Alberta Bioenergy Strategy Framework

**Vision**
Alberta’s Bioenergy Sector is a cornerstone of the province’s economic diversification and climate action strategies. The Bioenergy Strategy Framework is a key component of Alberta’s transition to a clean energy economy. Alberta will be a national leader in the production and use of sustainable, low carbon bioenergy products.

**What**
- A new ‘Alberta Bioenergy Strategy Framework’ is needed to capitalize on economic benefits and emission reductions from existing bioenergy production assets, and expand and develop new renewable and low carbon bioenergy production facilities in Alberta.

**Past**
- In 2006, an industry and Government of Alberta collaboration resulted in the 9-Point Bioenergy Plan framework. From 2007 to 2014, industry expanded bioenergy production capacity, delivered significant greenhouse gas (GHG) reductions, supported economic diversity through value-added manufacturing, enhanced waste stream management, leveraged new capital investment, created new jobs, added resiliency to the forestry & agriculture sectors, and strengthened rural communities.
- The Bioenergy Producer Credit Program (BPCP) was the key catalyst to industry growth from 2011 to 2014.

**Present**
- New energy & climate policies and regulations are under development
- AEP & Dr. A. Leach are leading public & industry stakeholder engagement processes
- The Bioenergy Producer Credit Program expires Mar31-16

**Future**
- Bioenergy is the cornerstone of a new ‘clean energy economy’ strategy and Alberta’s emerging ‘clean technology’ sector
- Bioenergy production supplies clean, renewable liquid biofuels, biogas, wood pellets, and biomass heat and power
- Bioenergy production supports the forestry, agriculture, and waste management sectors: it builds resiliency and diversifies the economy
- Bioenergy use delivers significant GHG reductions (through displacement of high carbon fossil energy) to meet Alberta’s climate action commitments (2020 / 2030)
- Economic growth: Alberta’s bioenergy sector is poised to attract new investment, support economic growth and prosperity, create high quality jobs and support bioenergy research and innovation
Alberta Bioenergy Strategy Framework: Overview

The Alberta Bioenergy Producers Group represents the companies that produce, or are developing projects to produce, bioenergy in the province (see Appendix 1). The group represents an unprecedented collaboration across all bioenergy platforms (liquid biofuels, biogas, wood pellets and biomass heat and power), which have come together to articulate a strong vision and clear recommendations as to how to sustain and grow a vibrant bioenergy production sector in Alberta.

There are three primary issues facing Alberta’s bioenergy production sector. These are:

1. **Market access** – New energy products have to compete against established, and often high-carbon, energy incumbents. Over the decades, these energy systems have built out production, storage, delivery and distribution systems and concentrated market supply chains. Federal and provincial capital grants, operating/royalty credits and tax programs have provided billions of dollars in public subsidies. The costs – and risks – for new energy producers to enter these markets are daunting. **Alberta’s bioenergy producers need assured market access for low carbon bioenergy products produced in Alberta.**

2. **Equitable returns** – the Bioenergy Producer’s Credit Program expires in March 2016. Under this program, bioenergy project developers were able to assess market risks, commit new capital, establish or expand production, and achieve a level of stability in the nascent bioenergy products marketplace. However, economic pressures from subsidized foreign imports, inadequate carbon valuation, regulatory burdens, and market immaturity (impacting market demand, supply chain development, scale efficiencies, distribution and storage infrastructure, etc.) are challenging existing bioenergy producers and impairing deployment of new capital and production expansion. **Alberta’s bioenergy producers need a fair price on carbon and a renewed production credit program that provides a stable platform to operate today’s fleet of bioenergy production plants and establishes a competitive investment climate to attract new capital and expand low carbon bioenergy production.**

3. **Leadership and collaboration** – over the past decade, considerable progress was achieved in the bioenergy sector. However, more could have done with closer attention to regulatory challenges, program design and implementation, and better collaboration and leadership across and between industry and government. There is much work to be done, and much of the potential of the bioenergy sector will not be achieved without strong support within government. **Alberta’s bioenergy sector needs dedicated leadership and support within the Government of Alberta to work across department resources and in close collaboration with industry to achieve the goals set out in this Bioenergy Strategy Framework.**

