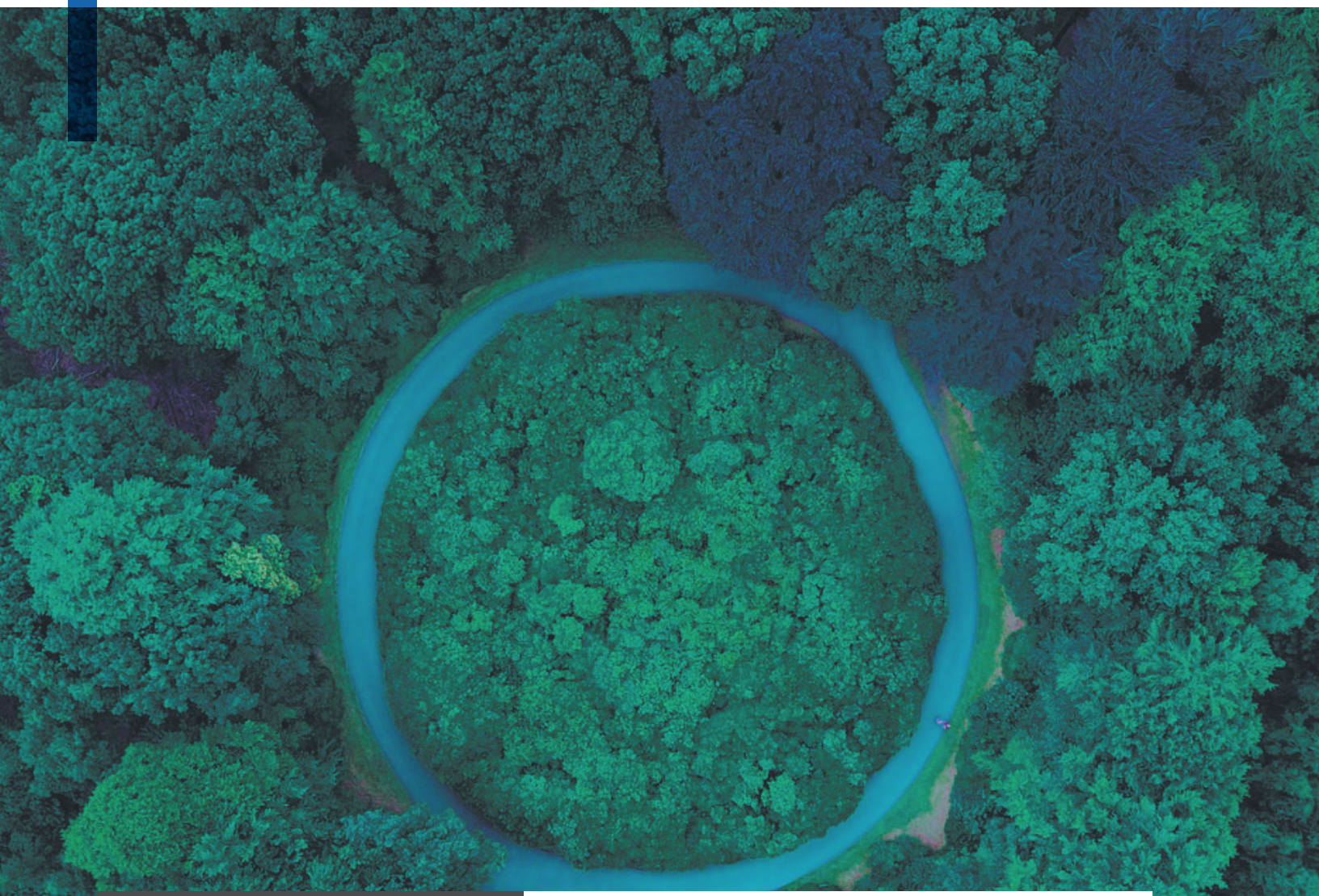
BOMA Canada

Circular Economy in Commercial Real Estate

Focus: Circular Procurement



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Welcome to Our Vision

Thanks to the efforts of dedicated building management teams, buildings are now more energy and water efficient than ever before, generate fewer carbon emissions, and promote occupant health and wellbeing. However, waste remains a persistent challenge, especially as the effectiveness of the existing frameworks for disposal and recycling are being revisited. It is also arguably the building management activity that is the most visible to tenants and therefore the one that can inspire the most engagement.

Applying Circular Economy (CE) principles to management and operational practices provides building managers a process where goods and services can be purchased systemically and purposefully to incorporate closed energy and material loops within value and supply chains, to reduce waste and other environmental impacts. Along with supporting broader corporate environmental and social objectives, such efforts will strongly contribute to Canada's transition towards a future where economic activity is associated with the regeneration of nature, rather than its degradation.

Recognizing the tremendous impact that the commercial real estate industry can have in this transformation, **BOMA Canada aims to accelerate the transition of the Commercial Real Estate (CRE) industry towards a Circular Economy** by identifying and creating standardized approaches that support the following objectives:

1. Raise Awareness: Help the commercial real estate (CRE) industry broadly understand how existing buildings can adopt and advance principles of circular economy.
2. Self-Assessment and Performance Monitoring: Measure the extent to which principles of circular economy is already integrated in existing sustainability practices, highlight opportunities for deeper overlap, and monitor progress over time.
3. Capacity Building: Offer educational and engagement opportunities for CRE professionals to share their experiences to build internal proficiency on implementing circular economy principles.
4. Foster Cross-Discipline Engagement: Engage stakeholders from various disciplines to support building managers in their endeavours.

These activities will support the developments already underway by the Canadian Federal Government as well as across the European Union.

The commercial real estate industry has made important commitments and taken bold actions to reduce its overall environment impacts and improving the social well-being of its tenants, employees, and the communities in which it operates. Through collaboration and by combining efforts, it can have a major role in accelerating the transition to circular and low-carbon economy in Canada.

Benjamin Shinewald
President & CEO,
BOMA Canada

Objectives of this Guide

This Guide has been developed to lay the groundwork around what it means to adopt principles of circular economy (CE) in all key areas of building operations. It will introduce **core definitions and concepts** to support a deeper understanding of CE as it relates to management of CRE. After providing an **overview of the opportunities** that exist across many areas of building operations, we will explore one area that holds the potential for **immediate impact** on building operations and its impact on environment: **Circular Procurement**.

Future resources will explore the numerous other opportunities that exist for building managers to participate in the circular economy. Stay tuned!

Acknowledgement

BOMA Canada would like to acknowledge and thank the members of Circular Building Operations Working Group and our partners at the Recycling Council of Ontario & Circular Innovation Council as well as Circular Economy Leadership Canada for their support for and participation in the development of this vision and resulting resources.

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1. What is Circular Economy?

Safeguarding natural systems

Vision 2050 provides an inspirational look at what the world could look like by 2050, "a planet of around 9 billion people, all living well – with enough food, clean water, sanitation, shelter, mobility, education and health to make for wellness – within the limits of what this small, fragile planet can supply and renew, every day". The document elaborates on the pathways required for this future, such as enabling the "education and economic empowerment" of certain groups of people as well as embedding the true cost of pollution in the price of goods and services, halving carbon emissions worldwide, halting deforestation, and delivering a "four-to-tenfold improvement in the use of resources and materials".[1]

These objectives will be much more difficult to achieve if the current linear model of production and resource utilization are maintained, requiring the ongoing extraction of raw resources from the ground, transforming them into good and services for our use, then disposing of them at the end of their useful life or well before it.

> *"[Our system is] in crisis. And the reason it is in crisis it that it is a linear system, and we live on a finite planet and you cannot run a linear system on a finite planet indefinitely"*
>
> *Annie Leonard – The Story of Stuff*

The primary objective of a circular economy

The overarching purpose of adopting a circular economy is to transition the current economic model to a zero-carbon or low-carbon economy model through sustainable business practices. As it relates to buildings, there are two sources of carbon that contribute to their total carbon footprint:

1. Embodied Carbon: This is the carbon associated with the construction and the renewal (including renovations and tenant build-outs) of the building or infrastructure throughout its whole lifecycle (building materials, construction processes, transportation of goods and materials for construction, equipment in the building, etc.)
2. Operational Carbon: This is the carbon released from the day-to-day operation of a building. This includes but is not limited to the use of energy, including electricity, natural gas and other fossil fuels for the operation and maintenance of all building systems - HVAC, lighting, etc., water use, including toilets, cleaning, drinking water, irrigation and cooling towers, use of chemicals in the sanitation and janitorial tasks, solid waste generated, transportation of goods and materials, plus any other carbon related to the operation, management and use of the building.

