LEAN COMPLIANCE
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THE ENVIRONMENTAL GOLDEN THREAD

CONNECTING-THE-DOTS

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ZOOM ETIQUETTE

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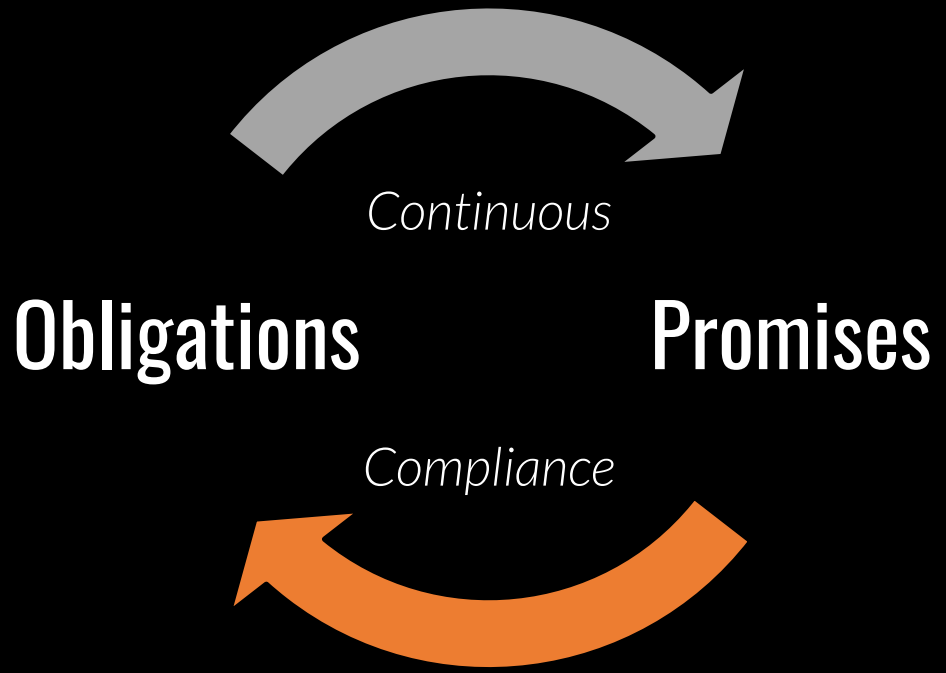


- *Raise your hand if you want to ask a question or type it in the chat window*



ABOUT US

LEAN COMPLIANCE helps you take a proactive and systems approach to compliance so you can stay ahead of risk and receive the benefits from always being in compliance.



WHY THIS WEBINAR?

What we are observing



1. *The number of initiatives directed towards environmental regulations, standards, and stakeholder obligations is increasing.*
2. *Existing management structures are struggling to steer and manage environmental objectives.*
3. *Many initiatives do not have a home and are handled partially, separately and often without co-ordination of effort or purpose.*
4. *Confidence that environmental outcomes will advance is low.*

The environmental mountain is getting bigger, and the landscape is more difficult to negotiate.

WHY THIS WEBINAR?

What we are observing



How do we climb this mountain?

WEBINAR OUTLINE



1. *The Compliance Landscape*
2. *Municipal Case Study*
3. *Survey of 25 Municipalities Across Ontario*
4. *Environmental Obligations Strategy*

WEBINAR OUTLINE



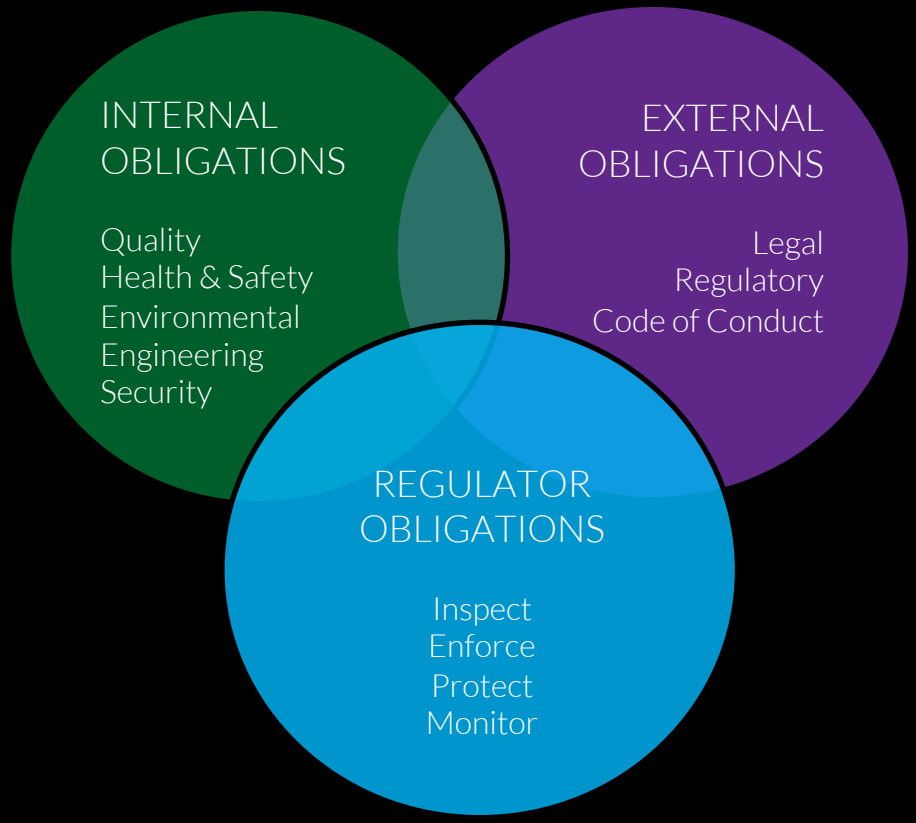
1. *The Compliance Landscape*
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THE COMPLANCE LANDSCAPE

What is the nature of environmental obligations?

Social License to Operate

Accept Stakeholder Responsibilities → Conformance to Standards



Regulatory License to Operate

Accept Public Responsibilities → Conformance to Requirements

Authority to Govern

Accept Government Responsibilities → Conformance to Acts

Increasing number of compliance obligations directly or indirectly touch environmental concerns

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THE COMPLANCE LANDSCAPE

What is the nature of environmental obligations?

REACTIVE / REDUCTIVE THINKING

RULES BASED → **AUDIT BASED**

WHAT SHOULD I DO? WHAT MUST I DO?

AUDIT / LAGGING ACTIONS

PROACTIVE / SYSTEMS THINKING

PERFORMANCE BASED → **RISK BASED**

HOW CAN I IMPROVE? HOW CAN I ENSURE OUTCOMES?

ANTICIPATE / LEADING ACTIONS

Environmental obligations are increasingly becoming performance and risk-based

THE COMPLANCE LANDSCAPE

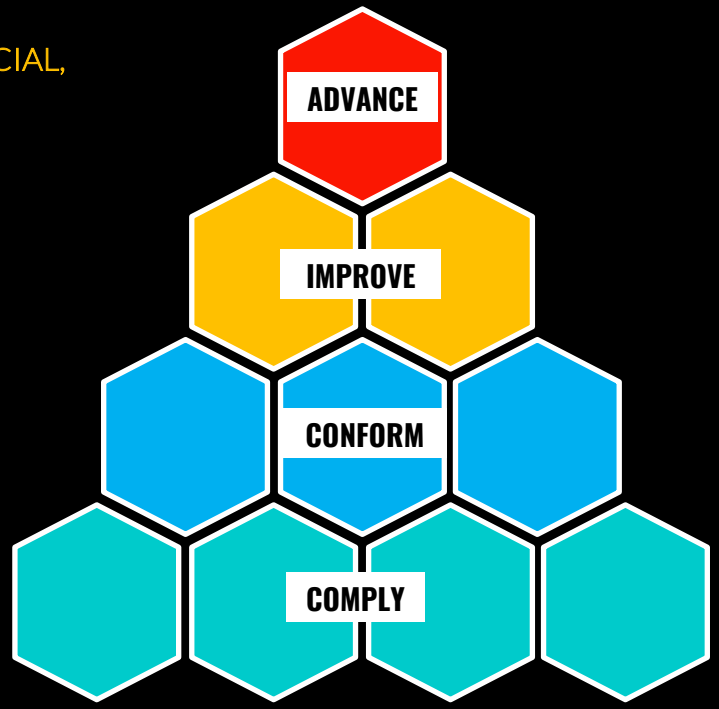
What is the nature of environmental obligations?

