

Sustainability in Business and Practice

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Solutions for Life™

First Era in the Water Sector

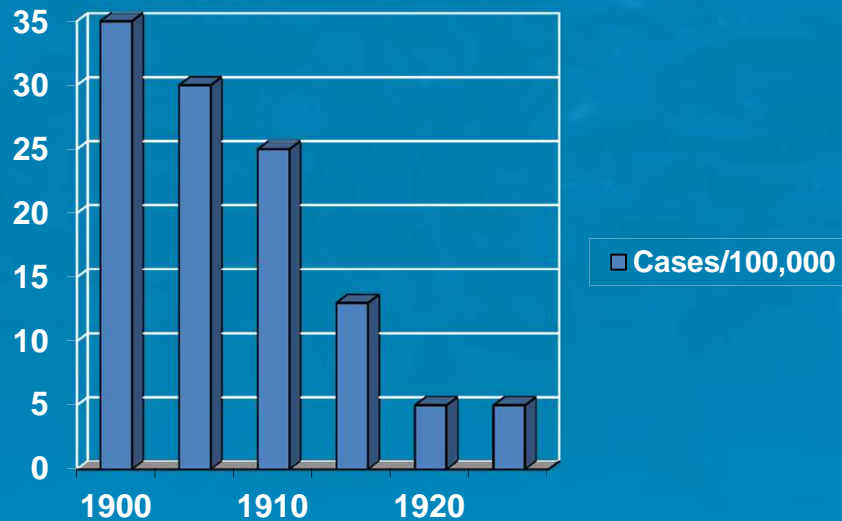
Find and Deliver Water Supplies



Second Era

Find and Deliver Water Supplies

Public Health



Third Era

Find and Deliver Water Supplies
Public Health

Environmental Health

Today, the Cuyahoga River is home to more than 60 species of fish; Beavers, blue herons and bald eagles nest along the river's banks.

NY Times
June 20, 2009



Fourth Era

Find and Deliver Water Supplies

Public Health

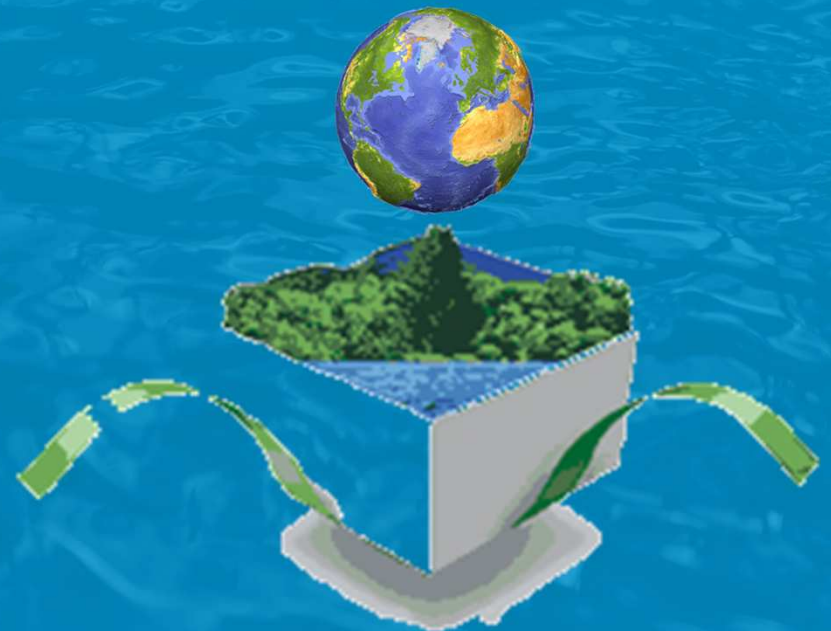
Environmental Health

Sustainable Environment



The Classic Definition

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



Sustainability - In Business Terms

What does your enterprise need to do now so that it meets its current requirements and obligations without compromising its ability to compete in the future?

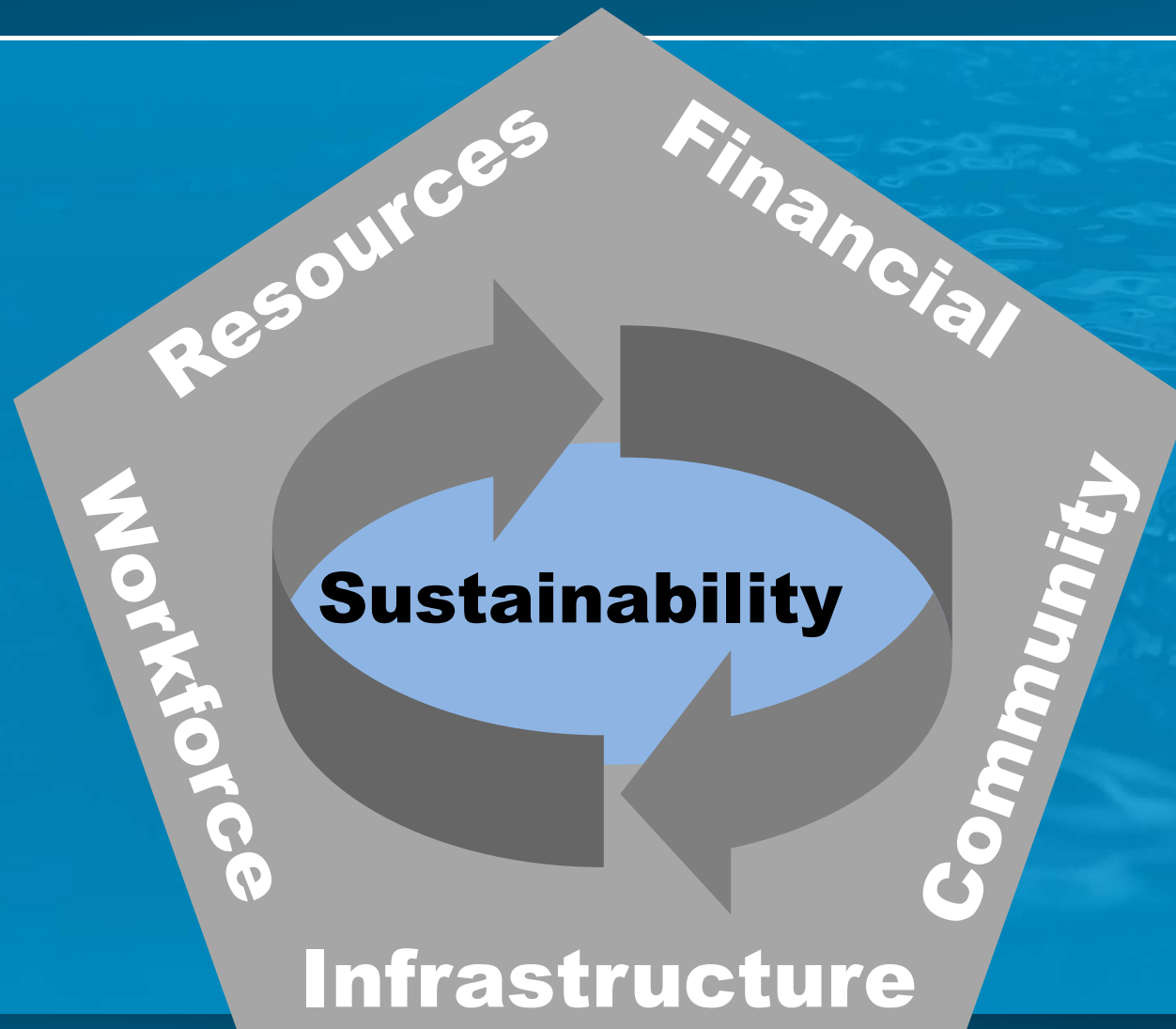
Presentation Outline

- An example of drivers
- Metrics and approaches
- Program and project examples
- Closing thoughts