1 World Business Council for Sustainable Development (wbcsd), 2017. Vision 2050: The new agenda for business

Understanding the difference between embodied and operational carbon is critical in order to take appropriate measures to minimize the overall carbon footprint of a building. For existing buildings, there is very little that could be done to reduce the embodied carbon because they are already built. However, measures can be taken to minimize additional embodied carbon associated with tenant build-outs and asset renewal activities throughout the lifecycle of buildings. Our efforts to mitigate operational carbon would greatly impact the total annual emission from buildings.

Three principles of circular economy

A circular economy is a "systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources". [2]

It is based on three key principles: [3]

1. Design out waste and pollution

2. Keep products and materials in use

3. Regenerate natural systems

This model aims to keep products and materials in use for as long as possible. Products are therefore designed to last, to be reused, repaired, and remanufactured. The

material components of the product can be disassembled and re-introduced into the production loop to become new products, reducing our need for landfills. **The value of the resource is therefore retained during its entire life cycle, eliminating the very concept of waste.** Natural ecosystems can now begin to thrive again because this economic model favours the use of renewable resources and does not depend on continuous resource extraction. The circular economy drives performance and innovation by making greater use of its physical assets, all while protecting the critical services provided by nature such as food, freshwater, drought, and fire prevention. [4]

"The circular economy vision and approach gives endless possibilities to create a thriving economy"

– The Ellen MacArthur Foundation

Figure 1: The closed loop of a circular economy[5]

2 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail
3 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail
4 Accenture, 2014. Circular Advantage: Innovative Business Models and Technologies to Create Value in a World without limits to Growth
5 Cécile Van Oppen, Godard Croon & Dirk Bijl de Vroe, 2018. Circular Procurement in 8 Steps

Did you know?

While recycling plays a role in a circular economy, it is only one of the processes that may be applied to a material. Most materials decrease in value every time they are recycled, leading to the concept of "downcycling". Eventually, the material or product will end up in a landfill.

Repairing, upgrading, and remanufacturing are some of the ways through which the value of the original material can be continuously retained.

Biological and technical nutrients

In a circular economy, materials are separated into two fundamentally distinctive flows: biological and technical. Biological materials are organic materials that can safely re-enter the natural world once they have been used because they will biodegrade over time. They will provide nutrients to the environment. For example, paper products are considered a biological nutrient. Technical nutrients on the other hand, cannot biodegrade and therefore they must re-enter the production loop so that their value can be captured and recaptured. Metal, plastics, and synthetic chemicals are examples of technical nutrients.

Based on the type of material in question, different processes will be recommended to keep the nutrient in the circular resource loop.

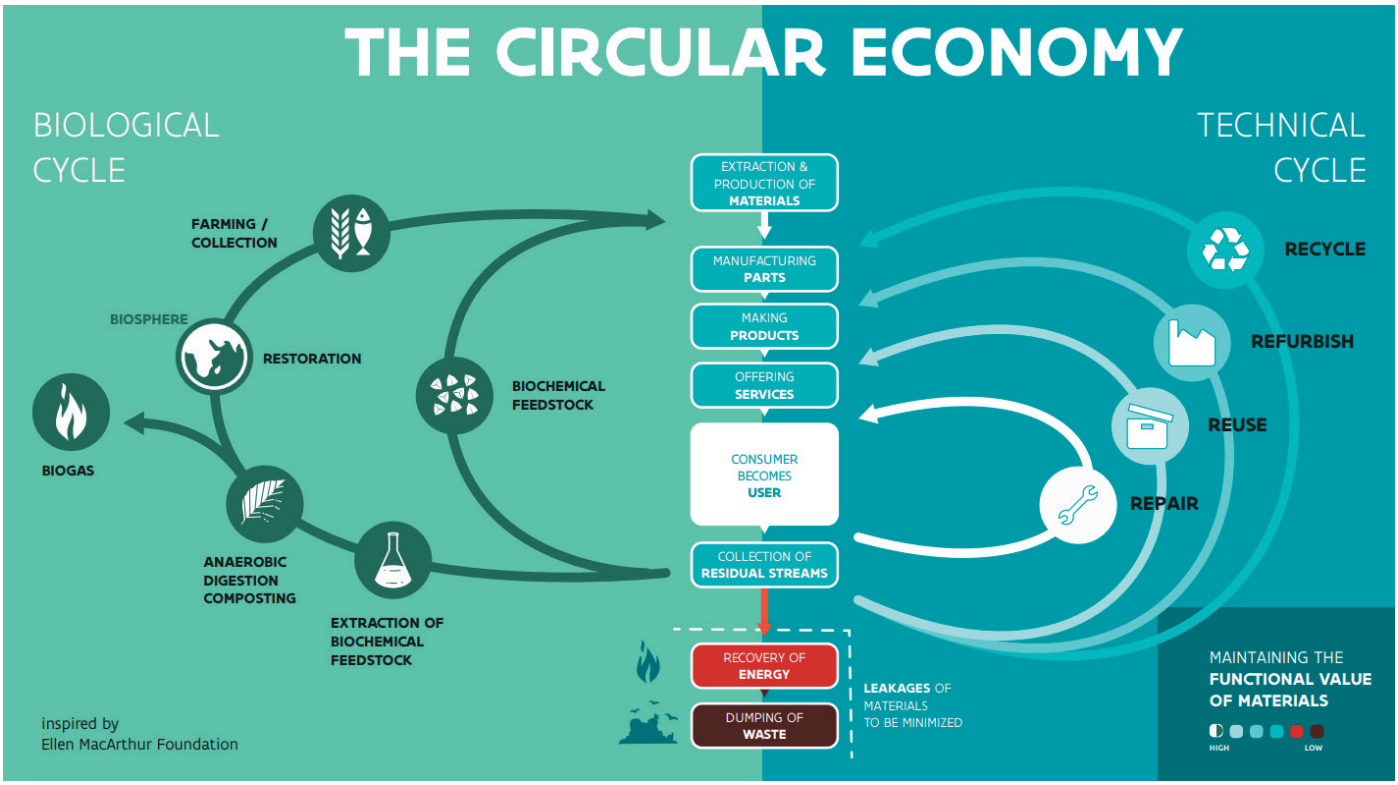


Figure 2: Biological and technical cycles of the Circular Economy

2. How can Building Managers Contribute to the Circular Economy?

Building managers coordinate space, infrastructure, people, administration, and operation. They control the physical resources that flow through the building and the services offered to occupants. Since they oversee the entire system, building managers have **considerable influence.** [1]

ReSOLVE Framework

The ReSOLVE framework for the built environment was developed by the Ellen MacArthur Foundation, McKinsey & Co., and SUN. It identifies **six actions that organizations can take to apply circularity in their work:**

- **R**egenerate
  Conserve and enhance the earth's ecosystems by favouring renewable resources and returning biological nutrients to nature (e.g. implementing a robust organic waste program and contributing to composting).
- **S**hare
  Keep products in use in their original form for as long as possible through sharing, exchanging, and redistributing (e.g. instead of discarding unwanted office furniture, Donating them to a charity that recovers and redistributes used office furniture to other organizations).
- **O**ptimize
  Avoid using resources or creating waste unnecessarily with products and operating practices that are efficient, and where the products' useful life is extended through repairability or upgradability and where reverse logistics are supported. E.g. implement preventive maintenance to reduce the frequency of replacement or service of certain equipment that leads to creation of waste and increase in costs.
- **L**oop
  Keep technical nutrients (e.g. plastic, metal) in perpetual use as long as possible. Use design that favours disassembly and re-manufacturability (into the original form or into a new product). For example, implement a comprehensive waste management program that will allow users to capture as much of the recyclables and return to further processing to convert them as raw materials to produce the same products or different products.
- **V**irtualize
  Where practical and reasonable, replace physical products with their virtual counterparts. For example, instead of purchasing printed user manuals or printing instruction manuals, use digital copies. Provide meeting invitees the option of attending meeting virtually, etc.
- **E**xchange
  Swap out actions and products that have negative ecological consequences with those that favour the use of renewable energy and renewable materials (regenerative and biodegradable) inputs. For example, consider increasing the use of renewable power for your operation. Encourage the use of EV vehicles for business.

1 RICS, 2018. Circular economy: role of facilities manager

Applying ReSOLVE to building management activities

What does this mean for building managers? By applying the framework's lens to each activity, the following areas of opportunity can be identified. Review Appendix B for more details on the ways CE can be applied to ongoing building operations.

Many of these areas of opportunity focus on the materials, goods, or products used in the building. By focusing both on **preserving and prolonging** the life of the assets already in the building through maintenance and repair, and by **selecting** materials and products that can have a useful end of life, it becomes possible to significantly minimize the amount of waste generated at a building while also promoting equity and prosperity.

