



**CBIN: Canadian Biomass Innovation
Network**

**RCIB: Le réseau canadien d'innovation
dans la biomasse**

June 9, 2005

Maria Wellisch, Program Coordinator

Natural Resources Canada (NRCan)



Natural Resources
Canada

Ressources naturelles
Canada

Canada

CBIN (Canadian Biomass Innovation Network)

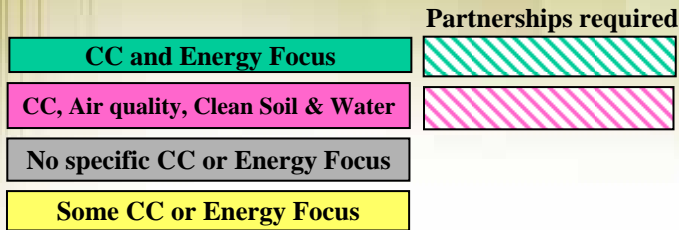
RCIB: Le réseau canadien d'innovation dans la biomasse



- **Introduce R&D Network**
 - Funding of Applied R&D: bioenergy, biofuels, industrial bioproducts & bioprocesses
- **Bioenergy R&D = foundation**
 - expanded to include other bio products, biorefineries
- **Research Activities & Themes**
 - Biomass Conversion & Utilization Technologies
- **Upcoming Events & Contact Info**



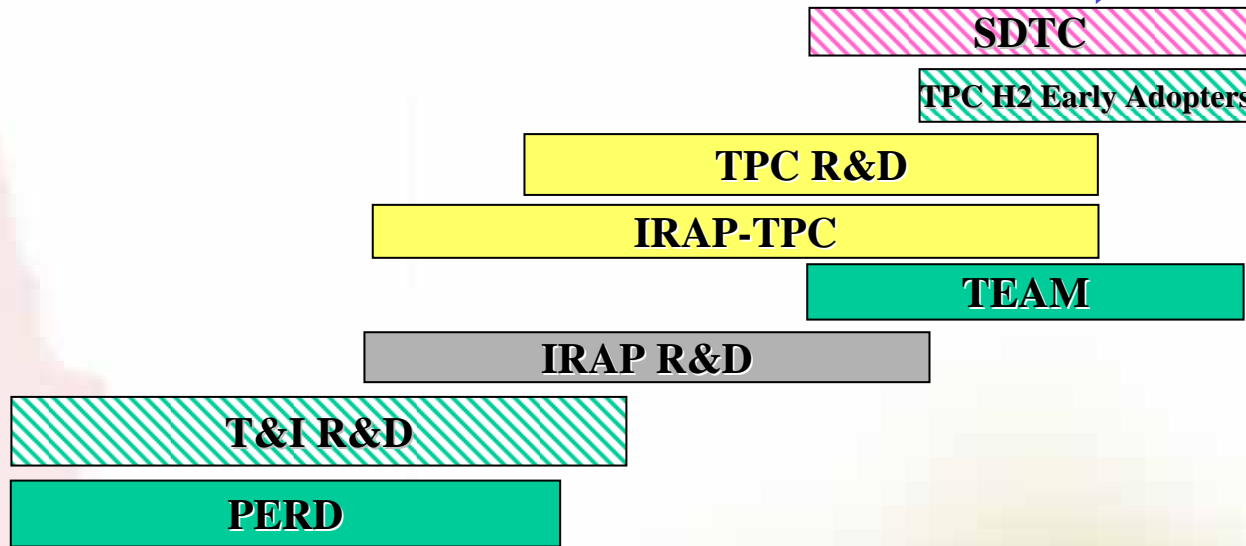
Federal Energy Science and Technology Eligible Activities and Stages of Technology



Support Criteria (measurement criteria highlighted)



- Techno & economic benefits to Canada
- Lead to industrial development & commercial exploitation
- Enhance profitably, improve technology base of firms
- Advancing unproven S&T to validation stages of demo & commercialization
- Acquisition & growth of new S&T capability & capacity.
- Reduce Technical Risk
- Novel & new approaches



