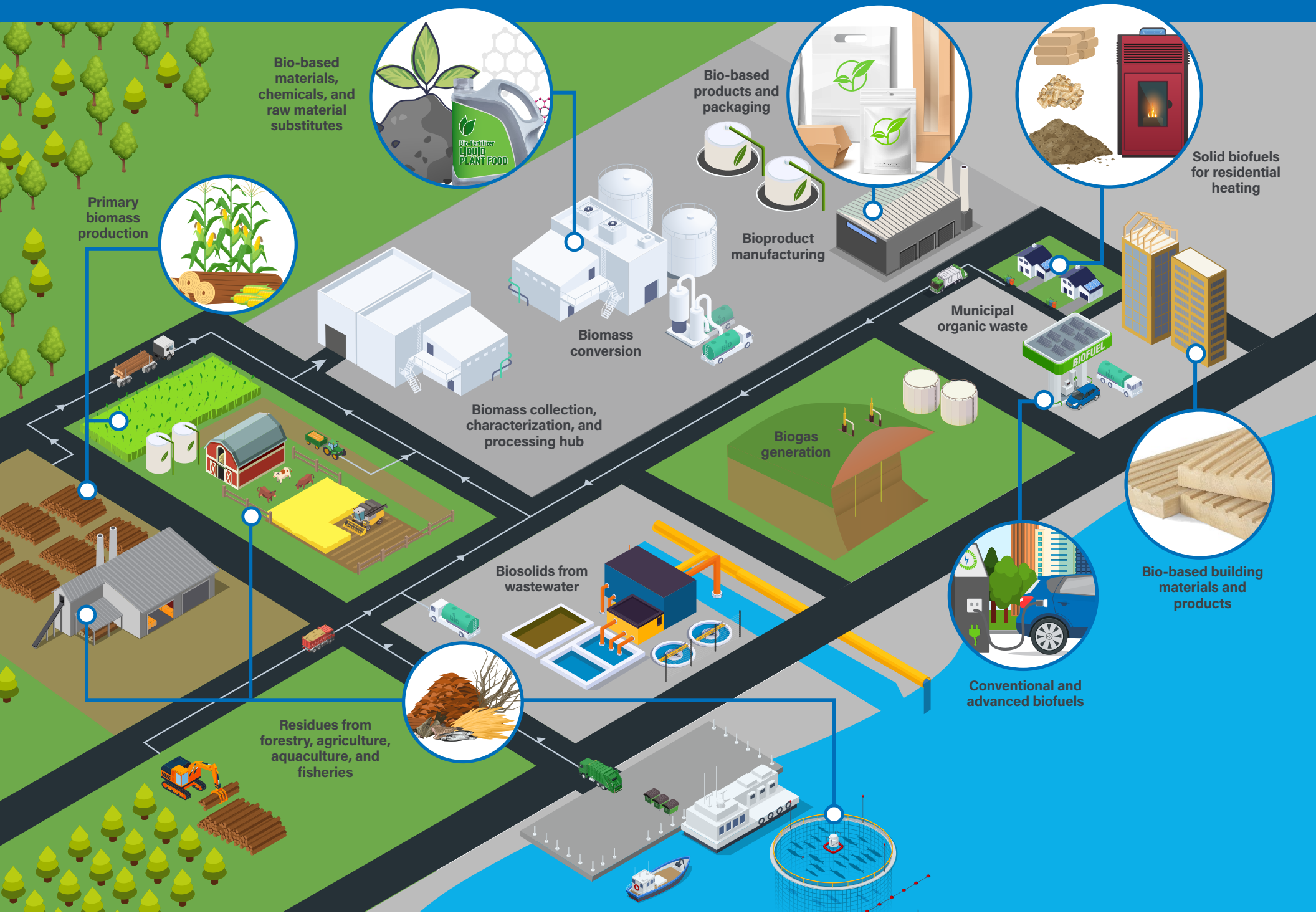
Standards help unlock the potential of bioeconomy

CSA Group's standards and research support the advancement of the bioeconomy to help decarbonize our economy and reduce waste by transforming biomass and bio-based residues into value-added products.



What is bioeconomy?

By processing crops, agricultural, forestry, fisheries and aquaculture residues, and other renewable organic materials, bioeconomy can generate bioenergy and bio-based fuels, as well as produce new, innovative, high-value bio-based materials and products. This can help reduce the need for traditional raw materials and energy sources, limit greenhouse gas (GHG) emissions and waste generation, and promote sustainable production processes and methods.

Biomass production

Bioeconomy relies on a dependable supply of renewable biological resources. Sustainably-sourced biomass can come from primary production, cultivating crops and plants intended for conversion into biofuels or bio-based products, or from the collection of residues from agriculture, forestry, fisheries, and aquaculture, as well as solid municipal waste.

