

Towards an Integrated Action Plan for the Bioeconomy

**Outcomes and Conclusions from a
Critical Conversation^R at Carleton University**

June 3, 2013

**Report prepared for
Natural Resources Canada**



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Executive Summary

The bioeconomy refers to economic activity based on the production of innovative (non-conventional) products and bioenergy from biomass (forest, agriculture, marine and waste) using novel technological processes. Expanding the Canadian bioeconomy has the potential to generate environmental benefits, to provide opportunities for rural development, and to open new pathways for economic growth.

The Canadian Forest Service retained the services of Carleton University's Sustainable Energy Research Center to host and facilitate a Carleton *Critical Conversation*^R on the bioeconomy on June 3, 2013. This event was designed to identify priority areas for government action and to build consensus among senior federal officials for improved integration of activities related to the advancement of Canada's bioeconomy.

This event occurred at a critical point in the development of Canada's bioeconomy. In contrast to similar events held in previous years where discussions focused on analyzing emerging technologies, determining bioeconomy business case viability, and on high-level environmental and economic priorities, attention turned in this meeting to identifying and prioritizing tangible pathways for governmental action. Such actions are intended to reinforce, strengthen and build momentum around initial bioeconomy activities to date.

The event specifically focused on the framework conditions that would be necessary for Canada to achieve the potential benefits associated with the bioeconomy while reducing the risk of falling behind competitors. Framework conditions, which in this context refer to regulatory, policy and operational conditions that impact the growth and competitiveness of emerging bioeconomy activities, are recognized as essential determinants of Canada's attractiveness as a jurisdiction for bioeconomy investment.

At the June 3 meeting, senior federal government and industry participants were tasked with prioritizing bioeconomy-relevant framework conditions in terms of the relative need for short-term action on each. Voting by participants identified five high priority areas for action:

1. Harmonizing and aligning regulations, breaking down bottlenecks;
2. Developing a common vision;
3. Identifying government champions;
4. Building a cross-sectoral innovation system; and,
5. Developing better market Intelligence, mapping and understanding the value chain.

Identifying priority areas for action represents an important first step, one that is necessary to set the stage for further work to advance the bioeconomy. Continuing collaboration between government and industry will be essential. Engaging with provinces and territories, in order to better understand jurisdictional priorities and plans for the development of the bioeconomy, was identified as an essential next step, potentially leading to elaboration of opportunities for improved coordination on the bioeconomy moving forward.

Introduction

The bioeconomy has the potential to improve the environmental and economic sustainability of Canadian industry¹. It has the potential to contribute to a gradual transformation of many sectors of the current economy. Examples of potential benefits from the bioeconomy include: reduced use of fossil fuels; new bio-based ways to produce and use energy and fuels; new bioproducts for nutrition and pharmaceuticals; and, bio-based economic opportunities which could in turn contribute to the rejuvenation of rural economies.

While encouraging early progress in bioeconomy initiatives is already being realized, more could be done, by federal, provincial and territorial governments and industry, to accelerate the advancement of the bioeconomy.

Why Focus Now on Framework Conditions for Advancing the Bioeconomy?

We are currently at a critical juncture in the development of the bioeconomy in Canada. There is a sense that government could strengthen its supportive roles in several ways: by designing and implementing strategic and well-coordinated tangible actions; by building on recent advances in technology; by learning from aggressive bioeconomy strategies implemented by other countries; and, by responding to growing public interest in a more sustainable future.

Several factors are impeding the advancement of the bioeconomy in Canada including a lack of strategic attention to this sector, particularly in comparison with the United States and the European Union, and poor coordination of governmental bioeconomy initiatives (between federal departments and between different levels of government). In addition, firms' limited access to capital for investment in innovative projects continues to constrain bioeconomy growth. An overarching framework demonstrating the federal government's commitment to, and plans for, the bioeconomy would serve to communicate a degree of policy certainty to the potential investors, thereby reducing the risk associated with bioeconomy-related projects.

Definitions: Bioeconomy and Framework Conditions

The bioeconomy refers to economic activity based on the production of innovative (non-conventional) products, including bioenergy, from biomass (forest, agriculture, marine and waste) using novel technological processes.

Framework conditions refer to those regulatory, policy and operational conditions that impact the growth and competitiveness of emerging bioeconomy activities. Examples of framework conditions that could be developed and/or better aligned to support the growth of Canada's bioeconomy are:

- a national vision for the bioeconomy
- environmental and equipment regulations
- market promotion activities
- tariff and non-tariff barriers to trade
- standards for 'sustainability'
- supporting financial policies
- information tools
- collaboration.

¹ The content of the Introduction of this report draws on the Scoping Paper prepared by the Canadian Forest Service, Natural Resources Canada, available at www.carleton.ca/cserc/BioeconomyScopingPaper.

These factors have led to the launch of work to better coordinate federal efforts on the bioeconomy, for example through the creation of the federal Bioeconomy Interdepartmental Working Group (Inset Box), with a long-term view to developing an integrated action plan.

Session to Identify Areas for Action

Natural Resources Canada's Canadian Forest Service organized the June 3 event in order to achieve the following two objectives:

1. to build consensus among senior federal government representatives regarding priority areas for action relating to the bioeconomy; and,
2. to generate support for efforts targeting improved coordination of governmental activities on this topic.

Twenty-nine individuals attended this event, including representatives from five government departments and eight industry associations. Participation by industry associations was based on their membership in the Bioeconomy Network (BEN), a collection of industry associations that was created to advance Canada's bioeconomy (Annex 1 – Participants).

The meeting began with context-setting presentations from industry leaders, followed by table discussions, distillation of the results into key areas for action, and then selection of the highest priority follow-up actions by all participants (Annex 2 – Agenda for *Critical Conversation^R* on the Bioeconomy).

