Resilience Workshop:
Introduction to the Envision Sustainable Infrastructure Framework & Climate Lens

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Institute for
Sustainable
Infrastructure

Institute for Sustainable Infrastructure

- Not-for-profit education and research organization

- Hub of a unique community of organizations and individuals involved in the planning, design, construction, and maintenance of infrastructure

Our mission is to transform the way public infrastructure is designed, built, and operated to regenerate and protect the environment, advance community values, and enhance prosperity and human well-being

Founding Organizations

Core Research Partner

Envision sustainable infrastructure framework

ISI develops and manages the **Envision™ sustainable infrastructure framework**

- Envision enables a *thorough examination of the sustainability & resiliency of infrastructure*
- *Provides a common language amongst stakeholders*
- Used by governments, public agencies, utilities, planners, designers, engineers, and other stakeholders to plan, design, and deliver more sustainable & resilient infrastructure

- Free guidance manual & easy-to-use project self-assessment tools

- Professional training & credentialing program

- Third-party project verification & recognition (awards) program
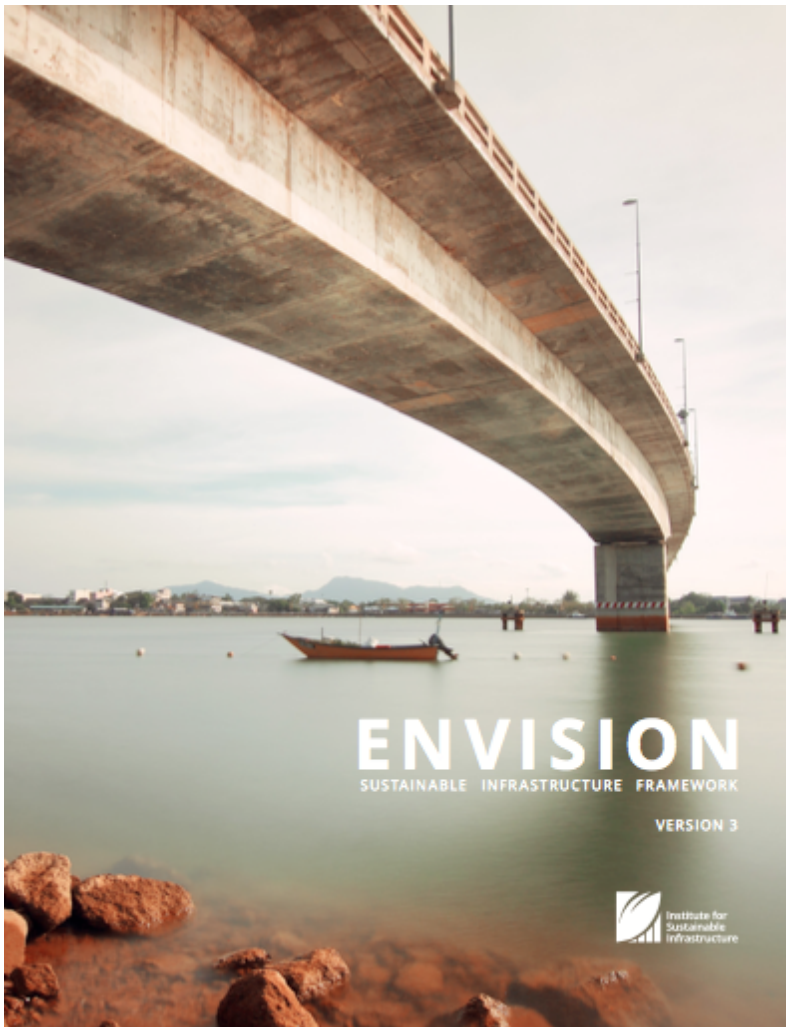
Envision is applicable to all types and sizes of infrastructure

ENERGY
Geothermal

Hydroelectric

Nuclear

Coal

Natural Gas

Oil/Refinery

Wind

Solar

Biomass

WATER
Potable water distribution

Water / wastewater treatment

Capture / storage

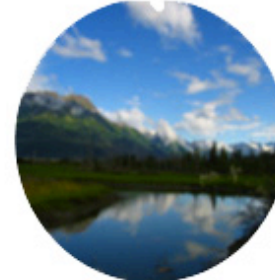Stormwater Management

Flood control

WASTE
Solid waste

Recycling

Hazardous Waste

Collection & Transfer

TRANSPORT
Airports

Roads

Highways

Bikes

Pedestrians

Railways

Public Transit

Ports

Waterways

LANDSCAPE
Public realm

Parks

Ecosystem services

Natural infrastructure

INFORMATION
Telecomm.

Internet

Phones

Data Centers

Sensors

64 sustainability & resilience indicators ("credits") across 5 main categories and 14 subcategories
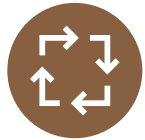
Quality of Life
14 Credits

Wellbeing, Mobility, Community

Leadership
12 Credits

Collaboration, Planning, Economy

Resource Allocation
14 Credits

Materials, Energy, Water

Natural World
14 Credits

Siting, Conservation, Ecology

Climate & Resilience
10 Credits

Emissions, Resilience

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Envision credit list

Quality Of Life
14 Credits

WELLBEING
QL1.1 Improve Community Quality of Life
QL1.2 Enhance Public Health & Safety
QL1.3 Improve Construction Safety
QL1.4 Minimize Noise & Vibration
QL1.5 Minimize Light Pollution
QL1.6 Minimize Construction Impacts

MOBILITY
QL2.1 Improve Community Mobility & Access
QL2.2 Encourage Sustainable Transportation
QL2.3 Improve Access & Wayfinding

