



Design Innovation in Resilience

Climate Resilience Webinar Series



U.S. Department of Housing and Urban Development

Disclaimer

- This presentation is intended to provide communities and states with the tools and information to help in climate resilience planning and activities.
- Information presented in this webinar is independent of the Notice of Funding Availability (NOFA) for the National Disaster Resilience Competition (NDRC). While we expect that this information will be useful to interested communities and eligible applicants, *it should not be construed as the definitive word on any singular approach to resilience.*
- All NOFA NDRC questions should be sent to: resilientrecovery@hud.gov

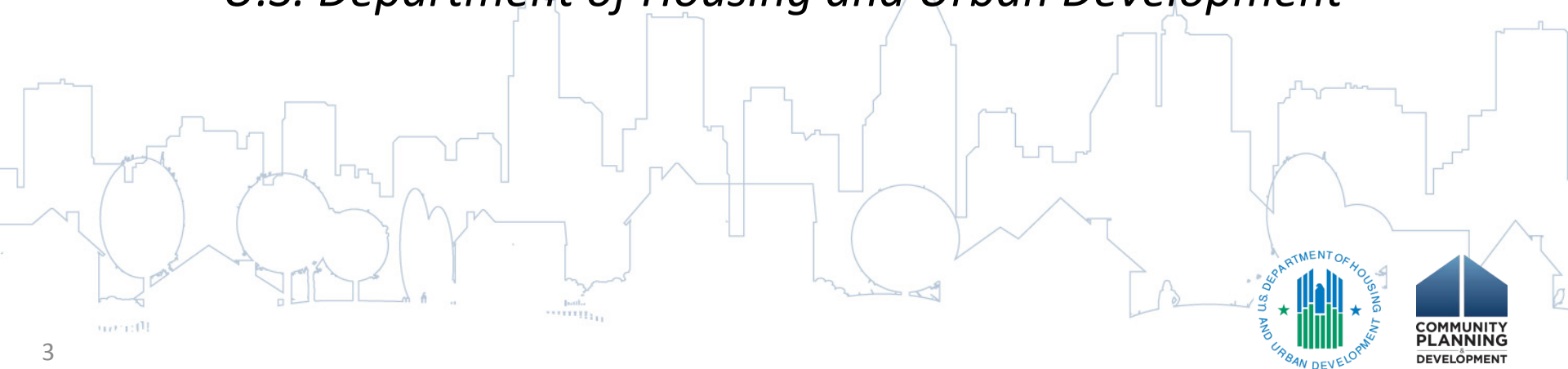
Presenter

Scott G. Davis

Senior Advisor

Office of Community Planning & Development

U.S. Department of Housing and Urban Development



Agenda

1. Overview
2. What are we Talking About?
 - Design Thinking
 - Innovation
 - Resilience
3. Using HUD's Rebuild by Design Competition as a Lens
4. Elements of Innovation in Resilience
5. Case Studies: Innovative Design from Winning RBD Projects
6. Wrap-Up & References

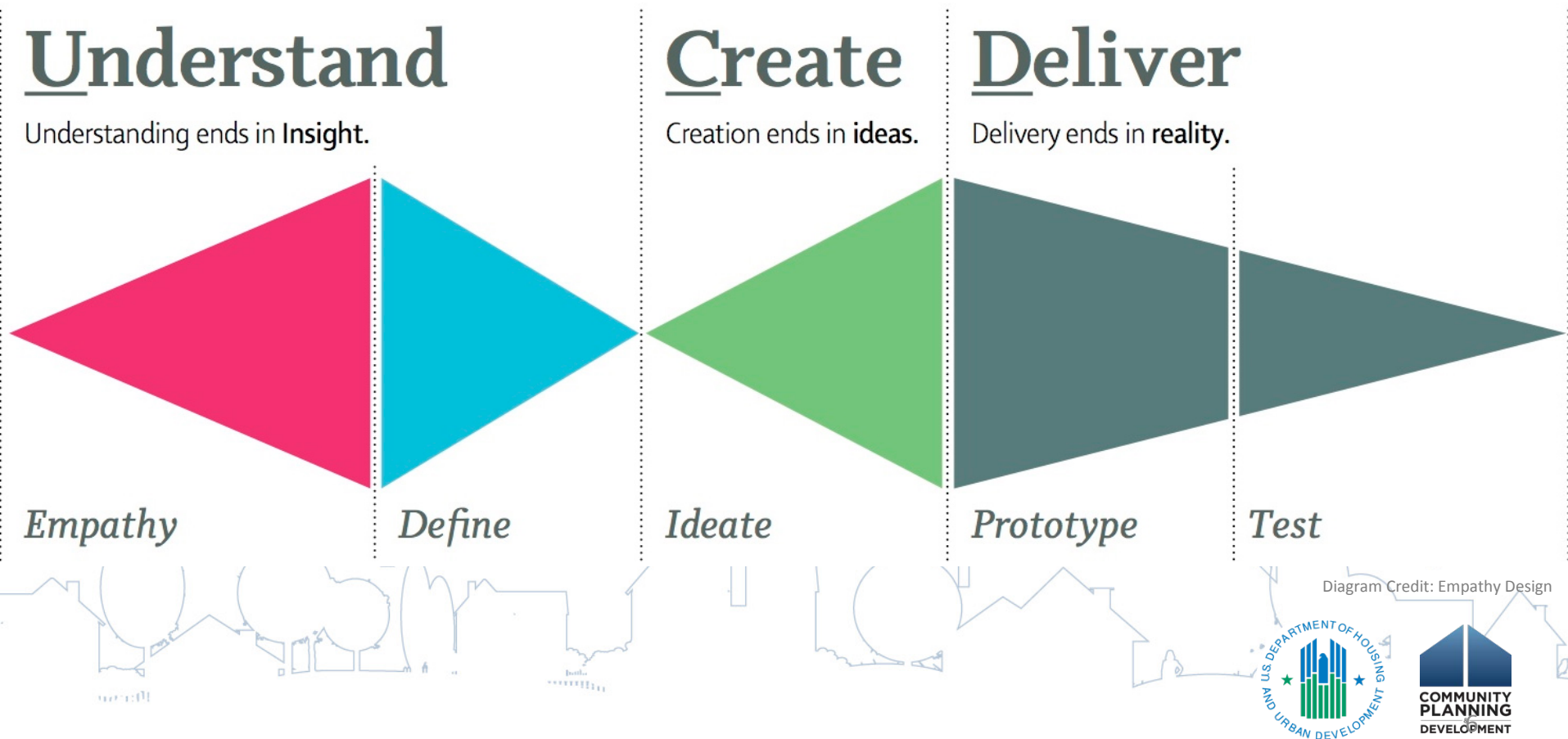
What Are We Talking About?

