

Circular Construction Innovation Hub



A Solution Space by
Generate Canada

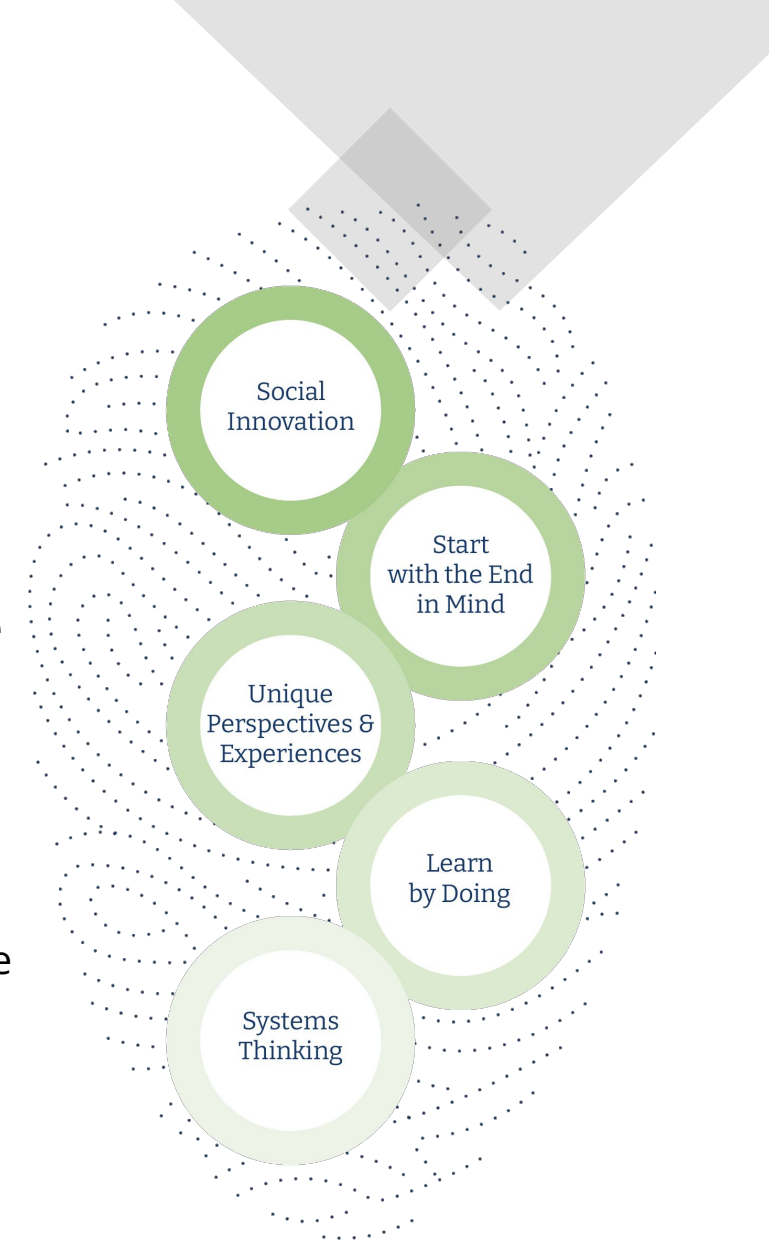
Circular Construction Innovation Hub

OVERVIEW

What is it?

Designed as a social and technical **innovation lab**, CCIH is a multi-stakeholder initiative that supports **coordination** across industry and government, **knowledge sharing**, and **capacity building** across the entire value chain to **accelerate the adoption of circular practices** within Canada's construction and real estate sector.

The 'Hub' will serve as a central point for coordination and knowledge sharing. The 'Spokes' of the Hub will consist of regional 'test beds' where Hub partners will undertake on-the-ground research, demonstration projects, and pilots to demonstrate circular strategies in practice, learn by doing, and tackle innovation challenges across various work streams. The results and successes from the research and case studies will be shared through the Hub and amplified accordingly with key audiences.



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BACKGROUND

The CCIH represents outcomes from 3+ years of industry engagement that identified a gap and a need.

- CCIH is a platform and mechanism for mobilizing construction and real estate sector stakeholders in line with a '*Strategic Framework for Action*'.
- The *Strategic Framework for Action* was developed as part of a project for advancing a circular built environment in Canada, co-led by CELC and CSA Group in collaboration with industry and government partners – designed to enable systems change over time ([See Report](#)).
- The *Strategic Framework for Action* highlights the importance of 'removing frictions', 'learning by doing through demonstration projects', then 'celebrating wins and amplifying best practices'.