COMMUNITY
QL2.1 Advance Equity & Social Justice
QL2.2 Preserve Historic & Cultural Resources
QL2.3 Enhance Views & Local Character
QL2.4 Enhance Public Space & Amenities

QL0.0 Innovate or Exceed Credit Requirements

Leadership
12 Credits

COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Foster Collaboration & Teamwork
LD1.3 Provide for Stakeholder Involvement
LD1.4 Pursue Byproduct Synergies

PLANNING
LD2.1 Establish a Sustainability Management Plan
LD2.2 Plan for Sustainable Communities
LD2.3 Plan for Long-Term Monitoring & Maintenance
LD2.4 Plan for End-of-Life

ECONOMY
LD3.1 Stimulate Economic Prosperity & Development
LD3.2 Develop Local Skills & Capabilities
LD3.3 Conduct a Life-Cycle Economic Evaluation

LD0.0 Innovate or Exceed Credit Requirements

Resource Allocation
14 Credits

MATERIALS
RA1.1 Support Sustainable Procurement Practices
RA1.2 Use Recycled Materials
RA1.3 Reduce Operational Waste
RA1.4 Reduce Construction Waste
RA1.5 Balance Earthwork On Site

ENERGY
RA2.1 Reduce Operational Energy Consumption
RA2.2 Reduce Construction Energy Consumption
RA2.3 Use Renewable Energy
RA2.4 Commission & Monitor Energy Systems

WATER
RA3.1 Preserve Water Resources
RA3.2 Reduce Operational Water Consumption
RA3.3 Reduce Construction Water Consumption
RA3.4 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements

Natural World
14 Credits

SITING
NW1.1 Preserve Sites of High Ecological Value
NW1.2 Provide Wetland & Surface Water Buffers
NW1.3 Preserve Prime Farmland
NW1.4 Preserve Undeveloped Land

CONSERVATION
NW2.1 Reclaim Brownfields
NW2.2 Manage Stormwater
NW2.3 Reduce Pesticide & Fertilizer Impacts
NW2.4 Protect Surface & Groundwater Quality

ECOLOGY
NW3.1 Enhance Functional Habitats
NW3.2 Enhance Wetland & Surface Water Functions
NW3.3 Maintain Floodplain Functions
NW3.4 Control Invasive Species
NW3.5 Protect Soil Health

NW0.0 Innovate or Exceed Credit Requirements

Climate and Resilience
10 Credits

EMISSIONS
CR1.1 Reduce Net Embodied Carbon
CR1.2 Reduce Greenhouse Gas Emissions
CR1.3 Reduce Air Pollutant Emissions

RESILIENCE
CR2.1 Avoid Unsuitable Development
CR2.2 Assess Climate Change Vulnerability
CR2.3 Evaluate Risk & Resilience
CR2.4 Establish Resilience Goals and Strategies
CR2.5 Maximize Resilience
CR2.6 Improve Infrastructure Integration

CR0.0 Innovate or Exceed Credit Requirements

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Example credit from Envision Guidance Manual

QL1.1 Improve Community Quality of Life

26 POINTS	INTENT	METRIC
	Improve the net quality of life of all communities affected by the project and mitigate negative impacts to communities.	Measures taken to assess community needs and improve quality of life while minimizing negative impacts.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A + B	A + B + C + D	A + B + C + D + E	A + B + C + D + E + F	A + B + C + D + E + F + G
(2) Community Considerations	(5) Community Linkages	(10) Broad Community Alignment	(20) Holistic Assessment & Collaboration	(26) Protecting The Future

(A) The project team identifies and takes into account community needs, goals, and issues. For example, the project team has located and reviewed the most recent community planning information and assessed relevant community needs, goals, and/or issues.

(B) The project meets or supports community needs and/or goals.

(C) The project assesses the social impacts it will have on the host and affected communities' quality of life.

(D) The affected communities are meaningfully engaged in identifying how the project supports community needs and/or goals.

(E) Based on the social assessment, potential negative impacts on the host or nearby affected communities are mitigated following a hierarchy that prioritizes avoidance, minimization, restoration, and offsetting.

(F) Community satisfaction is demonstrated by feedback from the stakeholder engagement process verifying actions taken in criteria A, B, C, and D.

(G) The project proactively addresses trends in changing social, economic, and/or environmental conditions within the community in order to ensure a high quality of life over the long term.

DESCRIPTION

This credit addresses the extent to which a project contributes to the quality of life of the host and affected communities. As this can be subjective, the credit criteria address how well the project team has identified, assessed, and incorporated community needs, goals, and issues into the project. Relevant community plans are assumed to be a viable expression of those needs, goals, objectives, and aspirations. In a real sense, they are the community's desired quality of life.

Unfortunately, infrastructure projects are often perceived as having negative impacts on communities. This "not in my back yard" (NIMBY) mentality can be addressed through active engagement and the proper alignment of projects with community needs, goals, and issues. Community support and engagement are critical to ensure the appropriate and effective investment of resources in infrastructure. Project teams and owners should consider how aligning the project with community goals reduces the risk of community conflicts that disrupt project delivery and increase cost.

PERFORMANCE IMPROVEMENT

Improved: The project team can demonstrate an understanding of the community needs, goals, and issues, and communicate how the project meets or supports those goals.

Enhanced: Communication and interactions with community stakeholders are essential to reaffirm and improve the project objectives. The project team works closely with community stakeholders to identify and assess potential social impacts. Social impacts include the intended and unintended social consequences, both positive and negative, of infrastructure projects and any social changes initiated by those projects.

Superior: Infrastructure projects often include difficult trade-offs involving positive and negative impacts, and a project designed to benefit one community may have adverse effects on others. In addition, the needs of a community may conflict with their expressed goals. Because positive impacts in all dimensions of performance may not be possible, the credit seeks a net positive impact. Importantly, the project benefits and impacts should be equitably distributed throughout the host and affected communities.

