



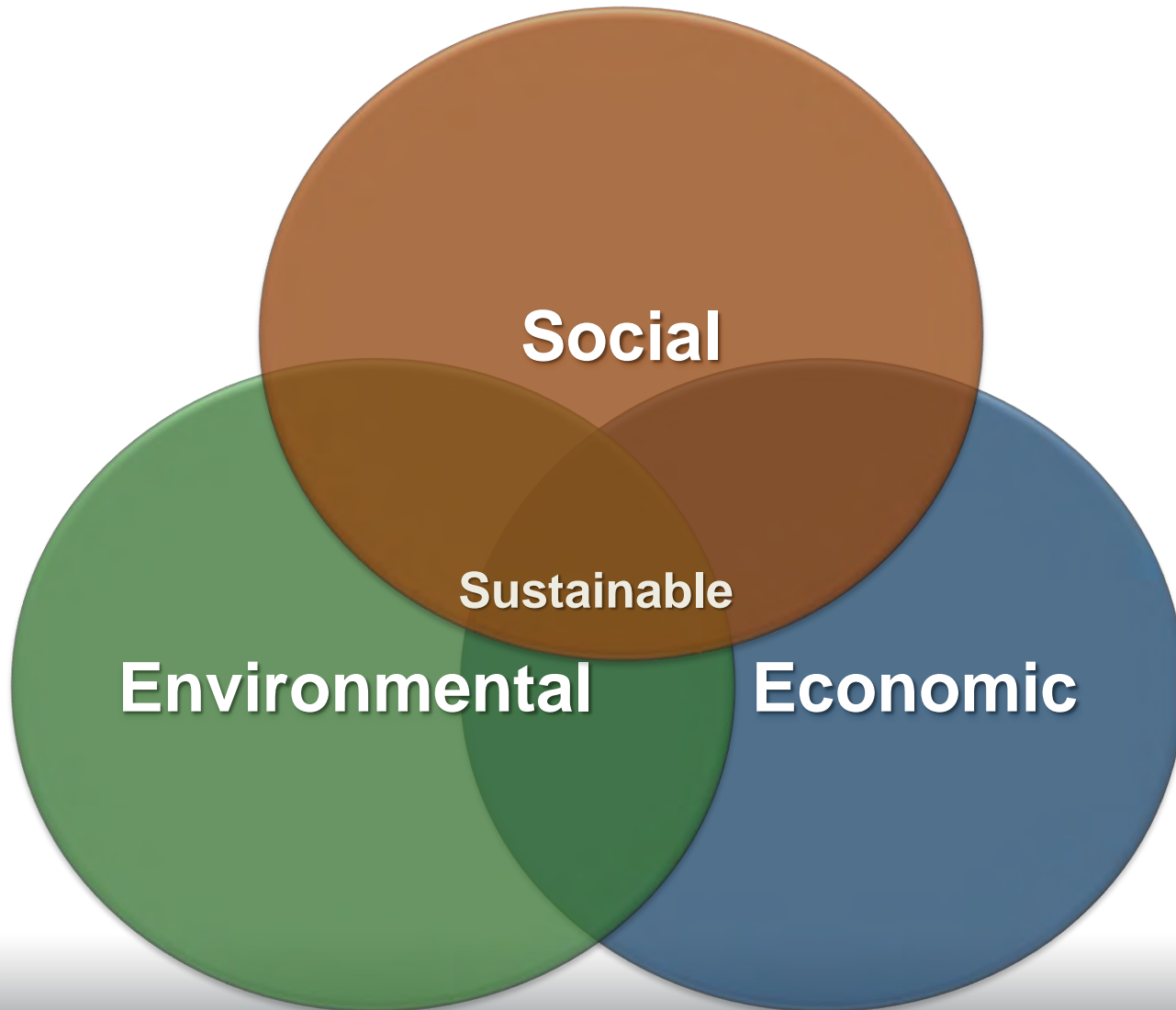
## PART 2 - MEASURING SUSTAINABILITY

Definitions, Examples and Discussion

Courtney Eaton, PE, ENV SP

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# Defining The Responsibilities



*“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”*

*1987 Brundtland Commission Report  
(UN Commission on Environment and  
Development)*

- Must balance
- Systems thinking
- Minimizing unintended consequences

# Sustainable Metrics Defined

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- What are sustainable metrics?

