



Bioproducts Discovery Development Centre / May 5th, 2017

CIRCULAR ECONOMY WORKSHOP Towards Mitigating Climate Change

Chaired by: Professor Amar K. Mohanty, University of Guelph
SUMMARY OF SESSION

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1.0 Introduction

The University of Guelph Bioproducts Discovery and Development Centre (BDDC) hosted a workshop on Friday, May 5th, 2017. The workshop's focus was the Circular Economy and how it plays an important role in mitigating climate change. The workshop was attended by a diverse group of stakeholders from academia, public and private industry, government and the general public.

The workshop provided attendees with an opportunity to learn about the following themes/issues:

- Waste minimization via a closed-looped system
- Food wastes as raw materials for new industrial products
- Household waste carpets and electronics valorization
- Industrial coproducts and byproducts valorization
- Waste to value-added products; eco-friendly food packaging and light-weight auto-parts; green manufacturing
- A panel of experts provided insights to a circular economy and waste free world and how this impacts climate change

The workshop provided an opportunity for the 125 attendees to network and share information / resources. With expert speakers from around the world, the workshop was a reflection of the breadth of ongoing work on the circular economy. The workshop was convened by **Amar K. Mohanty**, Professor and Premier's Research Chair of the University of Guelph. He opened the day with welcoming remarks and provided some background on the BDDC, and the agenda for the day. Professor Mohanty highlighted the need for creative thinking at all levels across all value chains as a multi-faceted approach is needed to ensure long-term sustainability. Furthermore, he emphasized the business opportunity for investing in the circular economy.

Wayne Caldwell, Professor and Interim Associate Vice-President, Research of the University of Guelph also provided welcoming remarks. He opened by stating climate change is a "game changer" and ambitious targets create demands for ambitious and innovative ideas. Professor Caldwell added that new practices are more likely to be adopted when there is a clear economic benefit.

Professor Caldwell mentioned ongoing projects at the University of Guelph that are contributing to the growing body of work in the circular economy, such as: mapping food waste across the entire value chain; developing fuel flexible boilers that heat greenhouses using plant waste and; commercializing greenroof technology.

The following section provides some high-level context and background on the circular economy.

Please note, all presentations are available online at the following link: <https://bioproductscentre.com/events/circularEconomy>

To mitigate climate change, we will need to:

- *Do more with less*
- *Find substitutes for carbon materials*
- *Build a Circular Economy that values existing commodities for the long-term*

- *Professor Wayne Caldwell*

2.0 Context: The Circular Economy

The circular economy is a restorative and regenerative system that aims to keep products, components and materials at their highest utility and value at all times.¹ As a continuous positive development cycle that preserves and enhances natural capital, optimizes resources yields and minimizes system risk, the circular economy manages finite stocks and renewable flows.² A circular economy can be achieved through several avenues, including: design, maintenance and repair, reuse, remanufacturing, refurbishing and recycling. The circular economy contrasts the linear economy which is the ‘take, make, dispose’ model of production.³

At its core, the circular economy is a system where nothing is wasted and valuable materials destined for landfill are put back into the economy without negative effects on people and the environment.