Conserving: Community satisfaction is the metric for quality of life. It should be evident that the community truly understands the full impact (positive and negative) of the project and is satisfied that it addresses their needs and goals while appropriately mitigating negative impacts. Documentation of community endorsement should be as broad as possible and specific to the requested documentation.

Restorative: The project team proactively identifies instances where long-term trends in socioeconomic or environmental conditions may undermine existing community aspirations and addresses them in the project.

Applicability: It is likely that all projects have the ability to align project objectives with community needs and goals, identified through active engagement, in order to achieve broad community satisfaction. It would therefore be difficult to demonstrate that the credit is not relevant or applicable to a project seeking an Envision award.

EVALUATION CRITERIA AND DOCUMENTATION GUIDANCE

A. Has the project team identified and taken into account community needs, goals, and issues?

1. Documentation that the project team has located and reviewed the most recent community planning information and assessed relevant community needs, goals, and/or issues. For example, meeting minutes with key stakeholders, community leaders, and decision makers; letters; and memoranda.

B. Does the project meet or support the needs and goals of the host and/or affected communities?

1. Evidence showing a comparison of the project vision and goals to the needs, goals, and/or issues of the community.

C. Has the project team assessed the social impacts the project will have on the host and affected communities' quality of life?

1. Assessing, identifying and evaluating the positive and negative social impacts of the project on affected communities' quality of life (e.g., a social impact assessment). Expectations for the depth and breadth of documentation are commensurate with the scale of the project and its impact on the broader community. Informal assessments are acceptable for small projects, provided that project teams present evidence supporting their conclusions.

D. Have the affected communities been meaningfully engaged in identifying how the project meets community needs and/or goals?

1. Documentation of processes for collecting, evaluating, and incorporating community input into the planning and design process (e.g., meetings, design charrettes, and communications with representatives of affected communities).

E. Has the project team addressed negative social impacts?

1. Evidence showing the extent to which options for mitigating negative impacts were identified and prioritized, and reasonable changes to the project made. Strategies for mitigating negative impacts should follow a hierarchy prioritizing avoidance, minimization, restoration, and offsetting.

F. Are the affected communities satisfied that the project addresses their needs and goals as well as mitigates negative impacts?

1. Acknowledgments and endorsements by the community that the design participation process was helpful and that their input was appropriately assessed and incorporated into project design.

2. Documentation of input and agreement from key stakeholders, community leaders, and/or decision makers regarding the impact assessment and planned action(s) (e.g., community satisfaction surveys, interviews with representatives of affected communities, comments and reactions from social media platforms). Specific statements about critical issues or actions taken within the project are better indicators of a true understanding of the project's impacts than general endorsements of the project as a whole. Evidence of community satisfaction and endorsement of plans includes:

   a. Community endorsement of the project team's assessment of their needs or goals per criterion A.

   b. Community endorsement that the project as proposed will address their needs or goals per criterion B.

   c. Documentation that the community understands and accepts potential impacts of the project per criterion C.

   d. Community endorsement of project strategies to mitigate negative impacts per criterion D.

G. Does the project proactively address long-term social, economic, or environmental changes that impact quality of life?

1. Documentation of long-term social, economic, or environmental changes/trends that may impact community goals and needs over time (e.g., aging population, economic transitions, or the degradation of the environment and ecosystem services). Note that social, economic, and environmental shifts are often connected. The degradation of the environment in a coastal community dependent on tourism and fishing negatively impacts the economy, which can lead to social impacts such as shrinking population. Consequently, the quality of life of the community is put at risk.

2. Documentation demonstrating how the project will proactively address one or more of these changes/trends.

3. Documentation demonstrating how the project represents a smart long-term investment for the community's future.

RELATED ENVISION CREDITS

QL1.2 Enhance Public Health & Safety

QL2.3 Improve Access & Wayfinding

LD1.3 Provide for Stakeholder Involvement

LD2.2 Plan for Sustainable Communities

LD3.1 Stimulate Economic Prosperity & Development

CR2.5 Maximize Resilience

Envision harnesses proven strategies to face sustainability challenges head-on

Mitigation hierarchy applied across a range of topics

Avoidance — Top priority given to actions that avoid creating impacts

Minimization — Measures taken to reduce the duration, intensity, or extent of impacts that cannot be avoided

