

Bioenergy Clusters Project Report

**Prepared for the
Agri-Environmental Partnership of Alberta**

August 2009

Executive Summary

The Agri-Environmental Partnership of Alberta's (AEPA) vision is Alberta's agriculture industry is profitable, accountable and recognized for its proactive, responsible environmental stewardship. To help achieve this vision, AEPA recognizes policy enhancements may be required to allow the agriculture industry, rural communities, municipalities, forestry and the public to benefit from bioenergy clusters.

Bioenergy clusters are bioenergy producing facilities that have multiple feedstocks and/or several energy outputs, as well as being mutually beneficial to partners such as a reduction of costs or an increase of investment opportunities.

AEPA's Bioenergy Clusters Project Team worked towards their strategic goal to develop a policy framework that would create an environment for Alberta to be recognized as the leader in North America for producing green energy through a viable, rural community-based, bioenergy industry.

The objectives of the Project Team were:

- To align regulations and policies that will allow for bioenergy clusters development to occur in a systematic and timely manner;
- Encourage the production and use of green energy through Market Based Instruments and Incentives;
- Increase awareness of bioenergy clusters and integrated facilities to community stakeholders;
- Enhance social-political-economic benefits through green energy production;
- Ensure recommendations clearly identify how production of green energy through bioenergy clusters will reduce environmental impact and contributes to the greening of Alberta.

Various key tasks and actions were completed during the Project Team's process to help achieve the stated goal and objectives;

1. Expanded on the industry-supported recommendations to the *Nine-Point Bioenergy Plan* forwarded to the Minister of Energy in fall 2008:
 - AEPA was a consulted stakeholder group for the development of the regulations for the Renewable Fuel Standard (RFS);
 - Provided recommendations to Alberta Energy into key priority areas as identified by the Provincial Energy Strategy;
 - Recommended to Alberta Energy a 'One Stop Shop' renewable energy website;
 - Recommended to Alberta Environment that the board managing the Climate Change and Emissions Management Fund have agriculture interest represented;
 - Developed a discussion document supporting loan guarantees with Agriculture Financial Services Corporation (AFSC) to promote and establish bioenergy clusters.
2. Identified and evaluated the current state of policy in Alberta for potential streamlining.
3. Conducted on-going investigation of frameworks and operating models in other jurisdictions.
4. Communicated and shared information with other bioenergy focused groups.
5. Recommended to the Institute for Agriculture, Forestry and the Environment (IAFE) they consider how renewable energy production would use market based instruments ('Greening the Grid'). IAFE also to consider how production of green energy would improve competitiveness and environmental performance of the forestry and agriculture sectors, as well as identify business models that support integrated infrastructures and identify gaps in tools required to achieve success.

The AEPA Board has concluded the work of the Bioenergy Clusters Project Team and will revisit the topic of bioenergy clusters in 2010 to determine if particular policy issues need to be addressed. They will monitor the bioenergy industry in the province as it evolves during that time.

Table of Contents

1. Introduction	4
2. Process	5
3. Key Findings	6
3.1 Provincial Energy Strategy	6
3.2 Industry Information	6
3.2.1 Forestry	6
3.2.2 Agriculture	7
3.3 The Alberta Research and Innovation Act	7
3.4 Renewable Energy Alternatives Project (REAP)	8
4. Completed Tasks and Actions.....	9
5. Conclusion	10
APPENDIX A: Bioenergy Clusters Project Team	12
APPENDIX B: Sources of Information – Experts, Documents, Presentations and Websites	13
APPENDIX C: AEPA Bioenergy Policy Recommendations to the Government of Alberta (GoA)	15

1. Introduction

Alberta has an abundance of relatively inexpensive feedstocks to supply a bioenergy industry with the potential to achieve significant economic, environmental and social outcomes for rural communities. Production of bioenergy through utilization of source materials such as manure, municipal waste and forestry byproducts/waste, offers a tremendous opportunity for Alberta.

