CCES 2025 Session Summary

Leveraging Data for Circular Economy Decision-Making Workshop

What data and information do organizations need to be collecting and analyzing to build the case for their circular economy strategies, programs, and initiatives? Researchers and practitioners have found themselves asking: why with a compelling business case and demonstrated benefits, is uptake of the circular economy still at an overall low in Canada? Data is often cited as a critical barrier in response to this question.

While it is clear that data is perceived as a barrier to circularity, it is less clear what exactly this means in practice and how this data barrier can be overcome. Herein lies the "data dilemma". Research by the Ivey Business School's Centre for Building Sustainable Value over the past five years has unpacked this phenomenon further, identifying what data businesses need, why they need it, and how not having this data acts as a roadblock. From this body of research, three key categories of data emerged:

- Environmental and economic data to motivate circular strategies and approaches;
- Material and supply chain data to enable a circular solutions; and
- Benchmark and measurement data to evaluate circular performance.

This 2.5 hour, hands-on workshop, explored topics related to data needs, measurement approaches, and reporting to support strategic decision-making at an operational and/or product level.

It provided participants with the opportunity to better understand the circular economy data dilemma and identify key resources and solutions to give business the data and information they need to accelerate uptake of the circular economy. As part of the workshop, participants had the opportunity to engage in discussions guided by experts in the field who shared more technical tools and resources across the three key data categories.

Date / Location: Wednesday, April 16, 2025 / Montreal, Quebec

Speakers:

- **Matthew Lynch**, Staff Director, Centre for Building Sustainable Value, Ivey School of Business, University of Western Ontario (Co-facilitator)
- **Carly MacArthur**, Research Associate, Centre for Building Sustainable Value, Ivey School of Business, University of Western Ontario (Co-facilitator)
- **Fabien Hammerer**, Chief Technology Officer, 5REDO
- **Melissa Zbacnik d'Antonio**, Project Manager, CTTÉI
- **Bethany Edwards**, Circular Products & Materials, World Business Council for Sustainable Development (WBCSD)
- **Alasdair Hedger**, Senior Expert in Circular Economy Measurement & Reporting, Ellen MacArthur Foundation
- **Patrick Wiedemann**, CEO, Reverse Logistics Group (RLG)

SESSION SUMMARY

Matthew Lynch and Carly MacArthur from the Ivey School of Business led a session focused on the critical role of data in advancing the circular economy. Recognizing data as a recurring theme, they unpacked the complexities surrounding its application. Their research involved understanding the data needs of Canadian circular economy stakeholders, leading to a framework with three key categories:

1. **Motivating Data:** This data demonstrates the **environmental** and **economic** benefits (costs and savings) of circular strategies, convincing businesses of their value.
2. **Enabling Data:** This data facilitates the implementation of circular practices by providing information on secondary **materials** (quantity, quality, price, accessibility) and **supply chain** logistics.
3. **Evaluating Data:** This data is used for **benchmarking** and **reporting** progress through standardized metrics, helping businesses measure performance and align with a desired circular future.

Initial polling of the audience indicated that data is considered highly important for advancing the circular economy, with greenhouse gas emissions and financial performance data being identified as the most crucial for decision-making.

Carly elaborated on the "data dilemma," where businesses recognize the need for data in circularity but struggle with its availability and complexity. The session aimed to provide structure to this challenge, enabling better data collection, organization, dissemination, and meaningful use. While successful circular economy initiatives highlight the importance of data, significant barriers persist, including a lack of clarity on data requirements, high collection costs, and difficulty in quantifying the financial benefits of data.

The workshop session involved structured discussions in three parts around each of the three data categories, aiming to move towards standardized, accessible, and meaningful data for the circular economy.

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PART 1: Environmental & Economic Data

Fabian Hammerer, 5REDO

Fabian introduced Life Cycle Assessment (LCA) as a method to quantify the environmental impacts of a product or service throughout its entire life cycle, from raw material extraction to end-of-life management. LCA involves building a life cycle inventory, which records all material and energy inputs and emissions at each stage.

Fabian highlighted three "magic tricks" of LCA:

1. **Inventory:** This step compiles a list of emissions and extractions, potentially numbering in the thousands, released into different environmental compartments.
2. **Midpoint Indicators:** These indicators link specific emissions to their direct environmental effects (e.g., CO2 to climate change), expressed in various units, making decision-making complex due to the multitude of indicators.
3. **Endpoint Indicators (Damage Categories):** To simplify, midpoint impacts are further linked to three main damage categories: extinction of species (biodiversity loss), loss of human life expectancy (DALYs), and non-renewable resource extraction (in dollars). This provides a more manageable overview for comparison.