Abatement — Measures taken to rehabilitate degraded ecosystems

Offsetting — Lowest priority given to measures taken to compensate for any residual adverse impacts
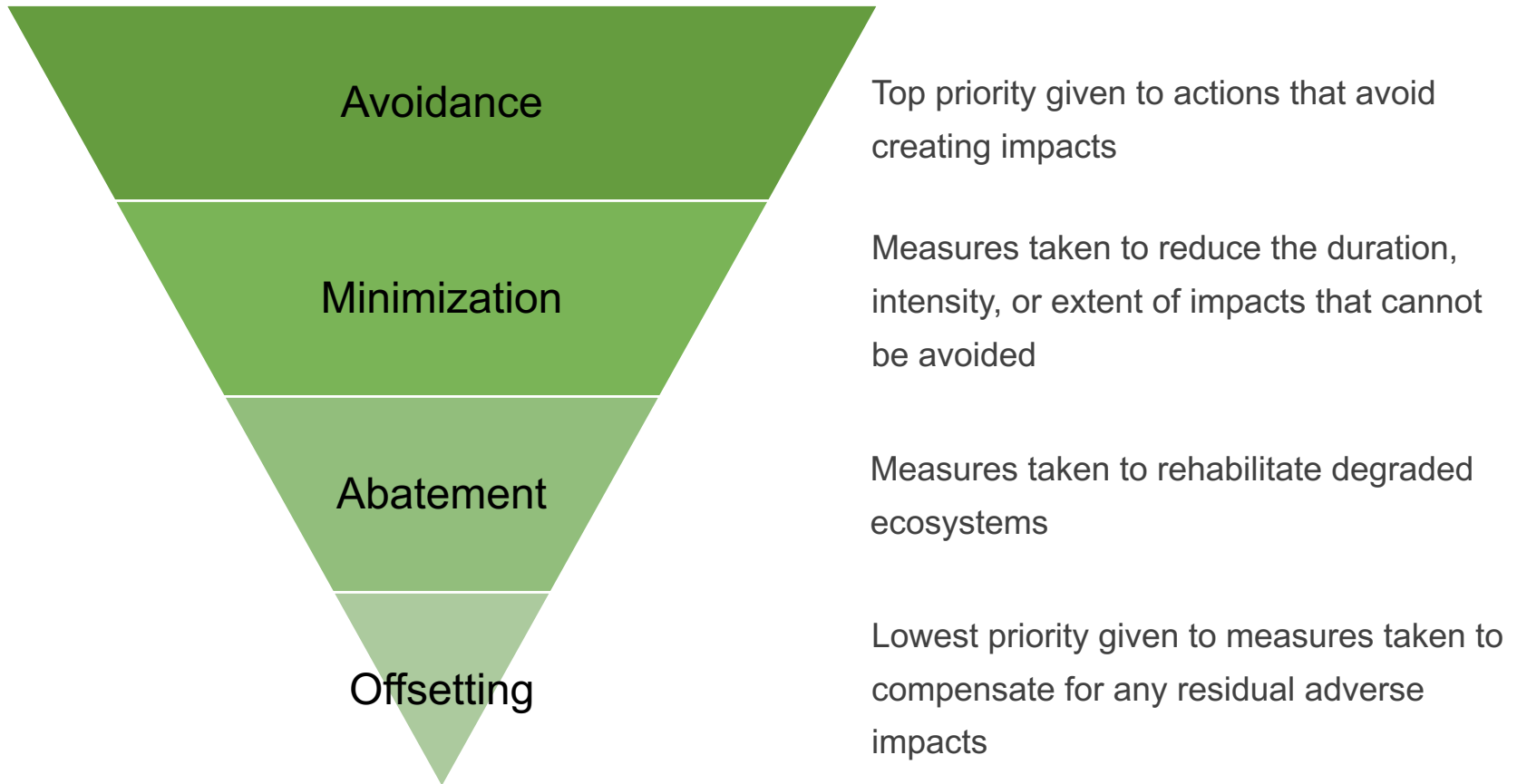
Envision expands opportunities for performance improvement across 3 dimensions