The Carleton Sustainable Energy Research Centre was engaged to host and facilitate a *Critical Conversation^R* event in support of these objectives (Annex 3 – Carleton *Critical Conversation^R*, Sustainable Energy Research Centre).

Setting the Stage

Three experts were invited to provide context-setting perspectives on issues and opportunities related to the advancement of the bioeconomy (Annex 4 – Experts' Biographies).

Bioeconomy Interdepartmental Working Group (BIWG)

Recognizing the diverse range of biomass activities and responsibilities for aspects of the bioeconomy across the federal departments, and the wide range of applications for bioenergy and bioproducts, a Bioeconomy Interdepartmental Working Group has been established with representatives from: Agriculture and Agri-food Canada, Environment Canada, Foreign Affairs and International Trade, National Defense, the National Science and Engineering Research Council, Natural Resources Canada, and Transport Canada, as well as other federal departments and organizations.

The work of the BIWG is directed to:

- identifying key issues facing the bioeconomy;
- developing options to assist the emerging bioeconomy sector in addressing these issues;
- contributing to improving the alignment of federal bioeconomy activities;
- highlighting opportunities for collaboration; and,
- exploring options for the development of a national framework on the bioeconomy.

The BIWG is coordinated by a secretariat led by NRCan and AAFC.

1. A global perspective on the state of the bioeconomy and key emerging issues – A concept in the making

Professor Sten B. Nilsson, CEO of Forest Sector Insights AB, and Guest Research Scholar, International Institute for Applied Systems Analysis (IIASA)

Dr. Sten Nilsson began by emphasizing his perspective that the bioeconomy should be anything but an isolated addition to a country's energy/economic infrastructure or a greenwashing of existing practices. Rather, implementing the bioeconomy should involve a fundamental reorientation of societal and political thinking, fundamentally changed economic development strategies, and fully integrated policy making. Its implementation will contribute to achieving social, economic and ecological sustainability (Inset Box).

Dr. Nilsson pointed out that, in some jurisdictions, advanced actions towards bioeconomy development are already well underway. Many international organizations² have included elements of the bioeconomy in their strategies, and many governments³ have taken actions to advance the bioeconomy within their jurisdictions.

Dr. Nilsson also drew attention to the critically important need for a forum to promote dialogue and collaboration amongst the many players. He suggested that the European Union's Policy Interaction Model for the Bioeconomy could serve as a useful reference point for consideration by Canada:

- A **Bioeconomy Panel**, to provide advice on implementation, suggestions for joint action, and monitoring and evaluation of progress;
- A **Bioeconomy Stakeholders Conference**, a recurring event to raise awareness and provide a forum for informed dialogue; and
- A **Bioeconomy Observatory**, to support monitoring, evaluation and policy making, providing services in capacity mapping, technology monitoring, and preparing future perspectives on emerging bioeconomy challenges and opportunities.

Dr. Nilsson also highlighted several other challenges and threats to the development of the bioeconomy that need to be recognized and addressed strategically. These include: the implications of the shifts in global economic power, finance, funding and access to capital; the cost of developing new supporting infrastructure; competition and resistance from entrenched interests; and competition with products produced by the petrochemical industry using low-cost natural gas as a primary feedstock.

To address these challenges, Dr. Nilsson cited important pathways to pursue, including: the creation of a collective vision; stimulating creativity and innovation, particularly in policy fields; and, actions by a broad cross-section of civil society, governments, businesses/industries, and consumers.

² Among them: The Global Green Institute, the World Bank, the Organization for Economic Cooperation and Development, United Nations Environment Programme, and United Nations Industrial Development Organization.

³ Among them: China (2011), Germany (2011), Ireland (2008), Malaysia (2012), Netherlands (2012), Norway (2012), Russia (2012), South Korea (2008), Sweden (2012), United States (2012), and the European Union (2012).

What is Bioeconomy?

1. Bioeconomy is the transition of the total economy and not just a subset of the economy.
2. Bioeconomy is fundamental change in production and consumption.
3. Bioeconomy is to find new ways to create products and services more efficiently.
4. Bioeconomy is a technology rich, innovation driven, and service-focused economy.
5. Bioeconomy is about politics, changing political economy of how big decisions are made.

Dr. Sten Nilsson, *A global perspective on the state of the bioeconomy and key emerging issues – A concept in the making*, June 3, 2013

Ending on an optimistic note, Dr. Nilsson emphasized the great opportunities for Canada in the bioeconomy, building on the leadership that Canada has shown in several areas within the bioeconomy. In addition, he noted that, based on the availability of vast biomass resources and the demand for bioproducts by several industrial sectors (chemical industry, construction, packaging, automobile manufacturing, and aircraft industries), Canada can learn from its experiences and capitalize this country's advantages to supply bioproducts to global markets. Dr. Nilsson also saw an opportunity to drive the creation of markets for emerging products as a complement to the ongoing production of conventional commodities. That said, Dr. Nilsson noted that while opportunities associated with the bioeconomy are significant, political will is required to ensure the realization of benefits from this sector.

2. Current opportunities and challenges in bioeconomy markets

Don Roberts, Renewable Energy and Clean Technology Team, CIBC World Markets Inc.

Don Roberts provided an overview of the global investment climate for bioproducts, with the majority of his analyses focusing on bioenergy. His opening point was that despite ongoing turmoil in financial markets, we are not waiting for a future bioeconomy to emerge; it is already here. Bioproducts are already available and they are already mainstream industries for investors and consumers alike.