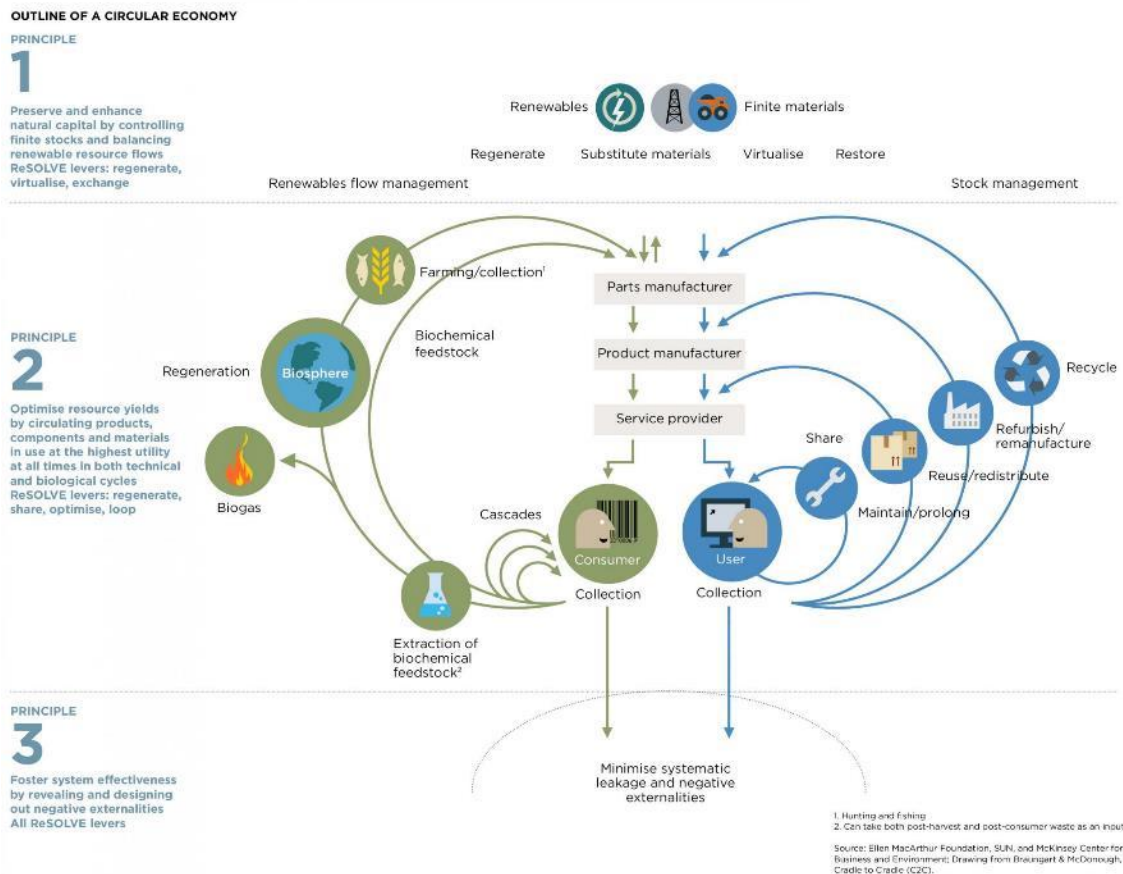


Figure 1: Circular Economy System Diagram. Source: Ellen MacArthur Foundation, 2015.

¹ Ellen MacArthur Foundation, (2015). *Circular Economy Overview*.

² Ibid.

³ Arditi, Stephane. (2017). Circular Economy in Europe: Focus on Product and Waste Policy. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario.

3.0 Key Note Presentation: Value Chain Perspectives

The morning session of keynote speakers was moderated by **Hamdy Khalil**, Senior Global Director for the Woodbridge Group and Professor **Manjusri Misra** from the University of Guelph.

3.1 Alexandre Lemille

Co-Founder, African Circular Economy Network; Founder & MD – Wizeimpact, France
Optimizing Circular Economy

Mr. Lemille's presentation kicked off the event with a clear focus on the future of the circular economy, with an emphasis on how to optimize the value of the circular economy. His presentation centered on challenging questions, such as:

- Is CE worth the investment?
- How do we prove this a better approach?
- When are solutions considered circular? When are they not?

Mr. Lemille suggests that the circular economy is the “future we want.” However, it is often depicted as an advanced recycling model. This is not true, as a circular economy is about imitating natural cycles as much as possible.⁴ In response to depictions of the circular economy as frugal, Mr. Lemille emphasized that a circular approach holds a future for business, the environment and society. When it comes to optimizing value, Mr. Lemille stressed that we cannot spur on change unless we can help people understand the value the circular economy brings. This can be done by understanding and integrating ‘human flows’ into the traditional circular economy understanding (seen above, in Figure 1 on page 4).⁵

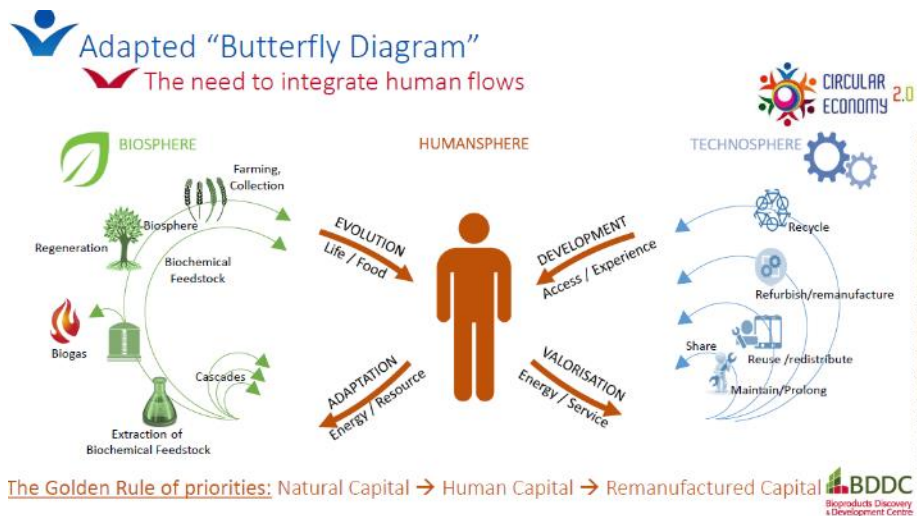


Figure 2: Adapted Butterfly Diagram. Source: Alexandre Lemille, 2017.

