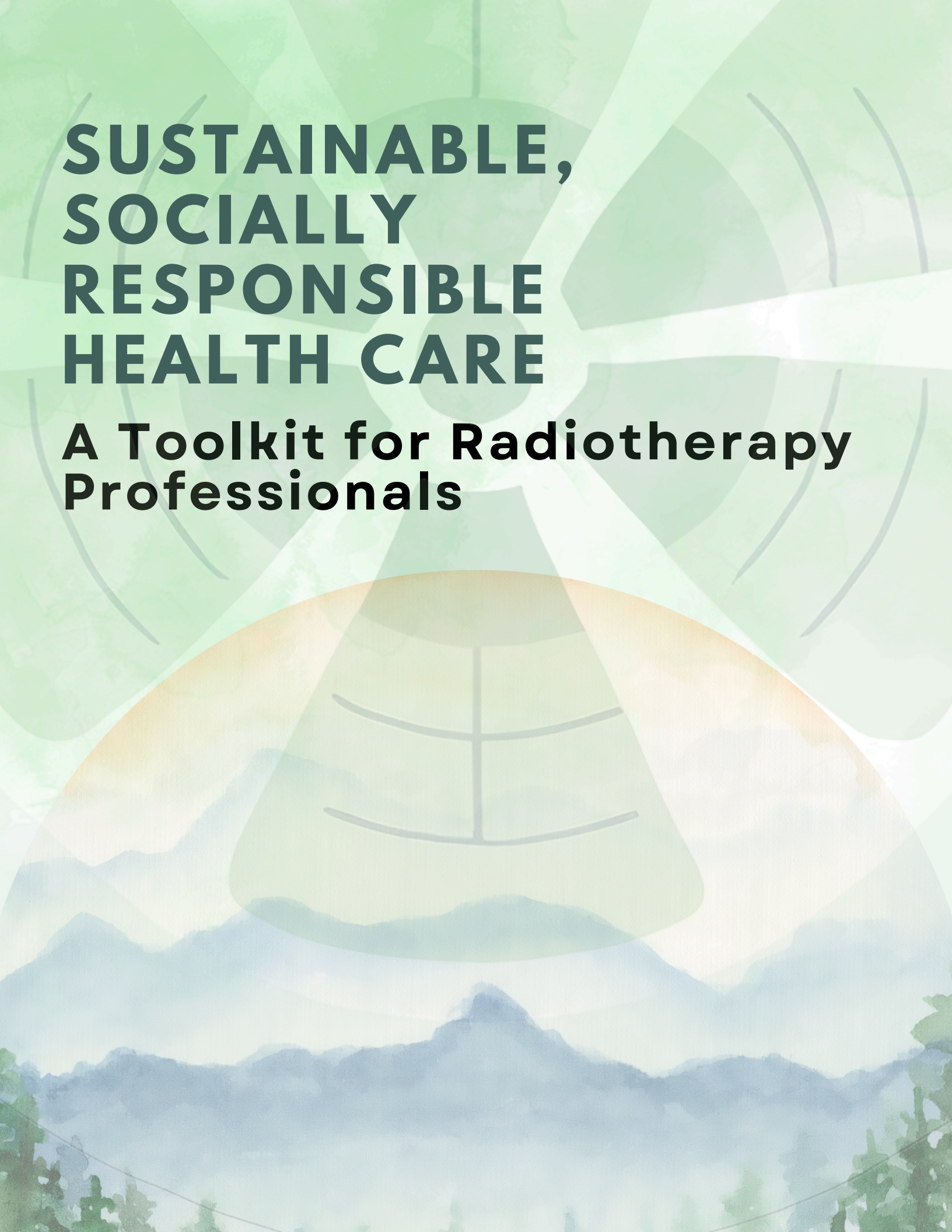




SUSTAINABLE, SOCIALY RESPONSIBLE HEALTH CARE

A Toolkit for Radiotherapy Professionals

PURPOSE AND SCOPE



Climate change has been identified as the greatest public health threat of our time. This concern is not confined to international borders and is increasingly relevant here in Canada as well.

