strategic areas.**

AI-EES tracks projects by strategic area to ensure that its efforts are appropriately weighted across each of the Corporation's portfolios and aligned to its major and minor focus areas. The chart below shows the Corporation's investments aligned to each strategic area this budget year. A list of projects by strategic area is provided in Appendix 2.

Figure 1: AI-EES 2014-15 investments (total \$17.5 million).



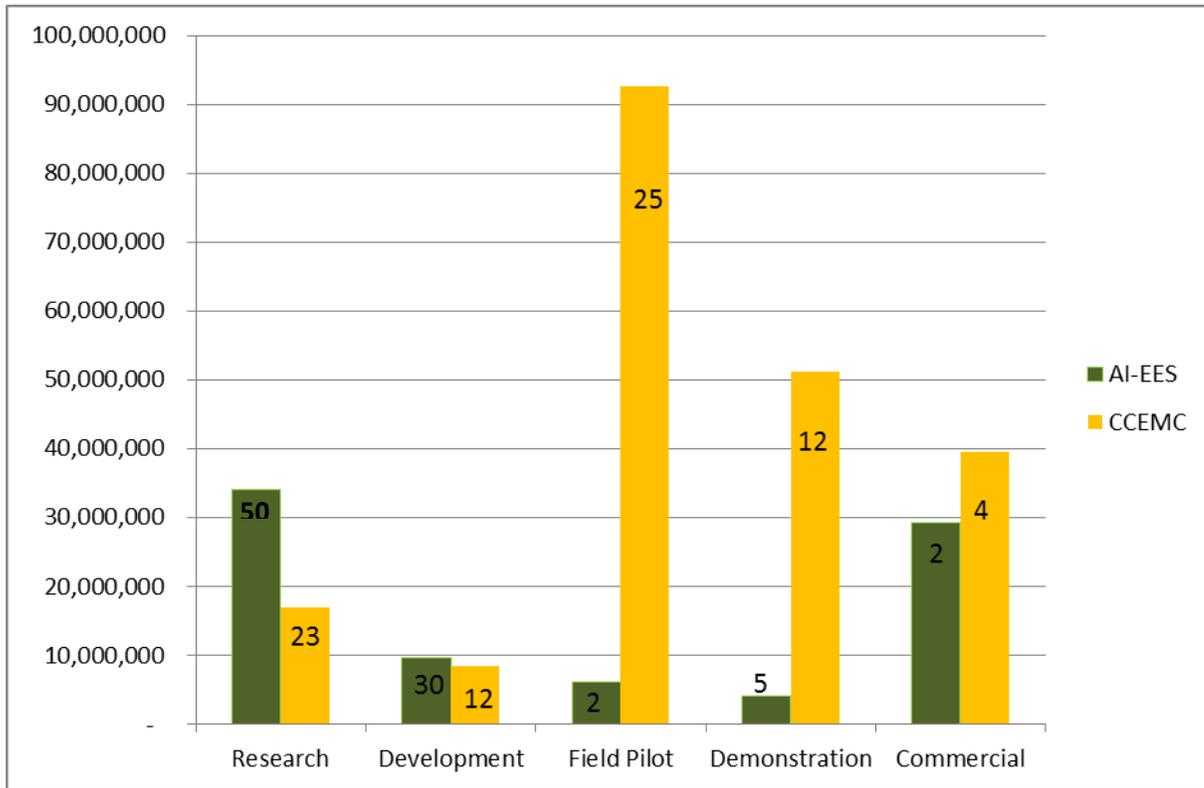
### Accelerate commercialization | Technology Readiness Levels

**Goal Statement: AI-EES invests in a portfolio of projects along the Technology Readiness Levels (TRL) scale.**

AI-EES evaluates projects and tracks their success by assessing their TRL relative to progress towards commercial applications and milestones achieved (see Figure 2). This allows AI-EES to maintain a balanced portfolio of projects along the pathway towards commercialization, keeping a number of projects entering the spectrum at the early ideas stage and developing technology transfer strategies when projects move closer to commercialization.

As of March 31, 2015, the 89 active projects in the AI-EES portfolio were analyzed and placed on the simplified TRL scale of research, development, pilot, demonstration and commercialization. AI-EES, as the project manager for projects of the CCEMC, also tracks the 76 active projects in the CCEMC's portfolio. The chart shows a balanced portfolio with AI-EES projects mostly at the earlier stages of development and CCEMC projects towards the commercialization end. Some projects originally developed with AI-EES and that fit the CCEMC mandate, have transitioned to being funded by the CCEMC to see them through the more expensive stages of pilot and demonstration.

Figure 2: Mapping AI-EES' active projects along the innovation path. Number of projects in each level is noted on the bar.



## Overall Achievement of Long Term Targets – Business Tracking

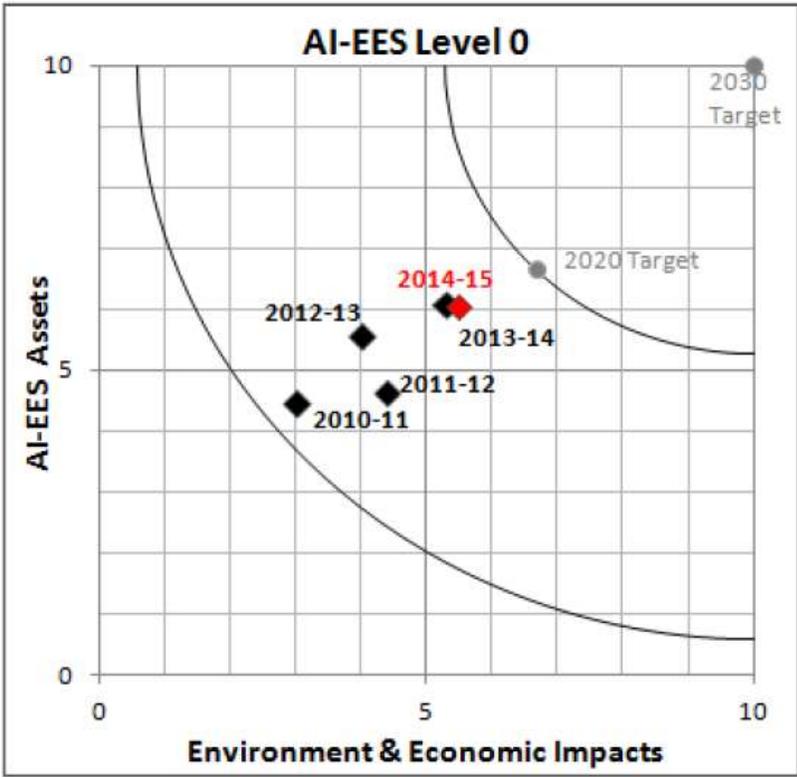
### **Goal Statement: AI-EES is working toward achieving its 2030 targets.**

AI-EES' vision is that Alberta leads the world in developing innovative energy and environmental technologies that build on the province's natural advantages. To achieve this outcome, AI-EES has established long-term targets aligned with provincial strategies. These targets ensure the Corporations' initiatives are aligned to Alberta priorities.