Trends have indicated opportunities exist to move bioenergy forward as a means to create and capture value for rural communities, agriculture, and forestry such as:

- Growing interest by the public and government in "greening Alberta's energy supply". Bioenergy utilizes waste materials from livestock, grain, processing, municipalities, and forestry, creating energy and reducing releases to the environment;
- Growing pressures to improve utilization of livestock manure due to increased interest in improved nutrient management to reduce nutrient transfer to the environment; and
- A need to manage costs (such as energy costs) and create new profit centers on farms, preferably integrated with the core farming and/or community activities.

A 'bioenergy cluster' for the purpose of this Project Team is defined as a bioenergy producing facility that has multiple feedstocks and/or several energy outputs, as well as being mutually beneficial to partners such as a reduction of costs or an increase of investment opportunities.

In countries outside of Canada, such as Denmark and Germany, there are various examples of bioenergy production in clusters to produce green energy. In Canada, the realization of the potential of bioenergy is dependent upon reliable technologies, co-digestion of manure with other feedstocks to increase efficiency, regulatory streamlining; labor/technical infrastructure supports, and effective policies to enable successful commercialization.

To encourage growth of a sustainable bioenergy industry in Alberta, the provincial government initiated the *Nine-Point Bioenergy Plan* to stimulate bioenergy development (ethanol, biodiesel, biogas). Originally announced October 2006 and reviewed in 2008, the plan provides grants to developers for infrastructure and market development under the following programs; Commercialization/Market Development Program, Bioenergy Infrastructure Development Grant Program, and the Renewable Energy Producer Credit Program.

Even though grants are available for bioenergy development in the province, policy enhancements may be required to allow the agriculture industry, rural communities, municipalities, forestry and the public to benefit from bioenergy clusters. Policy that recognizes quantification and value creation from all by-products of digestion (methane, nutrient management, GHG reductions, water management, odor reduction) and capitalizes on integration opportunities such as co-digestion, forestry byproducts, and rural/urban/industrial sources.

The Agri-Environmental Partnership of Alberta (AEPA) initiated a Project Team (Appendix A) to consider the opportunities and components of a policy framework that would create an environment for Alberta to be recognized as the leader in North America for producing green energy through a viable, rural community-based, bioenergy industry.

The objectives of the Project Team were:

- To align regulations and policies that will allow for bioenergy cluster development to occur in a systematic and timely manner;
- Encourage the production and use of green energy through Market Based Instruments and Incentives;
- Increase awareness of bioenergy clusters and integrated facilities to community stakeholders;
- Enhance social-political-economic benefits through green energy production;
- Ensure recommendations clearly identify how production of green energy through bioenergy clusters will reduce environmental impact and contributes to the greening of Alberta.

A policy framework tests processes and incentives that build on the strength of integrated sites and take advantage of all the potential benefits of bioenergy production. Components that require further investigation included:

- Regulatory alignment to allow development to occur in a systematic, timely manner. This includes such things as permitting of operations, and ensuring small producers of electricity have the ability to access the grid;
- Producer based incentives such as carbon-offset protocols for bioenergy to support greenhouse gas reductions for emitters, and technology investment support;
- Enhanced lending frameworks to manage access to capital (ie. enhancing access to capital for bioenergy generation for communities and producers through AFSC);
- Community approach that focuses on clusters of local stakeholders to maximize opportunities. It is necessary to bring forestry, urban, and municipal stakeholders into initiatives to increase co-digestion (improve methane yields), increase access to energy users, and enhance socio-political benefits;
- How the production of green energy through bioenergy clusters reduces environmental impact and contributes to the greening of Alberta;
- How renewable energy production connects to market based instruments (through the Institute for Agriculture, Forestry and the Environment);
- Other bioenergy policy issues include; "Food versus Fuel", Bioenergy Sustainability, Renewable Fuel Standards (RFS), Program Support, and Barriers to Investment.

2. Process

In order to achieve their strategic goal, the Project Team went through a process of assessment and investigation of issues relating to bioenergy in Alberta. In various face-to-face meetings and conference calls, the Project Team gathered and examined information on various bioenergy topics, and heard presentations and updates from various experts (Appendix B).