Mainly Commercial Criteria-driven

Mixed Commercial & S&T Criteria-driven

Mainly S&T Criteria-driven

Early-stage R&D	Applied R&D	Advanced Development, Product Development and pre-Commercialization	Demonstration & Technology Transfer	Deployment & Commercialization
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Introduce CBIN



- **R&D Network of researchers (government, industry, university)**
 - Vibrant R&D base to support sustainable biomass or bio-based innovation in Canada
 - **Applied R&D** in bioenergy, biofuels, industrial bioproducts & bioprocesses
 - Outputs feed demonstration, pre-commercialization programs (e.g. TEAM, APF Science & Innovation, SDTC, policymakers, technology developers, etc.)
- Support **strategic applied R&D** in 4 areas (activities):
 - Existing & New Biomass Supply
 - Biomass Conversion & Utilization Technologies
 - Integrated Bio Applications/Systems
 - Cross-cutting (strategy, assessment, policy, dissemination, etc.)



...



- **Vision**

- *To make strategic R&D investments that will advance the development of bioenergy, biofuels, industrial bioproducts and bioprocesses to:*
 - *increase supply of renewable energy (alternative to fossil fuel-derived energy);*
 - *directly or indirectly reduce greenhouse gas (GHG) emissions and*
 - *seed the sustainable development of Canada's bio-based economy.*

- **Chair: Hamid Mohamed (NRCan, OERD)**

- Interdepartmental Executive Committee
- Theme Leaders (federal govt leads)
- Input from External Advisory Panel



