USE OF ENVISION RATING SYSTEM TO PROMOTE INFRASTRUCTURE RESILIENCE AND SUSTAINABILITY

2/22/2018
Envision

- Identify ways in which sustainable approaches can be used to plan, design, construct, operate, maintain, and deconstruct/decommission infrastructure projects
- Apply to projects not currently addressed by an existing sustainability rating system
- Fill the gap between existing, sector-specific systems
Envision

ISI Founding Organizations

- Launched in 2012 – v2
- v3 release in 2018
Applicable Projects:
Components that make up the built environment

**ENERGY**
- Geothermal
- Hydroelectric
- Nuclear
- Coal
- Natural Gas
- Oil/Refinery
- Wind
- Solar
- Biomass

**WATER**
- Potable water and WW Treatment
- Water Reuse
- Storm Water Management
- Capture/Storage
- Collection & Distribution
- Flood Control

**WASTE**
- Solid waste
- Recycling
- Hazardous Waste
- Collection & Transfer
- Brownfield Restoration

**TRANSPORT**
- Airports
- Roads
- Highways
- Bridges
- Bikes
- Pedestrians
- Railways
- Public Transit
- Ports
- Waterways

**LANDSCAPE**
- Public Realm
- Parks
- Ecosystem Services

**INFORMATION**
- Telecommunications
- Internet
- Phones
- Satellites
- Data Centers
- Sensors
Envision 5 years after – Verified Projects

Envision Verified Projects by Year (2012 - 2017)

- Number Verified
- Cumulative Total
- Poly. (Cumulative Total)
Envision 5 years after - $ value of Verified Projects

Cumulative Value of Envision Verified Projects (in $ millions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (in $ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$102.00</td>
</tr>
<tr>
<td>2014</td>
<td>$252.00</td>
</tr>
<tr>
<td>2015</td>
<td>$1,104.00</td>
</tr>
<tr>
<td>2016</td>
<td>$5,578.40</td>
</tr>
<tr>
<td>2017</td>
<td>$9,916.87</td>
</tr>
</tbody>
</table>
Envision 5 years after – Location of Projects

- Marshview Park Phase 1
- Nutrient Management Facility
Envision 5 years after – Sector Use
Envision Toolkit

• Credentialing program
  – Envision Sustainability Professional
  – 4788 ENV SPs in North America
  – 180 in VA

• Pre-assessment checklist

• Envision Rating Tool

• Project verification and recognition
  – Platinum-Gold-Silver-Bronze
How Can You Use It?
How is Envision being used?

- To compare alternatives
- To assess the sustainability of past and current projects
- To identify ways to improve the sustainability of projects
- To identify the areas where projects are performing well, along with areas for improvement
- To compare the sustainability of similar projects, referencing a standard, industry accepted system
How is Envision being used?

- To identify and/or set a baseline for sustainability and demonstrate improvements in sustainability as enhancements are made to projects of a similar typology
- To receive public recognition for sustainability achievements by an independent, recognized system
- Verifiable way to show community / rate payers that project addressed community concerns and was more sustainable than typical projects
How Can You Use Envision? As a Planning Tool

- Engage stakeholders
- Assess community values
- Build consensus around "right" project solution
- Define project scope
- Evaluate conceptual projects or alternatives
How Can You Use Envision? As a Design Tool

- Identify opportunities for incremental improvements in sustainable performance

Inherent to Project:
- Noise and Odor Control
- Stakeholder Involvement
- Infrastructure Renewal
- Capacity Enhancement
- Flexible Operations
- Resiliency

Materials: Regional, Recycled, Reclaimed?

Vegetation: Local, Non-invasive, Natural Pesticides?

Pumping Station

Roof: Vegetated, Solar, High Reflectance?

Stormwater: Cistern, Rain Garden?