2.1 Feedback to the Government of Alberta's *Nine Point Bioenergy Plan*

Early in the process, Alberta Energy identified an opportunity for the AEPA to provide agriculture industry feedback to the Government of Alberta's *Nine-Point Bioenergy Plan* as part of the program review. The AEPA members consulted and collected feedback at an industry workshop attended by key stakeholders from the agriculture industry, various governments, and public stakeholders.

Consensus recommendations were forwarded to the Honorable Mel Knight, Minister of Energy, as well as the Honourable George Groeneweld, Minister of Agriculture and Rural Development, and the Honourable Rob Renner, Minister of Environment (Appendix C).

In November 2008, representatives of the AEPA met with Minister Knight to discuss the recommendations. He encouraged the AEPA to more clearly demonstrate how the recommendations were connected to energy production, and how they would reduce environmental impacts and contribute to the greening of Alberta. He was very supportive of integrated solutions to address issues and opportunities.

In response to the feedback from the Minister of Energy, the strategic intent and tasks of Project Team were expanded to include the Minister's comments; provide recommendations on connecting to green energy production, reduction of environmental impacts and contributions to greening Alberta. The focus of the Project Team expanded to bioenergy, with acknowledgement and consideration on how renewable energy such as wind or solar may connect to a cluster. Opportunities to connect to the Institute for Agriculture, Forestry and Environment, specifically in areas of market-based instruments, were also to be explored.

3. Key Findings

3.1 Provincial Energy Strategy

The Provincial Energy Strategy was announced December 11, 2008, which identified clean energy production as an outcome, including energy from renewable energy sources.

It recognized Alberta has a rich endowment of renewable energy resources that will play an increasingly important role in the energy future. Agricultural products, forestry waste products were identified, as were wind, solar, biomass, and geothermal as sources of renewable energy.

Under the new strategy, the Renewable Fuel Standard (RFS) was announced, with the addition of a government requirement to blend either ethanol or biodiesel into commercial fuels. In Alberta, the RFS will apply to transportation fuels and will require five per cent ethanol content in gasoline and two per cent renewable content in diesel. RFS will be implemented July 2010 with draft regulations due summer 2009. It will be a phase-in process, with the possibility of importing product if the supply in Alberta is not initially available.

The Bioenergy Program Amendment was also announced with the Provincial Energy Strategy, which amended the *Nine-Point Bioenergy Plan* originally announced October 2006. The program focuses on stimulating and supporting bioenergy investment in the province. To date, over \$100 million has been utilized in the Biorefining Commercialization and Market Development Program and the Bioenergy Infrastructure Development Program. The deadline for both programs has been extended to 2011. The Bioenergy Producer Credit Program is still in effect. 'Phase 2' funding has been implemented which raises the \$5 million limit based on a recalculated formula.

Alberta Energy has developed a new guideline acknowledging bioenergy clusters for their funding programs. This increases potential funding as clusters will be broken down into the individual components.

Key eligibility determinants for bioenergy clusters. Clusters must:

- Have a geographically-bounded concentration;
- Include multiple energy outputs (e.g. electricity, biofuels, etc);
- Provide quantifiable carbon reduction and environmental efficiencies;
- Include transfer of energy between components;
- Each component must have its own technology and intellectual property that is capable of functioning separately and independently of other components within the cluster.

3.2 Industry Information

3.2.1 Forestry

The forestry industry in Alberta is moving forward with bioenergy production in various areas in the province, with most companies with projects in at least the planning phase.

Wood biomass conversion projects are already developed including four bioenergy plants (Drayton Valley, Whitecourt, Grande Prairie, and Dapp), with others under development using various technologies, including a number of gasification projects. The majority of companies in the forestry industry are currently working with partners and are pursuing other partnerships on projects.

A bioenergy cluster is currently being developed in Drayton Valley with numerous industry partners called the 'Bio-Mile Industrial Park'. The first phase is a research and development commercial scale fibremat plant which will research the use of biomass feedstocks including trees, hay, silage, crop residue, animal wastes, municipal solid waste, and algae to produce bioproducts such as flooring, insulation, construction materials, and automobile interior parts. Other facilities are being planned by industry partners for future phases, including the commercialization of various technologies for bioenergy and biochemical production.

