CIRCULAR ECONOMY IN HEALTH CARE

Communicating to non-experts

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August 2021

Disclaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organizations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of Vancouver Coastal Health staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of Vancouver Coastal Health or the University of British Columbia.

Acknowledgements

The author acknowledges that the work for this project took place on the unceded ancestral lands of the xwməθkwəy̓əm (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səl̓ílwətaʔ/Selilwitulh (Tsleil- Waututh) Nations.

The author would like to thank all of the staff at the Energy and Environmental Sustainability, Facilities Management Unit within the Lower Mainland health organizations, and all interviewees who graciously offered their feedback and time.

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Contents

Executive Summary

On the world's current trajectory, global temperatures are expected to rise by 2° Celsius by the year 2100, leading to catastrophic changes that would threaten ecosystems and human survival (IPCC, 2021). In response to the United Nations' (UN) Intergovernmental Panel on Climate Change's (IPCC) report outlining these predictions, UN Secretary General António Guterres called on global leaders to act. "If we combine forces now, we can avert climate catastrophe. But… there is no time for delay and no room for excuses" *(BBC, 2021).*

It is evident that there is a limited window of opportunity to change the trajectory of our climate, slow the pace of global warming and create a healthier, safer future, but it will require collaboration, innovation, and a shift away from our current industrial and economic structures.

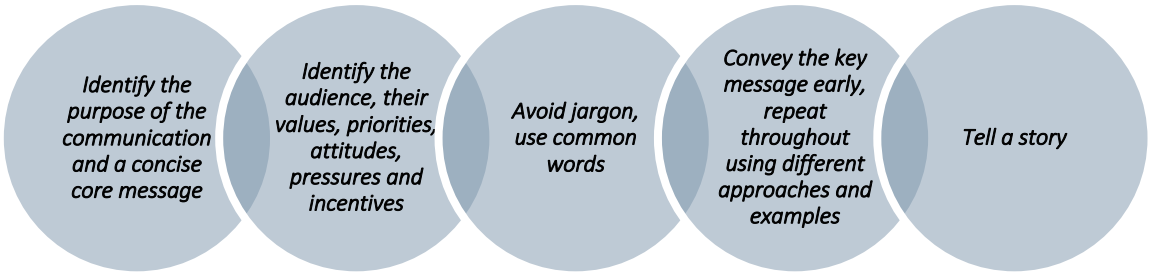
For leaders and organizations managing other crises, the year 2100 – and the consequences of climate change – may feel far away compared to their current challenges. How can we persuade others doing important work within our health-care systems to act urgently and reduce emissions and waste? How can we support and facilitate this work without overloading the professionals who have worked tirelessly throughout the COVID-19 pandemic?

This report outlines a strategic communications approach to educating and persuading non-experts about the health consequences of our current economic system. It explains the benefits of a transition to a more sustainable economic structure, informed by a literature review and series of interviews with health care stakeholders, environmental sustainability experts, and communications specialists. We propose a series of best practices for communicating the health risks of our current economic structure with an emphasis on persuading non-experts and decision makers.

In the current economic model, referred to as a linear economy, raw resources are extracted for production and products are disposed of at high rates. An alternative model, known as a circular economy, would emphasize the reuse, sharing, and repurposing of goods, discourage and delay disposal in landfills, and create new economies for sharing and recycling.

Benefits of a transition to a circular economy include reduced emissions, waste, and extraction of finite natural resources; supply chain reliability and security; improved food security; cost savings; improved health and well-being; and reduced health inequity.

This report emphasizes five core communications principles for reaching non-expert audiences:



Beyond these core principles, this report recommends a series of specific strategies for pro-environment persuasion. Based in psychology, behavioural science, and sociology literature, we outline the factors that influence pro-environment behaviours and suggest strategies for targeting communications to audiences based on their attitudes, organizational norms, perceived behavioural control, barriers, intentions, and incentive structures. A summary of these strategies follows on Page 3.

This report is intended to be used by sustainability experts who are presenting to stakeholders, community members, or leadership and are seeking new strategies to engage collaborators in environmental sustainability.

A shift to a circular economic model across all sectors – including health care – can only be accomplished through collaboration and working together. Despite the challenges and scale of work required to implement systemic transformation, we hope this report will facilitate new conversations and engagement that lead to opportunities: to learn and work together, restore ecosystems, and improve health.

Key Findings:
Best Practices in Sustainability Communications and Persuasion

Define the terms you are using: What is sustainability?
Sustainability can refer to the economy, environment, or other systems. Make connections between types of sustainability that your audience cares about and be clear about what you are referring to.

Make it personal: What does the audience care about?
Identify the pressures, attitudes, community or organizational norms, barriers, motivations and priorities of your audience and tailor your argument their specific perspective.

Use specific examples (with relevance to your audience)
Examples can help explain complex principles and make a theory relevant to the audience. Pick examples the audience will relate to and understand.

Empower people so they feel like they can play a part in the solution, while using the big picture to motivate why action is needed
Smaller actions can reinforce that change is possible, while the bigger picture of the importance of pro-environment work can motivate longer term and larger projects.

Engage enlightened community members as leaders
Find individuals who are already engaged in pro-environment work and support them, leverage their network, and help them ask as messangers to reach new individuals.

Introduction

This report presents the findings of a research project conducted with the objective of developing best practices and core messages that communicate the concept of a circular economy in health care in an accessible and compelling way.

A review of existing applications of circular economy in health care was conducted to identify illustrative examples for the purposes of storytelling, followed by a review of best practices in communicating the principles of circular economy, and interviews with stakeholders, communications specialists, and sustainability experts.

In this report, we outline the inseparable link between human and planetary health, and how the current structure and operations of the health-care sector are both negatively impacted by the consequences of climate change, as well as detrimental to ecological systems.

We explain the difference between a linear economic structure and circular economic structure, and the benefits of a transition to a circular economy with specific respect to human and planetary health.

Building on interviews with stakeholders and specialists and referencing psychology and sociology literature, we describe best practices in communications with decision-makers and propose a series of best practices in persuasive pro-environment communications.

This report aims to serve as an educational document for improving communication and persuasion efforts to promote pro-environmental behaviour broadly, and policies that facilitate the transition to a circular economy in health care more specifically.

We conclude by noting the importance of collaboration in this field of work. Readers are encouraged to use the tools outlined in this report to engage broader audiences and reach new individuals who can act as partners in creating a healthier and more ecologically sustainable future.

Background

Linear economy

In the current global economic model, referred to as a linear economy, products are destroyed at the end of their life, creating waste and leading to the depletion of natural resources (Didenko et al, 2018). It is colloquially described as a “take-make-waste” model, because the vast majority of products are constructed from raw natural resources and the product is disposed of at the end of its lifecycle (Ellen MacArthur Foundation, retrieved 2021). This model, depicted in Figure 1, notably causes degradation of ecological systems and depletion of resources.

Figure 1 Linear Economy Model[1]

The causal link between human behaviour, driven by a linear economic model, and climate change is undeniable. As a recent report from the United Nations’ Intergovernmental Panel on Climate Change stated, "it is unequivocal that human influence has warmed the atmosphere, oceans and land” (IPCC, 2021).

Since 1970, global temperatures have risen more than in any other 50-year period over the past 2000 years (IPCC, 2021). The same report notes that if our current economic model persists and

[1] http://thecircleofstuff.org/what-is-the-circular-economy/

emissions are not curtailed, the globe is on track to warm by 2° Celsius by the year 2100. Without changes, this warming would have catastrophic effects on crops, water supply, infrastructure, and ecosystems, all of which would negatively impact human health and survival.

Despite these challenges, there is an opportunity to slow the pace of warming and prevent the worst-case scenario, but it requires systemic transformation and a prompt reduction in emissions (IPCC, 2021). There are also considerable economic and health risks to continuing with the current linear economic model.

Market, operational, business and legal risks of a linear economic model, described in Figure 2, highlight the close link between economic prosperity and environmental sustainability. Market risks include resource scarcity and price volatility, operational risks such as supply chain failures and worker safety; business risks include evolving consumer preferences; and legal risks include future regulations, government policy, and liability (Circle Economy, PGGM, KPMG, WBCSD, and EBRD, 2018). These risks are interconnected. For example, consumer preferences have implications for political preferences and priorities, with 60% of Canadians agreeing that "if their government does not act now to combat climate change, it will be failing all citizens" (Ipsos, 2020). These political and consumer preferences, in turn, influence government regulation, policy, and legal risk, which have operational, market, and supply chain implications.