⁴ Lemille, Alexandre. (2017). Optimizing the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at:

<https://bioproductscentre.com/events/circularEconomy>

⁵ Ibid.

By understanding the balance between protecting natural capital and creating value in the technosphere, the circular economy is more likely to be valued and adopted across value chains. Internalization of externalities (waste) is a way to create value. Using electric cars as an example, Mr. Lemille stressed the importance of shared outcomes (i.e. improved air quality) and constructive collaboration (through interlinked stakeholder clusters).⁶ A cross-sectoral collaboration results in an innovative business approach that can result in optimization of value, versus a linear business approach that has known and limited stakeholders.

Mr. Lemille closed his presentation by stating, “A restorative economy functions alongside the overarching framework of value optimization to attain the future we want.”



3.2 Wendy Ren

Director, Ministry of Environment and Climate Change (MOECC) – Resource Recovery Policy Branch, Canada

Waste-free Ontario and Circular Economy

Through an overview of the recent changes to the Waste Free Ontario framework (which replaced the *Waste Diversion Act* in 2002), Ms. Ren was able to discuss both the opportunities and challenges for a circular economy approach in Ontario. As greenhouse gases and the cost of recycling continue to increase, the province feels growing pressure to apply a different model.⁷

Shifting away from a linear economy requires a shift in Ontarians’ mindset and views about waste. MOECC and Ontario recognize the opportunity for the circular economy to drive an innovative economy that encourages businesses to design long lasting, reusable and recyclable products. Furthermore, the circular economy can help Ontario stay competitive by attracting investment and creating jobs.⁸ Figure 3 below is a summary of the key challenges and opportunities.

⁶ Lemille, Alexandre. (2017). Optimizing the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at:

<https://bioproductscentre.com/events/circularEconomy>

⁷ Ren, Wendy. (2017). Waste Free Ontario and the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at:

<https://bioproductscentre.com/events/circularEconomy>

⁸ Ibid.



Ontario needs actions to shift from a linear economy to a circular economy.	
CHALLENGES	OPPORTUNITIES
✓ Ontarians generate a significant amount of waste	✓ Circular economy helps fight climate change by reducing GHG emissions from product life-cycle
✓ Ontario's diversion rates have stalled at 25% for last decade.	✓ Circular economy protects the environment by reducing reliance on raw materials and minimizing materials going to landfills
✓ Only focusing on end-of-life management of waste is costly	✓ Circular economy drives innovation by encouraging businesses to design long lasting, reusable, and recyclable products
✓ Ontario's landfill capacity is less than 20 years	✓ Circular economy helps Ontario stay competitive by attracting investment and creating jobs
✓ Greenhouse gas emissions have significantly increased	✓ Stakeholders called for a fundamental policy reform to transform Ontario to a circular economy
✓ Shifting away from a linear economy needs a change to Ontarians' mindset and views about waste	

Figure 3: Challenges and Opportunities for Ontario's Circular Economy. Source: MOECC, 2017.

Ms. Ren also provided an overview of the *Waste-Ontario Act, 2016* which include the *Resource Recovery and Circular Economy Act* and the *Waste Diversion Transition Act*.

*Resource Recovery and Circular Economy Act, 2016*⁹:

- Establishes an overarching provincial interests and enables the government to issue policy statements to provide further direction
- Establishes a new outcomes-based regime that holds producers accountable for their products and packaging
- Empower a non-crown and not-for-profit oversight body to oversee the producer responsibility regime
- Requires the development of a strategy for a Waste-Free Ontario: Building the Circular Economy

*Waste Diversion Transition Act, 2016*¹⁰:

- Replaced the *Waste Diversion Act, 2002* to ensure smooth transition to the new producer responsibility regime
- Governs operation of programs
- Governs wind-up of industry funding organizations

The *Waste Free Ontario Strategy* is a roadmap to further support the circular economy. Key objectives for this strategy include: (i) Enhance provincial direction and oversight; (ii) Increase

⁹ Ren, Wendy. (2017). Waste Free Ontario and the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at:

<https://bioproductscentre.com/events/circularEconomy>

¹⁰ Ibid.

resource productivity and reduce waste; (iii) Enable efficient and effective recycling systems and; (iv) support sustainable end markets.¹¹ The goals for this strategy include:

- 30% diversion rate by 2020
- 50% diversion rate by 2030
- 80% diversion rate by 2050

Ms. Ren highlighted key actions for Ontario's waste-free strategy that will move towards the province's ultimate long-term goal of zero waste and zero GHGs. Key areas to consider in this strategy include: organic waste (One third of Ontario's waste is organic waste); empowering a Resource Productivity and Recovery Authority; Amend the 3Rs regulations to increase resource recovery across all sectors; designate new materials to ensure products are fully responsible for recovering materials, products and packaging¹².

