CBIN: Canadian Biomass Innovation Network

Description of Program Activities and Themes

Activity 1: Existing and New Biomass Supply

This activity aims to improve the availability of Canada's two largest sources of biomass supply from forestry and agriculture operations. R&D in this area will generate information that is vital for planning, costing and siting of bioenergy, bioproduct or biorefinery operations. This will include detailed inventory information and the development of technologies and processes that will generate a cost-effective and sustainable supply of agriculture and forest biomass. It also links to longer term biotechnology research that is being undertaken to increase plant production and develop plants with specific traits.

This activity will support projects in the following themes:

Theme: Biomass Inventory (detailed agriculture and forestry biomass inventory)

Leaders:
- Mark Stumborg, AAFC-SPARC, tel 306-778-7261, fax 306-778-3188
- Jeff Karau, NRCan-CFS, tel 613-947-8997, fax 613-947-9090
- Dr. Bob Stewart, NRCan- CFS, tel 613-947-4792, fax 613-947-9090

Detailed biomass information is not readily available to the resource industries, government departments, planners or the general public. As bio-based industries develop, it will be essential that current and good information on biomass production (including costs) be available. These information systems will need to integrate information from a multitude of sectors and resources, including agricultural and forestry residues, MSW, purpose-grown biomass, food industry wastes, etc.

The objectives of this theme are to develop: (1) the modelling infrastructure to predict biomass availability from natural, salvaged and purpose grown agricultural and forestry biomass materials; and (2) a GIS map of the combined forestry and agriculture biomass available for industrial exploitation. It is anticipated that the agricultural and forestry inventories, when combined, will likely reveal key opportunities for biomass development from multiple sources, reducing the risk to industry from crop failure or tree loss to pests or fire. Given the natural variability of weather and the potential effect of climate change, the models will allow changes in biomass production potential to be identified under a variety of climate change scenarios.

This work will be carried out by scientists at AAFC and CFS in cooperation with several provincial governments, industrial partners, the Model Forest Partnership, FERIC and the Prairie Agricultural Machinery Institute. Some of the outputs that are expected to be delivered, over a four year time frame, include:

Canada-wide forestry site productivity indices by soil type, species, climate, and terrain location, into a two-scale Canadian Biophysical Site Index;

modelling indices for forest productivity for areas affected by extreme events, such as pest, fire, or disease;
low quality canola seed production models for biodiesel feedstock;
development of agricultural residue production coefficients based upon grain production statistics;
forest biomass production databases for GIS mapping of biomass productivity;
agricultural residue production databases for GIS mapping of biomass productivity;
regional (and potentially national) combined agricultural and forestry biomass GIS maps.

Current Projects 04/05

Agricultural Biomass Inventory
Improving Canada's National Forest Biomass Estimates

Theme: Purpose-Grown Woody Biomass Production (forestry and agroforestry)

Leaders:
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Forest biomass harvesting is well-developed and understood in terms of the harvest and transport of industrial roundwood; however, similar information for harvesting woody material in other forms is lacking. Technologies for establishing and maintaining energy plantations of species such as poplars and willows have been developed, largely in northern Europe and the US. The need to adapt such technologies to Canadian conditions is being addressed by this theme.

The objective of the forestry aspect of this theme is to increase the supply of biomass from purpose-grown woody crops through enhanced productivity of fast-growing species, and improved plantation technologies and implementation strategies. This work will be carried out by scientists at CFS in cooperation with the forest products industry, NGOs, and universities. Some of the outputs that are expected to be delivered over a four year time frame include the identification of species/clones with improved productivity, and the development of economically sustainable strategies for implementing bioenergy programs based on a sustainable supply of forest (and possibly agricultural) residues and biomass from energy plantations.