In setting the context for the global investment climate, Mr. Roberts identified four key drivers of investment in bioenergy and two impediments to the growth of this sector in North America (Inset Box). As an example, he outlined how low natural gas prices have caused several U.S. states to reconsider their renewable portfolio standards in power generation. Mr. Roberts reminded participants that low natural gas prices are a North American phenomenon, while markets for bioproducts and bioenergy are global. Illustrating this point are recent investment trends in the biomass-based power sector in Asia and Europe, driven in part by higher fossil fuel prices. In addition, he noted that policy uncertainty also impedes bioeconomy investment – a limitation that is present worldwide.

According to Mr. Roberts, European policies have focused mainly on power generation. Ambitious targets for reducing energy usage, improving energy efficiency and generating energy from renewables have been set by both national governments and the European Commission. However, these ambitious targets have also caused an increase in the price of biomass feedstocks. In fact, increased feedstock costs have led to the cancellation of roughly one third of the planned large-scale biopower projects in the U.K. (the most attractive biopower growth market) since January 2012. In addition to these market pressures, he pointed out that Europe continues to recover from the recent economic downturn, making the achievement of these targets more challenging

Turning to Asia, Mr. Roberts noted that China has set a target to triple its biopower generation capacity by 2020. Mr. Roberts was optimistic when discussing China, noting that the Chinese have a history of meeting their development goals. This bodes well for the bioeconomy in general, as growth in the Asian market may well offset the plateauing of European growth.

Drivers of Investment in Bioenergy

1. **Price of Fossil Fuels** – price signals vary (e.g., coal vs. oil vs. natural gas)
2. **Cost and Quality of the Resource** – typically 50%-70% of variable cost for bioenergy... location is important
3. **Efficiency of the Conversion Technology** – rapid changes in technologies
4. **Public Policy** – in many cases some public support is required.

Impediments to Investment in Bioenergy in North America

1. **Low natural gas prices**
2. **Policy uncertainty**

Don Roberts, *Current opportunities and challenges in bioeconomy markets*, June 3, 2013

Mr. Roberts also noted that, similar to the situation for biopower, the market (and technology) for biofuels may be on the verge of a leap forward. The U.S. government’s Renewable Fuel Standard (RFS2), which targets advanced biofuels, is one of the few renewable energy policies with bipartisan support at the federal level. The government has set aggressive targets for advanced biofuel production in both the short and long terms, and Mr. Roberts saw huge potential for this sector. He pointed out that investment in advanced biofuels has grown substantially over the last few years, with much of this investment in the form of venture capital and private equity, demonstrating investor expectations of growth in this industry. Additionally, investment has also poured into the biochemicals sector.

Mr. Roberts was optimistic that with these levels of investment and research, which helps to keep the “innovation pipeline” full, advanced biofuels would undergo a technological leap in the near future, leading to a reduction in the costs of production from their currently high levels. Mr. Roberts often returned to the point that bioenergy and bioproduct markets are global in scope and that promising opportunities exist outside of traditional markets.

3. Industry perspectives on the bioeconomy

Catherine Cobden, Chair of the Bioeconomy Network and Executive Vice-President of the Forest Products Association of Canada

In the third context-setting presentation, Catherine Cobden provided a synopsis of industry perspectives on the bioeconomy. Ms. Cobden noted that for industry the “essence” of the bioeconomy is to leverage Canada’s endowment of renewable resources to deliver sustainable products to global markets. Essential to this goal will be the creation of an innovation culture around these resources. Ms. Cobden identified the need for an innovation culture in the natural resources sectors in order to identify novel uses for existing products, and to discover and utilize useful, previously unknown properties of resources. She underlined the need for new supply chains to support, replace or augment finite resources. Ms. Cobden highlighted the transformation underway in the forest industry as an example of the emergence of the bioeconomy.

In recent years the Canadian forest sector has undergone a series of structural and cyclical downturns, which have damaged the industry’s traditional sources of revenue. The Bio-Pathways Project, recently undertaken by the Forest Products Association of Canada (FPAC) in partnership with FPInnovations and Natural Resources Canada, shed light on the potential that exists in the bioeconomy for the forest industry to re-invent itself. Ms. Cobden called this project a “wake-up call” for industry to the potential that exists in the bioeconomy, and said that the future of the forest sector lies in reorienting operations towards the bioeconomy. Ms. Cobden was quick to note that this transformation will not be easy, but that it is critical. She listed nine imperatives for a successful transition to the bioeconomy (Inset Box).

Nine Imperatives for the Bioeconomy

1. Productive, competitive industrial base
2. Market driven view
3. Innovation, innovation, innovation
4. Green credentials
5. Economic feedstock supply
6. Supply chain connectivity
7. Partnerships
8. Human resource capacity
9. Regulatory framework

Catherine Cobden, *Industry perspectives on the bioeconomy*, June 3, 2013

Ms. Cobden described the creation of the Bioeconomy Network (BEN) as a first step in addressing these imperatives. The BEN is a collection of cross-sectoral industry associations⁴ representing numerous facets of the Canadian economy. The BEN exists to raise the profile of the bioeconomy within Canada, and serve as a “one-stop shop” for government and investors to engage with industry. When discussing the drivers for different industries to come together, Ms. Cobden highlighted that the traditional compartmentalization of industries was an impediment to success. Ms. Cobden hopes the BEN will build new bridges between industrial sectors through partnerships, enhancing intersectoral coordination, and increasing the efficiency with which bioproducts are produced.

Insights from Participants

Insights from the participants on the discussions so far and thoughts on areas for action were provided in three ways: opening commentaries by five federal officials; feedback in plenary following table discussions; and, observations by a senior observer.

