Welcome to the *Climate-Safe Infrastructure* Webinar Series

Supporting AB2800 and the Work of California's Climate-Safe Infrastructure Working Group

May 17, 2018 | 12-1pm

CALIFORNIA natural resources AGENCY

Hosts

Juliette Finzi Hart | USGS

Co-Facilitator of CSIWG's work

Email: jfinzihart@usgs.gov

Susi Moser | Susanne Moser Research & Consulting

Co-Facilitator of CSIWG's work

Email: promundi@susannemoser.com

AB 2800 (Quirk): Purpose

Examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering, including oversight, investment, design, and construction.

AB2800 Working Group and Support Team

Co-Facilitators

Juliette Finzi Hart
USGS

Susi Moser
Susanne Moser
Research & Consulting

The Climate-Safe Infrastructure Working Group

Amir Aghakouchak
UC-Irvine

Bruce Swanger
Cal-Trans

Chester Widom
DGS, State Architect

Cis Liban
L.A. Metro

Dan Cayan
UC-San Diego, SIO

David Groves
RAND

Nancy Ander
DGS, Off. of Sustain.

Deb Niemeier
UC-Davis

James Deane
High-Speed Rail Auth.

John Andrew
DWR

Kristin Heinemeier
Realized Energy

Kyle Meng
UC-Santa Barbara

Martha Brook
CEC

Noah Diffenbaugh
Stanford

Gurdeep Bhattal
Cal-Trans

Robert Lempert
RAND

Project Team

Keali'i Bright
Natural Resources
Agency

Elea Becker Lowe
Natural Resources
Agency

Joey Wall
Natural Resources
Agency

Guido Franco
California Energy
Commission

AB 2800 (Quirk): Scope of Assessment and Recommendations

The working group shall consider and investigate, at a minimum, the following issues:

(1) **informational and institutional barriers** to integrating climate change into infrastructure design.

(2) **critical information needs** of engineers.

(3) **selection of appropriate engineering designs** for different climate scenarios.

The *Climate-Safe Infrastructure* Webinar Series

Purpose

- Hear from others elsewhere with relevant experience and expertise.
- Hear from CSIWG members.
- Educate and engage with interested stakeholders on climate change and infrastructure issues.

Sample of Webinar Topics

- What climate science can offer
- Various sectoral perspectives
- Processes of changing engineering standards and guidelines
- Holistic infrastructure planning and management
- Financing climate-safe infrastructure
- And others…

THE BRIDGE

CONNECTING SCIENCE AND POLICY

HOME ABOUT CONTACT US GUID

MAY 14, 2018

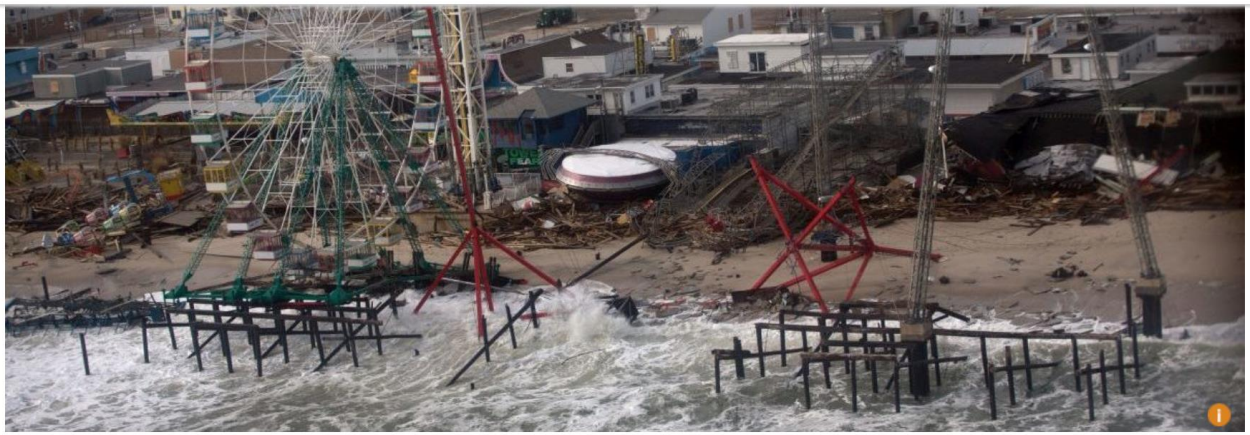
Infrastructure Helps Us, But Who's Helping Infrastructure?

Posted by Annika Deurlington

Union of Concerned Scientists
Science for a healthy planet and safer world

SEARCH >

[BLOG] UNION OF CONCERNED SCIENTISTS



email@email.com >

Building the Right Project: An Engineer's Perspective on Infrastructure Adaptation to Extreme Weather Events

DR. CRIS B. LIBAN, P.E., ENV SP, UCS SCIENCE NETWORK, UCS | MAY 16, 2018, 3:20 PM EDT

Dr. Cris B. Liban, P.E., ENV SP
Fellow of the American Society of Civil Engineers

MORE SCIENCE NETWORK POSTS >
MEET OUR OTHER BLOGGERS >

A Couple of Housekeeping Items

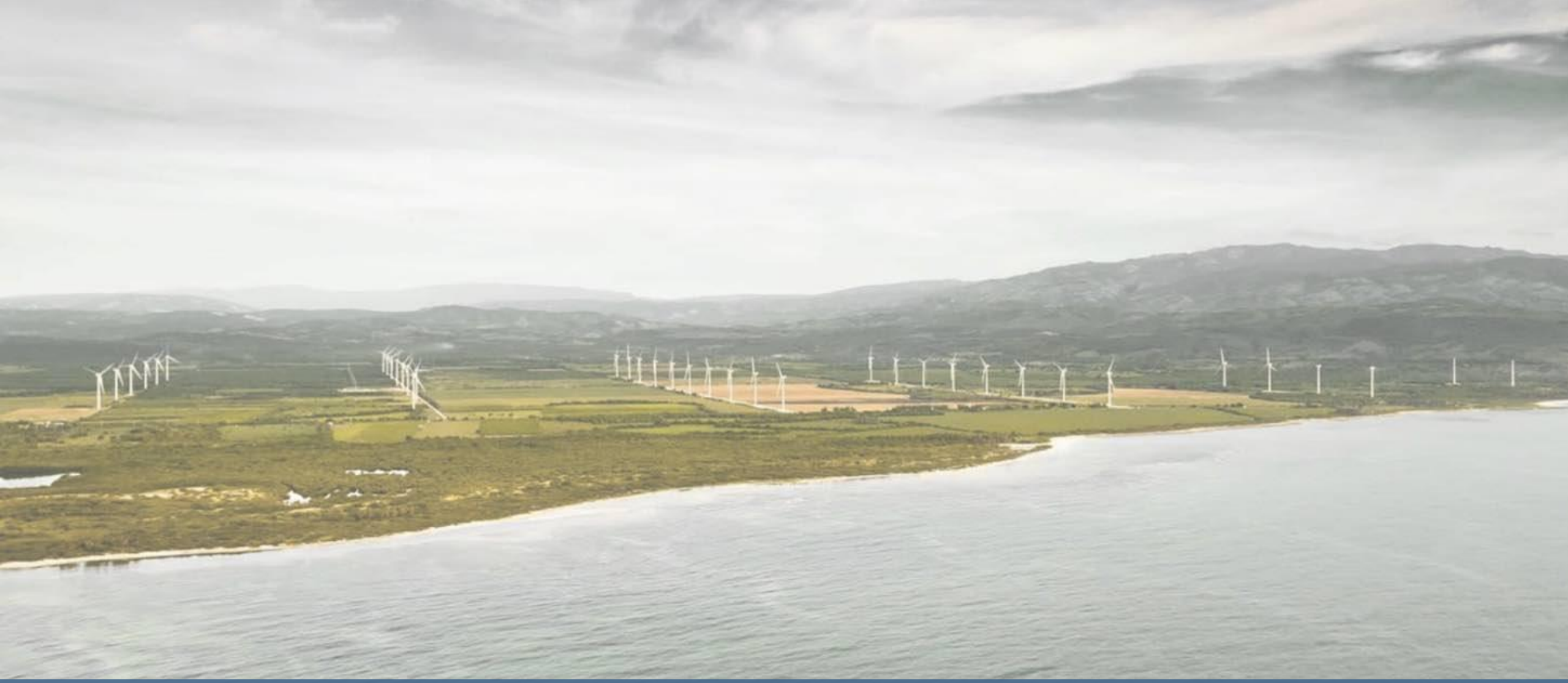
- Please type your questions for presenters into the chat box
- We will try to answer as many as possible after the presentations
- Answers to remaining questions will be posted on the website