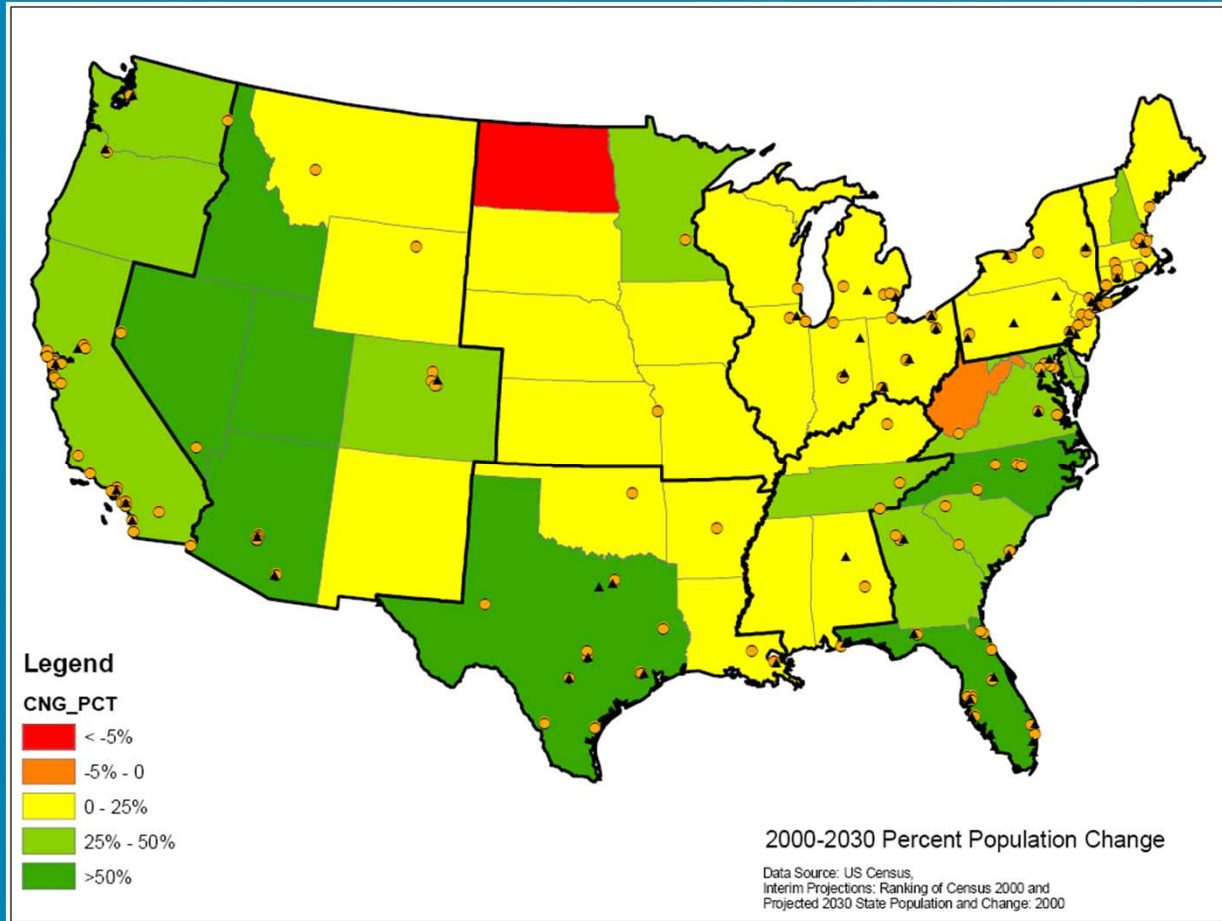
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Municipal Drivers for Sustainability



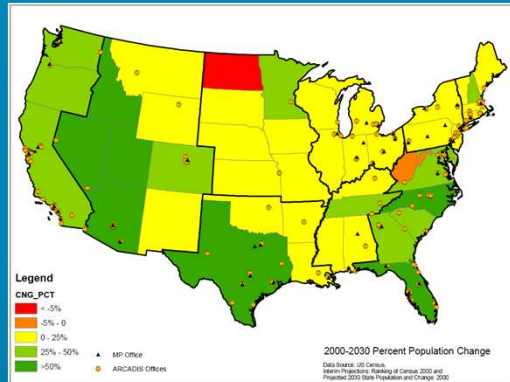
Projected 2000-2030 Percent Population Change: Water Rich to Water Poor



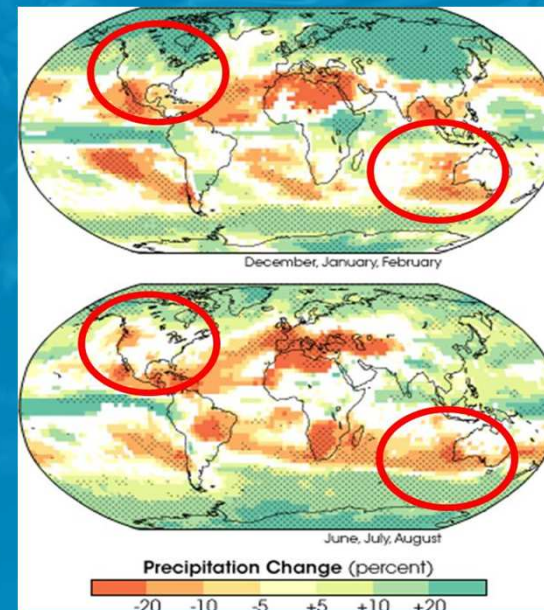
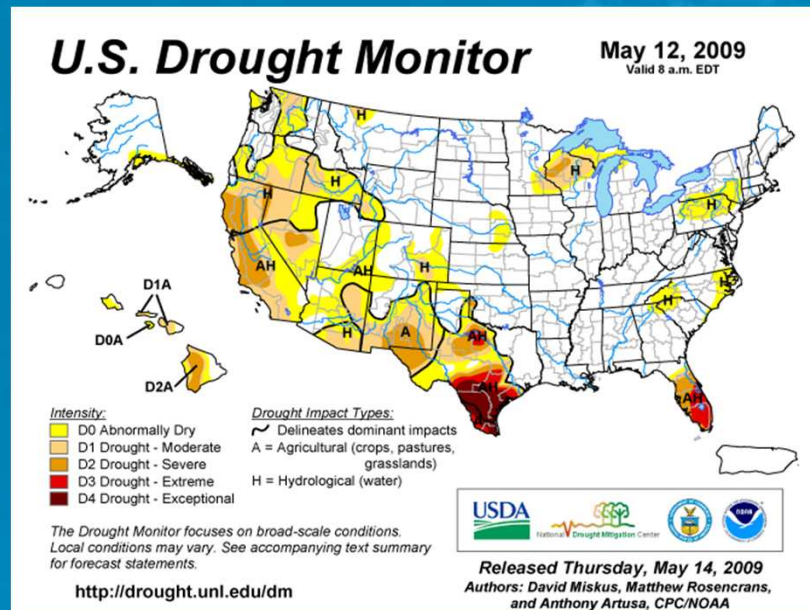
2000 – 282,000,000

2030 – 364,000,000

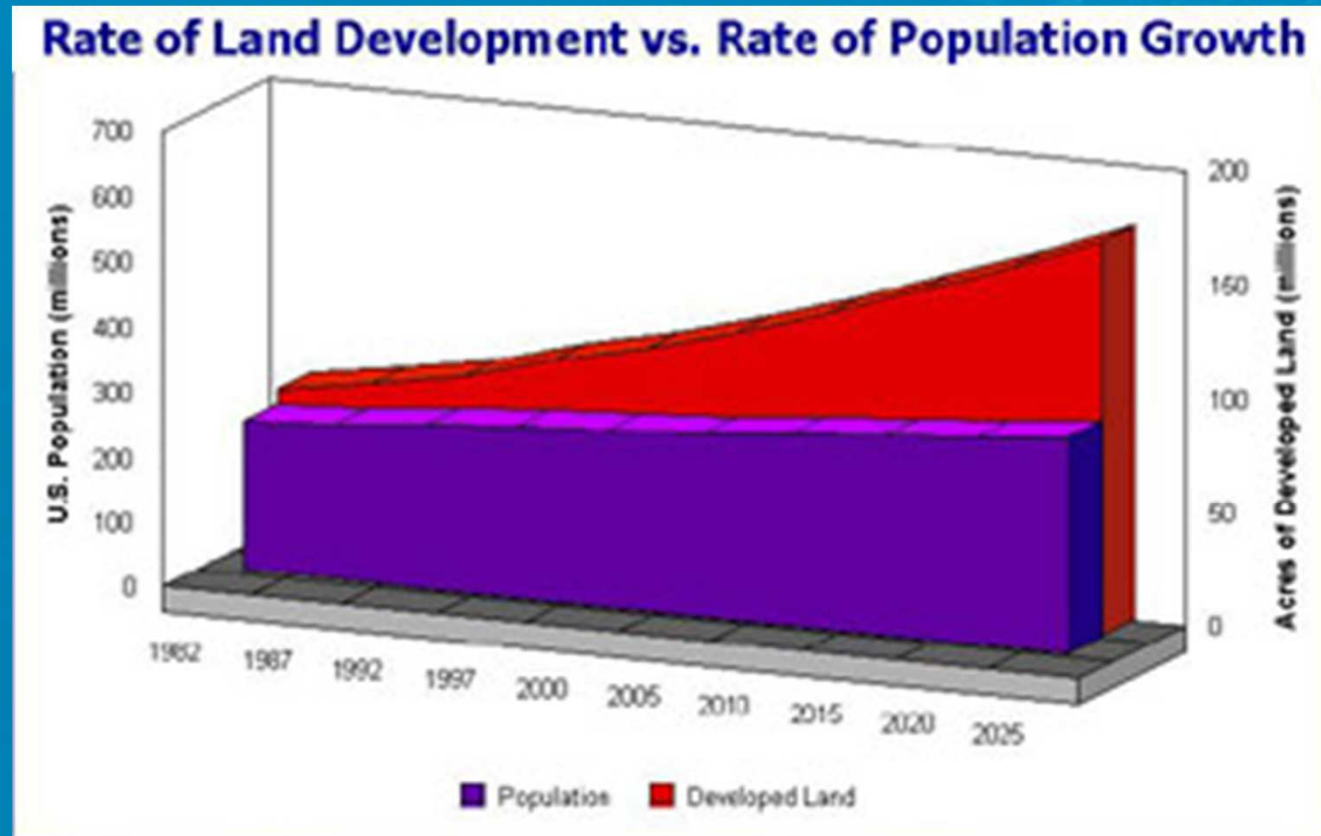
Climate - Drought and Floods



Average annual precipitation across the United States, in inches. Precipitation produces much of the world's drinking water, but precipitation levels range widely in different areas and seasons. Image courtesy of the U.S. National Atlas.