ENVIRONMENTAL, SOCIAL, GOVERNANCE (ESG)

VISION ZERO

INDUSTRY STANDARDS

REGULATIONS





Almost all municipal services contribute materially to environmental objectives.

Environmental obligations are a consideration at the top and the bottom, global and local, and everywhere in between.

THE COMPLANCE LANDSCAPE

What is the nature of environmental obligations?

Environment-First

WEBINAR OUTLINE

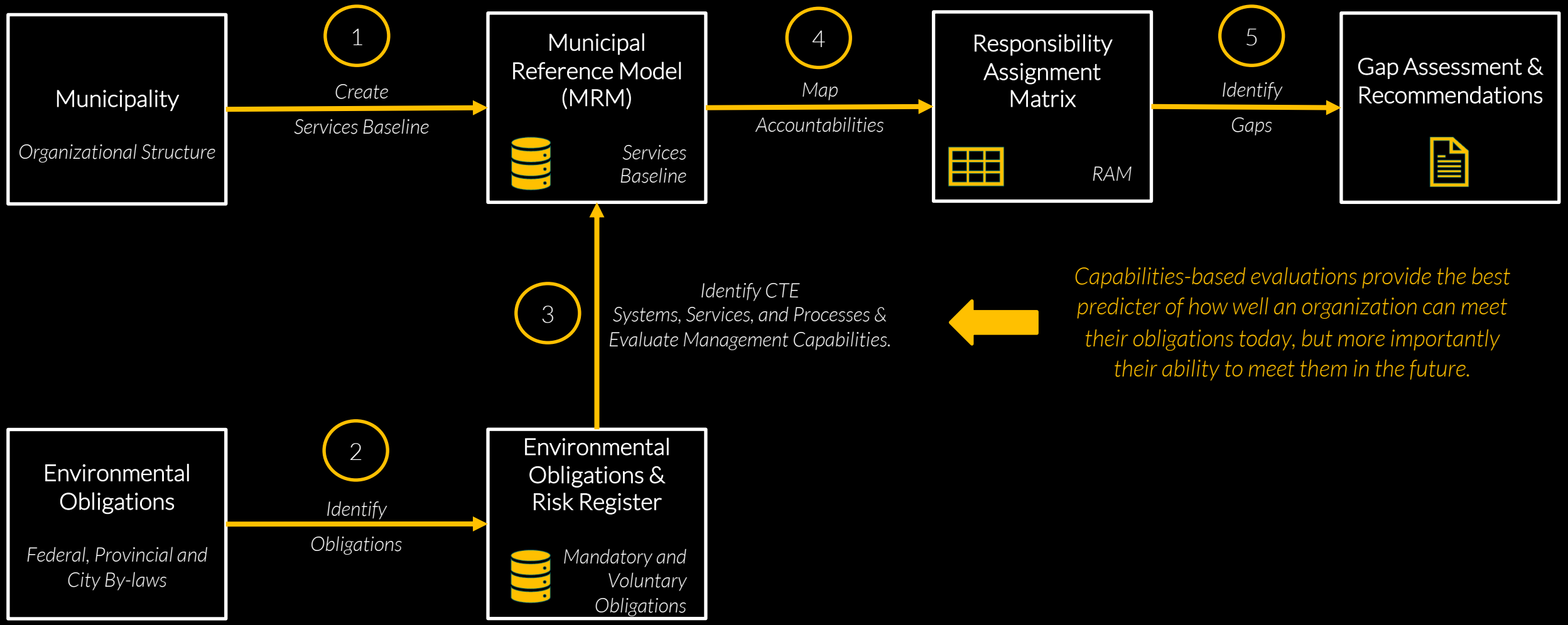


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MUNICIPAL CASE STUDY

How are environmental objectives supported?

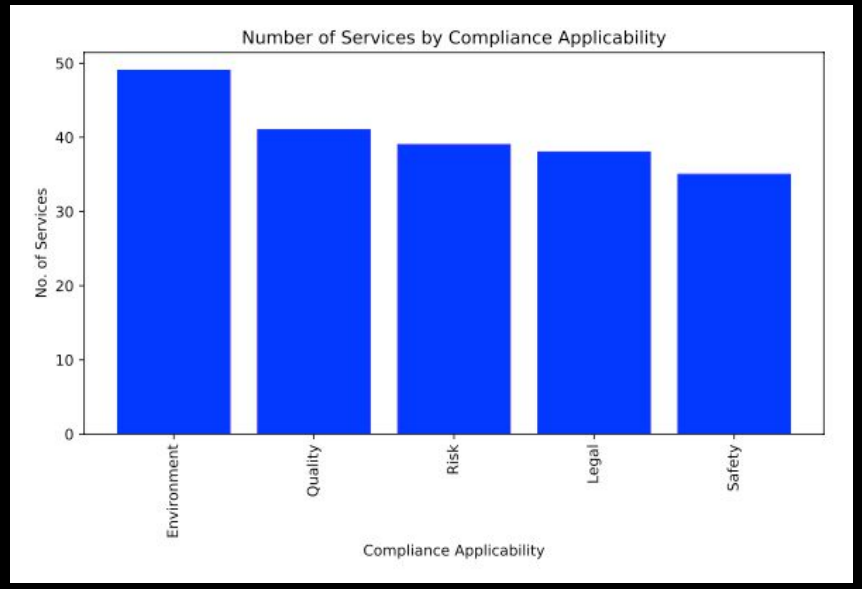


Capabilities-based evaluations provide the best predicter of how well an organization can meet their obligations today, but more importantly their ability to meet them in the future.

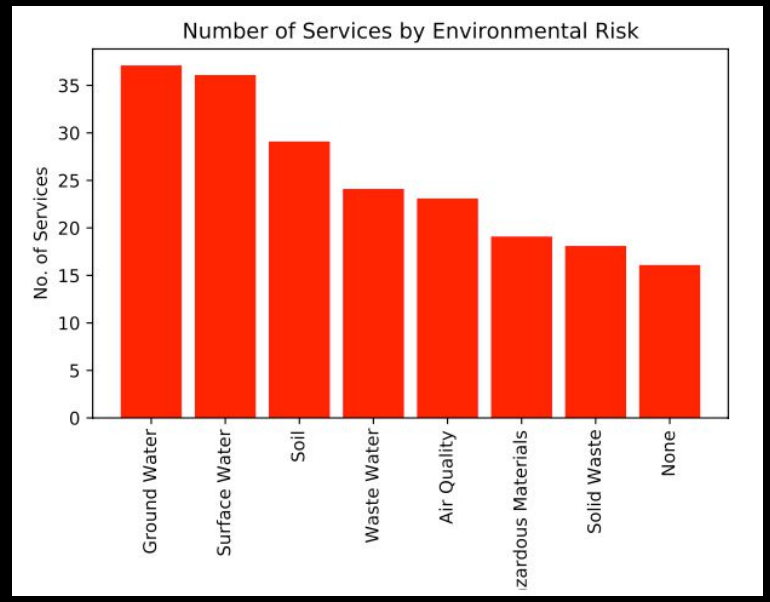
MUNICIPAL CASE STUDY

How are environmental objectives supported?

ENVIRONMENTAL OBLIGATIONS



ENVIRONMENTAL RISK



Majority of the 60+ municipal services are associated with environmental obligations and risk.

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MUNICIPAL CASE STUDY

How are environmental objectives supported?

135

5,000 obligations

OBLIGATION SOURCES



40%

OF SERVICES HAVE ROLE AS REGULATOR



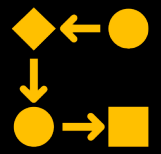
60%

OF SERVICES HAVE ROLE AS OWNER/OPERATOR



8%

OF SERVICES PRIMARY OBLIGATIONS ARE INTERNAL



Majority of services are focused on external obligations.
Internal obligations are mostly undocumented, under-represented, and under-serviced.