Insights from Five Senior Federal Officials

Following the three context-setting presentations, senior representatives of Agriculture and Agri-Food Canada, Environment Canada, Natural Resources Canada, and FPIInnovations commented on the presentations and provided their views on areas for actions to advance the bioeconomy in Canada. Comments largely focused on market intelligence, trade barriers and technology issues, policy responses, and innovation:

Market intelligence: The first of these themes was the need to properly assess the market for each bioproduct in order to determine those areas where Canada has a competitive advantage and to reveal emerging opportunities.

Trade barriers and technology issues: Emerging bioproducts require novel production processes and have environmental impacts different from conventional activities. In addition, many bioproducts are not widely traded internationally, and thus lack appropriate standards and regulations. The speakers noted that it is imperative that both government and industry be forward-looking in addressing these issues.

Policy responses: The speakers echoed the sentiments of the earlier presenters that well-crafted public policy is necessary for bioeconomy growth, given the significant scale of the transformation being anticipated. Specifically, policies should be designed to establish a level of policy certainty surrounding the advancement of the bioeconomy. Such policy certainty would communicate to the investment community that governments support continued growth of this sector. In addition, it is important that

⁴ Bioeconomy Network member organizations include: the Automotive Parts Manufacturers’ Association, BIOTECanada, the Canadian Bioenergy Association (CanBio), the Canadian Renewable Fuels Association, the Chemistry Industry Association of Canada, Crop Life Canada, the Forest Products Association of Canada, FPIInnovations, and the Sustainable Chemistry Alliance.

policies not be overly-ambitious, or promise too much too soon, in order to avoid leaving industry overextended and public expectations unmet.

Innovation: Finally, the speakers stressed that the bioeconomy will be driven by innovation. Thus, an integrated, collaborative approach to foster innovation by all actors is needed. A valuable point was raised that along with innovation, flexibility within innovation is important. For example, the effects of climate change will present new environmental conditions that cannot be controlled or accounted for with any certainty. In order to adapt to future environmental changes, then, those making investments in the bioeconomy will need to be flexible in their approaches to improve the likelihood of success.

Insights from Table Discussions

After the context-setting presentations and insights from the senior officials, participants were invited to share their views during table discussions and to propose three areas for action for consideration by all participants in plenary.

Table One highlighted the importance of being guided by industry priorities and needs. They recommended that all regulatory policies be placed under “one-roof” and that subsequent government policies should be aimed at improving information sharing, developing procurement policies, market promotion, horizontal collaboration, and incentives for commercialization. Table One also noted that efforts should be made to speed both the policy and regulatory systems impacting bioeconomy initiatives. The table recommended that operational aspects of the bioeconomy (financing, market research, etc.) should be geared toward de-risking investments in innovative bioeconomy projects in order to encourage early adopters.

Table Two noted that a common vision or framework needs to be developed and that the federal government has a leadership/championing role to play. In addition, individuals at that table highlighted the need to construct a database of bioeconomy market information (e.g., feedstock availability, demand for emerging products), perhaps similar to the model employed by the European Union. They also touched on the need for a comprehensive regulatory regime, making specific mention of the importance of international aspects, such as the protection of intellectual property and global standards for sustainability. Regarding areas for improved collaboration, Table Two emphasized the importance of increasing cooperation and collaboration between industrial sectors. This table also noted that educational campaigns focused on the benefits and possibilities of the bioeconomy could help to incentivize and facilitate its development.

Table Three recommended that the scope for the bioeconomy in Canada needs to be assessed and measured. This exercise would lead to the development of a more coherent and poignant vision for the bioeconomy moving forward. They also noted that developing an innovation system that spans the entire value chain and is active across industrial sectors would spur more efficient growth. This table also emphasized the need for championing by both governmental and industry leaders and the desirability of linking sector goals to tangible outcomes. Finally, they noted that the bioeconomy will require a skilled workforce, and that both industry and government have a role to play in promoting labour force skills development.

Table Four identified bioeconomy capacity mapping and crafting a common vision for this sector in Canada as high priority areas for action. Fostering partnerships among stakeholders, especially stakeholders outside the typical biomass-based industries, and building an efficient regulatory framework were also noted as important areas for action. Improving coordination between the different levels of government was also highlighted. Table Four also discussed the importance of raising awareness of the bioeconomy more generally, in particular to Canadians and consumers worldwide.

Table Five emphasized the need to articulate a vision, both domestically and globally, which would clearly specify Canada's targets for the bioeconomy. Once such a vision is developed, benchmarking of current initiatives, documentation of successes and failures, and tracking of bioeconomy activity are needed to promote success moving forward. With respect to collaboration, better mobilization of stakeholder resources toward the aforementioned framework priorities and the identification of both government and industry champions were identified as high priority areas for action.

Insights from a Senior Observer

Following the presentations summarizing the table discussions, a senior observer from the Canadian Forest Service, Natural Resources Canada, provided insights on key issues emerging from the discussions.

The senior observer started by noting that the context for the event has shifted significantly from that existing at the time of a similar event on forest-based bioenergy in 2009. The significant potential of the bioeconomy in Canada is being recognized and efforts to improve coordination of activities have commenced (e.g., the Bioeconomy Interdepartmental Working Group (BIWG) co-led by Natural Resources Canada's Canadian Forest Service and Agriculture and Agri-Food Canada). He mentioned that the next steps will include outreach to provinces and territories in order to connect with stakeholders across the country to develop a common approach to advancing the bioeconomy. He pointed out that improving coordination of bioeconomy activities represents only one aspect of advancing this sector.

The observer identified three congruent aspects as equally important: the correct political and economic timing for action; doing the required "homework"; and, articulating a vision with a coherent voice across government and industry.