Energy: Efficiency, Renewable?
Envision looks at the entire project life cycle

Credits to be executed in construction

- Construction Waste Management
- Credits related to long-term O&M procedures and setting aside resources
- Future
  - Construction Verification
How Can You Use Envision? As a Communication Tool

• Outreach Language

• Transparent Approach Toward Triple Bottom Line

• Award Confirms Achievement
Envision Structure
Envision Structure

- 5 Categories - 14 Subcategories
- Checklist - 55 groups of questions
- Rating System - 60 Credits
  - 5 Innovation credits
- 5 Levels of Achievement
  - Improved-Enhanced-Superior-
  - Conserving-Restorative
Quality of Life

Addresses a project’s impact on communities from the health and wellbeing of individuals to the wellbeing of the larger social fabric as a whole.

1 PURPOSE
QL1.1 Improve Community Quality of Life
QL1.2 Stimulate Sustainable Growth & Development
QL1.3 Develop Local Skills & Capabilities

2 WELLBEING
QL2.1 Enhance Public Health & Safety
QL2.2 Minimize Noise and Vibration
QL2.3 Minimize Light Pollution
QL2.4 Improve Community Mobility & Access
QL2.5 Encourage Alternative Modes of Transportation
QL2.6 Improve Accessibility, Safety, & Wayfinding

3 COMMUNITY
QL3.1 Preserve Historic & Cultural Resources
QL3.2 Preserve Views & Local Character
QL3.3 Enhance Public Space
Leadership

Comprised of the tasks that demonstrate effective leadership and commitment by all parties involved in a project.

1 COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Establish A Sustainability Management System
LD1.3 Foster Collaboration & Teamwork
LD1.4 Provide for Stakeholder Involvement

2 MANAGEMENT
LD2.1 Pursue By-Product Synergy Opportunities
LD2.2 Improve Infrastructure Integration

3 PLANNING
LD3.1 Plan For Long-Term Monitoring & Maintenance
LD3.2 Address Conflicting Regulations & Policies
LD3.3 Extend Useful Life
Resource Allocation

Measures the use of renewable / non-renewable resources.

1 MATERIALS
- RA1.1 Reduce Net Embodied Energy
- RA1.2 Support Sustainable Procurement Practices
- RA1.3 Use Recycled Materials
- RA1.4 Use Regional Materials
- RA1.5 Divert Waste From Landfills
- RA1.6 Reduce Excavated Materials Taken Off Site
- RA1.7 Provide For Deconstruction & Recycling

2 ENERGY
- RA2.1 Reduce Energy Consumption
- RA2.2 Use Renewable Energy
- RA2.3 Commission & Monitor Energy Systems

3 WATER
- RA3.1 Protect Fresh Water Availability
- RA3.2 Reduce Potable Water Consumption
- RA3.3 Monitor Water Systems
Natural World

Assesses the effect of the project on the preservation and renewal of ecosystem functions. Understand and minimize negative impacts while considering ways in to interact with natural systems in a synergistic and positive way.

1 SITING
NW1.1 Preserve Prime Habitat
NW1.2 Protect Wetlands & Surface Water
NW1.3 Preserve Prime Farmland
NW1.4 Avoid Adverse Geology
NW1.5 Preserve Floodplain Functions
NW1.6 Avoid Unsuitable Development on Steep Slopes
NW1.7 Preserve Greenfields

2 LAND+WATER
NW2.1 Manage Stormwater
NW2.2 Reduce Pesticide & Fertilizer Impacts
NW2.3 Prevent Surface & Groundwater Contamination

3 BIODIVERSITY
NW3.1 Preserve Species Biodiversity
NW3.2 Control Invasive Species
NW3.3 Restore Disturbed Soils
NW3.4 Maintain Wetland & Surface Water Functions
Climate and Risk

Minimize emissions that may contribute to increased short- and long-term risks and ensuring that infrastructure projects are resilient to short-term hazards or altered long-term future conditions.
Changes