Strategic Advisory Committee



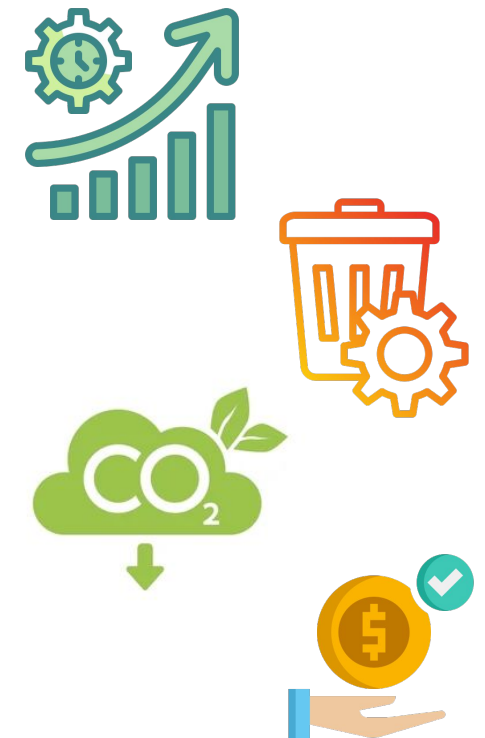
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VISION & GOALS

The vision and goals for CCIH will be established by the partners within the Hub, with work being highly outcome focused and impact driven.

Specific goals may include the following:

1. **Increase the resource productivity** of Canada's construction sector through circular strategies
2. **Reduce the amount of waste** coming from Canada's construction and buildings sector.
3. **Reduce the embodied carbon** of construction materials used for both new and renovation construction in Canada.
4. **Others** (e.g., affordability, resilience)



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PARTNERS

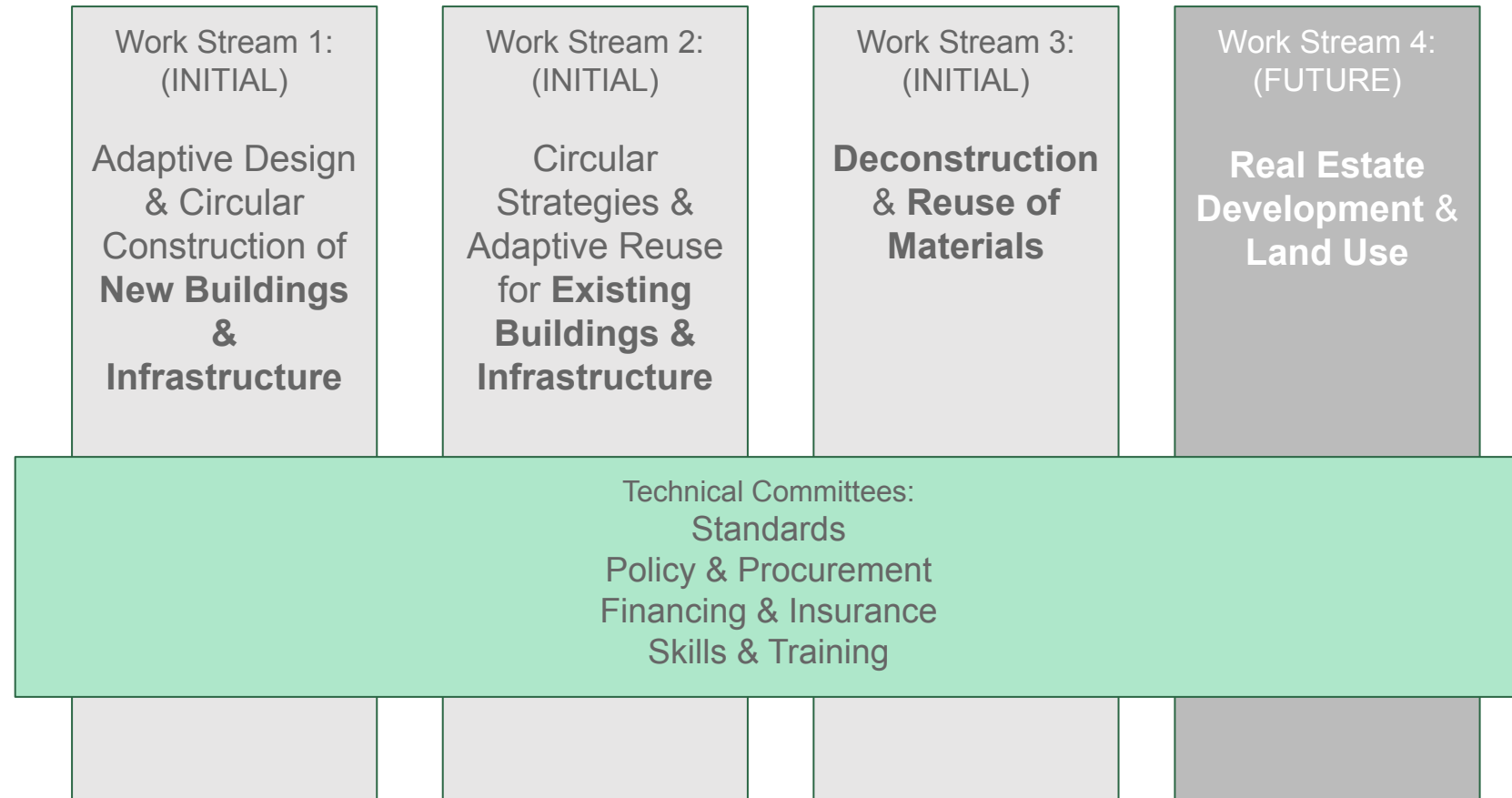
Partners (initial expressions of interest)