Political and economic timing: The observer noted that careful timing is essential for actions to advance the bioeconomy. An important factor which could influence policies in Canada is that the Obama administration has taken a proactive stance on climate change and sustainability, setting the stage for progress on reducing emissions in the United States. This policy action in the U.S. could potentially increase the likelihood of related initiatives being considered by the federal government in Canada. Also, interest in the bioeconomy by both European and Asian markets is strengthening. All of these factors bode well for the future of the bioeconomy especially if overall economic conditions improve.

Being well prepared: In order for Canada to take advantage of these favourable conditions, the senior observer pointed out that stakeholders must be properly prepared. The Bio-Pathways Project, the creation of the BEN, and the launch of the BIWG are examples of how both industry and government are completing the "homework" necessary to identify the opportunities and challenges associated with the

bioeconomy and to better coordinate related work going forward. While continued efforts are needed, progress to date is encouraging.

Speaking with one voice: The observer emphasized the critical importance of the need for stakeholders to develop a common vision for the Canadian bioeconomy and then to communicate this vision in a consistent and coordinated fashion. He also noted the importance of better understanding Canada's specific strengths to take full advantage of opportunities as they arise.

The observer noted several messages emerging from the discussions. In developing this common vision, collaboration is important; input and ideas are needed from all stakeholders. Similarly, champions, in both government and industry, need to emerge who are willing to take a defining role in driving Canada's efforts. On the subject of policy initiatives, a clear regulatory environment was highlighted as desirable. Both government and industry need to consciously direct activities toward addressing market failures, so as to avoid creating market distortions (e.g., the need for long-term subsidies).

Identifying Priorities and Discussion of Outcomes

As mentioned above, the task assigned to each table was to identify their highest priority areas for action to advance the bioeconomy in Canada. After each table reported their recommendations in plenary, the facilitators summarized the table recommendations into eleven potential areas for action (Table – Areas for Action).

Top Five Priorities

In order to identify the highest priority items from the discussions, the participants indicated their preferences by allocating their six votes among the eleven areas for action⁵. Participants could allocate more than one of their votes to an area for action.

1. **Harmonizing and aligning regulations, breaking down bottlenecks:** This item received the largest number of votes. During the table discussions, it was pointed out that an absence of regulations, while reducing the burden on industry in the short term, also creates uncertainty moving forward. With this in mind, a participant added that it was not only important to put harmonized and aligned regulations in place, but that the regulations must also be

⁵ The top five areas for action received 63% of the 139 votes cast by participants.

efficient and effective. Another added that environmental regulations governing the bioeconomy could spur innovation and stimulate the adoption of new technologies. One presenter extended this point to include the need to establish common standards across the bioeconomy. The point was made that intergovernmental collaboration is very important, in spite of the fact that the coordination of government actions is difficult due to mandate considerations.

- 2. Developing a common vision:** The essential starting point for developing a bioeconomy implementation strategy and action plan is a well-articulated vision of what the bioeconomy could become in Canada. As the senior observer stated, the vision needs to be coherent, reflecting the interests of government and industry and setting the stage for agreement on common priorities. It should include an analysis of the potential for this sector to create jobs and generate economic growth.

Areas for Action (Number of votes received)	
1.	Harmonizing and aligning regulations, breaking down bottlenecks (21)
2.	Developing a common vision (19)
3.	Identifying government champions (16)
4.	Building a cross-sectoral innovation system (16)
5.	Developing better market intelligence, mapping capacity, understanding the value chain (15)
6.	Developing operational capacity - access to capital, fostering risk-sharing (13)
7.	Better articulating the benefits of the bioeconomy, improving communication (13)
8.	Mechanism for measuring activities, benchmarking (11)
9.	Market promotion, especially internationally (9)
10.	Define roles of different players (4)
11.	Government procurement, provide incentives (2)

One participant stated that a holistic approach was required to position the bioeconomy within the overall Canadian economy, not just as a new fledgling “tack-on” sector. Working closely in an integrated fashion with provincial governments was mentioned on a number of occasions, providing guidance for an approach to developing a common vision statement in the future.

- 3. Identifying government champions:** The need for the federal government to take a visible and substantive leadership role with respect to the bioeconomy was mentioned on a number of occasions. One participant advocated for “clear government ownership” of the bioeconomy file. Also, there was an expectation that policy uncertainty could be reduced if the federal government played a leadership role and paid close attention to the bioeconomy as a priority policy area.

Another participant stated that it is imperative to get started now by identifying representatives of key organizations, rather than waiting until representatives of all sectors have been identified and have become engaged.

- 4. Building a cross-sectoral innovation system:** Innovation, and the need to foster collaboration amongst stakeholders, were mentioned frequently as an essential building block of any effort to advance the bioeconomy. Innovation is a key ingredient in the industry’s progress towards new products and new processing technologies.

The participants noted the need to ensure that the “R&D pipeline stays full” and to make innovation activities complementary, i.e., bringing the results of research to commercialization through the integrated actions of stakeholders. Industry can benefit from the sharing of

experiences and “lessons learned” from innovation initiatives through collaboration and dialogue, not only within a particular industrial sector but also through linkages between sectors.

Another important point mentioned was that technological innovation alone is not sufficient; innovation in policies, regulations, business practices and cross-sectoral partnerships will be equally important.

Several comments by participants highlight the innovation challenges ahead. One participant stated that while substantive investments are being directed to the bioeconomy, significantly more investment is required to meet the aggressive targets set for GHG reductions at the Copenhagen Conference of the Parties in 2009. Another participant underlined the importance of innovation, saying that the federal government has been active, and will continue to be active, but that this is dependent upon political will. Measures to protect a company’s intellectual property also require attention, particularly to provide for protection for those involved in international markets. In light of these challenges, building an innovation system to coordinate bioeconomy efforts is considered vital.