Financing the Future:
Challenges & Opportunities in the Building Sector

Andreas Georgoulias
Research Director
Harvard Univeristy Zofnass Program for Sustainable Infrastructure

Shalini Vajjhala
Founder & CEO
re:focus partners

David Dodd
Chairman & President
International Resilience Center

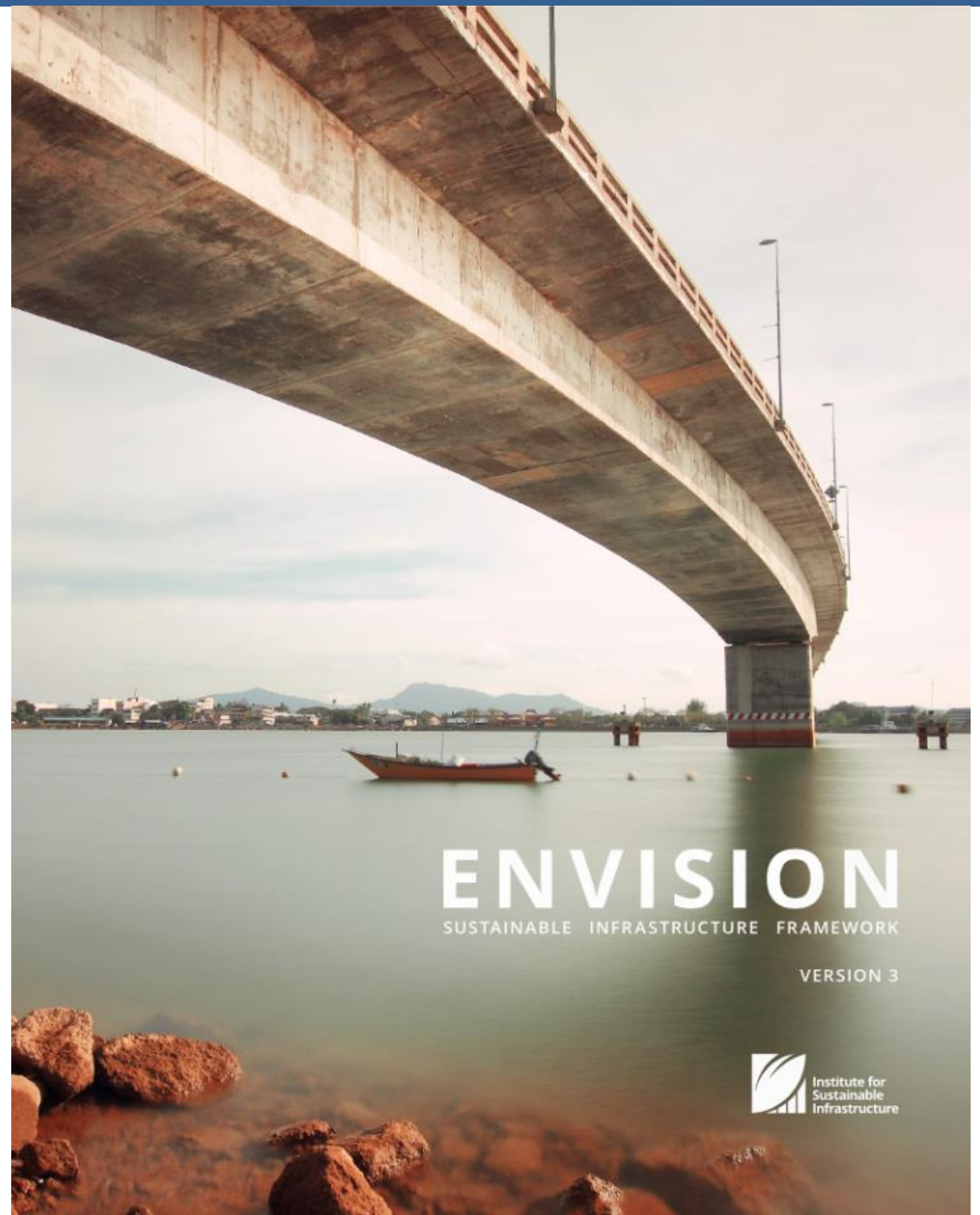


Infrastructure Financing I: Innovative Instruments, Approaches and Partnerships

Dr. Andreas Georgoulias
May 17, 2018

ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

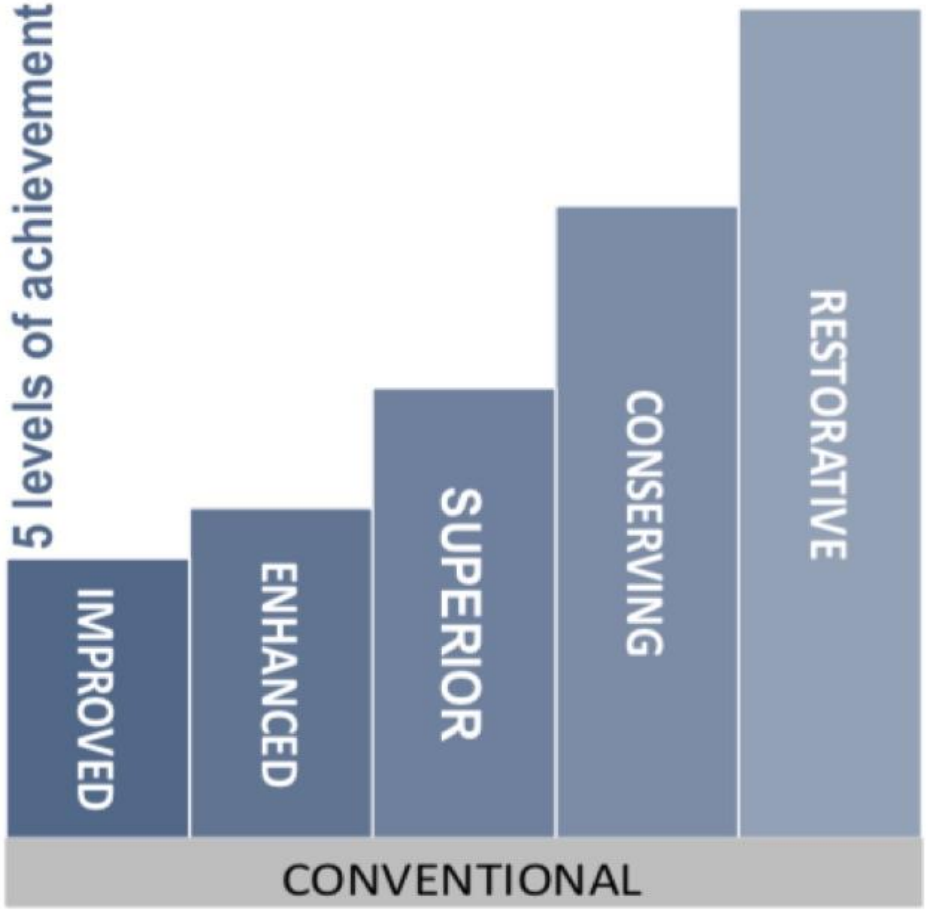
The Envision Rating System



The Envision Rating System

A set of 64 **quantitative and qualitative indicators** that identify and measure critical sustainability issues and provide recommendations for improvement.