3.3 Hilary French

Program Management Officer, United Nations Environment Programme's Regional Office for North America

From Farm to Fork: Reducing Food Waste in a Circular Economy

As a Program Advisor to the United Nations Environment Programme (UNEP), Ms. French specializes in promoting North American engagement with UN Environment's work on climate change, sustainable energy, air quality, sustainable consumption and production, and the green economy. For this workshop, she focused on food waste and loss at the global level. Some interesting statistics from her presentation include:

- We produce enough food to feed the world's population, and yet 800 million people suffer from hunger
- At least one third of food is wasted every year, costing approximately \$750 billion and generating 8% of global GHG emissions
- Food loss accounts for 21% of freshwater consumptions, 19% of fertilizer use, and 18% of cropland

Ms. French highlighted the Sustainable Development Goals, in particular Target 12.3:

By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

To meet Target 12.3 by 2030, three key recommendations have been put forward¹³:

¹¹ Ibid.

¹² Ren, Wendy. (2017). Waste Free Ontario and the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

¹³ [United Nations. \(2016\). Sustainable Development Goal 12.](#)



Target: Every country, city and company involved in the food supply chain should set food loss and waste targets that are consistent with Target 12.3 to ensure sufficient attention and focus

Measure: Governments and companies should measure, quantify and report on food loss and waste. “What gets measured, gets managed.”

Act: Governments, companies and civil society should accelerate and scale up adoption of policies, incentives, investment and practices that reduce food loss and waste.

Through her presentation, Ms. French provided workshop participants with a global perspective on resources, strategies and the economic impact of food loss. For example, the Food Recovery Hierarchy suggests that the best way to address food waste is to not create it in the first place. This can be done by improving ordering and management of food inventory; improving storage and transportation of food; developing informative data labeling of food and; repurposing unsold food or sell at discount during off-peak hours.¹⁴ She also provided some context on Canadian food loss – amounting to \$31 billion. Similar to the U.S., Canadians experience a majority of food waste at the consumption end of the value chain.

She invited attendees to be champions and lead by example by showcasing successes. She applauded the University of Guelph and the Bioproducts Discovery and Development Centre for its commitment to furthering the Circular Economy through research and knowledge transfer.

3.4 Stephane Ardit

Circular Economy, Product & Waste Policy Manager – European Environmental Bureau, Belgium

Circular Economy in Europe – Focus on products and waste policies

Mr. Ardit presented on the circular economy based on his work for the European Environmental Bureau (EEB) as a product and waste policy manager. His work focuses on how to support the transition towards a circular economy and zero waste society. Europe’s waste situation contrasts North America’s for a few reasons:

- The EU is densely populated
- Low natural resource availability
- High labour costs
- Low growth economy
- History of environmental protection
- EU is committed to global agreement on climate change and Sustainable Development Goals

¹⁴ French, Hilary. (2017). From Farm to Fork: Reducing Food Waste in a Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017 in Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

Mr. Arditi suggested that the circular economy is an opportunity to reconcile the economy and environment due to its non-linear approach. Furthermore, applying a life cycle approach that considers the entire supply chain shifts production from the 'cradle to grave' thinking to 'cradle to cradle' thinking.¹⁵

“80% of environmental impacts are determined at the design stage”
- **Stephane Arditi**

Products and waste are particularly interesting from a policy / regulatory standpoint. Mr. Arditi compared various product and waste policies to illustrate some of the regulatory challenges to be overcome. Setting 'ecodesign' standards, for example, creates a level playing field for high quality products. North America, however, remains reluctant to set these standards. When designed well, market incentives can also be used to nudge consumers towards the best products.¹⁶ Selling these ideas will require quantification the benefits, which draws a connection to Mr. Lemille's earlier presentation on optimizing value.

Mr. Arditi acknowledged that certifications and compliance can become overwhelming, but if governments/industry create consistent criteria, it is much easier to meet new regulatory demands. Shifting towards a circular economy will require a cultural shift in which production must move towards experience and enjoyment, rather than the traditional 'buy, use, and dispose' / linear model.¹⁷ Collaborating on borderless issues such as climate change and marine pollution is another challenge that the circular economy must overcome.