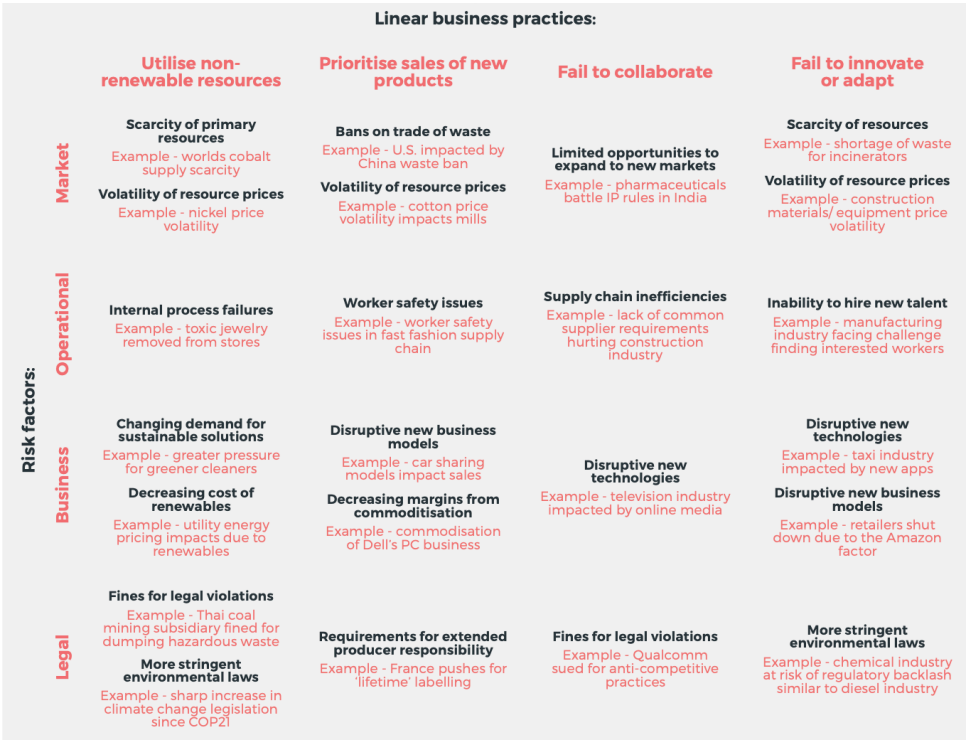


Figure 2 Linear Economy Risks, from "Linear Risks" (2018) by Circle Economy, PGGM, KPMG, WBCSD, and EBRD.

Environment and Health

In addition to the need to mitigate economic and ecological risks associated with the current linear model, there are considerable risks to human health posed by climate change. Further, the relationship between climate and health includes not only the consequences of climate change on human health, but also the impact of the health-care sector on ecological systems through waste, chemical hazards, and emissions.

The Lancet Countdown, a collaboration of 35 leading academic institutions and UN agencies, notes the inseparable relationship between health and climate change. The authors explain that the effects of climate change will exacerbate existing inequities both within and between countries, disproportionately impacting groups that are already marginalized (The Lancet, 2021). In addition, there are direct consequences to health from climate effects on housing, water supply, food security, heat-related illnesses, and air quality, depicted in Figure 3.

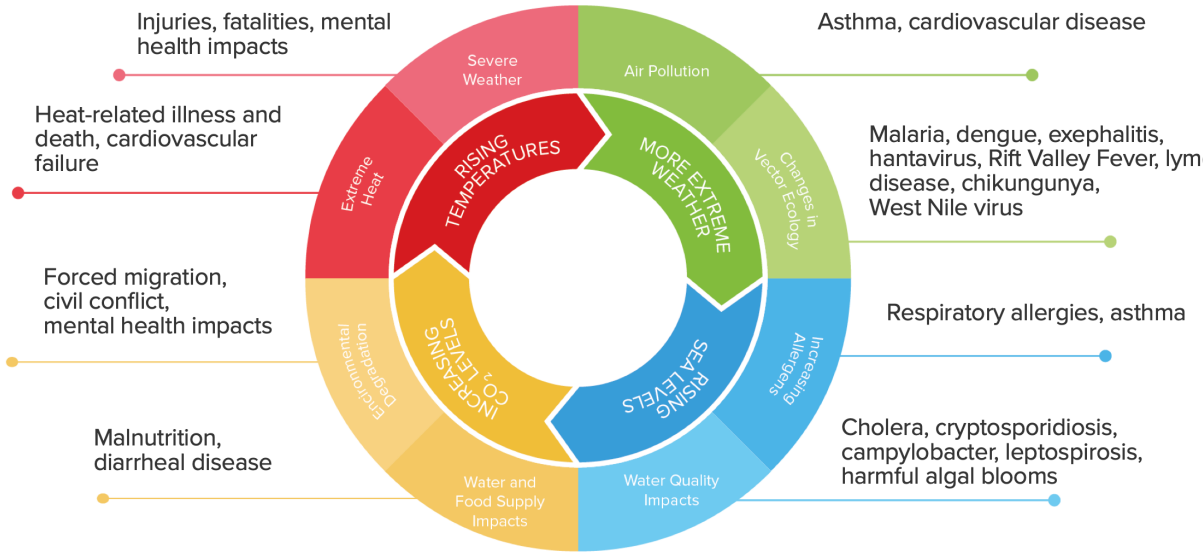


Figure 3 Impact of climate change on human health (Source: U.S. Centers for Disease Control and Prevention; Health Care Without Harm, 2019)

One of the direct impacts of climate change on health is through heat-related illness and death. Heatwaves are occurring more frequently, with greater intensity, and lasting longer, influenced by climate change (Perkins-Kirkpatrick et al, 2020). In the past 20 years, heat-related mortality has increased by more than 50 percent among people older than 65 years (The Lancet, 2021). These trends are expected to continue, directly impacting human health.

Extreme weather events including wildfire risk, drought, flood, and storms are also increasing in frequency and duration due to climate change, with direct and indirect effects on human health

(The Lancet, 2021). A recent study from the University of British Columbia found that exposure to elevated levels of particulate matter from wildfires was associated with increased odds of ambulance dispatches related to respiratory and cardiovascular conditions as soon as one hour after exposure (Yao et al, 2020). Indirectly, these events impact human health through threats to agricultural crops and food supply, access to potable water, and infrastructure damage that can prevent timely medical care, emergency assistance, and health-care structures (The Lancet, 2021).

Figure 4 Wildfires and smoke (Unsplash Photos)

Changes to climate are also changing suitability for several vector-driven diseases including dengue and malaria, and water-borne illnesses including cholera, campylobacter, and harmful algal blooms (IPCC, 2014).

Countries around the world recognize the threat posed to human health by climate change. In fact, 73 percent of countries participating in the Paris Agreement, an international treaty on climate change, reference health-related concerns in their contributions to the agreement (The Lancet, 2021).

Health Care Impacts on Climate

The relationship between health and climate is not limited to the effects of climate change on health, but also include the considerable impact of the health-care sector on the climate. If the health-care sector were a country, it would be the fifth largest emitter on the planet, responsible for 4.4 percent of global net emissions (Eckelman et al, 2020). Within Canada, the sector represents between 4.6 percent (Eckelman et al, 2018) and 5.2 percent of the national

Greenhouse Gas (GHG) emissions (Health Care Without Harm, 2019), making Canada one of the top health-care emitters per capita globally (Health Care Without Harm, 2019).

These numbers do not include the contributions of highly potent greenhouse gases used in anesthesiology and medical inhalers, which are challenging to account for due to differences in data collection but have indisputably detrimental effects as emissions (Health Care Without Harm, 2019). Many of the gases used in clinical anesthesiology are exhaled in the same chemical form as that in which they are administered (Gadani& Vyas, 2011). They persist in the atmosphere for an extended period of time where they functionally act as greenhouse gases (Brown et al, 1989). Nitrous oxide, for example, has a warming potential 300 times that of carbon dioxide, and was previously estimated to represent seven percent of human-induced climate change (Brown et al, 1989). Movement towards less detrimental compounds or renewed efforts at recapture could mitigate these effects.

