Bio-hubs: Roles in Biomass Supply Chains

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## Bio-hubs: Role in Bioenergy and the Broader Bioeconomy

A bio-hub acts as an **intermediary** in biomass supply chains and markets.

| Benefits | • Functions as a storage, loading, recycling, and processing facility.  
|          | • Improves biomass supply chains, enhances the value of biomass products, and creates business opportunities. |
| Challenges | • Variability in biomass availability (weather conditions, seasonality).  
|           | • Requires efficient logistics and transportation management.  
|           | • Capital investment, operation costs and technical complexity. |
| Opportunities | • Integrate within the bioeconomy through strategic planning and collaboration with various stakeholders.  
|              | • Capitalize on the growing demand for diverse feedstocks from bio-based industries |
Bio-hub Business Model and Business Model Canvas (BMC)

Bio-hub Business Model:
A framework defining how a business creates, delivers, and captures value for sustainable revenue.

- Essential for **optimizing processes** within bio-hubs, bioenergy production, and the broader bioeconomy.

Business Model Canvas:
A visual framework for developing, describing, and analyzing a business model.

- A **guide for** outlining essential components within the business model.
- **Components**: Key partners, activities, resources, propositions, customer relationships, customer segments, channels, cost structure, and revenue streams.
Components of Business Model Canvas

Value Proposition (VP)
- Feedstock supply contracts
- Economies of scale
- Biomass use consultation

Key Partners (KP)
- Biomass suppliers
- Renewable industry leader
- Innovation partners

Key Activities (KA)
- Biomass supply
- Cascading biomass use
- Biomass service
- Sustainability certification

Key Resources (KR)
- Biomass processing equipment
- Transportation infrastructure
- Skilled personnel

Customer Relationships (CR)
- Industry
- Forest owners
- Local communities
- Direct contacts
- Circular economy

Customer Segments (CS)
- GHG emission reduction industries
- Biomass residues holding industries
- Energy companies such as for district heating
- Carbon footprint reducing communities

Channels (CH)
- Informative websites
- B2B Initiatives
- Residue-based bio-industry
- Public procurement

REVENUE STREAMS: Sales of biomass for energy
Workshop: Business Model for Bio-hubs in Canada

Event Details
• Date: June 28, 2023
• Participants: 27 pre-selected experts

Objectives
• Present a theoretical bio-hub business model using the BMC template to enhance and tailor the model for Canada.
• Delve into specific model components to improve the model.
• Establishing a platform for sharing information related to the engagement requirements for bio-hubs to enhance the “theoretical” business model.
Pre-workshop Survey

Regional distribution of workshop participants

- Nova Scotia: 6
- New Brunswick: 4
- Quebec: 3
- Ontario: 6
- Saskatchewan: 8
- Alberta: 1
- British Columbia: 1

Respondents by type of organization

- Not-for-profit organization: 7
- Academia/ University: 3
- Provincial/ territorial government: 4
- Federal government: 5
- Industry or business: 6
- Research Institute: 6
Pre-workshop Survey

Respondents by Type of Sector

- Forestry: 71.0%
- Bioenergy: 54.8%
- Forest products: 45.2%
- Professional, scientific, technical: 22.6%
- Educational services: 19.4%
- Government (public administration): 19.4%
- Agriculture or agri-food: 12.9%
- Product manufacturing: 6.5%
- Other: 6.5%
- Construction: 3.2%

Respondents’ familiarity with bio-hubs

- Very familiar
- Somewhat familiar
- Not at all familiar

Percentage of Survey Respondents
Presentation of Theoretical BMC Utilizing Miro
Voting Feature of Miro

Key Partners

- Biomass suppliers
- Key industry looking to substitute fossil with renewable carbon or bioactive components
- Certification org. for sustainability
- Logistics companies
- Equipment suppliers
- Agency to apply for R&D funds
- First-movership/Partners
- Innovation partners
- Industrial Technological poles
- Environmental Sustainable Governance (ESG), Global Reporting Initiative (GRI) report
- Social Innovation Community

Key Activities

- Biomass supply
- Collaboration w/R&D
- Full fiber utilities zero-maintenance
- Certifying biomass for sustainability
- Communication to the customers on advances and contributions towards sustainability
- Biomass storage as a service
- Renting equipment related to biomass supply
- Providing services related to biomass supply
- Cascading use of biomass
- Assuring biomass is certified as sustainably sourced
- Providing equipment to customers who can find the best use
- Storing biomass
- Service of biomass logistics
- Intellectual property rights
- Providing sustainability certificates
- Creating value through the use of biomass
- Ensuring the equipment