- **Industry / Businesses** (Mantle Developments, TAS Impact, Northcrest, Perkins & Will, Arup, JLL, Lehigh Hanson, Geocycle, PLAEX, Viking Recycling, Ouroboros, Green Salvaged Materials, others)
- **Industry Associations** (CCA, CHBA, BOMA Canada, Canadian Wood Council, Cement Association, Climate Smart Building Alliance, others)
- **Federal Government** (Environment & Climate Change Canada, Natural Resources Canada, National Research Council, Centre for Greening Government)
- **Provincial & Local Governments** (RECYC-QUÉBEC, Metro Vancouver / NZWC, Vancouver, Richmond, Edmonton, Toronto, Halifax, others)
- **Academic & Professional Bodies** (BCIT, University of Ottawa, Ivey School of Business, ETS / CERIEC, BC Centre for Women in Trades, Royal Architecture Institute, Engineers Canada, others)
- **NGOs** (Light House, Smart Prosperity Institute, CSA Group, Carbon Leadership Forum, others)

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WORK STREAMS

- Work streams and projects will be organized around 3 initial themes.
- Technical Committees will provide support to Working Groups within the work streams to support 'learning by doing'.
- Circular Economy Leadership Canada (CELC)* will act as Secretariat for the CCIH to support coordination and knowledge sharing.

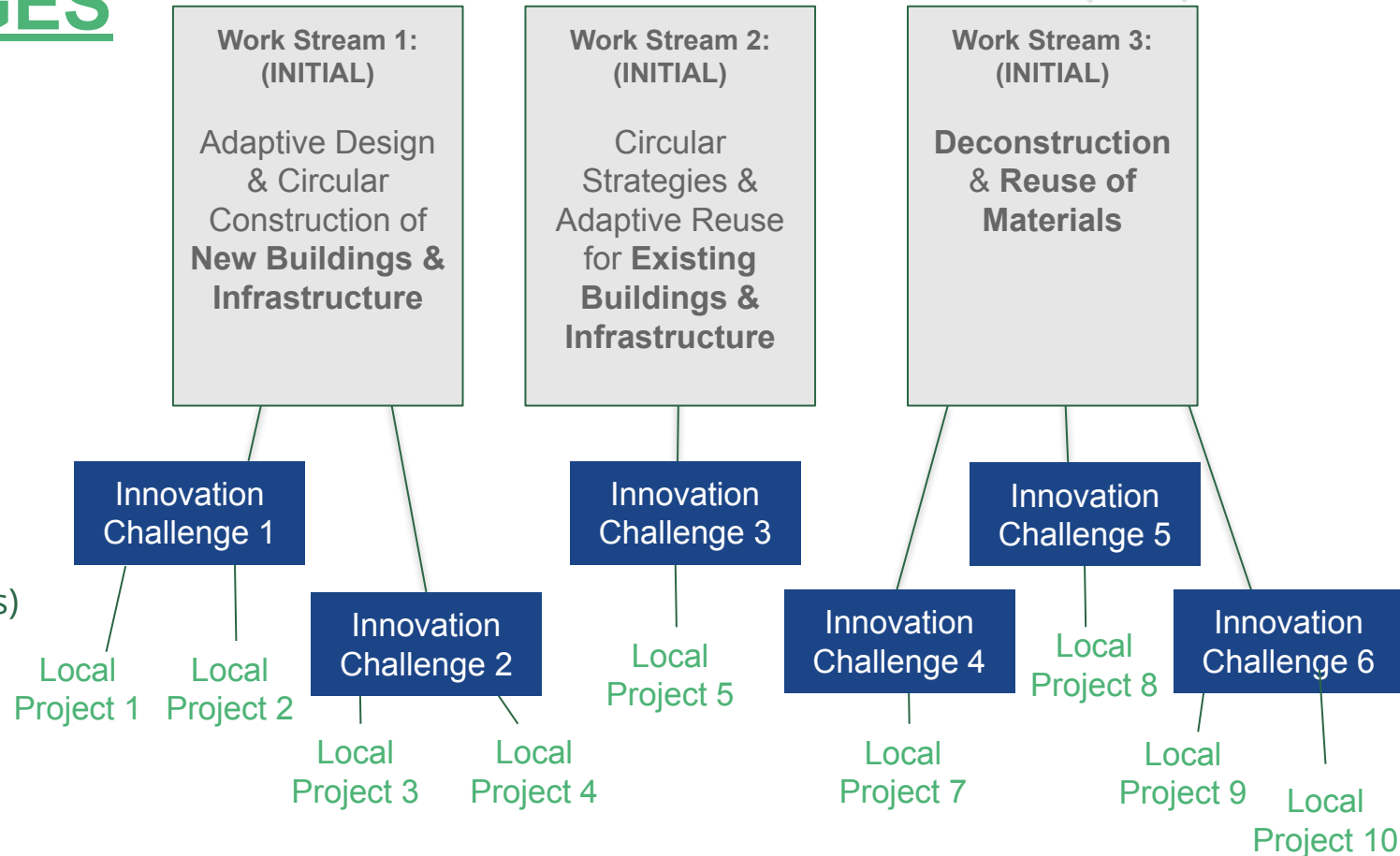


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INNOVATION CHALLENGES

Local demonstration projects, pilots, and applied research will focus on solving 'Innovation Challenges' under the various work streams, with initial focus on:

1. Embedding Circularity in Design Processes
2. Designing for Adaptability and Disassembly
3. Advancing Adaptive Reuse of Existing Buildings
4. Promoting Material Reuse by Addressing Performance and Risk (incl. testing and standards)
5. Advancing Deconstruction Practices and Policies
6. Scaling Infrastructure for Material Reuse (incl. sorting, storage, and marketplaces)



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PROJECT TYPES



Cross-cutting	Work Stream 1	Work Stream 2	Work Stream 3
<ul style="list-style-type: none"> • Standardized definitions • Toolkits and guides for practitioners • Standardized policy and/or procurement templates 	<ul style="list-style-type: none"> • Integrated Design Process & Project Delivery • BIM incorporating 'circularity' • Material reuse in new projects • Design for adaptability / disassembly projects • Digital material passport and traceability • Pre-fabrication with reused materials and DfD 	<ul style="list-style-type: none"> • Adaptive reuse business modelling (software) • Adaptive reuse portfolio profiling • Zero-waste renovation and upcycling • Adaptive reuse and home relocation projects 	<ul style="list-style-type: none"> • Deconstruction projects (Part 3) • Deconstruction projects (Part 9) • Sorting facilities and material storage (physical) • Digital material exchanges / marketplaces • Standards for material reuse • Structural testing for concrete and masonry • Salvaged wood testing / regrading

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PROJECTS & PILOTS:

Sample of Potential Projects, Pilots, and Research (under exploration)

Salvaged Materials into New Projects

1. Design Challenge for demonstration house using salvaged materials (PLAEX - New Brunswick)

Adaptive Reuse

2. Home relocation projects in Metro Vancouver (Light House)
3. Building life extension / adaptive reuse projects (Arup, EllisDon, TAS)

Deconstruction / Material Reuse

4. YMCA project in Toronto (Mantle Developments and Ouroboros Deconstruction)
5. Deconstruction projects (City of Richmond, City of Vancouver, VEMA Deconstruction)
6. Material reuse sorting and testing facility (Viking Recycling)
7. Building Material Exchanges (Light House and Green Salvaged Materials)

Cross-cutting

8. Professional and trades training (BCIT)
9. Standards development and testing (CSA Group)

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GOVERNANCE

- **CCIH Secretariat and administration** supported by Circular Economy Leadership Canada (CELC)
- **Steering Committee** will provide strategic direction and guidance
- **Structured Working Groups** organized around Innovation Challenges and local projects will engage in research and projects and support knowledge sharing
- **Technical Committees** will provide technical guidance in support of Working Groups (Standards, Policy & Procurement, Financing & Insurance, Skills & Training)