- Design & Design Thinking
- Innovation
- Resilience (and sustainability)



Design Thinking

Design thinking is essential to arriving at innovative solutions...



Design Thinking

Design thinking as a process is essentially the same a traditional planning process



Meet the Challenges of a Changing Climate

The Climate Resilience Toolkit provides resources and a framework for understanding and addressing the climate issues that impact people and their communities.

- 1 Identify the Problem
- 2 Determine Vulnerabilities
- 3 Investigate Options
- 4 Evaluate Risks & Costs
- 5 Take Action

Should Add # 6:
Monitor & Evaluate

Design & Policy

Resilience is a Place for Intersections in Policy & Design

Policy and design are reflections of who we are
as well as what we want to be.

They are natural reflections of our inherent desire to innovate.

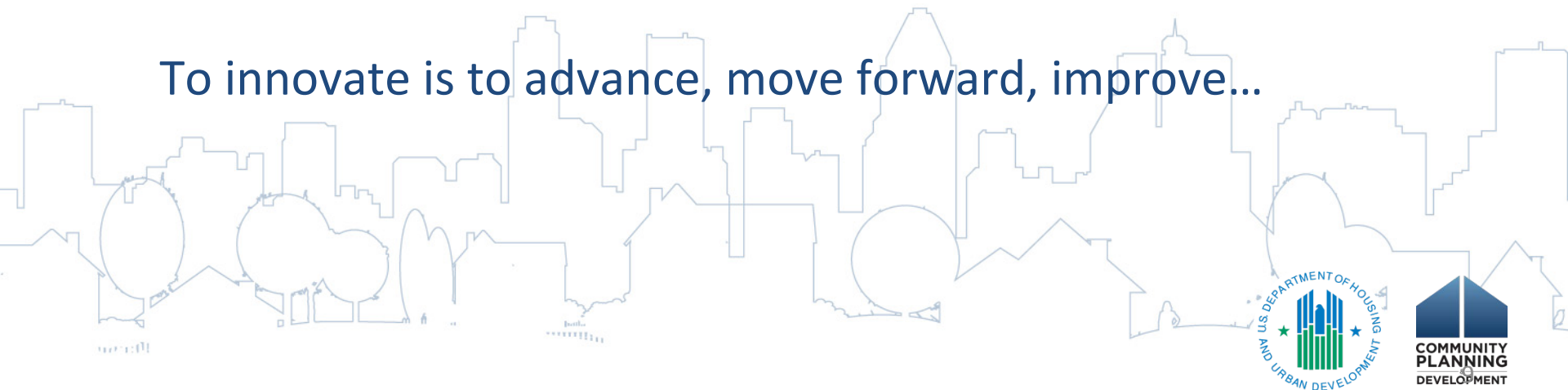


Innovation

Innovation $\neq$ New

Innovation = New + Better

To innovate is to advance, move forward, improve...



Innovation

Design innovation in resilience isn't limited to just structural and nature-based solutions, it can/should include design of...

- Research and Analysis Processes
- Communications and Outreach Strategies
- Governance Structures
- Financing Models
- Policy Frameworks
- Monitoring and Performance Measurement Approaches
- etc.



Resilience

Resilience? What ever happened to sustainability?