*Metrics are a way to quantify performance related to an established goal or objective*

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- What is their role in ‘measuring’ sustainability?

*Sustainable metrics are the measures of sustainability. This can be measured by evaluating the performance of a particular company’s environmental, social, and economic approaches. Programs can be measured against the best existing sustainable practices, which often go beyond the standard requirements*

# Frameworks help to Defining Goals & Objectives



# Triple Bottom Line Basis



## 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

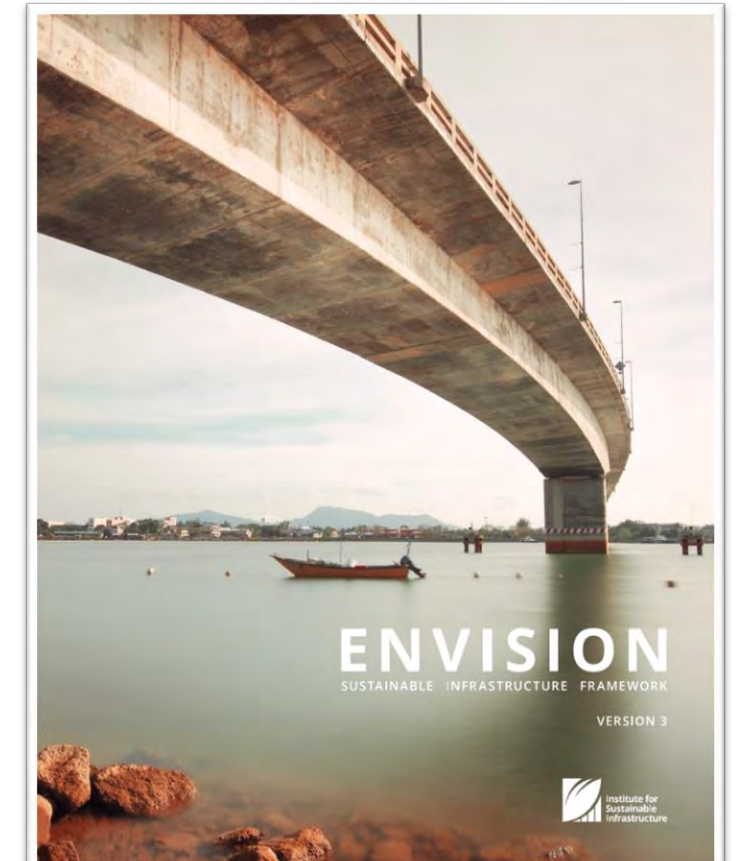
Siting, Conservation, Ecology



## Climate & Resilience

10 Credits

Emissions, Resilience



*Envision is a shared, transparent framework for creating sustainable infrastructure*

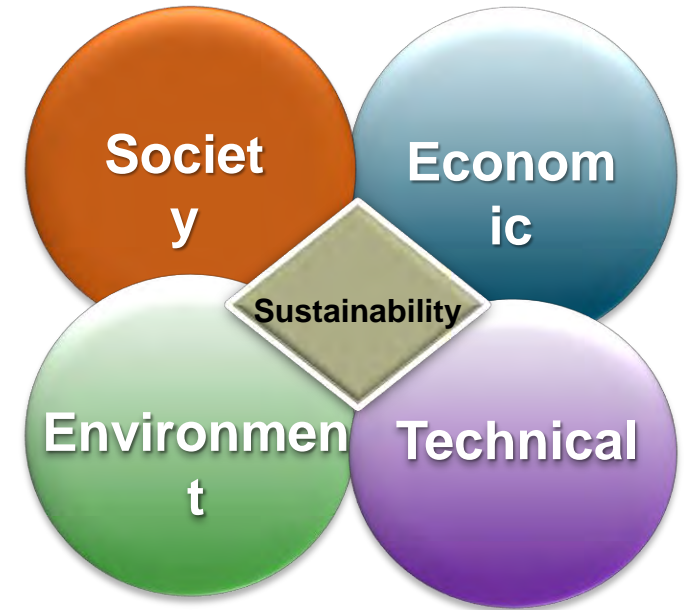
# Sustainable Metrics Expand the Criteria