On the agroforestry side, agroforestry configurations, interactions and management affect the amount and type of biomass produced. Better understanding of tree/herbaceous interactions under different designs and conditions, including microclimate effects, water use and other interactions, and their relationship to biomass production is required. The objective of this work is to optimize resource use efficiency and woody/herbaceous biomass production in various Canadian agroforestry systems. The work will be carried out by AAFC scientists located in different regions of the country in cooperation with landowners, conservation groups and scientists at CFS. The main output will be increased understanding of

agroforestry system design.

Current Projects 04/05

- Innovative Fast-Growing Energy Plantation Development
- Quantification and sustainability of willow feedstock produced in short rotation intensive culture in diverse regions in Quebec
- Assessing the potential supply of salvageable forest biomass in support of Canada's bioenergy strategy

Theme: Technologies for Harvesting, Preparation, Storage and Transportation

Leaders:
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Two recent US studies have identified the harvest, post-harvest, and pre-processing sectors as one of the most important areas of technology development because of its large impact on feedstock cost and overall system profitability. Canada has a very large land base with some unique environmental challenges that must be accommodated if the harvest, transportation, storage, and pre-processing of agricultural materials is to be done at the lowest possible cost. Most of the systems currently used are optimized for conventional grain and feed materials, not for industrial biomass. Opportunities exist to reduce the overall cost of biomass collection, improve its quality, and potentially reduce the overall harvest cost for conventional materials.

Similar challenges exist for forest biomass. Technologies need to be developed to harvest crops of densely-spaced small-diameter stems, chips and other comminuted material. Wood damaged by pests, disease, and fire offers unique challenges for harvesting, sorting, and separation.

The objective of this theme is to reduce the cost of agricultural and forest biomass feedstocks and to maintain or improve the quality of agricultural feedstock by: (1) improving harvest technologies to increase biomass collection yield and quality; transport system efficiency through the development of densification and materials packaging systems; and storage system efficiency to reduce cost and material losses; and (2) developing drying, cleaning, sorting, and size reduction systems to efficiently provide consistent appropriate material for subsequent processing.

This work will be carried out by scientists at AAFC and CFS in cooperation with several provincial governments, FERIC and industrial partners such as McLeod Harvest, Dow Chemicals, Shelbourne Reynolds, and Case New Holland. The new

technologies developed through this R&D are expected to improve the economics, quality and reliability of harvest and post harvest biomass systems.

Current Projects 04/05

- Feasibility study and development of technology to harvest, prepare and transport salvaged wood
- Agroforestry Production Systems
- Agricultural Residue Harvesting Systems
- Cost of Transporting and Handling Forest Biomass[1]

Theme: New and Improved Biomass Feedstocks

Leader:
- Dr. Wilf Keller, NRC-PBI, tel 306-975-5569, fax 306-975-4191

The application of biotechnology can enhance the potential for producing biomass feedstocks with desired traits for industry at faster rates. Genetic improvement programs for tree species, agricultural crops, and new domesticated varieties of annual and perennial plants are expected to play an important role in the supply of biomass feedstocks to industry. These could replace some petrochemical feedstocks in the production of plastics, chemicals, new materials, and fuels, and also replace traditional plant varieties with fast growing, pest and herbicide resistant ones. In addition, new varieties with altered composition could require less processing energy (e.g. trees with altered lignin and/or cellulose).

The two objectives of this theme are: (1) to develop value-added prototype transgenic oilseeds that will produce seed oils highly enriched in erucic, hydroxy or linolenic acids; and (2) to assess and develop tree species that can grow in the Canadian environment with traits that are desirable to the conversion industries including lignin altered varieties.

This work will be carried out by scientists at NRC BPI (Lipid Biotechnology and Cell Technology groups) and CFS in cooperation with the Government of Saskatchewan, the Universities of British Columbia, Manitoba and Saskatchewan, and industrial research partners. The R&D is targeted to develop: (1) seed oils with > 66% erucic acid, > 75% linolenic acid and > 35% ricinoleic acid within four years, and (2) tree species with altered lignin composition for the pulp and paper industry. Ecological fitness of the transgenic trees and their environmental safety will be an integral component of this research.