- QUALITY OF LIFE
- LEADERSHIP
- RESOURCE ALLOCATION
- NATURAL WORLD
- CLIMATE AND RESILIENCE

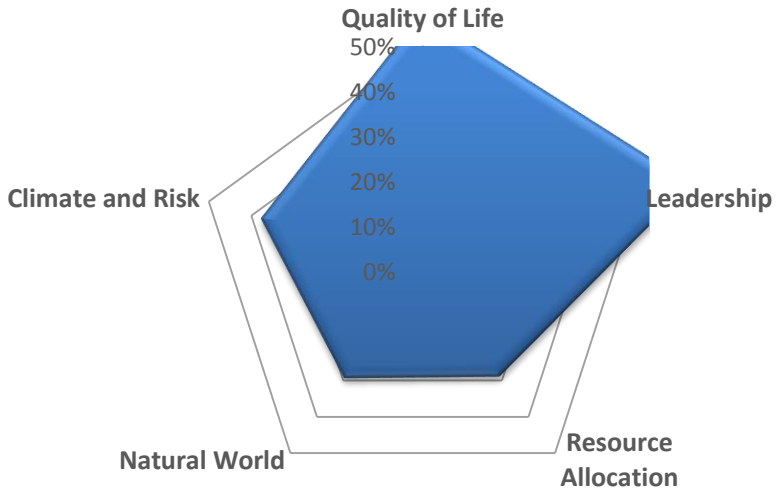


The Envision Rating System

SANTO ANTONIO HYDROPOWER PLANT
PLANTA HIDROELÉCTRICA SANTO ANTONIO

			IMPROVED MEJORA	ENHANCED AUMENTA	SUPERIOR SUPERIOR	CONSERVING CONSERVA	RESTORATIVE RESTAURA
QUALITY OF LIFE CALIDAD DE VIDA	PURPOSE PROPÓSITO	QL1.1 Improve Community Quality of Life QL1.1 Mejorar la Calidad de Vida de la Comunidad					
		QL1.2 Stimulate Sustainable Growth & Development QL1.2 Estimular el desarrollo y el crecimiento sostenible					
		QL1.3 Develop Local Skills And Capabilities QL1.3 Desarrollar Capacidades y Habilidades Locales					
	COMMUNITY COMUNIDAD	QL2.1 Enhance Public Health And Safety QL2.1 Mejorar la Salud Pública y la Seguridad					
		QL2.2 Minimize Noise And Vibration QL2.2 Minimizar ruidos y vibraciones					
		QL2.3 Minimize Light Pollution QL2.3 Minimizar Contaminación Lumínica					
		QL2.4 Improve Community Mobility And Access QL2.4 Mejorar el acceso y la movilidad de la Comunidad					
		QL2.5 Encourage Alternative Modes of Transportation QL2.5 Fomentar modos alternativos de transporte					
		QL2.6 Improve Site Accessibility, Safety & Wayfinding QL2.6 Mejorar la accesibilidad, seguridad y señalización					
	WELLBEING BIENESTAR	QL3.1 Preserve Historic And Cultural Resources QL3.1 Preservar los recursos históricos y culturales					
		QL3.2 Preserve Views And Local Character QL3.2 Preservar las vistas y el carácter local					
		QL3.3 Enhance Public Space QL3.3 Mejorar el espacio público					
		QL0.0 Innovate Or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos					

Envision Assessment



A case study: one need, three alternatives

Alternative I:

business-as-usual, capex X

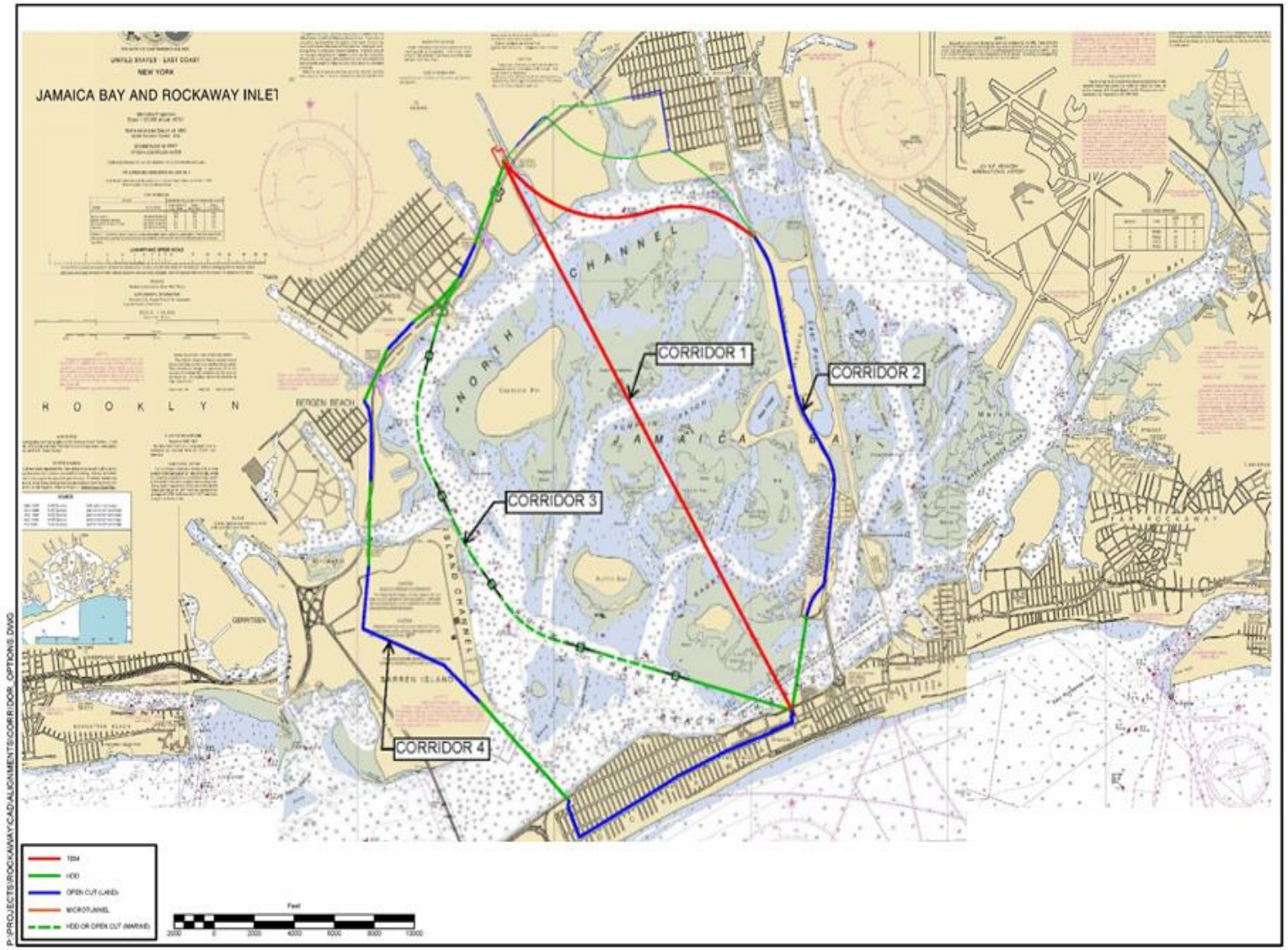
Alternative II:

capex 1.8X, lower opex

Alternative III:

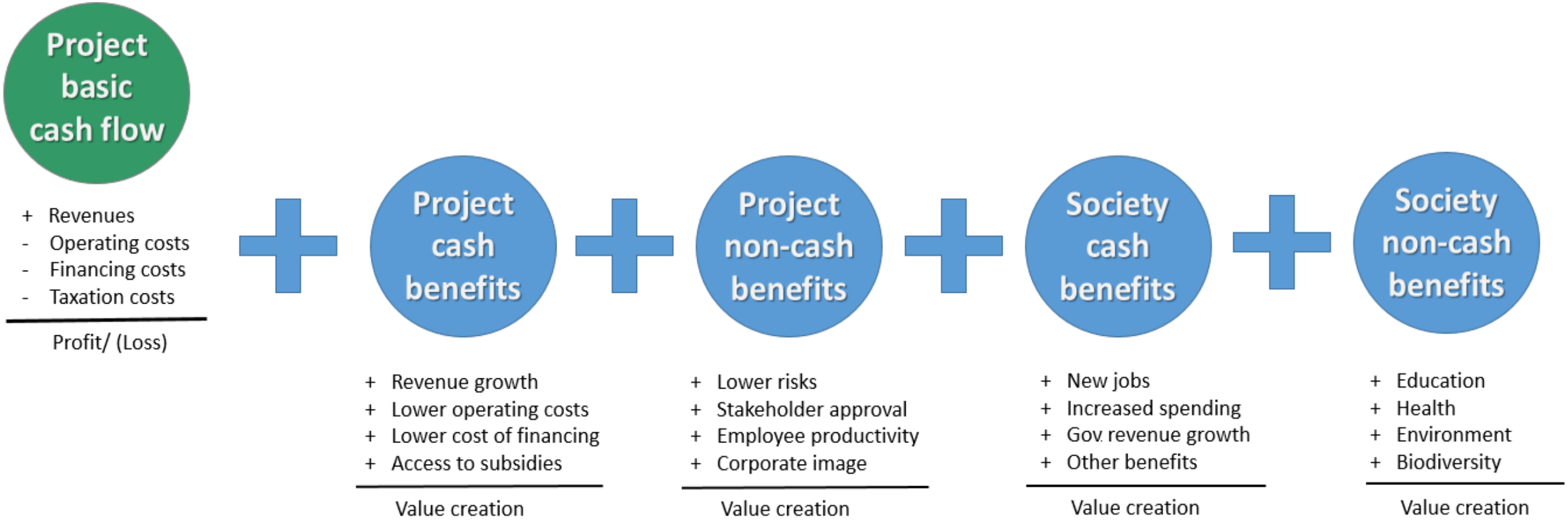
capex 1.6X, lower opex

Which one to chose??