Land Development is Increasing Faster Than Population



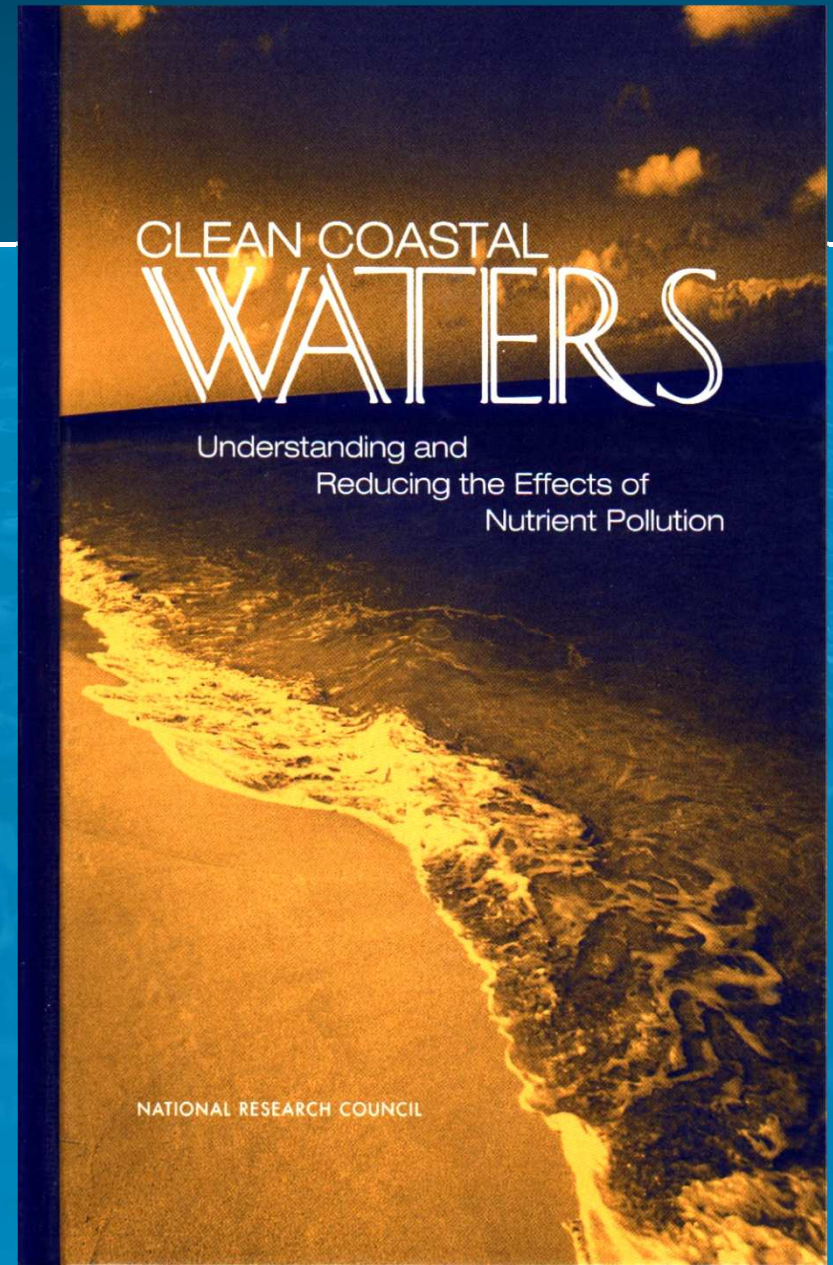
It's how and where we are growing that are driving our significantly increasing rate of land consumption, not domestic population growth.

Nitrogen Impairment

NRC 2000:

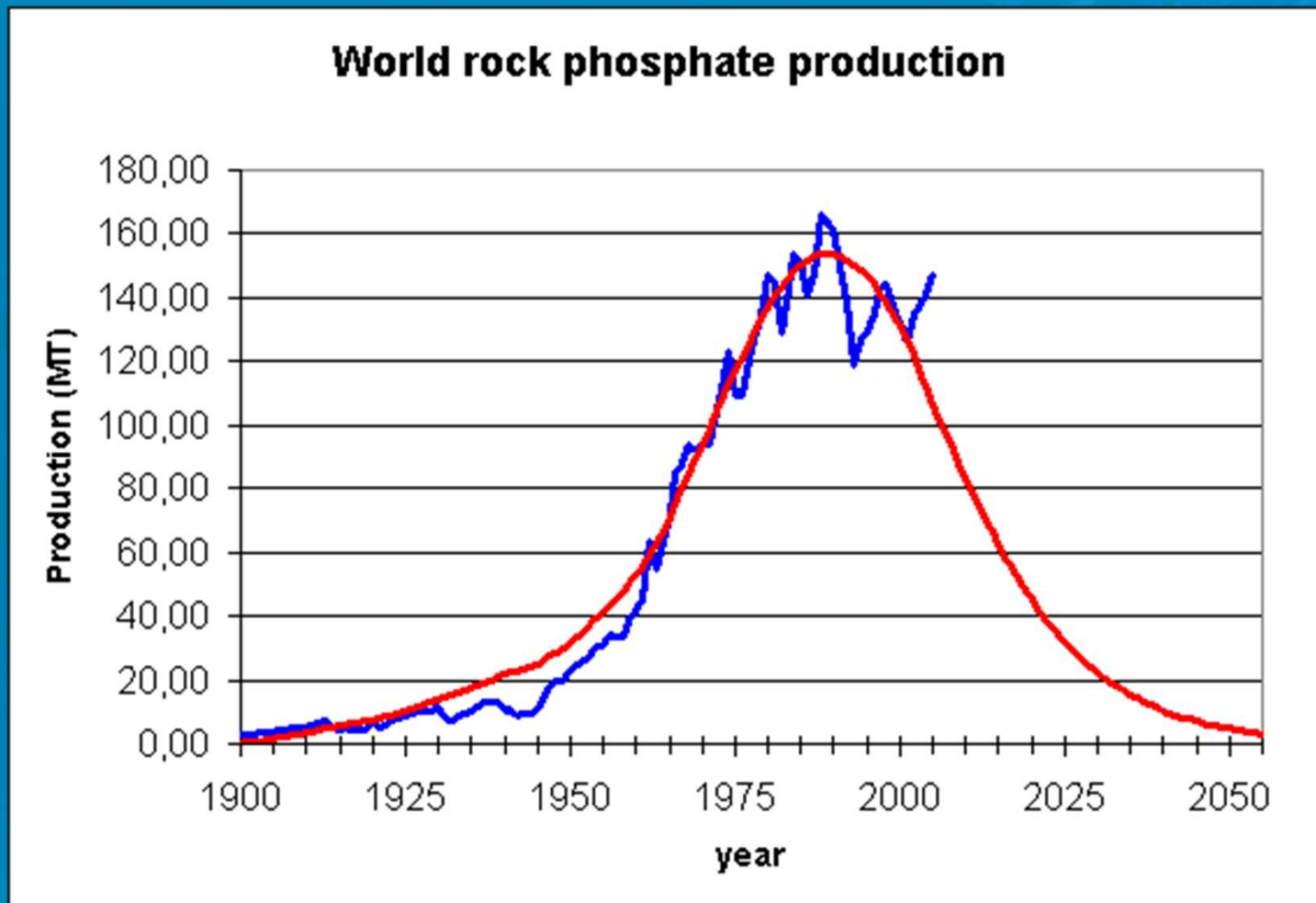
Nitrogen is now the largest pollution problem in the coastal waters of the United States.

