BUILDING INNOVATION
Conference

Connecting Design and Resilience

Design at Scales for People and the Planet

Agenda

1. Establishing common vocabulary
2. Case Study: DC Climate Action Plan
3. Case Study: Greenpeace

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Establishing a Common Vocabulary

Understanding Vulnerability

Resilient design is regenerative and life-affirming, creating diverse communities that are healthy, economically stable and adaptable through adversity. We must use a multifaceted assessment approach when determining risk.

Defining resilience

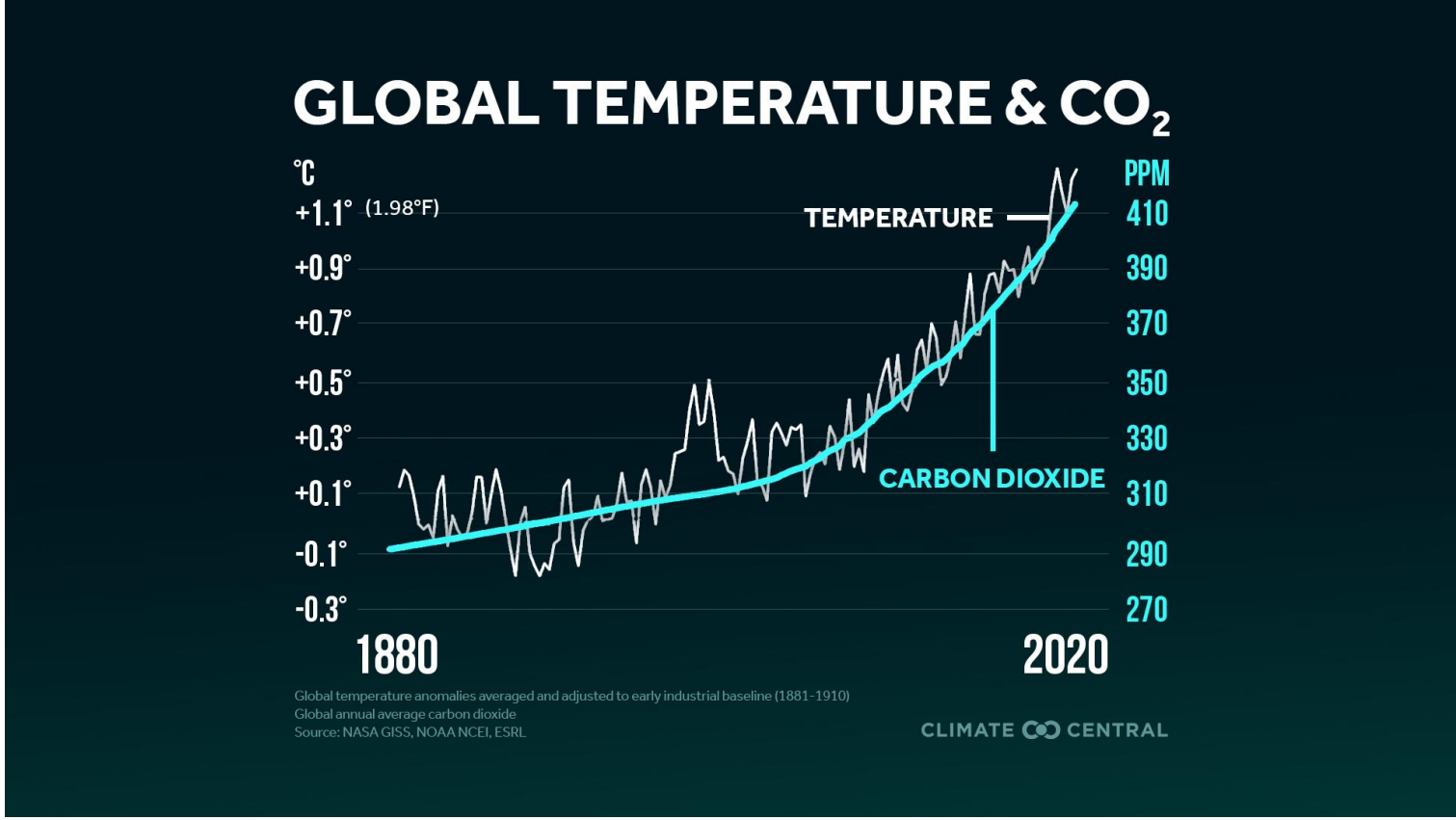
Resilient Design pursues spaces, buildings, and communities that are ***shock resistant, healthy, adaptable and regenerative*** *through a combination of diversity, foresight and the capacity for self-organization and learning.*

A resilient community requires humans to ***embrace their capacity to anticipate, plan and adapt*** *for the future.*

Why is this important?