- Expand beyond initial cost
- Potential uses
  - Alternatives comparison
  - Measure performance over time
  - Reporting to stakeholders

# Examples of Society / Community Metrics

- Aesthetic Impact
  - Noise levels
  - Light pollution
  - Views
- Public Space Enhancement
  - Addition of green space
  - Green space capacity
- Social Justice
  - Impact to vulnerable communities





# Quality of Life

- What is the project's impact on surrounding community?
  - Well-being –
    - Health & Safety
    - Light & Noise Pollution
  - Mobility
    - Sustainable transportation
  - Community
    - Public space enhancements
    - Historic / cultural resources



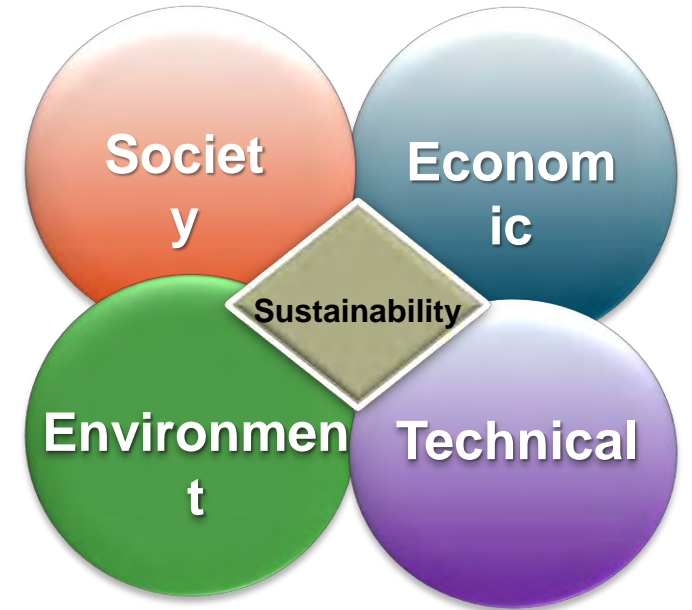
## Nutrient Management Facility in Alexandria, VA

Placed a multi-purpose athletic field on top of facility's process tanks



# Examples of Environment Metrics

- Resource Use
  - Materials - % recycled, % reused
  - Energy - % renewable, % reduction
  - Water - % reduction, % recycle
- Embodied Carbon / Greenhouse Gas
  - % reduction in supply chain or construction
- Sustainable sites
  - Stormwater management – volume capture / avoided load
  - Biodiversity – species count





# Resource Allocation

- What is the project's impact on physical resources?
  - Materials
    - Reduce, reuse, recycle
  - Energy
    - Efficiency / Commissioning
    - Renewables
  - Water
    - Resources / Efficiency



## Kunia Country Farms in Hawaii

Reduced potable water consumption by 75% - capture stormwater, minimizing evaporation, optimizing operations



# Natural World



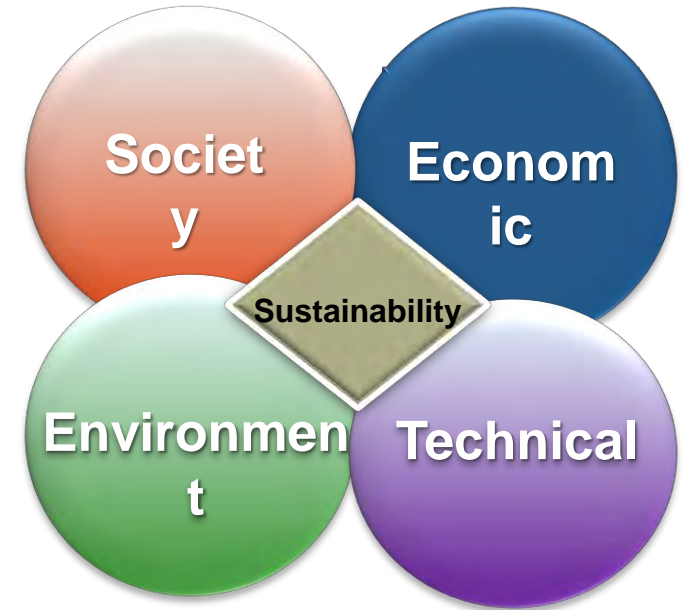
## Middle Blue River in Kansas City, MO

Green infrastructure creates habitat,  
encourages biodiversity and improves  
stormwater quality

