

BUILDING IN SUSTAINABILITY



Methods to integrate sustainability into asset management. *By Kim Fowler*

Three significant trends in Canada have raised the need for asset management planning, but also integrating sustainability into the ongoing plan. The first two reflect on the seventy-two years that have passed since the Second World War. First, the extensive infrastructure built immediately post-war is now needing replacement. Second, the post-war baby boomers are now retiring. When you factor these two things with climate change, local governments, which own about 60 per cent of the infrastructure in Canada, will be challenged to maintain the current quality of life and levels of service for communities without significantly raising property taxes. Sounds like a sustainability challenge. Various methods to integrate sustainability into asset management will be provided below.

Defining sustainability

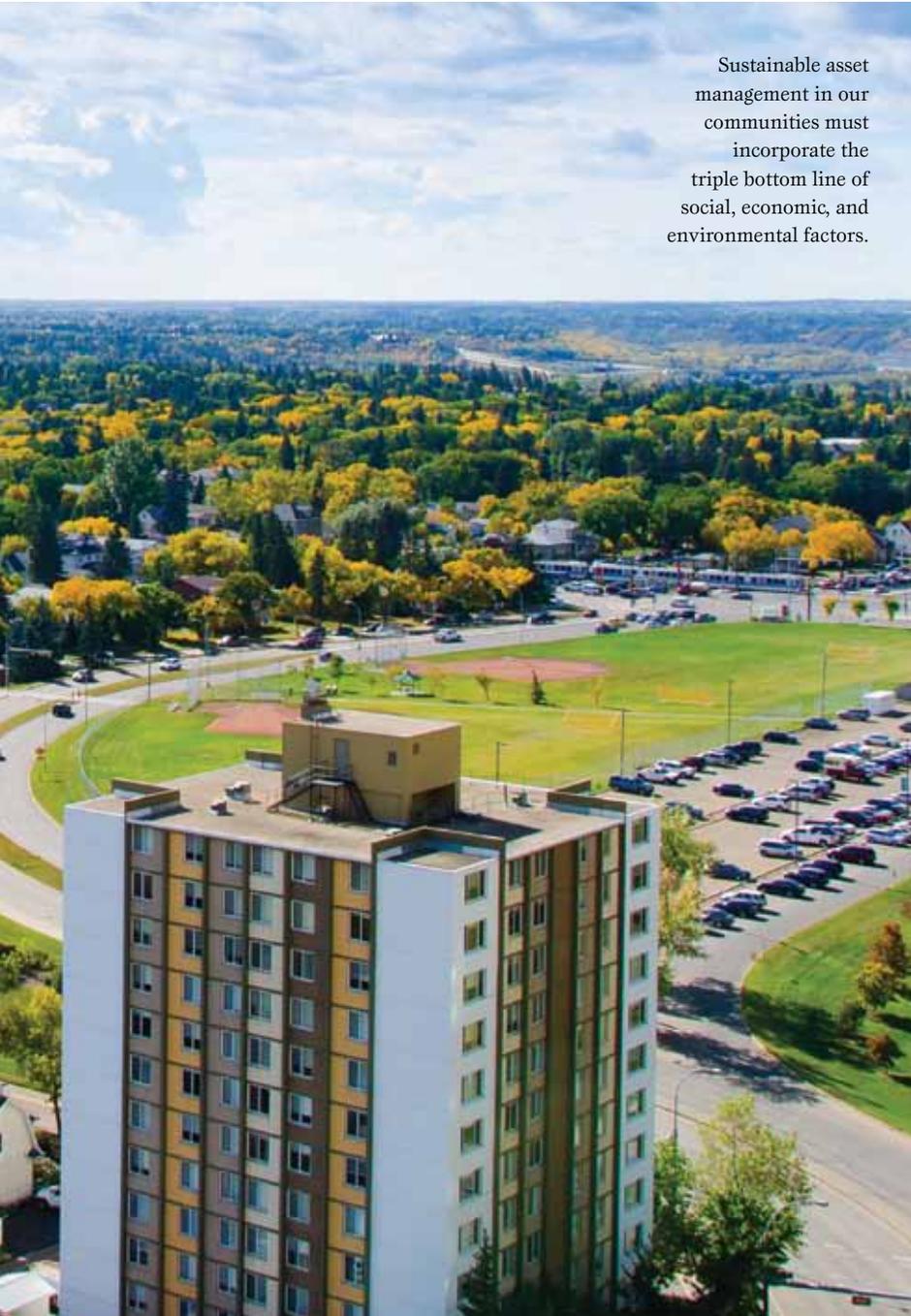
The United Nations Commission on Environment and Development defined sustainability in 1987 as meeting the needs of the present generation without compromising the ability of future generations to meet their needs. This includes environmental, socio-cultural, and economic resources. It also requires a systems or integrated approach where a healthy environmental, socio-cultural, and economic stasis can adapt to changing conditions.