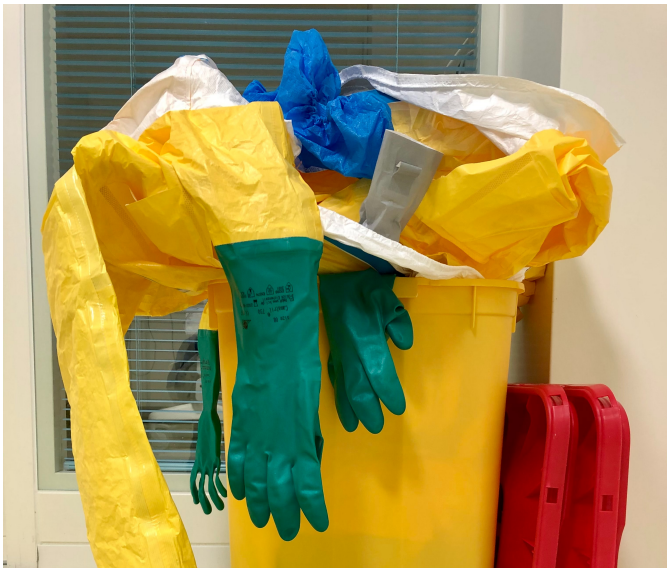


Figure 5 Medical Waste (Unsplash Photos)

Although energy use is the greatest contributor to health care's environmental footprint (Health Care Without Harm, 2019), waste is a valuable target for reduction as well. Locally, in 2019, the Lower Mainland health organizations threw out 3, 436, 024.4 kg of non-recyclable plastic (Garbage Composition Study of the St. Pauls' Hospital, 2019).

In addition to non-recyclable plastic, a fraction of recyclable plastic is actually recycled. According to a 2019 study from Environment and Climate Change Canada, only nine percent of the 3.3 million tonnes of plastic disposed of annually in Canada is recycled (ECCC, 2019).

There are adverse unintended health effects caused by the plastics used throughout health care in addition to their direct environmental impact as waste. The below table outlines some of the most detrimental plastics, their common uses, and adverse health effects associated. The table is adapted from Moore (2020).

While sterility and safety needs in health care necessitate some level of plastics use, there are regulatory and policy opportunities to reduce the quantity of plastics used and disposed of within the health-care system.

Plastic	Common Use	Adverse Health Effects
Polyvinylchloride	Food packaging, pacifiers, toys, IV bags, and tubing.	• Carcinogenic • Birth defects • Genetic changes • Indigestion • Liver dysfunction
Phthalates: • high-density polyethylene • polyethylene terephthalate • diisononyl	Blood bags and tubing, IV containers and components, surgical gloves, breathing tubes, labware, inhalation masks, irrigation bottles for saline and sterile solutions, sterile barrier packaging, water bottles, food containers, toys, kitchenware, and plastic bags.	• Carcinogenic • Endocrine disruption • Developmental and reproductive effects (birth defects) • Infertility • Contributor to the development of asthma • Immune system impairment
Bisphenol A (used in polycarbonate)	Medical tubing, food can linings, thermal paper, and toys.	• Endocrine and immune disruption • Increasing incidents of breast cancer • Abnormal growth patterns and • neurodevelopmental delays in children

Table 1 Common Plastics in Health Care and Health Consequences (Adapted from Shayna Moore, 2019: Researching a Circular Economy of Plastics in Health Care, Sustainability Ecology Center, 2020; Healthcare plastics recycling council, 2019; Health Care Without Harm, 2020; World Health Organization, 2018).

From emissions to waste, the health-care sector's contributions to the negative health consequences of climate change highlight the necessity to shift away from a linear economic model towards one that is more sustainable from an environmental, public health, and economic perspective.

Circular Economy

In comparison to a linear economy, a circular economy is a model that is restorative and characterized by efficient use and re-use of natural resources (Didenko et al, 2018). The Ellen MacArthur Foundation defines a circular economy as one that "*is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems*." (Ellen MacArthur Foundation, retrieved 2021). The model is based closely on closed-loop systems of energy and resource use (Didenko et al, 2018).

Other descriptions of a circular economic model focus on the importance of changing the nature of consumption, sharing products as a service, and reducing the reliance on landfills and incineration through reusing materials and products (WHO, 2018). This reduced reliance is accomplished through a series of actions referred to as the Waste Hierarchy, which evaluates different waste management practices by order of priority (Lansink, 2018). The most preferable action is to prevent or reduce waste, followed by reusing products, then recycling, followed by energy and material recovery, and disposal as a final and least preferable option (Lansink, 2018). The hierarchy is depicted in Figure 6, below.

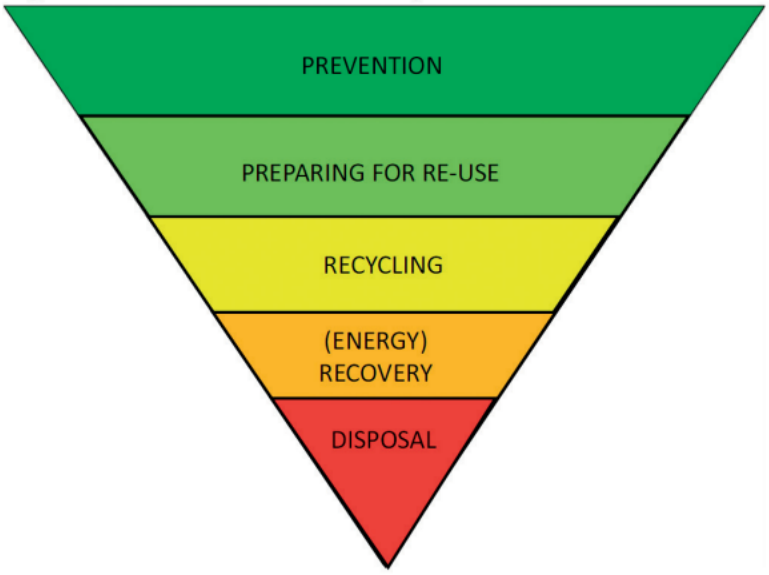


Figure 6 The Waste Hierarchy, (Bourguignon, 2017; WHO, 2018)

The European Union's policy work on circular economy highlights the importance of retaining the value of products in re-use or re-purposing. They define a circular economy as one where "the

value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised" (European Union, 2015). This speaks to the need to reduce energy and inputs in production, use, and re-use, acknowledging that processes lower on the waste hierarchy such as recycling or material extraction can be an energy-intensive process (WHO, 2018).

It is noted by the World Health Organization, European Union, Ellen MacArthur Foundation and others that a widespread transition towards a circular model must be supported and facilitated through legislative and policy changes such as product standards and regulations, waste regulations, a shift in taxation structure, consumer incentives such as reduced taxation for circular products, investment in innovation, support for training and research, and communications and awareness efforts (WHO, 2018).

Benefits of Circular Economy

A circular economy model mitigates many of the aforementioned risks of the current linear economic model by reducing reliance on increasingly scarce natural resources and decreasing emissions. It is also better positioned to meet future environmental, regulatory and legal standards, consumer preferences, and holds the potential to improve health and equity, while facilitating sustainable growth, job creation, and restoration of ecological systems (WHO, 2018).

Reduced emissions, waste, and extraction of natural resources

The Ellen MacArthur Foundation estimates that the transition from a linear economy to a circular economic model would facilitate a 48 percent reduction in carbon dioxide emissions by 2030 (Ellen MacArthur Foundation, accessed 2021). In addition to reduced emissions, a circular economy would lead to reduced waste in landfills, and would decrease the amount of finite raw resources extracted for consumption.

Supply Chain Reliability and Security

As a result of reduced reliance on finite raw resources, combined with the sharing of goods as a service, a circular economy would contribute to supply chain reliability and security. It would reduce reliance on supply chains that are susceptible to global conflict and politics, extreme weather events, and labour issues.