There are potential opportunities to support the forestry industry for bioenergy production:

- Develop business models to support integrated infrastructures, to increase the sharing of resources to create greater efficiencies where feasible (industrial centers). This would include water, gas, sewage, transportation, distribution, feedstock supply, etc.;
- Assist in market development to create sustainable businesses.

There is also potential for the forestry industry to integrate with agriculture and municipalities with the utilization of "plastic wood" (using extracted lignin). There may also be future need for a sustainable source of feedstock for forestry, and agriculture could provide this source with chaff and straw (pelleted to transport further distances).

3.2.2 Agriculture

The agriculture industry has been interested in bioenergy for many years, with the potential for organic wastes and by products in the form of manure, crops, crop residues, processing waste and animal remains, to provide a consistent feed stock supply to bioenergy processing facilities.

In Alberta approximately 19 facilities are currently proposed, six facilities are under construction, and seven facilities are in operation around the province. Most of the existing facilities are biogas, with many facilities under construction or proposed either for biodiesel or ethanol production. Comparably, fewer combined heat and power facilities are in operation or in the planning or construction phase.

As with the forestry industry, many of the bioenergy facilities have received a portion of their funding through the *Nine Point Bioenergy Plan*, with the majority of the funding provided by private companies and individual investors. Even with the increased interest in renewable energy production by consumers, the downturn of the global economy has caused some private funding sources to decrease investment in the short term.

As previously noted, there is potential to integrate infrastructures between agriculture, forestry and municipalities to increase the sharing of resources to create greater efficiencies where feasible. The creation of industrial centres in bioenergy clusters would help reduce costs such as; facility establishment, infrastructure, transportation and operation.

Even though agriculture has significant potential to provide organic waste streams for bioenergy production, not all sources are available for further processing in significant volumes such as crops and crop residues, as some sources are used as cattle feed, bedding and soil conditioners to minimize wind erosion. This competing use for feedstock, as well as for agricultural land for production, has caused concern for livestock producers due to the potential increase in feed values, and the increase in forage land taken out of production to grow annual crops.

3.3 The Alberta Research and Innovation Act

The purpose of the Act is to promote and provide for strategic and effective use of funding and other resources to meet the research and innovation priorities of the Government of Alberta (GoA). This includes fostering the development and growth of new and existing industries, such as bioenergy, and supporting a balanced long-term program of research and innovation. This legislation is intended to streamline capacity around research, increase alignment, responsiveness, accountability and competitiveness.

The new framework intends to make the research and innovation system less complex, more consolidated, with less overlap and stronger links between the players. Roles will be more clearly defined, and support and information services for participants will be more easily accessed.

It restructures provincial funding from 10 entities into five, reducing complexities, focusing on the government's strategic priorities, and combining capacity in the province to stimulate innovation.

The Alberta Research and Innovation Act will enable the GoA to create one new advisory body and four new, board-governed provincial corporations by transitioning the following existing organizations:

- Alberta Science and Research Authority;
- AET's five research institutes: Energy, Life Sciences, Agriculture, Forestry, and Information and Communications Technology (ICT);
- Alberta Heritage Foundation for Science and Engineering Research (operating as Alberta Ingenuity);
- Alberta Heritage Foundation for Medical Research (AHFMR);
- Alberta Research Council Inc. (a provincial corporation owned by the Crown);
- iCORE Inc. (a provincial corporation owned by the Crown).

The new entities are focused on bioindustries (agriculture, forestry, life sciences), energy and environment, health and bringing new technology to market.

The Alberta Research and Innovation Authority will provide advice and recommendations to the Minister of Advanced Education and Technology to support government decisions and directions. It would monitor the performance of the overall system.

The Act was passed through the Alberta legislature session this spring and received Royal Assent on June 4, 2009. The new entities will be created by regulations. The intent is to proclaim the Act and the regulations into force later this year. The new provincial corporations would then become operational, and the existing organizations would conclude their operations.