Version 2
- 5 categories
- 60 credits
- Climate and Risk
- Maximum Total Points – 809
- Envision Award at 95% design completion.
- No Credential Maintenance

Version 3
- 5 categories
- 64 credits
- Risk and Resilience
- Maximum Total Points - 1000
- Provisional Award at 95% design completion. Envision Award at 95% construction completion
- Annual Credential Maintenance
Changes

• Additional credits eg. equity and social justice, construction phase water and energy consumption

• Enhanced clarity on Levels of Achievement

• Currently registered projects can use v2 or v3. Cut off date for switching to v3 will be Q4 2018.

• New projects can register under v2 or v3 until Q4 2018

• Projects registered under v2 must complete verification by Q4 2020
### Projects Overview

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Lead</th>
<th>Project Status</th>
<th>Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheldon Avenue</td>
<td>Retaya Verner, AECOM, Principal Engineer</td>
<td>Verification</td>
<td>06/10/2015</td>
</tr>
<tr>
<td>Upper Proctor Creek Capacity Relief Project</td>
<td>Caroline Smith, City of Atlanta - Department of Watershed Management</td>
<td>Unregistered</td>
<td>01/07/2016</td>
</tr>
</tbody>
</table>

Need to manage your firm's project teams? Learn more about the benefits of becoming a Sustaining Member Organization.
## Project Input

<table>
<thead>
<tr>
<th>Purpose</th>
<th>13 credits in progress, 13 credits completed</th>
<th>Project progress</th>
<th>0 of 138 Possible points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>QL1.1 Improve Community Quality of Life</td>
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<td></td>
<td>N/A</td>
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<tr>
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<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Wellbeing</strong></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>QL2.1 Enhance Public Health and Safety</td>
<td></td>
<td></td>
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<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>
**Determining Levels of Achievement**

<table>
<thead>
<tr>
<th>Improved</th>
<th>Enhanced</th>
<th>Superior</th>
<th>Conserving</th>
<th>Restorative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance that is above conventional.</td>
<td>Sustainable performance that is on the right track.</td>
<td>Sustainable performance that is noteworthy but not conserving.</td>
<td>Performance that has achieved essentially zero negative impact.</td>
<td>Performance that restores natural or social systems.</td>
</tr>
<tr>
<td>Slightly exceeds regulatory requirements.</td>
<td></td>
<td></td>
<td></td>
<td>Not applicable to all objectives.</td>
</tr>
</tbody>
</table>

- Progression is not necessarily linear.
- Some credits will not include every level.
Credits

RA1.1 REDUCE NET EMBODIED ENERGY

INTENT:
Conservate energy by reducing the net embodied energy of project materials over the project life.

LEVELS OF ACHIEVEMENT

<table>
<thead>
<tr>
<th>IMPROVED</th>
<th>ENRICHED</th>
<th>SUPERIOR</th>
<th>CONSERVING</th>
<th>RESTORATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>E00 Life Cycle Assessment (LCA) performed.</td>
<td>E00 At least 10% reduction in LCA rated embodied energy.</td>
<td>E00 At least 40% reduction in LCA rated embodied energy.</td>
<td>E00 At least 70% reduction in LCA rated embodied energy.</td>
<td>E00 Reduction in LCA rated embodied energy.</td>
</tr>
<tr>
<td>E00 Raw material and energy content and transportation impacts considered.</td>
<td>E00 Raw material and energy content and transportation impacts considered.</td>
<td>E00 Raw material and energy content and transportation impacts considered.</td>
<td>E00 Raw material and energy content and transportation impacts considered.</td>
<td>E00 Reduction in LCA rated embodied energy.</td>
</tr>
</tbody>
</table>

DESCRIPTION

This credit addresses the need to reduce the huge amounts of energy that can be consumed long before a project begins operations. This energy is associated with the extraction, processing, manufacturing, and transport of materials and components. Consumption of such resources is a primary concern and greatly contributes to greenhouse gas emissions, energy consumption, and environmental pollution and degradation. Reducing net embodied energy does not mean focusing solely on the short-term. Maintenance and repair can consume large amounts of material and time. It is essential to consider the entire life cycle of a project to ensure that materials and resources used will result in less material being consumed over the life of the project. Therefore, projects should be designed to consider the consumption of construction and repair materials over the project’s lifespan.