The Alberta Bioenergy Strategy Framework comprises five key themes and recommendations, as set out below and described in more detail in the section following. A more detailed description of the core bioenergy sectors is included in the appendices.
Bioenergy Strategy Framework Themes

1. Market Access

In order to assure market access and assist an orderly market transformation from incumbent, high carbon fossil fuel energy products to low carbon bioenergy products, market-based regulatory measures are needed and should be expanded over time.

We recommend:

a. Expanding the province’s Renewable Fuel Standards (RFS)

b. Creating Renewable Portfolio Standards (RPS) for biogas and biomass-based heat/power

c. Adopting measures to increase use of wood pellets for biomass heat in residential and commercial facilities, and to assist in replacing coal-fired power generation

2. Carbon Pricing

The existing Climate Change Emission Management Act (the Act) and Specified Gas Emitters Regulation (SGER) have initiated a transition to lower carbon energy solutions. The province recently expanded measures under the Act and is currently reviewing its climate action plans and assessing future options.

We recommend:

a. Provincial leadership in adopting effective and efficient carbon pricing policies that are comparable to regional and global markets and protect the competitiveness of Alberta’s economy

b. Use of a portion of the ‘carbon funds’\(^1\) to expand the production and use of low carbon bioenergy products, and support research and innovation leadership

3. Bioenergy Production Program

To support a competitive investment climate, and ensure sustained growth and innovation in the bioenergy sector, a stable, predictable and accessible public investment program is needed. The current Bioenergy Producers Credit Program supported measurable growth and GHG reductions since enactment in 2011. A market-based ‘production credit’ system can effectively attract project capital and support competitive operations through the energy market transition period. Effective rate setting, sufficient longevity and measures to ensure access to the program are in place are essential.

We recommend:

a. Implementing a market-based system to support Alberta bioenergy production and encourage the use of low carbon bioenergy products

b. Establishing secure funding from a portion of the province’s ‘carbon funds’

c. Establishing a 10-year bioenergy production program term

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1 The term ‘carbon funds’ is used in this report to refer to revenue generated through climate action regulations (e.g. SGER, carbon tax, cap & trade or comparable system)
4. **Regulatory Reform**

Over the past decade, the province’s bioenergy sector emerged during a time of economic turmoil, high market volatility and considerable uncertainty with respect to climate action policies, carbon pricing, sustainability, and future energy supply sources. In addition, implementation of new regulatory measures under the Act were introduced in the period, and lessons can also be culled from best practices in other jurisdictions. A number of opportunities to enhance and create a more efficient and effective regulatory structure to support the production and use of low carbon and sustainable bioenergy products were identified.

*We recommend:*

a. Conducting a regulatory review to enhance and improve systems to support the permitting, production and use of low carbon, sustainable bioenergy products

b. Improving regulatory compliance, data collection and reporting systems to enhance transparency and ensure effectiveness of the climate action policies and regulations

5. **Innovation & Market Development & Capital Investment**

Excellence and leadership in the province’s innovation (research and development) system will support continued growth and adoption of lower carbon bioenergy technologies. The Alberta Innovates entities, supported by core funding, and the Climate Change Emissions Management Corporation (CCEMC) funding have each provided valuable support to the emergent bioenergy sector. A 'market-based' system is needed to complement the role these programs provide, and stimulate investment in innovation across the energy spectrum. A public capital investment fund (ala the 1970’s AOSTRA program), and/or realignment of the CCEMC project eligibility criteria, is needed to support significant capital investment in new, market-ready, value-added bioenergy production in the province.