Some key principles of sustainability, which directly relate to any good asset management process, are:

- 1 Dealing transparently and systemically with risk, uncertainty, and irreversibility.
- 2 Ensuring appropriate valuation, appreciation, and restoration of nature.

- 3 Integration of environmental, social, human, and economic goals in policies and activities.
- 4 Equal opportunity and community participation/sustainable community.
- 5 Conservation of biodiversity and ecological integrity.
- 6 Ensuring inter-generational equity.
- 7 Recognizing the global integration of localities.
- 8 A commitment to best practices.
- 9 No net loss of human capital or natural capital.
- 10 The principle of continuous improvement.
- 11 The need for good governance.

In September 2015, the United Nations adopted a new sustainable development

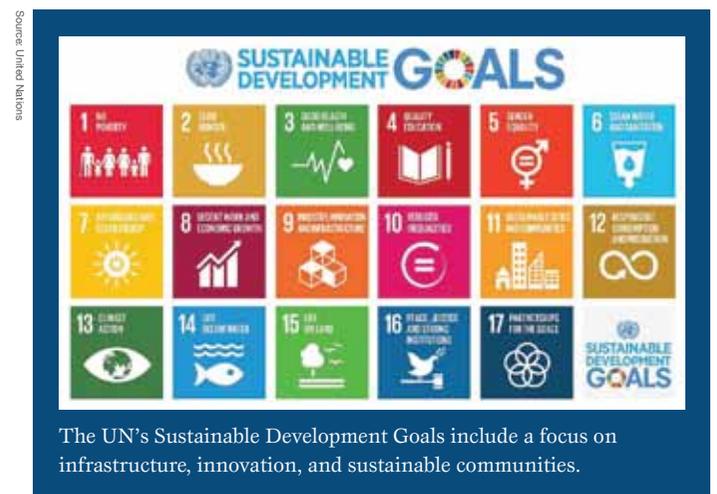


Sustainable asset management in our communities must incorporate the triple bottom line of social, economic, and environmental factors.

Sustainable Planning Integration for Municipalities



This diagram shows how triple bottom line may apply to local government asset management.



agenda, which included 17 goals. Each goal has specific targets to be achieved over the next 15 years. Goal #9 includes infrastructure and Goal #11 addresses sustainable cities and communities as shown below.

A system cannot be understood or managed by focusing on a single scale. All systems function at multiple scales of space, time, and structure. Interactions across the scales are fundamentally important to determine the dynamics of the system, including asset management. Three axes must be integrated for sustainability:

- 1 Time/term – short ↔ long
- 2 Scale/size – small ↔ large
- 3 Hierarchy/range – top ↔ bottom

Three key aspects of sustainability can be applied specifically to various levels of asset management, from strategic to operational:

- Triple bottom line (TBL)
- Climate change
- Resiliency

Triple bottom line

TBL is a framework for achieving corporate and community sustainability by assessing and balancing economic, environmental, and

standard hierarchy of local government planning from the strategic plan to day-to-day operations needs to be integrated with asset and growth management, and financial and budget planning.

TBL assessment provides a comparative summary tool for the integrated, complex, and changing conditions of our systems. An example of a TBL assessment designed

When resilience is enhanced, a system is more likely to tolerate disturbance events without collapsing.

socio-cultural criteria. This is also known as E3 integration of economics, natural ecology, and social equity, or as environment, society, and economy.

Using the principles of planet, prosperity, and people is another form of TBL. The

to assess budget decision packages in a local government is a budget matrix. The matrix uses criteria of strategic plan alignment, financial/economic value, social/community value, environmental value, and risk (likelihood of achievement), listed on

the side. The budget decision packages are listed at the top, across the matrix. The success of the matrix is corporate level assessment, including strategic plan alignment and a basic risk assessment, instead of department or division level assessment. Definitions of terms were provided for guidelines and consistency during scoring.

