



Making the Business Case for Advancing a Low-carbon, Circular Built Environment

World Circular Economy Forum 2021

Accelerator Session SUMMARY REPORT

October 2021





Supporting Partner Acknowledgements



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Contents

1. Background	2
Participant Profile	3
2. Key Take-aways	4
3. Highlights from Presentations	5
Context-Setting Presentations	5
Keynotes & Armchair Dialogue	7
Panel Discussion	10
4. Summary of Actions & Recommendations	13
Appendix A – Accelerator Session Agenda	15



1. Background

Approximately half of all extracted resources globally are used for the built environment, with 11% of global greenhouse gas (GHG) emissions being attributed to the embodied carbon found in construction materials. Simultaneously, nearly 40% of urban solid waste comes from construction and demolition. By 2025, it is expected that 2.2 billion tonnes of construction waste will be generated around the world (nearly double the amount of waste in 2018).

Not only is the linear model of ‘take, make, and waste’ harmful to the environment, it presents enormous lost business opportunities. How do we make the business case for a more circular built environment? What are the policy, investment, and market levers that can help get us there? How can these efforts further support global goals for net zero, address ecological degradation, and create new economic opportunities and decent jobs?

This **World Circular Economy Forum 2021 (WCEF2021) Accelerator** event, hosted virtually on **September 15, 2021**, focused on the business case for advancing circular innovation and strategies within the built environment and construction sector globally, building on new research from the World Business Council for Sustainable Development (WBCSD), the work by the United Nation’s One Planet Network, and Circular Economy Leadership Canada’s Circular Economy Solutions Series Built Environment work stream. The session also explored alignment with and linkages between material use, consumption, and global sustainability goals and indicators. See **Appendix A** for the Event Agenda.

To view a recording of the webinar, click the ‘Play’ button and enter passcode: [vu#M8*.L](#)



Participant Profile

More than 375 people registered and 188 participated in the virtual event from 49 countries globally (see Figure 1 for the regions), including representatives from architecture and design firms, construction companies, manufacturers and suppliers, real estate developers and managers, educational institutions, not-for-profits, consultants, financial institutions, standards bodies, and from all levels of government (see Figure 2).

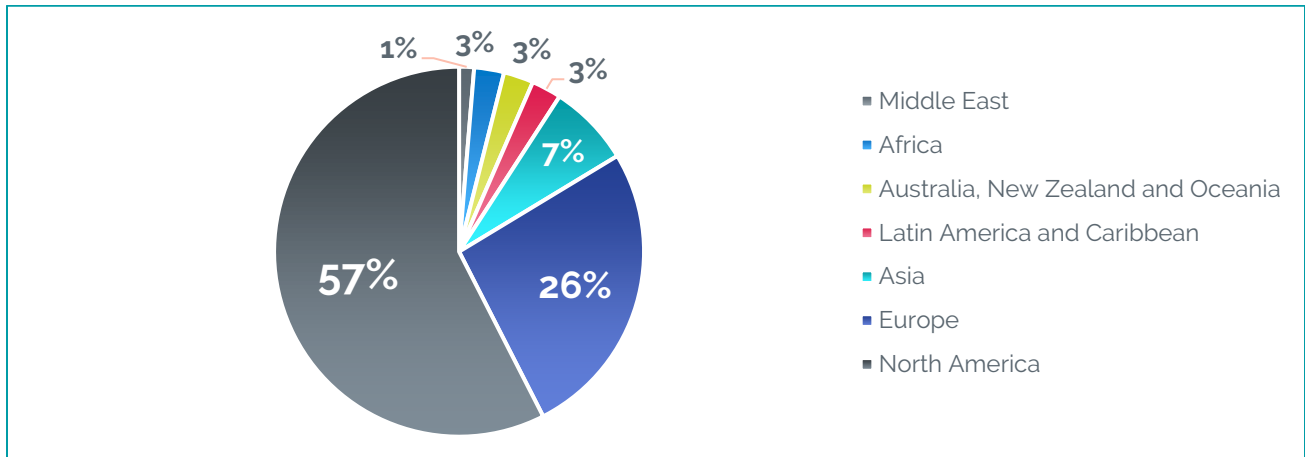


Figure 1: “What region are you joining us from today?” (N=153)