Project Phases

More durability and flexibility

End of life disassembly, up-cycling

Stakeholder Collaboration

Project team collaboration

Stakeholder issues and concerns

Performance Achievement

Beyond sustainable equilibrium

Restoration of systems

PERFORMANCE ACHIEVEMENT

Restorative

Conserving

Superior

Enhanced

STAKEHOLDER
COLLABORATION

PROJECT
PHASES

Improved

Owner

Project Team

Primary
Stakeholders

Secondary
Stakeholders

Planning

Design

Construction

Operations

End-of-Life

SUSTAINABILITY

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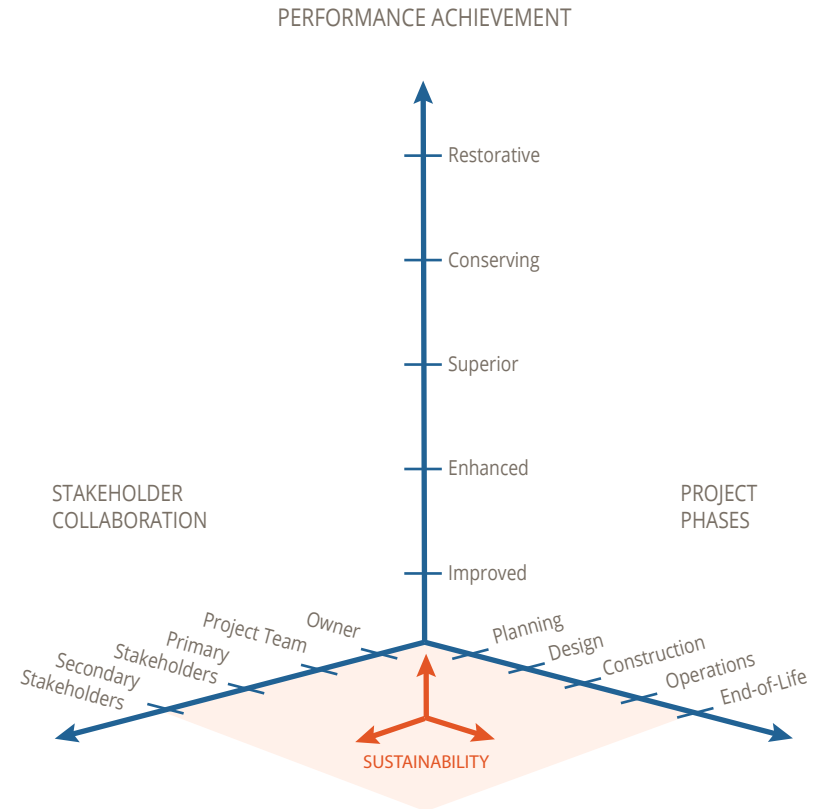
Envision designed to encourage use of the guidance early on in project planning and design
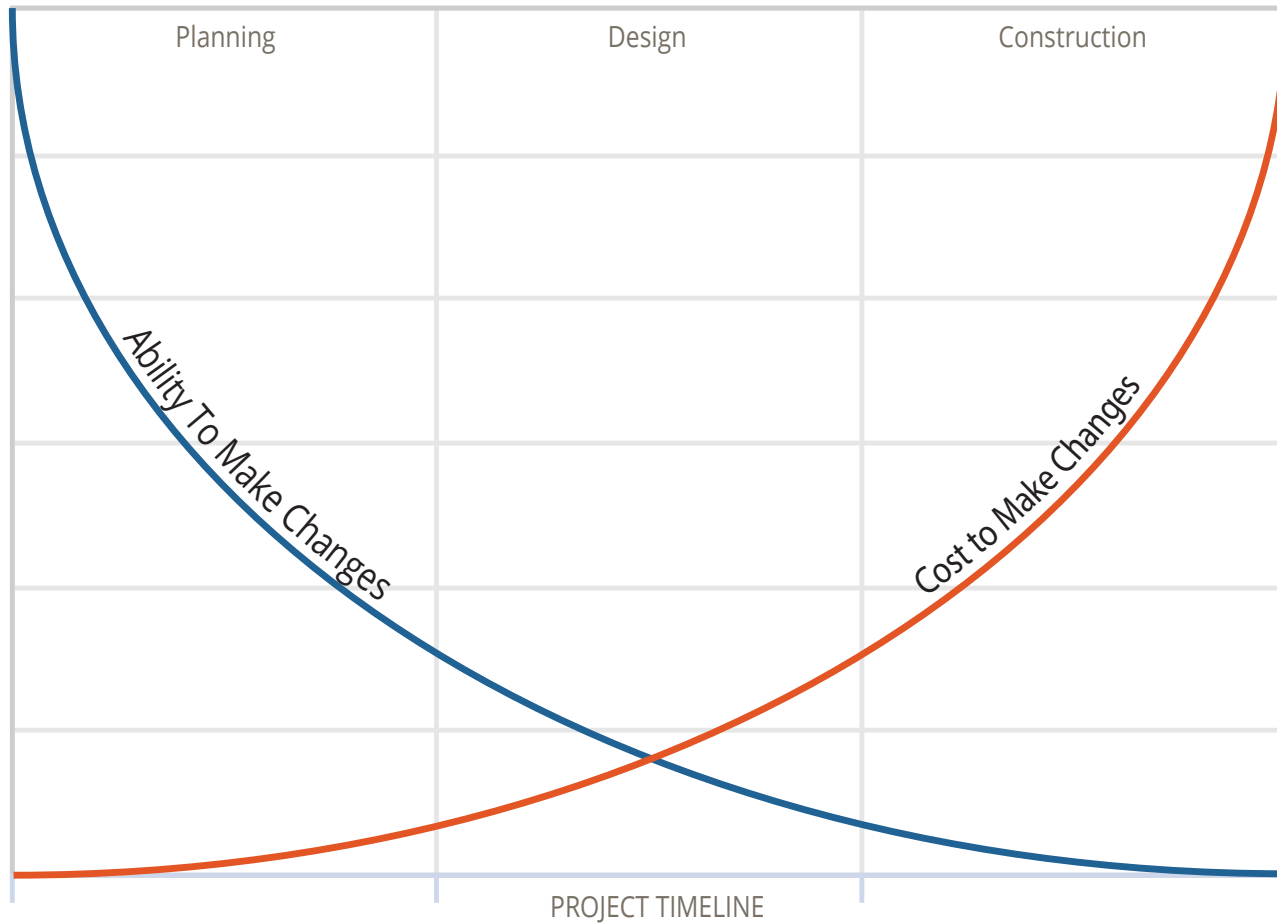
Explicit recognition given to innovation

- Extraordinary performance

- Overcoming significant barriers

- Scalable

- Transferable

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Independent third-party rating: validation of performance

4 ratings (or award levels) based on percentage of applicable points achieved:

- Verified: 20%

- Silver: 30%

- Gold: 40%

- Platinum: 50%

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Project scoring

Up to 5 Levels of Achievement (LoA) for each credit. LoAs assigned points weighted by three factors:

- Importance and impact of indicator

- Difficulty of the specific actions required to achieve performance

- The demonstrable impact meeting the LoA requirements will have

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Types of evaluation criteria in Envision

- **Yes/No:** action taken, or outcome achieved (e.g. project not located on sensitive sites)

- **Target:** specified outcome with discrete quantifiable levels (e.g., project reduces GHGs by 25%)

- **Execution:** process conducted, or commitment made to accomplish a certain objective (e.g., project team has a comprehensive sustainability management plan in place)

- **Accomplishment:** process conducted with a general or unspecified result (e.g., project team has 'minimized' use of fertilizers and pesticides)

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The Envision verification process

Two options: projects may submit for third-party verification during planning and design stage OR during construction.

Project self-assessments may be conducted at any stage of the project lifecycle.

Pathway A: Design + Post-Construction

Conduct project Self Assessment	Register project with ISI	Start Verification	Design Review (iterative)	Award (if sufficient pts. earned)	Post Construction Review (mandatory)	Project Complete

Pathway B: Post-Construction

Conduct project Self Assess	Register project with ISI	Start Verification	Post Construction Review (iterative)	Award (if sufficient pts. Earned)	Project Complete

Self-assessment tool

ISI provides project teams with an Envision self-assessment tool (often used prior to third-party verification)

- Excel-based checklist
- Presents Envision criteria as yes/no questions
- Results presented as an estimate of the possible score a project may achieve