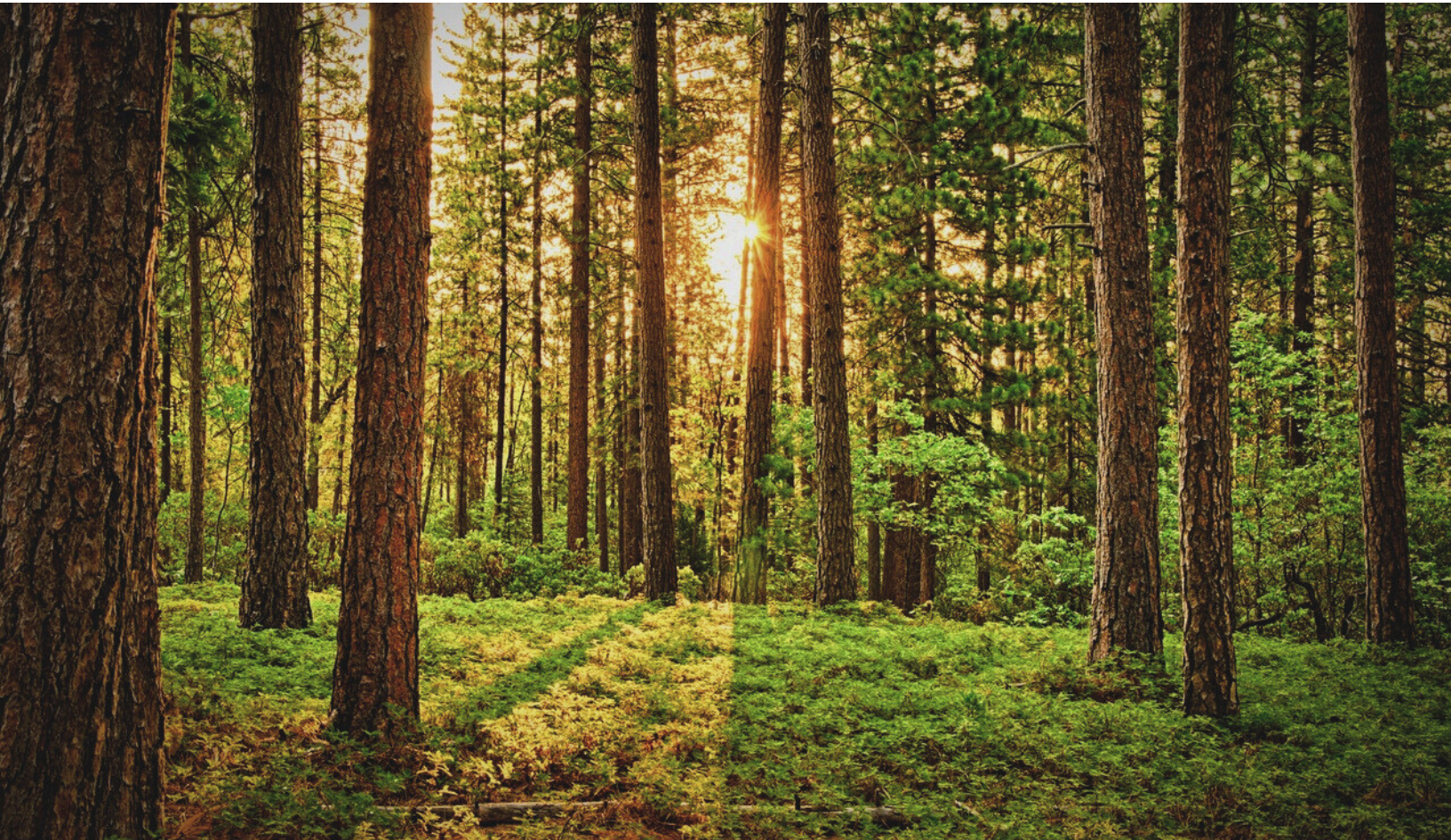
Several key pathways link environmental changes associated with climate change to increased cancer risk including increased air pollution, increased ultraviolet (UV) radiation exposure, water contamination, increased vector borne diseases, and disruptions in food supply and optimal nutrition. In addition, the consequences of climate change will impact the delivery of cancer care at every level. Severe weather events for example can disrupt treatment schedules. These effects result in a substantial cost to our patients and healthcare systems, as well as to health equity as climate change disproportionately affects our more vulnerable populations.