Two thirds of coastal rivers and bays are moderately to severely degraded from nitrogen pollution.



Courtesy: Paul Reiter, Executive Director, IWA

Global Phosphorus Shortage Threatens Development



Global Phosphorus Shortage Threatens Development

- The global food supply is dependent upon input from artificial phosphate fertilizer.
- We need five times more P in our fertilizer than in our food – hence the shortage.
- Since the late 1700s, there has been a one-way flow of phosphorus to the ocean.
- Population growth, cattle feed, and biofuels accelerate the depletion of phosphorus resources

There is every reason to consider phosphorus as a vital resource, not a waste product

Our Role is Transitioning

Current Mission

We protect public health and the waters of our service area by treating wastewater effectively.



Future generations will inherit clean waterways and be able to keep them clean.



Future Mission

We are stewards of water and nutrient resources in an energy efficient manner to enhance the sustainability of our community.

NACWA's Watershed Work is an Example of Expanding Networks

- American Rivers
- Association of State & Interstate Water Pollution Control Administrators
- Chesapeake Bay Foundation
- Environmental Law & Policy Center
- Natural Resources Defense Council
- Water Environment Federation



"To put it plainly, T. Boone Pickens is out to save America"...Carl Pope, Exec Director, Sierra Club

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Metrics for Sustainability: Global Reporting Initiative

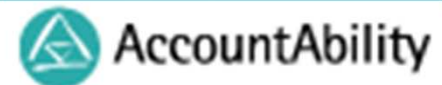


A common framework for sustainability reporting

The Global Reporting Initiative's (GRI) vision is that reporting on economic, environmental, and social performance by all organizations becomes as routine and comparable as financial reporting.

Sustainable Indices Vary in Applicability to Our Sector

- Dow Jones Sustainability Index (DJSI)
- Pacific Sustainability Index (PSI)
- American Institute of Chemical Engineers
- AccountAbility (Carbon Trust, London)
- Leadership in Energy and Environmental Design (LEED, USGBC)

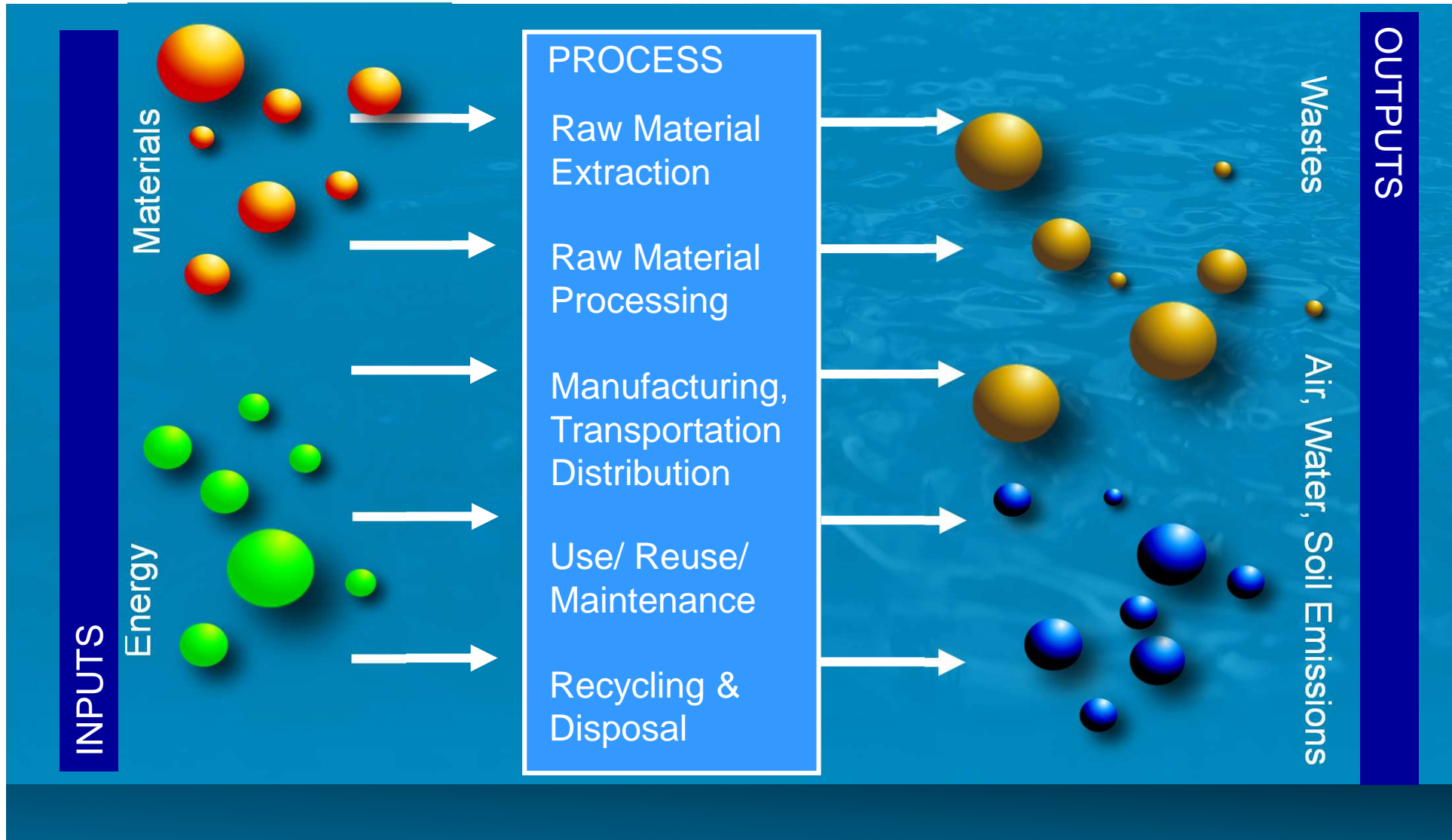


Footprints

- Carbon
- Ecological
 - Compares consumption to resource limits
- Natural capital
 - Quantifies economic value of ecosystem goods and services
- Water
 - 140 liters water = 1 cup coffee
 - 3000 liters water = 1 kg rice
 - 16,000 liters water = 1 kg beef



A Life Cycle Assessment Provides a More Holistic View of Project Inputs and Outputs



The Future for Infrastructure Sustainability Indices

- ASCE



- Paul Zofnass and the Harvard Graduate School of Design

Z Zofnass Program for Infrastructure Sustainability

**INFRASTRUCTURE SUSTAINABILITY &
DESIGN CONFERENCE**

April 21-23, 2010

Harvard University
Graduate School of Design



The Future for Infrastructure Sustainability Indices

It may take at least another decade of developing and refining sustainability metrics before we reach convergence of the type(s) of metrics that are most likely to serve the water sector in the future...