3.5 John Wilkinson

Senior VP – Sustainability, GreenField Specialty Alcohols Inc., Canada
Circular Economy and Public Policy

Prior to Mr. Wilkinson's role as Senior VP, Sustainability with GreenField Specialty Alcohols Inc., he represented the rural ridings of Perth-Middlesex and eventually Perth-Wellington. Serving in Cabinet as Minister of Research and Innovation, Minister of Revenue and as Minister of the Environment, Mr. Wilkinson's diverse experience in government and policy provided key insights for workshop attendees.

¹⁵ Arditi, Stephane. (2017). Circular Economy in Europe: Focus on Product and Waste Policy. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

¹⁶ Ibid.

¹⁷ Ibid.

Mr. Wilkinson reiterated the importance of harmonizing our consumption patterns with natural cycles. Our current use of fossil fuels is unsustainable, and a new approach must be applied.¹⁸ As the #1 producer of ethanol in Canada with 20% of the market share for pharmaceutical grade alcohol, GreenField has become a large GHG emitter. GreenField has pursued opportunities to help offset cap and trade costs.

“In a fight between our species and Mother Nature, who do you think will win?”
- **John Wilkinson**

Mr. Wilkinson provided attendees with three circular economy projects at GreenField:

1. SEMECS joint venture – Varennes, Quebec: Since dumps are no longer approved in Quebec, organic waste is processed in a biodigester to produce biogas and digestate. GreenField then uses the biogas to displace natural gas consumption.
2. Truly Green Tomatoes – Chatham, Ontario: A greenhouse located across the road from GreenField’s facilities in Chatham uses excess heat and CO₂ from the ethanol plant to heat the greenhouse. Additionally, excess organic waste at the greenhouse is anaerobically digested for GreenField.
3. New research breakthroughs in Jet Fuel

Key takeaways from this presentation included the need to harmonize with Mother Nature and to break our society’s addiction to fossil fuels¹⁹.

3.6 Amar K. Mohanty

Professor & Premier’s Research Chair – University of Guelph

Circular Economy: A Path Towards Innovating Biobased Materials – Need for Disruptive R&D

Dr. Mohanty’s presentation focused on bioproducts, innovation and Canada/Ontario’s position within the global circular economy. He highlighted that the circular economy will result in a reduction in waste which can lead to new jobs, reduced GHGs and a new economic logic.²⁰ While the linear model is non-profitable, unsustainable and harmful to the environment, a close loop system is innovation driven and drives money back into the economy.²¹ A circular economy also requires a collision of industry, academia and government: knowledge dispersion by large industries and small-medium enterprises (SMEs) is crucial.

¹⁸ Wilkinson, John. (2017). Circular Economy and Public Policy. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

¹⁹ Ibid.

²⁰ Mohanty, Amar K. (2017). Circular Economy: A path towards innovating biobased materials – Need for disruptive R&D. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

²¹ Ibid.

A study from seven European nations that adopted a circular economy approach suggests that each nation's GHG emissions reduced by up to 70% with workforce growth of approximately 4%.²² Dr. Mohanty emphasized that the EU is ahead of North America in the circular economy.

Next, Dr. Mohanty compared Europe and the United States' waste treatment. While Europe has a more diversified waste treatment (38% landfill; 36% energy recovery; 26% recycled), the U.S. deposits 91% of its waste in landfills with only 9% being recycled.²³ For example, in 2013 the U.S. disposed more than 35 million tons of food waste in landfills.²⁴ This food breaks down to produce methane, which contributes to climate change.



Focusing specifically on packaging, Dr. Mohanty highlighted the need for a shift in the packaging sector. It is estimated that by 2050, oceans will have more plastics than fish (by weight).²⁵ A three-step approach is needed to (i) redesign and innovate, (ii) reuse and (iii) improve economics and quality of recycling. The first step requires significant investment and innovation into research and development (R&D). This fundamental redesign and innovation is needed for greater than 50% of plastic packaging (by number of items).²⁶

It is estimated that sustainable packaging will increase to become a \$274 billion market by 2020 due to increasing demand for sustainable packaging.²⁷ Novel bioplastics, edible packaging and bio-based PET are some examples of sustainable packaging trends. Dr. Mohanty's area of interest has been utilizing undervalued co-products to create value-added bioproducts. Using coffee chaff from the coffee industry to close the loop and create additional value for coffee products was provided as an example. The BDDC, University of Guelph and Coffee Club LP collaboration that resulted in a compostable single-serve coffee pod was among the many successes discussed at the event.



Biocarbon is another bioproduct that holds significant potential for the circular economy as it can be used to consumer products such as automotive interior parts or compostable mulch film.