In fulfilling this credit, estimation of the net embodied energy of project materials is required. The estimation may be carried out by a life-cycle assessment (LCA) and include the required energy for material extraction, transportation, refinement, manufacturing, and end-of-life processes. The material must satisfy the requirements to be included in the project’s credit, while the material to be used for maintenance and emergency operations of the project must be identified. Project teams are expected to consider the availability of materials and technologies to reduce the net embodied energy over the entire project life. Because of the relative novelty of this assessment and the variability of energy sources, project teams are expected to discuss in detail the strategies and technologies used to reduce the net embodied energy over the entire project life.

Project teams pursuing multiple credits that require a LCA may find that conducting a single comprehensive LCA is more efficient. A single LCA project that includes multiple credits may be more efficient and less time-consuming. This will require that the project teams conduct a single LCA project to meet all of the requirements of the multiple credits.

EVALUATION CRITERIA AND DOCUMENTATION

A. Use the project team’s consideration to implement materials with lower embodied energy and less environmental impact. This information may include the use of materials with lower embodied energy and less environmental impact over the life of the project.

B. Demonstrate that the project team has reduced the net embodied energy of the project by 40% or more compared to the baseline scenario.

C. Document the calculation of the net embodied energy of materials used in the project and the reduction in embodied energy achieved.

D. Provide evidence of the reduction in embodied energy achieved, including any changes in material selection and manufacturing processes.

SOURCES


RELATED EMPIRICAL CREDITS

RA1.2 Support Sustainable Procurement Practices.
RA1.3 Use Renewable Materials.
RA1.4 Use Regional Materials.
RA1.5 Diverse Materials from Landfills.
RA1.6 Reduce Energy Consumption.
RA1.7 Use Renewable Energy.
RA1.8 Reduce Perchloro Ethylene Consumption.
RA1.9 Promote Sustainable Landscaping.
RA1.10 Reduce Greenhouse Gas Emissions.
RA1.11 Reduce Air Pollution Emissions.
RA1.12 Promote Water Conservation.
RA1.13 Promote Waste Reduction.
RA1.14 Increase Energy Efficiency.
RA1.15 Manage Natural Disasters.
### Project Input

<table>
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<tr>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
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<td>N/A</td>
<td>0</td>
</tr>
<tr>
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<td>N/A</td>
<td>0</td>
</tr>
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<tr>
<td>Wellbeing</td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>QL2.1 Enhance Public Health and Safety</td>
<td>N/A</td>
<td>0</td>
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<tr>
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<td>N/A</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
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<td>N/A</td>
<td>0</td>
</tr>
</tbody>
</table>
Verification and Award Steps

- Envision Sustainability Professional (ENV SP)
  - Project team point of contact
  - Project registration and fee ($1000)

Registration → Assessment → Verification → Award → Appeals
Verification and Award Steps

- Envision Sustainability Professional (ENV SP)
  - Project assessment and documentation
  - Pay verification fee (see table)

Appeals
## Verification Fee

<table>
<thead>
<tr>
<th>Project Size, $</th>
<th>Non-Member Price</th>
<th>ISI Member Price</th>
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<tbody>
<tr>
<td>Up to 2 million</td>
<td>$3000</td>
<td>$2400</td>
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<tr>
<td>2 to 5 million</td>
<td>$8500</td>
<td>$7000</td>
</tr>
<tr>
<td>5 to 25 million</td>
<td>$17,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>25 to 100 million</td>
<td>$25,000</td>
<td>$21,000</td>
</tr>
<tr>
<td>100 to 250 million</td>
<td>$33,000</td>
<td>$28,000</td>
</tr>
<tr>
<td>Over 250 million</td>
<td>Contact ISI for large or multi-phase projects.</td>
<td></td>
</tr>
</tbody>
</table>