Improved Food Security

The current food production system is both energy and resource intensive and causes damage to natural systems through pesticide and fertilizer use, soil degradation, transportation, and food waste, all of which have consequences to human health. By transitioning towards food systems

that use regenerative practices that include multi-species integration, improved water use and a focus on soil health and biodiversity, agri-foods producers could realize cost savings while actively contributing to ecosystem restoration (Schreefel et al, 2020). Crucially, in the context of human health, this would reduce water contamination, improve capacity to provide nutritious food to a growing population, and reduce environmental degradation that is associated with risks to human health.

Cost savings

Through sharing products and reduced consumption of raw resources, there is an opportunity for cost savings for organizations and individuals. Additionally, a circular economy would create jobs through policies to incentivize innovation and the need for secondary markets for recycling and repurposing of existing goods (Ellen MacArthur Foundation, accessed 2021). This would lead to sustainable growth that is less susceptible to disruption, while benefitting human and planetary health.

Health and Well-being

Reducing the severity and pace of climate change through reduced emissions and waste will lead to reduced severe weather events and their associated injuries, fatalities and mental health impacts; reduced heat-related illness and death; reduced illness due to air pollution, reduced water and vector-borne illnesses; and improved access to safe, nutritious food (Health Care Without Harm, 2019).

In addition to mitigating the negative effects of climate change on human and planetary health, these benefits would translate into reduced pressure on health-care systems, allowing for the best possible care to be delivered to patients.

Improved health equity

The health burden of extreme weather events including heat waves has been found to disproportionately affect marginalized communities, including persons of colour (Basu et al, 2008), individuals of lower socioeconomic status (SES) (Shonkoff et al, 2011), and those with chronic health conditions, many of which are associated with lower SES (WHO, 2018; Shonkoff et al, 2011).

Researchers at the University of British Columbia recently mapped climate vulnerabilities to a range of extreme weather events including smoke, flooding and air pollution in the Vancouver Coastal Health and Fraser Health regions, and observed higher vulnerability associated with lower income areas (Faculty of Medicine, UBC, 2020). This is confirmed by other literature, which

notes that lower-income urban communities and communities of colour are often located within areas with low greenspace and greater roads, pavement, and buildings, which absorb sunlight and create a local heat-island effect (Shonkoff et al, 2011).

Through reducing emissions, a circular economic model would reduce the frequency and impact of extreme weather events that are exacerbating health inequities, compared to maintaining the current structure.

Internationally, many countries in the Global South, which have among the smallest contributions to emissions and waste, are poised to be disproportionately impacted by the consequences of climate change, including low-lying islands in the Pacific that are susceptible to rising sea level, and Northern and Sub Saharan Africa, which is susceptible to increasing droughts (Sen Roy, 2018; Health Care Without Harm, 2019).

Workers of lower socioeconomic status, especially members of marginalized communities, are the most likely to be exposed to harmful contaminants and dangerous conditions through their work (WHO, 2018). From a health equity perspective, a transition away from a linear economic model to a circular model would create new labour needs in safer industries, while reducing the economic incentives for firms to extract raw resources and produce consumer goods with high environmental and health costs. This would in turn improve the health of workers and reduce environmental contaminants.

Findings

What is Circular Economy?

The following section outlines non-expert explanations of the concept of circular economy as it pertains to health care in two different lengths: an approximately thirty second elevator pitch, and a longer explanation of approximately five minutes. The purpose of these explanations is to provide a basis from which future communications efforts can be built upon.

In Brief (30 seconds)

Circular Economy is about delaying and reducing the amount of each item that is thrown out. It means asking whether an item is needed, whether an existing item can be borrowed or repurposed, and if not whether a reusable product is available, and selecting reusable products that are designed to have the greatest proportion of raw materials recovered at the end of its lifecycle. This can be supported by policy and tax structures that make it more expensive to throw things out, and cheaper to borrow, share, or reuse a product.

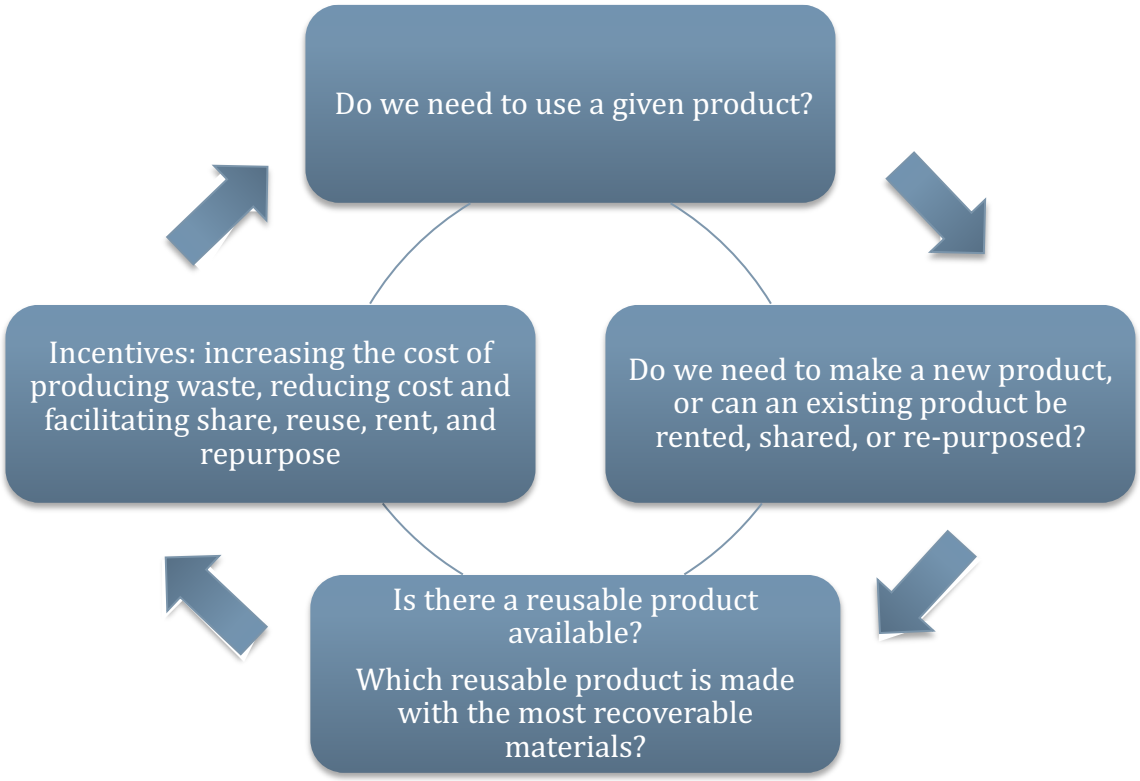


Figure 7 Circular Economy Diagram (Samuels, 2021)

Extended Explanation (5 minute explanation)

Our current economic system is a linear economy, where most products are made from natural resources and the product is thrown out at the end of its lifecycle. This damages the environment and uses up limited natural resources. It also produces a lot of waste and emissions, which are driving climate change and negatively impacting our health.

We've already seen an increase in events like droughts, wildfires, and tropical storms, and these events are predicted to become more common as global temperatures increase. These events directly and indirectly impact human health, through our water, food, and air. For example, in the most recent heat wave in British Columbia, more than 500 people passed away from heat-related illnesses (CBC News, 2021). The heat and drought also caused crops to fail, made the land more susceptible to wildfires, contributed to poor air quality, and led to unsustainably high energy and water use. These types of events disproportionately impact those who are already the most marginalized and the most at risk of poor health outcomes, so in addition to the health and climate effects, they contribute to inequity.

If we want to reduce our waste and emissions, and slow the pace of climate change, we need to shift the way we make, use, and dispose of products. A circular economy is about delaying and reducing the amount of each item that is thrown out. It means asking whether an item is needed, whether an existing item can be borrowed or repurposed, and if not whether a reusable product is available, and selecting reusable products that are designed to have the greatest proportion of raw materials recovered at the end of its lifecycle.

The immediate benefits of this are reduced waste and emissions. But there are also considerable economic benefits: increased innovation, supply chain security and reliability, and job creation. It would help improve the health of all, but especially those who are already marginalized and poised to face the greatest impacts of climate change.