This is why **circular procurement** is the first area of opportunity to be explored.

While waste diversion may be a critical piece of the company's sustainability objectives, its interrelationship with procurement is rarely recognized. **When end-of-life considerations are included in procurement decisions less waste is generated, and diversion and capture rates increase.**

Building operations, repair, and maintenance

- Select equipment that are made with materials that have a low environmental impact over the full lifecycle of the building; are durable; are high efficiency
- Implement preventative maintenance program to prolong the life of materials/equipment

Utilities

- Reduce water consumption by using grey water or rainwater in toilets & landscaping
- Optimize energy use through building automation systems (sensors, metering, BAS, BIM)
- Integrate renewable energy technologies such as combined PV and solar hot water, small-scale biodigestion

Construction/Renovation/Retrofit

- Select building materials and components that are made from recycled content; can be dissassembled; and returned for remanufacture
- Document materials used in construction including recommended destination in a second life (a "material passport")

Food and catering

- Select suppliers that use locally sourced ingredients; find value from food and food waste (e.g. food banks, farms)
- Innovate with suppliers and tenants to offer waste free service options
- Create centralized collection point for used take away containers to return to retailer

Waste Management

- Reduce waste creation by procuring materials that are more durable; can be repaired; and can be adapted to new uses
- Change procurement criteria to require vendor take-back
- Support reverse logistics to recover and return materials to manufacturers
- Avoid material waste by procuring services instead of products themselves (e.g. purchasing lighting instead of the lamps themselves).

Office furniture & supplies

- Select products and supplies that are durable; can be repaired or refurbished; are modular and can be re-configured; are designed for disassembly or remanufacture
- Create opportunities for extending the life of furniture through re-use such as by donation or sharing programs

Landscaping & Site

- Conserve habitat and biodiversity; restore native flora and habitats
- Encourage food production on-site, which supports employee engagement and education

Occupant experience and engagement

- Provide occupants with opportunities to engage with sharing economy such as by providing space for a tool library; exchange spaces; repair cafes; car/bicycle sharing
- Create a collection point for certain materials such as textiles, to be distributed to partner organizations for re-use or re-manufacture
- Explore new lease agreements upon renewal or tenant changes that align tenant and building manager's circularity objectives

3. What is Circular Procurement?

Principles

Circular procurement is the process of purchasing works, goods or services that are designed to:

- Keep resources, materials, and energy within the supply chain (closed loop)
- Avoid creating waste across the whole life cycle (zero waste)

The commercial real estate sector has significant purchasing power that can be leveraged to advance broader individual and collective economic, environmental and social goals.

Building managers can use their purchasing power to create momentum that has the opportunity to yield multiple benefits simultaneously:

- Increase the availability of goods and services that are circular thanks to higher demand
- Avoid the negative environmental impacts associated with the product during manufacturing, use, and end of life
- Improve vendor/supplier relationships
- Spur innovative business models and partnerships
- Lower costs over the life of the product
- Support corporate ESG objectives

This is a good news story that building managers and tenants can get behind!

Opportunities in Canada and Beyond

Procurement for the public sector in Canada, valued at $200 billion annually[1], represents a powerful purchasing block, able to influence and create opportunities for collaboration with suppliers to support their objectives. Extending this potential to the private sector, and specifically to asset owners and managers, enables an even larger procurement capacity that can start to create transformation in supply chains, transitioning us towards a circular economy.

Globally, circular procurement has the potential to deliver on the global 2030 Agenda for Sustainable Development and the United Nations' Sustainable Development Goals, and specifically on the following four goals.

Make cities and human settlements inclusive, safe, resilient, and sustainable

Ensure sustainable consumption and production patterns

Take urgent action to combat climate change and its impact

Strengthen means and implementation

1 Circular Innovation Council, 2020. http://circularprocurement.ca/

Considering the entire system

Green or sustainable procurement typically concentrates on how to improve sustainable practices within a linear economic model and as a result, focus can be narrowly applied to individual components, such as what materials are used in the product. On the other hand, circular procurement focuses on the value of a product, considers needs, best use, and end of life management. Within this system, it is possible to leverage the full value of a product or material while minimizing environmental and social impacts. The following questions can help ensure the entire system is kept in mind when procuring: Is it necessary? Can it be shared? Can I use it and not own it? Can I give it back to the supplier when it is at the end of life? Is it repairable? Can it be separated into its sub-components? What happens to the materials at the end of their life cycle?

Risk Mitigation, Resilience and Equity

Ensuring the value of a material or component is maintained throughout its life cycle provides societal, strategic economic, and environmental benefits for the commercial real estate industry. For a more detailed business case, please see Appendix A.

Societal

- *Increase occupant health, comfort, and performance*
  - Selecting materials and products for use inside the building that meet circular criteria will improve indoor air quality such as by reducing the concentration of pollutants in offices, leading to improvements in workforce performance of up to 8%[2].
- *Increase innovation*
  - Increased market demand for products and materials that meet high-level targets and criteria (e.g. shareability, recyclability, use of recycled materials, can be disassembled, is long-lasting) will help create new businesses and product offerings.[3]

Strategic

- *Strategic alignment and leadership:*
  - Circular procurement reinforces the organization's Environmental, Social and Governance (ESG) commitments, namely the following Sustainable Development Goals (SDGs): (7) Affordable and Clean Energy; (11) Sustainable Cities and Communities; (12) Responsible Consumption and Production; (13) Climate Action; (17) Partnerships for the goals

Economic

- *Reduce total cost of ownership*
  - Traditionally, procurement decisions are based on purchasing costs, rarely considering those incurred throughout the product's manufacturing phase or its end of life management , such as those associated with material consumption, energy consumption, maintenance, and end-of-life disposal. Using total cost of ownership (TCO) to determine the long-term value of a purchase and how that it contributes to the organization's broad environmental and social commitments will clearly demonstrate that selecting the assets with built-in circularity considerations makes good economic sense.[4]
- *Reduce operation and maintenance costs*
  - Costs associated with waste management will decrease thanks to circular procurement models that focus on repairability and take-back models, avoiding the waste bin entirely.
- *Reduce Liability and Risk*
  - Selecting vendors and suppliers that contribute to environmental and social objectives reduces the risk of liability
  - Products and materials purchased with circular procurement criterion in mind last longer, retain their value, and are more likely to be successfully returned into the production cycle for refurbishment or remanufacturing.[5]
  - Applying the circular procurement principles also improves regulatory compliance

2 World Green Building Council. About green buildings
3 Alhola K. et al, 2018. Exploiting the Potential of Public Procurement: Opportunities for Circular Economy
4 European Commission, 2017. Public Procurement for a Circular Economy: Good practice and guidance
5 Alhola K. et al, 2018. Exploiting the Potential of Public Procurement: Opportunities for Circular Economy

Environmental

- *Increase resource-efficiency*
  - Many materials already exist that can meet our needs, for example, engineered clay can offer an alternative to concrete, and uses up to 15% less material, requires less energy to produce, and can be recycled after use.[6]
- *Reduce presence of toxic materials and increase safety*
  - Materials that can be reintroduced into a production loop minimize the use of dangerous substances, ensuring the safety and ongoing health of building occupants and staff.[7]
  - Reduce the amount of solid waste contribution to landfill
  - Minimize the impact on groundwater and air quality
  - Minimize operational carbon emissions

6 Ellen MacArthur Foundation, 2016. Circular economy in India: rethinking growth for long-term prosperity (p. 37)
7 SPP Regions, 2017. Circular procurement Best Practice Report