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MUNICIPAL CASE STUDY

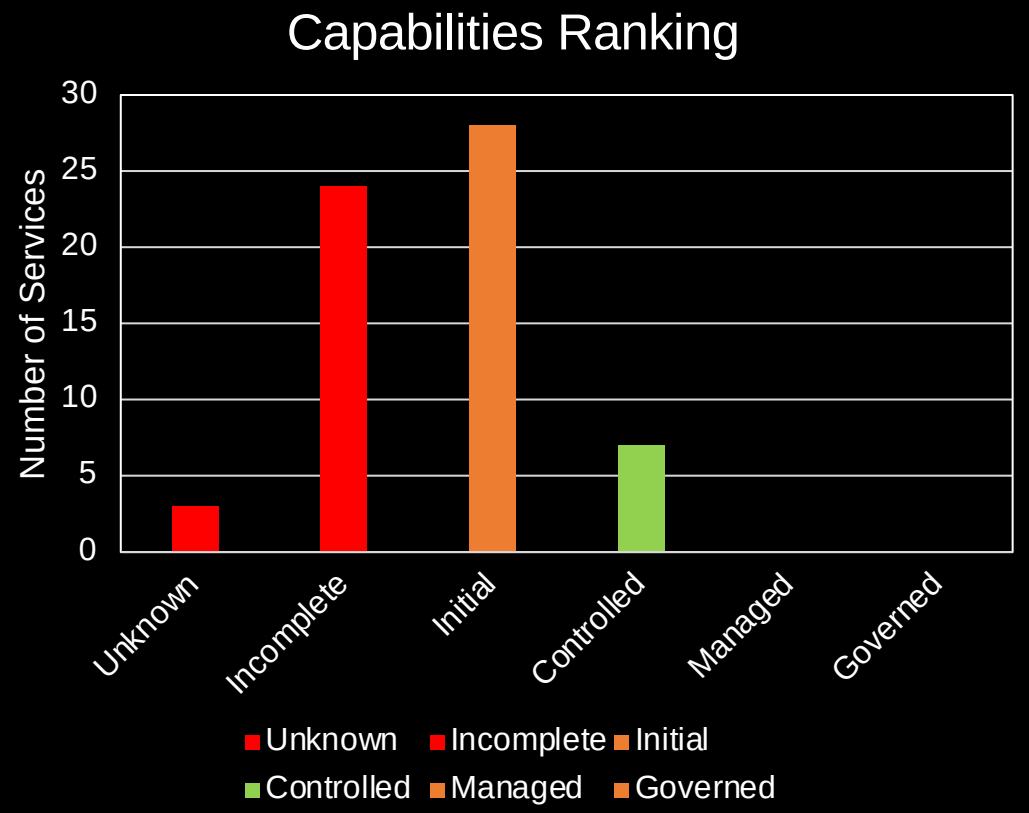
How are environmental objectives supported?

55%

OF SERVICES ARE CRITICAL TO ENVIRONMENT

10%

OF ALL SERVICES HAVE CONTROLLED PROCESSES



Greater than 50% of services are Critical to the Environment (CTE).

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MUNICIPAL CASE STUDY

How are environmental objectives supported?

RISK

93% of total obligations

92% of Services

59% Significant to Environment

10% Controlled Processes

< 50% Uncertain

External Obligations

Regulatory Compliance



MODERATE
level of uncertainty that all obligations will be met.

Circular Economy, Environmental Stewardship, Climate Adaption, Green Plan, etc.



Internal Obligations

7% of total Obligations

8% of Services

5% Significant to Environment

0% Controlled Processes

Mostly Uncertain

HIGH
level of uncertainty that all obligations will be met

RISK

External Obligations may or may not be met

Internal Obligations are unlikely to be met

WEBINAR OUTLINE



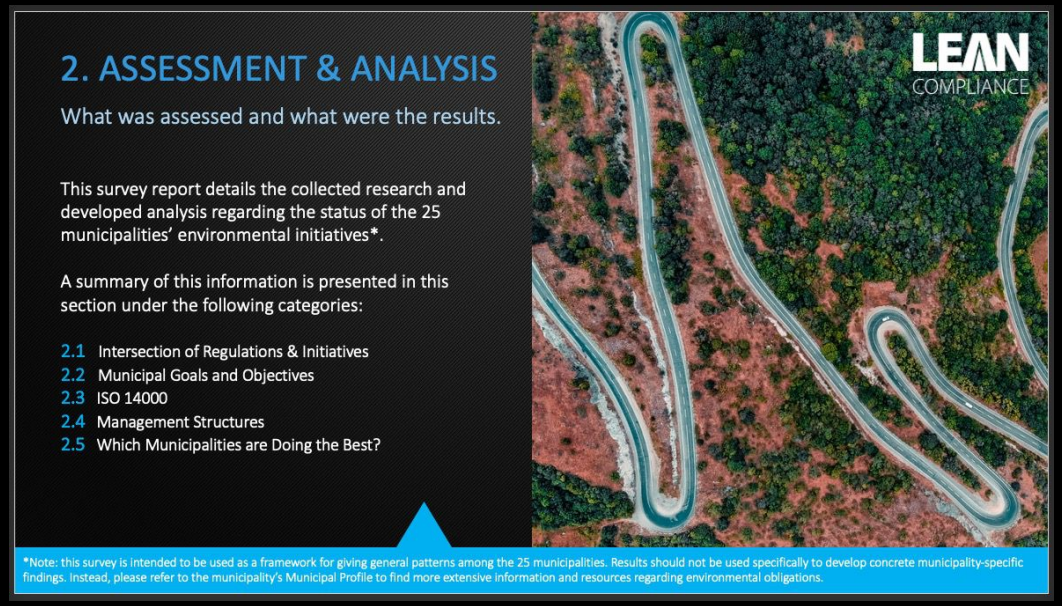
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SURVEY OF 25 MUNICIPALITIES ACROSS ONTARIO

How are environmental objectives supported?

SURVEY OBJECTIVES

1. *Intersection of Regulations & Initiatives*
2. *Identify Municipal Environmental Goals and Objectives*
3. *Determine if and how many are using an EMS (e.g., ISO 14000)*
4. *Identify management structures used to support environmental objectives*

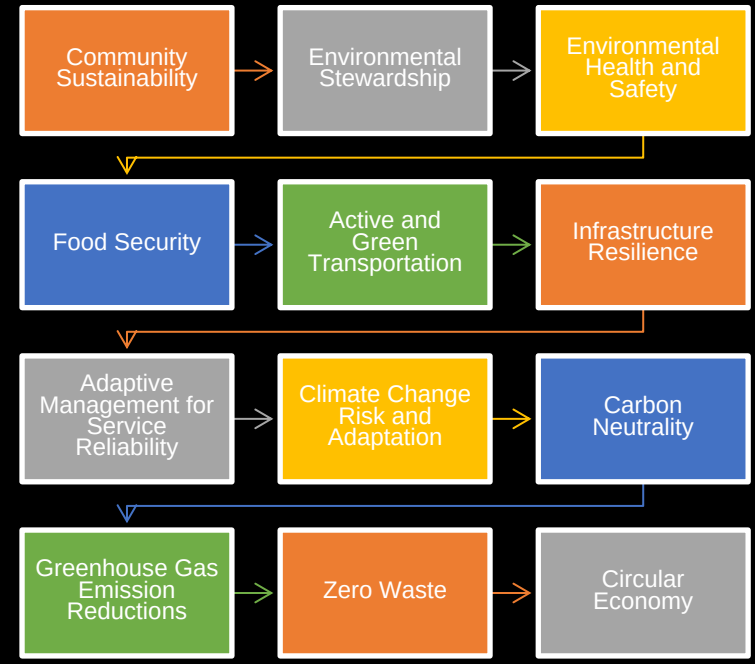


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SURVEY OF 25 MUNICIPALITIES ACROSS ONTARIO

How are environmental objectives supported?