To effectively address these challenges, it is imperative that our endeavors transcend the confines of clinical practice. As health care professionals, we occupy a privileged position that enables us to catalyze constructive transformations and assume a comprehensive support role for our patients. The ramifications of climate change, exemplified by escalating wildfires, worsening droughts, increasing periods of extreme heat and increasing frequency of extreme weather events like destructive atmospheric rivers and hurricanes in Canada, underscore the pressing need for our active engagement to improve planetary health and the health of our patients.

This toolkit represents a call to action for Radiation Medicine health professionals, including physicians, nurses, radiation therapists, medical physicists, and trainees to educate ourselves and advocate for sustainable health care solutions within our areas of influence. It offers a framework to empower individuals within our community to engage in this vital discussion and implement locally relevant solutions in our clinics, departments, hospitals and personal spheres.

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HEALTH CARE AND THE CLIMATE CRISIS

WHY IS THIS IMPORTANT?

The recent global COVID-19 pandemic has taught us that we can focus the attention of the health care system on a clear purpose when there is a looming threat. Climate action is required from all sectors of the economy including health care. This effort is crucial in order to achieve the net-zero carbon emissions goal by 2050, which was established by the Canadian government. In addition, building climate resilience among health care institutions and their supply chains is urgently needed as they are already being impacted by a changing climate.

HEALTH CARE CONTRIBUTES 5% OF THE GREENHOUSE GAS (GHG) EMISSIONS IN CANADA, WHICH IS HIGHER THAN THE AIRLINE INDUSTRY.

There is a high level of public contact and interaction with the health care system; therefore, the system itself should provide an exemplary commitment to environmental stewardship. The influence that health care can have in reducing emissions by others is significant.



New accreditation standards for governing boards as well as federal, provincial and local regulations, are requiring senior leaders to consider environmental stewardship in their strategic plans. This will affect enterprise risk management plans, capital investment plans, procurement policies and practices, and budgeting. In the future, recruitment and retention of young professionals will depend on the alignment of organizational priorities and commitments to shared values of social and environmental justice.

Health care governing boards, senior executives, and clinical staff all play a key role that extends beyond the boundaries of their organizations. As highly respected leaders, their actions can positively influence staff, patients, visitors, suppliers, and entire communities.

HEALTH CARE SHOULD CARE ABOUT PEOPLE AND THE PLANET.

REWARDS AND RISKS FOR ACTING NOW

REWARDS



- Leadership in your local community
- Positive staff culture and engagement
- Decisions made now will lock you into your future net-zero pathways (ie. new boilers, PPE contracts)
- Secure access to medical product supply chain with a focus on reusables
- Increase in infrastructure resilience

ABILITY TO MEET NEW STANDARDS



- New accreditation standards for leadership (2021) and governing bodies (2022)
- New carbon reduction regulations
- An imperative to adapt to climate change (now) and build resilience (for the future)

FISCAL RISKS

- Carbon tax: 600% increase expected this decade
- Climate inaction can demoralize staff, leading to decreased efficiency



HEALTH SYSTEM RISKS

- Needing to respond to a climate emergency in:
 - Operational services
 - Health services

ACTION ITEMS



LEADERSHIP

- ☐ Appoint a departmental lead and committee for sustainability
- ☐ Create a sustainability strategy for the department such as forming Green Teams
- ☐ Include sustainability in hospital and departmental goals and accreditation standards
- ☐ Engage with the hospital sustainability activities

This section contains some of the action items that have the greatest impact in reducing the hospital's carbon footprint. This list also includes the expected cost to help choose between items. Some of these items will be a real challenge!



PROFESSIONAL EDUCATION

PROFESSIONAL TRAINING AND DEVELOPMENT

- ☐ Incorporate planetary health into radiation medicine training and Continuing Medical Education events
- ☐ Support the professional development of staff, faculty and learners in planetary health science and empower/facilitate action
- ☐ Provide virtual options for attendance at educational events
- ☐ Advocate for sustainable practices at educational events e.g. sustainable food, hybrid options, no paper communications
- ☐ Use principles of Choosing Wisely Canada Program which was developed to educate clinicians on minimizing unnecessary investigations

• [HTTPS://CHOOSINGWISELYCANADA.ORG/RECOMMENDATION/ONCOLOGY/](https://choosingwiselycanada.org/recommendation/oncology/)