3.4 Renewable Energy Alternatives Project (REAP)

Led by Alberta Association of Agricultural Societies (AAAS), the REAP will explore the development of renewable energy in rural areas for electric power generation, with the intent to positively affect regional economic development and diversification by generating wealth and sustainability.

Project Objectives:

- The spreading of high-level renewable energy technology in rural areas and boosting rural economy and sustainability;
- Advance the development and viable implementation of alternative energy sources, which will ensure Alberta's long-term energy security;
- Provide vital alternative sources of income for agriculture, municipal and regional districts;
- Develop a business model, which can be replicated in rural communities across the province, nationally and internationally;
- Stimulate research and interest in "Alberta made" cutting edge alternative energy products and processes.

The intent of AAAS is to compile and utilize existing maps, research, technologies and experts in the field to develop and complete a working business model. The bioenergy cluster(s) will be owned and operated by a not-for-profit organization in a region in rural Alberta.

Location requirements will be identified as being essential in order to support the cluster, such as access to grid, feedstock availability, and regional development opportunities. Impact on strengthening the economy in a rural area will also be considered to determine the best location for the pilot plant. The intent is to ultimately establish 10 -12 bioenergy cluster sites around the province.

Based on the research information collected, the completed model will be transferable to other regions in the province (and potentially further) with the success of the pilot potentially motivating subsequent facilities to further populate other rural regions.

The AAAS is currently applying for funding to move the project forward, and will be informed of funding status in fall 2009.

4. Completed Tasks and Actions

Opportunities to provide input into existing processes became available as the Project Team worked through information and issues relating to bioenergy production in the province. The following tasks and actions were identified, moved forward and completed.

1. Expanded on the industry-supported recommendations to the *Nine-Point Bioenergy Plan* forwarded to the Minister of Energy in fall 2008:
 - AEPA was a consulted stakeholder group for the development of the regulations for the RFS. As a stakeholder, AEPA received information during the development process and attended stakeholder meetings as an agriculture industry representative.
 - Provided recommendations to Alberta Energy into key priority areas as identified by the Provincial Energy Strategy:
 - The Government of Alberta (GoA) develop a policy for upgrading power systems for renewable and specify “renewable zones”;
 - The GoA develop a map with multiple layers of information which identifies ideal locations for bioenergy clusters to be established;
 - The GoA develop 4 new commercial clusters, perhaps: 1 agriculture, 1 industrial, 1 forestry, 1 urban and;
 - The GoA create a clean energy centre, focusing on renewable energy production.
 - Recommended to Alberta Energy a ‘One Stop Shop’ renewable energy website. The website would provide information resources for bioenergy development, as well as staff contact information from various Ministries to simplify the information gathering process for developers. It could also be a key communication piece for the RFS in Alberta.
 - Recommended to Alberta Environment that the board managing the Climate Change and Emissions Management Fund have agriculture interest represented. This representation would ensure agriculture is not overlooked as a potential contributor to solving the issue of greenhouse gas emissions. Discussion with Alberta Environment representatives indicated the Board of Directors will be comprised of contributors to the fund as well as government and academia. Recent announcement of the Board members include an agriculture producer, although not representing agriculture. Agriculture applications will be considered if the case for reduction of greenhouse gas emissions can be made.
 - Developed a discussion document supporting loan guarantees with Agriculture Financial Services Corporation (AFSC) to promote and establish bioenergy clusters. AEPA established an objective as part of their Strategic Plan 2009-2012 to address policy and programs that should be aligned and integrated with environmental outcomes.
2. Identified and evaluated the current state of policy in Alberta for potential streamlining. GoA departments involved with bioenergy development regularly work with bioenergy related policy. These departments were members of the Bioenergy Clusters Project Team, including Agriculture and Rural Development, Alberta Energy, Alberta Environment, and Alberta Sustainable Resource Development, who contributed feedback regarding the issue.
3. Conducted on-going investigation of frameworks and operating models in other jurisdictions. GoA departments involved with bioenergy development regularly conduct bioenergy scans including frameworks and operating models. These departments were members of the Bioenergy Clusters Project Team, including Agriculture and Rural Development, Alberta Energy, Alberta Environment, and Alberta Sustainable Resource Development.