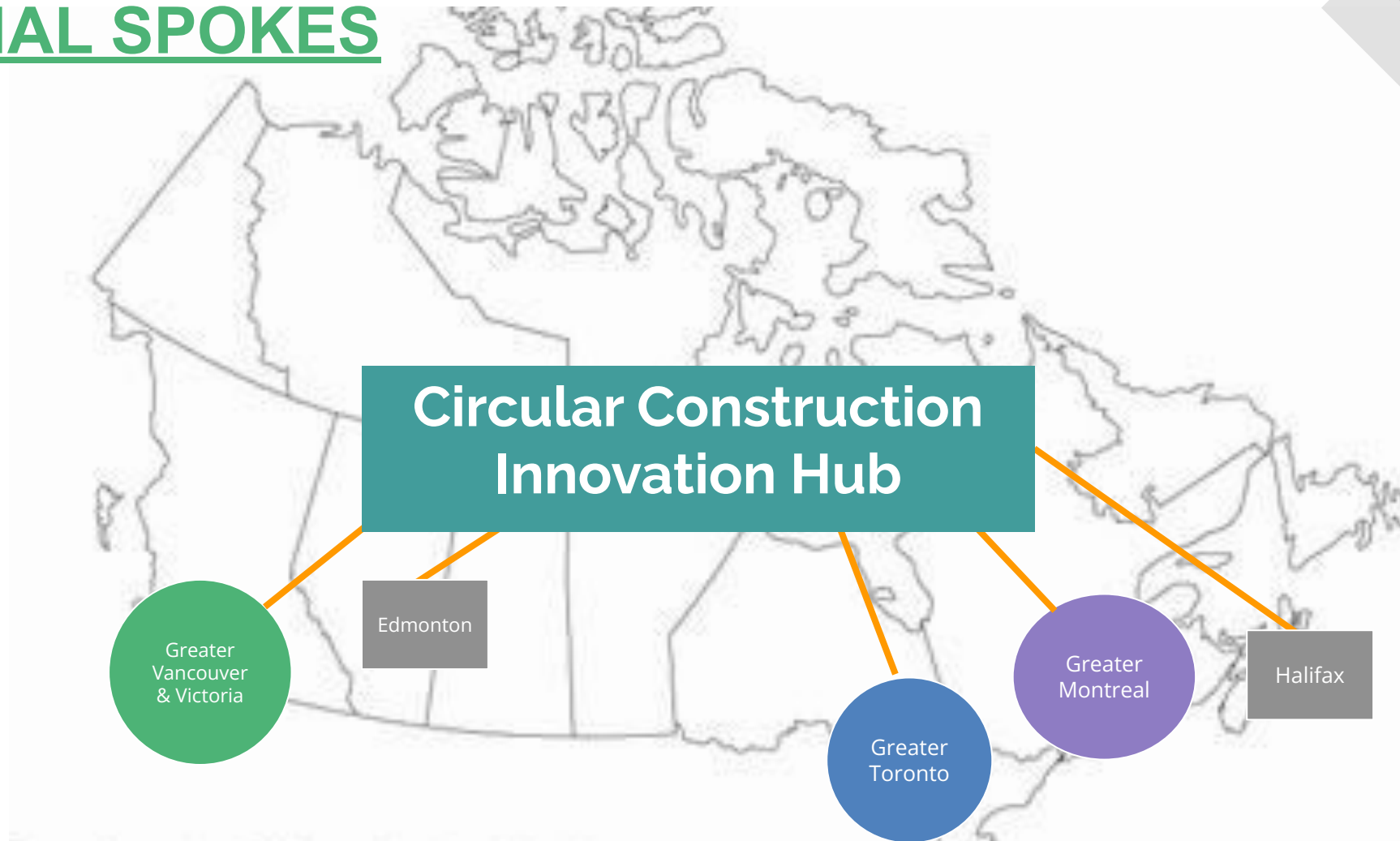


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REGIONAL SPOKES

Initial Spoke

Future Spoke
(in discussion)

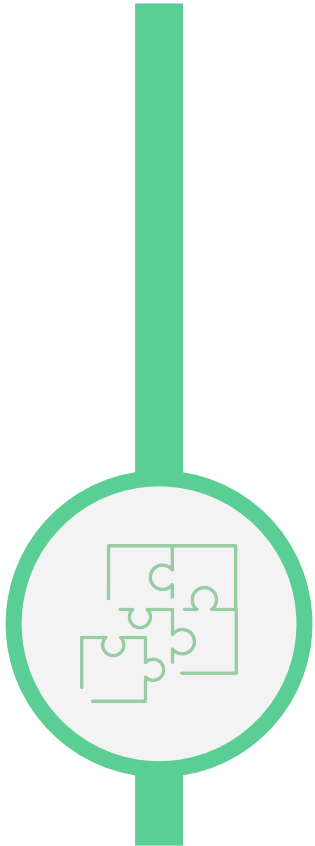


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SERVICES & BENEFITS

CCIH will provide the following services / supports to each regional spoke:

- **Coordinated knowledge sharing** from across the Hub and its network (as well as other regionally-based spokes), including access to an **online knowledge sharing platform**
- **Strategic guidance** and coordination to support demonstration project selection and targeted research
- **Support with partnership development** to advance new projects, research, demonstrations, and scaling
- Support with **finding matching funding** for local projects and research
- Support with **developing case studies** and environmental and socio-economic **metrics** linked to local projects, pilots, and demonstrations to quantify and learn from successes and challenges
- Development of **policy briefs and recommendations** for provincial and federal levels
- Access to **technical committees and experts** (policy / procurement, standards, financing / insurance, skills training, etc.)



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FUNDING MODEL:

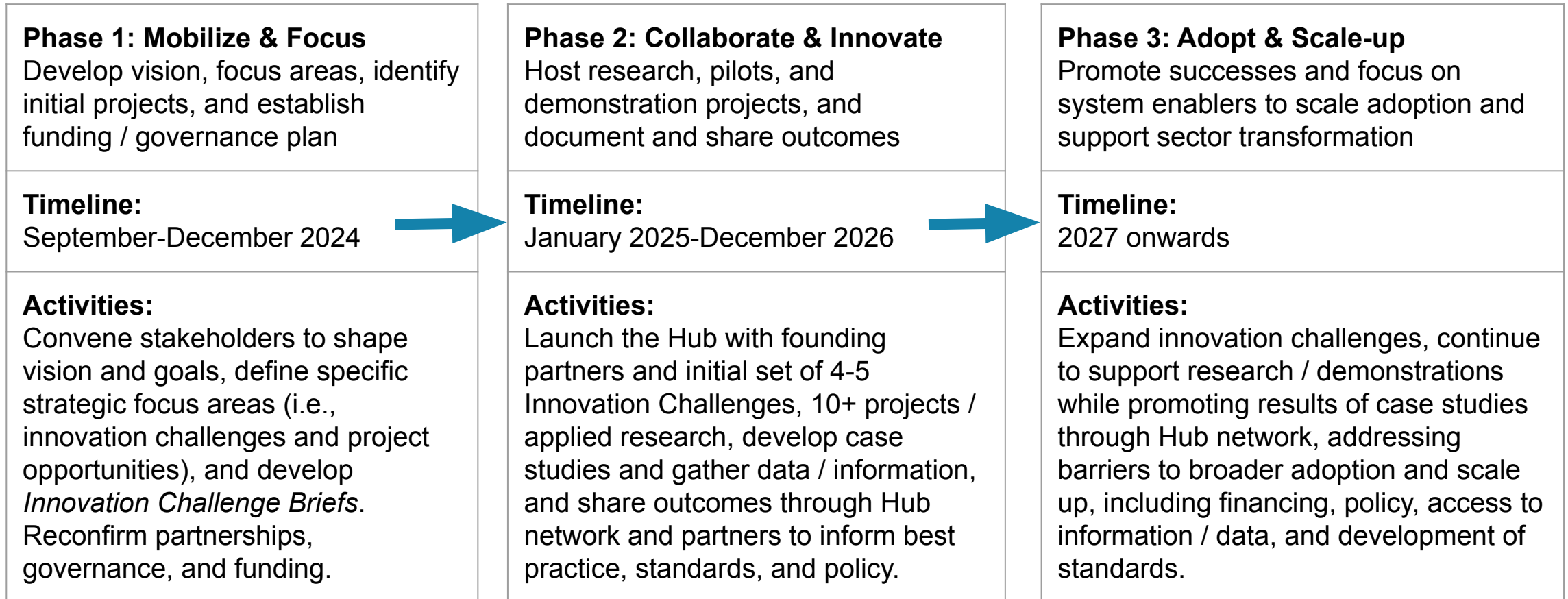
Proposing a diverse funding model for CCIH, with funding focused in 2 primary areas:

- **Funding for Projects & Research:** CCIH to help identify and direct funding to partners for pilots, demonstration projects, and applied research, including:
 - Project-based funding (for pilots, demonstration projects, and technical research)
 - Innovation Challenge sponsorship (e.g., design competition)
 - Grants and foundation funding
 - Research funding (government and industry)
- **Services Delivered by CCIH to Regional Spokes:** Local partners within each regional spoke provide an annual financial contribution (cost share model) toward the support services offered by the Hub, including:
 - Coordinated knowledge sharing and platform
 - Guidance for project selection and research coordination
 - Partnership development for projects
 - Assistance with securing matching funding
 - Support for creating case studies and metrics
 - Development of policy briefs, toolkits, and guidance documents
 - Access to technical committees and experts

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Taking a Phased Approach to Systems Change and Sector Transformation

Timeline (Q3 2024 - 2027+)



* See Appendix II for an overview of *Innovation Challenge Briefs*

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NEXT STEPS

Priority Actions for Fall 2024 (Phase 1: Mobilize & Focus)

1. **September-October:** Engage stakeholders who previously expressed interest in partnering to provide updates and identify potential pilots / research projects. **(Completed)**
2. **October:** Convene small group of stakeholders to draft vision, purpose / objectives, and focus areas (identify areas for developing Innovation Challenge Briefs) **(Completed)**
3. **October-November:** Draft 10-12 Innovation Challenge Briefs* with core partners (including CSA Group, Innovation North, and NZWC) within 3 initial work stream areas, and map to broader strategic 'action plan' framework. **(Completed)**
4. **November 24 & December 2:** Host stakeholder scoping workshops with interested parties / partners to refine draft vision and objectives, select innovation challenges to prioritize in the near-term, and finalize governance and funding model. **(Completed)**
5. **December-January:** Confirm partners and funding to ***launch Phase 2 in early 2025.***

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NEXT STEPS

- 1. Develop Budget & Terms of Reference:** Develop draft budget, as well as Terms of Reference for Steering and Technical Committees and secure partners.
- 2. Confirm Partners & Funding:** Understand potential funding sources, solidify regional spoke partners, and initial projects.
- 3. Launch CCIH:** Aiming to launch the Hub in Q1 2025 with 3 initial regional spokes, 4-5 prioritized Innovation Challenges, and 10+ projects in year 1.



www.circulareconomyleaders.ca

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APPENDIX I: About CELC



A Solution Space by
Generate Canada

About CELC

Circular Economy Leadership Canada (CELC), a solution space of the national not-for-profit charity Generate Canada, is working to connect Canada's circular economy community and serves as a bridge to similar networks around the world.

We provide **thought leadership**, **technical expertise**, and **collaborative platforms** for accelerating systems change and the transition to a low carbon, circular economy in Canada.

CELC has been actively working with the construction and real estate sector for the last 3 years to advance a circular built environment.

www.circulareconomyleaders.ca



- Champion a national approach to CE
- Serve as a national hub and international bridge
- Share evidence on benefits of CE
- Focus on critical enablers for advancing circularity
- Accelerate CE transitions in strategic sectors
- Supporting convening and relationship building across CE ecosystem