CAPITAL COST

- Savings / No cost
- \$ Small cost
- \$\$ Medium cost
- \$\$\$ Large cost



TRANSPORTATION

- ☐ Minimize patient travel - see *Radiation dose fractionation and process below*
- ☐ Minimize healthcare provider travel e.g. by offering virtual clinic days from home, virtual options for meetings, staff administrative days from home
- ☐ Facility has a secure area to store bikes, showers, lockers or other accommodations that encourage bike riding
- ☐ 10% parking spaces at the facility are dedicated to carpooling or EV charging
Car travel by staff, patients and visitors is a significant contributor to GHG emissions within health care. Encouraging carpooling can decrease environmental impact.
- ☐ Incentivize public transport e.g. offer subsidized bus or train passes for patients and staff

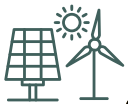


SUPPLY CHAIN

- ☐ **Procurement contracts contain weighting for sustainability of 10% or more**

The supply chain represents over 60% of health care's carbon footprint. Hospitals work with procurement organizations that award contracts to suppliers using a scoring system. If 'sustainability' is part of the scoring, suppliers are motivated to develop sustainable products, compatible with a circular economy.

- ☐ **Choose products with minimal/recyclable/compostable packaging, avoid single use items where possible**



BUILDINGS AND ENERGY

- ☐ **Periodic energy audit of the radiation department and follow through with advice given**

An energy audit reduces carbon footprint by finding problem areas in your building that are wasting energy. Reducing energy consumption will also save money on your energy bill.

- ☐ **Support transition to renewable energy sources**



FOOD ●

- ☐ **Plant-based food options for patients, visitors and staff are offered as the preferred choice**

Plant-based nutrition can reduce GHGs and other environmental impacts and are in line with recommendations from the Canada Food Guide and clinical guidelines to manage chronic disease.

- ☐ **Serve plant-based food in medical meetings and conferences**

- ☐ **Hospital uses a composter for food waste**

Composting decreases the amount of GHGs released by food waste



DRUGS AND DEVICES AND WASTE ●

- ☐ **Pharmacy has a sustainable prescribing strategy:**

Practice sustainable prescribing principles: the manufacturing, distribution and disposal of pharmaceuticals are a major source of GHG emissions. Consider the ecologic impact of all medications, prescribe conservatively (fewest number of medications, fewest number of tablets), deprescribe unnecessary medications, avoid single use materials in administration when possible.

- ☐ **Facility uses reusable gowns and linens**

Reusable gowns and linens are as safe as single-use items. Where reusable PPE infrastructure is available there can be significant cost savings.

- ☐ **Eliminate use of examination table paper**

- ☐ **Perform waste audits in departments and clinical pathways**



RADIATION MEDICINE

Cost is not included in this section due to lack of literature in this area and variation across centres. This will be updated as we move forward.



EQUIPMENT AND TECHNOLOGY

- ☐ Encourage sustainable procurement discussions
- ☐ Reduce waste of contrast and single use plastic by switching to multi-dose contrast system. Contrast can be recycled.
- ☐ Review energy consumption and machine use; use stand by mode (Linac and CT/MRI simulator) 'idle time' when not in patient use and optimize use during machine on time to maximise efficiency
- ☐ SF6 gas - track and reduce usage and ensure safe disposal
- ☐ Review data storage for LINACs/Radiation plans
- ☐ Review circular economy practices - e.g. tungsten is recyclable
- ☐ Use reusable or recyclable immobilisation devices



RADIATION DOSE FRACTIONATION AND PROCESS

- ☐ **Consider hypofractionation when appropriate and does not compromise patient outcomes**
E.g. 26Gy in 5 fractions for adjuvant breast cancer treatment, 25Gy in 5 fractions for neoadjuvant radiation for rectal cancer, 8Gy in one fraction for uncomplicated bone metastases, hypofractionation for prostate cancer treatments.
- ☐ **Consider same day consult, radiation simulation and treatment**
Treatment related travel is the most significant contributor to radiation treatment related GHGs.