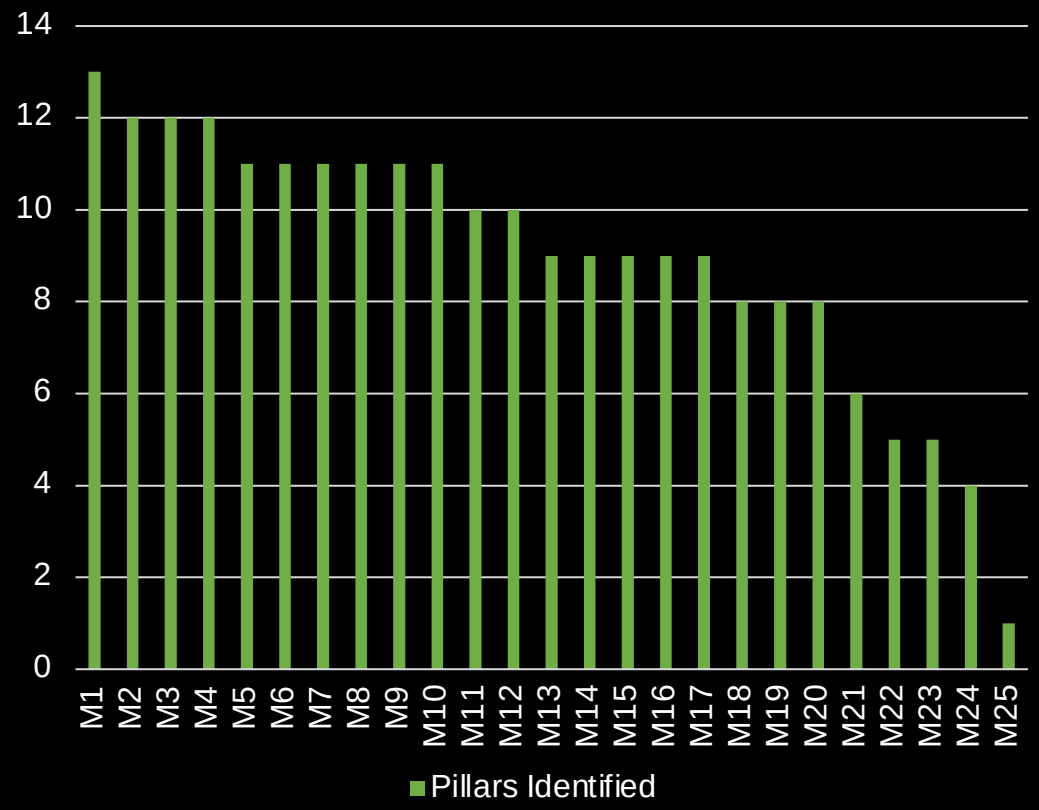


Environmental Action Plans can be grouped into these 12 pillars

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SURVEY OF 25 MUNICIPALITIES ACROSS ONTARIO

How are environmental objectives supported?



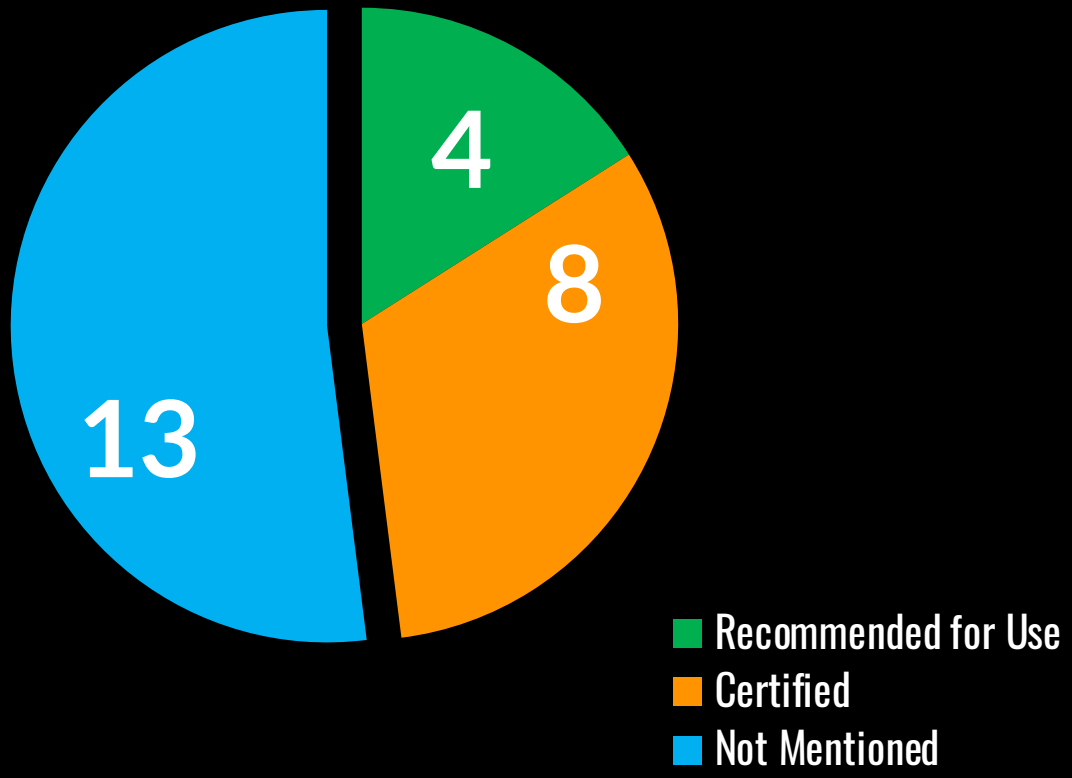
- *Municipalities have actions associated to one or more of environmental pillar.*
- *Most do not have defined outcomes, or measurable objectives.*
- *There is no reporting of progress.*

Actions exist for many of the pillars, but the work is planned separately, partially, and not operationalized.

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SURVEY OF 25 MUNICIPALITIES ACROSS ONTARIO

How are environmental objectives supported?



- *47% have or are pursuing ISO 14000 certification.*
- *Most do not use ISO 14000 to manage environmental initiatives.*

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SURVEY OF 25 MUNICIPALITIES ACROSS ONTARIO

How are environmental objectives supported?

84%

ENVIRONMENTAL RELATED COMMITTEES



60%

ENVIRONMENTAL ADVISORY COMMITTEES



36%

ACTIVE TRANSPORTATION ADVISORY COMMITTEE



14%

OTHER *



8%

CLIMATE CHANGE TASK FORCES



There is no single committee / department overseeing the scope of operational environmental objectives.

WEBINAR OUTLINE



1. *The Compliance Landscape*
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ENVIRONMENTAL OBLIGATION STRATEGY

How do we make progress up the mountain?

Challenges

1. *The number of initiatives directed towards environmental regulations, standards, and stakeholder obligations is increasing.*
2. *Existing management structures are struggling to steer and manage environmental objectives.*
3. *Many initiatives do not have a home and are handled partially, separately and often without co-ordination of effort or purpose.*
4. *Confidence that environmental outcomes will advance is low.*



Strategy

1. *The 12 Environmental Pillars*
2. *Environmental Steering Committee*
3. *Environmental Program*
4. *The Environmental Golden Thread*

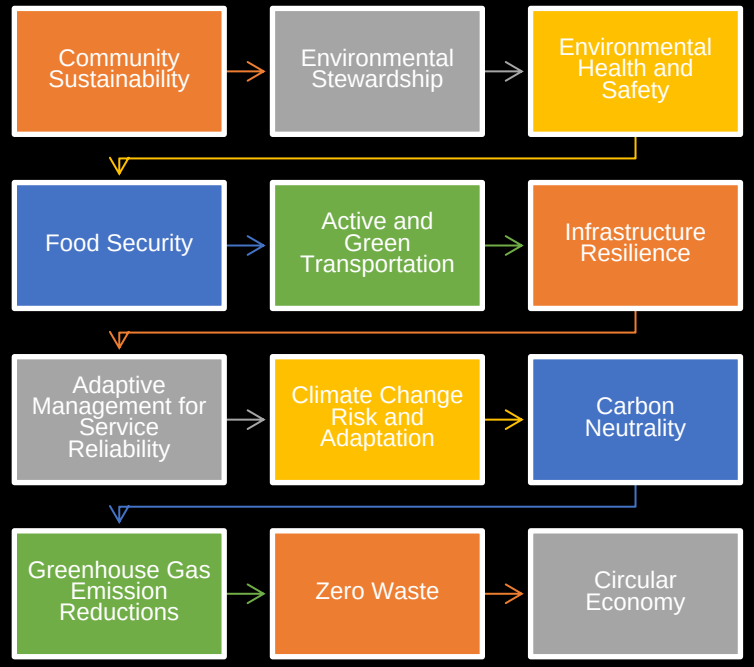
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ENVIRONMENTAL OBLIGATION STRATEGY

The 12 Environmental Pillars

PILLAR ALIGNMENT

- *Outcome*
- *Purpose and Goals*
- *Strategic Objectives*
- *Regulatory Influences*
- *Municipal Guidelines*
- *Connections*



Environmental pillars form the basis for operational environmental policy

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COMMUNITY SUSTAINABILITY





A sustainable community meets the needs of current generations without compromising the ability of future generations to meet their own needs through the simultaneous consideration of the community, environment, and economy.

ULTIMATE GOALS

Purpose

To meet the needs of the current community without compromising the ability of the future community to meet their own needs through simultaneously prioritizing the environment, community, and economy. To effectively manage tradeoffs so that current and future generations thrive.

End Target

Measure of sustainability (community, environment, and economic factors)

STRATEGIC OBJECTIVES

1. Support positive economic, social, and environmental links between urban, pre-urban, and rural areas through strengthening local and regional relationships for development planning.
2. Provide universal access to safe, inclusive and accessible green in public spaces- particularly focused on children, women, older persons, and persons with disabilities.
3. Reduce the adverse per capita environmental impact of cities, with special attention on air quality and waste management.
4. Reduce the risk of the community to be affected negatively by environmental disasters.
5. Promote sustainable natural resource management to ensure that the needs of the future community will be fulfilled, not just the current community demands.