Contact ISI for large or multi-phase projects.
Verification and Award Steps

Verifier
- Assigned by ISI
- Project verification

ISI Staff
- Oversight to the verification program
- Quality control
Project Scoring

SCORES - SHELDON AVENUE

Sheldon Avenue
Staten Island, NY

Project Stage
Complete

Silver

Generate printable view of selected credits
Download selected credit attachments
## Project Scoring

<table>
<thead>
<tr>
<th>Credit Category</th>
<th>Applicable</th>
<th>Submitted</th>
<th>Percentage</th>
<th>Applicable</th>
<th>Verified</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>QUALITY OF LIFE</td>
<td>138</td>
<td>59</td>
<td>43%</td>
<td>138</td>
<td>43</td>
<td>31%</td>
</tr>
<tr>
<td>LEADERSHIP</td>
<td>121</td>
<td>52</td>
<td>43%</td>
<td>121</td>
<td>52</td>
<td>43%</td>
</tr>
<tr>
<td>RESOURCE ALLOCATION</td>
<td>80</td>
<td>28</td>
<td>35%</td>
<td>80</td>
<td>4</td>
<td>5%</td>
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<tr>
<td>NATURAL WORLD</td>
<td>164</td>
<td>59</td>
<td>36%</td>
<td>164</td>
<td>59</td>
<td>36%</td>
</tr>
<tr>
<td>CLIMATE AND RISK</td>
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<td>60</td>
<td>49%</td>
<td>122</td>
<td>60</td>
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<td>Total Points / %</td>
<td>625</td>
<td>258</td>
<td>41%</td>
<td>625</td>
<td>218</td>
<td>35%</td>
</tr>
</tbody>
</table>
Verification and Award Steps

Registration → Assessment → Verification → Award

BRONZE: 20%
SILVER: 30%
GOLD: 40%
PLATINUM: 50%

Appeals
Agency Use of Envision
New York City Department of Design and Construction
OneNYC

**Vision 1: Our Growing, Thriving City**
New York City will continue to be the world’s most dynamic urban economy where families, businesses, and neighborhoods thrive.

**Vision 2: Our Just and Equitable City**
New York City will have an inclusive, equitable economy that offers well-paying jobs and opportunity for all to live with dignity and security.

**Vision 3: Our Sustainable City**
New York City will be the most sustainable big city in the world and a global leader in the fight against climate change.

**Vision 4: Our Resilient City**
Our neighborhoods, economy, and public services are ready to withstand and emerge stronger from the impacts of climate change and other 21st century threats.
SUSTAINABILITY

New York City is continuing to move aggressively to reduce its impact on the environment – meeting tomorrow’s needs without compromising resources available to future generations. DDC is helping the City rapidly minimize greenhouse gas emissions through dramatically reduced building energy use in both new construction and renovation. On building sites and infrastructure projects, DDC designs natural systems and habitats through the five boroughs to manage stormwater and bring the many benefits of nature to citizens. The City has set a high bar, pledging a reduction in greenhouse gas emissions of 80 percent from 2005 levels by 2050, and reducing commercial waste 90 percent by 2030. DDC’s High Performance Infrastructure Guidelines and Design and Construction Excellence 2.0 Guiding Principles are the foundation of DDC’s goals to bring excellence in design to all projects by:

- Significantly lowering the City’s carbon footprint by reducing the City’s greenhouse gas emissions;
- Working to link carbon reduction opportunities to new and existing public buildings and infrastructure projects; and
- Investigating energy retrofits