4. Circular Procurement Business Models

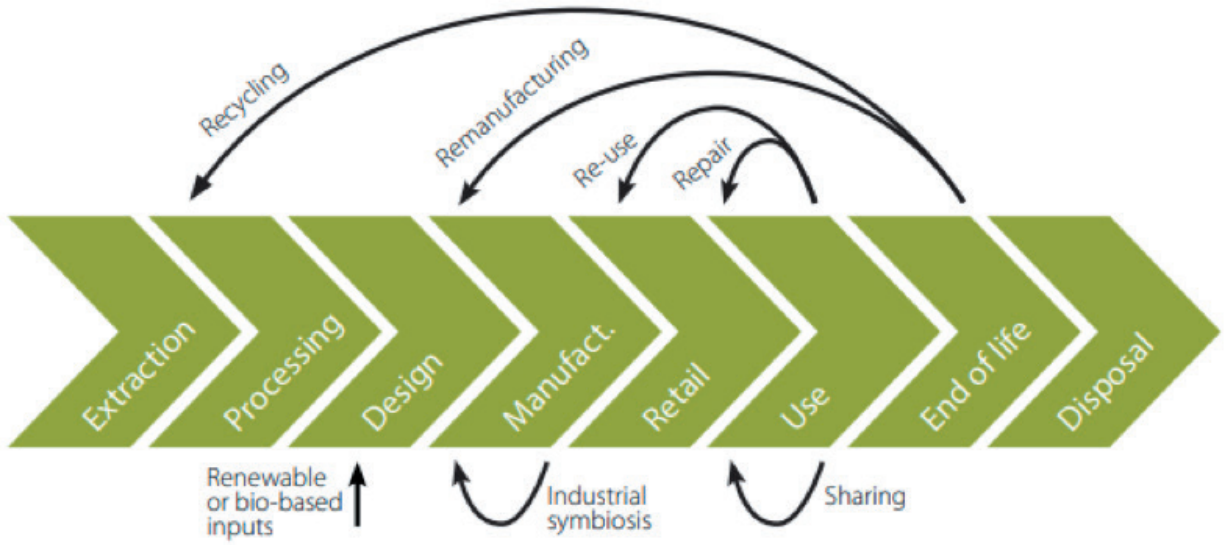
Circularity does not apply in the same way to every product, good, or service nor to buidlings..Rather, different considerations will be important depending on what is being procured as well as where and how it will be utilized. Five (5) circular business models[1] identify what procurement criteria should be applied to a given product or service based on the optimal way the material will flow through the economy. The actions found in the ReSOLVE framework are deeply embedded within each. When fully implemented, these business models can eliminate the negative environmental, social, and economic impacts associated with resource extraction, use, and end-of-life disposal.

1. Circular supply models: Instead of using traditional virgin materials as inputs into new products, these are made with materials that are bio-based, renewable, biodegradable, or recovered (i.e. recycled). When applied, this model reduces the demand for virgin resources over time, helping the conservation and rehabilitation of natural ecosystems.
    - Example: Using fuel in fleet vehicles that is made from residual bio-based feedstocks such as corn cobs, husks, leaves and stalks
2. Resource recovery models: Once a product has reached the end of its life, its core components are processed to become an input to create either a similar or different type of product
    - Example: Carpets made from re-processed waste materials, designed to be further disassembled and re-processed at the end of its life.
3. Product life extension models: The useful life of a product is extended through repair or remanufacturing. Prolonging the product's use will reduce the need for replacement, slowing resource extraction and the creation of waste.
    - Example: Remanufacturing used cleaning devices and equipment components and returning them to same-as-new condition or quality.
4. Sharing models: Products that are not in constant use or are under-used are shared across many people. By sharing, everyone does not have to have their own, which reduces the demand and need for new products and therefore new materials.
    - Example: Subscription-based bike or car-sharing platforms instead of physical fleet
5. Product service system models: Rather than purchasing a product, a service delivering the same benefits is offered instead. The manufacturer is incentivized to optimize the design so that the product is efficient and can be easily repaired.
    - Example: [Insert Case Study Box– Philip's "Pay per lux" (see below)]

There are no single solutions in a circular economy, rather, organizations can select whatever solutions and models best fits their needs at a given time.

As the benefits of circularity are becoming more widely understood, some suppliers are positioning themselves at the forefront of this shift, demonstrating a real understanding of the economic and reputational benefits that come with valuing a product throughout its entire life. These suppliers welcome the opportunity to discuss the purchasing organization's strategic, environmental, social, and economic objectives and can support building managers seeking to understand how supplier solutions can deliver on each. Engaging suppliers early and often is an important step to ensure that the full circularity implications and benefits of a given product are understood. As suppliers expand their own abilities and further internalizes the concepts of the circular economy into their operations, building managers should be prepared to revisit their own decisions and practices regularly. Circular procurement is a journey, we are all getting started together!

1 OECD, Re-Circle, 2018. Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective



Source: Adapted from Accenture (2015)

CASE STUDY: Using product-as-a-service model for building fit-out

Building managers or tenants can purchase building fit-out items, such as lighting, air conditioning, and carpeting, through new business models known as **performance-based or product-as-a-service** business models. In these models, users pay for the use of the products rather than the products themselves. The product-as-a-service provider retains ownership of the product along with the responsibility for the maintenance, upgrade, and take-back of the product. This incentivizes the supplier to invest in more research and development to ensure the product delivers superior performance and that it can be easily repaired or upgraded at the end of its life thanks to the use of high-quality materials that can be disassembled. The customer, meanwhile, benefits from better performance and reduced operational costs.

Let's look at Philips' "Pay Per Lux" as an example of product-as-a-service. Philips' "pay per lux" solution is an effective example of the transition from selling lamps or light bulbs to selling "light hours". Business customers pay a regular fee for Philips to handle their entire lighting service – design, equipment, installation, maintenance, and upgrades – only paying for light consumed – the "lux".[1]

Philips' "pay per lux" solution provides lighting as a service to Amsterdam's Schiphol Airport on a lease basis. Philips is responsible for the performance of the lighting for the duration of the contract. Specially designed light fixtures are easier to service and maintain, making them last **75% longer than conventional alternatives.** Individual component parts can be easily extracted and repaired, minimizing the need to replace whole fixtures. This reduces the consumption of raw materials. The system uses energy-efficient light-emitting diodes (LEDs), and is expected to provide the airport with a **50% reduction in energy consumption.**[2]

These business models operate at different moments in the life of the product, as illustrated in Figure 3.

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1 Phillips. Philips' transition from linear to Circular Economy.
2 Arup, 2016. Circular Economy in the Built Environment.

CASE STUDY: Journey of a chair – comparing a typical life cycle with a circular life cycle

Furniture can represent 30% of the embodied carbon in a building. This is due to the tendency to completely remove, dispose and replace furniture during tenant fit outs. The environmental impact of such a transition can be reduced by 80% when high quality remanufactured furniture is used instead.

Buying a chair made with all the right components does not automatically make the chair circular. To ensure the value of the materials and components are retained, the chair's useful life should be extended, for example by being donated for external use or returned to the supplier to be remanufactured, refurbished, or upgraded.

In the table below we compare the life cycle considerations of a typical chair with one that has been designed to be part of the circular economy resource flow.

	Typical life cycle considerations	Circular economy life cycle considerations
Procurement requirements	• Aesthetics • Dimensions • Costs (upfront) • Delivery, installation & support	• Aesthetics • Dimensions • Costs (upfront and end-of-life disposal) • Delivery, installation & support • Designed for repairability • Designed for disassembly and upgradability • Made from recycled content & high-quality materials • Made with no toxic materials
First use phase	• Used until components break, is no longer aesthetically pleasing, or until it no longer meets the user's functional needs	• Used until components break, is no longer aesthetically pleasing, or until it no longer meets the user's functional needs
Second use phase	• None	• Repaired, refurbished, or upgraded with circular components to extend life of chair and update aesthetics
End-of-Life Considerations	• Send to landfill	• Donation for reuse in other organization • Supplier/manufacturer recovers the product (take-back) • Disassembled and its components are reused, refurbished, or remanufactured into an identical or different product.

In 2012, Denmark's central procurement agency established a framework for circular office furniture for more than 60 municipalities. Technical specifications included:

- Requirements on the chemicals used in the manufacturing, treatment, or dyes used.
- Ability to separate and recover materials at their end-of-life.
- Wood and wood-based materials were required to come from legally harvested timber.
- At least 70% of the wood-related products had to be either recycled or verified as sustainable timber.

By using this approach, the agency realized savings of up to 26% compared to market prices, while also growing the demand for circular furniture products.[1]

1 European Commission, 2016. Procuring sustainable furniture in Denmark

5. Next Steps for Building Managers?

Resources & Checklists

How to start? Within the Appendix, building managers will find tools to help identify where and how circular procurement strategies can be implemented into ongoing building operations.

- Appendix A – Business case for circular procurement: Circularity makes good business sense, it will help improve the earth's biosphere, will have lasting positive societal implications and it leads to reduction in operating expenses. Building managers are invited to identify the components that will support their organization's transition towards circularity.
- Appendix B – Circular self-assessment and areas of opportunity: You're further along than you think! This checklist will help building managers understand what strategies already in place at the building are aligned with circular objectives and what further opportunities could be considered.
- Appendix C – Circular Procurement Checklists: This checklist provides an overview of the considerations that should be in place at key steps of the procurement process.
- Appendix D – Third-Party Certifications and Labels List: This appendix will help building managers specify criteria to support their circular procurement objectives.
- Appendix E – Glossary: Review a list of terms and concepts commonly used when discussing the circular economy.