AI-EES uses the ProGrid methodology to measure overall progress towards its 2020 and 2030 targets. This methodology provides a way to measure assets that do not necessarily show up on a balance sheet -- the Corporation's strategic approach, the effectiveness of staff and management systems, effectiveness of partnerships, the ability to influence directions, and outcomes relative to the defined targets. In its three operating areas AI-EES fine-tuned its major and minor areas of focus based on the shift in challenges facing the province this year. Results across these areas continued to be solid in 2014-15:

- The Energy Technologies team continues to grow the strong partnerships needed to advance technology readiness for future commercial processes, and is making progress in its five specific program areas (i.e. bitumen and heavy oil; upgrading and processing; value-added products; clean carbon; and tight oil and unconventional gas) as well as addressing international pressures facing the hydrocarbons industry (i.e. market access).
- The Renewables and Emerging Technologies team has strengthened its management capacity and its response to enable renewable energy through energy storage technologies. Its waste-to-value added program made the most impact in 2014-15.
- The Water and Environmental Management team has established AI-EES as a leading agency in developing knowledge and innovation to support Alberta's *Water for Life* strategy. Its investments in integrated Land Management and Tailings Management have led to advances in fundamental understanding, monitoring methods, and reclamation technologies, all of which contributed to informing policy development. In GHG management, novel technologies are advancing to the pilot stage to reduce carbon capture cost by 50 per cent.

Progress within each strategic area is measured annually against a set of criteria. The summary grid shown below illustrates that AI-EES is making progress toward its long-term goals overall. Although progress in 2014-15 appears to have stalled, advancements are still being made in Renewables and Emerging Resources and Water and Environmental Management. Larger investments are required to move the Energy Technologies goals further to commercialization and to attainment of the 2030 targets.



# MANAGEMENT'S DISCUSSION AND ANALYSIS

## Revenue Variances

The 2014-15 Budget (\$26.3 million) was higher than the 2014-15 Actuals (\$23.5 million). Budgeted funds from Innovation and Advanced Education (IAE) were higher due to the difference in revenue recognized in relation to the Water and Tailings Grant and the Water Research Institute Grant.

Grants from other Alberta Ministries were under budget due to a delay in one project, which pushed recognition of this revenue into the future.

Revenues from the Government of Canada, licenses and investment income were higher than predicted. This included a new interchange agreement with the Government of Canada for an additional \$145,000 over budget; new licenses sold for \$260,000 that were not in the original budget; and higher cash balances in the bank resulted in higher investment income of \$705,000.

AI-EES signed an interchange agreement with the Government of Canada in January 2014 resulting in increased grants from the federal government that were not reflected in the original budget.

2014-15 Actual Revenue (\$27.2 million) was higher than 2013-14 Actual Revenue (\$23.1 million) primarily due to increases in the grants from IAE.

Revenue from the CCEMC was down in 2014-15 (\$0.9 million in 2014-15 vs \$1 million in 2013-14) compared to last year primarily due to a reduced call on AI-EES expertise. Last year, CCEMC ran their Grand Challenge, which required considerable resources from AI-EES. That same high level of activity was not required in 2014-15.

## Expenditure Variances

### Technical Support Services

In 2014-15 a major change in categorization of expenses was made. In prior years, expenses related to fee-for-service contracts that were actual research and development projects were included in the Technical Support Services category. In 2014-15 management decided to track these types of projects with other grant expenses in the strategic area (for example in Energy Technologies). Therefore, expenses in Technical Support Services will be lower than prior years and lower than budgeted.

### Research

In 2014-15, the research budget included all projects, whether they are fee-for-service contracts or research grants and contributions. In four areas, Budgets for 2014-15 were higher than Actuals (Energy Technologies, Renewable and Emerging Resources, Water and Environmental Research and Alberta Water Research Institute). In these four areas there is more discretion given to planning and budgets reflect an optimistic approach to developing good projects and getting them approved in time to make payments in the fiscal year. With respect to the Alberta Water Research Institute grants, the budget is also higher than expected due to a delay in a project. For the Water and Tailings grant, the budget is lower than actual because four projects were able to accelerate their schedules.

Actual payments on research were higher in 2014-15 than actuals last year in four areas again (Energy Technologies, Renewable and Emerging Resources, Water and Environmental Research, and Water and Tailings). Expenditures were up in Renewable and Emerging Resources due to a large payment in the waste to energy program. In the Water and Tailings strategic area, the actuals were substantially larger as two projects had million dollar payments this year over last. The AWRI research grants were lower than last year as the program is winding down and research projects are being completed.

### **Administration**

In 2014-15, the actuals exceeded the budget by over \$900,000. Manpower costs were increased due to the ratification of the union contract and the resulting raises and lump sum payments. Legal services, communications services, and IT services all were higher than budgeted. A number of legal issues surrounding contracts emerged this year; AI-EES started a new newsletter and increased its proactive communications activities; and the Corporation is leading the development of IT tools for electronic document management.

AI-EES reduced its board, travel and advertising expenses in relation to budget.

Administration expenses in 2014-15 were higher than 2013-14 by about \$256,000. The most increases were in manpower (again in relation to the union ratification); and IT costs in relation to electronic document management. The major areas where spending decreased over 2013-14 were travel, advertising and legal services.

## OPERATIONAL OVERVIEW

### Major Business Strategy support: alignment between provincial and federal strategy

In 2014-15, Dr. Eddy Isaacs was seconded part time to Natural Resources Canada CanmetENERGY, the Canadian leader in clean energy research and technology development. This relationship delivered greater synergy between Federal and Provincial research and technology in sustainable unconventional resource development and water and renewable energy (including electricity). This Agreement demonstrated the possibilities for national alignment of innovation, research and commercialization priorities and built upon the Alberta - Canada Collaboratory in Cleaner Oil Sands Development Memorandum of Understanding (MOU) announced in February, 2012. As a direct result of the collaborative work undertaken by Dr. Isaacs, work on three national programs in Partial Upgrading, Non-Aqueous Extractions and Tailings Management has started.

