CCES 2025 Session Summary

Circular Value Creation: Driving Competitiveness & Productivity through the Circular Economy

This session delved into the topic of circular economy as a model for circular value creation that inspires eco-innovation, drives competitiveness, and enhances productivity. This dynamic discussion highlighted the diverse innovation ecosystem advancing a circular economy in Canada and globally, touching on approaches and bold strategies that governments and businesses are adopting to drive and thrive in a circular economy, creating value while minimizing waste and pollution.

Date / Location: Tuesday, April 15, 2025 / Montreal, Canada

Speakers:

- **Jean-François Houle**, Vice-President, Engineering, National Research Council of Canada (NRC) (moderator)
- **Henning Krassen**, Director, German Federal Ministry of Education & Research
- **Maya Ezzeddine**, R&D Sustainability Leader, Digital Buildings Global, Schneider Electric
- **Heather Stephens**, Chief Operating Officer, Emissions Reduction Alberta

SUMMARY

Introductions

Dr. Jean-François Houle introduced the session topic on circular value creation, highlighting the National Research Council of Canada's work in this area and defining circular value creation as a systemic approach to maximizing resource value.

Dr. Henning Klassen from the German Research Ministry spoke about his focus on the Eureka network, a large innovation network currently prioritizing circular value creation through a collaboration between Canada and Germany. He announced an upcoming research call, set to launch on June 12th in Montreal, aimed at defining and establishing circular value creation. Henning emphasized that this initiative is a funding opportunity for Canadian SMEs and provided QR codes linking to matchmaking resources for international partnerships and information on past and potential future topics.

Dr. Maya Ezzeddine, representing Schneider Electric Digital Buildings, presented their circularity framework based on a "use better, use longer, use again" mentality. This involves using more sustainable materials in design and manufacturing of electronics, extending product lifespan through serviceability and remote upgrades, and enabling the reuse and second life of materials. Maya highlighted the application of this framework across their R&D activities and the positive transformations observed.

Heather Stephens, COO of Emissions Reduction Alberta (ERA), introduced the organization's role in investing Alberta's carbon price from large industrial emitters into technologies that enhance economic competitiveness, attract investment, create jobs, and lower operating costs while reducing emissions and providing broader environmental benefits. Since 2009, ERA has invested nearly $1 billion in roughly 300 projects, with a total direct economic impact exceeding $7.4 billion. Circular economy is a key investment pillar for ERA, aiming to constitute 10-20% of their portfolio. To date, they have invested $105 million in 35 circular economy projects, with a total project value nearing half a billion dollars. Heather directed attendees to their website via a QR code to access their technology roadmap and information on funded projects and upcoming funding opportunities.

Panel Discussion

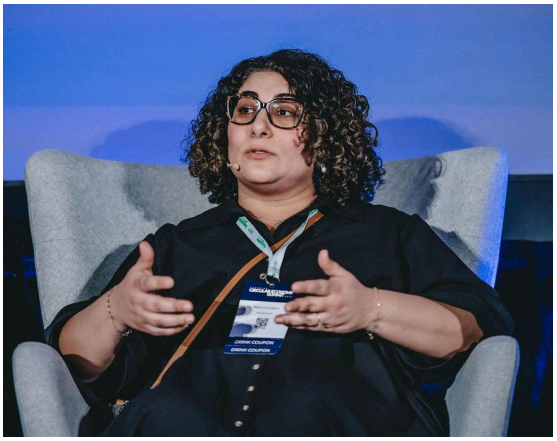
The panel discussion centered on collaborations, innovative business models, and necessary technologies for wider adoption of circular value creation.

Heather emphasized that partnerships and collaborations across industry, government, and innovators are crucial for success. She highlighted the need for a robust regulatory policy environment to support technological investments. Heather stressed that value flows across traditional boundaries, necessitating new forms of partnerships and governance. Academia and startups bring new ideas, governments provide policy tools, and corporations offer scale. Collaborative efforts are essential across the supply chain, from product design to end-of-life management, to share risks and financial capital for new infrastructure. She underscored the importance of ecosystems where one company's waste becomes another's input.