Additionally, building managers may wish to consult the following helpful resources for more insights and suggestions:

- What is the circular economy? (Ellen MacArthur Foundation)
- Circularprocurement.ca (Circular Innovation Council)
- Circular Procurement in 8 Steps (Netherlands Government)
- Public procurement for a circular economy: Good practice and Guidance (European Commission)

This is only the beginning. BOMA Canada will continue working with stakeholders to create and deliver resources and frameworks to support a transition towards circular building operations.

What should we work on next? Let us know your thoughts and areas of interest around the circular economy!

What can you do to become more circular today?

Appendix A: Business Case for Circular Procurement in Building Operations

Societal

- *Increase occupant health, comfort, and performance*
  - Selecting materials and products for use inside the building that meet circular criteria will improve indoor air quality such as by reducing the concentration of pollutants in offices, leading to improvements in workforce performance of up to 8%.[1]
- *Create jobs and skills opportunities*
  - Market demand for circular criteria will encourage suppliers and manufacturers to innovate, rethinking how products are made, creating new employment opportunities and the emergence of new skills.
  - Studies in the US and UK have found that deconstruction and disassembly requires significantly more labour than demolition – one "landfill job" can be replaced by 10 "resource recovery" jobs. Deconstruction paves the way for employment and training opportunities for relatively unskilled and low-skilled workers. These workers can receive on-the-job training and the basic skills needed for deconstruction can be easily learned and transferred to the construction trades.[2]
  - Requiring that a product be repairable provides local employment opportunities since large manufacturers may not be best suited to provide such hands-on services. New partnerships between large producers and local merchants may emerge. [3]
- *Increase innovation*
  - Increased market demand for products and materials that meet high-level targets and criteria (e.g. shareability, recyclability, use of recycled materials, can be disassembled, is long-lasting) will help create new businesses and product offerings.

Strategic

- *Strategic alignment and leadership:*
  - Circular procurement is aligned with several UN Sustainability Development Goals, further reinforcing the organization's environmental and social commitments: (7) Affordable and Clean Energy; (11) Sustainable Cities and Communities; (12) Responsible Consumption and Production; (13) Climate Action; (17) Partnerships for the goals
  - Integrating circular economy principles into overall strategic direction will highlight the organization's leadership in the industry which can help attract new investments, tenants and staff who share your objectives.
  - Application of Circular Economy principles to building operations will strengthen organizations' commitment to ESG
- *Engagement opportunities with tenants*
  - Circular economy provides a new and exciting framework on which to engage tenants to think about their environmental impact and the opportunities available to them to reduce it (for example, food court tenants).

Economic

- *Reduce total cost of ownership*
  - Traditionally, procurement decisions are based on purchasing costs, rarely considering those incurred throughout the product's manufacturing phase or its end of life management , such as those associated with material consumption, energy consumption, maintenance, and end-of-life disposal. Using total cost of ownership (TCO) to determine the long-term value of a purchase and how that it contributes to the organization's broad environmental and social commitments will clearly demonstrate that selecting

1 World Green Building Council. About green buildings
2 OVAM, 2018. Employment impact of the transition to a circular economy: literature study (p. 22)
3 Alhola K. et al, 2018. Exploiting the Potential of Public Procurement: Opportunities for Circular Economy

the assets with built-in circularity considerations makes good economic sense. [4]

- *Reduce operation and maintenance costs*
  - Implementing circular design principles during construction reduces operation and maintenance costs by 10% over 10 years compared to typically constructed buildings. [5]
  - Since products and materials are designed to last longer and be more durable, fewer replacement purchases are needed, and the product is less likely to need repair.
  - Costs associated with waste management will decrease thanks to circular procurement models that focus on repairability and take-back models, avoiding the waste bin entirely.
- *Future-proof costs*
  - Engaging in partnerships such as with product-as-a-service supplier models provide greater predictability in future expenses.
- *Reduce liability and risk*
  - Selecting vendors and suppliers that contribute to the organization's environmental and social objectives reduces the risk of liability
  - Selecting products that are made from recyclable or renewable materials reduces the risks of price volatility associated with extracting virgin resources.
  - Products and materials purchased with circular procurement criterion in mind last longer, retain their value, and are more likely to be successfully returned into the production cycle for refurbishment or remanufacturing. [6]
  - Implementation of Circular Procurement policies and application of Circular Economy principles will help enhance organizations' Resilience Plan

Environmental

- *Reduce resource consumption and prolonging the product's lifespan*
  - Selecting building materials and products that are modular means that existing materials can be typically reused up to 80% avoiding the need for virgin materials.[7]
  - Such selections will reduce the requirement for scarce natural resources and the impact their extraction can have on geopolitical relationships and natural ecosystems. [8]
- *Increase resource-efficiency*
  - Many materials already exist that can meet our needs, for example, engineered clay can offer an alternative to concrete, and uses up to 15% less material, requires less energy to produce, and can be recycled after use.[9]
- *Reduce presence of toxic materials and increase safety*
  - Buildings traditionally contain a complex mixture of compounds that are often difficult to separate, making material reuse and recycling difficult. Selecting materials that do not use toxic additives (e.g. in PVC) or that can be separated, facilitates material recovery at the end of its useful life.
  - These materials minimize the use of dangerous substances, ensuring the safety and ongoing health of building occupants and staff.[10]

4 European Commission, 2017. Public Procurement for a Circular Economy: Good practice and guidance
5 Ellen MacArthur Foundation, 2018. The circular economy opportunity for urban and industrial innovation in China (p. 53)
6 Alhola K. et al, 2018. Exploiting the Potential of Public Procurement: Opportunities for Circular Economy
7 Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment, 2015. Growth Within: a circular economy vision for a competitive Europe (p. 86)
8 SPP Regions, 2017. Circular procurement Best Practice Report
9 Ellen MacArthur Foundation, 2016. Circular economy in India: rethinking growth for long-term prosperity (p. 37)
10 SPP Regions, 2017. Circular procurement Best Practice Report

Appendix B: Circular Self-Assessment and Areas of Opportunity

The following table invites building managers to assess which circular economy strategies are already in place in their building(s) ("Existing Strengths"). From there, recommendations are given to further build on current strengths and more deeply embed circularity within building operations.

The areas of opportunity are not listed in any order of priority or importance.. building managers can start acting according to the opportunities available to them at any given time. Furthermore, building managers can choose to either expand their existing strengths, or focus on implementing the next steps of existing strengths. The beauty of the circular economy is that all actions are beneficial, and together they can bring about change.

A bonus? The implementation of most of the circular economy strategies listed below can earn building managers additional points under the BOMA BEST certification.

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Building operations, repair, and maintenance	Optimize, Loop, Exchange	☐ Equipment is selected for maximum efficiency	☐ Procure equipment made with materials with low embodied emissions ☐ Procure equipment made with materials with low environmental impact over lifecycle of building ☐ Procure equipment that is durable and repairable ☐ Equipment use generates no emissions (e.g., fuel switching) ☐ Configure equipment to minimize waste of resources (e.g., task lighting vs area lighting) ☐ Develop procurement templates (e.g., RFP, SOW) that incorporate elements of circular economy
Building operations, repair, and maintenance	Optimize, Loop, Exchange	☐ Suppliers are selected to minimize their impact across the supply chain (e.g., avoid resource extraction and use of harmful chemicals; fair labour practices, etc.)	☐ Purchase products as services instead of standalone items ☐ Select performance contracts to ensure efficiency ☐ Select suppliers that support take back models ☐ Develop procurement templates (e.g., RFP, SOW) that incorporate elements of circular economy

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Building operations, repair, and maintenance	Optimize	☐ A preventative maintenance program has been implemented to prolong life of materials/ equipment	☐ Conduct ongoing improvements to building envelope
Building operations, repair, and maintenance	Optimize, Loop	☐ Energy and water efficiency training is provided to building operations staff	☐ Provide and participate in training focused on maximizing efficient use of technology ☐ Provide and participate in training on understanding system efficiency (optimizing system based on configuration and equipment selection) ☐ Provide and participate in training on future trends (smart buildings)
Building operations, repair, and maintenance	Virtualize	☐ Paperless billing and/or monitoring (e.g., through apps) is requested	☐ Align occupants with circular objectives ☐ Allow occupants to participate in decision-making ☐ Support/select retailers/tenants with aligned CE business models such as stores that sell products made from recycled content, reusing materials, valorizing food waste
Utilities	Optimize, Exchange	☐ Energy use is optimized through building automation systems (e.g., sensors, metering, BAS, BIM, etc.)	☐ Purchase products as services instead of standalone items ☐ Select performance contracts to ensure efficiency
Utilities	Optimize, Exchange	☐ Potable water is used efficiently. ☐ Water-conserving measures are implemented (e.g., aerators, timers)	☐ Implement grey water or rainwater collection and use (e.g., toilets and landscaping)