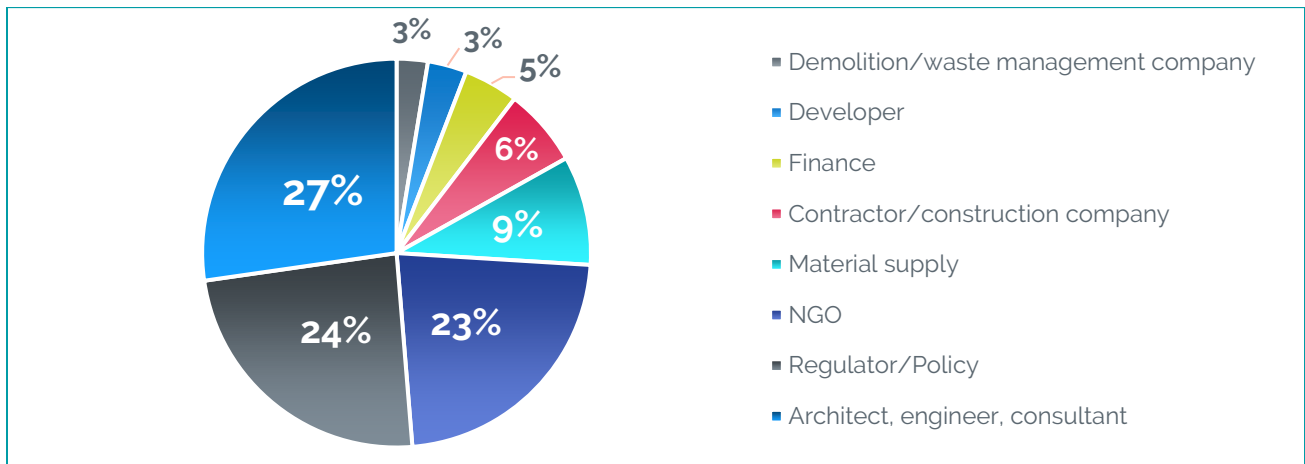


Figure 2: “What sector do you work in?” (N=154)

2. Key Take-aways

Below is a summary of key take-aways from the event:

- The webinar focused on the priorities for advancing the business case for circular economy (CE) strategies within the built environment, including the construction and real estate sectors.
- The construction and real estate sectors are some of the largest consumers of raw materials and energy globally and also the largest contributors to the waste stream by weight.
- The greatest impact associated with the construction sector is the ongoing need for virgin resource extraction. In fact, about half of all the extracted raw resources globally are used to make construction materials.
- The circular economy provides a framework and business strategies for moving away from the linear take make waste economy and allowing the full value of our materials and resources to be captured during their usage and at end of life.
- The question is not whether we should transform the linear processes into a circular one, but how quickly we can transition.
- Demand for circular solution in the built environment need to come from investors, developers, and major contractors – although that demand is weak because there is little awareness and understanding within industry of the environmental, social, and economic value of circular strategies.
- Certain decisions are irreversible and demand for circular solutions must happen at the beginning of the value chain, by real estate developers, investors, and financiers. As such, these stakeholders must understand the business case and value proposition for circularity to commit to incorporating circular products, services, systems, and assets in to their portfolios and projects.
- In terms of the drivers, for many it is about resource scarcity. Zero carbon commitments and customer are additional drivers but these can be very diverse depending on the region.
- This is not business as usual; the challenges are many and include: the need to comply with the industry and regulatory standards, as well as a lack of access to materials in sufficient volumes at the right time.
- For materials suppliers, a game changer will be to put in place take back models for materials. This will work if there is market and customer acceptance, and if it is cost effective. There is a lack of technical knowledge of how to retake the materials that can be recycled.
- It is also possible to incentivize procurement that drives innovation and demand for circular materials and practices. Public procurement and product standards should allow for higher volumes of recycled content in materials. For example, cement with high recycled content is only recently being allowed in Europe.
- There is a need to prioritize the repurposing and maintenance of infrastructure. Buildings and infrastructure have to be resilient, healthy, be able to store carbon, and be adaptable and reusable through assembly and disassembly.

3. Highlights from Presentations

Context-Setting Presentations



Presenter: **Paul Shorthouse, Managing Director, Circular Economy Leadership Canada**

Topic: Overview of Circular Economy and the Built Environment Sector

Paul is one of Canada's leading experts in the emerging circular economy, providing solutions and engaging leaders who are working at the intersection of business innovation, public policy, economic development, and sustainability. Paul has been leading a work stream on the *Built Environment* through the CELC's CE Solutions Series.