5. Developing better market intelligence, mapping capacity, understanding the value chain:

Participants discussed the content of this item at length. In essence, they felt that it is important to understand the characteristics of market demand for each emerging bioproduct. One participant indicated that access to knowledge and current information could serve to increase the interest and confidence of companies engaged in fledgling bioeconomy activities. Another added that it is important to have good information on the capacity for developing and marketing bioproducts to meet the expected demand. Understanding the value chain was interpreted by a participant as knowing the costs and value-added at each stage of the production process, including feedstock characteristics, transportation, processing, packaging and distribution, and wholesale and retail marketing.

An example was given of how market conditions affect the prospects for new bioproducts. At present, natural gas prices are low, and as a result, products produced by the petrochemical industry using natural gas as a feedstock are currently less expensive than equivalent products produced using biomass feedstocks. As long as natural gas prices remain low, bioproducts will face tough economic competition in the market place.

In addition to the five high priority areas for action identified through the voting process, participants stressed the importance of action on other bioeconomy-related topics, including:

- **Developing enhanced operational capacity - access to capital, fostering risk-sharing:** Operational capacity in this context refers to the set of operational factors supporting a firm’s competitiveness, including business environment, access to capital, and pathways for risk-sharing on bioeconomy projects; and,
- **Better articulating the benefits of the bioeconomy, improving communication:** Since the current knowledge and awareness of the features of the bioeconomy amongst the general public are limited, there is a need to better articulate the benefits, and to have both industry and government “speak with one voice”.

Important Points Which Fell Outside of the Categories Used for Voting

Following the presentation of the voting results, several comments were made on points which fell outside the eleven areas for action. These points could further inform subsequent work on the bioeconomy.

1. **Importance of policy certainty:** Access to capital, particularly at early stages of developing the bioeconomy, would be increased through improved policy certainty as established by federal and provincial governments. This could be in the form of commitment to a joint government-industry vision statement, as noted above.
2. **Importance of verifying product sustainability:** Several participants noted that constructing a system of credentials to ensure and demonstrate product/practice sustainability would be a worthwhile initiative. It was felt that this process would need to occur in the future once the initial frameworks were formulated.
3. **Interest in the services provided by the European Bioeconomy Observatory:** Participants noted that there were lessons to be learned from foreign jurisdictions and the policy tools they had developed. One example of this was the creation of a Bioeconomy Observatory, as described by Dr. Sten Nilsson in his presentation (see page 6). Such a policy instrument was seen as a potentially valuable tool, but was deemed as being too specific for the general categories used for voting during the event.
4. **Availability of highly-qualified people:** Although not included among the set of areas for action identified in this meeting, a critically important factor in advancing the bioeconomy is the availability of engineers, scientists, technicians, and maintenance staff trained in the latest technologies and processes. Also needed are marketing experts and global business specialists for bioproducts intended for foreign markets. In addition, people are needed with policy skills to provide sound policy advice to governments at all levels, with skills to design, implement, and enforce regulations and standards, and with the capability to work within companies to enable them to meet the requirements of new environmental, safety and health regulations and standards associated with the bioeconomy.
5. **Market research:** Participants specifically mentioned that the term "market research" was not clear, and that different understandings of the term were at play during the voting. An interpretation of market research involves understanding the demand for a particular product so that the prospects for future profits can be assessed.
6. **Market promotion:** Questions arose concerning the meaning of the term "market promotion". Generally, this term was thought to refer to activities of government and industry to make the public aware of the potential benefits offered by the bioeconomy. This was not seen to be a serious problem by any of the participants, but clarity of the term should be addressed in future events.
7. **Other areas for action not included in the voting:** The comment was made that it is important to not overlook any of the areas for action referenced in the scoping documents and restated on page 4 of this report. Not included in the areas for action identified through the table discussions were tariff and non-tariff barriers to trade and supporting financial policies.

Consideration of these, along with the priority areas for action identified through the voting procedure, was recommended.

Conclusions

While early progress in the development of Canada's bioeconomy is encouraging, participants at the June 3, 2013 *Critical Conversation*^R recognized that continued efforts are needed to support the growth of this sector going forward. In particular, activities to align Canada's framework conditions toward positioning this country as an attractive jurisdiction for bioeconomy investments are critical. Participants also recognized that, given the significant support being offered by competing countries to grow their domestic bioeconomies, Canada must take action in the near term to reinforce, strengthen and build momentum in this sector to ensure we are not left behind.

Advancing the bioeconomy will not be an easy task, nor can any one stakeholder accomplish it alone. This event highlighted that in these early stages there is a clear and important role for the federal government, in collaboration with industry, to develop a common vision for the bioeconomy.

This event identified five high priority areas for action for consideration by the government and industry:

1. Harmonizing and aligning regulations, breaking down bottlenecks;
2. Developing a common vision;
3. Identifying government champions;
4. Building a cross-sectoral innovation system; and,
5. Developing better market intelligence, mapping capacity, understanding the value chain.

1. Harmonized and aligned regulations and standards are needed in order to provide industry with an efficient regulatory environment that promotes the implementation of innovative projects and facilitates the trade of emerging bioproducts. While the federal government needs to be a leader in advancing the priorities of the bioeconomy, close collaboration with industry, provincial/territorial governments and other stakeholders is essential.

2. Governments and industry need to work together to develop a vision for Canada so that efforts are aligned and mutually supportive. The consolidation of industry's thinking through the creation of the Bioeconomy Network, and in a similar fashion, the establishment of the federal Bioeconomy Interdepartmental Working Group, will help pull together dialogue towards developing a common vision for the bioeconomy.