²² [Stahel, Walter R. \(2016\). Nature. Vol. 531, p. 443-446.](#)

²³ [World Economic Forum and Ellen MacArthur Foundation. \(2017\). The New Plastics Economy – Catalysing Action.](#)

²⁴ Ibid.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

Ford Motor Company is taking a great move towards using CO₂ based plastics to improve their auto-part production. Dr. Mohanty used the example of carpet waste in North America as a key area to explore: 230-260 million kg of carpet diverted to landfills in Canada.²⁸

Dr. Mohanty's key message was the need for research and innovation to further develop new materials. This will require disruptive technology and business models and collaboration across academia, industries and government.

4.0 Panel Discussion – Circular Economy in Practice

Each panelist from the afternoon session did a short presentation, followed by a panel discussion moderated by **Tyler Whale**, President of Ontario Agri-Food Technologies and **Tom Dowler**, Commercial Manager of IGPC Ethanol Inc. Presentations are summarized below, followed by a final summary of the panel discussion.

4.1 Phil Dick

Business Development Officer, Ontario Ministry of Agriculture, Food & Rural Affairs

Mass Balance Implications when Defining Circular Opportunities for Zero Waste

Mr. Dick's presentation focused on one of the key challenges facing Ontario's zero waste goal: measuring outcomes and efficiencies. Mass balance is important because waste occurs with measurable properties such as cost (inputs, process and outputs), calories (kWh, BTUs, etc.) and carbon (volume). Thus, net zero is a constant constraint.

Using manufacturing energy productivity as an example, Mr. Dick highlighted that measuring labour productivity and energy savings are not the same thing: while some industries (i.e. manufacturing) have become more productive, they have actually become less efficient due to external factors such as increased maintenance and labour costs.²⁹ Managing the input side of production drives efficiency: for example, spending \$1 managing inputs will save \$3-5 later on (in terms of reprocessing or finding a new use).³⁰ Mr. Dick continued that the bottom line for mass efficiency means that you can make \$1.2 million worth of goods with \$1 million.

Input management to reach mass balance requires realistic goals. While 80% of waste is avoidable through digital automation, real factors such as lack of utility management, increased cost of labour, food and packaging waste and higher transportation costs impact the ultimate goal. Mr. Dick emphasized that "it matters where you start" in terms of utility and process efficiency and product recovery. The inputs, process and outputs of a product will determine the

²⁸ Mohanty, Amar K. (2017). Circular Economy: A path towards innovating biobased materials – Need for disruptive R&D. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

²⁹ Dick, Phil. (2017). Mass Balance Implications when Defining Circular Opportunities for Zero Waste. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

³⁰ Ibid.

overall efficiency of a product. Mr. Dick concluded that zero waste can and should remain a goal in order to encourage optimization of inputs.³¹

4.2 Scott Hamlin

Founder & CEO, LOOPTWORKS, USA

Upcycling in a not so Circular Economy

LOOPTWORKS is an upcycled apparel company that recovers existing materials and turns them into bags, packs and accessories. Mr. Hamlin's background in the fashion and apparel industry led him to develop a company with a circular economy approach at its core: "use only what already exists." Excess materials are a line item expense for clothing manufacturers; by upcycling them, they can be turned into a high margin, positive revenue stream while 'doing good for the planet.'³²

Mr. Hamlin provided several examples of LOOPTWORKS projects, including the Southwest Airlines project. Through a partnership, 80,000 leather airplane seat covers were recovered (43 acres of leather).³³ Through reverse logistics, and a unique partnership that provides jobs to adults with special needs, they were able to produce a unique line of bags and apparel. 18 million gallons of water were conserved through this project.³⁴

"There is 70x more pre-consumer excess on the planet than post-consumer excess."

– Scott Hamlin

Mr. Hamlin encouraged workshop attendees to harness the energy and innovation in the room to create new opportunities for the circular economy. This will require a transfer of knowledge to industry, which is often limited to the companies that can afford to innovate. Mr. Hamlin emphasized the importance of collection – both pre and post-consumer – as well as reducing the carbon footprint from aggregation and materials separations. An additional opportunity and challenge will be educating the general population on the circular economy and influencing behaviour change. This was a theme that emerged from the event in general as many speakers felt this is amongst the most challenging obstacles to overcome.



³¹ Ibid.

³² Hamlin, Scott. (2017). Upcycling in a not so circular economy. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at : <https://bioproductscentre.com/events/circularEconomy>

³³ Ibid.

³⁴ Ibid.

4.3 Meena Hassanali

Director, Industry Programs – Provision Coalition, Canada

Building a Business Case for Food Loss + Waste Reduction

Provision Coalition (PC) is a non-profit organization directed by coalition members from Canada's food and beverage sector. PC delivers expert resources and programs to make food sustainably. Through value chain collaboration and knowledge transfer and outreach, PC has become a champion for reducing food waste and loss in Canada's food and beverage sector.