REGULATORY INFLUENCES

- Federal Sustainable Development Act
- Impact Assessment Act
- Arctic Waters Pollution Prevention Act

MUNICIPAL GUIDANCE

- FCM's "Municipalities for Climate Innovation Program" allocating funding, training, and other resources to aid municipalities in building sustainable and reliable services in their communities while tackling climate change and its effects.
- 2021 update to Canada's Land Stewardship Centre's "Green Communities Guide".
- FCM Annual Sustainable Communities Conference.
- UN Environment Programme's "Goal 11: Sustainable cities and communities" detailing targets linked to the environment where actions can be taken to increase overall community sustainability.
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Thriving Community

Reinforced by: Circular Economy, Environmental Stewardship, Active and Green Transportation, Food Security

ENVIRONMENTAL STEWARDSHIP

2



The responsible use and protection of the natural environment through conservation and sustainable resource management to enhance ecosystem resilience and human well-being. This takes into account the interests of society, future generations, and other species, while acknowledging society's sole responsibility for these actions. For example, biodiversity conservation is the practice of protecting and preserving the wealth and variety of species, habitats, ecosystems, and genetic diversity on the planet.

ULTIMATE GOALS

Purpose

To use resources responsibly and protect the natural environment through conservation, restoration and sustainable resource management, simultaneously enhancing local ecosystem resilience and human well-being, while taking into account the interests of society, future generations, and other species.

End Target

Zero negative impacts to the environment from resource management, extraction, and use.

Achieve the proper trade-offs in balancing “the need of the present without compromising the ability of future generations to meet their own needs

STRATEGIC OBJECTIVES

1. Advance and prioritize nature-based solutions:
   a. Construct engineered wetlands for water treatment and stormwater control.
   b. Conserve existing natural spaces and redirect development to brownfield sites when possible
   c. Reduce runoff and increase greenspaces through bioinfiltration, green roofs and walls, bioswales, and rain gardens. Focus on stream daylighting, where possible.
   d. Prioritize floodplain protection and restoration through tools such as riparian setbacks.
   e. Implement community gardens and urban forests and trees.
   f. Develop wildlife corridors and linkages.
   g. Utilize biological weed control and targeted grazing techniques.
   h. Practice xeriscaping where landscaping uses native vegetation
2. Engage and consult with local indigenous communities to establish a reciprocal relationship in which they officiate projects given their insights into sustainable stewardship of the land since time immoral.

REGULATORY INFLUENCES

- Environmental Protection Act
- Environmental Bill of Rights
- Environmental Assessment Act
- Pesticides Act
- Environmental Violations Administrative Monetary Penalties Act
- Environmental Enforcement Act
- Federal Sustainable Development Act
- Arctic Waters Pollution Prevention Act
- Fisheries Act

MUNICIPAL GUIDANCE

- 2016 Engineers Canada's "National guideline on sustainable development and environmental stewardship for professional engineers".
- 2010 Centre for Environmental Stewardship and Conservation's "An Ecological Recovery Plan for Canada: Creating a Healthier Environment and Economy Through Effective Stewardship".
- PDF version of the "National guideline on sustainable development and environmental stewardship for professional engineers".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces : Community Sustainability
Reinforced by: Environmental Health and Safety, Active and Green Transportation

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ENVIRONMENTAL HEALTH & SAFETY

3



Corporate and Public Environmental Health & Safety (EH&S) relates to how the corporation prioritizes environmental and occupational health and safety practices. How the municipality may ensure the health and safety of the public and workers includes preventing undue environmental damage, reducing workplace and environmental risks, complying with applicable legislation, and following best practices.

ULTIMATE GOALS

Purpose

To ensure environmental health and safety at the corporate and residential levels through reducing harmful exposure risks in the land, water, and air by the development of a comprehensive Environmental, Health and Safety Management System.

End Target

Zero harm to workers, public and the property.

STRATEGIC OBJECTIVES

1. Review environmental, health and safety management systems to identify hazards and carry out their respective risk assessments.
2. Focus on areas pertaining to social development, prevention, risk intervention, and incident response.
3. Maintain a system for measuring performance and ensuring continuous improvement by setting, auditing, and reviewing environmental, health and safety objectives and targets.
4. Ensure that the management system language is clear and concise so that it can be read and understood by those who may be at risk.
5. Review environmental, health and safety management systems to identify hazards and carry out their respective risk assessments. Focus on areas pertaining to social development, prevention, risk intervention, and incident response.
6. Maintain a system for measuring performance and ensuring continuous improvement by setting, auditing, and reviewing environmental, health and safety objectives and targets.
7. Ensure that the management system language is clear and concise so that it can be read and understood by those who may be at risk.

REGULATORY INFLUENCES

- Air Pollution and Air Quality
- Environmental Assessment Act
- Safe Drinking Water Act
- Waste-Free Ontario Act
- Pesticides Act
- Occupational Health and Safety Act
- Federal Sustainable Development Act
- Canada's Clean Air and Climate Change Act
- The Canadian Regulator Act
- Canada's Regulatory Framework for Air Emissions
- Impact Assessment Act
- Canada Shipping Act
- Lake Simcoe Protection Act
- Minimum maintenance standard

MUNICIPAL GUIDANCE

- Ontario Ministry of the Solicitor General's "Community Safety and Well-being Planning Framework: A Shared Commitment in Ontario".
- 2006 Health and Safety Authority's "Workplace Safety and Health Management: Practical Guidelines on the Implementation and Maintenance of an Occupational Safety, Health and Welfare Management System".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Food Security, Environmental Stewardship, Active and Green Transportation

Reinforced by: Climate Change Risk and Adaptation

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FOOD SECURITY

4



The state of having reliable physical and economic access to a sufficient quantity of safe and nutritious food that meets one's dietary needs and food preferences for an active and healthy life. Beyond just considering household food insecurity (HFI), municipalities should consider regional food security as climate irregularity continues to drive decreased food security in communities worldwide; putting all aspects of food security at risk: the amount of food produced, access to food, resiliency to diseases, nutrient absorption, and food safety. A more localized food system creates a more resilient, climate adaptive, and sustainable community.

ULTIMATE GOALS

Purpose

To provide community food security through increasing food availability, access, utilization, and stability to ensure that individuals are food-secure at the household level and the community itself has a climate-resilient food system to support this goal in the long-term.

End Target

Zero food insecure households within community)

STRATEGIC OBJECTIVES

1. Recognize that food security is a social issue, and in response offer immediate hunger relief to community members, increase education and resources for agriculture, and improve the availability, access, utilization, and stability of the local food system.
2. Conduct a risk assessment of the peri-urban food system's resilience to climate-related shocks and stresses that identifies vulnerable components and stakeholders.
3. Reduce food's farm to table distance and "food print" by requiring shipping distance on food labels, promoting regional products, supporting farmers' markets, and preferential procurement of locally produced food.
4. Integrate urban food security and urban agriculture into climate change adaptation and disaster management strategies.
5. Maintain and manage agriculture projects as part of the urban and peri-urban green infrastructure. Provide financial support for increasing the existing tree canopy, community orchards and gardens, home gardens, and promoting composting and rainwater collection.
6. Identify open urban spaces prone to floods and landslides and protect or develop these as permanent agricultural and multifunctional areas.
7. Integrate urban agriculture and forestry into comprehensive city water(shed) management plans, including social housing and slum upgrading programs.
8. Develop a municipal urban agriculture and food security policy and program.

REGULATORY INFLUENCES

- Nutrient Management Act
- Federal Sustainable Development Act

MUNICIPAL GUIDANCE

- Municipal World's "Top 10 tools and strategies for building local food security" in Canada.
- BC Food Systems Network's "Working with Local Government on Food Policy: A toolkit for civil society".
- The Intergovernmental Panel on Climate Change (IPCC) "Special Report on Climate Change and Land: Ch 05 Food Security".
- C40 Cities informational webpage on food security, climate change, and cities.
- 2020 RUAF article on "Cities, climate change and the food system of the majority".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Active and Green Transportation
Reinforced by: Environmental Health and Safety

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ACTIVE & GREEN TRANSPORTATION

5



Active transportation describes all human-powered forms of travel where individuals use their own power to get from one place to another. This mainly refers to walking and cycling, but can also mean skating, jogging, skiing, canoeing, and more. Green transportation describes a low-carbon travelling mode, encompassing active transportation, while also expanding to public transit and vehicular options. This can refer to low-carbon motorized buses, trains, subways, carpooling, and electric vehicles. The focus of green transportation models is to not depend on fossil fuels and other diminishing natural resources, while simultaneously boosting community health and economy.