CBIN Management

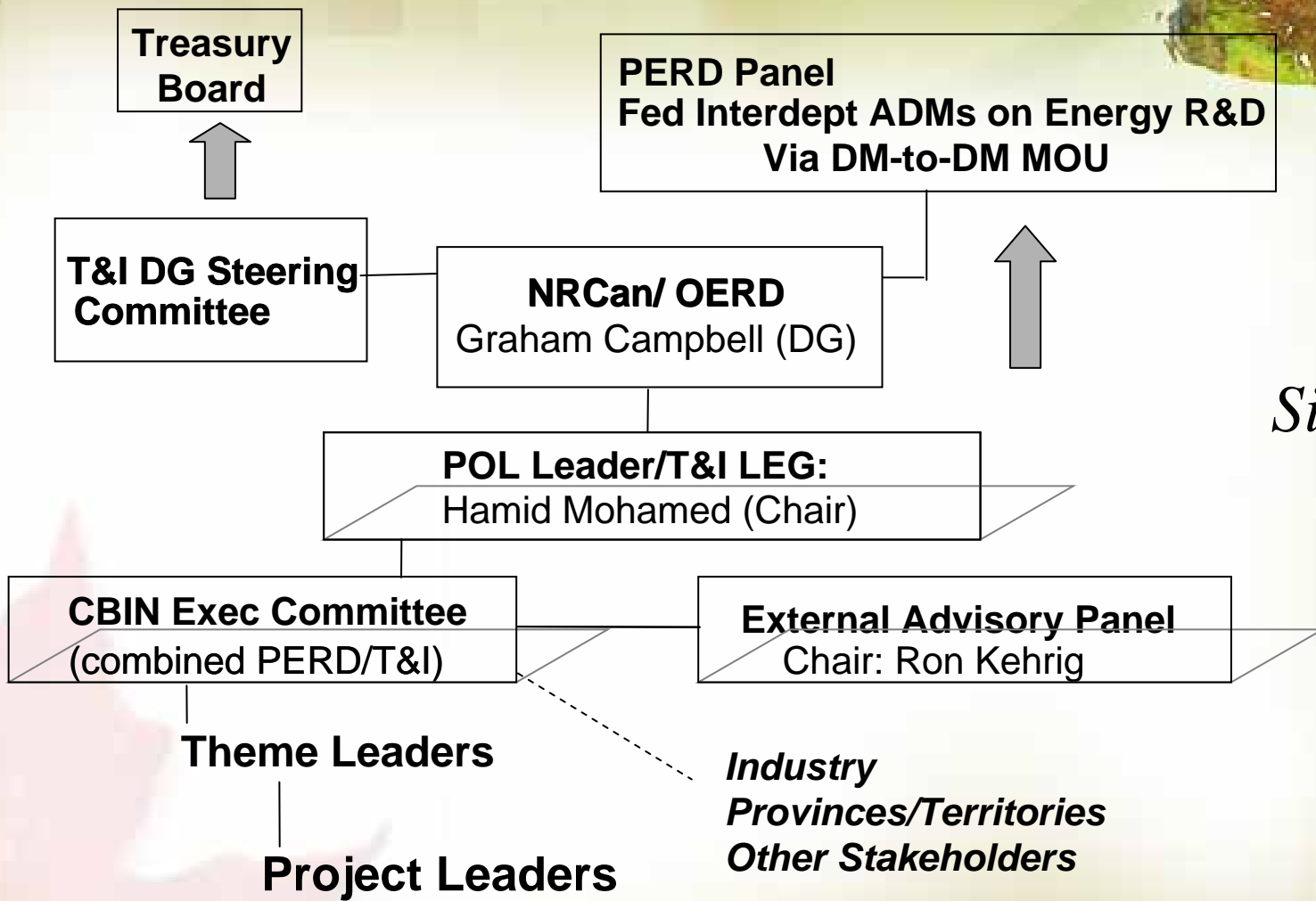
- Collaborative, Concensus-Based



- Interdepartmental Executive Committee**

Organization	Voting Member	Alternate
NRCan	Hamid Mohamed (Chair)	Maria Wellisch (Coordinator)
AAFC	Dr. Jim Brandle	Mark Stumborg
EC	Dr. Terry McIntyre	Matthew Schacker
IC	Dr. John Jaworski	Joe Cunningham
NRCan-CFS	Dr. Peter Hall	Dr. Robert Stewart
NRCan - CETC	Dr. Bill Cruickshank	Jody Barclay
NRCan - CETC	John Burnett	Ed Hogan
NRCan	Hamid Mohamed	Nicole Richer (Merrina Zhang)
NRC	Dr. Richard Isnor	Kevin Jonasson