A final step, **weighing**, assigns a value to these damage categories to produce a single overall score for direct comparison, although this introduces subjectivity.

Fabian discussed the trade-offs of each stage. Midpoint indicators offer deep insights and help track impact shifts but require extensive analysis. Endpoint indicators provide a more intuitive overview but with increased uncertainty. Weighed endpoints offer a simple score but with the highest uncertainty.

In conclusion, a good LCA relies on a comprehensive inventory, translates emissions into impacts and damages using scientific knowledge, offers flexible analysis levels, and crucially, helps identify impact shifts and potential trade-offs, thus removing environmental blind spots.

Melissa Zbacnik d'Antonio, CTTÉI

Melissa from CTTÉI (an applied research center in Quebec) introduced Material Flow Cost Analysis (MFCA) as a tool to uncover the hidden costs of waste. She used the analogy of an iceberg, where the visible tip represents waste management costs (7-10%), while the larger submerged portion represents the true cost, including waste production costs. These hidden costs encompass raw materials wasted, machine time, labour, energy spent on products that become waste, and unsold finished goods.
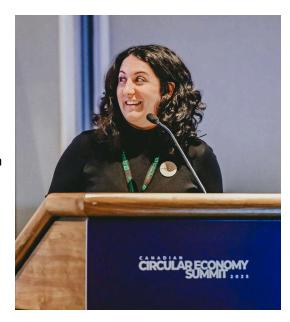
MFCA maps the entire production line, tracking material flows and associated costs at each step. By imputing a portion of production costs to waste, it reveals the total financial impact. This tool is particularly relevant for goods producers with significant waste compared to their output. MFCA is backed by ISO 14051 standard, ensuring its reliability.

While the ISO for MFCA is complex and often requires expert implementation, the research center collaborated with Université Laval to create a more accessible guide. This guide offers four variations of MFCA, ranging from a preliminary estimate to the detailed ISO norm, catering to different organizational needs and resources.

The benefits of using MFCA include tracking the real cost of waste (both direct and hidden), identifying opportunities to reduce manufacturing costs, quantifying the financial gains of waste reduction, and building a strong business case for investing in waste reduction measures and new equipment. Ultimately, by improving productivity and profitability, MFCA also contributes to a reduced environmental footprint.

Participant Questions & Workshop Discussion

Question 1: An audience member inquired about how they, as a medium-sized buyer of services, could influence their waste processing providers to change their thinking about waste processing and reporting, enabling better decision-making based on the providers' capabilities.

➔ **Response:** Melissa suggested exploring the possibility of the buyer launching their own manufacturing or leveraging their purchasing power to put pressure on their current manufacturers. Encouraging manufacturers to recognize the costs of inefficiency and waste, or to obtain an Environmental Product Declaration (EPD), were also proposed as ways to exert influence as a buyer.

Question 2: A participant shared a discussion point from their table regarding the perceived simplicity of tools like MFCA and Lifecycle Assessment (LCA) versus their actual complexity in quantifying circularity and the challenge of selecting the right approach for a specific goal.

➔ **Response:** Fabian acknowledged that LCA is not simple, especially in the initial phase of building the life cycle inventory, which can be time-consuming with little immediate return for clients. To address this, their company favors shorter-term engagements initially for smaller companies, building rough models to provide estimates and validating the inventory midway through the project to offer early insights. This helps build the business case and de-risks the process compared to waiting until a pilot phase. He noted that first-order calculations can sometimes differ significantly from full calculations due to misunderstandings in the inventory process, emphasizing the importance of client feedback and a collaborative approach.

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➜ **Response:** Melissa reiterated that there isn't one single solution and that MFCA is applied in situations where initial education is needed for companies not recognizing the true cost of their waste. The goal is to help them value their waste and see the potential for increased competitiveness and environmental benefits through solutions. She emphasized that they use a variety of tools from their "toolkit" (including LCA and material flow analysis) based on the client's specific needs and goals, starting with understanding the "why" behind the request (e.g., communication purposes vs. resource optimization). They adapt their approach based on the client's situation, acknowledging that starting with a less complex tool might be appropriate if LCA seems too daunting.