- Sustainability and resilience are related and complimentary concepts
- They are both about the long-term or indefinite viability of a thing to exist in a healthy, functional state



Resilience

What distinguishes resilience and sustainability?

Sustainability tends to focus more on the consumption of resources and production of negative outputs as the central condition to long-term viability;

while **resilience** tends to focus on the ability of a thing to withstand and adapt to negative impacts as the central condition to long-term viability.



Resilience

... or put more simply...

The focus of sustainability is the impact of a thing on the world; the focus of resilience is the impact of the world on a thing.

Resilience can be considered as a fundamental principle of sustainability (*i.e.*, if we're not looking at risk, how can we be sure that something is sustainable over the long-term)



The Basis of Resilience

The fundamental lens
through which
the problem and solution are identified
is **risk and vulnerability**



Risk & Vulnerability

Resilience is grounded in risk-based understanding

$$\text{Risk} = \text{Probability} \times \text{Consequence}$$



Risk & Vulnerability

Elements of Vulnerability

1. Exposure

- Spatial analysis informed by the threat, its probability, and the locations/type of impact

2. Sensitivity

- Degree to which assets would be impacted

3. Adaptive Capacity

- Ability of an asset to make adjustments to maintain functionality



Risk needs to be communicated in terms that are understandable and meaningful to individuals

A close-up photograph of a poker table. In the foreground, several playing cards are visible, including a 10 of hearts and a 3 of hearts. Behind the cards are several poker chips in blue, red, and green. The background is dark and out of focus.

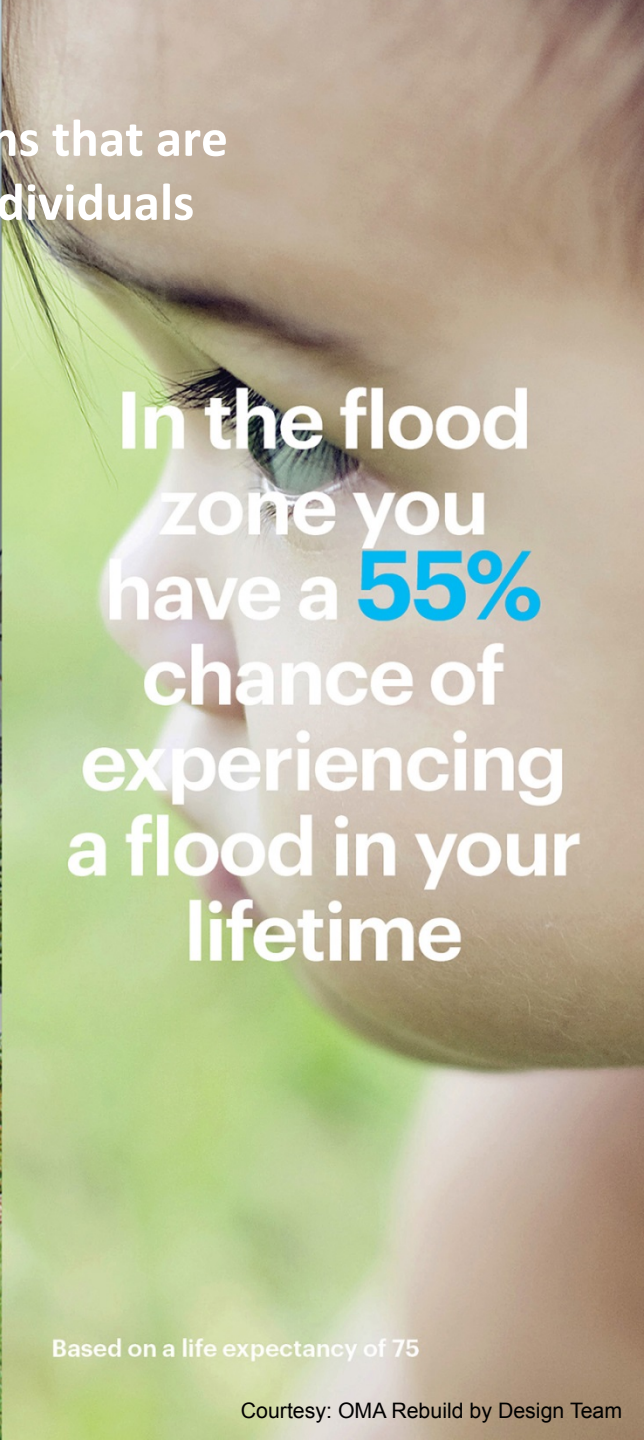
Experiencing
a 100 year
flood is about
five times
as likely as
getting a
flush in poker

For a single game of poker in 1 year, the probability for a flush is 0,197%

A photograph of a two-story house with a grey roof and white siding. In the foreground, a red sign with white text reads 'HOUSE FOR SALE'. A yellow banner with the word 'SOLD' in black is placed diagonally across the sign. The house is surrounded by green grass and some shrubbery.