Biomass collection, characterization, and pre-processing

Understanding the characteristics of the biomass collected from one or more sources, such as moisture content, particle size, bulk density, elemental composition, organic content, or the presence of microorganisms, helps determine the most effective methods for its conversion. Based on the characteristics, biomass may be pre-processed to prepare it for the selected conversion method.

Biomass conversion

Biomass can be converted into energy, fuels, and other products by several different methods, including combustion, gasification, pyrolysis, fermentation, and anaerobic digestion. Each of these methods involves different chemical and physical processes and can produce a range of products, such as biofuels, biogas, biochar, and biochemicals.

Bioproduct manufacturing

Bio-based materials and polymers can be used to manufacture various other products, from bioplastics to biocomposites for furniture, automotive parts, construction materials and products, and packaging. This reduces reliance on traditional raw materials and increases the potential for recycling and biodegradability of bio-based products, supporting the application of circularity principles.

Sustainability of bioeconomy

While the bioeconomy has great potential for decarbonizing various types of industry, it is important to ensure the sustainability of this economic model. That means taking into account factors like land use change, biodiversity, and social impacts and ensuring that biomass is produced in ways that do not compete with food production or have other negative environmental or social consequences.

Standards help unlock the potential of bioeconomy



CSA Group's standards and research support the transition to bioeconomy by setting requirements and guidance across the whole landscape - from sustainable biomass supply chain through safety and performance of conversion technologies to bio-based products, their use, and end-of-life management, including the disposal, recycling, and repurposing.

CSA Group also manages multiple mirror committees to support Canada's leadership role on the international scene and help ensure harmonization of the standards in North America and globally.

List of CSA Group publications

Feature publication

- *Bioeconomy Landscape: Insights for Standardization* (research report)

Biomass production

- CSA W209:21, *Biomass supply chain risk*
- CSA/ANSI B149.6:20, *Code for digester gas, landfill gas, and biogas generation and utilization*

Bioenergy and biofuels

- CSA B366.1-11 (R2020), *Solid fuel-fired central heating appliances*
- CSA B365-17 (R2022), *Installation code for solid fuel burning appliances and equipment*
- CSA B415.1:22, *Performance testing of solid fuel-burning heating appliances*
- 40+ CSA adoptions of ISO standards for characteristics, specifications, and test methods of solid biofuels
- Codes and Standards for Renewable Gas Pathways (research report)

Bio-based materials

- CSA Z5300:19, *Cellulose filaments (CF) — Preparing handsheets for physical tests*
- CAN/CSA-Z5100-17 (R2022), *Cellulose nanomaterials - Test methods for characterization*
- CAN/CSA-Z5200-17 (R2022), *Cellulose nanomaterials - Blank detail specification*
- CSA W206:20, *Kraft lignin — Glass transition temperature by differential scanning calorimetry*
- CSA W207:20, *Kraft lignin — Determination of thermal stability by thermogravimetry*
- CSA W213:22, Lignin — *Quantification of hydroxyl groups by 31P NM*
- Suite of standards for bio-based building materials and products
- Roadmap for the Development of International Standards for Nanocellulose (2023)
- Lignin Standards Development Roadmap (2018)

Sustainability and circularity

- CSA ISO 14021:20, *Environmental labels and declarations – Self-declared environmental claims (Type II environmental labelling)*
- CSA R117, *Plastics recycling: Definitions, reporting, and measuring (in development)*
- Defining Recycling in the Context of Plastics (research report)
- A Roadmap to Support the Circularity and Recycling of Plastics in Canada (research report)
- CSA Group Environmental Product Declaration (EPDs) Registry
- CSA Group Greenhouse Gas (GHG) Registries

Bioeconomy can help drive economic growth in Canada

9 Million hectares

of land not suitable for primary production can be used in Canada to grow crops for the production of biofuels and other bio-based materials and products[1]

Canada is estimated to produce about

120 Million tonnes

of agricultural and forest residues and municipal solid waste annually[2,3]

By 2029, the Canadian bioeconomy is projected to employ more than

223,000 workers[4]

[1] Fueling the bioeconomy with agricultural residues: How the Biomass Canada Research Cluster will boost ag-biomass, Canadian Biomass Magazine, 2019

[2] Canadian crop biomass energy research, Producer.com, 2020

[3] Biomass supply for biofuel production: Estimates for the United States and Canada, BioResources, 2009

[4] World employment and social outlook 2018: Greening with jobs, International Labour Organization, 2018

For more information, visit CSA Group website csagroup.org or contact us at naturalresources@csagroup.org to discuss how CSA Group can support your efforts to advance the bioeconomy sector.

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