How would this look in practice? In health care, it would mean starting by reducing the number of products being used where evidence says there is no clinical benefit. For example, there are many times where clinicians don't need to use disposable gloves, such as giving an injection. This cuts down on the number of supplies needed and used and has an economic benefit through cost savings.

Next, it would mean looking for opportunities to purchase products that can be reused from sustainable supply chains and looking for products that can have raw materials and built components extracted and reused at the end of its life. This would mean prioritizing the overall impact of a product's production, use, and disposal on the planet when considering what to choose.

On a bigger scale, it means incentivizing sharing, reusing, and repurposing goods, and disincentivizing throwing items out and extracting raw materials. By taxing emissions and waste, and creating policies that make it easier to reuse and share, organizations and companies can choose more environmentally friendly options while saving money.

It sounds like a huge shift, but it's already happening on smaller scales, and the incentives already exist to facilitate bigger changes. Regulatory changes that are being implemented like a price on emissions and the financial cost of extreme weather events – like forest fires that destroy infrastructure or droughts that devastate crops – are just some of the many incentives that already exist.

The status quo isn't working. It's not economically sustainable, it's not environmentally sustainable, and it's damaging our health – the circular economy is an opportunity to address all three while improving equity, stability, and security.

Communicating with Decision-Makers and Stakeholders

The following best practices were developed based on a literature review of science communications principles, psychology and sociology literature, and interviews with experts in sustainability, clinicians, staff and other stakeholders. These recommendations apply to all communications projects and are not limited to communicating the concept of circular economy in health care.

1. Identify the purpose of communication and a concise core message

Different objectives will require unique communications strategy, so it is crucial to identify the specific purpose of the outreach effort. These objectives may include:

Awareness: You want the stakeholder, individual, or audience to know more about who you are, what you do, and why you do it. You aren't trying to introduce concepts that are new to them, ask them for engagement, or convince them to join your cause.

Education: You want the audience to learn a new concept or idea. There is a knowledge gap you are trying to address, but you do not have a call to action associated with it.

Persuasion: You are trying to convince the audience of an argument or change their perspective.

Call to Action: You are asking the audience to participate in a specific action associated with your work, whether that is to enact individual change, join your cause as an activist, or educate others in their lives using their personal and social clout. In this case, you are making the assumption that they understand the concepts and purpose of your work and are calling on them to take specific measures to support your efforts.

Based on the objective, it is important to identify a key message that you want to convey to the audience. How you frame your argument and explain the message, however, will vary depending on the audience.

2. Identify the audience

The most effective message for a given audience will depend on many factors including their attitudes and beliefs, knowledge, priorities, the platform being used, and their way of processing new information.

Previous science communication literature emphasized the knowledge deficit model, which suggested that more knowledge about a scientific subject was associated with greater evidence-based decision-making and positive attitudes towards scientific research (Suldovsky, 2017). Recent evidence, however, suggests that this model is incomplete and overly simplistic (Suldovsky, 2017; National Academies of Sciences, Engineering, and Medicine; Division of Behavioral and Social Sciences and Education, 2017).

An audience's beliefs, values, and characteristics strongly influence the way in which they process information and how they form attitudes about that knowledge (National Academies of Sciences, Engineering, and Medicine; Division of Behavioral and Social Sciences and Education, 2017). When these factors are adjusted for, the relationship between knowledge and attitudes is not significant or negative (Allum et al, 2008). In other words, more knowledge on its own does not improve an audience's attitude towards a policy or argument, but it can be harmful to making your argument in some cases.

In developing communications products such as a report, presentation, or infographic for an audience, the audience should be clearly defined and specific. Next, the platform or tool being used to reach them should be evaluated for appropriateness. Where does the audience you are trying to reach usually receive new information? Most importantly, the audience's motivations,

beliefs and priorities need to be identified, and the narrative of the communication should be shaped to address them. These factors will be explored in detail through the theory of planned behaviour on Pages 23-26 of this report.

3. Avoid jargon, use common words

Jargon is defined in the literature as "specialized, technical vocabulary terms that are associated with a situational context or purpose and are rarely used outside of these particular circumstances" (Sharon and Baram-Tsabari, 2014). It is often used by experts within a field to refer to field-specific theories, principles, and concepts, making it difficult or impossible for those outside of the field to understand the meaning of the word.

Research suggests that when it is accessible or easy for an individual to understand a word or sentence, it experienced in a way that creates positive feelings of knowing, safety, and interest (Bullock, 2019; Song and Schwarz, 2009; Dragojevic and Giles, 2016). This, in turn, makes the individual more willing to be persuaded or learn more.

Not only does jargon interfere with the ability of a non-expert to understand the substance of a communications effort, but research has found that jargon is associated with 'motivated resistance to persuasion,' which refers to an individual's "motivation to oppose, or resist, perceived efforts to change existing attitudes" (Nisbet, 2015; Bullock, 2019). In other words, when jargon is used, it can cause an individual to resist the efforts to convince them of an argument. It is thought that the reason jargon causes people to react negatively to persuasion efforts is that they react to the subconscious fear and threat of not understanding, and this causes them to have a reactive or resistant mindset (Moyer-Gusé and Nabi, 2010; Bullock, 2019).

In contrast to jargon, words that are more commonly used, known as high-frequency words, are associated with lower processing times, impacting decision-making, cognition, and recognition (Brysbaert et al, 2017). Traditional measures of word frequency are based on books (Brysbaert et al, 2017), but alternative lists have been built based on television and film subtitles, or social media content. There is evidence that the source of words for frequency lists can be tailored based on demographics and experience (Johns et al, 2016), but regardless of the source of words the standardized way of evaluating word frequency status is frequency per million words, with high-frequency words occurring more than 100 times per million words and low frequency words occurring less than five times per million words (Brysbaert et al, 2017). Practically, this means it is important to use words that most people would say in a social conversation.

For communications to the general public, political candidates tend to use words that correlate with a grade 5 to 8 reading level of word frequency (Schumacher & Eskenazi, 2016). Over time,

the average grade level of speeches delivered by successful candidates for President of the United States has decreased (Schumacher & Eskenazi, 2016), reinforcing that accessibility of the words used is important for persuasion and likeability.

4. Deliver the key message early and repeat it in different ways

Individuals receive information in different ways, so presenting the information multiple times in different formats throughout a single communications product allows for it to be received by a greater proportion of the audience.

Those with lower numeracy are more likely to rely on the use of emotions, narrative, and bias in decision-making (Sinayev and Peters, 2015; Chapman and Liu, 2009). For others, however, data-driven communications can be more persuasive, even if they are also influenced by bias and narrative (Krause & Rucker, 2020). In cases where data is being presented, it is beneficial to use visualization, simplified numerical concepts such as percentages rather than field-specific metrics, and to confirm understanding after presenting data (Apter et al, 2008).

Evidence also supports that moderate repetition of a message improves recall and agreement with the message (Cacioppo & Petty, 1989). The most effective communications products will combine these practices: the message will be repeated several times in different ways, both with anecdotes or narrative storytelling, and with accessibly presented data, in the context of the audience's values, priorities, beliefs.

This was echoed by one interviewee with respect to health-care professionals:

"Figure out how people normally receive new information. Many health-care workers are data oriented so making sure you have clear data to back up what you are talking about, making sure that the model is clear to them even if it is imperfect, and having people see themselves reflected in the work is really important."

5. Tell a story

The literature makes a distinction between logical-scientific communication, which is where specific facts are presented without context and so that they can stand alone (Avraamidou & Osborne, 2009; Dahlstrom, 2014), and narrative storytelling. For non-expert audiences, however, research suggests that narratives or storytelling, which is context-dependent and uses temporal structure to explain cause-and-effect, can be more persuasive and engaging than logical-science communication (Dahlstrom, 2014).

For a research or policy problem, this narrative can persuasively be structured as the problem one is seeking to solve or address, or the current gaps in knowledge or practice, the proposed or implemented solution, how it addresses the gap, and the impact of solving the problem.

Narrative communication, when compared to logical-science communication, is associated with faster processing, better understanding, and improved recall (Dahlstrom, 2014; Wyer et al, 1995; Zabrucky & Moore, 1999). Further, work that builds on this association notes that making the message personally relevant to the audience amplifies the positive effects of moderate levels of message repetition (Claypool et al, 2004).