3. Leadership by government champions is essential. Such leadership will convey the government's commitment to the bioeconomy. Related to this point is the need to develop policy certainty surrounding the bioeconomy, which is recognized as a key factor in improving firms' access to capital for innovative projects.

4. Innovation has been, and will remain, critical to the advancement of the bioeconomy. Stakeholders should strive to foster a culture of innovation along the entire value chain and build linkages with

players outside their traditional sectors. Participants underlined the importance of both technological and policy innovation.

5. There is a need to facilitate targeted research in order to provide industry with better market intelligence. An example is mapping the value chain from feedstocks and processing through to wholesale and retail markets in Canada and abroad. There is a need to identify markets and areas where Canada has strength or advantages, and leverage them to support bioeconomy growth.

The June 3, 2013 *Critical Conversation*^R, hosted by Carleton University's Sustainable Energy Research Centre, produced a high level of consensus regarding the need for a coordinated national vision on the bioeconomy. In addition, the need to develop regulations that support bioeconomy growth, to improve market intelligence, and to engage champions at all levels of government and industry were highlighted. Through concerted actions in these areas to align Canada's framework conditions in support of the bioeconomy, this country can be positioned to capture the significant potential benefits offered by this emerging industrial sector.

Acknowledgements

The contributions of many individuals and organizations were essential to the successful delivery and reporting on the bioeconomy *Critical Conversation^R* event on June 3.

It has been a pleasure to work with the Natural Resources Canada officials in the design, organization and delivery of this event: Rory Gilsean, Amanda Dacyk, and Chanchoura Schmoll of the Canadian Forest Service.

The three presenters, Dr. Sten Nilsson (IIASA), Don Roberts (CIBC) and Catherine Cobden (FPAC), provided excellent context-setting presentations and shared their insights and recommendations in the course of the meeting.

Thanks are due to the Forest Products Association of Canada for providing the hospitality for the event.

The event was facilitated by Graham Campbell, assisted by David Cherniak and Kendal Bradburn. This report was written by David Cherniak and Graham Campbell.

Carleton University appreciates the opportunity to assist Natural Resource's Canada's Canadian Forest Service using the Carleton *Critical Conversation^R* format with this important initiative towards developing an integrated action plan for the bioeconomy. We look forward to providing assistance in the future as the bioeconomy initiative moves forward.

This report has been prepared for Natural Resources Canada – Canadian Forest Service in partial fulfillment of Contract No. 3000518319 to design, facilitate and report outcomes from a Carleton *Critical Conversation^R* event.

Annexes

1. Participants

Name	Title	Organization
Tom Rosser	Assistant Deputy Minister	Natural Resources Canada (Canadian Forest Service)
Glenn Mason	Director General	Natural Resources Canada (Canadian Forest Service)
Rory Gilsenan	Director	Natural Resources Canada (Canadian Forest Service)
Olaf Schwab	Chief	Natural Resources Canada (Canadian Forest Service)
Jean-Francois Levasseur	Program Lead	Natural Resources Canada (Canadian Forest Service)
Frank Des Rosiers	Assistant Deputy Minister	Natural Resources Canada (Innovation and Energy Technology Sector)
Gilles Jean	Director General	Natural Resources Canada (Varennes Research Center)
Greg Meredith	Assistant Deputy Minister	Agriculture and Agri-Food Canada (Strategic Policy Branch)
Andrea Johnston	Director	Agriculture and Agri-Food Canada (Strategic Policy Branch)
Kara Beckles	Chief	Agriculture and Agri-Food Canada (Strategic Policy Branch)
Derek Hermanutz	Director General	Environment Canada (Strategic Policy Branch)
Ronnie Hayes	Senior Business Advisor	Foreign Affairs and International Trade Canada
Brad Feasey	Senior Analyst	Industry Canada (Manufacturing and Life Sciences Branch)
Tim Karlsson	A/Director General	Industry Canada (Manufacturing and Life Sciences Branch)
Andrew Caddell	Trade Commissioner and Global Practice Lead, Forestry Innovation	Foreign Affairs and International Trade Canada
Catherine Cobden	Chair/ Vice-President	Bioeconomy Network/ Forest Products Association of Canada
Paul Lansbergen	Vice President, Regulations and Partnerships, Corp Secretary	Forest Products Association of Canada

Bob Laroque	Director, Environment	Forest Products Association of Canada
Don Roberts	Vice-Chairman of Wholesale Banking / Managing Director in Investment Banking	CIBC World Markets Inc.
Sten Nilsson	CEO/ Guest Research Scholar	Forest Sector Insights/ International Institute for Applied Systems Analysis
Jon Flemming	Vice President, Industry Affairs	BIOTECanada
Victoria Osbourne	Director, Policy & Industry Affairs	BIOTECanada
Deborah Elson	Vice President Membership, Stakeholder Relations and Industry Promotions	Canadian Renewable Fuels Association
James Lee	Portfolio Manager	Sustainable Chemistry Alliance/ Bioindustrial Innovation Canada
Pierre Lapointe	President and CEO	FPInnovations
Christopher Rees	Managing Partner	Canadian Bioenergy Association
Larry Gooder	Business Development Manager	Borealis Wood Power Corp.
Dennis Prouse	Vice-president, Government Affairs	CropLife Canada
John Margeson	Manager, Business and Economics	Chemistry Industry Association of Canada
Graham Campbell	Executive Director	Sustainable Energy Research Centre Carleton University

2. Agenda for the *Critical Conversation*^R on the Bioeconomy

Objectives

1. **Build consensus among senior federal government and industry representatives regarding priority areas of action relating to bioeconomy framework conditions**
2. **Garner support for efforts targeting improved integration of bioeconomy activities across sectors, departments and jurisdictions**