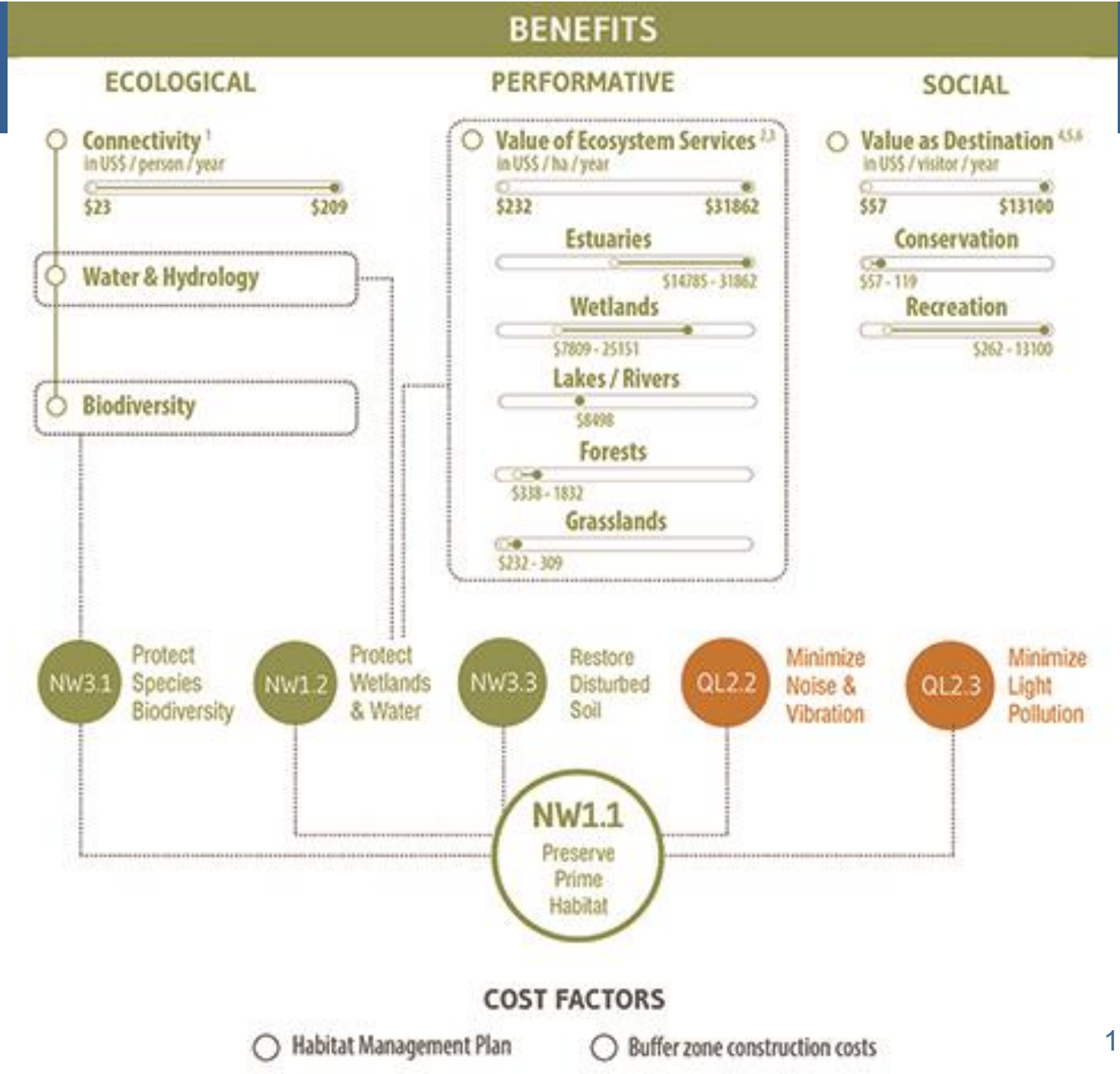


Step 1: apply Envision

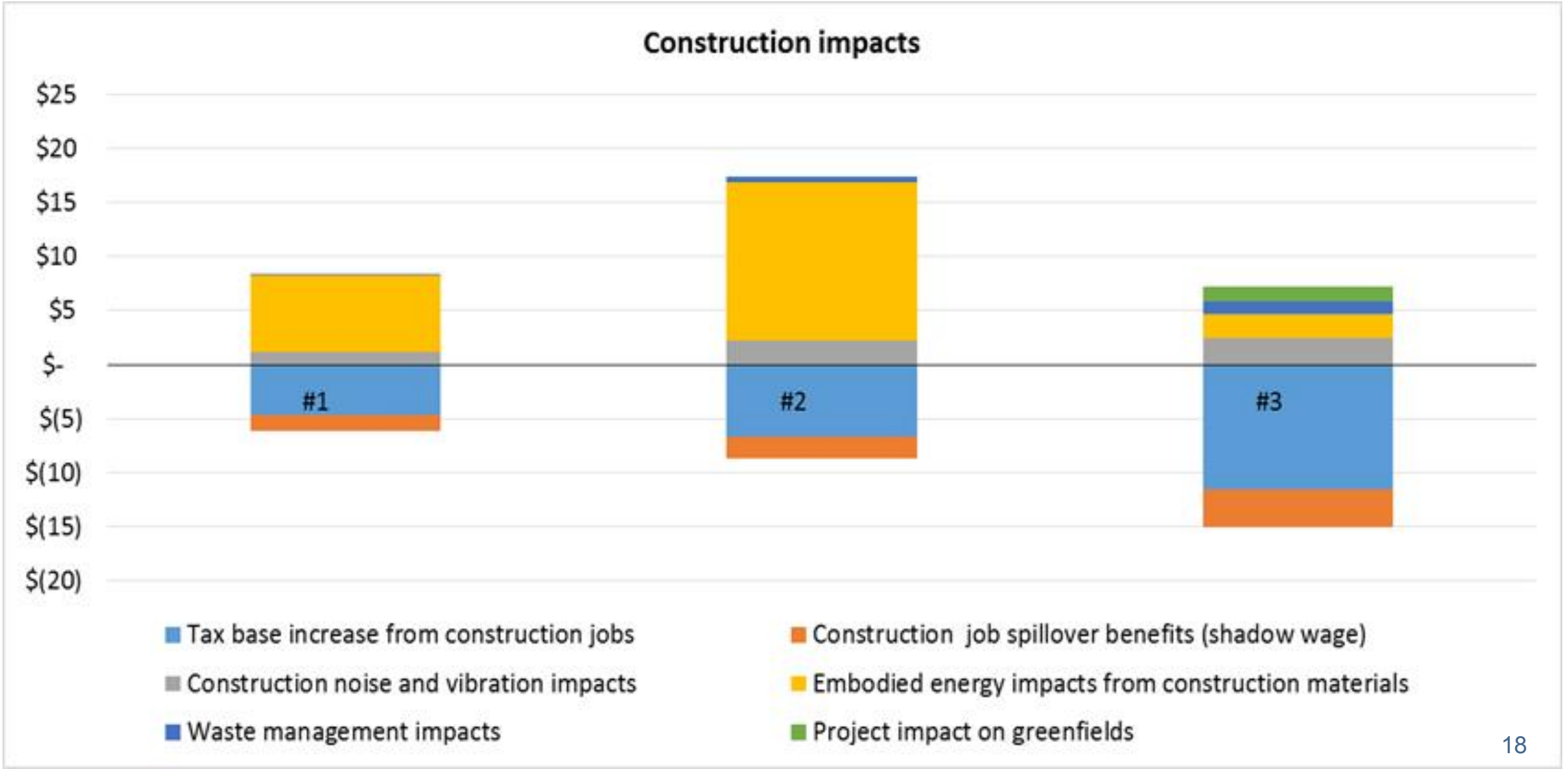
Step 2: apply the Zofnass Economic Tool



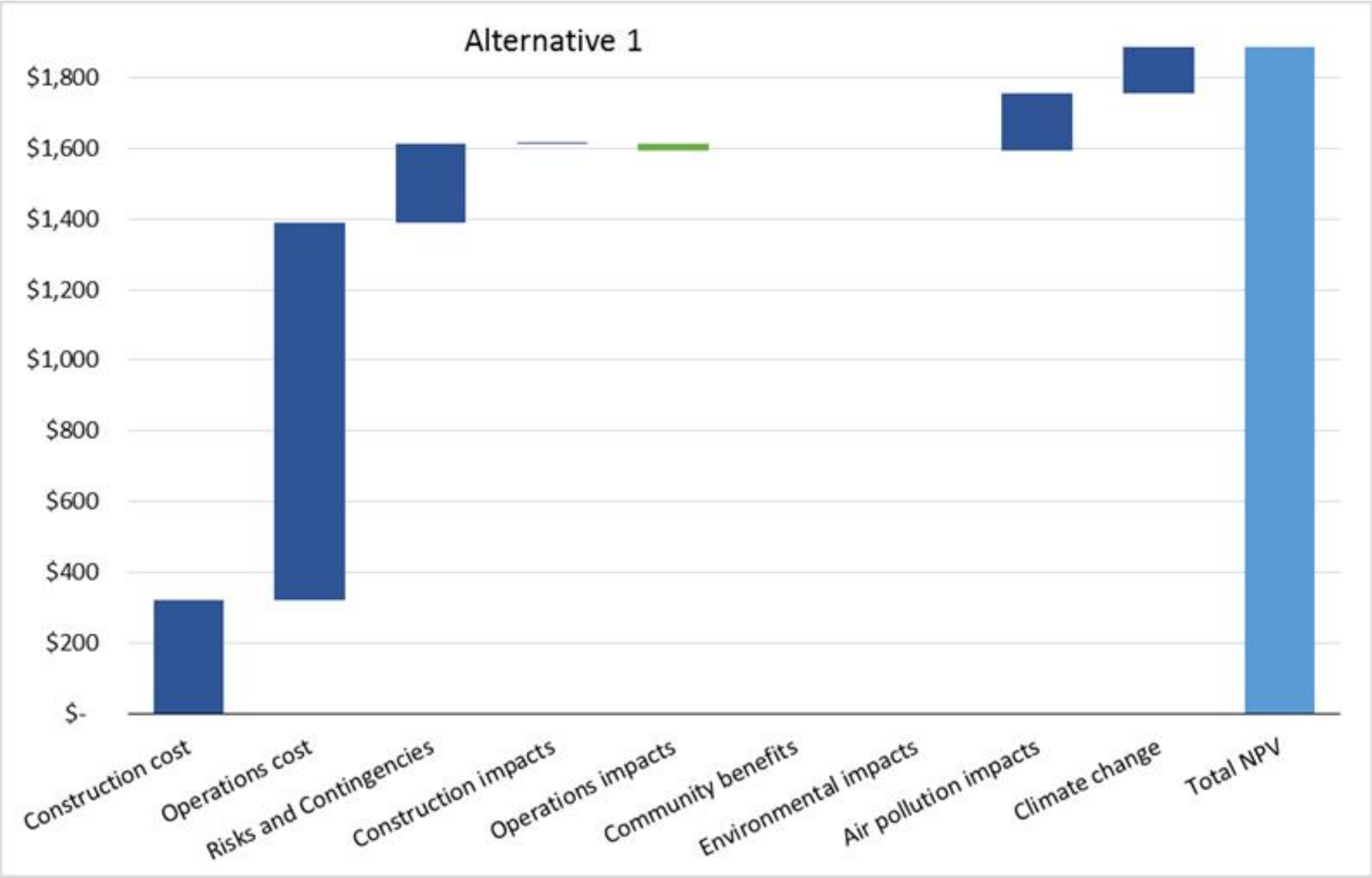
Step 3: Quantify impacts



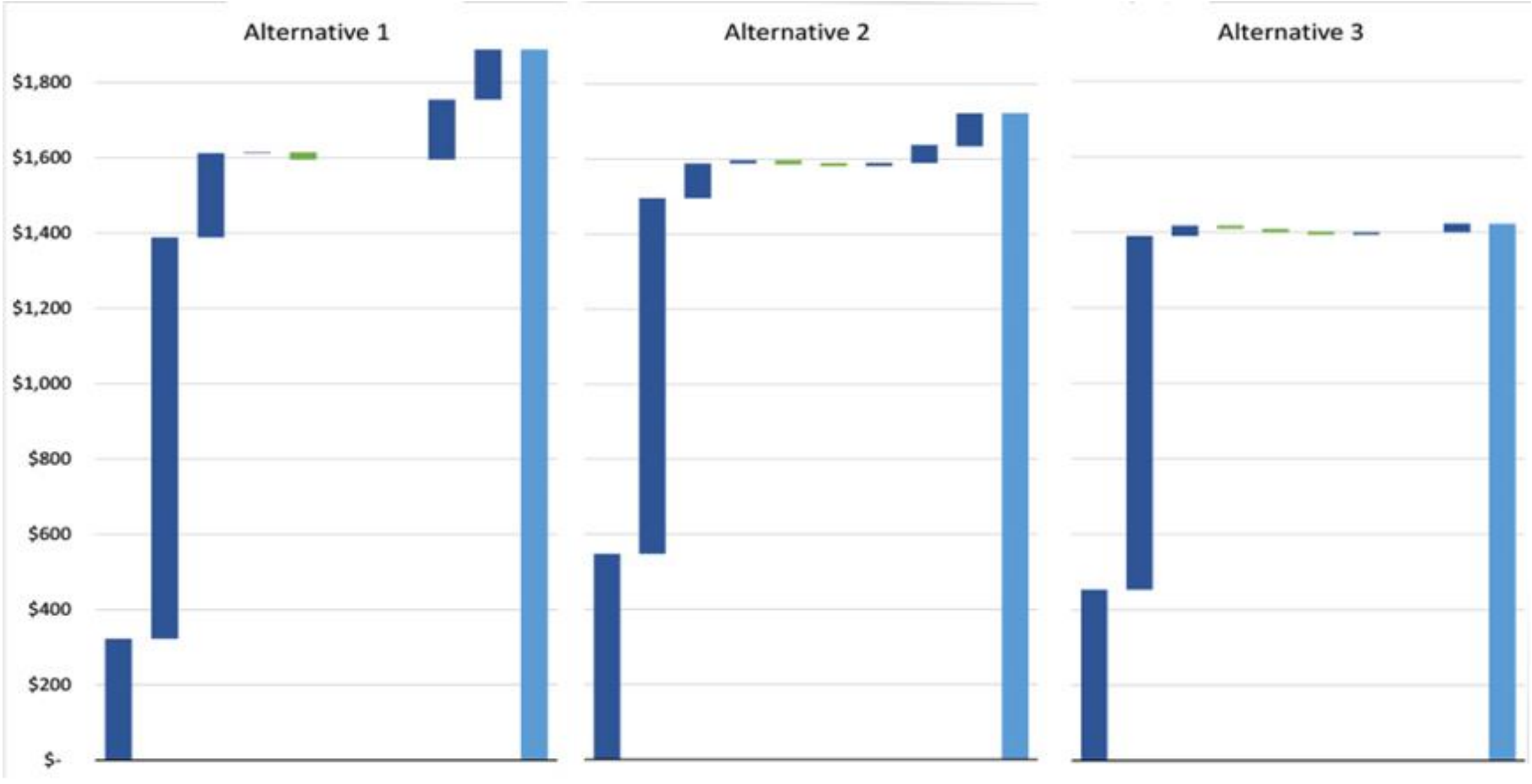
Step 3: Quantify impacts



Step 4: Examine the Life-Cycle of Impacts



Step 5: Compare alternatives and decide



ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

THANK YOU

FOR MORE
INFORMATION
www.zofnass.org

Dr. Andreas Georgoulias
ageorgou@post.harvard.edu

Capturing Value for Resilient Infrastructure Project Finance

Shalini Vajjhala
Climate-Safe Infrastructure Working Group
[Webinar]
March 17, 2018