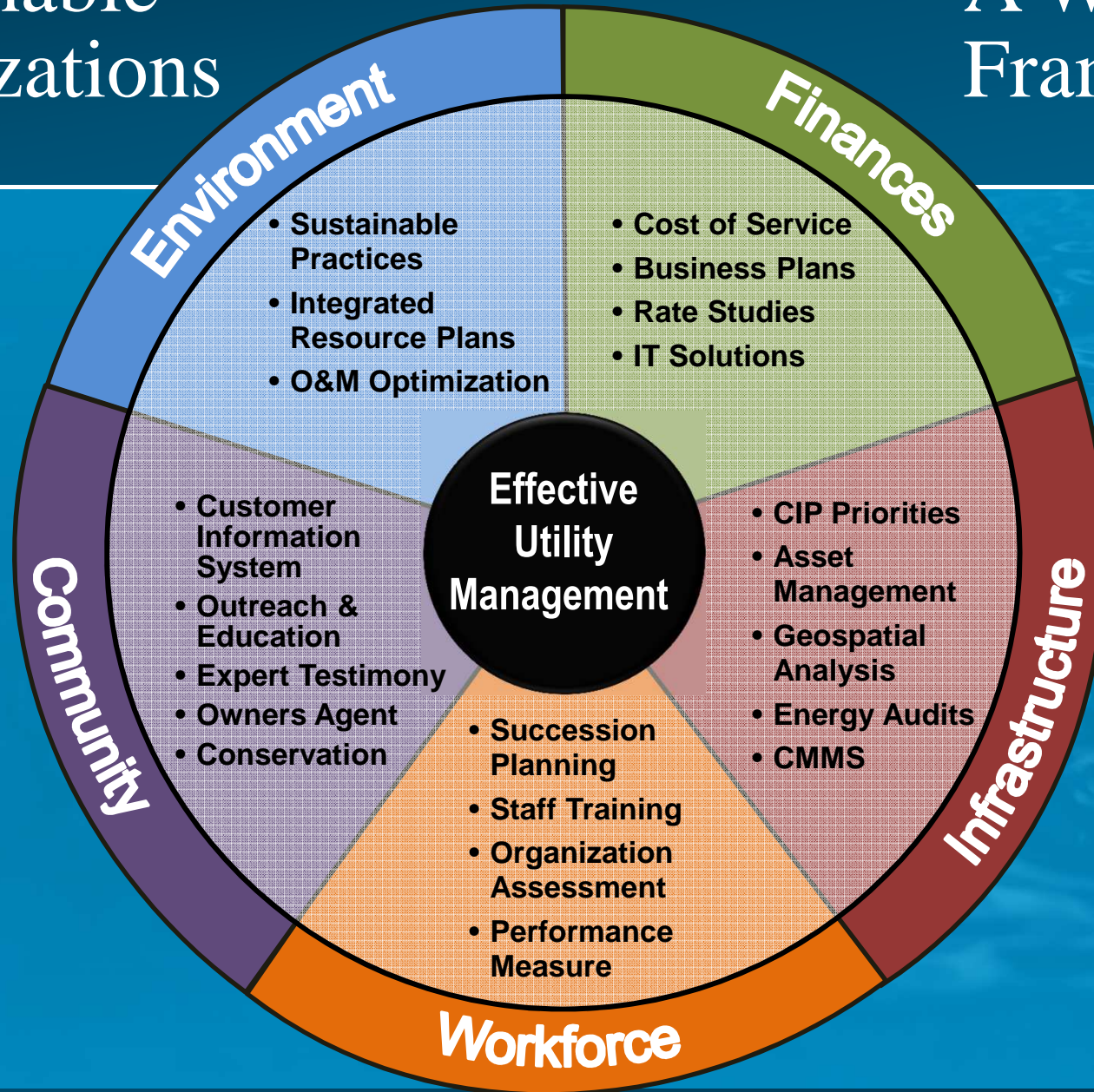
Understanding and Applying New
Sustainability Metrics in the Water Sector
WEF Technical Practice Update, 2010

The EUM Initiative is an Excellent Platform for Sustainability Metrics

- Product quality
- Employee and leadership development
- Financial viability
- Community sustainability
- Stakeholder understanding and support
- Customer satisfaction
- Operational optimization
- Operational resiliency
- Infrastructure stability
- Water resource adequacy

Sustainable organizations

A Working Framework



Example Sustainability Measures for Water Services

Environmental	Social	Economic
Total water use	Workforce demographics	Customer payments / net sales
Biosolids put to beneficial use	Average hrs of training or training investment	% of contracts paid in accordance w/ agreed terms (responsible contracting)
Direct energy use (including renewable)	Contributions to the community (e.g. education, humanitarian aid)	Customer service cost per account
Incidence of fines	Injury, lost days & absentee rates	Debt and O & M cost ratios
Environmental policy/ expenditure	Rate affordability	Return on assets

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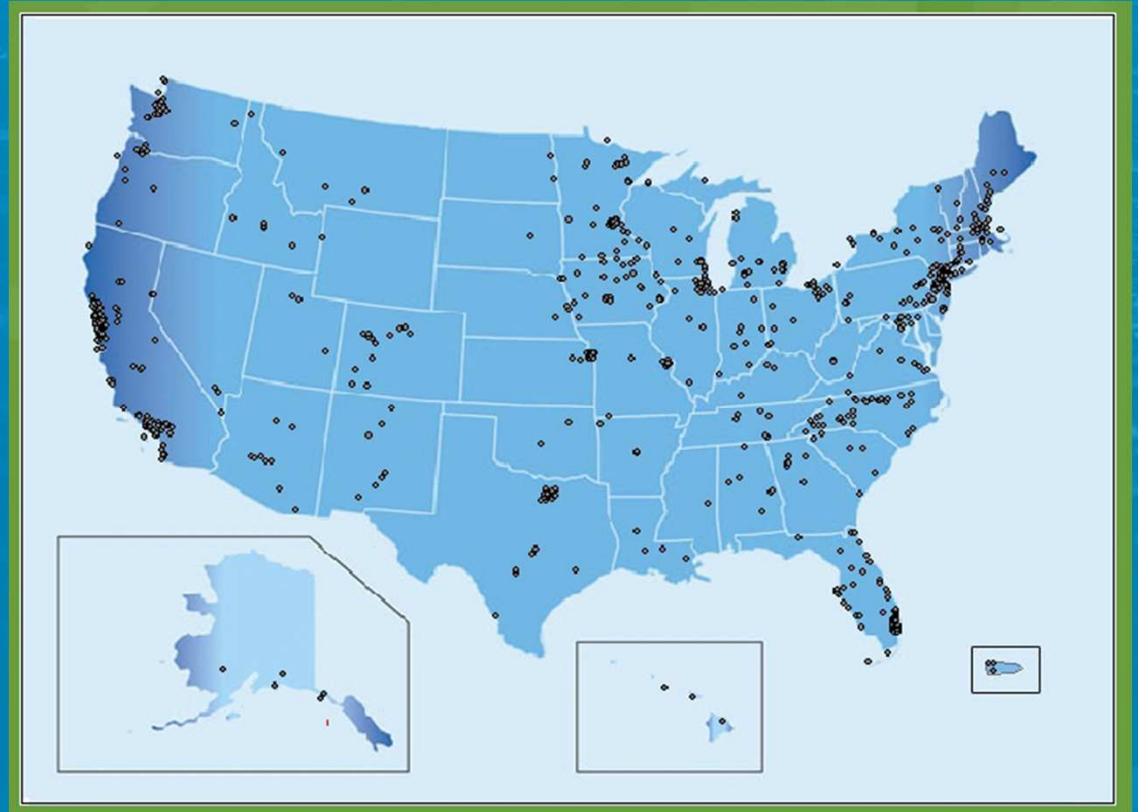
City of Columbus is Optimizing Solids Handling Across Three Facilities

- Jackson Pike WWTP
 - 80 MGD
 - 40 dry tons/day
- Southerly WWTP
 - 100 MGD
 - 70 dry tons/day (before digestion was operational)
- Compost Facility
 - 130 wet tons per day



U.S. Mayors Climate Protection Agreement

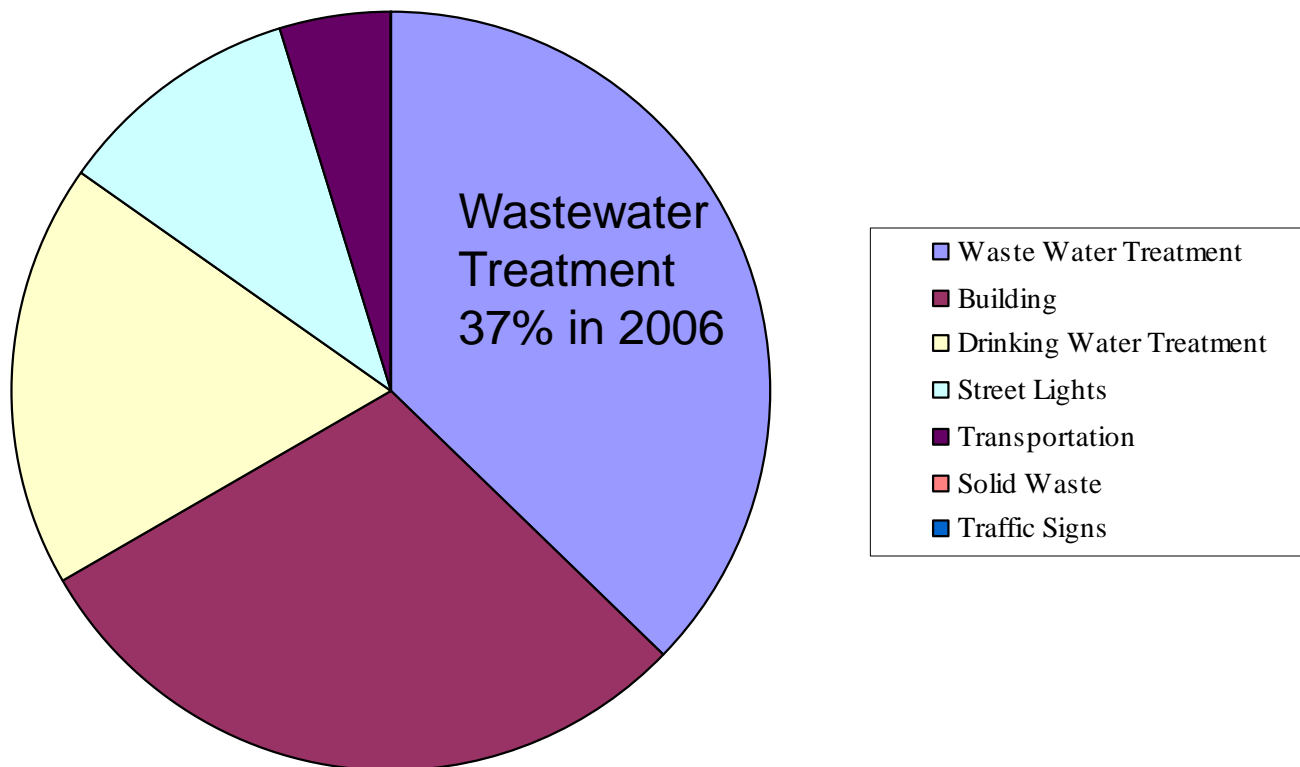
- Total of 1026 Mayors
- Goal of 7% below 1990 levels by 2012