Best Practices in Sustainability Persuasion

Based on a literature review and interviews with experts in sustainability, clinicians, staff and other stakeholders, a series of key best practices in communicating the concept of circular economy were identified.

1. Define the terms you are using: What is waste? What is sustainability?

Interviewees noted that common terminology in pro-environment work is subject to misunderstanding, multiple meanings, and confusion. It is important that the terms being used are clearly defined with respect to the argument being made. As one interviewee explained, the concept of sustainability is not intrinsically understood to refer to the environment, especially in health care:

"*Health care has sustainability in its landscape, but it is exclusively to do with the budget and bottom line. [For some], sustainable health care means economically viable health care, so you have to be careful how you start your conversation. It is engrained that sustainability means we can afford it or pay for it. You almost need to do some education and be in a learning relationship with people. There is no way for these people – whether it is clinical care or hospital administration – to have heard that sustainability is something else.*"

The Merriam-Webster dictionary defines sustainability as "capable of being sustained" where sustained is defined as "maintained at length without interruption or weakening" (Merriam-Webster, 2021). Making clear to the audience what system or resource is being referenced is crucial.

In discussing sustainability with a goal of communicating environmental sustainability, rather than defining it solely in the context of resource and energy systems and their impact on the

environment, it may be helpful to start with the definition some audiences will be familiar with, which is one of financial sustainability. For these audiences, the negative effects of the linear economy and costly consequences of climate change can be used as an argument that a shift towards reducing emission and waste is not only more sustainable for planetary and human health, but also for economic viability.

Interviewees noted that it is important to emphasize that it is not a choice between either climate or economy but rather that they are intertwined, and that this is not an extra task or problem for individuals but instead is linked to their current challenges.

"*What it looks like to people is 1) you want to change what we're doing and 2) you want to add something extra [to their workload]. Help them see it is not an appropriation or divergent path, it is complementary to what they are already doing. Sustainability is not something else or in addition to what they are doing, or adding to the work they have to do, it's embedded in what you are already doing.*"

"*This is not about balancing needs of health and safety with the environment, it's about showing people that they are actually connected. We can't ask people to 'do more' because they are already facing so many challenges.*"

Interviewees emphasized the need to educate stakeholders on why the current linear economic system is damaging to their goals as individuals and an organization, and then to frame pro-environment policy and behaviour as the solution that they can be a part of within the existing scope of their work.

Another important term to define and redefine is that of waste. As one interviewee pointed out, the concepts around how we manage our waste are intrinsically tied up in our definition of waste:

"We need to rethink what is waste: could this never be used for another purpose ever again? Waste is a human created concept so before we go back and use other strategies, we have to rethink the concept itself. When we look at the forest, are the leaves or branches that fall on the forest floor waste? Not really, they serve another important purpose in the system."

Locally, Vancouver company the Unbuilders, who take apart buildings to salvage and upcycle building components, have the motto "it's not waste, it's just wasted" (Unbuilders, retrieved 2021). This redefinition or reframing can be helpful in conceptualizing circularity for those who are new to the principles and application.

2. Make it personal: What are the attitudes, intentions, barriers, and pressures of the audience?

A common theme across interviews was the importance of targeting communications to stakeholders within the context of their priorities and values. As two sustainability and communications experts noted, framing a climate solution in reference to an individual's existing challenges can offer an opportunity for engagement, especially in individuals who may not otherwise view climate-related issues as relevant to the scope of their work.

"Make climate change a challenge for that specific person and then offer a solution so you are meeting their goals, and explain how your climate solution will benefit the person"

"Produce multiple versions of what you are communicating so you can have everyone reflected in the content somehow, because if they identify with the message then that's a toe in the door"

This concept is echoed in the literature and outlined by Khan et al (2020) and Yuriev et al (2020), who use variations of the Theory of Planned Behaviour (TPB) model to capture the interaction of psychological, social and situational factors in pro-environment behaviour. TPB models originated in the 1980s and describe how one's attitudes about the risks, benefits, and likelihood of success of a behaviour shape one's intent to practice the behaviour (Boston University School of Public Health, 2019). In it, intention is determined by attitudes towards the behaviour, subjective norms, and perceived behavioural control (Kan & Fabrigar, 2017).

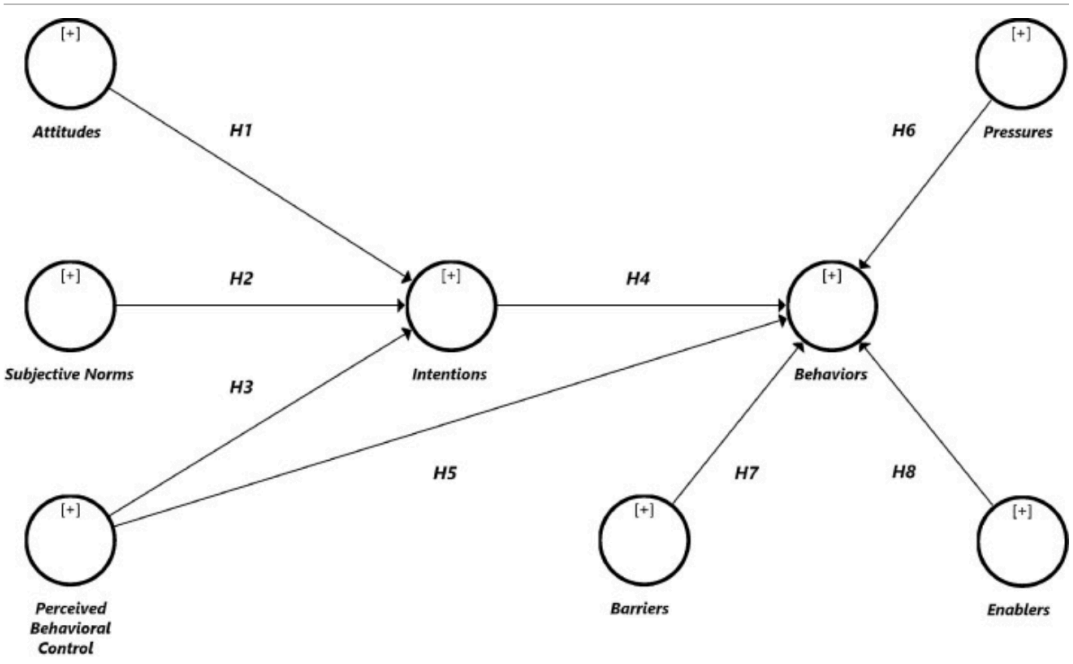


Figure 8 A model of the determinants of intentions and behaviours towards a circular economy for plastics (Khan et al, 2020)

In Khan et al's model, seen in Figure 8, attitudes are defined as "*the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question.*" It is important to separate out attitudes towards different components of circularity and address specific concerns, but broadly, pro-environment attitudes are an important foundation. National polling suggests that 68 percent of Canadians are concerned about Canada's environmental and climate change challenges and a strong majority believe that governments and large businesses should be doing significantly more to address these challenges (Centre for the Purpose of the Corporation, 2021). Among health-care staff in the Lower Mainland, pro-environment attitudes are extremely high. Results from a recent staff survey within the Lower Mainland health organizations showed that 87 per cent of respondents agree or strongly agree that health care organizations should demonstrate leadership when it comes to environmental health and wellness in the workplace and our communities (GreenCare Survey 2021).

Subjective norms, also included in Figure 8, are described as "*the perceived social pressure to perform or not to perform the behavior*" (Khan et al, 2020). Culture within units, organizations, and communities varies significantly and is reflected in this factor. For example, if an individual with strong social connections and influence embraces a specific waste-reduction initiative, that may increase the pressure on others within the unit to comply or actively engage with the initiative.