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Utilities	Exchange	☐ Low carbon energy sources are selected / A switch has been made to cleaner fuel types (e.g., renewably generated electricity)	☐ Integrate renewable energy technologies such as combined photovoltaic and solar hot water, small-scale bio-digestion, and electricity storage via batteries for emergency back-up power ☐ Purchase green energy through power purchase agreements
Utilities	Optimize, Exchange	☐ Active heat recovery strategies are implemented (e.g., ventilation air heat recovery, server room heat recovery, wastewater heat recovery, heat pump systems)	
Construction/ Renovation/ Retrofit	Optimize, Share, Loop, Exchange	☐ Building materials are selected for their environmental properties	Draft SOWs that require that materials and components: ☐ Can be repurposed ☐ Can be returned for remanufacture into the same or a different product (e.g., drywall, carpet) ☐ Are designed for disassembly ☐ Are made using bio-based materials or bio-mass waste products (e.g. sawdust) ☐ Are made from recycled content (e.g. steel, gypsum)
Construction/ Renovation/ Retrofit	Share, Loop	☐ Management program has been developed to minimize construction, renovation, and demolition waste being sent to landfill	☐ Document materials used in construction, including their recommended destination in a second life (a “material passport”)

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Construction/ Renovation/ Retrofit	Optimize, Virtualize	☐ Environmental renovation/fit-up criteria are included in green leases	☐ Design buildings and space to be able to flex with demand, modifying the space to fit different needs (commercial, residential, education)
Food and catering	Regenerate, Share, Optimize, Loop	☐ Suppliers are selected who demonstrate commitment to sustainability	Select suppliers that: ☐ Use regenerative food growing methods ☐ Use locally sourced ingredients ☐ Prevent avoidable food waste ☐ Find value from food and food waste, such as through partnerships with local food banks, farms. ☐ Avoid material waste (packaging)
Food and catering	Loop	☐ Retailers are engaged in an environmental procurement program	☐ Innovate with suppliers and tenants to offer waste free service options ☐ Create centralized collection point for used take away containers to return to retailer ☐ Collaborate with food retailers to source recyclable and municipally compostable cutlery/plates
Waste management	Optimize, Loop, Exchange	☐ Initiatives are implemented to decrease the amount of waste generated	☐ Select products that ☐ Are more durable ☐ Can be repaired ☐ Can be adapted to new uses ☐ Can be remanufactured or refurbished ☐ Procure services instead of products themselves (e.g. purchasing lighting instead of the lamps themselves). ☐ Develop waste reduction and education programs on the importance of valuing materials throughout their entire lifecycle

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Waste management	Regenerate, Share, Loop, Optimize, Exchange	☐ Waste diversion programs are implemented	☐ Change procurement criteria to require vendor take-back ☐ Select suppliers that support reverse logistics to recover and return materials to manufacturers ☐ Identify partners who can use certain waste streams as their inputs ☐ Use local digestors and other clean technologies that capture the value of organic waste streams, such as bio-digestion, heat recovery, mineral extraction and compost for on-site food production or general soil amendment.
Waste management	Virtualize, Optimize	☐ Final disposition / destination of all materials leaving the building is identified	☐ Improve data collection (waste types, amounts, meters) to inform public policy/ initiatives and calculate GHG avoidance ☐ Work with waste haulers to improve data transparency or add weight reporting requirements to contracts ☐ Collaborate with other building managers to provide consistency to waste haulers
Office furniture and supplies	Share, Optimize, Loop, Exchange	☐ A green / sustainable procurement program is implemented	☐ Select products and supplies that: ☐ Are durable ☐ Can be repaired or refurbished ☐ Are modular and can be re-configured ☐ Are designed for disassembly or re-manufacture ☐ Use materials efficiently ☐ Are created using 100% recycled content (e.g., paper products) ☐ Hold a third-party certification for disassembly ☐ Select furniture/supply leasing services ☐ Request that products arrive in minimal packaging that can be recycled or reused ☐ Collaborate with other building managers to share items between buildings or spaces, and/or to purchase in bulk to reduce packaging and emissions from shipping

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Office furniture and supplies	Share, Loop	☐ Re-furbished furniture and supplies are selected and preferred	☐ Create opportunities for extending the life of furniture through re-use such as by donation, sharing, or re-selling programs
Office furniture and supplies	Optimize, Loop	☐ Maintain warranty documents for furniture	☐ Take advantage of product repair, disassembly, and takeback services instead of outright disposal ☐ For modular items, repair or replace just the parts that require it
Landscaping and Site	Regenerate	☐ Landscaping practices that support ecosystem health are implemented	☐ Conserve or restore native flora ☐ Prevent soil erosion ☐ Select landscaping products that do not contain any harmful chemicals ☐ Design landscaped areas to require little or no irrigation (xeriscaping)
Landscaping and Site	Regenerate, Share	☐ Biodiversity and ecological resilience are supported	☐ Encourage food production on-site, supporting employee engagement, education, and mental health
Occupant experience and engagement	Share, Loop, Exchange	☐ Occupants are engaged in waste diversion initiatives	☐ Provide occupants with opportunities to engage with sharing economy such as by providing space for a tool library, exchange spaces, repair cafes, car/bicycle sharing ☐ Create a collection point for certain materials such as textiles, to be distributed to partner organizations for re-use or re-manufacture
Occupant experience and engagement	Optimize, Loop, Exchange	☐ Occupants align with building's environmental criteria through lease agreements	☐ Align occupants with circular objectives ☐ Allow occupants to participate in decision-making ☐ Support/select retailers/tenants with aligned CE business models such as stores that sell products made from recycled content, re-using materials, valorizing food waste

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Information Communication Technology (ICT)	Regenerate, Optimize, Loop, Exchange	☐ A sustainable procurement program for ICT is implemented	☐ Select products and supplies that: ☐ Are durable ☐ Can be repaired or refurbished ☐ Can be upgraded with new components ☐ Are designed for disassembly or re-manufacture ☐ Use materials efficiently ☐ Are created using a minimum percentage of recycled content (e.g. plastics and metal alloys) ☐ Hold a third-party certification or ecolabel (e.g., EPEAT) ☐ Are energy efficient ☐ Have a low carbon footprint ☐ Reduce the use of hazardous substances
Information Communication Technology (ICT)	Regenerate, Optimize, Loop, Exchange	☐ Suppliers that offer repair and refurbishment are selected and preferred	☐ Select suppliers based on transparency of supply chain for: ☐ Environmental impact of operations (material extraction, manufacturing) ☐ Labor and human rights records/ commitments ☐ Select suppliers that support reverse logistics and include end-of-life management in the contract
Cleaning	Regenerate, Optimize, Loop, Exchange	☐ Green cleaning program with third-party certified products and supplies is implemented	☐ Select products and supplies that: ☐ Are made from non-toxic ingredients ☐ Hold third-party certifications ☐ Have minimal packaging or 100% recyclable packaging ☐ Use materials efficiently ☐ Select cleaning equipment that: ☐ Is durable ☐ Can be repaired or refurbished ☐ Are designed for disassembly or re-manufacture ☐ Use materials efficiently ☐ Are created using recycled content

Areas of Opportunity	ReSOLVE Action	Starting Point: Existing Strengths	Next Steps
Cleaning	Optimize	☐ Training is provided to janitorial staff on the benefits of using specific equipment / supplies as per recommended specifications	
Fleet	Optimize, Exchange	☐ Low-carbon transportation options (e.g., electric vehicles) are supported and encouraged	☐ Support and encourage subscription models to sharing services for bicycles or cars (e.g., through subsidy)

Appendix C: Circular Procurement Checklists

This section contains language and concepts that have been directly extracted and adapted from the Ellen MacArthur Foundation Circular Economy Procurement Framework and adapted Consult this resource for a comprehensive overview on how to embed circular economy principles into the heart of the organization's corporate strategy and promote circular initiatives within the supply chain.