re:FOCUS PARTNERS

Drivers for Linking Resilience & Insurance

Image credit: weather.gov

Lucy Nicholson / Reuters

AP Photo/Mike Meadows

re:FOCUS PARTNERS

Infrastructure as Financial Risk Reduction

- A lot of infrastructure is designed to reduce risk
  - Public sector assets & services are safer
  - AND insurance companies lose less money when public & private policy holders are better protected
- We developed Resilience Bonds as one way of ensuring the *financial* value created by these public investments returns to the public sector

**without impact on public debt limits or credit ratings*

re:FOCUS PARTNERS

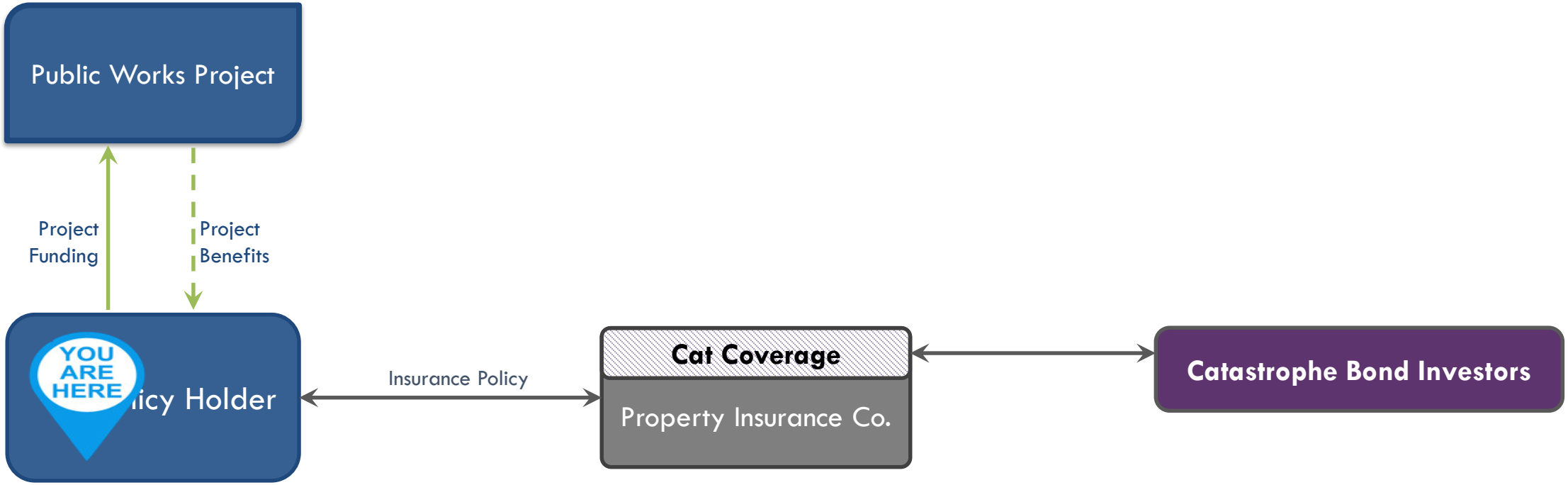
Three Entry Points for Cities & Utilities

- **Peril/Liability:** growing risks & expected losses
  - New Orleans Levee Systems
  - Thames Barrier (London)
- **Insurance**: required coverage or compliance
  - New York MTA (2013)
  - Amtrak (2015)
- **Project**: planned resilience projects
  - Planned Upgrade/Required Recertification
  - New Construction