### Thought leadership

In 2014-15, AI-EES staff continued its contribution to global thought leadership – as they were called upon to deliver more than 70 presentations on topics ranging from innovation to sustainability in oil sands development to competitiveness strategies and energy storage solutions.

### Communications

AI-EES' continues to raise awareness of its priorities and outcomes as part of Alberta's innovation system. Through communications efforts, AI-EES aims to be seen as the credible energy and environment expert when it comes to the development and implementation of innovation and technology strategies that will lead to maximizing Alberta's resource advantage, reducing GHG emissions and promoting exceptional water management practices.

In 2014, the Corporation was named as a key technology and innovation partner in the mandate letters of three Alberta Ministries - Innovation and Advanced Education, Energy, and Environment and Parks which is evidence of the value of the work we provide to these departments. In addition to supporting awareness through thought leadership (highlighted above), the Corporation:

- Hosted its annual Technology Talks event aimed at decision makers and potential partners (more than 200 targeted attendees with 90 per cent in agreement that the format is effective, sparking ideas for future collaboration)
- Hosted major focus area workshops on flood preparedness, partial upgrading and waste-to-biosolids, seeking input to identify the most effective ways to bridge technology gaps
- Hosted a Government of Alberta Learning session targeting more than 70 staff who wanted to better understand how AI-EES is supporting provincial priorities with the aim of building stronger partnerships to achieve these goals (attendees moved from a 2.7 to a 3.7 out of 5 on "mandate knowledge" following this activity)
- Increased its profile through earned media in a range of publications, including the Edmonton Journal, the Economist, the Globe and Mail as well as hundreds of mentions in technology trade publications
- Launched an electronic and print newsletter to share the stories of energy and environment innovation across Alberta
- Earned profile through participation in a series of industry-focused, sponsored events
- Grew its social media presence through an expanded twitter following.

Internal communication efforts are focused on ensuring the AI-EES team is highly engaged in delivering on the vision and goals of the organization. In 2014, AI-EES' overall employee engagement score was over 90 per cent.

### Knowledge transfer

Sharing outcomes that can lead to the acceleration of commercialization across industry sectors is core to AI-EES' business planning. This year, steps were taken toward achieving 2014-15 business plan objectives to be a key player in the innovation network, by creating value through the improved facilitation of knowledge, intellectual property, technology and skills transfer. AI-EES has embarked on a plan to be digital by 2020 to improve business processes and allow for effective knowledge sharing and collaboration within the innovation system. Access to the Corporation's research outcomes anytime by anyone will facilitate the open innovation required to leverage past investments to advance effective technology development and generate science-based knowledge to inform policy and decisions.

### Core programs and support services

AI-EES reports to the Minister of IAE. The financial statements are prepared with the support of accounting and finance staff at IAE. AI-EES also receives support for accommodations, and computer technology through the department.

The Operations team's primary work is to support the work of AI-EES' three strategic areas. This support is provided by internal staff (knowledge management, records management, administration) and consultants (communications, legal and HR).

### Collective measures

Innovation and Advanced Education hired a consultant to work on a collective measures framework for the innovation system. Results are still pending.

### Public Interest Disclosure Act

AI-EES had no disclosures in 2014-15.

### Restricted funding

Alberta's Ministry of Innovation and Advanced Education provided a \$30 million grant initiated in 2006 in support of the Alberta Water Research Initiative (AWRI). In 2012, IAE awarded AI-EES an additional \$15 million in the area of water and tailings research. Per the grant agreements, separate annual reports will be submitted to IAE detailing the progress of the projects financed under these funds.

### Highlights for Water Research Initiative Grant:

A major project titled "South Saskatchewan River Basin (SSRB) Adaptation to Climate Variability" was completed. The project explored practical options for adapting to climate variability and change and developed increased capacity for water resource management in the SSRB. An integrated river modeling tool was developed, which can assist in informing key policy and capital decisions. Several practical and implementable solutions were developed as a result of this collaborative process to improve resilience and adapt to current and future water management challenges.

Work under this grant is winding down. The original grant has been extended to allow completion of three remaining projects by March 2017. Future work in water is continuing under the Water and Tailings grant and a new proposal for a Water Innovation Program that AI-EES is developing.

### Highlights for water and tailings:

In 2012, a competition was held by AI-EES to support the development of relevant and scientific knowledge and technologies needed to achieve safe drinking water, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy. Eighteen water research projects, with a total investment over their lifetime of \$9.2 million, are continuing in 2014-15.

Of the initial \$15.23 million grant, \$13.2 million has been allocated to 24 projects, most of which will continue into 2015-16. Projects to use the remaining funds are still under development.

### Alberta Innovates Centres of Excellence:

AI-EES also received restricted funding for the Institute for Oil Sands Innovation (IOSI - formerly known as Centre for Oil Sands Innovation) and the Canadian Centre for Clean Coal Carbon and Mineral Processing Technologies (C<sup>5</sup>MPT) at the University of Alberta. Funds were forwarded to the University. Reports from these centres are available from AI-EES upon request. In 2014-15, IOSI filed two new patents, and published 26 papers in journals. From inception in 2011 to March 2015, C<sup>5</sup>MPT has filed one patent, made presentations at 86 conferences and trained 82 Highly Qualified People.

# APPENDIX 1

## Performance Measures Methodology

### **Accelerate Commercialization**

To arrive at the number and value of AI-EES investments in projects according to the Technology Readiness Levels, the Executive Directors and their staff who understand the projects review the definitions and provide a best fit analysis for each project. These are then grouped and graphed. The CCEMC projects, which are managed by AI-EES staff, are analyzed in the same manner.

### **Overall achievement of long-term targets - business tracking: the ProGrid Methodology**

This method requires the licensing of ProGrid Software to complete the analysis. AI-EES (and its predecessors) has been using this methodology since 2003. It is a method that helps measure intangibles, whether those are research projects, business plans, commercialization potential or overall organizational performance.

In 2003, AI-EES created 2020 and 2030 targets for the organization (then known as AERI). This was done by knowledgeable staff reading and reviewing relevant government documents, strategies and policies, undertaking feasibility studies, adding external knowledge and working to create stretch targets.

Working with ProGrid consultants, AI-EES translated those targets into an Evaluation Matrix and Language Ladders, both of which are key components of the ProGrid methodology.

The Evaluation Matrix establishes the criteria to review organizational performance. This is divided into inputs, outputs and some connecting enablers. For AI-EES, the inputs for the organization are the Management Capacity, Partnerships and Finances. The outputs are the Corporation's three strategic areas of Energy Technologies, Water and Environmental Management and Renewables and Emerging Technologies. Tying these together are the enablers: the method by which AI-EES is able to implement the relevant sections of various government strategies on Energy, Water and Environment.