BRACHYTHERAPY

- ☐ **Sustainable operating room (OR) practices**
 - Evaluate and reduce OR energy
 - Restrict the use of desflurane which has a global warming potential 2500 times that of CO2
 - Eliminate non-hazardous waste in biohazard bins to decrease unnecessary incineration, emissions and disposal costs
 - Ensure OR ventilation systems are set-back after-hours to decrease energy consumption
 - Reduce surgical waste (do not use single use where not needed).
- ☐ **Evaluate and reduce energy associated with treatment delivery where possible**
- ☐ **Evaluate brachytherapy sources impact e.g. processing of unused sources, source packaging**



NATURE-BASED SOLUTIONS



The facility has 25% green cover including green roof, food gardens, tree canopy, pollinator gardens and natural grass (except lawns)

Plants absorb CO₂ and reduce heat island effect. They provide beauty and evidence suggests plants lead to improved patient outcomes.



PATIENT CARE AND EDUCATION



Encourage Lifestyle Medicine interventions to improve cancer outcomes, reduce cardiometabolic sequelae of treatment and reduce concomitant chronic disease burden which will reduce climate impact by reducing need for healthcare.

- Encourage physical activity
- Promote whole-food, plant-predominant nutrition
- Promote measures for stress management, social connection, restorative sleep, avoidance of risky behaviours (e.g. tobacco, alcohol, screen time)
- Undertake Nature prescribing. Clinicians can register with Parks Canada and provide patient prescriptions for Canadian parks
- Engage and educate patients on the science and health related impacts of climate change
- Provide public educational material on carbon footprint of cancer care.



PERSONAL CHOICES



Choose plant-based meals

This is the single most impactful action that an individual can take to limit environmental destruction including GHG emissions, land use change, loss of biodiversity, species extinction, water and air pollution.



Reduce number of purchased consumer goods, consider second hand items, repair products when possible, ensure proper disposal at end of use



Divest from industries that contribute most to environmental destruction for banking and investments including fossil fuels, animal agriculture



Choose virtual options for conferences and meetings



When travel is required consider the lowest carbon option



Choose active transportation (cycling, walking) or public transport if an option



Perform energy assessment on home to improve efficiency, and transition to renewable energy sources



Advocacy

Educate yourselves by joining mailing lists of climate change advocacy committees and organizations, and participate/volunteer as per your capacity. Connect with policy makers at all levels to raise your concerns

NEXT STEPS

WHEN CONSIDERING THE ACTION ITEMS IN THIS GUIDEBOOK, THINK ABOUT:

What does our organization need in order to address this action item?

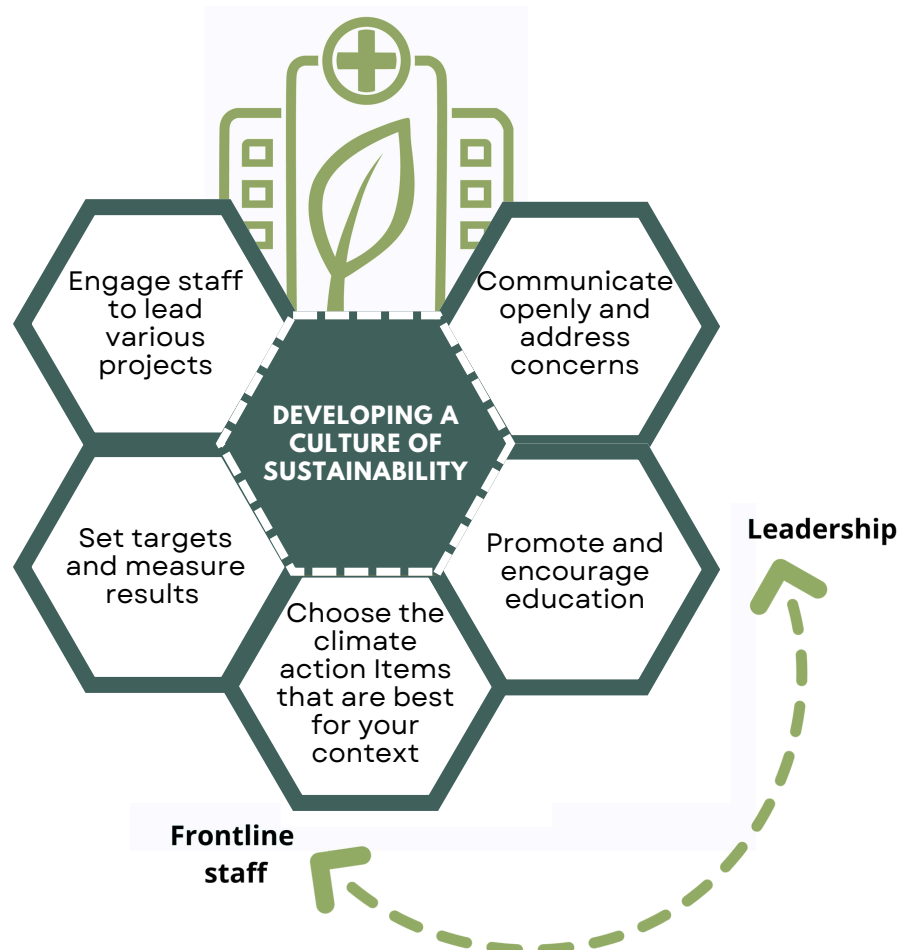
Who do we need to work with both inside our organization and outside to make it happen?