*We recommend:*

a. Expanding the refundable tax-based credit to support research, development, innovation and adoption of clean energy technologies

b. Use of a portion of the 'carbon funds' funds to promote development of new bioenergy markets, and buildout renewable energy infrastructure (biomass residue transportation, grid & pipeline interties, liquid fuel and gas storage & distribution systems)

c. Utilize strategic reserve, economic stimulus and/or 'carbon funds' to support capacity expansion, new greenfield capacity for new low carbon bioenergy production
Alberta Bioenergy Strategy: Detailed Recommendations

1. Market Access

i. Energy Markets

- Bioenergy products need secure market access to establish and create sustainable operating platforms for Alberta-based production (biofuels, biogas, wood pellets, biomass combined heat & power (CHP))

Recommendation #1: Market-based Bioenergy Standards

a. Liquid Biofuels
   i. Expand Diesel RFS from 2% to 5% by 2020
   ii. Support expansion of Gasoline RFS from 5%, and a carve-out for non-conventional renewable alcohol (cellulosic ethanol, biobutenol, methanol), subject to in-province production capacity
   iii. Review alignment with BC Low Carbon Fuel Standard (LCFS)
   iv. Establish 2025 transportation sector GHG reduction 'targets'

b. Biogas
   i. Establish biogas-specific Renewable Portfolio Standard (RPS) or measures to assure biogas market access to the electricity grid or natural gas distribution system

c. Forestry Biomass
   i. Electricity – establish biomass-power specific RPS or measures to assure biomass power market access to the electricity grid
   ii. Heat – adopt measures to recognize use of 'biomass heat' and displacement/avoidance of higher carbon heat energy sources
   iii. Wood Pellets – adopt measures to increase use of wood pellets for biomass heat in residential and commercial facilities, and for wood pellets to assist in replacing coal-fired power generation in the province

Recommendation #2: Market Integration

a. Liquid Fuels:
   i. Support buildout of storage, distribution and blending infrastructure for low carbon biofuels
   ii. Support high blend (E85) and mid-blend (B6-B20, E15) low carbon biofuels through fuel excise tax relief in order to expand market use and support RFS compliance options

b. Grid access (biogas, biomass CHP):
   i. Simplify interconnection process
   ii. Reduce grid access costs
   iii. Establish access priority/guaranty grid interties

c. Market-based pricing:
   i. ‘Full cost’ valuation to incent waste diversion
   ii. ‘Full cost’ valuation of ‘behind the fence’ consumption (per avoided transmission/distribution) or ‘net metering’ pricing
- ii. **Sustainability**
  - ‘Performance standards’ are needed to assure bioenergy products are sustainably produced and achieve the required GHG reduction targets.

**Recommendation #3: Sustainability Assurance**

a. **Biofuels – Eligibility under RFS**
   i. Adopt current version (v4.03 - 2013) of GHGenius
   ii. Increase GHG reduction threshold for renewable diesel fuels from 25% to 50%
   iii. Adopt ‘renewable biomass’ standards

b. **Biogas**
   i. Assist industry development of ‘best practices’ sustainability guidelines for biogas facility operations

c. **Forestry Biomass**
   i. Affirm ‘carbon neutrality’ of Alberta’s forest management and harvesting systems
   ii. Recognize national and international certification standards for regulatory compliance and market access

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2 [http://www.ghgenius.ca/](http://www.ghgenius.ca/)
4 [http://www.epa.gov/OMS/fuels/renewablefuels/compliancehelp/rfs2-aq.htm#2](http://www.epa.gov/OMS/fuels/renewablefuels/compliancehelp/rfs2-aq.htm#2)
6 E.g. the Forest Stewardship Council (FSC), the CAN/CSA Z809 SFM standard, and the Sustainable Forestry Initiative (SFI) certification standards
2. Climate Action

i. Carbon Price
- The Alberta Bioenergy Producers Group supports effective and efficient carbon pricing policies, that are comparable to regional and global markets and protect the competitiveness of Alberta’s economy
- ‘Carbon funds’ generated through climate action regulations (e.g. SGER\(^7\), carbon tax, cap & trade or comparable system) should be used, in part, to support the transition to a low carbon energy economy in Alberta