Current Projects 04/05

- New & Improved Biomass Feedstocks (Annual Plants)

[1] Project managed by John Burnett, NRCan-CETC

Activity 2: Biomass Conversion and Utilization Technologies

This activity supports R&D that advances the development of different thermochemical, biochemical and physical-chemical unit operations that can be used to convert different biomass feedstocks into bioenergy (heat and electricity), biofuels, biogases and valuable co-products (including chemicals, materials, other bioproducts). The intention is to move viable technologies further along the innovation curve. As these technology applications must ultimately be sustainable and competitive, attention will be paid to increasing conversion efficiencies and minimizing material and energy requirements in order to realize cost-effective technological solutions.

This activity will support projects in the following themes:

Theme: Biomass Conversion to Heat and Power (Bioenergy)

Leader:
John Burnett, NRCan-CETC, tel 613-947-4111, fax 613-996-9416

Canada's forest products industry is comprised of approximately 145 pulp and paper mills (i.e. large energy users) and over 900 solid wood and manufactured board facilities. It currently derives over 50% of its energy demand from biomass, with most of this taking place in the hogfuel boiler and spent liquor recovery systems of pulp mills. Currently both regulatory and economic drivers exist to encourage the industry to cleanly convert more biomass into energy, preferably power. The solid wood industries, in particular, have an urgent need to find cost-effective, environmental sound ways to use their wood residues.

The Forest Sector Issue Table identified several R&D gaps that when filled would lead to greater conversion of biomass into energy, cleaner conversion, more electricity generation and lower fossil fuel consumption. The Issue Table's report forms the basis for much of the R&D work supported by this theme. The main objectives of this R&D are to reduce GHG and criteria air emissions and increase sustainability through cost-shared, contracted-out R&D and field trials of technologies that economically convert wood residues (and possibly energy crops) into bioenergy. The areas to be investigated include: increased electrical production through higher efficiency of both the energy conversion (combustion or gasification) and the generating cycle utilized (IGCC) for black liquor and wood residues; economical small biomass cogeneration units for the solid wood industry; and technologies that allow biomass to replace fossil fuels in lime kilns.

This R&D, led by NRCan/CETC-Ottawa, will involve very experienced researchers from 7 major pulp and paper companies, 4 from Paprican, 3 representing Canadian technology providers, 3 universities and the federal government. The outputs are expected to include proof of concept of energy conversion technology; data and analysis that will allow potential adopters to evaluate technologies on an economic as well as on an environmental basis; and knowledge and know-how sharing with

industry.

Current Projects 04/05

- P&P Mill Sludge and Hogfuel Drying Strategy
- Improved Hogfuel Combustion (Validation of Assessment Methodology)
- Hogfuel Washing for Dioxin Reduction
- Biological Drying of Pulp Mill Sludges
- Co-combustion of Lignin with Coal for Utility Power Generation
- Black Liquor Gasification (Testing and Process Verification)
- Small Scale Biomass Power (Solid wood industry, Municipality)

Theme: Conversion of Waste to Bio-based Gases (biogas, syngas, hydrogen)

Leader:
Jody Barclay, NRCan-CETC, tel 613-996-9760, fax 613-996-6416

There is growing public concern regarding the current disposal of organic wastes such as MSW, effluent treatment sludges and manure. With the introduction of viable technologies, these wastes, or environmental liabilities, can be converted into economic opportunities. Technologies such as farm scale and combined agricultural/municipal anaerobic digestion, while proven in other parts of the world, have failed in Canada due to many hurdles unique to our climatic, environmental and economic conditions. Being cost-driven, the faming community cannot afford to take on this technical risk on their own. On the municipal side, there are opportunities to develop medium-scale landfill sites to tap into this underutilized source of energy. Furthermore, a substantial amount of municipal and industrial wastewater is treated using energy-intensive aerobic technology and could be treated anaerobically and produce energy as a by-product.