As one interviewee described, individuals can play a considerable role in shaping this social pressure:

"*Find out who the informal leaders are and make sure you appeal to them, they're the ones who are going to put a poster up in the lunchroom or engage their peers, because that social capital has been built over years. We need to design programs, projects, and communications to appeal to the most influential people within a division, and they will influence those around them.*"

Another factor in the model, perceived behavioral control, is defined as "*the perceived ease or difficulty of performing the behavior*" (Khan et al, 2020). In Khan et al's model, perceived control and attitudes were the most significant contributors towards one's intent to act. In order to engage health-care stakeholders, the intended action needs to be communicated as an accessible, achievable goal. One interviewee linked this concept to subjective norms and community-building:

"You want to put people in a spot where they feel part of something, that they can make a difference, that their opinion does count."

These three components: attitudes, subjective norms, and perceived behavioural control influence intention, which in turn influences behaviour (Khan et al, 2020). Of the three, perceived behavioural control is perhaps the greatest challenge with respect to implementing circular economy in health care. A majority of individuals have a positive attitude towards pro-environment behaviour and overall this translates to a perceived culture of pro-environment behaviour, but at an individual level many still feel helpless to act. Efforts at communication need to address this perceived difficulty of performing the behaviour and likelihood of success.

In Khan et al's model, there are three components that can facilitate or prevent intention from becoming behaviour, if positive intention exists: pressures, barriers, and enablers.

Barriers are defined by Khan et al as a "*lack of requisite resources and/or appropriate opportunities.*" Enablers are described as *"factors that may facilitate an organization to implement [a given policy]."* Pressures are defined by Khan et al as "*the perceived push on organizations, to implement [a given policy].*"

It is crucial to identify these barriers, enablers, and pressures with respect to a specific audience, because they will vary considerably. For example, a barrier to a clinician replacing a disposable product with a reusable product in clinical practice may be hospital policy or a lack of knowledge about available options, while the barriers to administration may be budgetary constraints.

The notion of identifying an audience's barriers, incentives, and priorities and adapting communications to reflect this was echoed throughout interviews. One interviewee described how a successful campaign to remove single use water bottles gained momentum when the organizers were able to reach out to vendors with economic opportunities and concerned citizens with environmental arguments:

"When discussing eliminating the use of single-use water bottles, some are on board for environmental reasons, others are on board for economic reasons. Having those laundry lists ready to drive home the benefits is important. If someone got into health care to help people, the human health argument might be more persuasive than the environmental argument."

Another interviewee noted that the focus should be on the ideal outcome one is trying to achieve, and that there can be many paths to the same conclusion:

"There is good market research about why people buy second-hand products, for example, including that for some they may hold conservative values and be frugal. Not everyone will be driven by climate change, but they can come to the same conclusion."

This was echoed by another interviewee, who described the importance of identifying an organization or individual's pressure point, or a problem that can be solved by implementing a pro-environment solution:

"Everyone has a pain point – something they don't like – it's inviting the opportunity to explain and solve it. By the time you have a sustainability problem, there's something else going on up the chain and we can figure out what it is. Sustainability can solve a lot of problems, including environmental ones."

3. Use specific examples with relevance to your audience

Examples are, in many ways, a way of repeating the message in a different way. For challenging concepts, they can illustrate it in a tangible format that is more accessible than the underlying theory.

With respect to the circular economy in health care, it can help to overcome the conscious and unconscious barriers of individuals who remain unconvinced of feasibility, or who are struggling to draw parallels between the concept of circularity and the practice of health care.

For organizations who are communicating their values, providing examples of how those values have translated into action makes the organization's claims more credible and trustworthy (Radley Yeldar, retrieved 2021).

As one interviewee noted, examples play a crucial role in helping people to understand challenging concepts:

"Breaking people out of the mold or challenging their existing beliefs is hard, but examples help solidify a concept."

<u>Examples of Circular Economy Applications in Health Care</u>

Reducing products needed

- Virtual health where possible, reducing emissions from transportation, volume of cleaning, and PPE due to fewer in-person appointments
- Reducing the number of gloves used in situations where evidence does not support their use for safety and sterility purposes, such as the NHS' 'Gloves Are Off' campaign (NHS, retrieved 2021)
- Eliminating unnecessary magazine subscriptions (CCGHC case study)
- Sizing cancer medication vials to eliminate wasted drugs (CBC, 2020)
- Optimizing surgical kits to eliminate unnecessary waste (Ahmadi, 2019)

Substitution

- Substituting Sevoflurane for Desflurane in anesthesiology
- Substituting oxygen for nitrous oxide as carrier gas in anesthesiology

Onsite Reuse of Products

- Reuse of patient-specific anesthetic gas during surgery
- Onsite reprocessing of medical devices
- Reusable linens (drapes and gowns) and onsite laundry
- Onsite distillation of solvents used in laboratories
- Use of onsite generated aqueous ozone for cleaning instead of cleaning chemicals which must be regularly shipped to the site (CCGHC case study)

Offsite Reuse of Products

- Reprocessing of medical devices
- Reusable linens (drapes and gowns) and offsite laundry
- Offsite distillation of solvents used in laboratories

Reuse, repairability, recyclability and refurbished products

- 3D printing of parts to improve repairability
- Amcor pledge to develop all packaging to be reusable or recyclable by 2025 (Amcor, retrieved 2021)
- Philips' Diamond Select refurbished systems program, which provides refurbished imaging systems that have the same quality and performance as new equipment at a lower cost (Philips, retrieved 2021a)
- Philips' pledge of 2018 to take back and repurpose all the large medical systems equipment that its customers are prepared to return to it by 2020. Including equipment such as MRI, CT, Ultrasound and interventional and diagnostic X-ray systems (Philips, 2019)
- GE Healthcare GoldSeal program, which refurbishes and recycles old imaging equipment (GE, retrieved 2021)

4. Empower people so they feel like they can play a part in the solution, but also use the big picture to motivate why it is needed

A common theme across interviews was the importance of creating a collaborative community from which to launch pro-environment changes, and to offer tangible and achievable projects for

engagement. This speaks to both the perceived behavioural control and attitudes components of the Theory of Planned Behaviour.

As one interviewee described, this includes linking an audience-specific problem with a tangible action, and offering ways they can participate in the solution:

"*Make climate change a challenge for that specific person and then offer a solution so you are meeting their goals. You have to explain how the solution you are offering will benefit the person you are talking to. It is always going to be the hard facts – or problem – at the start and then end on a high note with the solutions or opportunities that they can be a part of.*"

Providing individuals with micro-, meso- and macro-level actions depending on their level of engagement can facilitate improved perceive behavioural control, because the action is being tailored to the individual's circumstances.

While most individuals will initially only be engaged at the micro-level, which is action at the level of the individual, successful smaller actions can improve confidence and shift the factors within the Theory of Planned Behaviour so future actions may reach higher levels of engagement. Figure 9 outlines the descriptions of micro, meso and macro actions, where micro actions are those of individuals, meso actions are parts of society like groups or organizations, and macro actions are society as a whole, including political and economic factors.

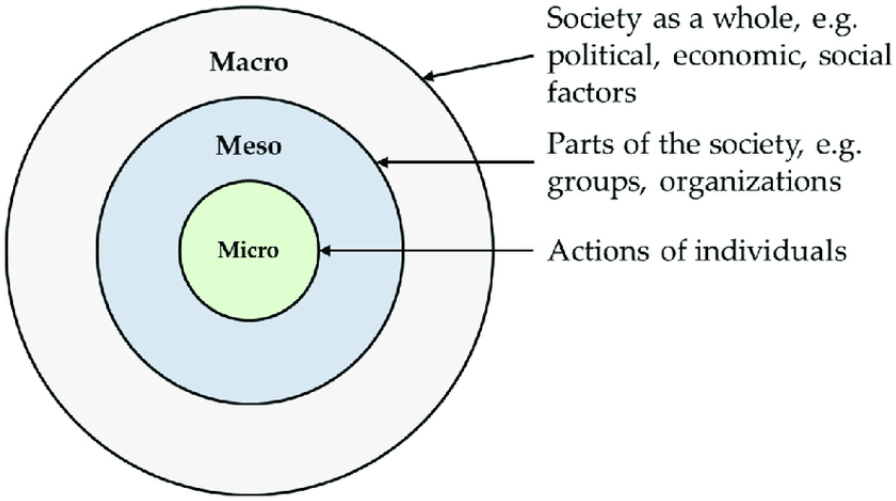


Figure 9 Levels of Engagement[2]

[2] https://www.researchgate.net/figure/Overview-macro-meso-and-micro-level_fig2_334664085

Some projects within the pro-environment sphere can be perceived to be small or incremental, especially relative to the scope of the challenges. Multiple interviewees noted that this work is still important for three reasons: first, it contributes to larger progress and can be more attainable in the immediate term, and second, it builds confidence in those who are newly engaged and demonstrates the feasibility of pro-environment work, which facilitates improved perceived behavioural control for future action. Finally, it shifts organizational and individual norms of behaviour to a more pro-environment state than previously existed, contributing to subjective norms.