FOR THE PLANET.

Carbon emissions are a central cause of global warming and the degradation of our planet, directly leading to increased severity in storms, droughts, and sea level rise.



This gradual warming, casually called **climate change**, impacts ecosystems, food chains, growing cycles, and species survival.

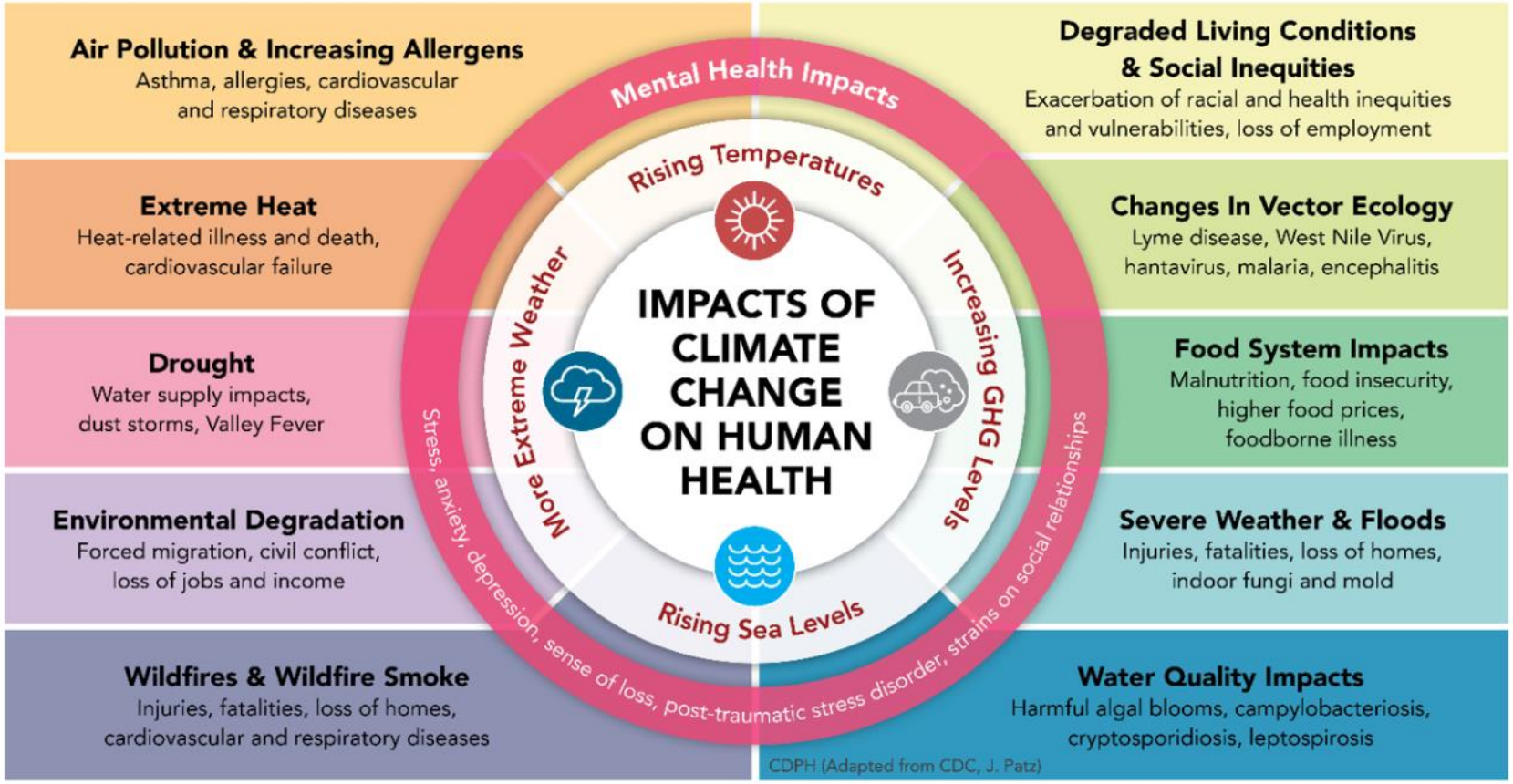
If left unaddressed, the planet faces extinctions, changes in oxygen levels, and increased temperatures that will **impact all of life on the planet**.