Food waste in Canada is valued at \$31 billion / year

- 30-40% of food produced is lost along the value chain
 - 2% of Canada's GDP
 - 70% of Canada's agri-food exports
- Gooch & Felfel, 2014

Reducing food loss and waste (FLW) is an opportunity with social, economic and environmental benefits. Key challenges, however, include raising awareness of the problem; access to innovative solutions; ability to quantify and track progress and; shifting Canadian's behaviour around FLW. In response to some of these challenges, PC has developed a FLW Toolkit. Ms. Hassanali walked workshop attendees through the toolkit to show how processors can measure and manage their food waste. Campbell's has committed to piloting the project. Through the FLW toolkit and assessment, Campbell's identified 6 opportunities to reduce food waste which would increase yield at their plant by 938 tonnes per year.³⁵ These opportunities were valued at \$706, 000, with a net payback in less than 6 months.³⁶

Ms. Hassanali's presentation provided workshop attendees with a real-world example of how the food and beverage industry can reduce their impact while creating a more profitable business model. The next steps for the toolkit include further alignment with FLW protocol and increasing its capacity to work with more than five processes. The toolkit will eventually include return on investment (ROI) calculations, including energy, water and carbon saving calculations.

4.4 John Pigott

CEO – Club Coffee, L.P., Canada

Remember the Consumer when Designing Products for the Circular Economy

Mr. Pigott brought an important aspect of the circular economy to the workshop. As the CEO of Club Coffee, Mr. Pigott reminded attendees that when designing products for a circular economy, we must always remember the consumer. At the end of the day, the consumer rules as they make the decision to purchase and consume a product. Consumers, however, are very complicated as they often want the right product for the right price and they want it immediately. This creates challenges for the circular economy as research and development for new

³⁵ Hassanali, Meena. (2017). Building a Business Case for Food Loss + Waste Reduction. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at:

<https://bioproductscentre.com/events/circularEconomy>

³⁶ Ibid.

innovations takes time. While marketing addresses the challenges associated with complex consumers, Mr. Pigott emphasized the true driver for change is innovation.

Single serve coffee has become a game changer for consumers. The North American retail coffee market exceeded \$18 billion in 2016 sales with approximately 38% and 50% U.S. and Canadian sales (respectively) coming from single serve.³⁷ This has resulted in 4 million K Cups per day entering the waste stream. Consumers sent a clear message that they want a better solution to reduce the environmental impact.

“Placed end to end, each day’s usage of K Cups would extend 475 km”
- **John Pigott**

Through a collaboration with the University of Guelph and BDDC, a 100% compostable pod has been developed. The pod is made from renewable bio-based materials, including a ring made with coffee chaff. This is an example of delivering the right solution to meet the unique demands of consumers (convenient and consistent quality – guilt free).

Mr. Pigott also addressed a central theme for the day – How do you get consumers to change their behaviour? He suggested: work with the brands they trust to deliver product that are designed for the circular economy (i.e. President’s Choice).

The next challenge for the circular economy will be helping consumers understand the product end life cost. While consumers have drawn the connection between energy production and consumption to GHG emissions, they are not linking the impact of packaged goods and landfills. This will make it challenging to show value in reducing waste via composting.



4.5 Atul Bali

CEO – Competitive Green Technologies, Canada

Land to Brand to Land – Using undervalued coproducts and by-products of Agriculture

Mr. Bali’s presentation focused on his work with bio-composites and how these materials can reduce global dependence on non-renewable resources by creating innovative, globally scalable and competitive products for food, auto and consumer markets.

Competitive Green Technologies, based in Leamington Ontario, compounds binary, ternary and quaternary polymer blends at an industrial scale with biomass to make compostable bio-composite resins that offer measureable value to the end-consumer. Mr. Bali’s reflected on the bioeconomy eco-system that has been created through the unique collaboration of primary

³⁷ Pigott, John. (2017). Remember the Consumer when Designing Products for the Circular Economy. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

producers, the BDDC, CGTech, molders, packagers, merchandisers and the final end-user. For farmers, compounding biomass can increase farm gate value by as much as 200%.³⁸

Some bio-composites include natural fibre reinforced polypropylene (used for flower pots, storage bins), bio-carbon reinforced bio-composites (used for light weight auto parts), and bio-carbon masterbatch (used as substitution for carbon black masterbatch).³⁹ Mr. Bali shared his own challenges and success with bio-composite materials, such as their recent status as the direct resin supplier to Ford. As the first biopolymer company to supply for Ford, Mr. Bali emphasized the difficulty of trying to do research at the speed of business. For example, a headlamp casing for Ford failed 7 times.