- What is the project's impact on natural resources?
  - Siting
    - Protect high land of high ecological value
  - Conservation
    - Stormwater management
    - Surface / GW quality
  - Ecology
    - Biodiversity

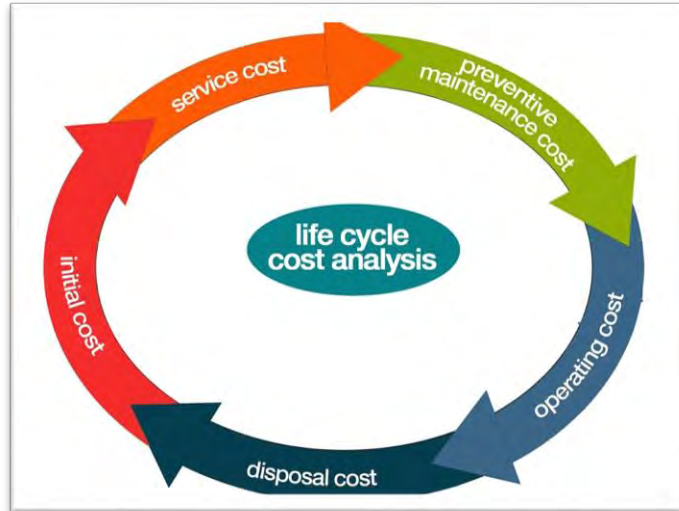
# Examples of Economic Metrics

- Lifecycle Cost
  - Initial Costs – design / construction
  - O&M Costs – energy, labor, materials
  - Soft Costs – permitting, financing
- Job Creation
- Economic Development
- Added Labor Capacity





# Leadership



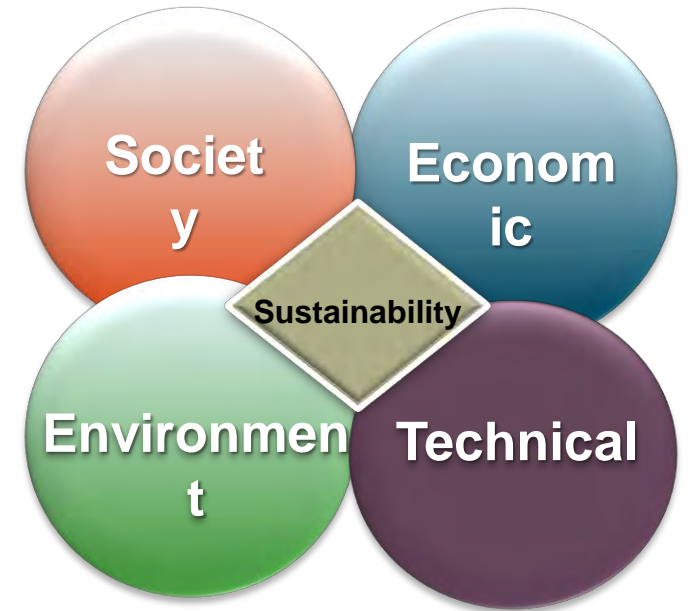
## Lifecycle Cost Analysis (LCCA)

Expand the analysis to quantify the full cost of the project including social and environmental impacts / benefits not just economic

- How is sustainably minded is the project leadership team?
  - Collaboration –
    - Teamwork and leadership commitment
    - Stakeholder involvement
  - Planning
    - Sustainable management plan
    - Plan for long-term monitoring and maintenance
  - Economy
    - Life-cycle economic evaluations