Why is this important?

FOR PEOPLE.

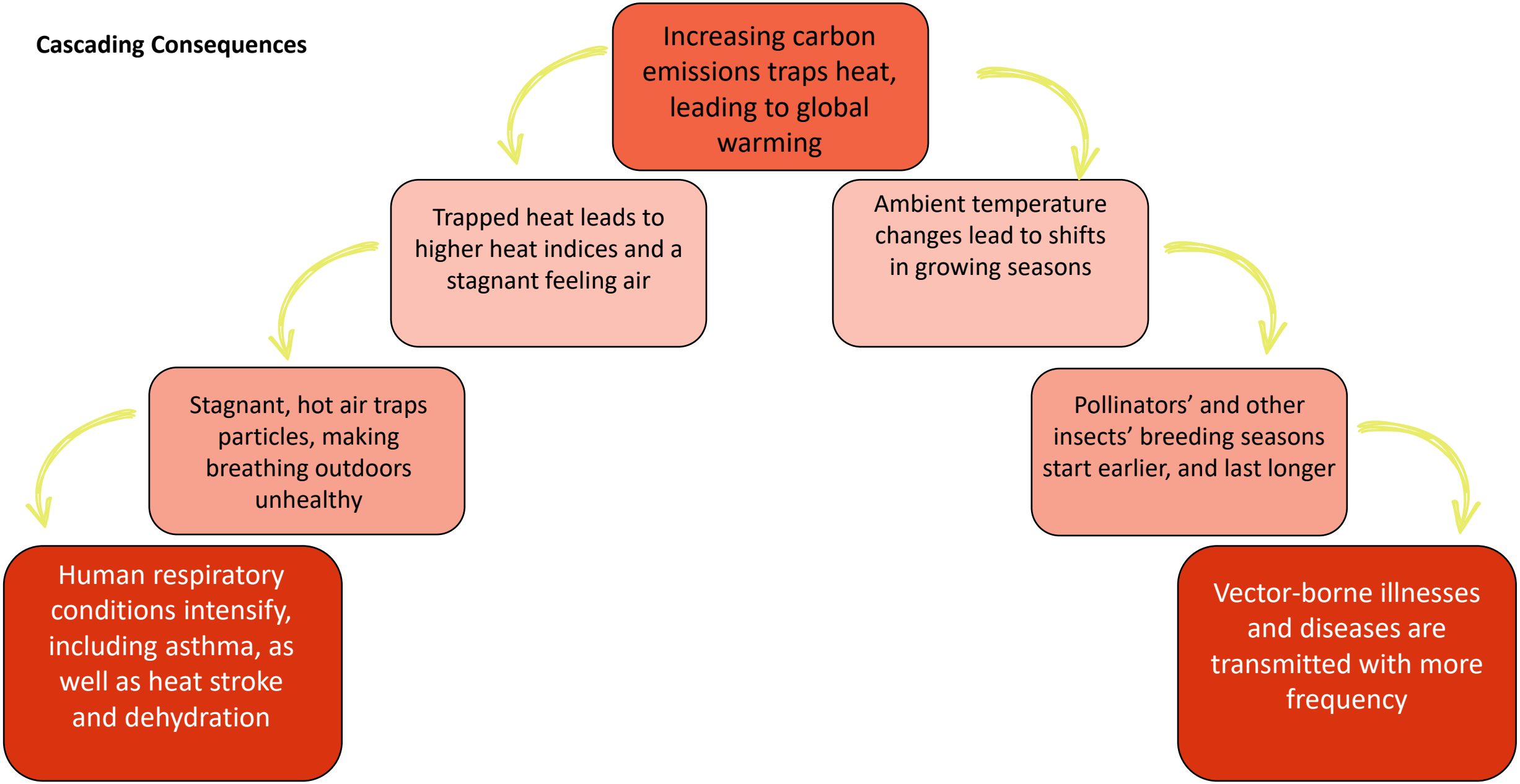
Global warming has been linked to **changes in the atmosphere**, including oxygen levels, particulate stratification, and increases in ambient temperature. Changes in the atmosphere have **direct impacts on human health.**

If we don't address climate change now, we will continue to see **steady increases in rates of asthma, allergies, and days when it's simply not safe for people to be outside**.