Maya echoed the importance of collaboration, especially for a global company. She explained that their "use better, use longer, use again" framework relies heavily on partnerships with suppliers for better materials. Ensuring the longevity and serviceability of their electronics in diverse environments requires continuous innovation and collaboration to find alternative, sustainable materials.

Henning reinforced that collaboration is key, noting the extensive network of 47 countries within Eureka. He emphasized the need to consider the business models associated with collaboration, asking how companies can derive value and compete globally through such partnerships.

The discussion then shifted to necessary technologies and innovations. Maya pointed out that a significant portion of their carbon footprint comes from downstream scope three emissions (use case and end-of-life) and upstream emissions (materials). Innovations are needed to improve energy efficiency, explore alternative energy sources, and create more circular end-of-life solutions, again highlighting the need for collaboration.



Heather provided examples from ERA's circular economy challenge, including projects in asphalt shingle recycling, high-density polyethylene container recycling, and utilizing inedible eggs in pet food and animal feed. She shared a key lesson learned: despite funding innovative projects, the scale-up challenge persists. Many companies struggle with access to capital, securing site hosts, and finding industry partners willing to take risks for demonstration and wider proliferation. In response, ERA initiated an Innovator Support Services program to provide assistance in areas like market analysis, product development, and financing to help funded projects succeed.

The discussion then turned to lessons learned in national and international value creation. Henning emphasized the need to think "out of the box" rather than incrementally improving the linear economy. He highlighted that while existing technologies like robotics and material science can contribute to circularity, the focus should be on entirely new, more effective concepts. Workshops preceding the conference revealed a consensus on the necessity of fundamentally rethinking and starting anew to achieve genuine circular value creation, rather than just adding circular elements to existing linear systems. He noted encountering others with a similar mindset, including someone from a rapidly growing Canadian city who saw an opportunity to build new circular concepts from the ground up.

Maya stressed that circularity must begin at the design stage. Applying eco-design principles involves considering the entire product lifecycle and all materials used. Given the global e-waste problem, it's crucial to design electronics that can be easily disassembled for material replacement and resource recovery. Standardization of materials and components, along with the ability to separate different materials within a product (like glass, plastic, and circuit boards), is essential to avoid shredding and landfill disposal. Sustainability teams should be involved early in the R&D process to guide design choices with circularity in mind.

Audience Q&A

The audience Q&A session following the conference panel on circular value creation generated a rich discussion, addressing topics ranging from digital product passports and investment challenges to youth engagement, repairability, and the integration of circular economy with broader sustainability goals.

Question #1: Walter Jager from ECD Compliance initiated the questioning by connecting Henning's earlier remarks on collaboration and profitability. He underscored the critical challenge of transitioning to a circular economy in a way that fosters economic growth rather than causing collapse. Mr. Jager highlighted the significance of digital product passports, particularly within the European context for electronics, as a mechanism to track material properties, circularity information, and chain of custody. This, he argued, is essential for enabling the reuse of components and increasing the uptake of recycled content, while ensuring due diligence. He also mentioned similar initiatives in Japan focused on linking physical material flows with digital passports. Given the global nature of supply chains, Mr. Jager posed the question of how Canada, perhaps through initiatives like Eureka, could advance the adoption of such systems to promote a profitable circular economy on a global scale.

- **Henning** responded by emphasizing the central role of data in realizing a successful circular economy. He envisioned a scenario where comprehensive data availability could drive deep analysis of material lifecycles. However, he also cautioned about the potential energy costs and economic feasibility of storing vast amounts of data. Furthermore, he raised concerns about data reliability and accessibility in regions with limited internet infrastructure. Henning suggested that Canada should focus on designing and implementing best-case data-driven models that demonstrably improve business outcomes and then leverage international networks like Eureka to share these successful examples.
- **Maya** added that Schneider Electric, operating globally with an R&D center in Montreal, is actively involved in the development of digital product passports. She highlighted the dual challenges of digitizing extensive historical data for comprehensive lifecycle assessments and optimizing data transmission from connected devices to balance system performance with energy efficiency. She stressed the importance of determining the "sweet spot" for data frequency based on specific product use cases to minimize the environmental footprint of data management.
- **Heather** underscored the critical interplay between energy use and data management in achieving circularity. She advocated for a holistic, systems-thinking approach that considers the energy implications of data collection and the potential for AI, powered by sustainable energy sources like nuclear, to optimize circular processes across various layers.