## APPENDIX 2

### Titles of research project by Strategic area

#### Energy Technologies

2014-15 initiatives that supported AI-EES' respective targets (amount invested in 2014-15 is shown in brackets):

20 per cent reduction in energy consumed in the production of bitumen (\$26,870)

- Simulation of Multiphase Flow in SAGD Wells and Production Systems
- Innovative Application of Electricity for Oil Sands Development.

At least 3.5 million barrels per day of heavy oil and bitumen production (\$355,143)

- NSERC Industrial Research Chair in Oil Sands Engineering (2 phases/projects)
- AACI program.

20 per cent increase in conventional oil production (\$246,000)

- Energy Efficiency Field Study; Application of Best Operating Practices in Alberta Oil and Gas Sector
- Identification of Best Energy Efficiency Opportunities in Alberta's Industrial and Agricultural Sector - Phase III
- NSERC CMG Foundation Chair Reservoir Simulation
- NSERC/Cenovus/Alberta Innovates Associate Industrial Research Chair in Energy and Environmental Systems Engineering
- NSERC/AERI Industrial Research Chair in Petroleum Thermodynamics.

Coal-fired power plants in Alberta at a natural gas equivalent (\$1,452,000)

- Modelling and Simulation Study of Underground Coal Gasification
- Canadian Clean Power Coalition Phase Five
- Canadian Center for Clean Coal Carbon and Mineral Processing Technologies
- Field Demonstration of Advanced Membranes for Syngas Cleanup and CO<sub>2</sub> Capture.

15 per cent of gas will come from non-conventional sources (\$3,123,250)

- Development of a Waste to Energy Decision Analysis Model for a Municipality in the Province of Alberta
- Determine Heating Value of Wastes
- Feasibility of Converting Municipal Solid Wastes (MSW) into Liquid Fuel using a Novel Methanolysis Process
- Lethbridge Landfill Drill Sample Methane Potential Measurements and Molecular Characterization
- Technology Opportunities in the Unconventional Duvernay Play
- An Integrated Process to Simultaneously Convert Natural Gas and Low-Cost Carbon Resources to Liquid Fuels
- NSERC Industrial Chair in Petroleum Microbiology
- An Organic Waste Inventory for Alberta
- Tight Oil Consortium
- NSERC Foundation CMG Industrial Research Chair in Reservoir Geomechanics for Unconventional Resources
- Conversion of Tri-Municipal Region Organic Waste to Bio-Energy
- Edmonton Municipal Waste Phase 3 Biowaste Demo.

At least one modular gas-to-liquid plant (\$410,277)

- Catalytic Light Olefin Upgrading - Using Natural Gas for Gasoline Quality Improvement
- CarbonSaver Field Demonstration Project
- Application of New Gas to Liquids Technologies to Reduce Emissions Phase 2.

20 per cent of in situ bitumen production is partially upgraded (\$2,252,553)

- Acid Enhanced Bitumen Visbreaking
- Opportunities to Improve the Competitiveness of Alberta's Oil Sands Products for U.S. Refineries
- NSERC NEXEN Chair in Bitumen Upgrading
- Institute for Oil Sands Innovation (formerly COSI).

### **Renewables and Emerging Technologies**

2014-15 initiatives that supported AI-EES' respective targets (amount invested in 2014-15 is shown in brackets):

20 per cent of energy is derived from renewable resources (\$360,000)

- Critical Assessment of Pembina Institute Methodology and Conclusions on Renewable Energy
- Spray on Nanoparticle Solar
- Developing Alberta's Geothermal Reservoirs with EGS-CO<sub>2</sub> Method
- Feasibility Analysis of a Geothermal Based Steam/Electricity Generation Application in Alberta
- Electrochemical Engineering Innovation by Combining iF Cathode Technology with Porous Silicon Anode Technology for Advanced Battery Commercialization.

### **Water and Environmental Management**

2014-15 initiatives that supported AI-EES' respective targets (amount invested in 2014-15 is shown in brackets):

30 per cent increase in water efficiency (\$6,087,719)

- Evaluation of Existing Legal Instruments to Promote Integrated Water Management Decision Making
- Sustainable Urban Water Management in the Context of Climate Variability and Change
- Perceptions of Water Quality among Rural Albertans and Association with Livestock
- Enhancing Accessibility and Use of Alberta's Natural Water Recreation Areas Through Prevention of Swimmer's Itch Transmission
- Towards Integrated Source Water Management in Alberta
- Economics of Adaptation to Extreme Hydrological Events
- Oil and Water: Stakeholders' Framing of Resources in Alberta's Oil Sands
- Alberta WaterPortal, Phase III
- Inside Education, Leading Edge Science in the Classroom
- Flood Indicators: Improving Forecasting in Alberta
- South Saskatchewan River Basin (SSRB) Adaptation to Climate Variability
- Baseline Isotope Geochemistry of Alberta Groundwater
- Investigation of the Occurrence of Pesticides in Groundwater of Southern Alberta
- SSRB Flood Mitigation Assessment – Bow River Basin
- Assessing the Ecological Impacts of Water Extraction on Stream Hydrology and Alberta's Fish Community Structure and Function
- Advanced Approaches to Dealing with Water Disinfection Byproducts
- Water Reuse In Alberta: Case Studies and Policy Development to Support Continuing Economic Development
- Redevelopment and Enhancement of the Irrigation Demand Model as a Tool for Basin Water Management

- Investigation of the Speciation, Toxicity, and Fate of OSPW Organic Fractions during Advanced Oxidation
- Quantifying Groundwater Recharge for Sustainable Water Resource Management
- Functional Flows: A Practical Strategy for Healthy Rivers
- Sustainable Wetland Habitat: Reclamation Targets, Design Criteria and Wetland Policy Implementation
- Predicting Alberta's Water Future
- Arsenic in Rural Alberta's Ground Water
- Assessing Water Quality, Microbial Risks and Waterborne Pathogens in Rural Alberta using a One Health Framework
- Expanding Wastewater Reuse in Alberta Through Application of a Quantitative Microbial Risk Assessment Framework
- Climate Vulnerability and Sustainable Water Management in the SSRB - Part of the Watershed Stewardship and Ecosystem Management Focus Area
- Resolving Natural and Anthropogenic Influences to Groundwater and Surface Water Environments in the Lower Athabasca Region
- IDE's Collaborative Development Program in Alberta
- Water Reuse and Management of SAGD Processed Waters.