ULTIMATE GOALS

Purpose

To improve community health and safety through increased access to active and green transportation, simultaneously increasing greenspaces, promoting active lifestyles, stimulating the economy, reducing pollution, and cutting carbon emissions.

End Target

Zero transportation modes supported by fossil fuels.

Increase in opportunity for active transportation

STRATEGIC OBJECTIVES

1. Provide access to safe, affordable, accessible, and sustainable transport systems for all, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.
2. Improve access by diversifying transportation options, giving individuals more choices as to how they meet their access needs.
3. Concentrate urban growth, limit sprawl, and provide for more mixed land use through urban structure and land use policies reducing demand by moving origins and destinations closer together and reducing habitat destruction and loss of agricultural and recreational lands.
4. Give priority to less polluting, lower impact modes of transportation in the design of transportation systems and urban areas. Ensure that the rate of use of renewable resources does not exceed rates of regeneration, and non-renewable resource use is minimized. Pedestrian and cycling paths should be provided as attractive and safe alternatives to cars.
5. Make transportation-related decisions in an open and inclusive process. Inform the public about transportation options and impacts and encourage them to participate in decision making so that the needs of different communities (i.e., rural vs. urban; cyclists vs. drivers, etc.) can be understood and accounted for.
6. Protect historical sites and archaeological resources, reduce noise pollution, and consider aesthetics in the planning, design, and construction of transportation systems.

REGULATORY INFLUENCES

- Federal Sustainable Development Technology Act

MUNICIPAL GUIDANCE

- FCM's webpage where resources can be found pertaining to sustainable transportation.
- 1996 OCED International Conference's "Guiding Principles for Sustainable Transportation" listing 8 principles along with strategic directions for sustainable transportation.
- Canada's Active Transportation Fund "intended to support projects that improve active transportation infrastructure across Canada".
- 2019 The Centre for Active Transportation's "Improving Active Transportation and Public Transit Integration: A Guidebook for Policy and Planning".
- Municipal by-laws, policies and plans

CONNECTIONS

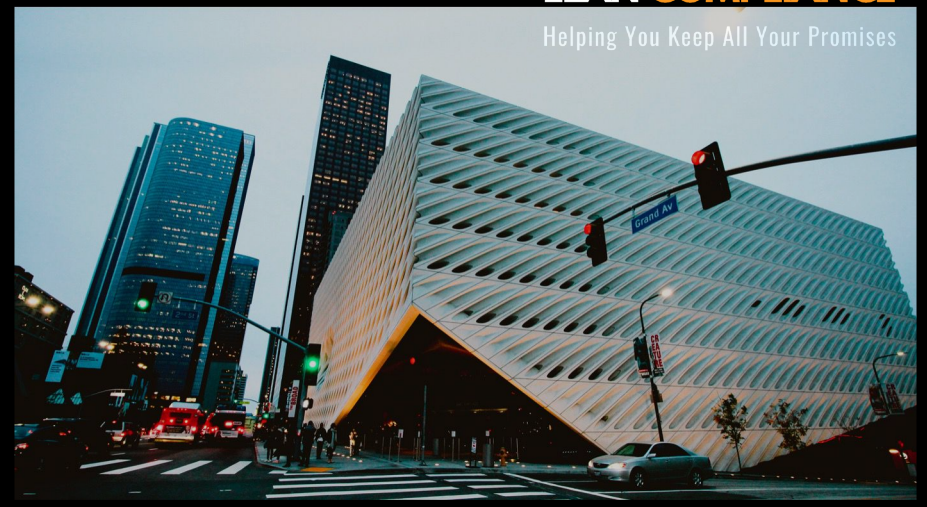
Reinforces: Food Security, Environmental Stewardship
Reinforced by: Environmental Health and Safety, Food Security

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INFRASTRUCTURE RESILIENCE

6



The ability to reduce the magnitude and duration of disruptive events to infrastructure related services. The effectiveness of this depends on the ability to anticipate, adapt, and recover from a given disruptive event. This strategy is the most flexible and cost-effective strategy to maintain the integrity of the infrastructure to minimize service impacts.

ULTIMATE GOALS

Purpose

To develop new and retrofit existing infrastructure to be planned, designed, built and operated in a way that anticipates, prepares for, and adapts to changing climate conditions.

End Target

Zero recovery time from environmental-related disruptions.

STRATEGIC OBJECTIVES

1. Performance of infrastructure project and policy appraisals, such as Strategic Environmental Assessments and Environmental Impact Assessments.
2. Development of spatial planning frameworks, like vulnerability maps, to improve management of climate risks, reduce vulnerability of existing infrastructure, and prevent the construction of new infrastructure in high-risk areas.
3. Upgrade the most critical infrastructure first, that has the greatest impact on reliability, accessibility and the economy.

REGULATORY INFLUENCES

- Federal Sustainable Development Act
- Pan-Canadian Framework on Clean Growth and Climate Change

MUNICIPAL GUIDANCE

- 2021 International Institute for Sustainable Development report on "Advancing the Climate Resilience of Canadian Infrastructure".
- Federation of Canadian Municipalities Municipal Asset Management Program.
- FCM's "Guide for Integrating Climate Change Considerations into Municipal Asset Management".
- Public Infrastructure Engineering Vulnerability Committee's (PIEVC) "PIEVC Engineering Protocol".
- 2020 Quest's "Community Resilience Mini-Guide".
- Engineers Canada "Preparing for the Impact of Climate Change: The Importance of Improving Infrastructure Climate Resiliency - The Engineering Perspective".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Climate Change Risk and Adaptation
Reinforced by: Adaptive Management for Service Reliability

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ADAPTIVE MANAGEMENT FOR SERVICE RELIABILITY

7



Improve the certainty that municipal services and their underlying systems will perform their intended function adequately for a specified period of time, or will operate in a defined environment, without unexpected failures. Climate-resilient services include adaptive management to account for future uncertainties caused by environmental change while moderating risks and exploiting beneficial opportunities.

ULTIMATE GOALS

Purpose

To ensure that services are resilient to changes to the environment to reduce direct losses and reduce the indirect costs of disruptions through iterative and cyclical adaptive management processes. Ensure that these services can also withstand, respond to, and rapidly recover from disruptions caused by such conditions

End Target

Zero disruptions from environmental-related impacts

STRATEGIC OBJECTIVES

1. Development of adaptive management tools that rely on the continuous monitoring and reassessment of programming and implementation of a design.
2. Inclusion of these adaptive management tools to account for uncertainty in the future (i.e., climate model projections and socioeconomic changes).
3. Linkage of climate change and disaster risk management into a co-management system, where adapting to climate change actively addresses disaster risk and vice versa.
4. Utilization of spatial planning frameworks to redirect development away from high-risk areas. These frameworks can also be used to visualize which infrastructure are at high risk and can be retrofitted.

REGULATORY INFLUENCES

- This pillar is a best practice approach that supports all the environmental pillars as they are all connected and operate together cyclically.

MUNICIPAL GUIDANCE

- 2019 WSP article outlining five steps for how adaptive strategies can be developed to prepare for climate threats.
- 2018 Institute for Catastrophic Loss Reduction paper "The governance of climate change adaptation in Canada" discussing 5 cyclical stages of climate change adaptation.
- 2010 Government of Canada's paper on "Adapting to Climate Change: An Introduction for Canadian Municipalities".
- 2011 Natural Resources Canada's guidebook on "Climate Change Adaptation Planning: A Handbook for Small Canadian Communities".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Infrastructure Resilience
Reinforced by: Climate Change Risk and Adaptation

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CLIMATE CHANGE RISK AND ADAPTATION

8



Climate change adaptation refers to adjustments in ecological, social, or economic systems in response to climate change risks and their associated impacts. Climate change risk can be modelled through risk assessments considering the consequences, likelihoods, and responses to the impacts of climate change. These assessments also give options for addressing these factors under societal constraints, such as conflicting preferences or values.

ULTIMATE GOALS

Purpose

To take proactive action in adapting to climate change that reduces the risks associated with its negative impacts, while taking advantage of potential new opportunities through comprehensive risk assessments and adaptive management.

End Target

Reduce climate-change risk to below acceptable thresholds (ALARP).