Question 3: An audience member asked about the boundaries of LCA, specifically looking upstream to energy sources and downstream to emissions.

➜ **Response:** Fabian explained that the boundaries depend on the purpose of the LCA. "Cradle-to-gate" assesses impacts up to the factory exit, while "cradle-to-grave" includes the use phase and end-of-life. Inventory creation involves tracking all material flows, ideally using primary data from suppliers (though challenging). Secondary data from aggregated databases is often used for smaller companies. Technically, LCA always traces back to raw material extraction and considers uncontrolled releases like landfilling or incineration as emissions. The boundaries are more abstract than physical locations.

Question 4: An audience member shared a metaphor from a sustainability workshop ("I need a compass, not a GPS") to illustrate the industry's confusion about which circularity tools to use, feeling that tools like LCA are often perceived as expensive, time-consuming, and yielding uncertain results. They asked how the panel helps companies navigate this and understand the different types of tools available.

➜ **Response:** Melissa stated that their process begins with a meeting and a series of questions to understand the client's needs and goals. They then determine the appropriate tool (compass vs. GPS, in the metaphor), considering whether the aim is simply communication or actual resource optimization. Their team (including chemists and engineers) focuses on understanding the underlying issues and finding practical solutions. She emphasized that their approach isn't about pushing a specific tool but understanding the client's "why" to reduce impacts and adapting their methods accordingly, recognizing that starting with a simpler approach might be necessary if a comprehensive LCA seems overwhelming.

PART 2: Material & Supply Chain Data

Bethany Edwards, World Business Council for Sustainable Development (WBCSD)

Bethany from WBCSD presented the Circular Transition Indicators (CTI), a globally recognized methodology developed in collaboration with over 50 companies, including KPMG. CTI aims to support both reporting and achieving circularity goals for businesses. It complements existing sustainability frameworks and aligns with European reporting standards (CSRD and ESRS), as well as ISO's inflow-outflow model.

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CTI focuses on data collection and exchange across design, material sourcing, and recovery teams. The core model analyzes circular inflows, recovery potential, and circular outflows to calculate a circularity score at the product, facility, or corporate level. This data can be used for strategic business decision-making and scenario modeling to justify investments in circular strategies.

The CTI methodology helps establish baselines, set targets, monitor progress, and report in line with regulations. It involves a scoping exercise to define boundaries and the selection of indicators across four modules:

1. **Close the Loop:** Focuses on material circularity, water circularity, and renewable energy use.
2. **Optimize the Loop:** Considers critical materials and their impact, product lifetime, and water circulation.
3. **Value the Loop:** Measures material productivity and the decoupling of linear revenue by attributing value to circular components.
4. **Impact of the Loop:** Assesses GHG emissions, nature impact (land and water use), and social impact (with new indicators to be released).

A simplified example illustrates how different recycled content percentages and recovery potentials impact the overall material circularity score.

A case study with VF Corp, a clothing and footwear manufacturer, demonstrates the practical application of CTI. By analyzing a jacket, VF Corp quantified the reduction in GHG emissions achieved by switching from virgin to recycled polyester. This highlighted the dual benefits of improved circularity and reduced emissions. The analysis also underscored the need for increased availability of high-quality secondary material pools and the importance of investing in technologies like advanced sorting.

Bethany also mentioned the Partnership for Carbon Transparency (PACT), a WBCSD initiative working with SAP to facilitate data exchange on GHG emissions and recycled content through existing EPR systems. This aims to improve the validation and verification of recycled materials.

Briefly touching on the regulatory landscape, Bethany noted the significant increase in circular economy legislation. She highlighted the alignment of CTI with Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standard (ESRS), providing a map of how CTI indicators correspond to specific reporting requirements.

Finally, Bethany introduced the Sphere framework, a WBCSD tool focused on sustainable packaging. While specific to packaging, its holistic approach, including a circularity indicator alongside other environmental and social considerations, offers a trade-off model for scenario analysis. This allows companies to evaluate different packaging options based on various impact categories.

In conclusion, CTI provides a comprehensive and adaptable framework for businesses to measure, manage, and report on their circular transition, ultimately driving more sustainable practices.

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Participant Questions & Workshop Discussion

Question 1: The questioner noted their positive experience using CTI for circularity gap measurement and inquired about its potential integration with the WBCSD's Global Circularity Protocol (GCP), which has been recently announced.