This R&D will explore ways to increase the production of biogas, syngas and/or hydrogen from municipal, industrial, agricultural, and forestry wastes. Much of this work is a continuation of R&D previously done under PERD POL 4.2.3. This R&D is designed to fill the gaps identified by work underway at NRCan, AAFC and other departments. It is a priority in the CBIN R&D Program because this R&D can create value (energy, GHG reductions) from waste and provide numerous other benefits to society.

The main delivery partners will include NRCan, AAFC, EC, NRC, HC, IC, OMAF, FCM, the farming community (and especially livestock producer groups), municipalities and industrial technology developers since they have the necessary laboratory facilities, technical expertise, biotechnology networks, and complimentary funding programs (T&I DEP, ETAA, Ecoamu, IRAP, FCM, TEAM, and SDTC). Some of the outputs expected from this work are:

increased knowledge of the production of waste-derived gaseous fuels leading to the development of competitive conversion technologies
credible data to verify technology performance claims, especially with regards to GHG reductions
development of supportive codes, standards and/or practices (e.g. Waste as a Resource Guide)
reliable technical information to: direct policy development; and, increase acceptance of waste conversion technologies by potential producers (farmers, municipalities, etc.) and end users (communities, utilities, etc.)
increased networking: interdepartmental collaboration within the federal government; partnering between research providers, adopters and end users; and, involvement of provincial governments and industry stakeholders
communications tools (fact sheets, web ready publications, power point presentations, etc.) targeted at farmer groups, municipal decision makers and other stakeholders.

Current Projects 04/05

- FCM Waste Guide (Phase: Dissemination)
- City of Toronto Waste to Energy
- LFG Catalyst Test (part 2)
- Manure Digestion
- Environmental Impact (GHG and Air Emissions) of Various MSW Management Options
- Biological Production of Hydrogen from Biomass

Theme: Key Separation and Conversion Processes for Bioproducts

Leader:
- Dr. Bill Cruickshank, NRCan-CETC, tel 613-993-8732, fax 613-996-9416
- Dr. Ashwani Kumar, NRC, tel 613-998-0498, fax 613-991-2384
- Dr. G. (Joe) Mazza, AAFC, tel 250-494-6376, fax 250-494-0755

The manufacture of bioenergy, biofuels, and chemical and material co-products generally involves a combination of different unit processes. In this theme, R&D will be carried out in 3 technology areas: (1) extraction, fractionation and separation processes to recover value-added products such proteins, saponins, polyphenols from biomass feedstocks; (2) chemical pretreatment technologies to overcome the recalcitrance of cellulosic biomass; and (3) fermentation systems that transform cellulosic biomass derived sugars to biofuels and bioproducts. The rationale for this R&D is as follows:

Separation processes are essential unit processes for co-product production. However, they can be very costly, energy intensive and involve the use of aggressive chemicals. Consequently, there is a need to develop less energy intensive and more environmentally friendly techniques such as super critical extraction and membrane-based separations.

Developing efficient and cost-effective pretreatments that can separate the primary constituents of cellulosic biomass with minimal degradation is essential for biochemical conversion of biomass. In particular, pretreatments need to be developed for softwood residues, which are abundant in Canada.

In the near term, there is a requirement to develop fermentation systems that can efficiently use pentose sugars for the production of fuel ethanol. Almost one-third of the total sugars that can be obtained from agricultural and hardwood feedstocks are pentose sugars. If pentose sugars could be efficiently fermented, the overall ethanol yield could be increased by 30%.

The delivery partners will include the federal government labs at AAFC and NRC, University of British Columbia and research facilities at private companies. The anticipated work includes the development of a few laboratory scale separation processes; continued work on dilute acid/steam pretreatment and organosolv-based pretreatment processes; and use/improvement of thermophilic microorganisms operating in the specific ethanol fermentation application.