Recommendation #4: Carbon Funds
a. ‘Carbon funds’, from existing SGER or novel carbon pricing systems (e.g. cap & trade or carbon tax) should be dedicated to support expanding the production and use of low carbon bioenergy products
b. Carbon pricing systems should reflect the energy density and carbon emissions, on a comparable lifecycle assessment basis, of all energy products

ii. Emission Performance Credits (EPC)\(^8\)
- Emission Performance Credits (EPCs) are an important feature of the current Act and SGER regulations for Alberta’s bioenergy producers

Recommendation #5: Bioenergy Emission Performance Credits
a. Maintain the EPC structure and access to credit generation for bioenergy producers

iii. Offset Credit System\(^9\)
- The Offset Credit System is a valuable component of the Alberta energy and climate change regulatory system for bioenergy producers, and their ‘upstream’ agricultural, forestry and waste management sectors
- The Offset Credit System would be more effective with greater program longevity, and improved simplicity, transparency and accountability

Recommendation #6: Offset Credit Market Efficiency
a. Review bioenergy offset credit protocols to evaluate opportunities to improve integrity and access to credits
b. Create a program term (not project-based) for offset credits of at least 20 years
c. Improve offset credit trading and reporting system (volumes/price)
d. Expand offset credit protocols to support bioenergy production pathways (e.g. biomass to energy, waste diversion, manure diversion)

\(^7\) [http://aep.alberta.ca/climate-change/guidelines-legislation/default.aspx](http://aep.alberta.ca/climate-change/guidelines-legislation/default.aspx)


3. Bioenergy Production Program

i. **Bioenergy Production Fund**
   - Establish a performance-based bioenergy production program to support expansion in production and use of Alberta-based bioenergy products

   **Recommendation #7: Bioenergy Production Program**

   a. Implement a market-based system to support Alberta bioenergy production and encourage the use of low carbon bioenergy products
   b. Dedicate a portion of ‘carbon funds’ to support bioenergy production in Alberta:
      i. Set stable and fair rates with firm floor price (technology, feedstock neutral)
      ii. Reflect carbon reduction values at point of production
      iii. Configure to reflect different bioenergy sectors
      iv. Reward innovation and progressive GHG reductions
   c. Establish 10-year term to provide necessary policy stability for project maturation, time for orderly market transition within energy sectors

ii. **Capital Investment Fund**
   - Establish a capital investment program (ala the 1970’s AOSTRA program for oilsands technology innovation), and/or realignment of the CCEMC project eligibility criteria, to support commercialization of new low carbon bioenergy production technologies

   **Recommendation #8: Expand Bioenergy Production Capacity**

   a. Utilize strategic reserve, economic stimulus and/or ‘carbon funds’ to support capacity expansion, new greenfield capacity for new bioenergy production
   b. Establish 10-year term to provide necessary stability, time for orderly project development and supply chain integration within clean energy sectors
4. Regulatory Review

- Regulatory reform is needed to improve market and regulatory efficiency, address duplication /omissions, and improve accountability and transparency of energy production & use.

Recommendation #9: Regulatory Reforms

a. Biofuels – RFS Compliance (all fuels – fossil and renewable)
   i. Incorporate all fuels ‘consumed’ in the province (e.g. ‘behind the fence’ fuel use)
   ii. Establish quarterly compliance & reporting
   iii. Expand data reported (products, feedstocks, carbon intensity, country of origin)
   iv. Verifiable (mass-balance, previous year) carbon intensity methodology; engineer certification of carbon intensity
   v. Compliance credit trading – establish tracking and reporting system
   vi. Publish results within 60 days of quarter end

b. Permitting Bioenergy Facilities
   i. Bioenergy specific regulatory framework (permitting) that reflects biogenic origin and technology platforms of the bioenergy processes
   ii. ‘One window’ system with defined lead, approval process, no jurisdictional overlap, predictable timelines and reduced regulatory costs

c. Forestry Biomass
   i. Review approval process for smaller projects to reduce regulatory/project approval burdens
   ii. Remove biomass (biogenic carbon) from SGER baseline emission quantification
   iii. Revise regulatory process for biomass energy production approval and use of logging debris from Crown lands
   iv. Enable ‘across the fence’ power sales between entities without AESO tariff
5. Innovation & Market Development