Depending on the options available in the market, below are some criteria that can help make procurement more circular. Different considerations will apply to each product. This checklist provides a systematic approach to core applications of circularity.

a) Identifying needs

- Can you explore the opportunities to reuse as-is or repurpose internally?
- Can you choose non-ownership-based sourcing options?
- Can you embed circular economy criteria in your requirements?
- What is your optimal supply chain structure to address your circular economy needs?
- Can you choose the payment arrangement that enables circularity?
  - Fixed period (e.g., price/month): Potential circularity, but no incentive to limit consumption/use rates.
  - Pay-per-use (e.g., price/wash cycle) or Pay-per-outcome (e.g., price/ provision of light or price/service of floor covering): Greater chance for circularity, as the supplier is incentivised to provide the service with minimum consumption of resources.
- Can you consider the following aspects in relation to your sourcing need:
  - technical aspects.
  - compliance culture.
  - sourcing locations.
  - supply chain capability / capacity.
  - the need to develop an after-market.
- What is the present capability of the supply market to meet or exceed your sourcing needs and the required circular economy criteria?
- How early can you engage your potential suppliers to understand their intent and preparedness to meet your circular requirements?
- Can you consider the following aspects?
  - New technologies, alternative goods or services and new business models.
  - Existing supplier capabilities.
  - Available reverse logistics structures.
  - Circular economy maturity of the market
  - Existence of local suppliers and/or partners with local economic impact.
  - The impact extraction, production, and transport have on climate.

b) Sourcing products and materials

In a circular economy, materials are separated into two fundamentally distinctive flows: biological and technical. Biological materials are organic materials that can safely re-enter the natural world once they have been used because they will biodegrade over time. They will provide nutrients to the environment. For example, paper products are considered a biological nutrient. Technical nutrients on the other hand, cannot biodegrade and therefore they must re-enter the production loop so that their value can be captured and recaptured. Metal, plastics, and synthetic chemicals are examples of technical nutrients.

Criteria for technical items

For example, when sourcing new furnishings, cleaning supplies, new equipment, or fixtures

- Can you purchase items that are USED MORE?
  - Can you purchase through business models that increase utilisation (e.g., supplier can provide repair, reuse, rental, recommence, and remanufacturing options at scale)?
  - Can you choose items that are designed, created, and manufactured to be durable, repaired or refurbished so it aligns with a business model that keeps it at its highest value?
  - Can you make sure that all items that are made and purchased will be used?
- Can you purchase items that are MADE TO BE MADE AGAIN?
  - Is there a system in place to collect and return these items for reuse, repurpose, refurbishment, remanufacturing, or recycling, thus making sure they don't end up as waste?

    - Can you purchase items that use packaging made from reusable, recyclable, or compostable materials?
- Can you purchase items that are MADE FROM SAFE AND RENEWABLE INPUTS?
    - Can you purchase items that are free from hazardous chemicals, and thus respect the health of ecosystems?
    - Can you purchase items the production of which (including chemicals used during manufacturing and finishing processes) is fully decoupled from the consumption of finite, non-renewable resources?
    - Can you purchase items made from post-consumer recycled content (where technically possible) both to decouple from finite feedstocks and to stimulate demand for collection and recycling?
    - Can you purchase items which, if (partially) made from virgin inputs, use inputs from renewable feedstocks, where proven to be environmentally beneficial, and, where relevant, are sourced from regenerative sources?
    - Can you purchase items that are manufactured, distributed, sorted and recycled using renewable energy?
    - Can you purchase items that, through their production, maximise resource efficiency (water, energy, material use etc.)?

Criteria for biological items

For example, when sourcing cleaning supplies, catering

- Can you source/purchase ingredients that are grown regeneratively?
- Can you source/purchase ingredients that are made from by-products of other processes?
- Can you utilise the entire value of the ingredients you purchase?
- Do you have a strategy/plan in place to valorise by-products of the ingredients you purchase?
- Can you source/purchase ingredients that are grown locally where appropriate?
- Can you source/purchase diverse and/or seasonal ingredients?

Criteria for packaging

- Can you eliminate problematic or unnecessary packaging through redesign and innovation, getting rid of materials, components or formats that:
    - are not reusable, recyclable or compostable.
    - can be avoided altogether.
    - hinder or disrupt recycling.
    - have a high likelihood of being littered.
    - or contain hazardous chemicals?
- Can you replace single-use packaging with reusable formats, i.e., refillable or returnable, or choose to implement alternative delivery models?
- Can you purchase packaging or plastics that are 100% recyclable or compostable, meaning they are effectively recycled or composted in practice and at scale?
- Can you purchase packaging or plastics with recycled content or sourced from renewable (or bio-based) feedstocks?

c) Shortlisting

It is possible that not all suppliers will be able to offer circular options, therefore it may be necessary to have a conversation with suppliers to educate them about the important criteria:

- Can you conduct the supplier briefings, setting out the requirements and communicating circular economy opportunities?
- Does the supplier have a good understanding of circular economy principles?
- Can they articulate them and demonstrate their understanding properly through their activities and offerings?
- Can you create and circulate evaluation templates for all key stakeholders to score suppliers?
- Can you run debriefs for suppliers upon disqualification to help them improve their circular economy offerings?

Not all suppliers may be able to these needs, therefore, starting a conversation with suppliers may be Checklist: Circular economy questions to consider for pre-qualification

d) Evaluation, Selection, and Performance Review

- Can you combine the total cost of ownership and circular economy related value in one analysis to maximise value? (not just about upfront costs)
- How can you create a negotiation environment which fosters innovation and problem solving – two essential ingredients for a circular economy?
- How can you create an open communication stream with your supplier to periodically evaluate how well they fulfil your circular economy needs?

Appendix D: Third-Party Certifications and Ecolabels Reference List

Third-party certifications and ecolabels can help purchasers efficiently and effectively identify desirable products and services. The following table provides a list of the third-party certifications and labels that can support circularity. The relevant procurement category has been identified for easy reference.

While these certifications and labels are helpful for selecting the product or services that meet an organization's objectives, its use alone does not guarantee that a product is circular since it still may finish its life in a landfill. The importance of reverse logistics systems cannot be overstated.

Standard	Description	Procurement category
ECOLOGO®	Products, services, and packaging undergo rigorous scientific testing, exhaustive auditing or both, to prove their compliance with stringent, third-party, environmental performance standards.	☐ Building materials ☐ Custodial ☐ Utilities (Electricity)
Forest Stewardship Council® (FSC)	Products come from responsibly managed forests that provide environmental, social, and economic benefits.	☐ Building materials ☐ Furniture ☐ Office supplies ☐ Packaging & paper
Green Seal®	Products meet or exceed life-cycle-based sustainability criteria for sustainability (reduce toxic pollution and waste, conserve resources and habitats, and minimize climate change and ozone depletion).	☐ Custodial ☐ Building materials ☐ Packaging & paper
ENERGY STAR®	Products meet strict standards for energy efficiency set by the U.S. Environmental Protection Agency (EPA).	☐ Appliances ☐ HVAC equipment ☐ Information Communication Technology (ICT)
GREENGUARD	Products designed for use in indoor spaces meet strict chemical emissions limits, which contribute to the creation of healthier interiors. Emission limits align with office furniture industry criteria.	☐ Custodial ☐ Building materials
Canadian Organic Standards	Recognizes any food, seed, or animal feed that meets organic production standards.	☐ Food

Standard	Description	Procurement category
Cradle to Cradle CertifiedTM	Products are assessed for environmental and social performance across five critical sustainability categories: material health, material reuse, renewable energy and carbon management, water stewardship, and social fairness. 5 levels of certification can be achieved (Basic, Bronze, Silver, Gold, Platinum).	☐ Building materials ☐ Furniture ☐ Office supplies ☐ Packaging & paper
WaterSense	Products meet strict standards for water efficiency set by the U.S. Environmental Protection Agency (EPA).	☐ Indoor water fixtures ☐ Irrigation
Sustainable Forest Management (SFM)	Developed by the Canadian Standards Association (CSA), products are sourced from sustainably managed forests. Demands active public involvement by local residents.	☐ Building materials ☐ Furniture ☐ Office supplies ☐ Packaging & paper
Sustainable Forestry Initiative (SFI)	Products are sourced from production methods that support water quality, biodiversity, wildlife habitat, species at risk, and forests with exceptional conservation value.	☐ Building materials ☐ Furniture ☐ Office supplies ☐ Packaging & paper
Safer Choice	Products contain ingredients that are safer for human health and the environment.	☐ Custodial
TCO Certified	IT products meet the following criteria: socially and environmentally responsible manufacturing; user health and safety; product performance; product lifetime extension; reduction of hazardous substances; material recovery; sustainability performance indicators	☐ Information Communication Technology (ICT)
USDA Organic Seal	The U.S. National Organic Program (NOP) accredits third-party organizations to certify that farms and businesses meet the national organic standards for food production, processing, delivery, and retail sale.	☐ Food