Agenda

- A. **Welcome and introductory remarks** (Tom Rosser, ADM, Natural Resources Canada- Canadian Forest Service)
- B. **Context for the day and introduction of speakers** (Graham Campbell, Carleton University)
- C. **Framing presentations**
 1. **A global perspective on the state of the bioeconomy and key emerging issues – A concept in the making**
Professor Sten B. Nilsson, CEO of Forest Sector Insights and Guest Research Scholar, International Institute for Applied Systems Analysis
 2. **Current opportunities and challenges in bioeconomy markets**
Don Roberts, Renewable Energy & Clean Technology Team, CIBC World Markets Inc.
 3. **Industry perspective on bioeconomy**
Catherine Cobden, Chair of the Bioeconomy Network and Vice-President, Forest Products Association of Canada
- D. **Initial federal views on the framing presentations**
 - Greg Meredith - Agriculture Agri-Food Canada, Strategic Policy Branch
 - Tom Rosser - Natural Resources Canada, Canadian Forest Service
 - Derek Hermanutz - Environment Canada, Strategic Policy Branch
 - Frank Des Rosiers - Natural Resources Canada, Innovation and Energy Technology Sector
 - Pierre Lapointe – FPInnovations
- E. **Table discussions: Identify table member's priorities for action on the bioeconomy**

Where are there overlaps/differences?
Are there opportunities for synergies?
Which framework conditions are most often implicated?
- F. **Reporting session: One representative from each table reports on common/overarching points from discussions**
- G. **Observations thus far from a senior observer** (Natural Resources Canada – Canadian Forest Service)

Common strategic directions heard so far. What's been missed?
Some ideas towards common themes, opportunities for synergies
- H. **Selection of the highest priority synergies and opportunities by voting protocol. Presentation of voting results**

Facilitated by Carleton University
- I. **Presentation of draft conclusions** (facilitated by Carleton University)

Common elements - strategic themes and directions, opportunities for synergies to guide an action plan
Discussion, critique, and improvement of draft conclusions
- J. **Summary, next steps and close** (Graham Campbell, Carleton University)

3. Carleton *Critical Conversation*^R and Sustainable Energy Research Centre

A **Carleton *Critical Conversation*^R** is a structured provocative conversation which aims to push the boundaries of thinking around key policy issues currently challenging stakeholders. The broad purpose is to develop and advance policy alternatives and options. This event brought together individuals working on bioeconomy issues across government and industry and an international expert.

Each *Critical Conversation*^R focuses on a well-defined question or issue. Other integral features are: a pre-event scoping paper which sets the context and provides all participants with a common reference document; participation by invitation, engaging people with a mix of expertise and sectoral representation; context-setting presentations from recognized experts; intimate in-camera dialogue, in table discussions and plenary sessions; commentary by a senior observer offering personal insights and flagging any overlooked issues; selection of high priority items using a voting protocol; and, a summary report which documents the discussion and provides conclusions to guide future policy development.

The **Carleton Sustainable Energy Research Centre (CSERC)** facilitated this *Critical Conversation*^R. CSERC is affiliated with both the Faculty of Engineering and Design and the Faculty of Public Administration. Its goal is to advance sustainable energy by working jointly on innovative technologies and policies. The Centre offers a program of sustainable energy seminars, courses and supports research amongst faculty researchers. www.carleton.ca/cserc/.

4. Experts' Biographies

Sten Nilsson

Sten Nilsson is the CEO of the consulting firm Forest Sector Insights AB. He has worked as a consultant on the transformation of the forest sector for international organizations as well as the forest industry itself. In 2010, he worked as an advisor to the Forest Products Association of Canada and the Canadian Government through the Canadian Forest Service with respect to the transformation of the Canadian forest industry to a bio-oriented industry. Dr. Nilsson is affiliated with the European Commission and different industries on the bio-concept. He has served as an expert in different international organizations such as the World Commission on Forests and Sustainable Development, the International Boreal Forest Research Association, and the Rights and Resources Initiative. Dr. Nilsson has held a number of consultancies in organizations such as the World Bank, the FAO, the OECD, and the European Commission.

Don Roberts

Mr. Don Roberts is a Vice-Chairman of Wholesale Banking, and Managing Director in Investment Banking with CIBC World Markets Inc. where he leads the bank's Renewable Energy & Clean Technology Team. In 2012, he was chosen by Corporate Knights Magazine as the individual in the Financial Services sector who contributed the most to sustainable development in Canada. Mr. Roberts is an Adjunct Professor in the Department of Forest Resource Management at the University of British Columbia (Vancouver), is on the Board of Directors, of the Rights and Resources Institute (Washington, D.C.), and he serves in an advisory capacity for a range of government, industry, and NGO groups.

Catherine Cobden

Catherine Cobden is the chair of the Bioeconomy Network (BEN), a group of industry associations joining forces to explore ways to take advantage of the significant emerging potential in the global marketplace for bio-based products. Ms. Cobden is also the Executive Vice President of the Forest Products Association of Canada (FPAC), the nationally and internationally recognized voice of Canada's wood, pulp and paper producers. She played a key role in developing the Canadian Forest Sector Transformation Strategy, shepherded the landmark Bio-Pathways study, and led the 2012 launch of a new vision to chart a dynamic direction for the sector. Before joining FPAC, Ms. Cobden was a lobbyist with Fleishman Hillard and she also held several corporate positions within forest products companies including a global newsprint producer. Ms. Cobden is a chemical engineer from the University of Toronto and a graduate of its Pulp and Paper Centre.

The expert presentations are available at www.carleton.ca/cserc/BioeconomyExpertsPresentations.