- Clean energy innovation is needed at all levels of the energy supply chain – from production (oil, gas, biomass harvesting), refining/conversion (petroleum, renewable), to storage, distribution, blending and use
- A 'market-based' system is needed to complement the role the Alberta Innovates system\textsuperscript{10} and CCEMC funding programs provide, and stimulate investment in innovation across the energy spectrum
- The transition to a lower carbon economy will require investments in research, innovation in resource management practices, new market development and infrastructure to bring about the transformation in an orderly manner

**Recommendation #10: Clean Energy Innovation Tax Credit**

a. Expand the Alberta Scientific Research and Experimental Development Tax Credit to support research, development, innovation and adoption of clean energy technologies at existing and new facilities

**Recommendation #11: New Markets & Infrastructure**

a. Use a portion of the 'carbon funds' funds to promote development of new bioenergy feedstocks, testing of new agronomy/forestry/waste management practices, new market development, and renewable energy infrastructure (e.g. biomass residue transportation, grid & pipeline interties, storage & distribution, high-blend retail systems)

\textsuperscript{10} \url{http://www.albertainnovates.ca/}
### Appendix 1: Alberta Bioenergy Producers Group

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Bioenergy Product</th>
<th>Contact Person</th>
<th>Plant Location</th>
<th>Status</th>
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<td>Biodiesel</td>
<td>Ron Cardwell</td>
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<td>Hairy Hill</td>
<td>Operating</td>
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<td>Ethanol</td>
<td>Bridgette Duniece</td>
<td>Red Deer</td>
<td>Operating</td>
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<td>Boyle</td>
<td>Re-commissioning</td>
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<td>Invigor Biofuels</td>
<td>Biodiesel</td>
<td>Kelsey Prenevost</td>
<td>Lethbridge</td>
<td>Re-commissioning</td>
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<tr>
<td>Enerkem</td>
<td>Methanol</td>
<td>Marie-Helene Labrie</td>
<td>Edmonton</td>
<td>Commissioning</td>
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<td>DMI - Steeper</td>
<td>Renewable fuel</td>
<td>Joerg Goetsch / Mike Gauthier</td>
<td>Peace River</td>
<td>Development</td>
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<tr>
<td>Enerkem</td>
<td>Ethanol</td>
<td>Marie-Helene Labrie</td>
<td>Edmonton</td>
<td>Development</td>
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<td>Chin</td>
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<td>Lethbridge Biogas</td>
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<td>Stefan Michalski</td>
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<td>Vanderwell</td>
<td>Wood pellets</td>
<td>Con Dermott</td>
<td>Slave Lake</td>
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11 ABPG members only (not a complete list of all bioenergy projects under consideration in Alberta)
### Biomass Combustion (Heat + Power)

<table>
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<tr>
<th>Plant Name</th>
<th>Fuel Type</th>
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<th>Location</th>
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<td>Alberta Pacific</td>
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<td>Canfor</td>
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<td>Mike Jordan</td>
<td>Grande Prairie</td>
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<td>Joerg Goetsch / Mike Gauthier</td>
<td>Peace River</td>
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<td>Heat</td>
<td>Dave Harman</td>
<td>Fort McMurray</td>
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<td>Valley Power</td>
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<td>Drayton Valley</td>
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<td>Heat</td>
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<td>West Fraser (Hinton Wood)</td>
<td>Heat</td>
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**Total operating plants:** 24  
**Standby, re-commissioning and construction stage plants:** 6  
**Total development stage plants:** 5  
**Alberta Bioenergy Producers Group:** 44 bioenergy projects
Appendix 2: Biofuels (Biodiesel + Ethanol) Sector Overview