4. Communicated and shared information with other bioenergy focused groups:
 - The consultant working with the Alberta Association of Agricultural Societies' (AAAS) Renewable Energy Alternatives Project was in contact with Bioenergy Clusters Project Team members for additional information. Contact was also made with the AAAS Executive Director regarding project status.
 - The Senior Development Officer with Agriculture and Rural Development, worked closely with the AAAS in the development of the proposal, and was a member of the Bioenergy Clusters Project Team.
5. Recommended to the Institute for Agriculture, Forestry and the Environment (IAFE) they consider how renewable energy production would use market based instruments ('Greening the Grid'). IAFE also to consider how production of green energy would improve competitiveness and environmental performance of the forestry and agriculture sectors, as well as identify business models that support integrated infrastructures and identify gaps in tools required to achieve success.
This work may include:
 - Exploring and identifying opportunities for market based instruments in Alberta, including renewable energy production.
 - IAFE initiated research on 'The Role of Energy in Greening Alberta's Forestry and Agriculture Sector'. The first phase will focus on research that helps to identify challenges and opportunities in greening Alberta's forestry and agriculture sectors through energy. The second phase involves a more in-depth exploration of those opportunities and challenges identified, including jurisdictional scans and comparison and analysis of supportive policies and policy frameworks. Information gathered by the Bioenergy Clusters Project team was forwarded to the IAFE to assist in this research.

In order for the Bioenergy Clusters Project Team to take the next steps to develop policy recommendations to promote and enable bioenergy clusters to further develop in the province, consultation with the forestry, agriculture and bioenergy industries, as well as municipalities is required to accomplish various tasks and to identify key policy issues.

The AEPA Board acknowledges the importance of bioenergy, however at this time they have agreed to conclude the work of the Project Team and revisit the topic of bioenergy clusters in 2010 to determine if particular policy issues need to be addressed.

During this time, they will continue to monitor the bioenergy industry as it evolves in the province, in light of U.S. Environmental Policy development, Alberta's Provincial Energy Strategy, the global economic situation, environmental concerns, as well development of other provincial focused initiatives, in particular REAP and the work of the IAFE (to be complete March 2010).

5. Conclusion

Trends have indicated opportunities exist to move bioenergy forward as a means to create and capture value for rural communities, agriculture, and forestry. Bioenergy clusters not only create greater efficiencies by integrating facilities, but have the potential to create significant economic, environmental and social outcomes.

The AEPA recognizes the need for policy enhancements that may be required to allow the agriculture industry, rural communities, municipalities, forestry and the public to benefit from bioenergy clusters. Through a process of gathering information, assessment and investigation of issues relating to bioenergy in Alberta, the Bioenergy Clusters Project Team identified various key tasks and actions which would help achieve the Project Team's goal and objectives. Most were completed or acted upon, with the exception of the consultation with the forestry, agriculture and bioenergy industries, and municipalities to identify key policy issues.

The AEPA Board has concluded the work of the Project Team and will revisit the topic of bioenergy clusters in 2010 to determine if particular policy issues need to be addressed. They will monitor the bioenergy industry in the province as it evolves during that time.

Even though not all the objectives of the Bioenergy Clusters Project Team were met, the information gathered and connections developed between stakeholders in agriculture, forestry, bioenergy, and municipalities throughout the process was very valuable. Awareness and understanding was created of issues and partners involved in renewable energy production. Future actions of the AEPA regarding bioenergy clusters will benefit from the work of the Project Team.