What impact can we expect to have on patients, staff, our community and our bottom line?

How can we encourage learning, creativity and innovation?

HOW CAN WE DEVELOP A CULTURE OF SUSTAINABILITY?

In addition to creating a strategy and leadership roles, an organization needs to develop a culture of environmental stewardship in order to get to net zero in all aspects of their operation. This may take years. Engagement of frontline staff and leaders through education, peer support and communication can be a call to action in the short term. Setting the tone by adopting a net-zero strategy to work towards, establishing targets, measuring results, and engaging staff to lead projects can affirm that environmental stewardship really matters. Shifting and sustaining this kind of change must be iterative (ongoing) and bi-directional (top-down and bottom-up).



GLOSSARY

ACCREDITATION STANDARDS

Accreditation Canada surveys hospitals to rate them on the extent to which they meet national standards for quality and hospital operations. New Standards regarding environmental stewardship were adopted for leadership in 2021 and for governing bodies in 2022.

CIRCULAR ECONOMY

A systematic approach to economic development designed to benefit business, society and the environment. It moves beyond recycling to keeping products in use, eliminating waste streams and regenerating natural systems.

DIVESTING FUNDS

By moving money from standard portfolios to low-carbon portfolios, significant greenhouse gases are saved.

GREENHOUSE GAS (GHG) EMISSIONS

GHGs are made up of carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and fluorinated greenhouse gases (F-GHGs).

HVAC SYSTEMS

Heating, Ventilation and Air Conditioning (HVAC) systems that generate most of hospitals' GHG emissions.

LIFE CYCLE ASSESSMENT (LCA)

A tool to assess potential environmental impacts throughout a product's life cycle, i.e., from natural resource acquisition, via production and use stage to waste management (including disposal and recycling)

NATURE-BASED SOLUTIONS

Implementing sustainable designs and natural features into the built environment to promote adaptation and resilience. These solutions would include natural grasses, pollinator gardens, rain gardens, trees and green roofs.

NET-ZERO

Achieving a balance between the greenhouse gas emissions put into the atmosphere and those taken out. CO₂ emissions make up over 80% of GHGs and can be broken down into Scope 1 direct emissions (i.e. heating and cooling), Scope 2 indirect emissions (i.e. purchased from utilities), and Scope 3 emissions generated from the operations of the company (i.e. supply chain, travel). In order to prevent the worst climate damages, global net human-caused emissions of carbon dioxide (CO₂) need to fall by about 45 percent from 2010 levels by 2030, reaching net-zero around 2050.

SUSTAINABLE PRESCRIBING

This involves optimizing medications for patients, typically resulting in less medications prescribed. Also, in some cases, prescribers can switch from one medication to another one which produces less GHGs. For example, switching MDI inhalers to low carbon alternatives.

SUSTAINABLE PROCUREMENT

Building environmental sustainability factors into the rating system for the acquisition through purchase or lease of real property, goods or other products, works or services.