In the flood
zone, there is a
1 in 4 chance
that your
home will be
flooded before
paying off your
mortgage

Assuming a 30 year mortgage

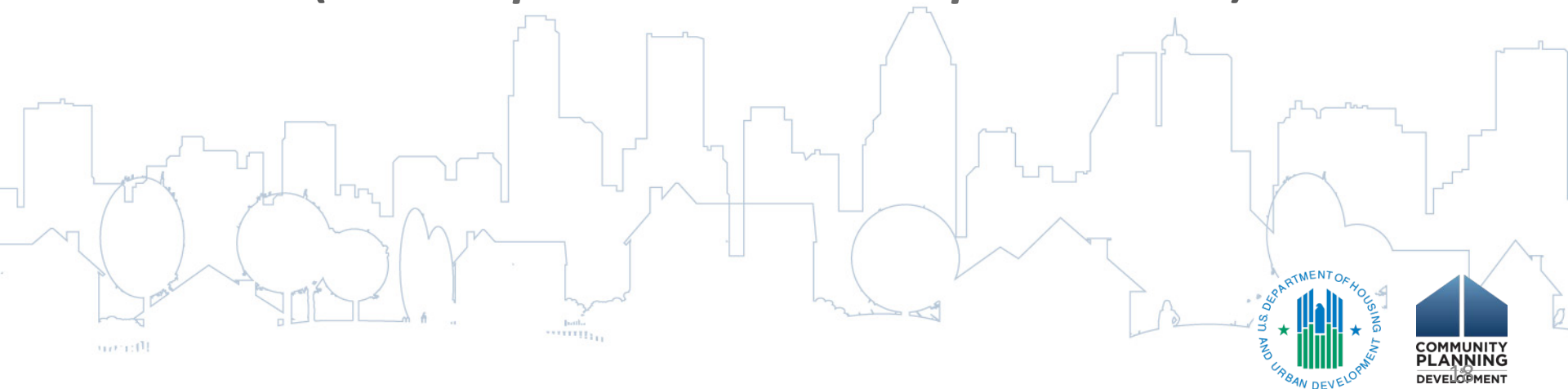
A close-up photograph of a person's face, focusing on their eye and nose. The person has light skin and dark hair. The background is a soft, out-of-focus green color.

In the flood
zone you
have a **55%**
chance of
experiencing
a flood in your
lifetime

Based on a life expectancy of 75

HUD's Rebuild by Design Competition

Examples of innovation in
HUD's Rebuild by Design Competition
(both process and product)



What Is Rebuild by Design?

Rebuild by Design (RBD) was a regional planning and design competition to increase resilience in the Sandy-affected region.

- Launched under the auspices of the President's Hurricane Sandy Rebuilding Task Force (began June 2013, winners announced June 2014)
- Called for as Recommendation #3 in the Task Force's Hurricane Sandy Rebuilding Strategy
- Administered by HUD under the authority of the America COMPETES Act, in partnership with philanthropy, nonprofits, and academia



REBUILD BY DESIGN

**An Initiative of the President's Hurricane Sandy
Rebuilding Task Force**

In Collaboration With

**NYU's Institute for Public Knowledge
Municipal Art Society
Regional Plan Association
Van Alen Institute**

**Lead Supporter
The Rockefeller Foundation**

**With Support From
Deutsche Bank Americas
Foundation
Hearst Foundation
Surdna Foundation
The JPB Foundation
The New Jersey Recovery Fund**

What is Rebuild by Design?

Innovating Together to Create a Resilient Region



Phase 1: Regional Research & Analysis

Problem Statement

- Climate change and natural hazards are contributing to more people, property, and assets at increasing levels of risk & vulnerability

- Understanding and identification of risk and vulnerability using best available science, site visits, and stakeholder input
- Output: Regional Risk & Vulnerability Analysis
- Output: Identification of 3-5 key areas of risk & high-level approach for design opportunity

Phase 2: Site-Based Design Development

Goal

- Development of innovative yet implementable proposals that increase social, physical, economic, and ecological resilience

Performance Criteria:

1. **Innovative** (design solutions)
2. **Implementable**
 - Technically
 - Financially
 - Politically
 - Legally

- Iterative and participatory process to develop design solutions for selected sites
- Education and public outreach to engage communities and other stakeholders in design process
- Output: Innovative and implementable proposal to increase resilience in a high-risk area, including a strategy for implementation

What Does Implementable Mean?

- Technically
 - Demonstration of technical feasibility; professional validation of engineering and scientific principles/methods
- Financially
 - Finance strategy that is reasonably attainable; commitment to funding operations & maintenance
- Politically
 - Has the support of the community, key stakeholders, and relevant elected officials
- Legally
 - Has potential to be permitted/approved within existing framework of regulatory flexibility & authority; does not require an act of Congress to proceed



HUD's Rebuild by Design Competition

Rebuild by Design represented...

- Innovation in Process
 - Use of 2-phase competition to find solutions to “wicked” problems
- Innovation in Partnership
 - Leveraged knowledge, resources, and skill sets within and outside of government
- Innovation in Policy
 - Up-front commitment to help fund implementation; focus on “innovative yet implementable” pushed boundaries but also required proposals to demonstrate technical, financial, regulatory, and political feasibility + strong community buy-in



Elements of Innovation

In terms of community resilience, innovation...