1. **Business Model**
   - Bio-refinery production:
     - Sale of bioenergy products (renewable diesel (biodiesel) and gasoline (ethanol) fuels)
     - Sale of animal feeds: (a) free fatty acids (biodiesel); (b) wet distiller grains (ethanol)
     - Sale of renewable chemicals: (a) glycerin (biodiesel); (b) methanol (ethanol)
   - Carbon emission offset credits (AB)
   - Low carbon fuel standard credits (BC, CA)
   - BP CP production credits (expiring)

2. **Benefits**
   - a) Environmental
     - Reduction of greenhouse gas emissions in transportation fuels:
       
       | Company                     | Biofuel | Feedstock  | Gasoline | Diesel | %  |
       |-----------------------------|---------|------------|----------|--------|----|
       | ADM Agri-Industries Company | Biodiesel| Canola     | 20.25    | -79%   |
       | Enerkem                     | Ethanol | MSW        | 36.62    | -60%   |
       | Growing Power Hairy Hill L.P.| Ethanol | Wheat      | 36.77    | -60%   |
       | Invigor Bioenergy Corporation| Biodiesel| Fats/canola| 28.41    | -70%   |
       | Permolex                    | Ethanol | Wheat      | 32.88    | -64%   |
       | Alpac                       | Methanol| Pulp residue| Unknown |
       | DMI (Steeper)               | Renewable fuel oil| Pulp residue| 15.00   | -84%   |

   - Reduction in other criteria air contaminants and carcinogens through reduced use of diesel and gasoline fuels
   - Reduce/eliminate environmental damage from crude and refined oil production (e.g. tailings leakages) and transportation spills (e.g. pipeline ruptures, derailments, marine shipping)

   - b) Regulatory
     - Eligibility under provincial, state and federal mandates (RFS, LCFS regulations)
     - In 2017, North American automakers are required to improve fuel economy under phase 2 light duty (gasoline) Corporate Average Fuel Economy (CAFÉ) standards. Ethanol blends of E20 to E30 deliver high octane, exceptional performance and reduce emissions (benzene, soot, particulate matter, and carbon monoxide)

   [12](http://www.epa.gov/oms/climate/regs-light-duty.htm#2017-2025)
Rulemaking is underway for phase 2 GHG emission standards and fuel efficiency standards for medium and heavy-duty sector (diesel) vehicles effective in 2019.\textsuperscript{13} Renewable diesel (biodiesel, HRD) blends of 6 to 20\% offer immediate potential to achieve deep de-carbonization in these fleet vehicles.

c) Agriculture
\begin{itemize}
\item Reduce export market dependence for primary crops
\item Advanced biofuels are now in commercial production from agricultural residues
\item Market for off-grade, low quality or spoiled crops and crop residues
\item Support for novel crop development, diversification and agronomic innovation
\item Expand / diversify animal feed supplies
\item Supplemental nutrient-rich water supply for local agriculture market (from syrup production)
\end{itemize}

d) Waste Management
\begin{itemize}
\item Advanced biofuels are now in commercial production from municipal solid waste streams (up to 90\% waste diversion at Edmonton facility)
\item Local / regional waste diversion for organics/municipal solid waste
\item Local / regional waste diversion for non-compostables/non-recyclables
\end{itemize}

e) Forestry
\begin{itemize}
\item Advanced biofuels are now in commercial production from forestry residues
\item Emerging technology platform will expand production potential of renewable diesel, biojet fuels from forest residues
\end{itemize}

f) Community
\begin{itemize}
\item Local, rural community support through economic development and diversification, improved resiliency of local forestry and agricultural sectors, local jobs in the community
\item Opportunity for ‘green’ leadership: clean-tech sector jobs & sustainability stewardship
\end{itemize}

g) Energy
\begin{itemize}
\item Co-generation at facilities reduces on-grid power consumption
\item Energy security improvement through extending supplies of transportation fuels, avoiding economic shocks from refinery shutdowns/outages (e.g. diesel fuel shortages)
\item Consumer choice and improved market competition from additional fuel options
\item Extended life of fossil fuel reserves
\end{itemize}