Key Resources

- Biomass supply equipment
- Laboratory equipment
- Knowledge on biomass storage
- Assuring biomass is certified as sustainably sourced
- Consulting on the best use of the given storage space
- Condensing biomass storage space using a sustainable technology

Value Proposition

- Sourcing certified sustainably sourced renewable carbon for the best market possible
- Biochemical properties
- Physical properties of biomass
Value Proposition for Bio-hubs

- Biomass Harvest & Removal; 19; 11%
- Feedstock Supply Contracts; 39; 22%
- Integrated Energy Supply (stump to stack); 21; 12%
- Economies of Scale Leveraging; 27; 15%
- Value-added Wood Products; 22; 13%
- Biomass Conditioning for Optimal Value; 22; 12%
- Biomass Use Consultation; 26; 15%
# Integration of Key Components of BMC

## Key Partners

1. **Biomass Suppliers**: 61
2. **Renewable Industry Leader**: 25
3. **Innovation Partners**: 22
4. **Sustainability certification organisation**: 13
5. **Logistic partner**: 12
6. **Equipment suppliers**: 10

## Value Proposition

1. **Feedstock Supply Contracts**: 39
2. **Economies of Scale Leveraging**: 27
3. **Biomass Use Consultation**: 26
4. **Biomass Conditioning for Optimal Value**: 22
5. **Value-added Wood Products**: 22

## Key Activities

1. Biomass supply: 61
2. Cascading Biomass Use: 15
3. Biomass Service Providers: 14
4. Sustainability Certification: 14
5. Full fiber utilisation: 13
7. Biomass storage services: 8

## Key Resources

1. Innovative use of Biomass: 46
4. Biomass storage Expertise: 20
5. Biomass Transport & Delivery: 19
6. Sustainable Biomass Certification Assurance: 16
7. Insurance & Investment Support for Feedstock Supply: 14

## Customer Relations

1. Industry Network Collaboration: 29
2. Forest Owners: 23
3. Local communities: 22
4. Direct contacts: 18
5. Circular Economy & Sustainability Recognition: 16
6. Support for Consumer’s Fuel Switching Infrastructure
7. Financing: 15

## Channels

1. Net-Zero Industries Events: 31
2. Residue-based Bio-industry: 31
3. Public Procurement: 23
5. Lobbying Efforts: 13
6. Biomass supply & Bioeconomy conferences: 9
7. BDO Zones: 9
8. Social innovation & Entrepreneur Sponsorship: 2

## Customer Segments

1. GHG Emission Reduction Industries (Carbon Pricing): 38
2. De-Fossilization Required Industries: 28
4. Energy Companies e.g. district heating: 20
5. Carbon Footprint-Reducing Communities: 19
6. Wood Pellet Industry: 10
7. Regional Developers: 6

## Costs

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## Benefits: revenues, perks, fringe benefits
Key Learnings

• **Successful biomass supply in the bioeconomy requires** strategic partnerships, optimized operations, resource access, strong customer relationships, and effective outreach channels.

• Despite the opportunities, various challenges exist in implementing elements of the bio-hub business model.

• **Tailored to Canada’s unique bioenergy challenges and opportunities**, this workshop provided insights for a successful bio-hubs business model.

• **Limited bio-hub examples in Canada** mean that best practices and key success factors remain to be defined.

• Integration of bio-hubs within supply chains will evolve as we learn how they can best support business opportunities.
Study Limitations

- The workshop focused on forest supply chains, suggesting a need to **include other bio-based sectors**.
- Participation was limited considering that **conditions vary greatly across regions in Canada**, namely calling for more Indigenous involvement.
- The results are **exploratory**, providing insights into the perceptions of sector representatives rather than presenting a fully validated business model.
Future Steps in Business Model Development

• Obtain **cost and revenue data** through case studies to inform subsequent models.

• **Connect with more stakeholders** designing and operating bio-hubs in Canada to validate the model and demonstrate bio-hub implementation.

• Future studies should investigate how **investments in biomass supply chain management** and policies can facilitate bio-hub development.

• **Replicate the workshop** in other countries, offering lessons on crucial factors for business models and fostering innovative thinking.
Questions