1. is **Multi-Disciplinary & Collaborative**
2. takes a **Regional, Systems Approach**
3. is **Iterative & Participatory** in process
4. examines **Multiple Hazards & produces Co-Benefits**
5. seeks **Integrated Solutions** that are **Leveraged**



Multi-Disciplinary & Collaborative

Multi-Disciplinary & Collaborative

Regional, Systems Approach

Iterative & Participatory Process

Multiple Hazards & Co-Benefits

Integrated & Leveraged Solutions



Multi-Disciplinary & Collaborative

WCY architecture + urban design

Claire Weisz
Mark Yoes
Adam Lubinsky
Layng Pew
Kennedy Howe
Olivia Lerner
Catherine Nguyen
Paul Salama
B. Tyler Silvestro
Alice Shay
Maiko Shimizu
Thom Stead
Mathew Suen

West 8

**Urban Design
& Landscape
Architecture**
Adriaan Geuze
Claire Agre
Riette Bosch
Ela Chojecka
Janneke Eggink
Giulia Frittoli
Lauren Micir
Florentia van Gils
Daniel Vasini
Moniek Widdershoven

AIR Worldwide

Andrew Kao

NowHere

Yeju Choi

ARCADIS

Piete Dirke
Daniel Hitchings
Jelmer Cleveringa
Roni Dietz
Edgar Westerhof

CURE., Columbia University

Jesse M. Keenan

Helen Han Creative

Helen Han

Rutgers University

Kate John-Alder

Verisk Analytics

Gary Cornbrooks

BJH Advisors

Kei Hayashi

Great Lakes Dredge & Dock Co. LLC

William Hanson

Griffith Planning & Design

Maxine Griffith

WB unabridged w/ Yale ARCADIS

DE URBANISTEN
75B VolkerIntra



CENTER for ADVANCED URBANISM



**SASAKI
RUTGERS
ARUP**

SCAPE / LANDSCAPE ARCHITECTURE PLLC

PARSONS BRINCKERHOFF
STEVENS INSTITUTE OF TECHNOLOGY
OCEAN AND COASTAL CONSULTANTS
SEARC CONSULTING
THE NEW YORK HARBOR SCHOOL
LOT-EK
MTWTF
PAUL GREENBERG



Analyze. Advise. Act.

Cooper, Robertson & Partners, Inc.
Architecture, Urban Design

W Architecture and Landscape Architecture, LLC

Dewberry



PennDesign / OLIN

HR&A Advisors
eDesign Dynamics
Level Infrastructure
McLaren Engineering Group
Barretto Bay Strategies
Philip Habib & Associates
Buro Happold

**OMA
AMO**



INTERBORO



Project Projects

RFA Investments

AABEL



Multi-Disciplinary & Collaborative

Collaborative administration of the competition connected the teams to:

- Local, state, and federal government agencies/programs
- Local elected officials
- Local and regional authorities, such as transit and water/wastewater
- Local community-based organizations
- Top-tier scientists
- Philanthropies & foundations