Insights

- The circular economy provides a framework and business strategies for moving away from the linear 'take-make-waste' economy, allowing the full value of our materials and resources to be captured during their usage and at end of life.
- While many think of circular economy applied to the construction sector as waste management and diversion, the opportunities span the entirety of both the value chain and building life cycle.
- WBCSD's 2018 report, *Scaling the Circular Built Environment* explores current barriers to circularity, as well as strategies for overcoming these barriers through key enablers.
- The report highlighted several challenges to circularity, namely:
 - Culture and beliefs – which includes consumer perceptions, a hesitancy to collaborate, and a bias toward the status quo
 - Market issues – including artificially low virgin material prices, circularity not being included in valuation assessments, and limited understanding of the risks associated with the linear model
 - Regulations – including limited use of green public procurement to drive demand, counter-productive regulations, and rigidity in how regulations are designed
 - Education – including a limited understanding and awareness of the opportunities for circular strategies across the value chain
 - Technology – limited data and information sharing, as well as technology and infrastructure gaps.
- We need to address all of these factors and barriers to support a stronger business case for circularity in the built environment.
- A new report being finalized by WBCSD shows the potential of CE solutions to:
 - Deliver greater environmental value, including deeper GHG emissions reductions from materials through embodied carbon considerations for example;
 - Create more social value (for example, by maintaining the cultural heritage of a building/district); and
 - Generate more economic value in terms of cost savings from materials, waste management, and new innovative business models.
- Data and insights from WBCSD's new study were gathered from two circular projects (two from NREP: Resource Rows and Upcycled Studios). The projects used the waste of today to build the buildings of the future.



Presenter: **Pekka Huovila, Lead, Sustainable Buildings & Construction Programme, One Planet Network & Green Building Council Finland**

Topic: Circular Built Environment & Alignment with UN SDGs

Pekka has over 30 years of experience in sustainable building research and practice in Europe and in developing countries. He has coordinated the UN's One Planet [Sustainable Buildings and Construction Programme](#) (SBC) since its start in April 2015 for the Ministry of the Environment in Finland, which is also supported by Green Building Council Finland.

Insights:

- One Planet Network is a platform of six programmes that have the mandate to implement Sustainable Development Goal (SDG) #12 focused on Sustainable Production and Consumption.
- The circular built environment is a priority of SBC's programming.
- Last year, SBC released seven regional reports, exploring circularity in Europe, North America, Oceania, the Middle East, Africa, Asia, and Latin America – from this, they released 10 global recommendations for the circular built environment:
 1. Think and act differently now and in the near future
 2. Monitoring and reporting is essential
 3. Lifecycle considerations at the outset of planning and design
 4. Building materials are the essential building blocks for the built environment
 5. Procurement processes need to be considered
 6. Adaptation and resilience will be needed
 7. Locally adapted solutions and practices need to be encouraged
 8. New business models are required
 9. Overhaul of education and skills is needed
 10. Collaboration and financing agreements will drive the transition
- From the UN SDGs, SDGs numbers 6, 7, 8, 9, 11, 12, and 13 clearly relate to the circular built environment
- Of the 231 SDG indicators, 58 indicators are closely linked to circularity and the circular built environment.
- Currently conducting case studies in Africa, Asia, and Latin America.

Audience Question: Did the One Planet work also target the World Development Bank?

Response: Discussion is ongoing with many regional and multi-lateral banks.

Keynotes & Armchair Dialogue



Presenter: **Gustaf Lilliehöök, Partner & Sustainability Lead, NREP**

Topic: Driving Demand for Circular Design & Innovation

Gustaf is based in Denmark and is a Partner at NREP, a Nordic real estate investor, owner, developer, and operator that wants to push innovation within the real estate sector. Gustaf's role at NREP is focused on how the company can be a champion for impact and sustainability in real estate. Prior to joining NREP in 2012, Gustaf spent 7 years at the International Finance Corporation, the private sector investment arm of the World Bank Group with a focus on ESG investing.