ORGANIZATIONS WITH KEY RESOURCES

LEADERSHIP

- **Leadership strategy:** [Organizational Readiness Playbook](#)
- **Divesting from fossil fuels, investing in green energy:** [shiftaction.ca](#)
- **Elements of a green facility:** [PEACH Health Ontario](#)
- **Canadian Medical Association:** [Environmentally sustainable health systems in Canada Policy](#)
- **Canadians Association for Physicians for the Environment:** <https://cape.ca>

EDUCATION

- **Choosing Wisely Canada:** [Using Labs and Blood Wisely](#)
- **Calculating your footprint:** <https://healthclimateaction.org/checkup>
- **Radiotherapy and the Climate Crisis:** <https://www.astro.org/Workshops/Climate-Change-Webinar>
- **ASTRO Climate Change Statement:** <https://www.astro.org/provider-resources/climate-change-statement>
- **Patient education:** <https://medsocietiesforclimatehealth.org/advocacy-resources/patients/>

SUPPLY CHAIN

- **Procurement contracts:** <https://sustainabilityadvantage.com/sp/toolkit/>
- **Reusable gowns:** <https://journals.sagepub.com/doi/full/10.1177/01410768211001583>
- **Reusable items & OR pick lists:** <https://sustainablehealthcare.org.uk/activity/green-surgery-challenge-2021/>
- **Circular economy for medical PPE:** <https://greenhealthcare.ca/ppe-msup/>
- **PVC recycling:** <https://www.vinylinstituteofcanada.com/medical-pvc-recycling-pilot-program-pvc-123/>
- **Reusable sharps container:** <https://bcgreencare.ca/reusable-sharps-container-implementation-is-expanding-across-fraser-health/>
- **Examinable table paper roll:** <https://www.cfp.ca/content/66/10/748.long>
- **Low Carbon Sustainable Pharmacy:** <https://cascadescanada.ca/resources/climate-resilient-low-carbon-sustainable-pharmacy-playbook>

NATURAL SYSTEMS

- **Green Design for Climate Resilience and Well-Being:** <https://bcgreencare.ca/wp-content/uploads/2021/10/Green-Design-for-Climate-Resilience-and-Well-being.pdf>

BUILDINGS AND ENERGY

- **New buildings:** <https://cagbc.org>
- **Energy manager, heating systems, and LED lights:** <https://practicegreenhealth.org/topics/energy/energy>
- **Preparing Canada's Health Care Buildings for Net-Zero:** <https://greenhealthcare.ca/net-zero-ready/>

FOOD

- **Sustainable Health Care Food System:** <https://peach.healthsci.mcmaster.ca/wp-content/uploads/2024/10/sustainable-health-care-food-system-business-case-implementation-guide.pdf>
- **Plant forward diets:** <https://nourishleadership.ca/programs/planetary-health/>
- **Patient Recipe Book:** <https://www.pcrm.org/healthy-hospital-program/resources>
- **Plant Based Treaty:** <https://plantbasedtreaty.org/>
- **Healthy and Sustainable Food:** <https://greenhealthcare.ca/healthy-and-sustainable-food/>
- **Sustainable Meetings and Events:** <https://sustainable.harvard.edu/resources/meetings-and-events/>
- **Plant Based Canada:** www.plantbasedcanada.org
- **Greener by Default:** <https://www.greenerbydefault.com/>
- **Forward Food Canada:** <https://www.forwardfood.org/canada/>
- **Plant Based Data:** <https://plantbaseddata.org/>

TRANSPORT

- **Zero Emission Vehicles:** <https://chasecanada.org/wp-content/uploads/2021/03/ZEV-BACKGROUND-ENG.pdf>
- **Battery-Powered Micro-Mobility:** <https://greenhealthcare.ca/micro-mobility/>

MORE GREEN ORGANIZATIONS

- **Synergie Santé Environnement:** <https://synergiesanteenvironnement.org>
- **Nordic Center for Sustainable Health Care:** <https://nordicshc.org/>
- **Planetary Health Alliance** <https://www.planetaryhealthalliance.org/>
- **Project Drawdown:** <https://drawdown.org/>
- **GreenHealth Lab:** <https://greenhealth.ucsf.edu/>
- **Stockholm Resilience Centre:** <https://www.stockholmresilience.org/>
- **Healthcare Without Harm:** <https://noharm.org>

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THIS IS A LIVING DOCUMENT WHICH WILL BE REVISED AS THIS FIELD EVOLVES. WE WELCOME COMMENTS AND SUGGESTIONS.

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