RESILIENCY

Resilience design delivers projects capable of adapting to change. Resiliency means preparing the City’s public buildings and infrastructure to maintain service, and to rapidly rebound from extreme events. The chief hazards to the City’s built environment are storms and flooding of increased frequency and greater severity, extreme heat, extreme cold and human caused tragedies. Many of these risks will loom larger as the effects of global warming become more obvious. Some resiliency challenges develop over time, such as hazards from sea level rise and critical systems that are not maintained. Design can not only make us safe, but can also build communities, enhance neighborhoods and invite investment. Well-coordinated tactics that can evolve and adapt over time will achieve robust buildings, infrastructure, neighborhoods and services. In a Post-Hurricanes Irene/Sandy environment, DDC wants to ensure that all future capital projects are designed to heightened expectations of resiliency by:

- Mitigating neighborhood flooding and offering high-quality water services;
- Assuring that areas at risk are built to updated code standards and construction practices; and
- Recreating a sense of community and neighborhood safety lost in the aftermath of Hurricanes Irene/Sandy
14. The Consultant shall prepare and submit a Preliminary Design Report concerning, the Project. The report shall document all issues and concerns identified; existing substandard features and the measures proposed to address the issues and substandard features identified; alternative schematic designs considered and design recommendations that have been accepted by the Commissioner, including sustainable Design alternatives, if any, as described in Section 2.3 and 4.10.4.E of these General Requirements and those alternatives that improve the Envision Sustainability DDC Baseline Rating of the applicable project typology.

### 4.41 ENVISION

The consultant shall be familiar Envision Sustainable Infrastructure Rating System - an in-depth guidance platform and rating system used to assess and improve the sustainability metrics of all types and sizes of infrastructure projects. The Consultant shall assign an Envision Sustainability Professional [ENV SP] to track the project and collect all relevant data in response to the Envision Rating System credit categories. Information about the Envision Process can be found by going to the Institute for Sustainable Infrastructure (ISI) website located at www.sustainableinfrastructure.org.

Using the Envision Rating System the consultant will perform a schematic assessment of the assets associated with or affecting the project, using both the Envision™ Checklist, an educational tool that helps users become familiar with the sustainability aspects of infrastructure project design, as well as any project typology specific Envision baseline data that the agency can supply. The overall objective is to identify, but is not limited to, resources, energy reduction, process optimization and technology opportunities that are measurable and will improve the long term economic, environmental and social sustainability of the project.

All projects shall prepare a document showing opportunities for maximizing the sustainable impact of each projects outlining methods to improve the project via planning and design, making recommendations as to areas where the Project can improve.

During the Preliminary and Final design of the Project the Consultant shall prepare an Envision Scoresheet from the Institute of Sustainable Infrastructure – where all documents, including but not limited to, meeting minutes, presentations, data compilations, studies, and reports which are prepared in the performance of this Project, shall be compiled. Any, and all improvements to the Baseline Rating of the specified project typology will be documented in the Envision Scoresheet. It required, the Consultant shall officially submit the project’s Envision Scoresheet to ISI for verification. The Consultant shall work with ISI’s verifier to provide further documentation, use their feedback to improve the overall score of the project and to confirm the level of achievement of the project.
Sustainability

These factsheets were produced by various WEF Committee's and are available for download.

- Use of the Envision Sustainable Infrastructure Rating System for Water Infrastructure
For more information visit the Sustainability Topic Page.

Use of the Envision Sustainable Infrastructure Rating System for Water Infrastructure

The Envision Sustainable Infrastructure Rating System is a triple bottom line based sustainability rating system specifically developed for use in civil infrastructure. The water infrastructure sector has successfully leveraged Envision to achieve application of sustainable practices in the planning, design, and long-term operation of a full range of facilities.
ENVISION: A RATING SYSTEM FOR SUSTAINABLE INFRASTRUCTURE

The industry now has detailed guidance and metrics for sustainable infrastructure projects of every size and type.
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