Insights:

- Upcycling is an important strategy for reducing GHG emissions.
- It is important to procure materials from producers that employ upcycling and recycling in their manufacturing / remanufacturing.
- NREP began working on upcycling about 10 years ago - it is important to prioritize upcycling materials that would really move the needle and achieve progress.
- Upcycle Studios:
 - These studios are built with 69% upcycled materials.
 - The design of these buildings is driven by the materials going into the building – for example, window design can be driven by the upcycled windows that you have available.
 - Upcycled brick walls – it is often difficult to reuse bricks because they are embedded with mortar. Most often, bricks are crushed and used as road fill. But in upcycled buildings, rather than demolishing brick buildings, can cut out 1-metre by 1-metre sections of existing brick walls. These sections can be reused in “new” / upcycled construction.
 - Lots of potential for upcycled wood floors and wood wall claddings.
- Learnings – this is not business as usual
 - Barriers to project level execution:
 - Specifications and standards of materials – we need certifications;
 - There is a lack of availability of upcycled materials in a sufficient volume – we need a material bank or a market of upcycled materials to provide timely access;
 - Regulatory frameworks are not helping to ensure that upcycled materials are available and used; and
 - Planning and building permits also pose a significant barrier to the use of upcycled materials.
 - Keys to success:
 - Need strategic alignment and commitment;
 - Manage barriers up-front;
 - Secure continuous material access; and
 - Necessary scale – bigger is better.



Presenter: **Eva Carranza, Head of Circular Economy, Holcim**

Topic: Meeting the Supply for Circular Products & Materials

Eva is based in Geneva and has a background as a chemical engineering, having worked with Holcim Group now for over 12 years. Holcim Group is a global leader in sustainable building solutions and, in Canada, includes Lafarge Canada. Since last year, Eva's key programs have focused on embedding circular economy in all the activities across the global company.

Insights:

- Holcim is a global leader in building solutions, with 2,300 building sites and around 70,000 employees. Almost 10% of Holcim employees – and 20% of operative sites - are in Canada where the Brand is known as Lafarge Canada. In addition, Holcim has a net zero pledge in partnership with Science-Based Targets.
- Circularity is the key driver in their net zero target.
- By 2030, Holcim will:
 - Aim to have 30% recycled content in their cement;
 - Recycle 100 million tonnes of waste and by-products;
 - Substitute 37% of fuel use by generating energy from landfill waste;
 - Double their recycling;
 - Double recycling of construction and demolition waste into high-value products; and
 - Produce a structural concrete that uses 100% recycled materials.
- Aiming to replace natural materials to build more with less virgin material – Holcim will do this by:
 - Using alternate raw materials (e.g., using waste from minerals processing, using wood ashes etc.);
 - Using alternative low carbon fuels (e.g., agricultural waste, combustible construction debris);
 - Using clinker substitutes (e.g., recycled gypsum, or waste from steel productions); and
 - Using construction and demolition waste (e.g., recycled glass).
- This is not business as usual – we need integrated solutions and a change of business models to improve circularity
 - Solutions depend on the regional markets – it's a challenge to scale this globally. Municipal standards and customer acceptance affect the ability to scale circularity in the built environment. In Canada Lafarge is working with partners to find leading cities to advance recycled content.
 - For example, recycling facilities need to be close to consumption centres, and delivering recycled goods needs to have a cost advantage over primary materials.
 - Economics is key in making the trade-off between profitability and achieving circularity.
 - We need to establish a level playing field in regulations for recycled content standards.
 - Global regulations may not be possible due to the importance of local access to recycled content.
- **Case Study:** In Canada, Lafarge Canada (a member of the Holcim Group) recycles over 3.4 million tonnes per year, including recycled aggregates, processing slag and fly ash into alternative cements, and incorporating other mineral byproducts as a raw material in cement production and organic materials as a low carbon fuel.
 - Lafarge Canada was recently awarded \$15 million dollars from Emissions Reduction Alberta to support a project which will trial a clean-technology that will “mine” landfilled fly ash and process it to produce a cementitious product of high enough quality to be used as a cement supplement.
 - Between the use of slag and fly ash, Lafarge is already producing enough supplemental cement each year to equal the annual production of a typical mid-size Canadian cement plant.