Get Green Columbus Preliminary Emissions Analysis

Emissions By Source



Major Considerations

- Mayors Climate Protection Agreement
- Beneficial utilization
- Carbon footprint reduction
- Wet weather capacities
- Future nutrient limitations
- Stakeholder input



Four-Step Selection Methodology

Step 1: Analyzed Eco-Flow™ modeling and selected the preferred scenario from scenarios with similar results



Step 2: Evaluated the selected scenarios with respect to GHG emissions and annualized costs

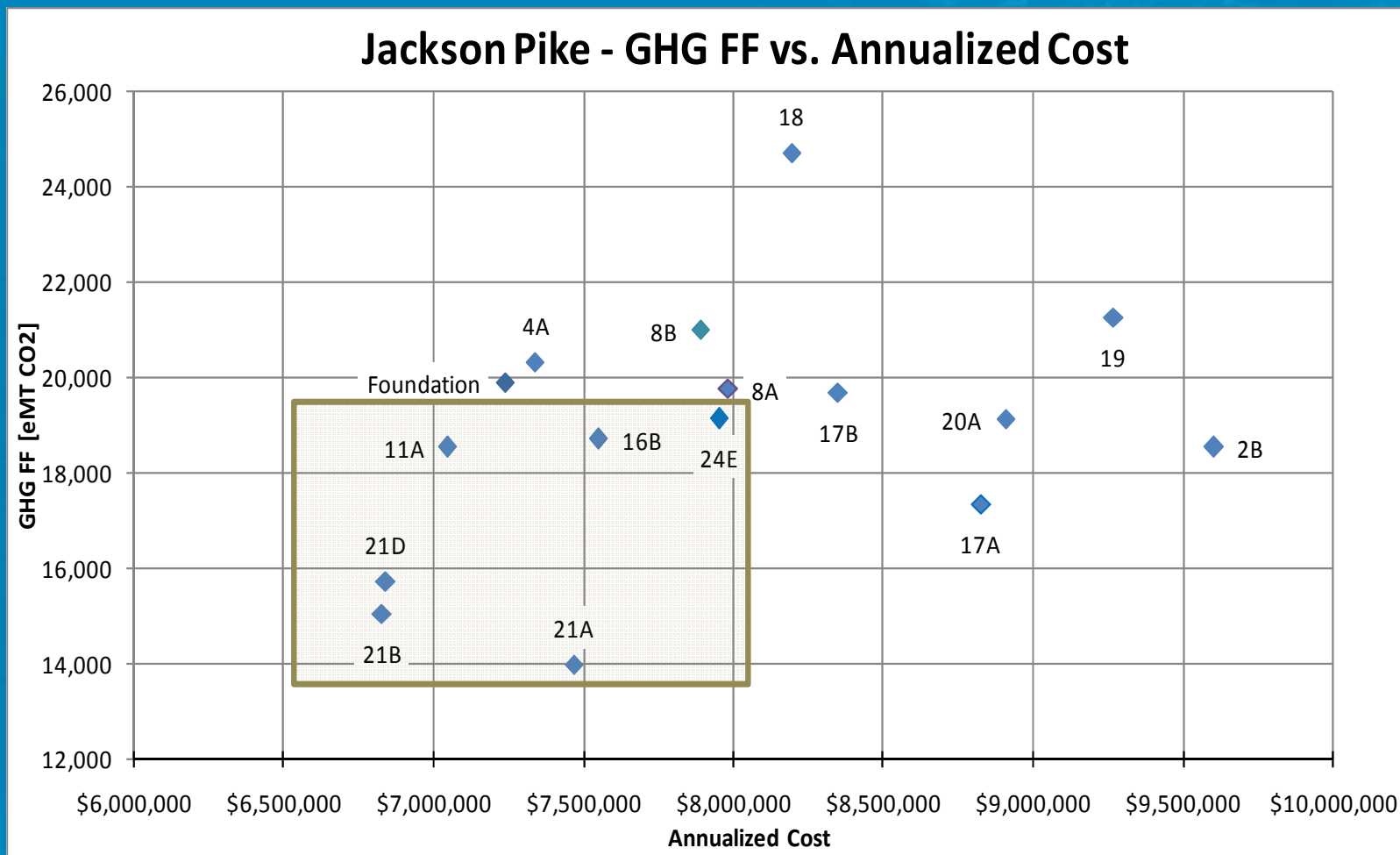


Step 3: Analyzed the shortlisted scenarios with respect to TBL scores



Step 4: Considered applicability to current operations and City goals to make recommendation

Screened Scenarios with Best GHG Performance per Dollar



Summary of TBL Performance Criteria

Performance Category	Factors	Type	Weight (%)
Social	Quality of life (1)	Qualitative	30
	Beneficial Products	Qualitative	70
Environmental	Third party offsets/ carbon sequestration	Quantitative	30
	GHG emissions	Quantitative	60
	Footprint (2)	Qualitative	10
Economic	Capital costs	Quantitative	90
	O & M	Quantitative	10

1. Odor generation, exposure to smoke, dust, noise, etc.
2. Disruptions to local habitat, waste generation

Selection of Recommended Scenario

- Considered:
 - Diversification
 - Mayors Climate Protection Agreement
- Selected:
 - JPWWTP: 70% land application, 30% compost, digestion pretreatment, sell pipeline biogas
 - SWWTP: 50% land application, 50% compost, two phase digestion, sell pipeline biogas



Coquina Coast: Desalination Water Supply



- New alternative water supply for Northeast Florida Coast
- Once constructed, one of the largest desalination facilities in the US:
 - 25 - 50 mgd by 2020
 - 50 – 80 mgd by 2050
- Twelve agency stakeholders
 - Suppliers
 - “Ex officio”
 - Water management district

Coquina Coast: Desalination Water Supply



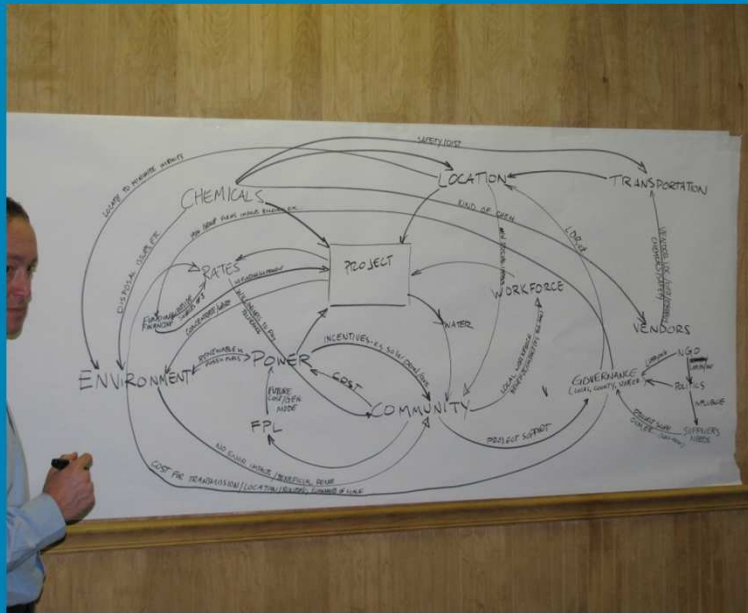
- Facility components
 - Intake
 - Treatment (vessel or land based?)
 - Storage (on or off-site?)
 - Transmission/Distribution
 - Concentrate management
- Project components
 - Power
 - Environmental impact
 - Funding
 - Governance