CELC Work Stream

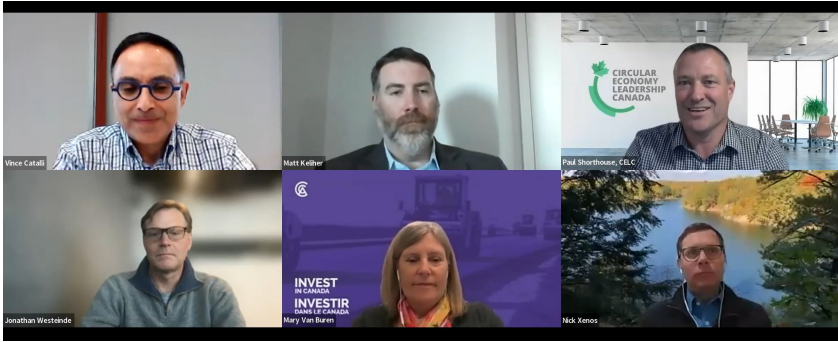
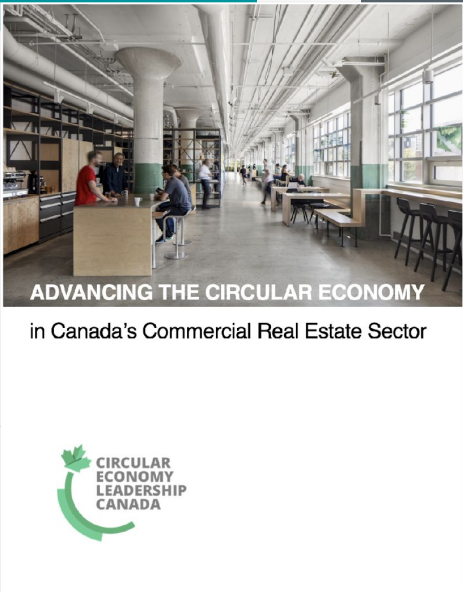
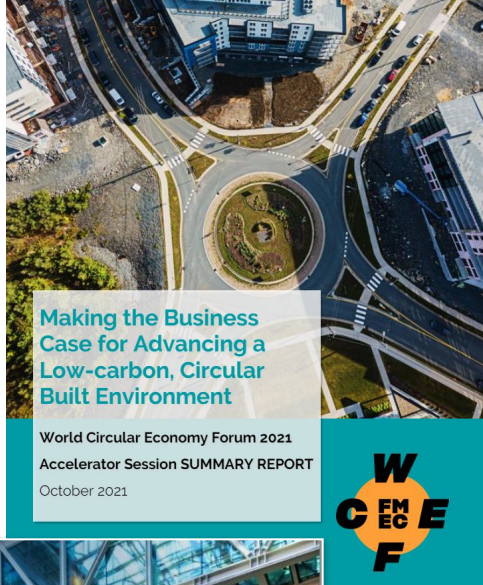
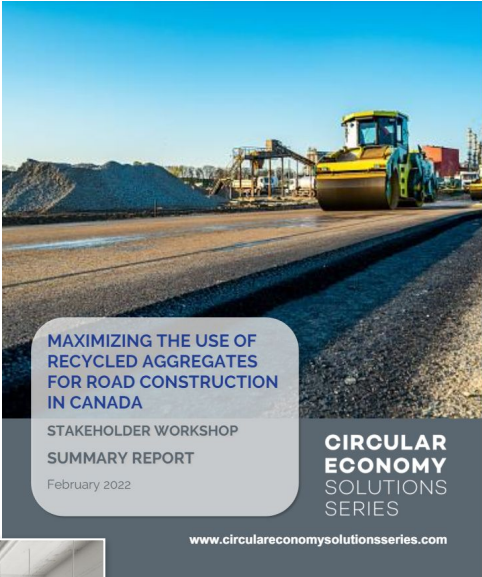
Circular Built Environment

- CELC's Circular Built Environment work stream goes beyond a focus on construction waste to encompass the entire built environment and real estate ecosystem in Canada.
- Recent projects and ongoing initiatives are:
 - Exploring the business case for circular strategies and extending the life of existing buildings
 - Identifying the policies and standards needed to support circularity in the construction and real estate sector
 - Working with industry to develop an action plan and launch a *Circular Construction Innovation Hub* inline with the recently published Strategic Framework for Action.