Simplified



Funds from 2 Federal Programs



Existing PERD BEST POL

Bio-based Energy Systems and Technologies

- \$ 2.7 million/yr
- 25+ yrs in existence
- Bioenergy R&D

New Technology & Innovation (T&I) Biotechnology Program

- \$ 20 million for R&D / 4 yrs
- GHG reductions in 2025

All investments require partnerships, leverage and dissemination

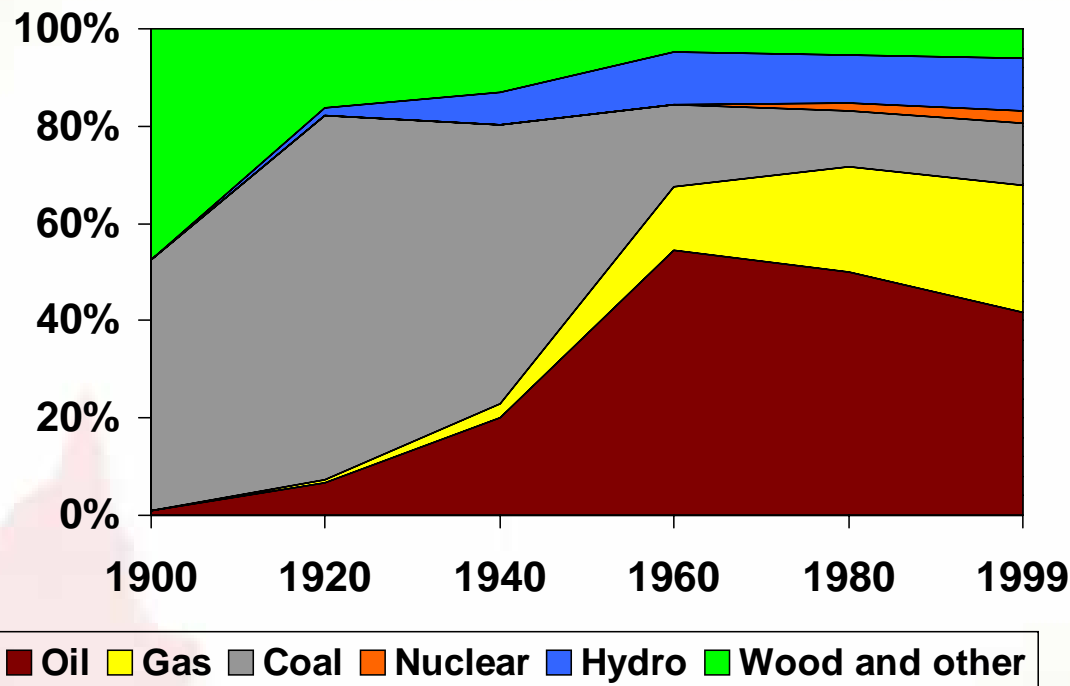
2.1.3. Transportation Fuels from Renewable Energy Sources

4.2.3 Forest and Forest Products Industry

4.2.5 Agriculture and Forestry Biomass Supply for Energy



20th Century: Forest biomass resources converted into energy – heat & power



Bioenergy displaced by fossil fuel energy (coal, oil, nat gas) over the 20th century

In 2000 (6% share):

- 504 PJ (hogfuel + spent pulping liquor)
- 95 PJ (residential wood)



Envision a More Bio-Based Economy, but different 'bio' than 20th century



Energy Consumption
11,589 PJ (2003)

92% fuels & energy
10,700 PJ (2003)

7.8% non-energy use
(903 PJ, e.g. chemical feedstocks, etc.)

Supply side:

- In 2025, 6-7% (NEB) to 8-9% (with R&D) of primary energy share
- cleaner and more diversified forms of bio-based fuels & energy
- more biomass used as feedstock for Chemicals, Materials, etc.

Demand side:

- more bioprocesses (substituting more energy intensive chemical & physical processes)



Biomass Feedstocks

Forest

- mill residues
- slash
- short rotation forestry

Agriculture

- crops (e.g. cereal grain, oilseeds)
- crop residues
- livestock manure
- animal fat
- energy crops

Urban & Other Ind Wastes

- MSW
- Restaurant greases
- municipal effluent
- industrial effluent
- fisheries waste

direct

Bioenergy
heat
power

Biofuels & Chemical Intermediates

Renewable diesel
methyl ester &
SuperCetane

Acids:
lactic,
levulinic,
succinic

Alcohols:
ethanol
methanol
glycol

Bio-based Gas
biogas, syngas
hydrogen

Biomaterials & Industrial Bioproducts

Natural fibres, composites,
lubricants, adhesives & resins,
pesticides, solvents, fertilizers,
plastics, modified proteins,
saponins, etc.



More bio-based economy offers tremendous opportunities with some challenges



- **Sustainable economic development, utilization of wastes, rural and aboriginal community development, Canada's green advantage**
- Many feedstocks, many conversion routes, many products – where to focus ?
- Competing with mature petrochemical industry – need to reduce cost, add value and “full cost accounting”
- Feedstock: “not free”; available in areas away from industrial infrastructure; wet & contaminated; not available 12 months per year; variable
- **Energy conversion technologies:** demonstrated, proven commercially; produce energy + products cleanly & low cost; complete packages
- Production of Valuable Co-products: biorefinery development; improve plant economics; identified products for which there are markets
- Insufficient pull; weak support for energy from biomass; questions re: sustainability; access to grid; etc.