Source: National Institutes of Health

Cascading Consequences



VALUES OF RESILIENT DESIGN – THE TRIPLE BOTTOM LINE

Using three lenses to make the case.

Social benefits:

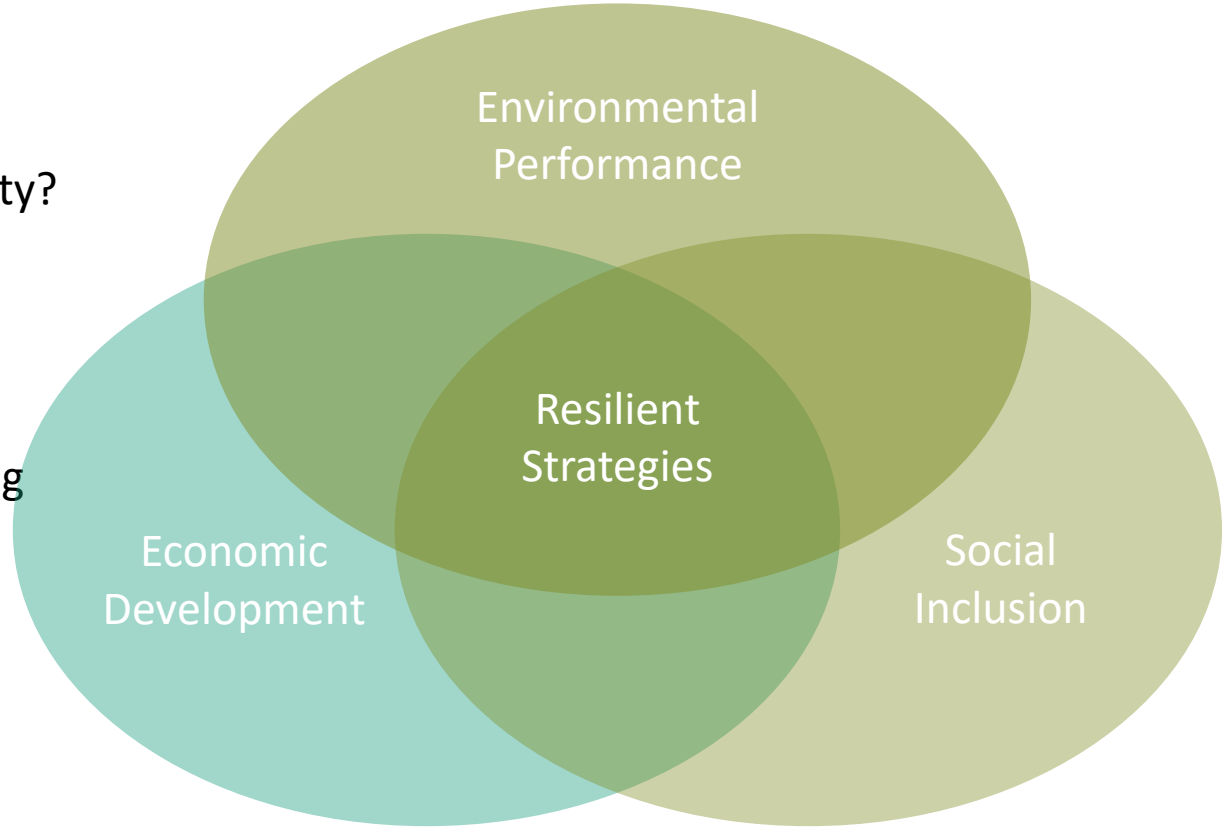
- Health and wellbeing of occupants and users
- Reduced anxiety and stress-induced issues
- Is there a greater benefit to the larger community?

Economic benefits:

- What is the cost to bounce back?
- Insurance premiums
- Up-front costs for preparations
- Business continuity – what is the cost of stopping work?