- Challenges to scaling recycled content globally:
 - Illegal dumping of recyclable materials (many materials end up directly in the environment, rather than in managed landfills);
 - Lack of technical know-how on how to recycle some materials; and
 - Lack of understanding of the economic value of recyclable materials.
- Potential solutions:
 - Enforced standards and norms – regulate material quality, invest in technical research;
 - Reinforce positives – expand “LEED” and “BREEAM” schemes, consider green financing; and
 - Employ achievable and proactive targets – avoid minimum use targets and instead incentivize maximum use, offer tax breaks for the use of recycled materials. Public procurement practices can encourage a level playing field.
- Let’s envision cities that are constructed from components that can be used and reused indefinitely. How can we distribute the benefits of circularity evenly throughout the supply chain?

Audience Q&A: How do you convince your clients to use upcycled and recycled materials?

Gustaf:

- We have two kinds of customers – those who will live and work in these buildings and those who will own these buildings.
- People who will live and work in these buildings desire to live and work in a place with a green identity. And in this sense, the demand outstrips supply.
- The other kind of customers are those who will be the long-time owners of buildings and may one day sell these buildings. We encourage these customers to broaden their time horizons and consider the long-term economic, social, and environmental benefits of owning upcycled buildings.

Eva:

- Holcim is finding that in northern countries, demand is outstripping supply.
- We need circular buildings to be as, or more, convenient than conventional construction.
- Another challenge is that recycled content can sometimes be more expensive than virgin materials. This needs to change.
- We need to ensure performance standards of recycled content.

Audience Polling Results

The audience was asked during the webinar about their current level of activity on projects in the built environment that would be part of the circular economy, as well as the business case for advancing these projects. The results are shared in Figures 3 and 4 below.

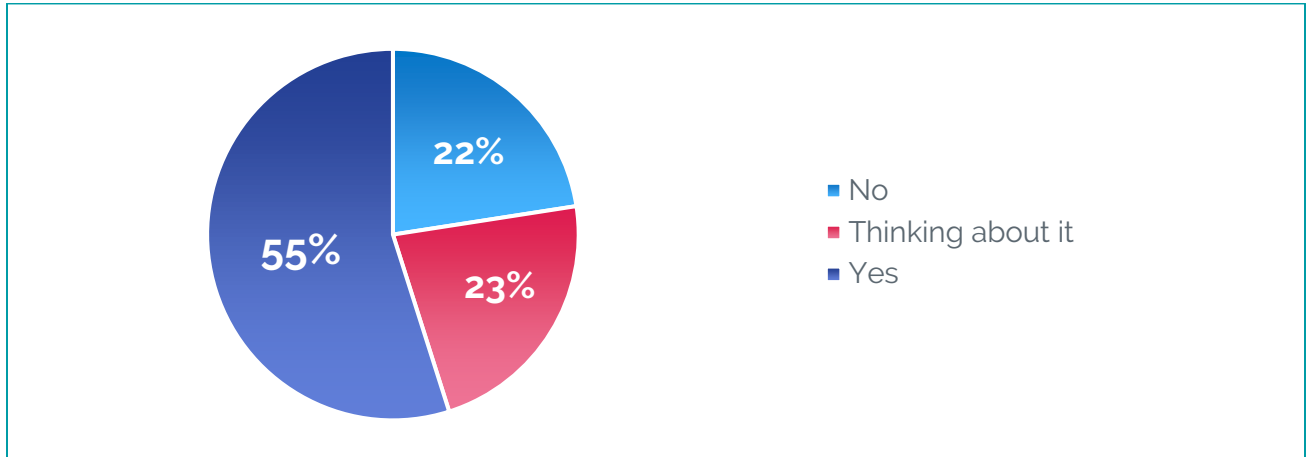


Figure 3: “Are you working on circular built environment projects?” (N=102)