			Credit Assessment Status	Evaluation Questions Assessed		Assessment Status						Assessed Maximum Points Available	Total Maximum Points
				Yes	No	Improved	Enhanced	Superior	Conserving	Restorative	Points		
Quality of Life	**Wellbeing**	QL1.1 Improve Community Quality of Life	Assessed	7	0	0	0	0	0	26	26	26	26
		QL1.2 Enhance Public Health & Safety	Assessed	3	3	0	7	0	0	0	7	20	20
		QL1.3 Improve Construction Safety	Assessed	5	0	0	0	0	14	--	14	14	14
		QL1.4 Minimize Noise & Vibration	Assessed	5	0	0	0	0	10	0	10	12	12
		QL1.5 Minimize Light Pollution	Assessed	4	2	0	0	6	0	0	6	12	12
		QL1.6 Minimize Construction Impacts	Assessed	3	3	0	2	0	0	--	2	8	8
	Mobility	QL2.1 Improve Community Mobility Access	Assessed	3	3	0	3	0	0	0	3	14	14
		QL2.2 Encourage Sustainable Transportation	Assessed	3	1	--	0	0	12	0	12	16	16
		QL2.3 Improve Access & Wayfinding	Assessed	2	2	0	5	0	0	--	5	14	14
	Community	QL3.1 Advance Equity & Social Justice	Assessed	3	4	3	0	0	0	0	3	18	18
		QL3.2 Preserve Historic & Cultural Resources	Assessed	5	1	--	0	0	12	0	12	18	18
		QL3.3 Enhance Views & Local Character	Assessed	3	3	0	3	0	0	0	3	14	14
		QL3.4 Enhance Public Space & Amenities	Assessed	4	0	0	0	0	0	14	14	14	14

			Credit Assessment Status	Evaluation Questions Assessed		Assessment Status						Assessed Maximum Points Available	Total Maximum Points
				Yes	No	Improved	Enhanced	Superior	Conserving	Restorative	Points		
Leadership	**Collaboration**	LD1.1 Provide Effective Leadership & Commitment	Assessed	3	1	0	5	0	0	--	5	18	18
		LD1.2 Foster Collaboration & Teamwork	Assessed	4	0	0	0	0	18	--	18	18	18
		LD1.3 Provide for Stakeholder Involvement	Assessed	3	3	0	6	0	0	0	6	18	18
		LD1.4 Pursue Byproduct Synergies	Assessed	0	5	0	0	0	0	0	0	18	18
	Planning	LD2.1 Establish a Sustainability Management Plan	Assessed	2	3	4	0	0	0	--	4	18	18
		LD2.2 Plan for Sustainable Communities	Assessed	2	3	0	6	0	0	0	6	16	16
		LD2.3 Plan for Long-Term Monitoring & Maintenance	Assessed	4	1	0	0	8	0	--	8	12	12
		LD2.4 Plan for End-of-Life	Assessed	0	5	0	0	0	0	--	0	14	14
	Economy	LD3.1 Stimulate Economic Prosperity & Development	Assessed	5	0	0	0	0	20	--	20	20	20
		LD3.2 Develop Local Skills & Capabilities	Assessed	3	1	0	4	0	0	0	4	16	16
		LD3.3 Conduct a Life-Cycle Economic Evaluation	Assessed	3	2	0	0	10	0	0	10	14	14

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Infrastructure development rated by Envision*

**Cumulative value of all projects in Envision verification program
(in $ millions) (2012 - 2019)**
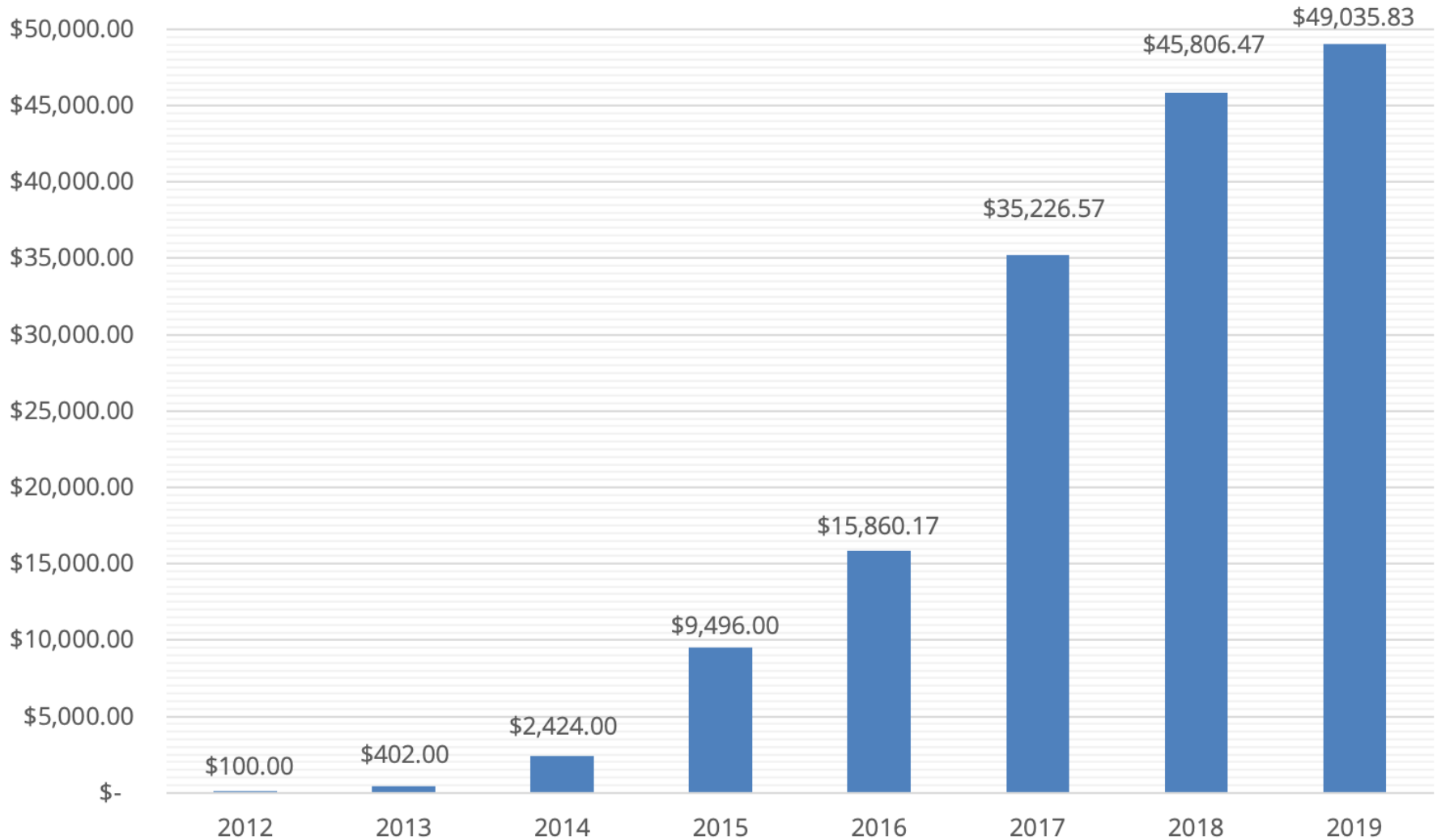
* Includes projects that have completed third-party verification and received a rating, projects currently being verified, and projects registered for review. Does not include projects using Envision self-assessment tools or projects not intending to submit for verification