Environmental benefits:

- Mitigating certain climate events
- Less reparation after an event
- Reducing pollution and waste
- Energy independence

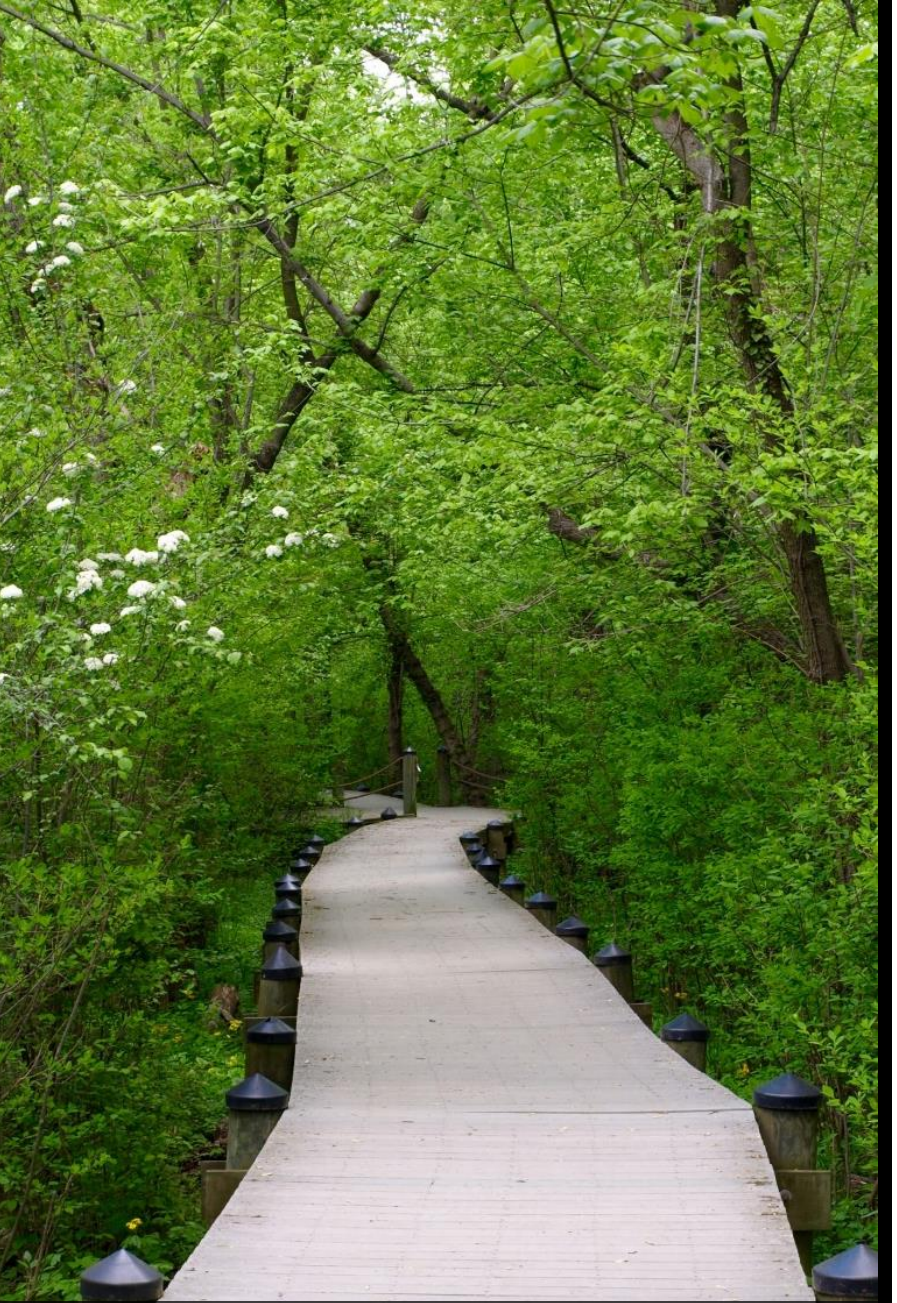


Defining Resilience

Beyond climate, truly resilient design demands that we account for the economic and social impact of our designs.