Regional, Systems Approach

Multi-Disciplinary & Collaborative

Regional, Systems Approach

Iterative & Participatory Process

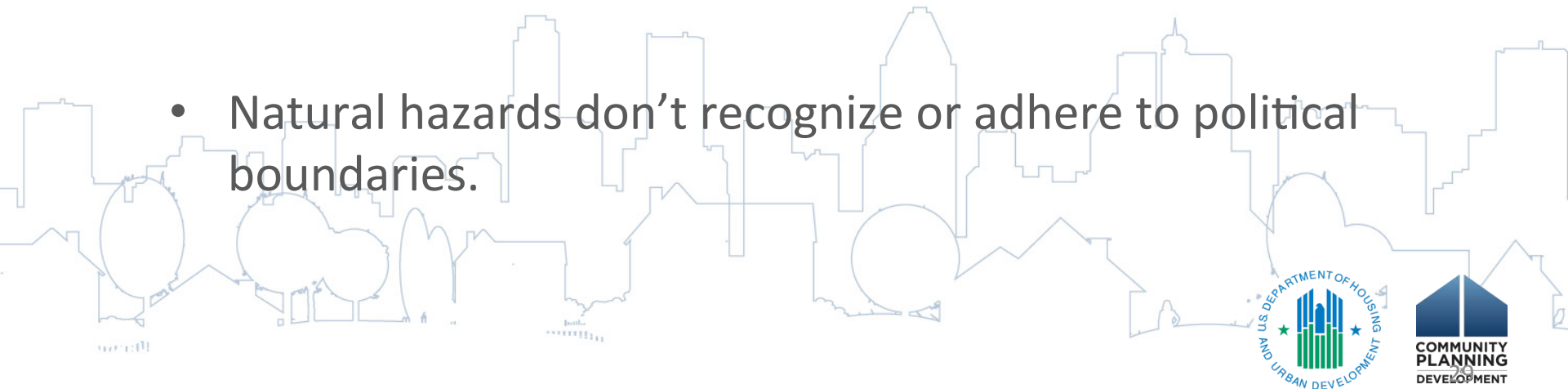
Multiple Hazards & Co-Benefits

Integrated & Leveraged Solutions

Regional, Systems Approach

Perspective and Geographic Scale of Understanding

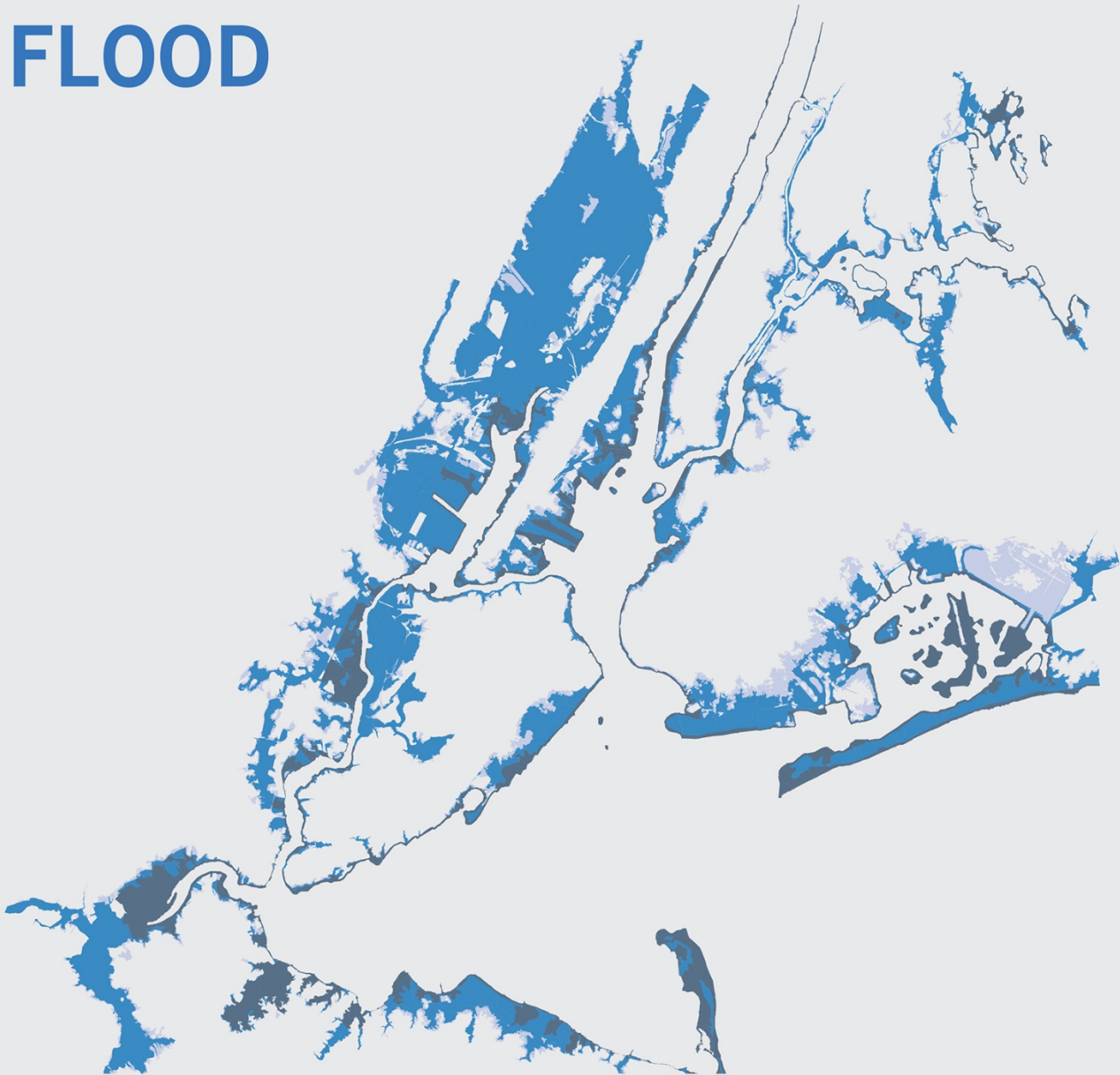
- The geographic scale of analysis should be that at which the threat or hazard exists.
- For most hazards, this is a regional level
- Natural hazards don't recognize or adhere to political boundaries.