Projects using Envision by sector*

Total Envision Projects by Sector

Energy (9%)
Food (1%)
Industrial (1%)
Land/Environ. (8%)
Water (42%)
Transportation (37%)
Waste (2%)
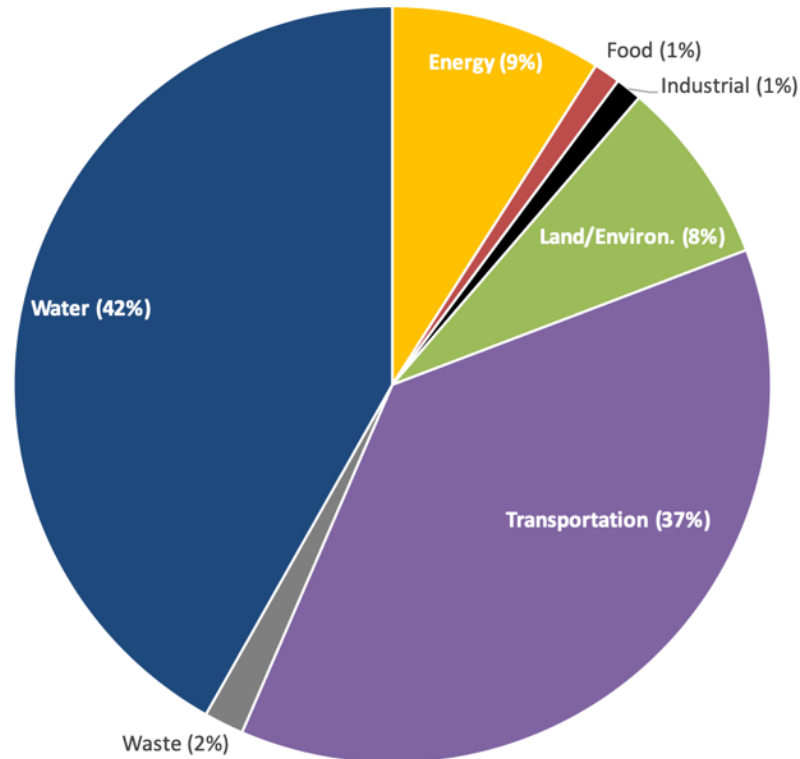
Legend: Energy | Food | Industrial | Land/Environ. | Transportation | Waste | Water

* Graph does not include projects using Envision self-assessment tools or projects not intending to submit for verification

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3 Canadian project examples

Grand Bend Area Wastewater Treatment Facility

Lambton Shores, Ontario
Envision Platinum, 2015

- $10M cost savings using Envision early in project planning and design
- Flexible, durable design
- Protection of prime farmland
- Constructed wetland, habitat restoration
- Trails and interpretive signage to encourage community visitors & school tours
- Long-term partnerships with regional conservation authority and local university
- Design consistent with the Ontario Adaptation Strategy and Action Plan

Surrey Biofuel Facility

Surrey, British Columbia

Envision Platinum, 2017

- First closed-loop fully integrated organic waste-to-energy infrastructure facility in North America
- Capable of processing 115,000 tonnes of residential and commercial organic waste into renewable natural gas / year
- Fuels the City's entire fleet of natural gas-powered waste collection vehicles, its growing fleet of natural gas-powered operations service vehicles, and provides a renewable fuel source for the City's District Energy System
- Key to helping Metro Vancouver area achieve its regional waste diversion targets of 80% by 2020

**Samuel de Champlain
Bridge Corridor Project**
Montreal, Quebec
Envision Platinum, 2018

- PPP with Canadian Federal Government as the public partner

- Use of Envision & third-party verification formed part of project agreement

- Supports over $20 billion in international trade & 40-50 million commuters per year

- Integration of bike and pedestrian pathways, future LRT

- Safety & construction innovations

- Extensive climate and risk analysis conducted, adaptation planning

- Inaugurated late June 2019 & officially opened to traffic on July 1

Climate & Resilience

Climate Lens

Federal "Investing in Canada Plan" requires applicants seeking federal funding for new infrastructure projects to undertake a Climate Lens Assessment

- Requirement of *Investing in Canada* bilateral agreements signed between Infrastructure Canada & the provinces and territories