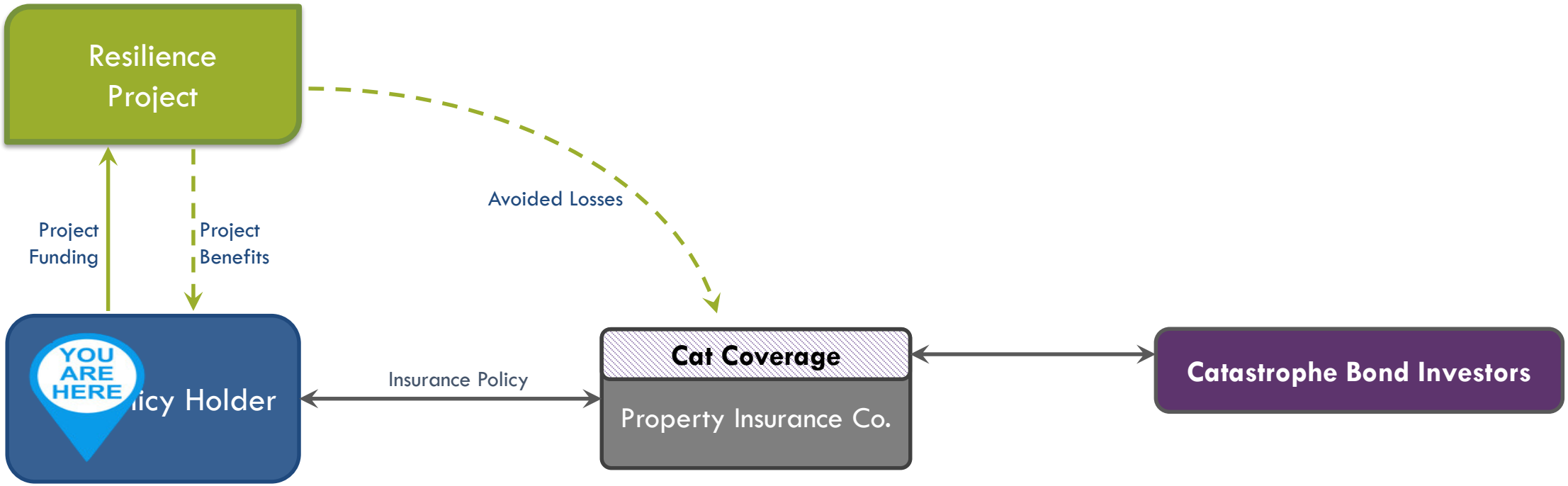
re:FOCUS PARTNERS

How Resilience Bonds Work

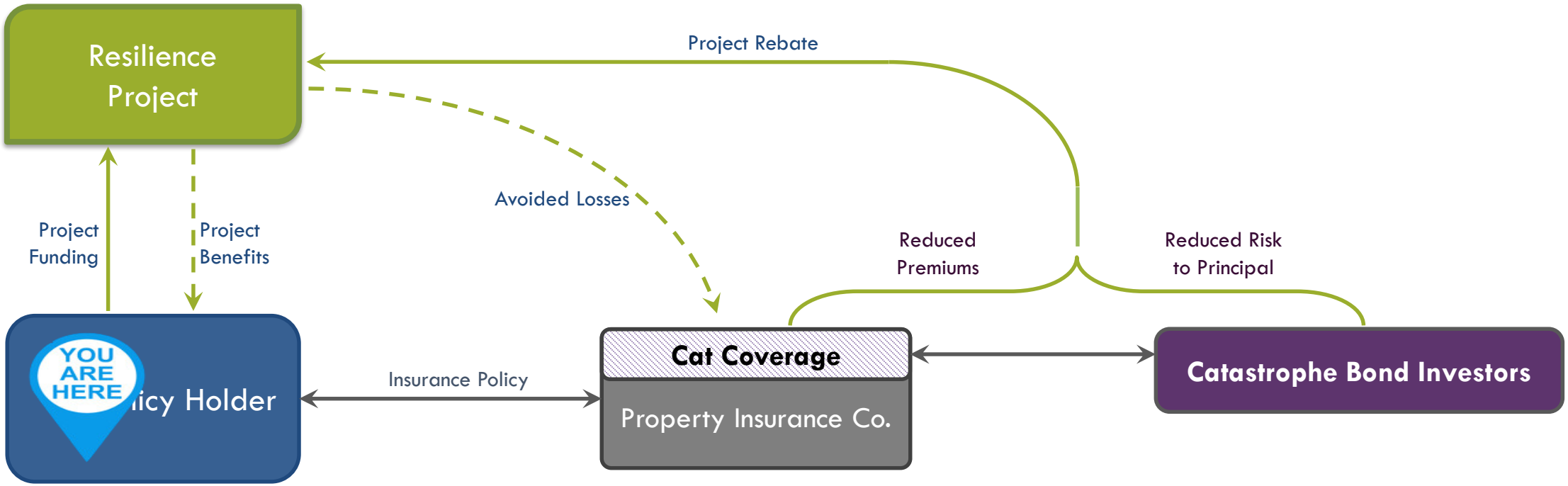
How Resilience Bonds Work



How Resilience Bonds Work



How Resilience Bonds Work



Benefits of Resilience Bonds

1. Fill Project Funding Gaps
    - Rebates can be securitized to cover up-front budget shortfalls or fund future project phases
    - Savings can cover O&M costs or addt'l insurance
2. Help Meet Insurance Compliance Obligations
    - Existing federal disaster assistance requirements
    - Potential new req's (i.e. FEMA Disaster Deductible)
3. Enhance Project Design Integrity
    - Create additional financial benefits, where catastrophe protections also reduce chronic risks

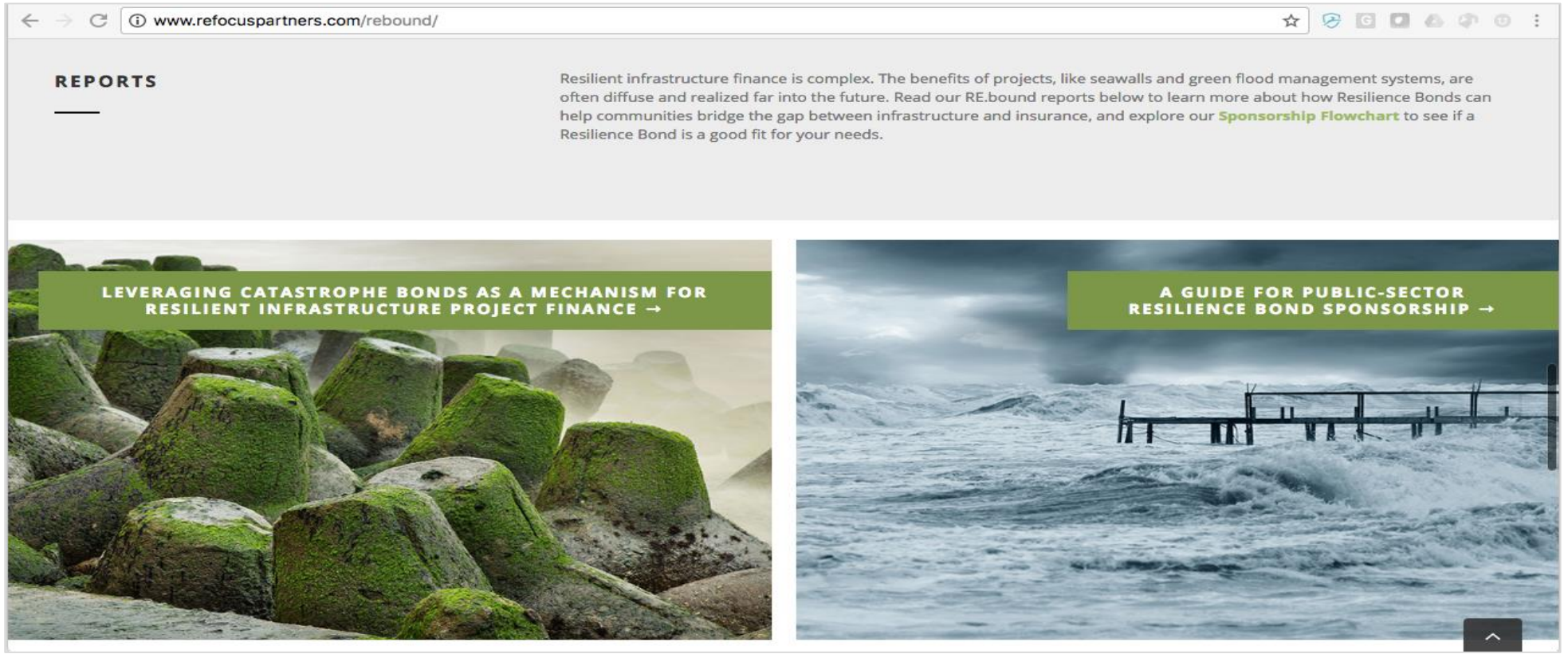
re:FOCUS PARTNERS

4 Ways We Create Opportunities for Financing Protection & Prevention

1. Finding the ‘Biggest Losers’: Who is currently losing money or facing a near-term shortfall without a specific resilience investment?
2. Busting Silos: Identifying value across sectors.
3. Fostering Flexibility: Linking revenue & non-revenue generating projects and services.
4. Linking Physical & Financial Protection: Leveraging insurance-linked finance.

re:FOCUS PARTNERS

Questions? Read more at: www.refocuspartners.com/rebound



re:FOCUS PARTNERS

Building Resilience Through Public Private Partnerships

Presented to the AB2800 Climate-Safe Infrastructure Webinar

May 17, 2018

Presented by IRC--The International Resilience Center (www.ippprc.org)

The Cost of Not Investing in Resilience is Huge

- "With the total of last year's disasters costing nearly the same as Denmark's gross domestic product, which the World Bank tallied at $306.9 billion in 2016, we cannot simply react to disasters anymore, but embrace a world proactively built to mitigate and withstand the changes in our climate….without the assurances of evidence-based research to guide the design, creation, and impact of new infrastructure, there is little hope for a sustainable future anywhere."

  --"Staggering Costs: The Economics of Sustainable Infrastructure" by Michelle Wyman, Executive Director, U.S. National Council for Science and the Environment

- A small investment may produce significant returns for both public and private sectors through reduced loss and suffering

Resilience-Focused Public Private Partnerships

- Example: New Orleans Iconic Art-Deco "Big Charity" Public Hospital
- Massive 1.2mm sq. ft. public hospital--flooded, condemned
- Federal and State governments could not afford the added investment needed to produce resilient facilities, specifically a new super-resilient emergency facility
- Of the 1,170 deaths from Katrina, estimated **520** were in acute medical care prior to the storm

- Construction of new, 450-bed facility with extremely resilient emergency care facility-$1.1b
- Non-profit health foundation partnered in building, operation