Sustainability Workshop

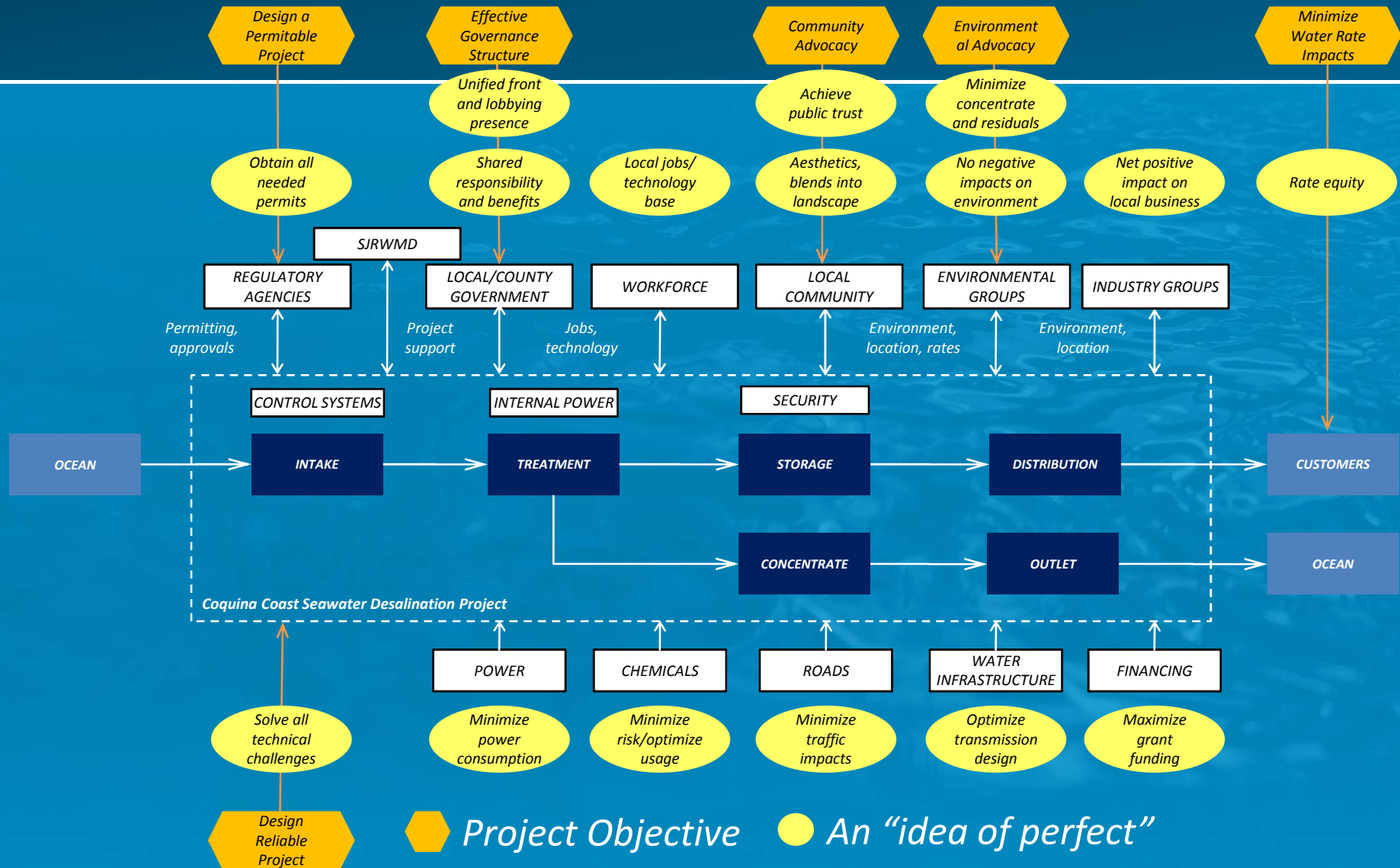
- 30+ participants
 - ✓ Array of expertise
- Defined project boundaries
- Identified external influences
- Discussed “keys to success”
- Identified key project objectives
- Developed implementation strategy



Coquina Coast: Understanding the System



Coquina Coast: Mapping Reveals Objectives



Project Evaluation Criteria



Community Acceptance

Location of facilities:

proximity to community
need for rezoning/rights-of-way acquisition

Ability to blend visually into to the surroundings

Consistency with local standards

Minimizes community impacts

(construction and operation):

public safety, traffic, noise, lighting, aesthetics

Improvement to local economy:

job creation (construction and operation)
attraction of tourists/visitors
support of local businesses

1 = Acceptable to community (significantly improves public support)

2 = Moderately acceptable to community

3 = Neutral

4 = Somewhat unacceptable to community

5 = Unacceptable to community

Environmental Stewardship

Minimizes marine impacts, including:

concentrate disposal
threatened and endangered species
impingement/entrainment of sea life
impacts to marine life
offshore fuel management

Minimizes non-marine impacts, including:

impacts to wildlife and vegetation
threatened and endangered species
wetlands and coastal resources
impacts to water quality
impacts to air quality
cultural resources

Minimizes carbon footprint

Minimizes waste/residuals

1 = Improvement to existing environmental conditions

2 = No impact to environmental conditions

3 = No significant impact to environmental conditions

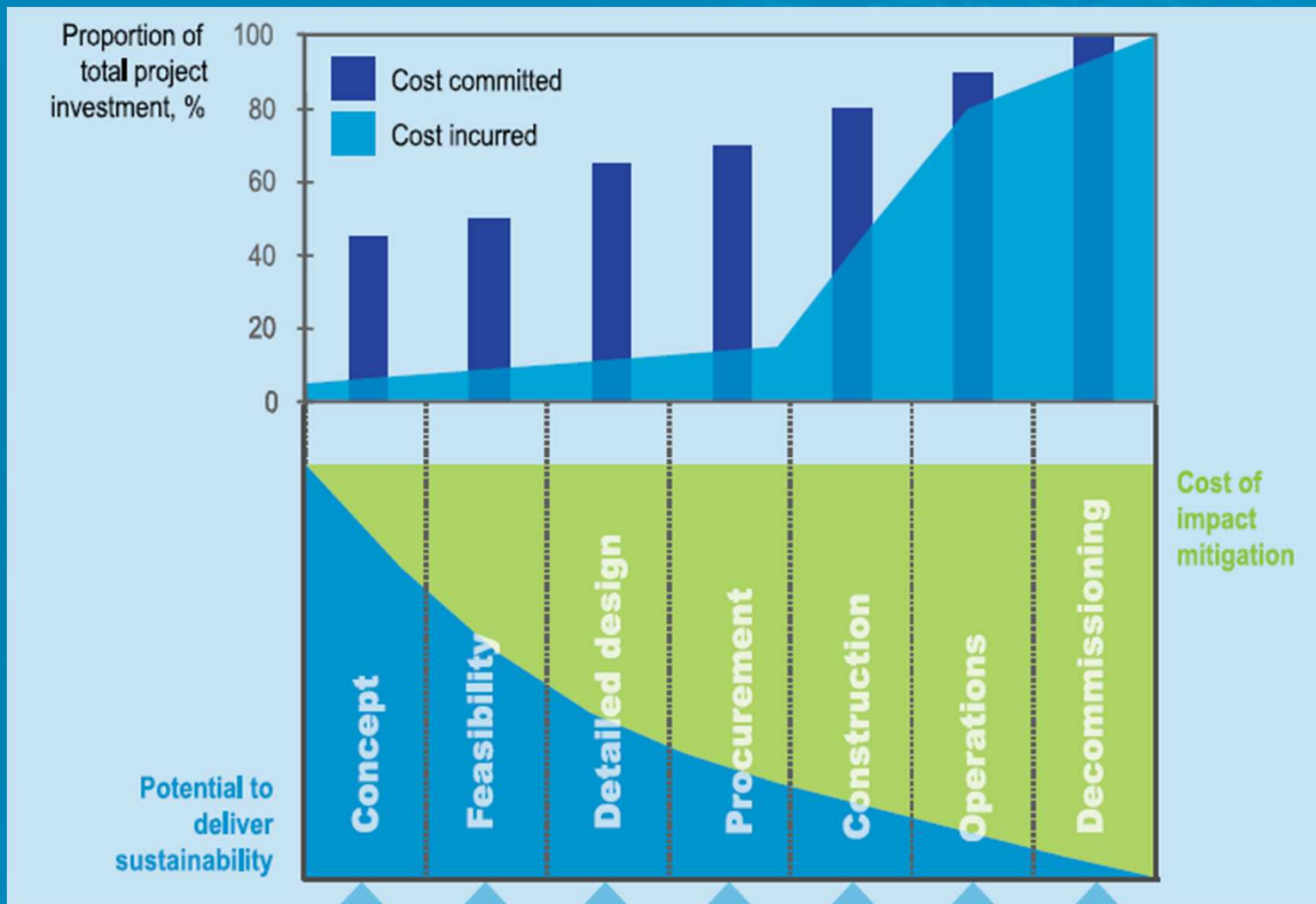
4 = Impact to environment requiring mitigation