➔ **Response:** Bethany confirmed that CTI is indeed being incorporated into the GCP. The WBCSD's circular products and materials team has reorganized its work streams, with CTI now operating under the GCP umbrella. The GCP has two main work streams: "measuring and managing" (where CTI resides, focusing on performance and accountability) and "financials and disclosure." This integration aims to link circularity performance with financial considerations and disclosure, potentially influencing capital market investments by highlighting the value proposition of circularity. The goal is that increased accountability and disclosure will justify financial investments in the circular economy.

Question 2: This question focused on the influence of regulatory environments on the choice of circularity tools. The questioner noted varying regulatory standards across different regions (e.g., minimum standards in Canada versus more stringent continual improvement standards elsewhere) and asked if companies operating primarily in these different environments tend to favour specific tools.

➔ **Response:** Bethany acknowledged the regional differences in regulations. While the WBCSD has a European focus due to its Geneva base, its multinational membership means that companies, even those headquartered outside Europe (like Apple in North America or textile companies in China), are paying close attention to European reporting and disclosure requirements (CSRD, ESRS, ESG) if they operate or sell into the European market. Bethany highlighted a slide that mapped CSRD and ESG requirements against CTI, indicating that companies already engaged in CSR reporting are well-positioned to calculate a circularity score using CTI. Therefore, European regulations are a significant driver for the adoption of tools like CTI, even globally. Furthermore, the incorporation of CTI's inflow-outflow methodology into ISO circularity standards adds to its credibility and broader adoption. Bethany observed that the impact of European regulations might be less discussed in the current location compared to other parts of the world but emphasized its importance for companies with European market access.

PART 3: Benchmarking & Reporting

Alasdair Hedger, Ellen MacArthur Foundation (EMF)

Alasdair from the EMF discussed the evolving landscape of sustainability reporting, particularly concerning the circular economy. He framed the current juncture as a crossroads, questioning whether reporting is a burden or benefit, costly or value-creating, and voluntary or mandatory. The circular economy is a relatively new area within this reporting landscape.

Alasdair emphasized the importance of circular economy reporting for both corporate strategic decision-making (tracking progress and informing investments) and capital markets (informing investors and enabling access to capital for circular solutions).

The current state of play involves moves towards harmonization among sustainability reporting frameworks like GRI, International Sustainability Standards Board (ISSB), and CDP. A key area of difference lies in the focus of disclosures: financial materiality (impact on financial performance), impact materiality (environmental and social impact), and double materiality (both). Harmonization efforts are underway, such as the ISSB standardizing financial materiality and interoperability assessments between frameworks like EU reporting standards, GRI, and ISSB.

The Ellen MacArthur Foundation has launched resources, including a paper on circular economy metrics across major disclosure initiatives, to help organizations navigate this complexity. Their analysis indicates that while circular economy-related metrics like material flows are being incorporated, there's a need for harmonization in defining the circular economy and a current focus on downstream rather than upstream flows, with less ambition on nature regeneration. Gaps also exist in metrics for circular design and nature impact.

Looking ahead, mandatory circular economy reporting is emerging, exemplified by the EU's recent requirements. However, there's a current backlash and proposed simplification of EU regulations, which could reduce the scope and requirements. The Ellen MacArthur Foundation and financial actors have opposed these proposals, emphasizing the criticality of ESG data for long-term competitiveness.

Globally, the ISSB and the Global Circularity Protocol (GCP) are expected to accelerate circular economy reporting. The ISSB is currently focused on climate and biodiversity, but the circular economy is crucial for achieving these targets. The Ellen MacArthur Foundation actively engages with the GCP, welcoming its standardization efforts.

The Ellen MacArthur Foundation's goal is to simplify circular economy reporting to enable scaling. They focus on harmonization aligned with their three principles and aim to ensure reporting demonstrates the outcomes of circular activities to build the investment case. A key challenge identified is the lack of accurate emissions data reflecting the benefits of circular practices within the GHG Protocol, which doesn't adequately account for practices like product durability. The Foundation is actively involved in the GHG Protocol's scope three technical working group to address these issues.

Key takeaways for companies include the fundamental need for a circular economy transition regardless of reporting trends. To track progress and make a business case, companies should measure and disclose relevant circular economy activities that align with their strategy and inform investors about risk and opportunity management.