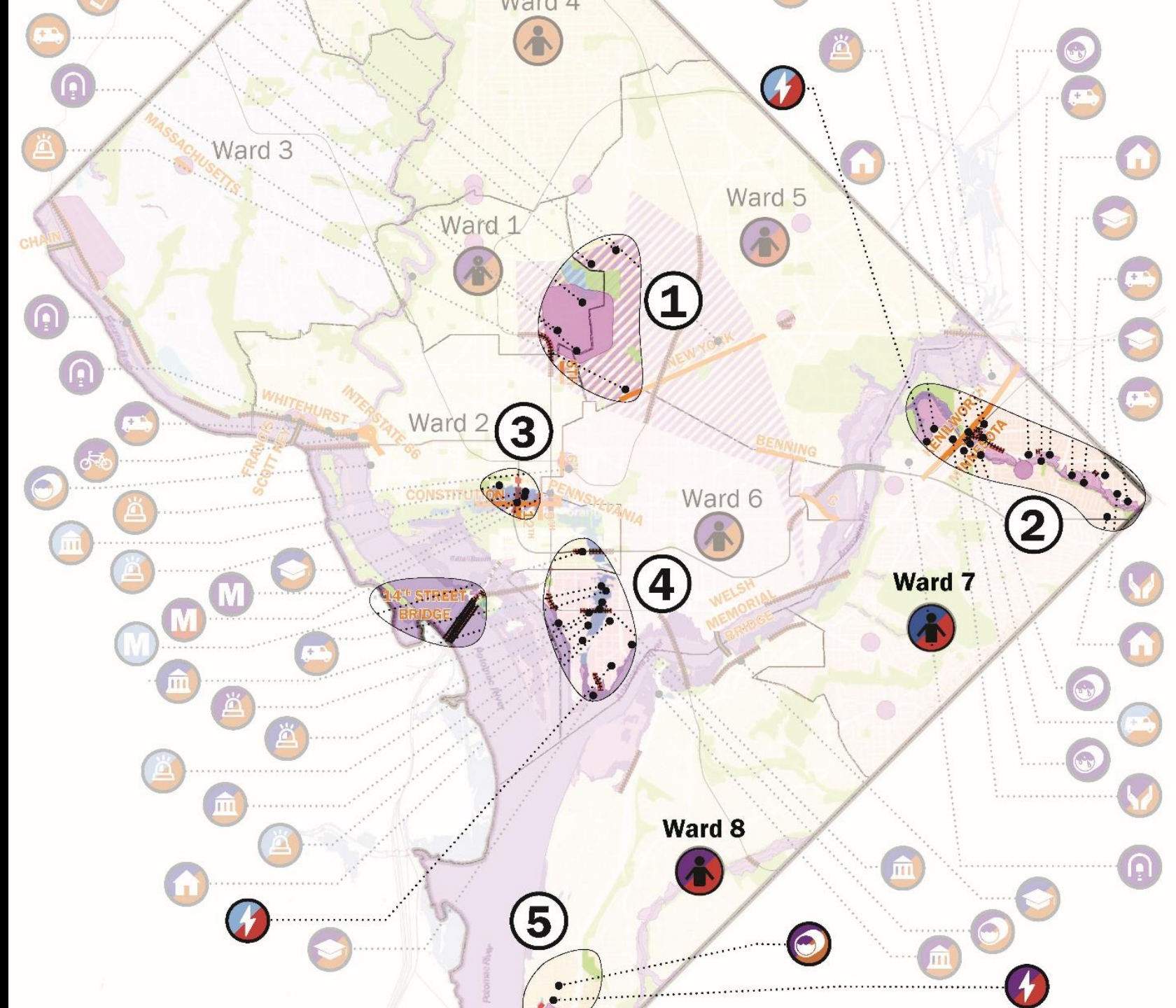
Path to Success

1. Understand the Signal Issues
2. Design with Empathy
3. Rember that you are always serving two clients
4. Pick one aspect of the design to build from
5. Incorporate Storytelling