STRATEGIC OBJECTIVES

1. Identification of climate change hazards and their impacts through the analysis of how the local climate will change.
2. Assessment of risk exposure and vulnerability.
3. Consideration and deliberation of adaptation options.
4. Implementation of structural (e.g. using permeable pavements to reduce rainfall run-off and flooding) and management (e.g. enhanced monitoring or flexibility in design) adaptation measures.
5. Implementation of ecosystem-based approaches, including natural infrastructure, as a complement or substitute for traditional built infrastructure, which yields co-benefits.
6. Monitoring and assessment of the implemented options.

REGULATORY INFLUENCES

- Canada Foundation for Sustainable Development Technology Act
- Federal Sustainable Development Act
- Pan-Canadian Framework on Clean Growth and Climate Change

MUNICIPAL GUIDANCE

- 2010 "Adapting to Climate Change: A Risk-based Guide for Local Governments, Volume 1".
- 2021 Canadian Council of Ministers of the Environment "Good Practices in Climate Change Risk Assessment: A Summary" with link to the full document within it.
- 2019 "Global Climate Risk Index: Who Suffers Most From Extreme Weather Events? Weather-related Loss Events in 2017 and 1998 to 2017".
- Local Governments for Sustainability (ICLEI) "Guide and Workbook for Municipal Climate Adaptation".
- ICLEI "Workbook for Municipal Climate Adaptation".
- 2010 Manual for "Climate Change Adaptation Framework".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Carbon Neutrality, Environmental Health and Safety
Reinforced by: Infrastructure Resilience

CARBON NEUTRALITY





Synonymous for net zero carbon emissions, this means successfully having a balance between emitting and removing carbon from the atmosphere. Carbon neutrality is defined as for every ton of anthropogenic carbon dioxide emitted; an equivalent amount of carbon dioxide is removed via offsets such as carbon sequestration.

ULTIMATE GOALS

Purpose

To achieve annual zero net anthropogenic CO2 emissions by a specified date through emission reductions and offsets for the mitigation of climate change.

End Target

Carbon neutrality by 2050.

STRATEGIC OBJECTIVES

1. Expand decarbonized electrification: low-emitting electricity captures a larger share of total energy use and provides low-cost fuel-switching for some fossil fuel-based end uses (hydro, wind, solar, nuclear, CCUS, and energy storage).
2. Ensure the timing of electrification expansion aligns with the supply of zero carbon electricity.
3. Increase energy efficiency: expand energy savings trends in buildings, transportation, and industry.
4. Implement zero emission transport fuels: electric batteries, non-food crop biofuels, and hydrogen power.
5. Decarbonize industrial processes. Policy making and business collaboration ensures a stable investment path.
6. Enhance land sinks for carbon sequestration through ecological engineering practices.
7. Commit to innovation through deploying pilot and demonstration projects as many carbon neutral technologies are in early stages of development.
8. Structural economic change.
9. Indigenous participation: a transition to carbon neutrality necessitates involvement from indigenous communities and requires the empowerment and participation of local communities on their own terms.
10. Social change: behaviour and consumption pattern adaptation facilitated through education.

REGULATORY INFLUENCES

- Canadian Net-Zero Emissions Accountability Act

MUNICIPAL GUIDANCE

- 2009 "Getting to Carbon Neutral: A Guide for Canadian Municipalities"
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Greenhouse Gas Emission Reductions
Reinforced by: Climate Change Risk and Adaptation

GREENHOUSE GAS EMISSION REDUCTIONS

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The reduction of all greenhouse gas (GHG) emissions, not just carbon, focuses on also reducing emissions for methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, nitrogen trifluoride, and ozone gases. It is important to set reduction targets for these other greenhouse gases as many have much higher global warming potentials (GWPs) than carbon dioxide.

ULTIMATE GOALS

Purpose

To reduce the rate and magnitude of climate change and its related impacts through mitigation efforts focused on the reduction of greenhouse gas emissions.

End Target

Net zero GHG emissions by 2050

STRATEGIC OBJECTIVES

1. Energy-sector emissions:
   a. Reduce transportation sector emissions through implementation of active and green transportation, more efficient transportation engineering designs, electric and other low-carbon vehicle options, and education for improved consumer behaviour.
   b. Reduce building heating and cooling energy consumption through utilization of natural gas recovered from waste sites and other methane emission sources, blending of hydrogen into the current natural gas system, and improving insulation and overall building energy efficiency.
   c. Reduce emissions coming from industrial and manufacturing sectors - heavy industry and light manufacturing - through increased energy efficiency, carbon capture, utilization storage (CCUS), and utilization of alternative chemical reactions.
2. Reduce, cap, and utilize non-energy emissions from the waste-management and oil and gas sectors. Waste management methane emissions from landfills can be capped and burnt and emissions from water treatment may be reduced through technology upgrades.
3. Ensure community affordability and energy-system (electricity and natural gas, mainly) reliability.

REGULATORY INFLUENCES

- Canadian Net-Zero Emissions Accountability Act
- Federal Sustainable Development Act
- Pan-Canadian Framework on Clean Growth and Climate Change
- Waste-Free Ontario Act

MUNICIPAL GUIDANCE

- 2021 International Institute for Sustainable Development report on "Advancing the Climate Resilience of Canadian Infrastructure".
- Federation of Canadian Municipalities Municipal Asset Management Program.
- FCM's "Guide for Integrating Climate Change Considerations into Municipal Asset Management".
- Public Infrastructure Engineering Vulnerability Committee's (PIEVC) "PIEVC Engineering Protocol".
- 2020 Quest's "Community Resilience Mini-Guide".
- Engineers Canada "Preparing for the Impact of Climate Change: The Importance of Improving Infrastructure Climate Resiliency - The Engineering Perspective".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Zero Waste

Reinforced by: Carbon Neutrality

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ZERO WASTE

11



The Zero Waste International Alliance Definition: "The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health." The focus of zero waste is to keep waste out of the environment through comprehensive waste management systems.

ULTIMATE GOALS

Purpose

Maintain an effective comprehensive waste management system that prevents or reduces waste from being created in the first place and transforms pre-existing waste streams into resources that can be recovered, reused, and reintegrated, supporting a circular economy paradigm.

End Target

Zero waste is created or disposed of

STRATEGIC OBJECTIVES

1. Close the loop of resource consumption: design, produce, distribute, consumer use, reuse/repair, recycle, and design again.
2. Support consumer behavioural change from consume/dispose to consume/repair/reuse/recycle through education and increased economic equity.
3. Transition existing waste diversion programs to extended producer responsibility frameworks without disruption of services to prevent and reduce waste from being initially created.
4. Ensure disposal facilities are well-planned and managed to minimize their need and reduce their GHG emissions.
5. Support public participation in resource recovery through education.
6. Implement an action plan to reduce the volume of food and organic wastes going to disposal.
7. Use green procurement practices to build market demand for recovered materials.
8. Implement disposal bans to direct materials to alternative end-markets.

REGULATORY INFLUENCES

- Waste-Free Ontario Act
- Federal Sustainable Development Act

MUNICIPAL GUIDANCE

- 2017 Ontario "Strategy for a Waste-Free Ontario: Building the Circular Economy".
- FCM's webpage where resources can be found pertaining to sustainable waste management.
- European-based "Guide for Zero Waste Municipalities: A Guide on How to Establish, Implement and Monitor a Zero Waste Programme within your Local Municipality".
- 2017 Professional Engineers Ontario's "Solid Waste Management Guideline" with the goals of "Zero waste in the province and zero greenhouse gas emissions from the water sector".
- Municipal by-laws, policies and plans

CONNECTIONS

Reinforces: Circular Economy

Reinforced by: Greenhouse Gas Emissions Reductions

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CIRCULAR ECONOMY

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Rather than the current linear economy, a circular economy paradigm transforms waste streams into resources, closing the loop of consumption through eliminating landfill waste, circulating resources, and regenerating the environment. This system is restorative by design, replacing the end-of-life concept and leading towards zero waste. A circular economy paradigm goes further than zero waste principles through striving to regenerate the environment, not only keeping waste out of it.

ULTIMATE GOALS

Purpose

To phase out waste in the products, materials, and services that are used by the city.

Increase public participation of circular economy practices

End Target

All services implement circular economy strategies to achieve zero waste

STRATEGIC OBJECTIVES

1. Shift from a linear to a circular economy paradigm: Refuse, Reduce, Reuse, Refurbish, Recycle, Recover
2. Encourage local and sustainable consumption habits through promoting urban agriculture, increasing opportunities for inclusive local supply chains, and improving access to affordable and safe public transportation options.
3. Regenerate the environment through creation of feedback-rich systems in which resources are regenerated at a faster rate than they are extracted.
4. Focus on waste prevention in the construction, manufacturing, healthcare, agriculture, plastics, and retail sectors.