The concluding remarks highlight the increasing relevance of European sustainability reporting requirements for Canada, especially with the focus on European trade partnerships. The translation of ISSB standards into Canadian standards will further drive the local reporting agenda.

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Patrick Wiedemann, Reverse Logistics Group (RLG)

Patrick, CEO of RLG, discussed their approach to reporting, benchmarking, and servicing customers in the realm of Extended Producer Responsibility (EPR), while also highlighting their use of data analytics for operational efficiency. RLG operates in 80 countries, managing data for customers across various product categories under EPR regulations, including packaging, electronics, batteries, tires, and upcoming textiles.

Their system combines product master data with transactional data and internal rule engines (algorithms translating regulations) to automate the generation of tens of thousands of reports across different jurisdictions and product types. Granularity in product master data is key to understanding complete obligations, anticipating future regulatory changes (like PFAS and the Federal Plastics Registry), ensuring data accuracy (critical for fee calculations), and facilitating flexible reporting. AI can then assist in quality checks, benchmarking, and analytics on the existing or collected data.

Beyond compliance, RLG leverages this granular data to help customers proactively measure their material footprints and drive sustainability initiatives. For packaging, they maintain a database of over 58 million products with material breakdowns, enabling them to track producers' changing footprints. They provide compliance cost data per product and country, aiding financial management and strategic decisions. Retail customers use their data to identify and phase out unwanted materials, receiving monthly reports on their progress. This detailed data also serves as valuable input for broader analytics frameworks like CTI.

Patrick then discussed their operational use of data analytics, using the Blue Box program in Ontario as an example. As the operator of the Common Collection System (CCS), RLG tracks the mass flow of collected materials in real-time. Crucially, they sample deliveries to understand the material composition and, more importantly, the contamination levels within the collected waste. This detailed understanding of contamination (non-accepted materials) is vital because it hinders recyclability and increases costs at Material Recovery Facilities (MRFs). By identifying the types and sources of contamination, they can help implement targeted public education and other processes to improve the system's efficiency and achieve higher recycling and recovery rates.

This continuous measurement also allows for continuous improvement as material flows and types change. Their ultimate goal is dynamic logistics management, already implemented in Europe, where predictive algorithms determine when bins are full, optimizing collection routes and reducing logistics costs and CO2 emissions.

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RLG's proprietary Track & Trace system in Ontario shows real-time data on material flows. Contamination analysis reveals significant percentages of non-accepted materials (over 25% in some regions), highlighting the cost and environmental inefficiency of transporting and processing contaminated materials. Understanding these details is crucial for driving improvements and achieving the sustainability goals of the recycling programs. In essence, data analytics is central to RLG's strategy for customer service in EPR compliance, optimizing operational processes within the CCS, and beyond.

Participant Questions & Workshop Discussion

Question 1: The first question asked if the speaker's company receives requests from customers for baseline data and benchmarking, and if so, how they navigate this.

➔ **Response:** Patrick confirmed they do receive such requests and provide benchmarks. However, these benchmarks are conducted on peer groups, ensuring the confidentiality of individual brand data. Customers can see how they compare against their peers without specific data from competitors being disclosed. He also mentioned that in the UK, they possess significant market data (handling put-to-market calculations for 70% of retailers based on their sales data), giving them unique insights into economic trends.

Question 2: The second question inquired if the company has modeled upcoming regulations, specifically mentioning PFAS, for all the products in their database.

➔ **Response:** Patrick stated that they are actively working on it due to increasing customer demand for this information as the requirements emerge.

Question 3: This question explored whether the data on the cost and difficulty of processing different types of plastics is leading to design changes in packaging among their customers.

➔ **Response:** Patrick affirmed that customers do use this data to inform design changes. Their platform provides insights into where and how changes can be made. While they don't dictate specific material choices (not being packaging experts), they equip customers with the data and tools to track the impact of their design changes on their environmental footprint as updates are made in the database.

Question 4: The final question asked if their database and understanding of regulations allow them to identify products with the highest risk of having very different regulatory requirements across various markets.

➔ **Response:** Patrick confirmed their database's capability to extract this information. Their rule engines, which interpret regulations, enable the analysis of products by jurisdiction and risk level. They can also model the potential impact of applying eco-modulated legislation from one region to another and link this analysis to commercial data.