APPENDIX A: Bioenergy Clusters Project Team

Team Members:

Rick Atkins	Alberta Agriculture and Rural Development
Donna Chaw	Alberta Environment
Jennifer Jabs	Alberta Energy
Jim Jones	Alberta Agriculture and Rural Development
Mike Kotelko	Alberta Cattle Feeders
Stuart McKie	Alberta Pork
Mahendran Navaratnasamy	Alberta Agriculture and Rural Development
Reimer Poth	Red Deer County
Jurgen Preugschas (chair)	Alberta Pork
John Richter	Alberta Egg Producers

Project Manager:

Janet Dietrich	Alberta Agriculture and Rural Development
----------------	---

APPENDIX B: Sources of Information – Experts, Documents, Presentations and Websites

Experts:

Agriculture: Jim Jones, Senior Development Officer, Biogas – Alberta Agriculture and Rural Development
Energy: Jennifer Jabs, Senior Economist – Alberta Energy
Forestry: Dave Patterson, Bioproducts Specialist - Sustainable Resource Development

Documents and Presentations:

- AEPA Bioenergy Policy Direction & Recommendations to the Government of Alberta
- Alberta Agriculture Growth Strategy - Biogas (methane) Overview
- Alberta Community Wood Energy Demonstration Project - The Installation Of a Wood Biomass Heating System In the Camrose County Office Complex
- An Information Guide on Pursuing Biomass Energy Opportunities and Technologies in British Columbia
- ARD - Biogas Energy Electricity Generation and Interconnection to the Power Grid
- Biogas - Heat and Power Industry - Opportunity Profile - Central Alberta Economic Partnership
- Biogas Mission to Germany and Austria: Nov. 6-11, 2005
- Draft Policy Paper - Ethanol Distillers' Grains for Livestock Feed
- Drayton Valley Bio-Mile: Project and BioEnergy Grant Update
- Drayton Valley's Bio-Mile: Shaping Innovation in the Fiber Industry
- Energy From Wood Biomass Combustion in Rural Alberta Applications
- Feasibility of Producing Biogas into Gas Gathering Systems and Supplying Biogas Energy to - Upstream Oil and Gas Facilities
- Forest Fuels Management and Biomass Utilization Bibliography: Knowledge Available for Management of North American Forest Fuels With Consideration of the Potential Uses of the Woody Biomass Generated by the Fuel Treatments
- Getting Value from Every Fibre
- Green Energy Clusters
- How America Can Look Within to Achieve Energy Security and Reduce Global Warming
- Manure Odour Management and Bioenergy Feasibility Analysis
- Market Potential of Power Production From Anaerobic Digestion of Animal Manure in Canada
- Optimum Sizing for Anaerobic Digestion - University of Alberta
- Powerbase Energy Systems to commercialize waste-to-energy technology - Biofuels Canada
- Producing Alternative Fuels, Energy & Chemicals From Woody Biomass
- Risk Assessment for Bioenergy Manufacturing Facilities in Alberta (GenSolutions)
- The Value of Waste - Biofuels Canada
- Various Methane Gas Source Comparison
- Waste Based Biogas Feasibility Study - Town of Olds
- World Bioenergy 2008

Websites:

Alberta Agriculture and Rural Development: Bioenergy Projects and Other Information
<http://www.agric.gov.ab.ca>.

Alberta Energy website on Bioenergy
<http://www.energy.alberta.ca/OurBusiness/bioenergy.asp>

Agriculture & Agri-Food Canada - Biomass Inventory Mapping and Assessment Tool
<http://nlwis-snite4.agr.gc.ca/GeoViewer/Default.aspx?Language=en&Context=BIOMASS>

Canadian Wind Energy Altas
<http://www.windatlas.ca/en/maps.php>

The Altas of Canadian Wind and Sunshine- NRCAN site

<http://altas.nrcan.gc.ca/site/english/maps/archives/3rdedition/environment/climate/020>

Canadian Wind Energy Association - Map of Installations

http://canwea.ca/farms/wind-farms_e.php

Presentations and case studies as presented at the "Alberta Biogas Conference"

<http://www.climatechangecentral.com>

Proceedings - 2007 Capturing Feed Grain & Forage Opportunities Proceedings - "Farming for Feed, Forage and Fuel" - Red Deer

[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/crop12124](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/crop12124)

APPENDIX C: AEPA Bioenergy Policy Recommendations to the Government of Alberta (GoA)

Recommendation 1: Ensure agricultural product and byproduct streams—including manure, crop residues, specified risk material, and processing waste—are taken into consideration when developing future bioenergy-related policies.