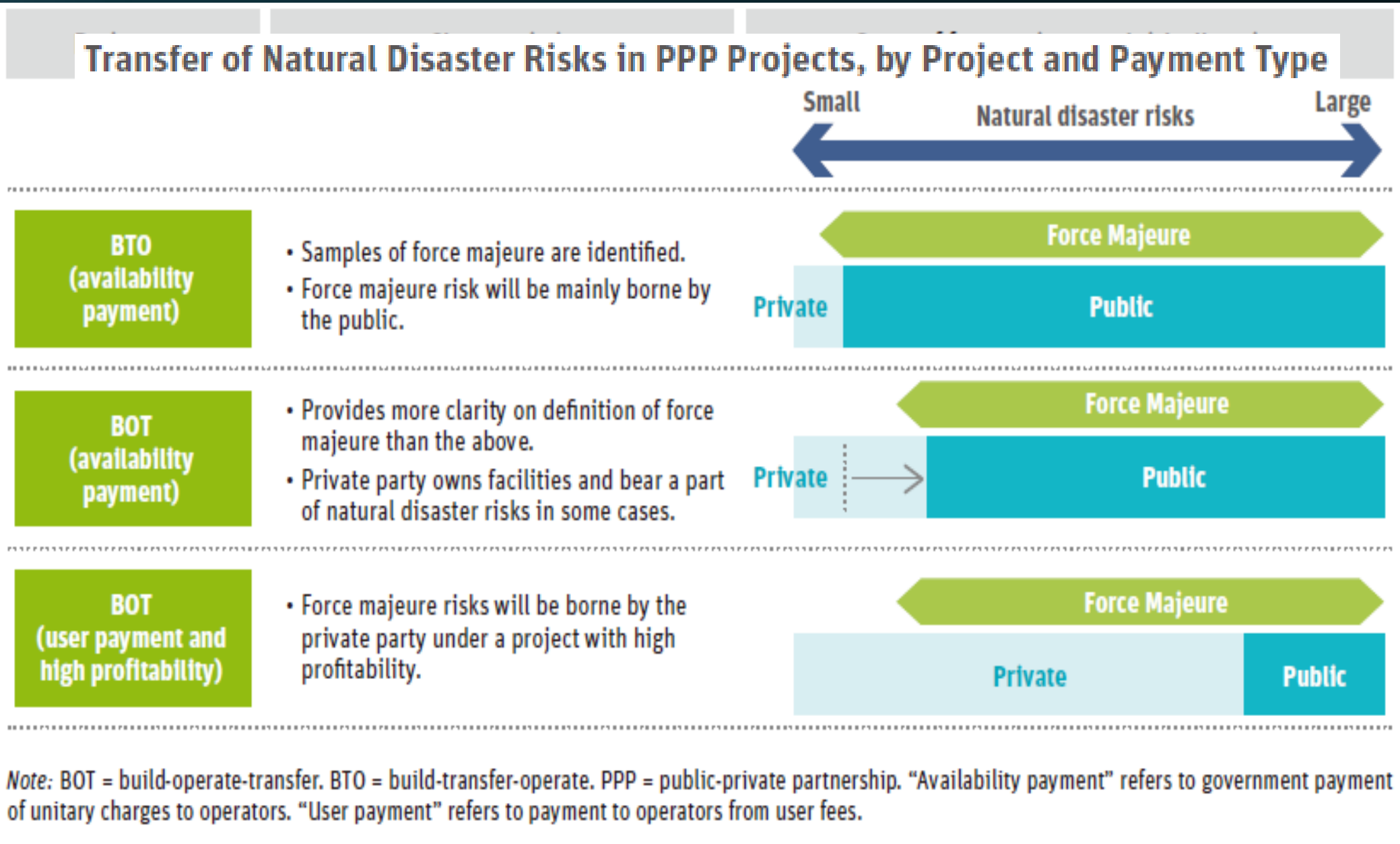
Source	Funding	Operation
Federal	$642m	Public Health
State	$279m	State University Medical School
Private	$143m	Management

Other examples of PPP for Resilient Infrastructure

- 1. Indian Ocean Tsunami (2004)—two companies, CH2M Hill and ARUP Group, raised $80,000 and $370,000 respectively internally in a show of goodwill, leading to the following:
  - CH2M Hill was granted concession to construct water treatment plants in Sri Lanka and Indonesia in partnership with GE, ongoing services to the Sri Lanka Tsunami Reconstruction Program, and construction of two water treatment plants in Maldives
  - ARUP received several contracts for technical advisory services
- 2. Japan East Coast Earthquake and Tsunami (2011)—Japan fully embraced PPP as a way to both more effectively rebuild and lessen "force majeure"—unforeseeable circumstances that prevent someone from fulfilling a contract. Full report is available for free download:
  - http://documents.worldbank.org/curated/en/479931516124878843/pdf/122703-WP-PUBLIC-P161727-ResilientInfrastrcuturePPPJapanCaseStudyFINALweb.pdf

Japan's Methodology—Transfer of Disaster Risk

Transfer of Natural Disaster Risks in PPP Projects, by Project and Payment Type



Note: BOT = build-operate-transfer. BTO = build-transfer-operate. PPP = public-private partnership. "Availability payment" refers to government payment of unitary charges to operators. "User payment" refers to payment to operators from user fees.

Aichi Toll Road: Risk Sharing Policy

Disaster type	Events for which additional costs are borne by the public sector
Earthquake	• Damage based on normal social conventions
Heavy rain	• Maximum rainfall of 80 millimeters or more in 24 hours • Even if the rainfall is below the above standard, it is considered heavy rain if the hourly rainfall is significant (20 millimeters or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.
Storm	• Maximum wind speed of 15 meters per second or more (average in 10 minutes)
High tide, storm surge, tsunami	• Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively nonminor damage

The public sector shall bear the cost if the concessionaire cannot foresee or cannot be reasonably expected to establish measures to prevent additional costs. More precisely, additional costs resulting from natural disasters that fall under force majeure would be borne by the public sector if (a) the disaster recovery project is in accordance with the National Government Defrayment Act for Reconstruction of Disaster Stricken Public Facilities, and (b) the public sector agrees that there were no reasonable measures that the concessionaire could have taken to prevent the additional costs from being incurred because the event was unforeseeable.

Source: Contract documents, Aichi Toll Road Project.

Proposed Framework-Resilient PPPs-World Bank

Area \ Actor	International Organization	Awarding Authority	Private Sector
Policy and Legal Framework	• Foster political will on resilience • Bolster DRM and resilience in PPP technical assistance • Encourage emphasis on climate risk in public investment management frameworks • Strengthen country's capacity to make robust decisions in face of uncertainties	• Introduce flexibility into existing PPP policy frameworks to enable integration of resilience • Level the playing field on disaster risk and resilience in PPP procurement • Review language of PPP contracts	• Promote awareness of climate and disaster risk in insurance • Support to improve disaster resilience by advisers
Project Preparation and Structuring	• Bolster climate risk and resilience in PPP technical assistance • Strengthen country's capacity to make robust decisions in face of uncertainties • Leverage climate finance and financial risk mitigation instruments	• Incorporate climate and disaster resilience in project preparation and transaction structures • Level the playing field on climate risk and resilience in PPP procurement	• Shareholders: Understand implications of natural disaster for investment performance • Insurers: Promote awareness of climate risk in insurance • Advisers: Develop capacity on climate resilience by advisers
Procurement	• Leverage climate finance and financial risk mitigation instruments	• Incorporate climate and disaster resilience	• Insurers: Promote awareness of climate risk in insurance • Advisers: Develop capacity on resilience
Implementation		• Harness private sector DRM expertise	• Project company: Incorporate resilience measures through project life cycle
Risk Transfer and financing	• Leverage climate finance and financial risk mitigation instruments		• Lenders: Incorporate DRM and resilience in lending criteria and loan covenants

Australia's TISN-CIR: Programmatic Best Practice Building PPP for Resilience at a National Scale

- Trusted Information Sharing Network for Critical Infrastructure Resilience
- Serves as a prime mechanism to develop a partnership approach between business and government for more resilient critical infrastructure, as a shared responsibility
- Builds relationships and trust between federal/state/local governments, NGOs, universities, and businesses
- Focuses on policies to encourage formation of partnerships for more resilient infrastructure, focusing on interdependence, common needs
- Implemented policy changes to allow flows of critical information
- Can facilitate horizontal (B to B, interagency) and vertical (business to government-featuring a direct line to the Australian AG) connections

THANK YOU!

David A. Dodd, CEcD/FM
Founding President and CEO
International Resilience Center
1618 Paul Morphy Street
New Orleans, LA 70119
(318) 525-5559
www.ippprc.org

Financing the Future:
Challenges & Opportunities in the Building Sector

Andreas Georgoulias
Research Director
Harvard Univeristy Zofnass Program for Sustainable Infrastructure

Shalini Vajjhala
Founder & CEO
re:focus partners

David Dodd
Chairman & President
International Resilience Center

Thank you!

- The ***Climate-Safe Infrastructure*** Webinar Series continues at least through July 2018
- Upcoming webinars:
  - Financing the Future – Parts 2 and 3 (end of May / early June)

- Track webinars and progress of CSIWG at: http://resources.ca.gov/climate/climate-safe-infrastructure-working-group/
- Questions: Joey Wall - Joseph.Wall@resources.ca.gov