\textsuperscript{13} \url{http://www.epa.gov/oms/climate/regs-heavy-duty.htm}
3. **Current Issues & Barriers**
   - Subsidized international imports: pending conversion of US blender’s credit to producer’s credit
   - High carbon renewable fuels: enjoy market access in most regulatory systems
   - High ‘policy risk’: considerable uncertainty and change of global, North American regulatory systems (RFS, LCFS, EU-RED)
   - High energy, feedstock and bioenergy commodity price volatility: exacerbated without strong market-based regulatory systems
   - Regulatory (permitting) pathway hurdles: no specific AE regulations for ethanol – regulated as methanol, jurisdictional overlap (AEP/AE/AF/IAE)
   - Carbon Offset System: overly complex, expensive, uncertain, timing issue; uncertain long-term policy support and eligibility under regulatory frameworks
   - Project development: timeline for proper project development (planning, design, financing, permitting, construction) is long; need stability to government policies, programs and regulations
Appendix 3: Biogas Sector Overview

1. Business Model
   - Sale of bioenergy products
     - renewable electricity
     - renewable heat
     - renewable natural gas (RNG)
   - Sale of organic fertilizer
   - Tipping fees for organic materials diverted from landfill
   - Carbon offset credits (AB)
   - Low carbon fuel standard credits (RNG - BC, CA)
   - BPCP production credits (expiring)

2. Benefits
   a) Environmental
      - Reduction of greenhouse gas emissions, methane (CH4) in particular
        - 89% reduction compared to AB power grid
      - Less over-acidification of soils, less groundwater contamination
      - Diversion of organics (industrial, municipal, source separated organics (SSO's) from landfill
   b) Energy
      - Decentralized & distributed baseload power (24/7) - reduces transmission infrastructure and associated costs
      - Stabilization of electricity distribution system
   c) Agriculture
      - Reduced odour of digested material (vs manure)
      - Increased nutrient value of digested material
      - Digested material is more homogenized and facilitates easier nutrient uptake for plant roots (better balance between N and P)
      - More efficient use of nitrogen (more NH4 + N is accessible)
      - Reduction of pathogens through anaerobic process
   d) Community
      - Local, rural community support through economic development and diversification, improved resiliency of local forestry and agricultural sectors, local jobs in the community
      - Opportunity for 'green' leadership: clean-tech sector jobs & sustainability stewardship, potential 'bio-energy clusters'
      - Extended life of landfills
3. **Current Issues & Barriers**
   - Regulatory (permitting) pathway unclear, no technology specific regulations, no general requirements for all plants, jurisdictional overlap (AEP, AF, AUC), no regulatory lead, unpredictable timelines
   - High costs of grid interconnection (power), gas interconnection has not been explored
   - Micro-gen policy not applicable as soon as excess power is available for grid export
   - Very little restrictions on the disposal of organics in landfills, landfill fees very low and not reflective of “full cost”, competition with municipally owned entities and associated costing
   - Power pool prices not sufficient to sustain operation, full value of bioenergy power is not recognized by market purchase contracts
   - Carbon offset potential currently limited to the benefits of green power production, little appetite for new offset protocol development
   - No longer term mechanism (BPCP expires Mar31-16) to honor long term continuous production and environmental benefits: impairs ability to attract capital
Appendix 4: Forestry (Wood Pellet & Biomass CHP) Sector Overview

1. Business Model

Overview: The forest sector integrates a number of specific sectors, including lumber, panels, pulp and paper, and wood pellets, and other integrated operations, such as biomass heat and power.

Combined, these sectors also produce a number of by-products, or ‘residuals’, such as:

- **Wood chips**: produced and shipped to pulp mills for the production of pulp and paper
- **Shavings**: used as livestock bedding, converted to wood pellets, or used to produce heat directly
- **Sawdust**: used to produce wood pellets, or as hog fuel to produce heat and power
- **Hog fuel**: can be made up of both sawdust and bark, or just bark, and used to produce heat and power

The forest industry is necessarily integrated to take full advantage of opportunities to reduce the costs of harvesting and processing biomass from Alberta’s vast forests. As well, regulations now require the sawmill industry to stop burning some of their waste products in typical beehive burners; these waste streams must now be landfilled, sold or further processed further. Due to the remoteness of some of these facilities, this can be economically disadvantageous.