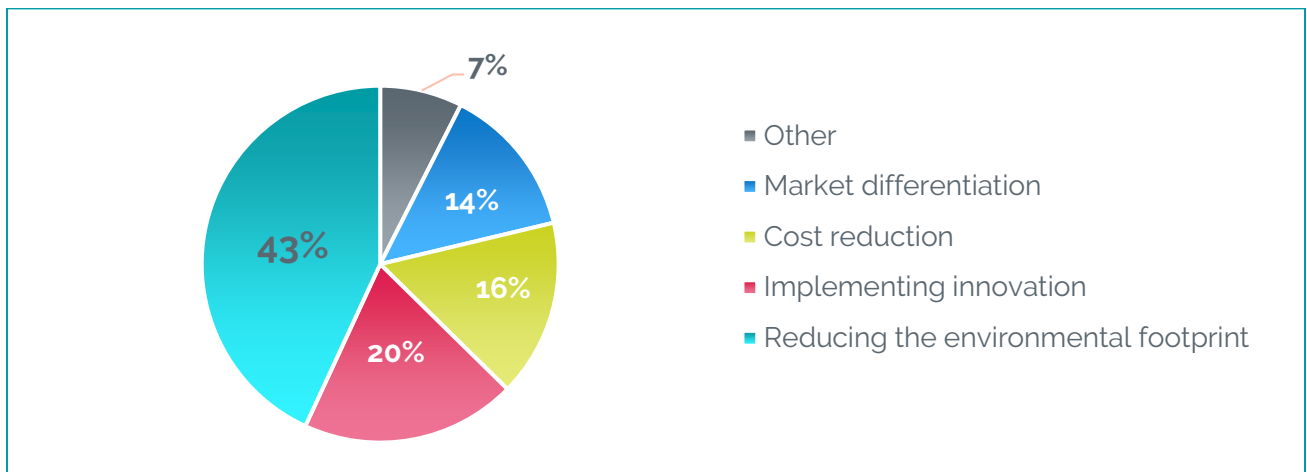


Figure 4: “What is your business case for building circular?” (N=104)

Panel Discussion



Presenter: **Monica Bennett, Director of Thought Leadership, Global Infrastructure Hub**

Topic: **Circular Infrastructure Opportunities**

Monica is based in Australia and leads the development, delivery, and dissemination of the Global Infrastructure Hub's strategic and innovation-focused programs of work, including work streams on InfraTech, Infrastructure Futures, Circular Economy, and Transformative Recovery Post-COVID. The focus and outputs of the programs she leads is to generate impact for G20 governments and GI Hub's global industry stakeholders.

Insights:

- The G20 is an international forum for major economies. Key stakeholders are ministries of finance across the G20. Aim to make the case for circular infrastructure across these economies.
- A year ago, GI Hub began a project to raise awareness about circular infrastructure.
- Aim to minimize GHG emissions by minimizing material inputs into the delivery of infrastructure.
- Data is essential to making the case for circularity.
- Operational emissions (e.g., electricity use) vs infrastructure material embedded emissions (e.g., steel and cement).
- Buildings are responsible for 20% of global GHG emissions.
- Anticipating a rapid increase in demand for low-carbon infrastructure as we approach 2050.
- How can infrastructure industry reduce the embedded emissions of steel and cement?
 - Components of the solution will be innovation in procurement and repurposing innovation.



Presenter: **Donald Chong, Design Principal, HDR**

Topic: **Innovating through Circular Design & the Use of Mass Timber**

Donald has firmly established himself among Canada's leading progressive architectural voices through his innovative place-making and his commitment to thoughtfully-executed architecture. With over two-decades of award-winning work, Donald has held numerous architectural speaking, academic and jury engagements globally – related to master planning, urban design, structural innovations, mass timber and resilience.

Insights:

- Globally, our narratives are crossing. We are all seeing a level of urgency due to this perfect storm (climate change + COVID-19).
- Trees are a perfect model for discussing materials. Trees are a perfect gift of a material, and they store carbon. It's a great material for thinking at a systems level.
 - Trees and forests are also great examples of circularity in action.
- We need to think generationally when discussing the circular economy
 - Architects should be stewards to think of future generations – we should aim to build things that outlast us.



Presenter: **Patrick Enright, Senior Green Building Engineer, City of Vancouver**

Topic: The Role of Policy in Driving a Circular Built Environment

Patrick is a Senior Green Building Engineer with the City of Vancouver's Sustainability Group, where he works on green building policy and code updates for large, new buildings. Current priorities include the implementation of the City's Zero Emissions Building Plan and its Embodied Carbon Strategy.

Insights:

- Vancouver City Council declared a climate emergency in 2019, and in November 2020 approved a Climate Emergency Action Plan.
 - Aiming to reduce embodied carbon 40%, city-wide, by 2030.
- This strategy lays out a vision for the business case for a circular economy.
 - Aim is to create a healthy, equitable, circular, and carbon positive construction economy.
- Consider building materials, building reuse, low carbon planning, and community design for material efficiency, durability, and disassembly.
- The built environment should be an asset to future generations, should store carbon, and should have reusable components.
- Aiming to tie in this circular built environment strategy to zero waste strategy and green economy strategy.
- Green jobs are being created through mass timber, low-carbon concrete, low-carbon procurement, and in deconstruction.
 - Aiming to enact policies to further encourage these practices to drive the demand and support the business case.