50 per cent reduction of GHG emissions on a per equivalent barrel basis (\$191,604)

- Conceptual Engineering Study of Technologies for Reducing Solution Gas Venting in Cold Heavy Oil Production
- Membranes for CO<sub>2</sub> capture: FSC-PVAm Membrane.

100 million m<sup>3</sup> reduction from legacy mature fine tailings (\$1,969,900)

- Field Scale Demonstration of Elector Kinetic Systems (EKS)
- EKS Phase II Electro Kinetic Remediation Work Program
- High Pressure De-Oiling of SAGD Produced Water
- NSERC Industrial Research Chair in Water Quality Management for Oil Sands Extraction
- Chair Advanced Oxidation of Oil Sands Process-Affected Water - Process Fundamentals
- Oil Sands Tailings Geotechnique Chair
- InLine Dewatering of Oil Sands Tailings
- Ceramic Membrane De-Oiling and Desilication.

A new area of Integrated Land Management was formalized in mid 2014-15, including in the following projects: (\$1,016,566)

- Biological Impacts of Dilbit Spills in Freshwater Aquatic and Riparian Ecosystems – A Knowledge Synthesis and Gap Analysis
- Oil Sands Alberta Campus Project (OSCAP)
- A Comparative Toxicity Assessment of Diluted Bitumen (dilbit) to Sour and Sweet Crude Oils
- Advanced Air LiDAR
- LiDAR/Wet Areas Mapping Linear Corridors Forest Recovery Project
- The Effect of Weathering on Dilbit and Conventional Crude in Fresh Water Systems
- Creating a Predictive Eco-site Classification Platform for Alberta: Phase 1 Feasibility Assessment, Technology Development & Piloting
- Nutrient Status and Retention in Reconstructed Sandy Soils
- Alberta Applied Biodiversity Conservation Chairs
- Atmospheric Metal Deposition in Northeastern Alberta
- Atmospheric Organics Deposition in Northeastern Alberta.

**APPENDIX 3**  
Financial Statements

**ALBERTA INNOVATES – ENERGY AND ENVIRONMENT SOLUTIONS**

**FINANCIAL STATEMENTS**

**MARCH 31, 2015**

Statement of Operations

Statement of Financial Position

Statement of Cash Flows

Notes to the Financial Statements

Schedule 1 – Expenses – Detailed by Object

Schedule 2 – Salary and Benefits Disclosure

Schedule 3 – Related Party Transactions

Schedule 4 – Allocated Costs

## MANAGEMENT'S RESPONSIBILITY FOR REPORTING

Alberta Innovates – Energy and Environment Solutions' (AI-EES) management is responsible for the preparation, accuracy, objectivity and integrity of the information contained in the annual report including the financial statements, performance results and supporting management information. Systems of internal control are designed and maintained to produce reliable information that meet reporting requirements, and to ensure that transactions are executed in accordance with all relevant legislation, regulations and policies, reliable financial records are maintained, and assets are properly accounted for and safeguarded. The Annual Report has been approved by the Board of Directors and is prepared in accordance with ministerial guidelines.

The Auditor General of the Province of Alberta, the corporation's external auditor appointed under the *Auditor General Act*, performs an annual independent audit of AI-EES's financial statements in accordance with Canadian generally accepted auditing standards.

*[Original signed by Eddy Isaacs]*

Eddy Isaacs, Chief Executive Officer  
Alberta Innovates – Energy and Environment Solutions

*[Original signed by Darrell Dancause]*

Darrell Dancause – Executive Director and  
Senior Financial Officer, Corporate Services  
Innovation and Advanced Education



## Independent Auditor's Report

To the Board of Directors of Alberta Innovates—Energy and Environment Solutions

### **Report on the Financial Statements**

I have audited the accompanying financial statements of Alberta Innovates—Energy and Environment Solutions, which comprise the statement of financial position as at March 31, 2015, and the statements of operations and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

### **Management's Responsibility for the Financial Statements**

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### **Auditor's Responsibility**

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

### **Opinion**

In my opinion, the financial statements present fairly, in all material respects, the financial position of Alberta Innovates—Energy and Environment Solutions as at March 31, 2015, and the results of its operations, its remeasurement gains and losses, and its cash flows for the year then ended in accordance with Canadian public sector accounting standards.

[Original signed by Merwan N. Saher, FCA]

Auditor General

May 26, 2015

Edmonton, Alberta

**ALBERTA INNOVATES - ENERGY AND ENVIRONMENT SOLUTIONS**  
**STATEMENT OF OPERATIONS**  
**FOR THE YEAR ENDED MARCH 31, 2015**

	2015		2014
	Budget (Note 3)	Actual	Actual
	<i>(in thousands)</i>		
<b>Revenues</b>			
Government Transfers			
Government of Alberta Grants	\$ 26,260	\$ 23,494	\$ 20,309
Government of Canada Grants	-	145	36
Premiums, Fees, and Licences	-	260	-
Investment Income	400	705	568
Other Income	2,981	2,623	2,234
	<u>29,641</u>	<u>27,227</u>	<u>23,147</u>
<b>Expenses - Directly Incurred (Note 2, Schedules 1 and 4)</b>			
Energy Technologies	7,339	4,990	4,180
Renewable and Emerging Resources	6,437	3,236	538
Water and Environmental Management	4,878	2,618	2,228
Water and Tailings Research	4,194	4,964	3,403
Alberta Water Research Institute	2,316	1,684	2,595
Program Administration (Note 9)	4,213	5,143	4,887
Technical Support Services (Note 9)	4,157	1,239	2,366
	<u>33,534</u>	<u>23,874</u>	<u>20,197</u>
<b>Annual Operating Surplus (Deficit)</b>	<u>\$ (3,893)</u>	<u>\$ 3,353</u>	<u>\$ 2,950</u>
<b>Accumulated Surplus, Beginning of year</b>		<u>29,525</u>	<u>26,575</u>
<b>Accumulated Surplus, End of year</b>		<u>\$ 32,878</u>	<u>\$ 29,525</u>

The accompanying notes and schedules are part of these financial statements.

**ALBERTA INNOVATES - ENERGY AND ENVIRONMENT SOLUTIONS**  
**STATEMENT OF FINANCIAL POSITION**  
**AS AT MARCH 31, 2015**

	<b>2015</b>	<b>2014</b>
	<i>(in thousands)</i>	
<b>Assets</b>		
Cash (Note 4)	\$ 55,934	\$ 54,616
Accounts Receivable	957	1,247
Tangible Capital Assets (Note 5)	30	51
	\$ 56,921	\$ 55,914
<b>Liabilities</b>		
Accounts Payable and Accrued Liabilities	\$ 1,791	\$ 3,173
Deferred Revenue (Note 6)	22,252	23,216
	24,043	26,389
<b>Net Assets</b>		
Accumulated Operating Surplus	32,878	29,525
	\$ 56,921	\$ 55,914
Contractual Obligations (Note 8)		

The accompanying notes and schedules are part of these financial statements.