Question #2: The discussion then shifted to the financial aspects of circular economy projects, with a delegate inquiring about the difficulty of securing investments compared to traditional ventures.

- ➔ **Heather** observed that many circular economy startups are in the pre-revenue phase, making their valuation complex for conventional financiers accustomed to linear business models with clear revenue streams. She noted that the interconnectedness of value chains in circular models can also be challenging for investors to fully grasp. Consequently, these ventures often face greater hurdles in obtaining financing.
- ➔ **Henning** agreed, pointing out the inherent costs associated with being an early adopter in the circular economy, including the need for rigorous testing of new materials and processes. He cautioned against the superficial use of "circular economy" as a buzzword in funding applications, emphasizing the need for a well-defined and economically viable business case.
- ➔ **Heather** highlighted the vital role of organizations like ERA in mitigating investment risks by providing matching funds, signaling market demand, and offering financial support to offset the initial costs of adopting circular technologies. The moderator further emphasized the importance of advisory services and incubators in guiding entrepreneurs to develop comprehensive business plans that demonstrate a clear understanding of the circular ecosystem and potential collaborations.

Question #3: Daniel Taillant from the Commission for Environmental Cooperation shared observations about the strong interest in clothing recycling among youth in Montreal, the dwindling number of skilled repair professionals like cobblers, and the issue of planned obsolescence and lack of repairability in many consumer electronics and appliances. He questioned whether increased state intervention is necessary to mandate the fixability of products, given the growing consumer desire for repair and the environmental benefits of extending product lifespans.

- ➔ **Heather** noted the anecdotal evidence of youth enthusiasm for upcycling and the aging demographic of repair trades.
- ➔ **Maya** stressed the importance of designing products with repairability in mind, ensuring the availability of spare parts and the necessary technical skills. She also highlighted the significant economic and environmental value of recovering precious metals from electronic waste currently ending up in landfills.
- ➔ **Jean-François** connected repairability to affordability, suggesting it as a viable way to provide more accessible goods.
- ➔ **Henning** emphasized the role of science communication in educating young people about sustainable practices and circular economy concepts.

Question #4: Lastly, a question from an individual working on reducing embodied carbon explored the potential disconnect between circular economy and overall sustainability, particularly within the construction sector. The delegate highlighted the priority of reuse over recycling in reducing embodied carbon and noted instances where circular economy was perceived as jargon not necessarily aligned with sustainability goals. The questioner sought advice on simultaneously building infrastructure and changing mindsets to promote deconstruction and reuse in construction, while also incentivizing the maintenance and repair of existing products to maximize material value.

- ➔ **Jean-François** provided a compelling statistic on the vast number of homes in Canada requiring retrofitting, underscoring the significant potential of the retrofit economy. *"There are 13.5 million homes in Canada that need to be retrofitted. If we're going to meet our 2050 targets, we need to do the math… 13.5 million homes or buildings means a building a minute as of today."*
- ➔ **Henning** recommended engaging directly with professionals in the disassembly process to understand current limitations and identify opportunities for improvement. He shared an anecdote illustrating how a lack of clear communication during deconstruction led to the loss of a valuable reusable component.
- ➔ **Another delegate** emphasized the need for compelling storytelling to convey the "why" behind data collection for circular economy initiatives.
- ➔ **Maya** stressed that the appropriate level of data for storytelling depends on the specific data and the target audience.
- ➔ **Heather** concluded by highlighting the power of real-world examples and proof points in demonstrating the value of data-driven optimization for circularity, drawing parallels with successful applications in other industrial sectors.