# Examples of Technical Metrics

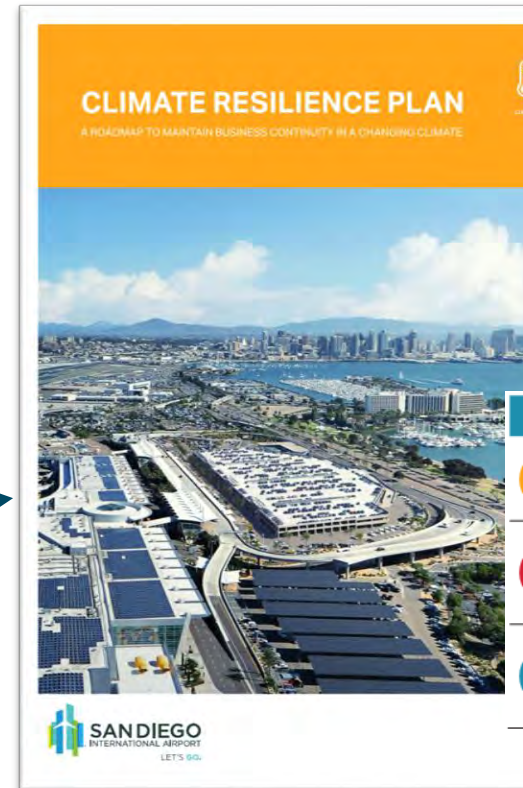
- Constructability
- Reliability
- Resilience to Vulnerability
  - Climate threats
  - Natural disaster
  - Regulatory
  - Supply chain
  - Health & safety








# Climate & Resilience

- How does the project consider climate and resilience?
  - Emissions
    - Air, GHGs, embodied carbon
  - Climate & Risk
    - Assess vulnerability
    - Evaluate risk & resilience
    - Establish goals
    - Maximize resilience



## San Diego International Airport Terminal Upgrade

- Identified climate threats
- Facilities designed to handle periodic flooding events
- Design access roadways to ensure functionality in the event of severe storms
- Design elevation of roadways higher than projected SLR in 2100

Climate Stressor*	Mid-Century	End-of-Century
 Precipitation	No significant change	Less frequent but more intense precipitation +0.2-in annual increase
 Heat	+6 extreme heat days per year on average Heat waves 1.4 days longer on average	+22 extreme heat days per year on average Heat waves 3.9 days longer on average
 SLR	5 percent chance that SLR will meet or exceed 1.4 feet	5 percent chance SLR will meet or exceed 4.5 feet 50 percent chance SLR will meet or exceed 2.6 feet

# Benefits of Measuring Sustainability



1. **Sustainable Decisions:** Helps decision makers meet sustainability goals and guide decisions
  - Offers a transparent approach
2. **Full Cost:** Use to evaluate soft costs and benefits (i.e., environmental / social)
3. **Community Benefit:** Address community-based priorities, in addition to utility-centric ones
4. **Performance:** Encourages benchmarking and tracking performance
5. **Leadership:** Demonstrates good governance



# Introduction of the Panelists



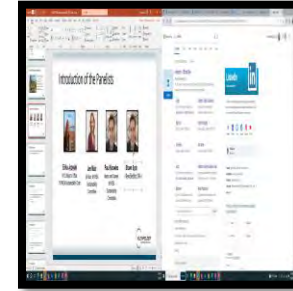
**Erika Jozwiak**  
NYC Mayor's Office,  
NYWEA Sustainability Chair



**Jen Muir**  
JK Muir, NYWEA  
Sustainability  
Committee



**Paul Knowles**  
Hazen and Sawyer,  
NYWEA  
Sustainability  
Committee



**Shawn Syde**  
New Bedford, MA

# Panel Discussion

- How would you apply the Use of Sustainable Metrics within your committee / organizational role?

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  - Commissioning

# Panel Discussion

- How would you apply the Use of Sustainable Metrics within your committee / organizational role?
- What are the challenges and opportunities of implementing the use of sustainable metrics within projects?
  - Funding
  - Public Acceptance
- What are the challenges and opportunities of measuring performance related to metrics within projects?
  - Commissioning
- How could NYWEA / NEWEA help in the above?

# Audience Q&A?



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# Quick Agenda



- Sustainable Metrics Defined
- Frameworks for Goal Setting
- Examples of Sustainable Metrics
- Benefits of Expanding the Criteria
- Panel Discussion
- Audience Q&A