Mr. Bali highlighted the world-wide potential for the 'land to brand to land' eco-system that is supported by research and innovation at the University of Guelph and BDDC. He used the German word, *einander*, to emphasize the importance of "one understanding". He felt that one understanding should be the foundation for any collaborative efforts because it will help identify value proposition and application needs from the beginning. Mr. Bali also stressed that innovations with bio-composites are an iterative development process that require perseverance.



4.6 Panel Discussion

The final panel discussion highlighted several themes from the workshop. The discussion has been summarized below:

Need for collaboration

- Need to identify unique partnerships to ensure innovation and technologies reach industry stakeholders
- Share our successes with each other

Creating a behavioural shift

- Need to develop value propositions that address systematic problem of waste
- Will need a unique mix of regulatory and business case initiatives



³⁸ Bali, Atul. (2017). Land to Brand to Land – Using undervalued coproducts and by-products of Agriculture. Presented at the *Circular Economy Workshop*. May 5th, 2017. Guelph, Ontario. Available online at: <https://bioproductscentre.com/events/circularEconomy>

³⁹ Ibid.

- Need to ensure you understand the consumer and their needs – always keep this front of mind
- Identify ways to help processors understand the potential opportunities

Need for research

- From a policy standpoint, this research needs to be supported
- Potential for more pilot initiatives
- Identify ways to accelerate the diffusion of these innovations to speed up the process



Take the lead

- Take an international lead and do not wait for innovations/regulatory changes to emerge from the U.S.
- Seize the moment (and momentum)

5.0 Key Messages and Conclusion

The following slide was developed by Synthesis Agri-Food Network for the final wrap-up for the workshop. Dr. Wilton led a final discussion around the central themes and key challenges discussed at the workshop.

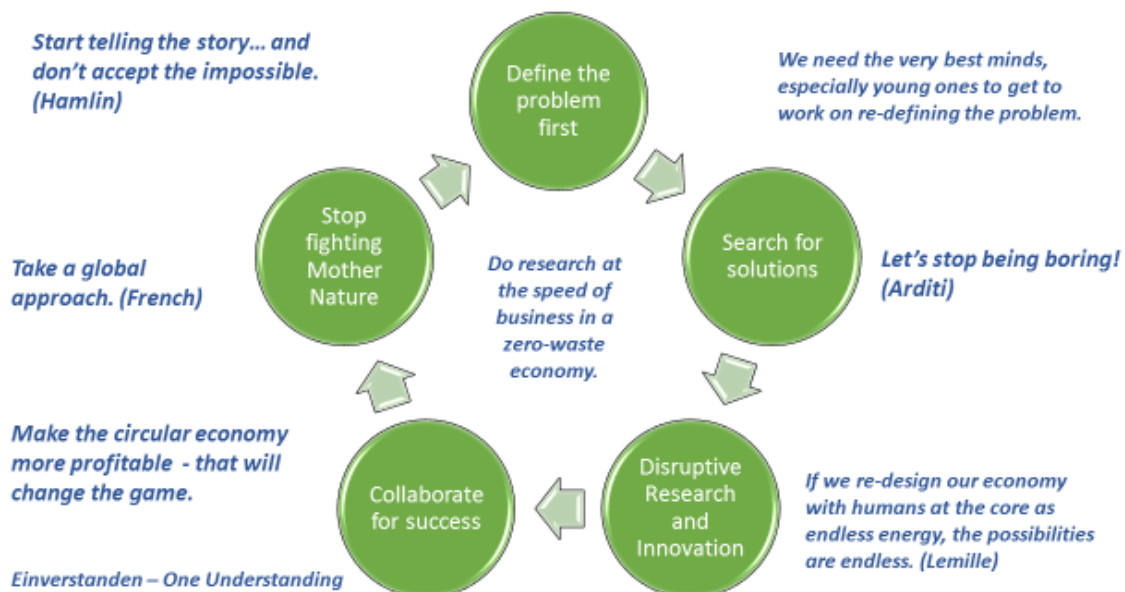


Figure 4: Themes and Takeaways. Source: Synthesis Agri-Food Network.

Dr. Mohanty closed the workshop by thanking all sponsors, speakers, organizers and attendees for their support and participation in the event and encouraged attendees to stay involved for future opportunities to further develop the circular economy in Ontario through research, innovation, and collaboration.

5.1 Event Sponsors

This event would not have been possible without the support of generous sponsors.



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Figure 5: Group photo of the Circular Economy Workshop. May 5th, 2017