Agriculture products and byproducts have value and can contribute to the production of green energy, and therefore should be recognized and integrated into future related policy. This includes new policies and existing policies that may be revised in the future. For example, the Waste-to-Energy Recovery Policy currently does not include agricultural streams, but may in the future if energy recovery competes with alternative uses. This recommendation has benefits for the agriculture industry, the environment and for rural communities.

Recommendation 2: Streamline and integrate bioenergy-related regulations and policies within the various departments and agencies of the Government of Alberta.

There are many GoA ministries involved in the area of bioenergy, including Energy, Agriculture & Rural Development, Environment, Municipal Affairs, Transportation, Sustainable Resource Development, and Advanced Education & Technology. Policies and regulations must be aligned, integrated and complementary to help bioenergy development and operation. This also includes streamlining the 27 steps industry requires to connect to the power grid.

Recommendation 3: Create a 'one stop shop' information network to assist with bioenergy development.

A cross-ministry network would provide support, such as assistance in 'on-farm' biogas cluster development and operation, interpretation of regulation, technical support, business development and community engagement (i.e. website, 1-800# and dedicated staff). The network would also work with other sectors, such as municipalities, forestry and energy, to enhance integration of clusters and to take advantage of future technologies and other opportunities.

Recommendation 4: Establish opportunities within the *Climate Change and Emissions Management Fund* for agriculture producers who provide green energy and improve energy efficiencies. Opportunities for agriculture to capture and store carbon should also be explored.

Agriculture must be considered when funding parameters and guidelines are being developed for this newly-established fund. Agriculture producers who would be able to access this fund will help the industry be part of the solution in reducing greenhouse gas (GHG) emissions.

Recommendation 5: Increase government commitment to the sector, which may include developing the following programs: invest in repeatable biogas cluster projects, implement special programs (such as loan guarantees) with Alberta Treasury Branches or Alberta Financial Services Corporation, and provide funding for technical staff or training for bioenergy production.

Increased government commitment would assist in cluster development, incent municipalities and agriculture to work together, promote a regional approach and help rural development. This would benefit the agriculture industry, consumers, rural communities and the public while creating green energy.

Recommendation 6: Align provincial and federal government regulations and policies that impact bioenergy.

The GoA should work with the Government of Canada to ensure aligned and complimentary regulations and policies, which would help maximize the leveraging of resources and incentives for cluster development. Currently the resource sector is allowed exploration write-offs up to 100 per cent. The GoA should influence the Government of Canada to allow the same for the renewable energy sector. This would encourage investment, stimulate innovation and create diversification. The GoA could consider new tax credits and incentives for manure and other bioenergy products. These measures should be reflective of their energy balance, and clearly define GHG credits from biogas clusters that go beyond the \$15 per tonne.

Recommendation 7: Influence the modification of Canadian Food Inspection Agency regulations, as well as other federal regulations that negatively impact bioenergy development and operation.

The GoA should influence the Government of Canada to modify federal regulations to ensure bioenergy developments and operations are not hindered by regulatory barriers. Federal regulations need to be simplified, integrated, coordinated and complementary to streamline processes to reduce restrictions.

Other key comments from AEPA Bioenergy Workshop participants include:

- The total value of manure as an input into business models must be recognized by the industry as a whole, the Government of Alberta, investors and developers. AEPA has established a Manure Market Project Team that will explore the market potential of manure and will determine the nutrient and energy value of manure;
- An Alberta Renewable Energy/Fuel Standard must be carefully considered, including any impacts on the agriculture sector (livestock and cropping) prior to implementation. The AEPA could work with the Government of Alberta and other stakeholders to explore the opportunities and challenges with an Alberta Renewable Energy/Fuel Standard;
- In order for bioenergy to be successful in the future, the *Nine-Point Bioenergy Plan* should be extended for a minimum of 10 years.