Similarly, a concept known as the Ladder of Engagement can be used to gradually engage individuals can help to facilitate accessible and low-barrier action. This is depicted in Figure 10, below. Any member of the organization or network could be engaged through observation, and if communications are persuasive, they could be encouraged to actively follow pro-environment efforts. Engagement efforts higher up on the ladder are higher barrier and effort and would be targeted at individuals who are already engaged.

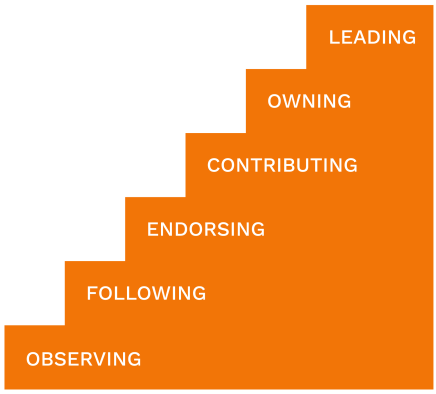


Figure 10 Ladder of Engagement[3]

5. Engage enlightened community members as leaders

Engaging those who are already supportive of implementing specific pro-environment policies or actions as community leaders and policy champions is crucial to success in the health-care setting.

[3] https://kpu.pressbooks.pub/openimc/chapter/the-engagement-ladder-theory/

As described in the Theory of Planned Behaviour, cultural pressures or subjective norms influence the intentions of individuals within that social setting, so having individuals who can create or shift those subjective norms through their own social influence can lead to other less-engaged individuals having positive intention to act in ways they may not have otherwise.

These engaged individuals can also serve to reduce organizational barriers by providing information and educating administration or can increase pressures by lobbying for policy changes. In addition, by definition, these individuals are themselves enablers of pro-environment behaviour within their organizations and units.

Interviewees noted that these individuals have already been doing the important work in this sphere, and the key is to continue to engage them, support their efforts, and amplify their messages. Many commented on the trend of these engaged individuals conducting pro-environment work at an organizational level in addition to their traditional scope of work. As one interviewee explained, "*We see enlightened individuals, often a lone wolf, who is trying to get things done on the side of their desk.*"

These individuals often have limited resources, including time and personnel, so staff who are working in the sphere of environmental sustainability can act to not only engage them but to reduce their workload while leveraging their knowledge as a stakeholder, social network, and message.

Stakeholder Motivations and Incentive Structures

As previously discussed, depending on an audience's attitudes, perceived behavioural control, barriers, enablers and pressures, the argument that will be persuasive to them to support or enact pro-environment behaviour will differ. Table 2, on the next page, outlines some potential motivations of stakeholders within the health-care sector and how an appeal might be targeted to address the motivation. In this case, a motivation or incentive structure is the combined forces of attitudes, subjective norms, pressures, barriers, and enablers outlined in Khan et al's model from Figure 8.

The appeals outlined refer back to the benefits of a circular economy outlined on pages 12-14, and the consequences of a linear economy outlined on pages 5-10.

Motivation	Appeal
Improving Global Health or Addressing Health Inequity	• Impacts of climate change – extreme weather events such as heat, drought, wildfires, storms and flash flooding – will disproportionately affect the most marginalized within and between countries
Business & Management	• In British Columbia, health authorities are mandated to be carbon neutral and thus must purchase carbon offsets, so reducing emissions can reduce these costs • As policies change, the cost of emitting will increase • Purchasing reusable products can have a lower per-use price than disposable products, especially after accounting for the cost of disposal and waste • It is a political, legal, and economic liability in the long term to rely on intrinsically unstable systems, supply chains, and finite resources • Insurance companies are increasingly recognizing high-emissions projects as uninsurable from a business perspective (Guardian, 2020)
Patient Health/Health Outcomes	• Considerable health consequences of heat, drought, wildfires, pollution, storms, flash flooding and other consequences of climate change • Waste and toxic chemicals from medical plastics are detrimental to human health
Procurement	• Reusable products and repurposed products ensure greater supply chain reliability than single use products that are subject to resource, labour, transportation, and global political volatility
National Security	• Having a sustainable, domestic supply of medical products provides governments security from on other countries' trade decisions, labour conditions, and ensures greater reliability
Public and Political Support	• National polling supports that the majority of Canadians and British Columbians care about addressing climate change, and thus would support policies that align with this • Staff within the Lower Mainland Health Organizations similarly have high support for pro-environment policies and are overall supportive of efforts to improve sustainability within health care.

Table 2 Motivations and Appeals for Different Stakeholder Groups

Challenges and Opportunities in Health Care

There are challenges to implementing a circular economy in health care that were identified through interviews with stakeholders and staff. In efforts to encourage pro-environment behaviour among health-care workers, directly addressing these concerns is an important step.

Workload of health care staff

Throughout the COVID-19 pandemic, health-care staff have been under additional stress and pressure. In some areas of health care, concerns about workload persisted prior to the pandemic and have been exacerbated. It is imperative that in reaching out to staff with pro-environment projects or communications that staff do not feel that they are being asked to take on additional work. Instead, these projects need to be an opportunity to improve the work that is already ongoing. Explaining the link between human health and environment, making projects low barrier to engagement, and highlighting the increased workload associated with climate change-related illness can assist in addressing this.

Procurement

Given the public nature of health-care spending in Canada, there are specific guidelines for current procurement processes, with some constraints around how products are selected. Currently the technical and clinical specifications and financial cost are the most important factors. While there are some opportunities to select reusable products, challenges include up-front cost of reusable products, the types of products available from vendors, and limitations due to existing trade agreements. Future opportunities to facilitate circularity in procurement would include weighing the costs to health of energy-intensive production, including consideration of emissions due to transportation and supply chain, supply chain security, and the environmental, health and financial cost of disposal of products.

Different budget items

A recurring challenge that was raised throughout interviews was the constraints of siloed budgets on policy decisions. If a policy option is more expensive for one area of the organization's budget while creating savings in a different area of the budget, especially over different time scales, there are often limited mechanisms to reconcile the net effect of the decision. Future options could consider policy options that were a net positive despite requiring budgets to be reconciled across departments or units.

Whether health-care staff identify pro-environment engagement as part of their role

Given the hierarchy within health care, many interviewees noted that staff are focused on work that falls within the defined scope of their practice and are hesitant to take on work that falls beyond this. It is crucial, however, that sustainability experts facilitate engagement with stakeholders across the health authority in order to broaden the reach of pro-environment policies. As mentioned previously, explaining the link between human health and environment and highlighting the increased workload associated with climate change-related illness can assist in making the connection between the defined scope of their work and pro-environment projects.

Conclusion

The Lower Mainland health organizations who partner through the Energy and Environmental Sustainability team all strive to improve the health of the communities they serve. Vancouver Coastal Health's vision is "Healthy lives in healthy communities" (VCH, retrieved 2021). Fraser health's vision is "Better health. Best in health care" (Fraser Health, retrieved 2021). The Provincial Health Services Authority and Providence Health similarly are guided by visions of excellence in health, and social justice, health care and innovation, respectively.

Excellence in human health is inseparable from environmental sustainability and is impossible to achieve with our current linear economic structure.

The challenges and scale of work required are considerable, but the implementation of circular economy in health care is achievable with collaboration. Not only will it require new partnerships, but it necessitates engagement with new audiences who will come to the conversation with their own unique barriers and priorities.

This report is intended to facilitate improved communication to non-experts, to explain the concept of circularity and why our current structure is untenable. We hope the tools found within this report will assist in conveying the need, benefits, and opportunity to lead the Lower Mainland towards a healthier and more sustainable future.

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