Wood pellet manufacturing has reduced the surplus of hog fuel in the province somewhat. Pellet production has been relatively stable in Alberta, but has increased tremendously in other parts of Canada, such as British Columbia and Ontario, and the US for commercial/industrial heat production and the elimination or reduction of coal fired power.

Mills have adopted other strategies, and many have implemented ‘waste to energy’ bioenergy systems to try to economically deal with these residues, including producing heat and power for internal use and export to the Alberta grid. These strategies have in many cases allowed mills to reduce their reliance on fossil fuels required in the production of their own products, and has also helped displace higher carbon power generation on Alberta’s electricity grid. Further opportunities are available to not only process more of the mill residual wastes, but also to augment biomass supply with forest harvesting residuals that are typically left or burnt in the bush.

**Forest Biomass Bioenergy:**

- Achieves multiple values from co-products (i.e. industrial and commercial heat and power from biomass fuel)
- Utilizes wood residuals that are renewable, carbon neutral and sourced from third party certified companies to contribute to reducing GHG emissions
- Ability to develop new, renewable, low carbon products (liquid biofuels, wood pellets, bio char etc.) to further support Alberta’s energy needs
- Supports regional diversification and local jobs
2. **Benefits**

   a) Environmental
   - Reduction of greenhouse gas emissions in Alberta grid power
   - Potential to reduce airborne particulate matter over conventional fuel sources (e.g. reduction in PM10 and PM 2.5) from combusting forest residuals (slash) in a controlled environment (furnace with electrostatic precipitator) vs. open burning in the bush
   - Reduction in landfilled biomass and methane avoidance through diversion to energy production

   b) Regulatory
   - Supports regional power solutions – reduces expansion of transmission lines
   - Alberta’s forests already certified under internationally recognized third party systems as sustainably managed – work within these frameworks

   c) Waste Management
   - Forest residuals currently burnt in the forest – increase economic/health benefits by burning in efficient combustors with up to date emission
   - Reduction in landfilled or stockpiles of biomass waste

   d) Forestry
   - Reduction in wild fire hazard – needs to be balanced with nutrient cycle

   e) Community
   - Helps stabilize smaller, regional communities by supporting existing renewable energy facilities and incenting further renewable energy development

   f) Energy
   - Eliminates or reduces coal use for power generation through firing or co-firing wood pellets or biomass
   - Supports a diversified energy portfolio that has lower GHG emissions, is renewable and more stable with less reliance on out of province sources
   - Local / regional power production offsets line losses
3. **Current Issues & Barriers**

- Establish new protocols for long term bioenergy power pricing to de-risk capital investment, incent new project development and support existing facilities during periods of low market power prices.

- A RPS carve out in the grid for renewable power with a sub category for biomass will let the market dictate the value of this power, similar to how the grid functions now.

- Regulatory issues related to the application process, monitoring, transmission approvals cause hardships and confusion, particularly to smaller producers. Currently, they act as a disincentive to further renewable energy development (e.g. the review process is triggered by what appears to be an arbitrary size (5 MW)).

- Allow “across the fence” electricity sale between entities without AESO tariff applicability to encourage local biomass power generation at industrial levels.

- Need to simplify and improve ‘biomass to energy’ and ‘residuals diversion’ Offset Credit protocols in order to address weaknesses to eligibility and provide clarity and clear direction to quantify offsets and attract investment. These protocols should also recognize the value of utilizing biomass, and not stockpiling or disposing of these residuals using less desirable methods. Should also identify potential unintended consequences of not supporting appropriate biomass residuals management, and its effect on mill operations or in driving up the costs of residual sawmill chips.