Current Projects 04/05

- Extraction, Separation and Purification Processes for Value-Added Products[2]
- Novel Fractionation Process & Co-Products Related to Ethanol Production
- Development of Hollow-Fibre Membrane System for the Separation of Ethanol/Water Mixtures
- Softwood-Residues-to-Ethanol: Scale-up and Bottleneck Reduction
- Evaluation of Promising Pretreatment Technologies for Cellulosic Biomass-to-Ethanol Conversion (Softwood Residues)
- Ethanol and Co-Products via Biomass Fractionation

Theme: Biocatalysis for Industrial Applications

Leader:
- Dr. Bill Cruickshank, NRCan-CETC, tel 613-993-8732, fax 613-996-9416
- Dr. Peter Lau, NRC-BRI, tel 514-496-6325, fax 514-496-6265

Recent advances in genomics and biotechnology are leading to the development of new enzymes and biocatalytic (e.g. living cells) systems. Such systems can replace certain chemical catalysts or be used in novel, integrated biorefining systems/ processes to produce a variety of products, including biofuels, chemicals and materials. They offer the potential of being very specific in their action, improving process yield and/or energy efficiency, and often having lower environmental impact than the chemical catalysts they replace.

[2] Subcritical water extraction and foam-based separation: Joe Mazza; Membrane-based separation: Ashwani Kumar

For the first two years of the Program, the R&D work is expected to focus on improving the efficiency (and lowering the cost) of two industrial applications of enzymes: (1) cellulase enzymes used in the conversion of cereal grain straw into glucose; and (2) pectinase enzymes used in the extraction of hemp fibres. This R&D could be expanded to other applications in the second part of the Program.

The delivery partners include NRC's Biotechnology Research Institute and Institute for Biological Sciences, and private companies with cellulase R&D capacity such as Iogen. Over a four year time frame, it is expected that the R&D will show significant improvements in the performance of cellulase and pectinase, respectively, for cellulosic ethanol production and hemp fibre extraction.

Current Projects 04/05

- Improving Cellulase Enzymes for the Enhanced Conversion of Cellulose to Fermentable Sugars and Reduced Finished Ethanol Costs
  Superior Pectinase for Processing Industrial Hemp and Other Agro-Fibres

Theme: Advanced Biomass Conversion & Utilization Technologies

Leader:
Ed Hogan, NRCan-CETC, tel 613-996-6226, fax 613-996-9416

Advanced thermochemical conversion technologies, such as gasification and pyrolysis, offer considerable potential to increase the contribution of biomass to the overall energy supply. Compared with conventional combustion systems, these systems generally have higher conversion efficiencies, and produce valuable gases and/or liquids that can be converted into energy, chemicals and other co-products while releasing fewer particulates into the atmosphere.

Although significant progress has been made in the development of gasification systems over the last few years, continued R&D support is required to achieve industrial implementation. Similarly, pyrolysis is a technically promising and economic process for the conversion of biomass to liquid fuel. Canada is a leader in the development of fast pyrolysis, but it is still at a relatively early stage of development when compared to combustion or even gasification systems.

Pyrolysis liquids (bio-oils) could potentially substitute fossil fuels in boilers, furnaces, engines and turbines for heat and power generation. However, there are a number of characteristics of bio-oil that pose technical problems, including high viscosity, water and oxygen content, acidity, low heating value, char content in the oil, zero miscibility with petroleum fuels and instability under storage. As such, the development and industrial demonstration of conversion units that can efficiently

convert bio-oils into energy are needed. Similar testing is needed for renewable diesel fuels in stationary applications.

This theme will also look at new innovative applications for biomass, such as the use of biomass by the steel industry.