FLOOD

2.5
MILLION INHABITANTS
IN THE NEW YORK
& NEW JERSEY
METROPOLITAN AREA
LIVE IN THE FLOOD
ZONE



FEMA FLOOD ZONES
NEW YORK CITY/
NORTHERN NEW JERSEY REGION

FEMA Designated Flood Zones

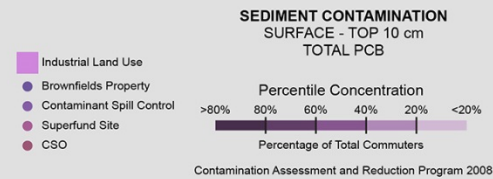
Zone XX – 500-year
Zone A – 100-year
Zone V – 100-year

(FEMA, NOAA) *Digital Flood Data for Nassau County Unavailable ©2013



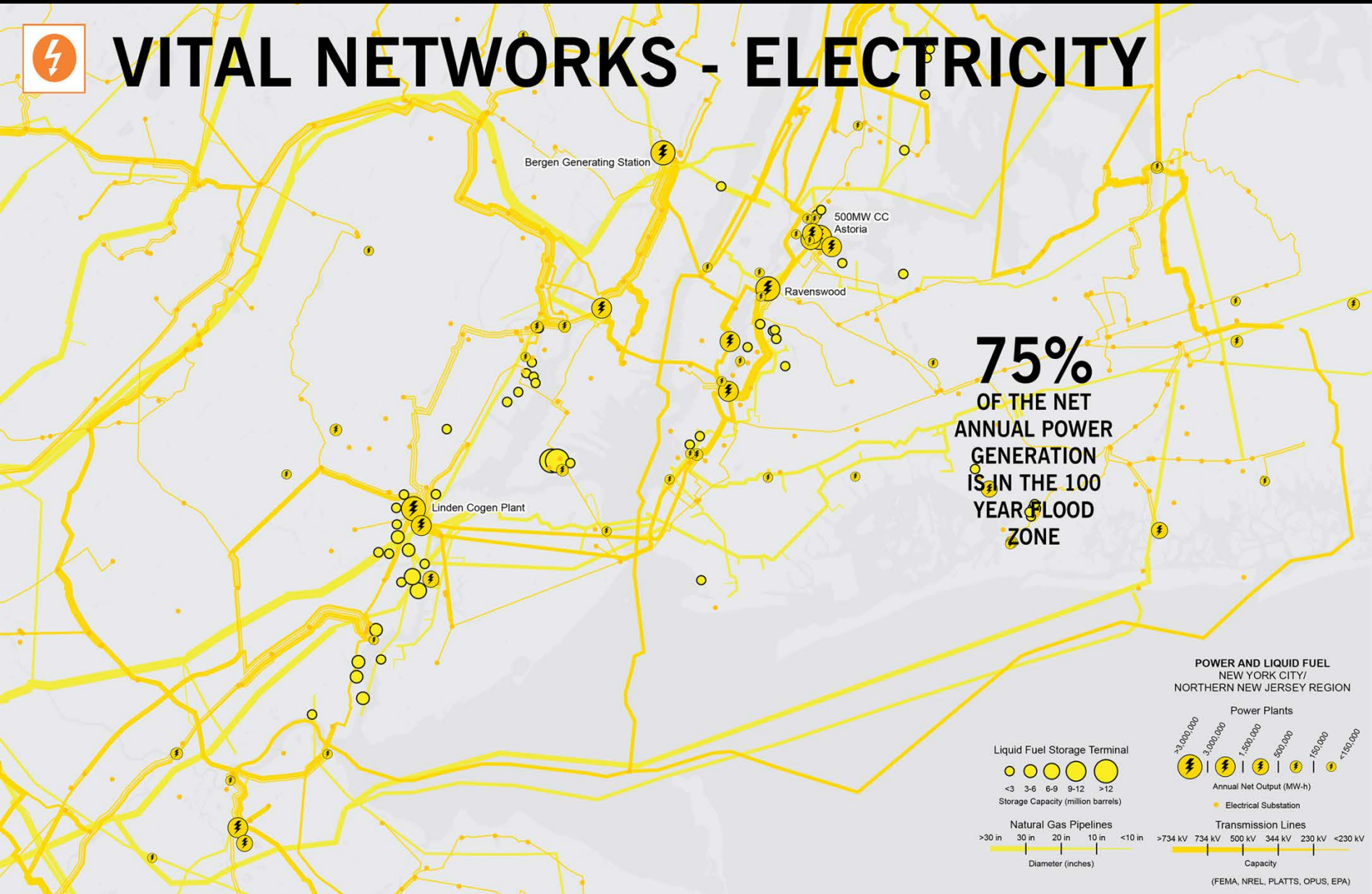
POLLUTION

80%
OF THE
REGIONAL FUEL
STORAGE IS
IN THE FLOOD
ZONE

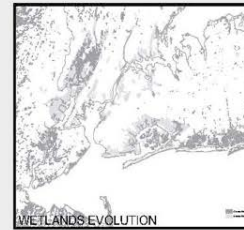
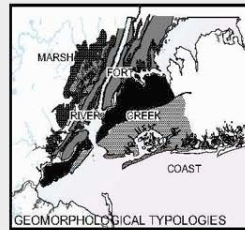