- Determine whether project will contribute to or reduce climate pollution

- Consider climate change risks in location, design, and planned operation of projects

- Identify & assess opportunities to reduce carbon pollution

- Identify & assess adaptation opportunities

- Applicability:

  - Projects > $10M

  - Any project that deals with climate change resilience or GHG mitigation

  - All projects under Disaster Mitigation and Adaptation Fund

  - Smart City Challenge winning proposals

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Infrastructure Canada

- Two components:
  - GHG mitigation assessment
  - Climate change resilience assessment

- Applicants may need to undertake one or both types of assessments depending on program, funding stream, project cost

- Recognized methodologies to assess climate change risk and resilience:

  - Envision® sustainable infrastructure framework from Institute for Sustainable Infrastructure

  - Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol

  - SuRe® – Standard for Sustainable and Resilient Infrastructure

Climate Lens
General guidance
Version 1.1 - June 1, 2018

Steps of Climate Risk Assessment Process[1]

Establish Context (Scope)
- Understand historical climate data & future projections
- Define assessment objectives, timeframe, resources available
- Develop workplan

Risk Identific-ation
- ID current & projected climate change impacts and associated potential risks to the asset, system, surrounding environment
- Determine likelihood and potential consequences of each

Risk Analysis
- Estimates of likelihood and consequences of risk events and opportunities
- Estimates of the acceptance of risk by different stakeholders or record reasons for non-acceptance based on stakeholder consultation

Risk Evaluation
- Evaluate risks in terms of likelihood & consequence (e.g., very high to very low); understand costs and benefits, determine acceptability
- Rank & prioritize risks in order of importance to address

Adaptation Measures
- ID options to treat/deal with each risk
- Consider potential opportunities and how they can be exploited
- Select optional solutions (based on ROI, loss estimation analysis)

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[1] Climate Lens, General Guidance, Annex G – Methodologies and Resilience Assessment Steps: https://www.infrastructure.gc.ca/pub/other-autre/cl-occ-eng.html#2

Envision's approach

Credits in the Climate and Resilience Credit Category—CR2.2 – CR2.5—outline an approach to understanding risk and resilience consistent with Climate Lens requirements

CR2.2 Assess Climate Change Vulnerability

CR2.3 Evaluate Risk and Resilience

CR2.4 Establish Resilience Goals and Strategies

CR2.5 Maximize Resilience

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Envision's approach, cont'd

CR2.2 Assess Climate Change Vulnerability

INTENT: Develop a comprehensive climate change vulnerability assessment	METRIC: Scope & comprehensiveness of the assessment

A. Determine climate change threats to the project and its surroundings:

- Asset
- Infrastructure system
- Community-scale

Account for climate change's impact on the frequency, duration & severity of threats / hazards identified

B. Determine vulnerability of the project to climate change threats

C. Determine vulnerability of the infrastructure system…

D. Determine vulnerability of the community…

E. Share findings

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Envision's approach, cont'd

CR2.3 Evaluate Risk and Resilience

INTENT: Conduct a comprehensive, multihazard risk and resilience evaluation	METRIC: Scope & comprehensiveness of the assessment

A. Establish scope and boundary of the assessment:
- Asset
- Infrastructure system
- Community-scale

B. ID critical functions and dependencies of the asset

C. ID threats or hazards to the project & its surroundings

D. ID vulnerabilities of critical functions and dependencies of the asset

E. Evaluate risks by determining probability and impacts

F. Involve stakeholders in the risk evaluation

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Envision's approach, cont'd

CR2.4 Establish Resilience Goals and Strategies

INTENT: Support project and community resilience through est. of clear objectives and goals	METRIC: Degree to which resilience goals expand from initial commitments to quantifiable objectives, L-T operating plans & community-wide dev. plans

A. ID project performance goals and risk appetite of the owner

B. Develop risk management strategies based on risk evaluation (CR2.3)

C. Engage stakeholders in developing resilience goals

D. Ensure the project supports or is part of larger community resilience or climate change adaptation goals

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Envision's approach, cont'd

CR2.5 Maximize Resilience

INTENT: Increase resilience, life-cycle system performance & ability to withstand hazards by max. durability	METRIC: Degree to which the project incorporates elements that increase durability, ability to withstand hazards, and extend useful life

A. Develop resilience goals and strategies based on comprehensive risk evaluation (CR2.2)

B. Implement resilience strategies that are sufficient to address major project risks and improve project resilience

C. Monitor implementation of project resilience strategies, review their ongoing effectiveness

D. Incorporate resilience goals and strategies into ongoing O&M

E. Include methods for measuring/quantifying resilience performance targets

References:

1. Institute for Sustainable Infrastructure & Envision: www.sustainableinfrastructure.org

2. Grand Bend Area Wastewater Treatment Facility Envision Award Announcement: https://sustainableinfrastructure.org/project-awards/grand-bend-area-wastewater-treatment-facility/

3. Surrey Biofuel Facility Envision Award Announcement: https://sustainableinfrastructure.org/project-awards/surrey-biofuel-facility-earns-envision-platinum/

4. Samuel de Champlain Bridge Corridor Project Award Announcement: https://sustainableinfrastructure.org/project-awards/new-champlain-bridge-corridor/

5. Investing in Canada Plan: https://www.infrastructure.gc.ca/plan/about-invest-apropos-eng.html

6. Climate Lens General Guidance: https://www.infrastructure.gc.ca/pub/other-autre/cl-occ-eng.html

7. Disaster Mitigation and Adaptation Fund: https://www.infrastructure.gc.ca/dmaf-faac/index-eng.html

8. Smart Cities Challenge: https://www.infrastructure.gc.ca/cities-villes/index-eng.html

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Contact information

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Link to Video: https://youtu.be/eyf-QZzSiug