This objectives of this R&D work are to: (1) improve (with the aim of commercializing) gasification and pyrolysis technologies used to convert forest residues and MSW to heat and power, bio-oil, char and co-products; (2) test the use of bio-oil and renewable diesel in stationary applications (e.g. Stirling engine); and (3) explore the feasibility of using biomass energy in steel making. The delivery partners will likely include industry (e.g. companies such as Enerkem, Ensyn, Renewable Oil, fuel distributors, steel industry), government researchers, provincial governments, municipalities and utilities. Some of the outputs anticipated from this R&D are: material preparation of MSW to improve gasification efficiency; evaluation of suitability of different feedstocks for gasification and pyrolysis; study of Fischer Tropsch diesel manufacture; combustion tests of pyrolysis oil components; and combustion and emission test program for home furnaces and industrial boilers.

Current Projects 04/05

BioOil in Lumber Kiln Application
Feasibility of Using BioOil in Steel Making Application
Field Testing and Verification of Pyrolysis Oil in Lumber Kiln Applications
Gasification of wood residue in a plywood mill application (pending approval)
Combustion Testing of Fish Oil-Derived Biodiesel Fuel
Pyrolysis Network

Theme: Biofuels (Renewable Diesel Fuels) for Transportation Applications

Leader:
Dr. Jacques Monnier, NRCan-CETC, tel 613-995-1631, fax 613-996-9400

Canada has set a national biodiesel production target of 500 million litres by the year 2010. This R&D will investigate technologies that produce inexpensive renewable diesel fuels that perform well at low temperatures. More specifically this R&D will look at improving existing biodiesel production systems, investigating new technologies for producing biomass-derived diesel fuels such as alkyl levulinates, SuperCetane and Fischer-Tropsch diesel fuel, and enhancing product characteristics of renewable diesel fuels. This is expected to help accelerate the use of renewable diesels in Canada and develop new markets for agricultural products. Focus will be placed on lower quality feedstocks that are more difficult to process but less expensive, such as restaurant trap greases and lipids from wastewater treatment plants.

The delivery partners will include NRCan (CETC) laboratories, universities and private companies such as Advanced Engine Technology. The R&D work is expected to involve the development of new and improved process schemes; trial production and characterization of new renewable diesels, and the formulation of robust renewable-diesel fuel blends.

Current Projects 04/05 (funded by Biodiesel Targeted Measures)

- Pretreatment of low quality triglyceride feedstocks for renewable diesel fuel production
- Novel reactor for production of biodiesel
- Northern climate renewable diesel fuels

Activity 3: Integrated 'Bio' Applications

As the title implies, this activity focuses on the entire process from feedstock to final product. It looks at the processes and systems that could produce bioenergy, biofuels, bio-based gases, chemicals and/or valuable co-products from a given feedstock. Viewed from a cradle to cradle perspective, this could also include product use, recycling and disposal. This R&D will also explore how one or more biorefineries might function in an eco-cluster configeration, and where eco-cluster opportunities might exist in Canada.

This activity will support projects in the following themes:

Theme: Integrated Biorefining

Leader:
Dr. Neil Westcott, AAFC, tel 306-956-7266, fax 306-956-7247

The objective of this theme is to identify and develop promising biorefinery applications that integrate the production and conversion of biomass into energy, biofuels, chemicals, materials and other co-products. In the first two years of the Program, this will involve the development of a biorefinery process that converts oilseeds (e.g. flax, cruciferous oilseeds) into renewable diesel and valuable co-products (e.g. pesticides for horticulture crops, hydrogen, lubricants, gums, resins, low temperature fluids, etc.).

There is a lack of fundamental knowledge of the potentially valuable constituents of the brassica and flax crops grown in Canada, and limited knowledge of the unique chemical compositions of oilseed and what products could be produced from oilseed. Oilseeds will be selected from those with known biorefinery potential and advanced biorefinery designs. These include *Brassica juncea*, *Brassica carinata* and *Sinapis alba*, hardy plant species that are agronomically adapted to most growing areas in Canada. Oil derived from these species is readily being used in biodiesel production.