Targeted Outcomes



Final Outcome(s) – More sustainable bio-based economy

- Increased supply of sustainable energy (incl energy carriers) from biomass
- Less unutilized and wasted biomass
- Reduced energy intensity of energy production, industrial manufacturing sectors
- Reduced GHG intensity of energy production, industrial manufacturing & transportation sectors
- Increased production of chemicals and materials from biomass feedstocks in appl where sustainability is enhanced rel to conventional manufacturing





4 Areas of Activity

4: Cross-Cutting/Program

= strategy work, policy & reg framework, assessment (environmental, techno and socio-economic, market, etc.), dissemination

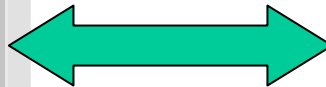
3: Integrated Bio Applications/ Systems

1: New & Existing Biomass Supply

- 4 themes

2: Biomass Conversion & Utilization Technologies

- 6 themes



20% funds (04/05)

70% funds (04/05)



4 Activities, 13 Themes



Final Outcome – More sustainable bio-based economy

Activity 1 – Existing & New Biomass Supply

- Detailed GIS-based understanding of Canada’s available biomass (*forestry, ag residues, agroforestry*)
- New technologies for prodn, harvesting, processing
- Id of next generation feedstocks and potential value chains

4 themes

Activity 2 – Biomass Conversion & Utilization Technologies

- New and/or improved biomass conversion technologies (energy and/or products) and bioprocesses
- Eg: combustion, gasification, pyrolysis, digestion, separation, fermentation, esterification, etc

6 themes

Activity 3 – Integrated Bio Applications

- Improved understanding and development of new and/or improved systems for producing energy and/or products
- Eg: biorefinery, cluster

2 themes

Activity 4 – Cross-Cutting

- Strategy and *next CBIN*
- Assessment tools (LCAs, techno-economic studies, etc.)
- Policy and regulatory work
- Communication and dissemination



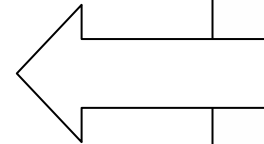
CBIN Program Components

National Priorities



Initial Strategic Plan
Vision 2025
R&D Gaps
CBIN Program

Provinces, territories
Industry
Other stakeholders



Action Plan

- 4 activities
- 13 themes
- 04/05 program:
 - \$4 million
 - 46 projects
- 05/06 program:
 - \$8.2 million

***Leveraging
\$ 3 million =
Industry + Other Fed
Programs***



Summary



- **Bioenergy + Industrial Biotechnology – “hot”**
 - Drivers: Sustainability, advances in genomics and biotechnology, higher energy prices, climate change
- **CBIN: Applied R&D program**
 - Supports strategic R&D in bioenergy, biofuels, industrial bioproducts, bioprocesses
 - Investments need partnerships and leverage
- **Trends point to:**
 - bioenergy + higher value product (suite of products), biorefineries
 - Conversion of mixed, multiple feedstocks
- **Requires on-going work; remaining challenges**
 - Infrastructure, technical, economic, assessment, policy, which pathway, which co-products ?



Upcoming Events ...



- June 16-17: Bio Economy Foresight (Office of National Science Advisor)
- June 22-23: CBIN R&D Results Meeting – Progress 04/05 and Program/Strategy Review
- Renewable Energy Strategy (ongoing)
- Sept: Meetings with Provinces (Quebec + Atlantic)
- CBIN RFP for 06/07 ?
- Nov-Dec: BioNorth; Workshop “Industrial Biotechnology” – CBIN together with other groups (BIOCAP, Bioproducts Canada, TEAM, SDTC) – discussions with receptors
- Sustainable Energy S&T Strategy (ongoing)
- Jan 2006: 05/06 CBIN Project Review





For more information

Natural Resources Canada:

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- Maria Wellisch – Program Coordinator tel (613) 996-6195

CBIN website: 'www.cbin-rcib.gc.ca'
(Strategic Plan; Theme Descriptions & Contacts; RFP Info)