VITAL NETWORKS - ELECTRICITY



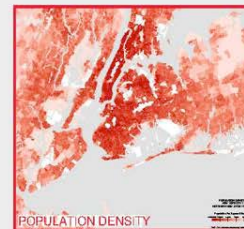
REGIONAL ANALYSIS



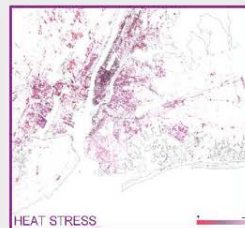
85%
OF THE
REGIONAL
HISTORIC
WETLANDS
HAS BEEN
DEVELOPED
OR LOST



2.5
MILLION INHABITANTS
IN THE NEW YORK
& NEW JERSEY
METROPOLITAN AREA
LIVE IN THE FLOOD
ZONE



66%
OF THE MOST
VULNERABLE
COMMUNITIES
LIVE WITHIN A
1/2 MILE OF THE
FLOOD ZONE



80%
OF THE
REGIONAL FUEL
STORAGE IS
IN THE FLOOD
ZONE

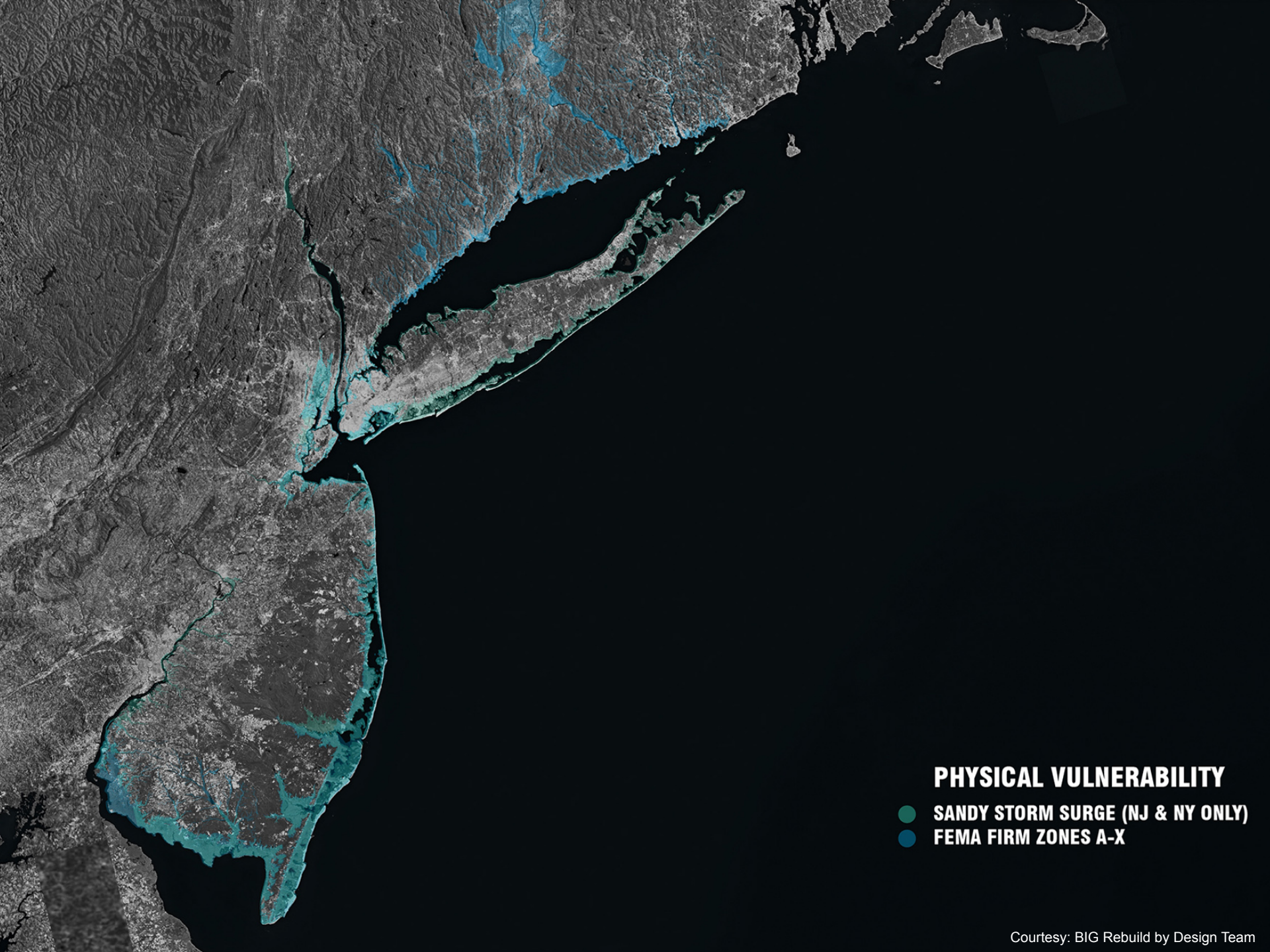


75%
OF THE NET
ANNUAL POWER
GENERATION
IS IN THE 100
YEAR FLOOD
ZONE

Vulnerable Public Housing in New York City



Courtesy: URG Rebuild by Design Team



PHYSICAL VULNERABILITY

- SANDY STORM SURGE (NJ & NY ONLY)
- FEMA FIRM ZONES A-X