Presenter: **Pascal Eveillard, Deputy VP, Sustainable Development, Saint-Gobain**

Topic: Role of Suppliers in Driving Circular Innovation

Pascal is an executive manager with a focus on sustainability within the buildings sector. He joined the Saint-Gobain Group in 2000 and is now the Group Director for Sustainable Business Development. Pascal is in charge of implementing Saint-Gobain's strategy to foster the market transition towards more sustainability and circular practices.

Insights:

- Saint-Gobain is a € 40-billion provider of construction products.
- Becoming circular is a priority for Saint-Gobain, as well as achieving carbon neutrality.
- Operations – have a global approach, which considers circularity at three levels:
 1. Minimize construction waste;
 2. Increasingly substitute virgin materials for recycled products; and
 3. Switch all packaging to fully recyclable packaging with minimum standards for recycled content.

- Develop and promote lightweight solutions, which supports development of more flexible buildings that can more easily be repurposed.
- Provide transparent information to customers.
 - Will certify the amount of recycled content in their products.
- Advocacy – they advocate for bans on landfilling, and advocate for better recycling.
- Consider the increasing scarcity of sand and gypsum, which are critical materials for the construction industry.
- Customer demand – varies according to region.
- Public policies and regulations – increasing policies that will include requirements for circularity.



At the beginning of the webinar, participants were invited to take part in a poll that asked what the key barriers are to advancing circularity within the built environment. In response to the polling question, top responses included:

- **Regulations** (including legislation and permitting)
- **Education, awareness and information** (including skills and capacity building)
- **Culture and beliefs** (including corporate culture and personal beliefs)
- **Market and material supply issues**
- **Technology** (including the need for more innovation to address technical challenges)

4. Summary of Actions & Recommendations

The speakers highlighted their key take-aways and priority focus areas for making the business case to advance a circular built environment globally in response to the following question:

What is the one thing that needs to happen to scale circular economy in the built environment?

- **Gustaf Lilliehöök:** For the development part of the value chain, there is a need for regulatory pressure to force an accelerated pace. The constellation of new parties, how they come together, and how contracts typically work is not a context that is favourable for change. Unless there is very strong pressure for change, then unfortunately the transition to a circular economy won't be fast enough.
- **Eva Carranza:** We need to translate long-term visions into short-term, clear, action plans. Not only for industry, but also for municipal governments.
- **Monica Bennett:** Scaling will be a journey, and the place to start is defining the end objectives, understanding the data and strategies.
- **Donald Chong:** Having the willingness to see the big picture so that we understand we can craft the system and that we are already part of it.
- **Patrick Enright:** We can create policy that encourages circular procurement and creates incentives within life cycle assessment and carbon accounting, for the reuse of materials, and designing for deconstruction.
- **Pascal Eveillard:** Facilitating policy environments – we don't necessarily need higher taxes, but we do need better-facilitated policy and regulatory environments.



Appendix A – Accelerator Session Agenda

Below is the agenda from the virtual WCEF2021 Accelerator session event hosted on September 15, 2021.

Program Overview	Timing
<p>Opening, Context-setting Presentation & Keynotes:</p> <p><u>Context-setting Presentations</u> Paul Shorthouse, Circular Economy Leadership Canada (host) Pekka Huovila, One Planet Network / Finnish Green Building Council</p> <p><u>Keynotes & Armchair Dialogue</u> Gustaf Lilliehöök, NREP Eva Carranza, Holcim</p> <p><u>Audience Q&A + Polling</u></p>	<p>10:00am-10:40am EDT</p> <p>40 mins</p>
<p>Panel Presentations & Discussion:</p> <p>Monica Bennett, Global Infrastructure Hub Donald Chong, HDR Patrick Enright, City of Vancouver Pascal Eveillard, Saint-Gobain</p>	<p>10:40am-11:25am EDT</p> <p>45 mins</p>
<p>Closing Words & Wrap-up:</p> <ul style="list-style-type: none"> Host: Paul Shorthouse, Circular Economy Leadership Canada 	<p>11:25am-11:30am EDT</p> <p>5 mins</p>



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