Approved by the Board of Directors

[Original signed by, Aaron Falkenberg]  


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Director

May 26, 2015  


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Date

[Original signed by, Doug Beaver]  


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Director

May 26, 2015  


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Date

**ALBERTA INNOVATES - ENERGY AND ENVIRONMENT SOLUTIONS**  
**STATEMENT OF CASH FLOWS**  
**FOR THE YEAR ENDED MARCH 31, 2015**

	<b>2015</b>	<b>2014</b>
	<i>(in thousands)</i>	
<b>Operating Transactions</b>		
Annual Operating Surplus	\$ 3,353	\$ 2,950
Non-Cash Item:		
Amortization of Tangible Capital Assets	21	21
Decrease (Increase) in Accounts Receivable	290	(684)
(Decrease) in Accounts Payable and Accrued Liabilities	(1,382)	(57)
(Decrease) Increase in Deferred Revenue	(964)	11,039
Cash Provided by Operating Transactions	1,318	13,269
<b>Increase in Cash</b>	1,318	13,269
<b>Cash, Beginning of Year</b>	54,616	41,347
<b>Cash, End of Year</b>	\$ 55,934	\$ 54,616

The accompanying notes and schedules are part of these financial statements.

**ALBERTA INNOVATES – ENERGY AND ENVIRONMENT SOLUTIONS**

**NOTES TO THE FINANCIAL STATEMENTS**

**MARCH 31, 2015**

**NOTE 1 AUTHORITY AND PURPOSE**

Alberta Innovates – Energy and Environment Solutions (the Corporation) is a Provincial Corporation, as defined in the *Financial Administration Act*, that was established on January 1, 2010 and operates under the authority of the *Alberta Research and Innovation Act*. The objectives of the Corporation are to support, for the economic and social well-being of Albertans, energy and environment research and innovation activities aligned to meet Government of Alberta priorities, including, without limitation, activities directed at the development and growth of the energy and environment sectors, the discovery of new knowledge and the application of that knowledge.

The Corporation is exempt from income taxes under the *Income Tax Act*.

**NOTE 2 SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES**

These financial statements are prepared in accordance with Canadian Public Sector Accounting Standards.

The measurement of certain assets and liabilities is contingent upon future events; therefore, the preparation of these financial statements requires the use of estimates, which may vary from actual results. Management uses judgment to determine such estimates. In management's opinion, the resulting estimates are within reasonable limits of materiality and are in accordance with the significant accounting policies summarized below.

**a) Basis of Financial Reporting**

**Revenue**

All revenues are reported on the accrual basis of accounting. Cash received for which goods or services have not been provided by year end is recorded as deferred revenue.

Government transfers

Transfers from the Government of Alberta, federal and other governments are referred to as government transfers.

Government transfers and the associated externally restricted investment income are recorded as deferred revenue if the terms for use of the transfer, or the terms along with the Corporation's actions and communications as to the use of the transfer, create a liability. These transfers are recognized as revenue as the terms are met and, when applicable, the Corporation complies with its communicated use of the transfer.

**NOTE 2**

**SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES (Cont'd)**

All other government transfers, without terms for the use of the transfer, are recorded as revenue when the transfer is authorized and the Corporation meets the eligibility criteria (if any).

Other Revenue

Other revenue includes the reimbursement of expenses from other organizations.

Royalties and licensing fees are recognized as they accrue in accordance with the relevant agreements, when an amount can be reasonably estimated, and there is reasonable assurance of collection.

Investment Income

Investment income is interest income and is recorded on the accrual basis where there is reasonable assurance as to its measurement and collection.

**Expenses**

Directly Incurred

Directly incurred expenses are costs the Corporation has primary responsibility and accountability for. In addition to program operating expenses such as salaries, supplies, etc., directly incurred expenses also include:

- amortization of tangible capital assets.
- pension costs which are the cost of employer contributions for current service of employees during the year, and
- valuation adjustments representing the change in management's estimate of future payments arising from obligations relating to vacation pay.
- patents owned by the Corporation as a result of research activity are not capitalized due to the uncertain value of the benefits which may accrue to the Corporation.

Grants are recognized as expenses when authorized, and eligibility criteria, if any, are met.

Incurred by Others

Services contributed by other entities in support of the Corporation's operations have not been recorded in the financial statements and are disclosed in Schedule 4.

**Valuation of Financial Assets and Liabilities**

The Corporation's financial assets and liabilities are generally measured as follows:

<u>Financial Statement Component</u>	<u>Measurement</u>
Cash	Amortized Cost
Accounts Receivable	Amortized Cost
Accounts Payable and Accrued Liabilities	Amortized Cost

**NOTE 2      SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES (Cont'd)**

The Corporation has no assets or liabilities in the fair value category, has not engaged in foreign currency transactions and has no remeasurement gains or losses. Consequently, no statement of remeasurement gains or loss has been provided.

**Assets**

Financial Assets

Financial assets are assets that could be used to discharge existing liabilities or finance future operations and are not for consumption in the normal course of operations. Financial assets of the Corporation are limited to financial claims, such as advances to and receivables from other organizations, employees and other individuals. Assets acquired by right are not included in these financial statements.

Tangible Capital Assets

Tangible capital assets of the Corporation are recorded at historical cost and amortized on a straight-line basis over the estimated useful lives of the assets. The threshold for capitalizing new systems development is \$250,000 and the threshold for major systems enhancements is \$100,000. The threshold for all other tangible capital assets is \$5,000.

**Liabilities**

Liabilities are recorded to the extent that they represent present obligations as a result of events and transactions occurring prior to the end of the fiscal year. The settlement of liabilities will result in sacrifice of economic benefits in the future.

**Net Assets**

Net asset represent the difference between the carrying value of assets held by the Corporation and its liabilities.

Canadian Public Sector Accounting Standards require a “net debt” presentation for the statement of financial position in the summary financial statements of governments. Net debt presentation reports the difference between financial assets and liabilities as “net debt” or “net financial assets” as an indicator of the future revenues required to pay for past transactions and events. The Corporation operates within the government reporting entity, and does not finance all its expenditures by independently raising revenues. Accordingly, these financial statements do not report a net debt indicator.

**Financial Risk Management**

The Corporation’s financial instruments include cash, accounts receivable and other assets and accounts payable and accrued liabilities. The Corporation is not involved in any hedging relationships through its operations and does not hold or use any derivative financial instruments for trading purposes.