5 = Impact to environment that cannot be mitigated

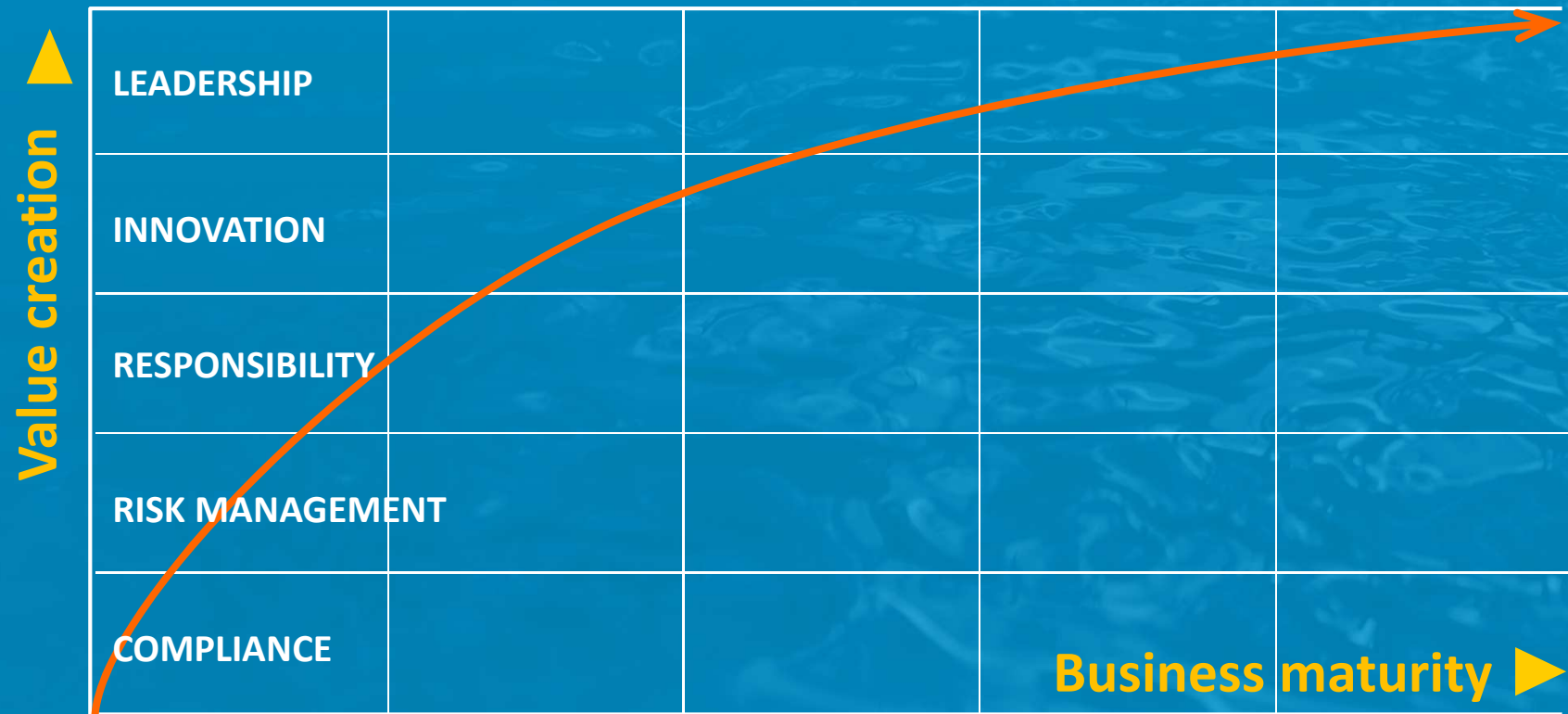
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Why Consider Sustainability at the Beginning of the Project?



The Sustainability “Evolution” of Organizations



Legislative alignment

Systems and procedures

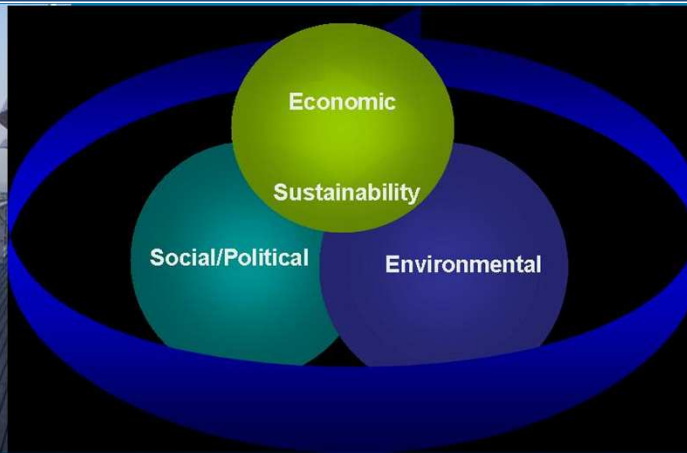
Behaviours, eco-efficiency

Partnerships, eco-effectiveness

Strategic alignment

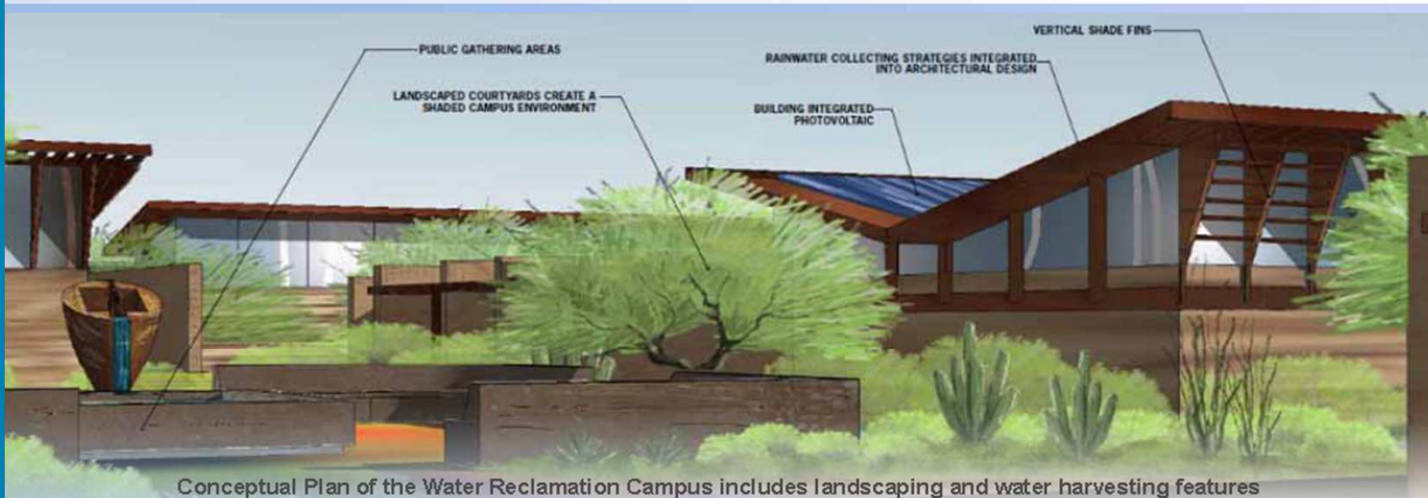
Alexandria Sanitation Authority: Sustainability Review

- Authority was faced with decreasing water supply as Chesapeake Bay water was increasingly allocated to aquaculture and tourism
- Held workshops to train staff in sustainability concepts
- Focus on creating a culture of long-term planning
- Emphasis on going above and beyond current regulations
- Developed metrics to measure achievements in sustainability



PIMA County Embraced Social Aspects of Sustainability in Their Master Plan

Multiple Benefits of the Regional Optimization Master Plan



- **Showcase for cultural and biological resources**
- **Environmental and aesthetic enhancements: adjacent parks, natural areas and economic development centers**
- **Sustainability projects including LEED Silver Certification and water harvesting at the Water Reclamation Campus**

A Sustainable Future Will Require Re-Thinking Existing Paradigms

- Significant recovery of nutrients requires an upstream strategy
- Energy recovery increases with decreasing “wet stream processing”
- Keeping treatment and reuse as close to the source as possible is watershed efficient
- Holistic views of water management require interagency alliances and agreements
 - Singapore “NEWater”: Drinking water, wastewater, stormwater/drainage

Additional Thoughts

- Our mission is evolving from ecosystem protection to resource management
- A resource focus allows us to be the “poster children” for sustainability in our communities
- “Common currency” is the holy grail for metrics
 - ✓ What is the economic value of social/ environmental benefit?
- Sustainability approaches will necessitate new alliances
- The sustainability dialogue – in itself – is a success story

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