REGULATORY INFLUENCES

- Waste-Free Ontario Act
- Canada Foundation for Sustainable Development Technology Act
- Federal Sustainable Development Act
- Pan-Canadian Framework on Clean Growth and Climate Change
- Impact Assessment Act

MUNICIPAL GUIDANCE

- Ellen Macarthur Foundation's webpage of resources for "Circular cities: thriving, liveable, resilient".
- Ellen Macarthur Foundation's "Circular Economy in Cities: Project Guide".
- European Circular City Funding and Information Guide webpage.
- The Collaborating Centre for Sustainable Consumption and Production (CSCP) "Circular Economy Guidebook for Cities".
- 2020 United 4 Smart Sustainable Cities "A guide to circular cities".
- 2019 OECD "Roundtable on the Circular Economy in Cities and Regions".
- Municipal by-laws, policies and plans

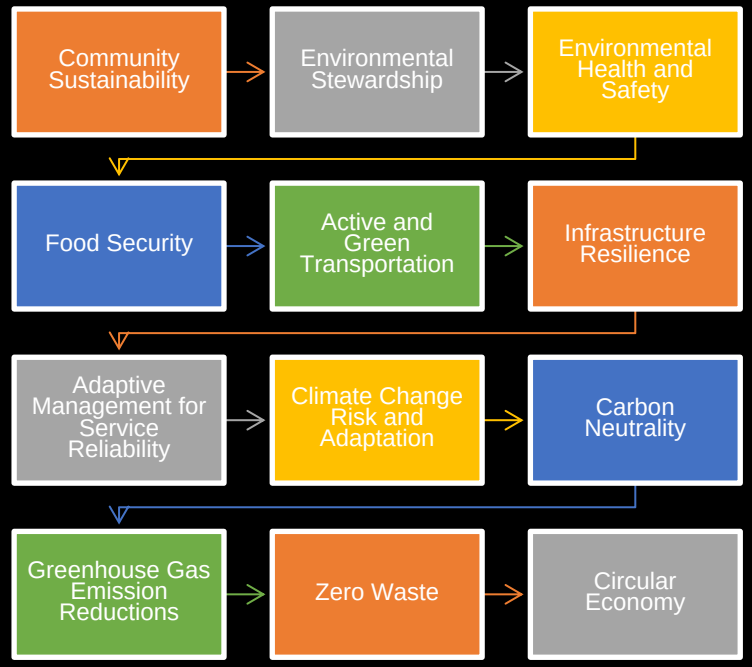
CONNECTIONS

Reinforces: Community Sustainability

Reinforced by: Zero Waste

ENVIRONMENTAL OBLIGATIONS STRATEGY

The 12 Environmental Pillars



PROGRAM OF PILLARS

- *Pillars drive and are informed by operational plans and activities (top down and bottom up)*
- *Pillars will have shared objectives and risks*
- *Pillar dependencies need to be managed and leveraged*
- *Pillars must be managed as a system-of-systems to produce more than the sum of its parts*

"Partial Implementation of a holist approach is an oxymoron" – Elihayu Goldratt

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ENVIRONMENTAL OBLIGATIONS STRATEGY

The Environmental Golden Thread

An Environmental Golden Thread:

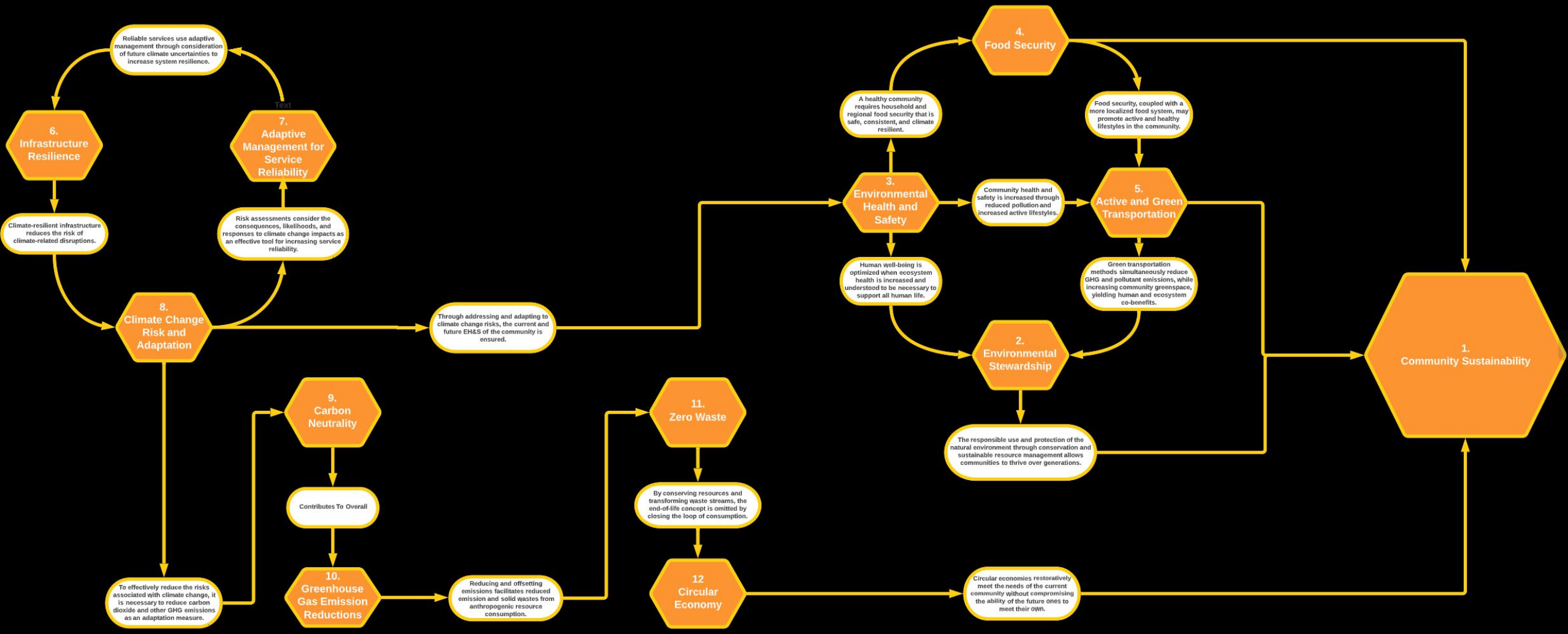
- *Defines what is essential for an environmental program to be effective (i.e., able to continuously advance environmental outcomes).*
- *Provides assurance that environmental systems and interconnections are operational.*
- *Provides traceability and transparency for retrospective and prospective analysis.*
- *Is resilient and adaptable to c hanging conditions*



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ENVIRONMENTAL OBLIGATIONS STRATEGY

The Environmental Golden Thread



WHY THIS WEBINAR?

How will you negotiate your environmental obligations?


environmental
risk
risk
transportation
waste
zero
energy
regulatory
ecology
global
impact
esg
future
warming
nature
emission
change
recycle
solar
active
policy
neutrality
reuse
green
national
alternate
regulatory
air voluntary
carbon
protection
local
stakeholder
resilience
adaptive
biosphere
safety
crisis
water
green
legal
stewardship
gas
food
service
nature
health
electrification
consumption
national
initiatives
systems
processes
industry
community
resources
flooding
adaptation
sustainability
circular
pollution
economy
program
services
security
crisis
ecology
systems
infrastructure
emissions
renewable
fuels
reductions
air
transportation
waste
zero
targets
solar
carbon
esg
climate
net
alternate
services
greenhouse
governance
environmental
active
processes
water
reliability
pollution
emission
adaptive
recycle
solar
active
policy
neutrality
reuse
community
stewardship
green
national
alternate
regulatory
air voluntary
protection
local
government
fuels
economy
risk
risk
global
crisis
solar
carbon
esg
net
climate
alternate
services
greenhouse
industry
community
flooding
industry
ecology
systems
security
crisis
services
program
economy
pollution
consumption
circular
sustainability
transportation
adaptation
zero
warming
initiatives
consumption
national
electrification
energy
impact
water
green
legal
stewardship
adaptive
resilience
stakeholder
future
ecology
regulatory
energy
targets
carbon

Q&A



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THE ENVIRONMENTAL GOLDEN THREAD

CONNECTING-THE-DOTS

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