**NOTE 2      SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND REPORTING PRACTICES (Cont'd)**

The Corporation's financial instruments are exposed to credit risk, market risk and liquidity risk.

1) **Credit Risk**

Credit risk relates to the possibility that a loss may occur from the failure of another party to perform according to the terms of a contract. The Corporation's accounts receivable are exposed to credit risk. Management manages this risk by continually monitoring the creditworthiness of counterparties and by dealing with counterparties that it believes are creditworthy.

2) **Market Risk**

Market risk is the risk of loss from unfavourable change in fair value or future cash flows of a financial instrument causing financial loss. Market risk is comprised of currency risk, interest rate risk and price risk. The Corporation's cash is exposed to interest rate risk. Management manages this risk by continually monitoring the Corporation's deposits in the Consolidated Cash Investment Trust Fund (CCITF) and their corresponding rate of return.

3) **Liquidity Risk**

Liquidity risk is the risk that the Corporation will not be able to meet its obligations as they fall due. The Corporation's accounts payable and accrued liabilities are exposed to liquidity risk. Management manages this risk by continually monitoring cash flows.

It is management's opinion that the Corporation is not exposed to significant credit risk, market risk and liquidity risk arising from its financial instruments.

**b) Future Accounting Changes**

In March 2015 the Public Sector Accounting Board issued PS 2200 – Related party disclosures and PS 3420 – Inter-entity transactions. These accounting standards are effective for fiscal years starting on or after April 1, 2017.

- PS 2200 – Related party disclosures defines a related party and identifies disclosures for related parties and related party transactions, including key management personnel and close family members.
- PS 3420 – Inter-entity transactions, establishes standards on how to account for and report transactions between public sector entities that comprise a government's reporting entity from both a provider and recipient perspective.

Management is currently assessing the impact of these standards on the financial statements.

**NOTE 3 BUDGET**  
(in thousands)

A business plan with a budget deficit of \$3,893 was approved by the Board on February 25, 2014 and the full financial plan was submitted to the Minister of Innovation and Advanced Education.

**NOTE 4 CASH**  
(in thousands)

Cash in the amount of \$55,934 (2014 - \$54,616) include deposits in the Consolidated Cash Investment Trust Fund (CCITF) of the Province of Alberta. The CCITF is administered by the Ministry of Treasury Board and Finance with the objective of providing competitive interest income to depositors while maintaining appropriate security and liquidity of depositors' capital. As at March 31, 2015, \$22,212 of the cash balance is restricted as it represents grants received that have restrictions on their use (2014 - \$23,216).

The portfolio is comprised of high-quality short-term and mid-term fixed-income securities with a maximum to maturity of three years. As at March 31, 2015, securities held by the Corporation had a time-weighted return of 1.2% per annum (2014: 1.2% per annum). Due to the short-term nature of CCITF investments, the carrying value approximates fair value.

**NOTE 5 TANGIBLE CAPITAL ASSETS**  
(in thousands)

	Equipment <sup>(1)</sup>	Computer Hardware and Software	Total	Total
	3-20 years	5 years	2015	2014
<b>Estimated Useful Life</b>				
<b>Historical Cost</b>				
Beginning of year	\$ 76	\$ 30	\$ 106	\$ 106
Additions	-	-	-	-
	<u>76</u>	<u>30</u>	<u>106</u>	<u>106</u>
<b>Accumulated Amortization</b>				
Beginning of year	49	6	55	34
Amortization expense	15	6	21	21
	<u>64</u>	<u>12</u>	<u>76</u>	<u>55</u>
<b>Net Book Value at March 31, 2015</b>	<u>\$ 12</u>	<u>\$ 18</u>	<u>\$ 30</u>	
<b>Net Book Value at March 31, 2014</b>	<u>\$ 27</u>	<u>\$ 24</u>		<u>\$ 51</u>

<sup>(1)</sup> Equipment consists of office equipment

**NOTE 6 DEFERRED REVENUE**  
(in thousands)

Deferred revenue represents unexpended, externally restricted funds.

	2015			2014	
	Water	Waste	Other	Total	Total
	Research	Mgmt			
	Fund	Tech			
Balance, Beginning of Year	\$ 11,966	\$ 9,600	\$ 1,650	\$ 23,216	\$ 12,177
Grants Received - Government of Alberta	5,730	-	1,840	7,570	16,630
Grants Received - Other	-	-	1,427	1,427	280
Interest Income	175	-	-	175	164
Recognized as Revenue:					
Interest Income	(175)	-	-	(175)	(164)
Government of Alberta Grants	(5,299)	-	(3,210)	(8,509)	(5,871)
Other Grants	-	-	(1,452)	(1,452)	-
Balance, End of Year	\$ 12,397	\$ 9,600	\$ 255	\$ 22,252	\$ 23,216

**NOTE 7 BENEFIT PLANS**  
(in thousands)

The Corporation participates in the multi-employer pension plans: Management Employees Pension Plan (MEPP), the Public Service Pension Plan (PSPP), as well as, a Supplementary Pension Plan (SRP) for Public Service Managers. The Corporation does not have sufficient plan information on MEPP, PSPP or the SRP to follow the standards for defined benefit accounting and therefore follows the standard for defined contribution accounting. Accordingly the pension expense for these pension plans is equivalent to the annual contributions of \$422 (2014 - \$375).

At December 31, 2014, the Management Employees Pension Plan reported a surplus of \$75,805 (2013 – surplus \$50,457), the Public Service Pension Plan reported a deficiency of \$803,299 (2013 – deficiency \$1,254,678) and the Supplementary Retirement Plan for Public Service Managers reported a deficiency of \$17,203 (2013 – deficiency \$12,384). The Corporation is not responsible for future funding of the plan deficit other than through contribution increases.

**NOTE 8 CONTRACTUAL OBLIGATIONS**  
(in thousands)

Contractual obligations are obligations of the Corporation to others that will become liabilities in the future when the terms of those contracts or agreements are met.

	<b>2015</b>	<b>2014 <sup>(1)</sup></b> <b>(Restated)</b>
Obligations under contracts and grants	<u>\$ 31,441</u>	<u>\$ 37,388</u>

Estimated payment requirements for each of the next five years are as follows:

	<b>Contracts</b>	<b>Grants</b>	<b>Total</b>
2015-16	\$ 2,187	\$ 16,060	\$ 18,247
2016-17	731	6,675	7,406
2017-18	16	5,547	5,563
2018-19	-	225	225
2020-21	-	-	-
Thereafter	-	-	-
	<u>\$ 2,934</u>	<u>\$ 28,507</u>	<u>\$ 31,441</u>

(1) Amount restated from \$37,028 to adjust for changes to the March 31, 2014 ending balances of 3 contracts.