Standard	Description	Procurement category
Food Alliance	Certifies agricultural operations, food processors and distributors that ensure: safe and fair working conditions; the health and humane treatment of farm animals; protection and enhancement of wildlife habitat and biodiversity; conservation of soil, water, and energy, and reduction and recycling of waste; transparent and traceable supply chains; and continual improvement of management practices.	☐ Food
Rainforest Alliance	Identifies agricultural practices that protect wildlife by planting trees, control erosion, limit agrochemicals, protect native vegetation, hire local workers, and pay fair wages.	☐ Food
Protected Harvest	Recognizes agricultural practices that reduce the impact of toxic pesticides on the environment such as through field monitoring or scouting, pest management decisions, field management decisions, weed management, insect management, disease management, soil and water quality, and storage management.	☐ Food
Fairtrade International	Overseen by Fairtrade Labelling organizations (FLO) international, products meet certain environmental, labor, and development standards.	☐ Food ☐ Textiles
Biodegradable Products Institute (BPI)	Recognizes products, packaging or materials that are fully compostable, are accepted by a majority of commercial compost facilities, and are associated with the diversion of desirable feedstocks (i.e. food scraps). It cannot require disassembly to be composted and cannot simply be a redesign of an item that is a better fit for recycling.	☐ Paper & packaging
MSC's Blue Eco Label	From Marine Stewardship Council (MSC), this label identifies seafood that comes from a sustainable source and satisfies the requirements of the MSC criteria for sustainable fishing, including sustainable harvest of the target stock, acceptable impact of the fishery on the ecosystem, effectiveness of the fisher management system, and compliance with relevant local and national local laws and standards and international understandings and agreements.	☐ Food

Standard	Description	Procurement category
Comprehensive Procurement Guidelines	Developed by the EPA, this program promotes the use of materials recovered from solid waste by listing procurement recommendations for the amount of recycled-content contained in construction products, landscaping products, non-paper and paper products, and other items. Includes a searchable database of suppliers.	☐ Building materials
Environmentally Preferable Purchasing	Developed by the EPA to help federal purchasers, this site provides an index that identifies the relevant third-party certifications and ecolabels applicable to specific purchasing categories.	☐ Building materials ☐ Custodial ☐ Furniture ☐ Information Communication Technology (ICT) ☐ Landscaping ☐ Paper & packaging
Electronic Product Environmental Assessment Tool (EPEAT)	Provides independent verification of manufacturers' claims against the EPEAT criteria that include materials selection, energy conservation, product longevity/life cycle extension, design for end of life, end-of-life management.	☐ Information Communication Technology (ICT)
Various non-profit certifications ensuring supplier diversity	• Canadian Aboriginal and Minority Supplier Certification • WBE Certification, Certified Women Business Enterprises • Canadian Gay and Lesbian Chamber of Commerce Certification • Inclusive Workplace Supply Council of Canada Certification • Certified Aboriginal Business Program (CAB), Canadian Council for Aboriginal Business • Buy Social Canada Supplier Certification • Ontario Living Wage Employer	☐ All categories

Appendix E: Glossary

Biological nutrients:

Materials or stocks that can be easily absorbed or digested by natural systems in a benign way (unbleached paper or food).[1]

Circular business models:

Circular business models (CBMs) are disruptive innovative business models aiming to drive the sustainability of the whole business network (system) through circularity. They are instruments of translating products and services designed for reuse into attractive value propositions.[2]

Circular economy:

Looking beyond the current take-make-waste extractive industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles:

1) Design out waste and pollution; **2)** Keep products and materials in use; **3)** Regenerate natural systems.[3]

Closed Loop System:

A system not relying on matter exchange outside of the system, as opposed to open loop where material may flow in and out of the system.[4]

Circular procurement

TBD

Design for disassembly:

Design principle that calls for the end-of-life options of how the product, components and materials can be deconstructed.[5]

Design for repairability:

Design principle that calls for products to be manufactured using fasteners, materials and processes that allow them to be easily be fixed.[6]

1 Leyla Acaroglu, 2018. Quick Guide to Circular Economy Business Strategies
2 Forum for the Future. Circular Business Models
3 Ellen MacArthur Foundation, 2017. Circular Economy Concept
4 Zero Waste Canada. The International Zero Waste Definition & Hierarchy
5 Circular Economy Practitioner Guide, 2018. Glossary
6 Circular Economy Practitioner Guide, 2018. Glossary

Downcycling:

Turning materials from one or more used products into a new product with lower quality. [7]

Embodied Carbon:

The amount of carbon emitted during the making of a building. This includes extraction of raw materials, manufacture and refinement of materials, transport, the building phase of the product or structure, and the deconstruction and disposal of materials at the end of life.[8]

Maintain/Prolong (& Share):

This innermost loop of the technical cycle shows the strategy of keeping products and materials in use by prolonging their lifespan for as long as possible through designing for durability as well as maintenance and repair. These longer-lasting products can then be shared amongst users who are able to enjoy access to the service they provide, removing the need to create new products.[9]

Operational Carbon

The amount of carbon emitted during the operational or in-use phase of a building. This includes the use, management, and maintenance of a product or structure.[10]

Reuse/Redistribute:

Technical products and materials can also be reused multiple times and redistributed to new users in their original form or with little enhancement or change. Marketplaces such as eBay are proof of this already well-established approach.[11]

Refurbish/Remanufacture:

Remanufacturing and refurbishment are two similar, yet slightly different, processes of restoring value to a product. When a product is remanufactured it is disassembled to the component level and rebuilt (replacing components where necessary) to as-new condition with the same warranty as a new product. Refurbishment is largely a cosmetic process whereby a product is repaired as much as possible, usually without disassembly and the replacement of components.[12]

Recycle:

Recycling is the process of reducing a product all the way back to its basic material level, thereby allowing those materials (or a portion of them at least) to be remade into new products. While this is undoubtedly and important process in a circular economy, the loss of embedded labour and energy, the necessary costs to remake products entirely, and the inevitable material losses mean that it is a lower value process than those closer to the centre of the system diagram, such as reuse and remanufacturing. [13]

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7 Forum for the Future. Circular Business Models
8 SPOT.UL.com
9 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail
10 SPOT.UL.com
11 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail
12 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail
13 Ellen MacArthur Foundation, 2017. The Circular Economy in Detail

Regenerative Design:

A whole systems approach to creating solutions that offer back more than is taken in their creation by exploring the way natural systems solve problems and creating things that are interconnected with natural systems.[14]

Renewable materials:

Materials that are replenished at a rate equal to or greater than the rate of depletion. Renewable materials include, for example, cotton, hemp, maize, wood, wool, leather, agricultural by-products, nitrogen, carbon dioxide, and sea salt. To be renewable such materials (where relevant) must be produced using regenerative practices or, in a transition phase, using sustainable practices.[15]

Resource efficiency:

A percentage of the total resources consumed that make up the final product or service.[16]

Service:

A service is something a company provides, and the customer pays for, but there is no transfer of material ownership. A service cannot be transported or stored and only exists while the provider is supplying it and the customer is using it. For example, refurbishing is a service. There are three types, dependent on whether there are material flows, and who owns them:

1) Services with material flows, where your business owns the materials (e.g., a company that owns and leases furniture); **2)** Services with material flows, where your business doesn't own the materials (e.g., a company that services IT hardware owned by others); **3)** Services without material flows (e.g., consultancy).[17]

Sharing model:

Business model based on the sharing of under-used assets as a service.[18]

Systems Thinking:

A holistic approach to understanding the way parts fit together in dynamic relationships to make up a whole system. It's the opposite of reductive or linear thinking and involves a series of practical approaches and mental models that enable a more complex view of the world, focusing on relationships and synthesis.[19]

Technical nutrients:

Materials or stocks that are manipulated by humans and cannot be easily re-integrated into nature (for example, plastics).[20]

14 Leyla Acaroglu, 2018. Quick Guide to Circular Economy Business Strategies
15 Ellen MacArthur Foundation. Circulytics Definitions List
16 Circular Economy Practitioner Guide, 2018. Glossary
17 Ellen MacArthur Foundation. Circulytics Definitions List
18 Circular Economy Practitioner Guide, 2018. Glossary
19 Leyla Acaroglu, 2018. Quick Guide to Circular Economy Business Strategies
20 Leyla Acaroglu, 2018. Quick Guide to Circular Economy Business Strategies

Total cost of ownership:

Business model based on the sharing of under-used assets as a service.

Waste:

Unwanted materials or substances. In a circular economy, waste is designed out.

Zero waste:

This is a strategy and movement to go beyond waste reduction and remove all disposable products from a place, company or lifestyle by embracing a set of strategies that eliminate waste completely. The goal is to avoid sending any waste to a landfill or incinerator.[21]

21 Leyla Acaroglu, 2018. Quick Guide to Circular Economy Business Strategies

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