Climate change

As climate change impacts continue to be felt amidst other economic, social, and environmental stressors, the difficulty of maintaining robust and resilient infrastructure systems is increasing across Canada, as reported by the International Institute for Sustainable Development (IISD). In their 2013 report entitled, *Climate Change Adaptation and Canadian Infrastructure*, the IISD strongly recommends changing from reacting to the adverse impacts of climatic events to an anticipatory approach. Implementation of planned adaptation measures can then secure the sustainability of critical sectors. Four general conclusions were made in the report:

- 1 Climate change has the potential to substantially affect the effectiveness and lifespan of infrastructure in Canada, particularly transportation, buildings, marine and water management infrastructure.
- 2 Adaptive measures can be taken to limit costs and strengthen the resiliency of infrastructure.
- 3 While a great deal of research and planning has been done, most supporting policies and regulatory changes remain nascent, and investments have not yet fundamentally shifted.
- 4 The current state-of-play provides a key opportunity for industry actors to engage in the further development and implementation of effective approaches to support climate-resilient development.

Mitigation measures must be determined by how a changing climate affects the triple bottom line or life cycle costing of a community asset. This could include determining: the best economic value using life cycle costing, how to adapt an aging population to climate change, and how to adjust parks operations to changing plant,

insect, and animal species. An effective climate change risk strategy contains a combination of responses to:

- 1 Technical aspects. (e.g., modifying the design of infrastructures to make them more resistant to the increased intensity of floods)
- 2 Policy and legal aspects. (e.g., new building codes), financial aspects (e.g., specific funds allocated to support the maintenance of infrastructure)
- 3 Socioeconomic aspects. (e.g., relocation or abandonment of infrastructures, change in habits and behavioral patterns associated with the use of infrastructures)
- 4 Institutional aspects. (e.g., awareness raising and capacity building of the infrastructure sector on climate adaptation)

Resilience

Resilience is the capacity to recover quickly from difficulties and the ability to spring back into shape or condition (elasticity). In social-ecological systems, it is the capacity to absorb or withstand perturbations and

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Speakers: LINN GOULD (Executive Director, Just Health Action), DR. KATHERINE DUNSTER (MBCSLA, RPBio, Kwantlen Polytechnic University School of Horticulture), PAUL KEPHART (CEO, Principal Ecologist & Designer, Rana Creek Design), CHRISTIN HILTON (Urban Partnership Director, The Nature Conservancy), GAIL VITTORI (Co-Director, Center for Maximum Potential Building Systems), DR. HAMID KARIMI (Deputy Director, Natural Resources Administration, DC DOE), AMANDA STURGEON (CEO, International Living Future Institute), JEFF JOSLIN (Director, Current Planning, San Francisco Planning Department)

other stressors and remain within the same regime—essentially, maintaining its structure and functions. Resilience also describes the degree to which the system is capable of self-organization, learning, and adaptation. In the context of infrastructure, climate resilience refers to the capacity to adapt to changing conditions without catastrophic loss of form or function.

When resilience is enhanced, a system is more likely to tolerate disturbance events without collapsing. When resilience is reduced, the vulnerability of a system to smaller disturbances with which it could previously cope increases. Even in the absence of disturbance, gradually changing conditions (e.g., nutrient loading, climate, habitat fragmentation, etc.) can surpass threshold levels, triggering an abrupt system response. The new state of the system may be less desirable if ecosystem services that benefit humans are diminished, such as eutrophication of a freshwater lake, which depletes its biodiversity. Restoring a system to its previous state can be complex, expensive, and sometimes impossible.

The added capacity of humans to anticipate change and influence future

pathways improves the social-ecological resilience in systems. Seven principles have been identified for building resilience and sustaining ecosystem services in social-ecological systems:

- 1 Maintaining diversity and redundancy
- 2 Managing connectivity
- 3 Managing slow variables and feedbacks
- 4 Fostering complex adaptive systems thinking
- 5 Encouraging learning
- 6 Broadening participation
- 7 Promoting polycentric governance systems.

What does local government resilience mean for asset management?

- It reduces vulnerability to climate change by identifying impacts, risks, and determine adaptation strategies to limit costs and strengthen resiliency of infrastructure.
- It covers the whole asset management process from decision making, design, operation, maintenance and replacement.

- Investment choices can be rethought or reconsidered to implement resilience. This will also best position a local government to capture the benefits, including funding, of low carbon, climate resilient development.

- Adaptation is a dynamic, context-specific and often long-term process that requires sustained efforts from a variety of actors.

Within an increasingly risky environment, triple bottom line, climate change, and resiliency can be integrated to drive innovation and achieve sustainable asset management for local governments. The future economic, socio-cultural, and environmental sustainability of our communities rely on the continuing benefits of the services provided by local government asset management. ♣



Kim Fowler is a sustainability consultant for local government based in Nanaimo, B.C.



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