**NOTE 9 RESEARCH ADMINISTRATION**  
(in thousands)

The Corporation carries out activities on behalf of Climate Change and Emissions Management Corporation (CCEMC) and invoices CCEMC directly. Revenues are recorded in Other Income and expenses are recorded in Program Administration and Technical Support Services. Amounts for CCEMC are as follows:

	<b>2015</b>	<b>2014</b>
Revenues		
Other Income	<u>\$ 872</u>	<u>\$ 1,009</u>
Expenses		
Program Administration	619	725
Technical Support Services	<u>253</u>	<u>284</u>
	<u>\$ 872</u>	<u>\$ 1,009</u>

**NOTE 10 APPROVAL OF FINANCIAL STATEMENTS**

These financial statements were approved by the Board of Directors.

**ALBERTA INNOVATES - ENERGY AND ENVIRONMENT SOLUTIONS**  
**SCHEDULES TO THE FINANCIAL STATEMENTS**  
**FOR THE YEAR ENDED MARCH 31, 2015**

**Schedule 1 - Expenses Directly Incurred by Object**

	<b>2015</b>		<b>2014</b>
	<b>Budget</b>	<b>Actual</b>	<b>Actual</b>
	<i>(in thousands)</i>		
Grants	\$ 25,064	\$ 16,733	\$ 12,396
Supplies and Services	4,950	3,429	4,419
Salaries, Wages & Employee Benefits	3,510	3,679	3,310
Amortization of Tangible Capital Assets	10	21	21
Financial Transactions and Other	-	12	51
	<b>\$ 33,534</b>	<b>\$ 23,874</b>	<b>\$ 20,197</b>

**Schedule 2 - Salary & Benefits Disclosure**

Year ended March 31, 2015

*(In Thousands)*

	2015			2014	
	Base Salary <sup>(1)</sup>	Other Cash Benefits <sup>(2)</sup>	Other Non- Cash Benefits <sup>(3)</sup>	Total	Total
	(in thousands)				
Chairman of the Board	\$ -	\$ 5	\$ -	\$ 5	\$ 4
Board Members	-	37	1	38	33
Chief Executive Officer	271	76	13	360	347
Executives:					
Executive Director, Energy Technologies	171	2	50	223	214
Executive Director, Renewable and Emerging Resources	172	2	46	220	212
Executive Director, Water Resources and Environmental Management	193	2	52	247	233
Director, Strategic Planning and Operations	131	2	41	174	161

(1) Base salary includes regular salary.

(2) Other cash benefits include honoraria for Board Members, car allowance and direct payments in lieu of pension payments for the Chief Executive Officer, and lump sum payments. No bonuses were paid in 2014 or 2015.

(3) Other non-cash benefits include employee benefits and contributions or payments made on behalf of employees including pension and supplementary retirement plan, health care, dental coverage, group life insurance, short and long term disability plans, Workers Compensation Board premiums, accommodations, learning account items, health spending account items and professional memberships.

### Schedule 3 - Related Party Transactions

Year ended March 31, 2015

Related parties are those entities consolidated or accounted for on a modified equity basis in the Government of Alberta's financial statements.

Entities in the Ministry refers to entities consolidated in the Ministry of Innovation and Advanced Education. Other entities outside of the Ministry relates to the remaining entities consolidated at the Provincial level.

Alberta Innovates - Energy and Environment Solutions had the following transactions with related parties recorded in the Statements of Operations and the Statements of Financial Position at the amount of consideration agreed upon between the related parties:

	Entities in the Ministry		Other Entities Outside of the Ministry	
	2015	2014	2015	2014
	<i>(in thousands)</i>			
<b>Revenues</b>				
Grants	\$ 23,454	\$ 20,256	\$ 40	\$ 53
Other	-	72	-	-
	<u>\$ 23,454</u>	<u>\$ 20,328</u>	<u>\$ 40</u>	<u>\$ 53</u>
<b>Expenses – Directly Incurred</b>				
Grants	\$ 7,660	\$ 5,807	\$ 57	\$ -
Other Services	361	382	4	3
	<u>\$ 8,021</u>	<u>\$ 6,189</u>	<u>\$ 61</u>	<u>\$ 3</u>
<b>Payables to</b>	<u>\$ 581</u>	<u>\$ 1,715</u>	<u>\$ -</u>	<u>\$ -</u>
<b>Deferred Revenue</b>	<u>\$ 12,397</u>	<u>\$ 13,296</u>	<u>\$ 9,600</u>	<u>\$ 9,640</u>
<b>Contractual Obligations</b>	<u>\$ 8,237</u>	<u>\$ 11,863</u>	<u>\$ 43</u>	<u>\$ -</u>

The above transactions do not include support service arrangement transactions disclosed below.

The Corporation also had the following transactions with related parties for which no consideration was exchanged. The amounts for these related party transactions are estimated based on the costs incurred by the service provider to provide the service. These amounts are not recorded in the financial statements.

Accommodation expenses incurred by others are disclosed in Schedule 4.

	Other Entities Outside of the Ministry	
	2015	2014
	<i>(in thousands)</i>	
<b>Expenses – Incurred by Others</b>		
Accommodation <sup>(1)</sup>	\$ 318	\$ 320

- (1) The Corporation's share of accommodation costs is based on the proportion of space occupied compared to the total space occupied by all Ministries.

**Schedule 4 - Allocated Costs**

Year ended March 31, 2015

*(In Thousands)*

Program	2015		2014	
	Expenses <sup>(1)</sup>	Accommodation Costs	Expenses incurred by others <sup>(2)</sup>	Total Expenses
	<i>(in thousands)</i>			
Energy Technologies	\$ 4,990	\$ -	\$ 4,990	\$ 4,180
Renewable and Emerging Resources	3,236	-	3,236	538
Water and Environmental Management	2,618	-	2,618	2,228
Water and Tailings Research	4,964	-	4,964	3,403
Alberta Water Research Institute	1,684	-	1,684	2,595
Program Administration	5,143	318	5,461	5,207
Technical Support	1,239	-	1,239	2,366
	<u>\$ 23,874</u>	<u>\$ 318</u>	<u>\$ 24,192</u>	<u>\$ 20,517</u>

(1) Expenses – Directly Incurred as per Statements of Operations.

(2) The Corporation receives financial processing and reporting services from the Department of Innovation and Advanced Education at no cost. The dollar value of these services cannot be accurately determined.

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