This theme is closely tied to R&D on new and improved feedstocks in Activity 1. The delivery team includes AAFC, Plant Gene Resources Centre, provincial agriculture departments, biotechnology and other industry. Some of the expected outputs are: improved knowledge of plant constituents, identification of advanced breeding lines and varieties with preferred compositions, and links to an economic model to determine value of biorefinery products.

Current Projects 04/05

- Integrated Oilseed Biorefineries

Theme: Regionally Clustered Enterprises

Leader:
Dr. John Jaworksi, IC, tel 613-954-1035, fax 613-952-4209

Biorefineries (see above) can yield a wide range of products from a single raw material. These products often fall into different lines of business that can be pursued either by a major diversified enterprise or by a regional cluster of smaller, more specialized enterprises. While the theory for eco-industrial clusters has been articulated, there are few operating examples. Work under this theme will explore how such clusters can be developed and how their economic and environmental performance can be measured and optimized. This R&D will focus on the identification and development of a regionally clustered enterprise that can (1) exploit bioproducts opportunities relating one platform (e.g. soybean oil); and (2) achieve greater efficiency by operating cooperatively (as eco-industrial clusters) rather than individually. It is expected that candidate eco-clusters will be identified for different regions of the country.

This R&D will be carried out by IC, AAFC, NRC, EC, NRCan, BIOCAP, provincial governments, and involve several private companies such as CASCO, Ensyn and Iogen. A workshop will be organized in the first year to bring the right players together, and develop the workplan for this R&D. Specific R&D that will be undertaken in developing the cluster(s) includes:
a) characterization of existing materials and energy flows among companies in the region encompassing the potential cluster and identification of potential synergies
b) assessment of the potential for substitution of fossil carbon with renewable carbon from biomass and for substitution of stoichiometric chemical processes with catalytic bioprocesses (e.g. enzymes)
c) identification of wastes/residues that are produced and the potential for use as feedstock that will be converted into value-added products and/or energy/fuels
d) development of a cluster "design" or overlay including feedstock and process modifications that increase overall production efficiency, reduce transportation requirements and waste/residue production.

Current Projects 04/05

- Regionally Clustered Enterprises

Activity 4: Cross-Cutting Issues

This fourth area of activity supports cross-cutting work related to coordination, strategy development, analysis and assessment, policy support, communication and dissemination. This work will involve participation of the CBIN ExCo, the External Advisory Panel, federal government policy and inventory groups, counterparts in provinces, US and EU, and industry and multi-stakeholder groups including BioProducts Canada and BIOCAP.

Examples of work that will be carried out under this activity are:

- technical support for the development of sound government 'bio' strategies, policies, regulations, codes, standards
- alignment with the R&D strategies of other federal 'bio' initiatives
- revisions of CBIN strategic plan and action plan
- identification of the Canada's promising 'biomass to product' pathways
- development of 'energy and products from biomass' baseline and tracking of CBIN progress against this baseline
- improved GHG reduction estimates
- environmental impact studies (e.g. LCAs)
- market studies, techno-economic studies, socio-economic studies
- development of appropriate assessment frameworks and tools to evaluate the full impacts of selected biomass feedstock to product pathways
- joint communication projects with industry, associations and other biotech departments targeted to engage specific receptors
- program dissemination; communication of progress and results to other government stakeholders, industry, university and the general public
- support for the establishment of new national research networks (i.e. seed funding), and
- maintenance of CBIN website, including database.

Leaders:

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Maria Wellisch, NRCan-CETC, tel 613-996-6195, fax 613-996-9416

Current Projects 04/05

Environmental Criteria for Siting of Biomass (oil from canola / soybean and animal by-products) to Biodiesel
Environmental Criteria for Siting of Cellulosic (agro forestry) Wastes to Bioethanol
Regulatory Oversight for Biomass (Municipal Sludges and Biosolids) to Energy

Canadian Green Crop Network: Biomass for Greenhouse Gas Reduction and Industrial Energy Efficiency
Strategic Studies
Dissemination
Program Development (website, external advisory panel, etc.)