CELC Work Stream

Cumulative Body of Research & Engagement





APPENDIX II: Theory of Change

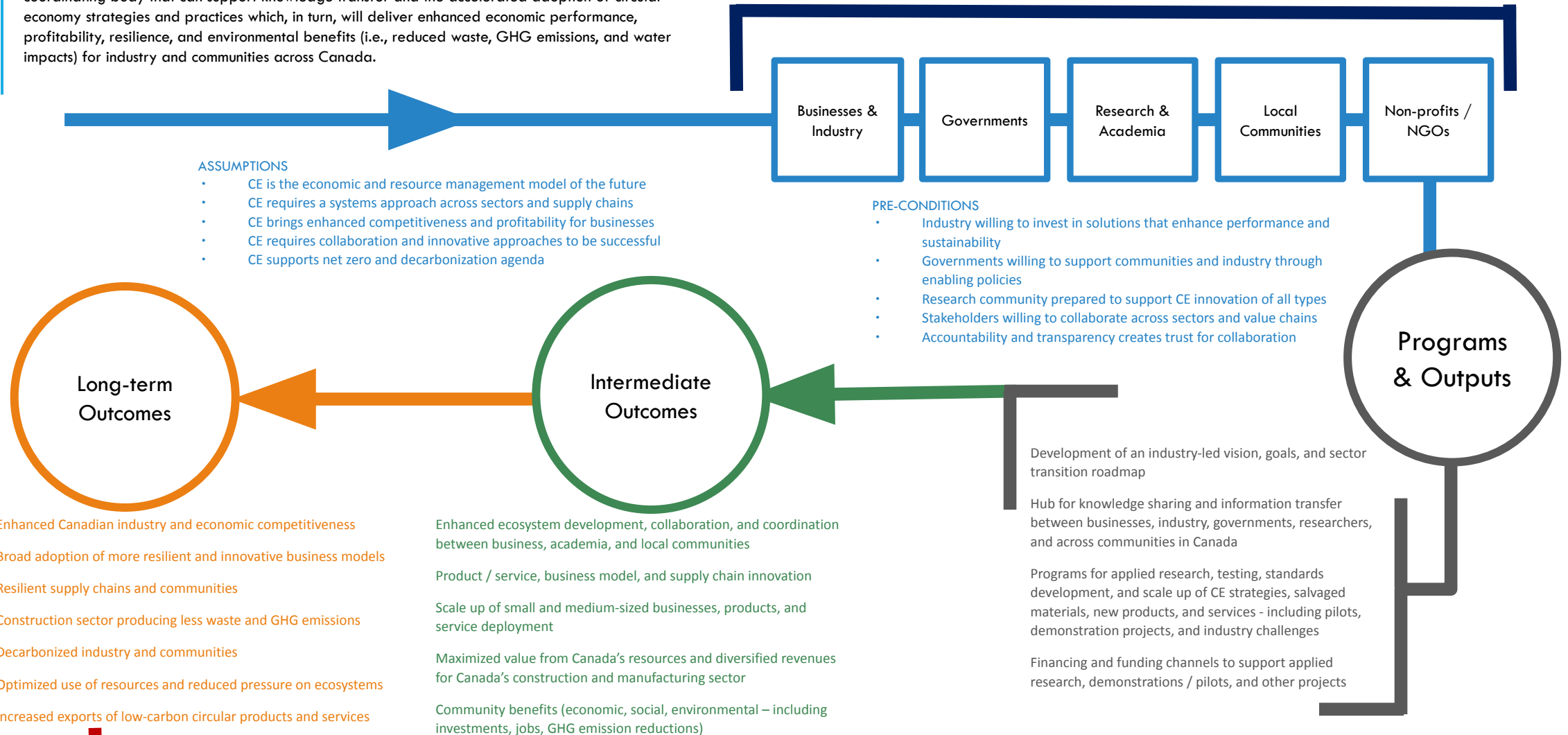


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CCIH: THEORY OF CHANGE

OPPORTUNITY STATEMENT: Canada's construction and real estate sector would benefit from a coordinating body that can support knowledge transfer and the accelerated adoption of circular economy strategies and practices which, in turn, will deliver enhanced economic performance, profitability, resilience, and environmental benefits (i.e., reduced waste, GHG emissions, and water impacts) for industry and communities across Canada.

CIRCULAR CONSTRUCTION INNOVATION HUB (CCIH)



Adaptive Design – Adaptive Reuse – Deconstruction – Land Use

WORKSTREAMS

CCIH IMPACT Innovative, economically competitive, resilient, and environmentally sustainable construction sector in Canada producing less waste and aligned with Canada's climate change / net zero goals

An aerial photograph of a roundabout with a central green island. The road is paved and has white dashed lines. The surrounding area includes green grass, trees, and a small body of water on the right side. The text is centered over the green island.

**APPENDIX III:
Innovation
Challenge Briefs**

Overview:

Innovation Challenge Briefs

Background on Innovation Challenge Briefs

To overcome the inertia required to change the current linear construction system, innovation must be strategically applied to address systemic barriers.

By 'shrinking the systems change' into manageable pieces, figuring out what works and what doesn't, addressing the pain points, and improving the business case, circularity can increasingly become the standard of practice, adopted by critical stakeholders in the value chain and scaled over time.

One well-established process for shrinking the change is by developing "Innovation Challenge Briefs", which focus on clearly articulating the root causes and important solutions for enabling systems change over time.

Overview:

Innovation Challenge Briefs

What are *Innovation Challenge Briefs*?

Innovation Challenge Briefs are critical guiding documents for tackling the barriers and identifying the best innovation pathways within the system, helping to position and frame specific system challenges into narrative documents.

More specifically, Innovation Challenge Briefs consist of:

- A clear statement of a specific problem (root causes, key stakeholder groups, etc.) and systemic barrier.
- A discussion of why it matters (what's at stake and why now).
- An articulation of other factors impacting the specific systemic barrier and what's needed (prioritization of gaps that need to be filled).
- Identifying a set of strategic solutions pathways (e.g., design criteria and challenges, demonstration and pilot projects, research, etc.) and factors to measure in order to prove out solutions and tackle the systemic barrier (i.e., who is doing work in this area, what solutions have already been explored, etc.).

Overview:

Innovation Challenge Briefs

How do *Innovation Challenge Briefs* Support Systems Change?

Innovation Challenge Briefs transform specific problems and barriers into **actionable projects**. Practically speaking, an Innovation Challenge Brief is a valuable tool for:

1. Gaining political and institutional support around a demonstrated need or opportunity.
2. Building a team around a set of defined objectives.
3. Going after grant funding or early stage investment for the development of potential solutions, pilot and demonstration projects, and research.

By taking stock of existing knowledge on the issues and barriers and taking time to properly distill the challenges and innovation pathways through the Briefs, more strategic and coordinated efforts and investments can be made to effectively bring forward solutions to enable systems change.

This ensures an informed approach toward innovation – one that is grounded in evidence and focused explicitly on the achievement of strategic impact. Such an orientation ensures that innovation is never taken up as an end in itself, but is rather the means by which to achieve positive impact within the construction and real estate sector.