DC CLIMATE ADAPTATION PLAN

Washington, DC



DC CLIMATE ADAPTATION PLAN

Process

Three Tasks

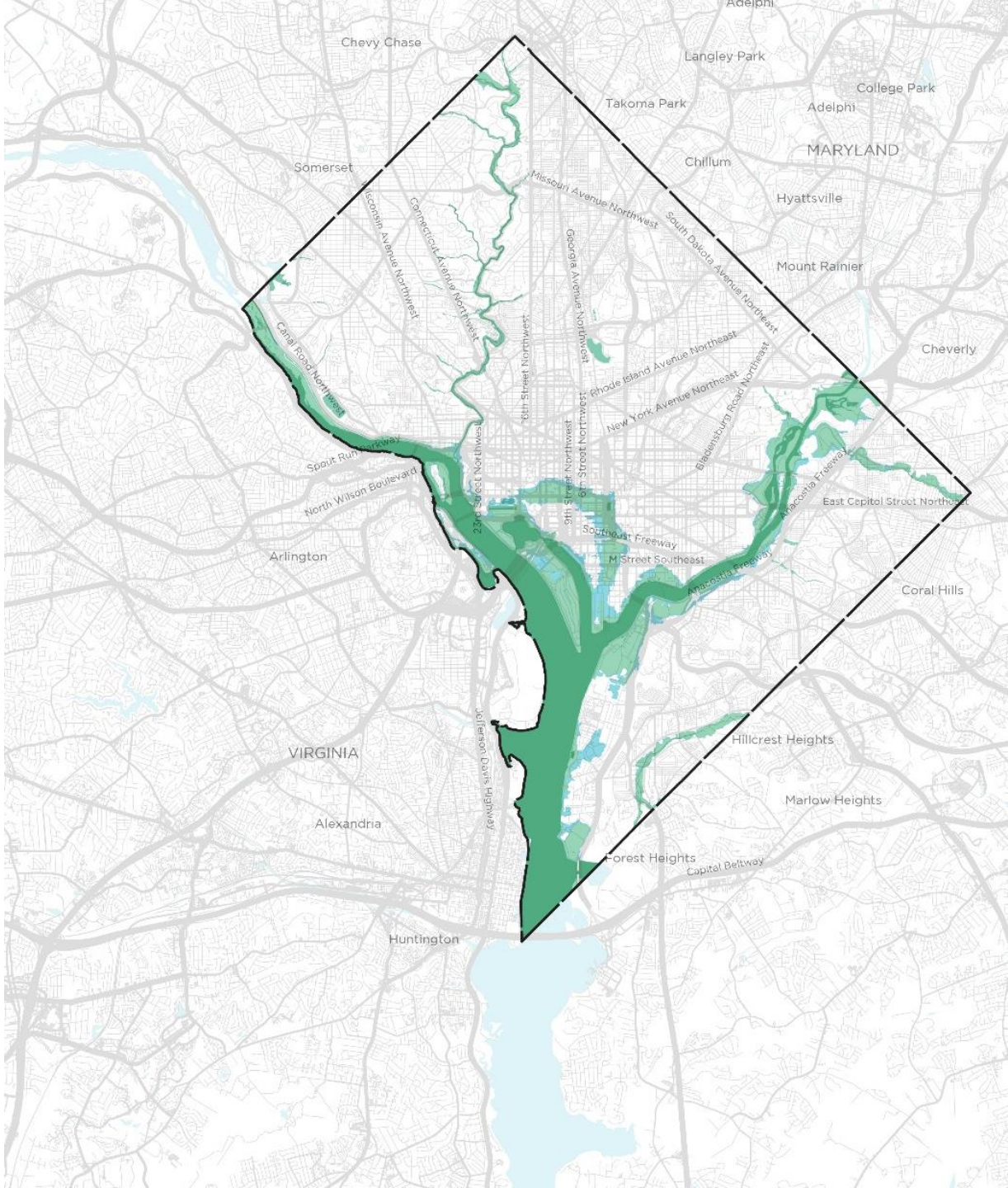
- Climate Projections: Initial assessment completed by Kleinfelder
- Vulnerability Assessment:
  - Series of workshops with DC department and agency reps
  - Recommendations from team
- Adaptation Plan: recommendations from Perkins&Will

DC CLIMATE ADAPTATION PLAN

Process

Task 1: Climate Projections

- Seven initial projections considered
- Study narrows down to three
  - Sea level rise/storm surge
  - Precipitation
  - Temperature (extreme heat)



Putting resilience into practice.

Past

- FEMA flood maps
- Historic weather data
- Climate Explorer

Present

- Transportation Maps
- Food Deserts/Locations
- City-wide Climate Plans

Future

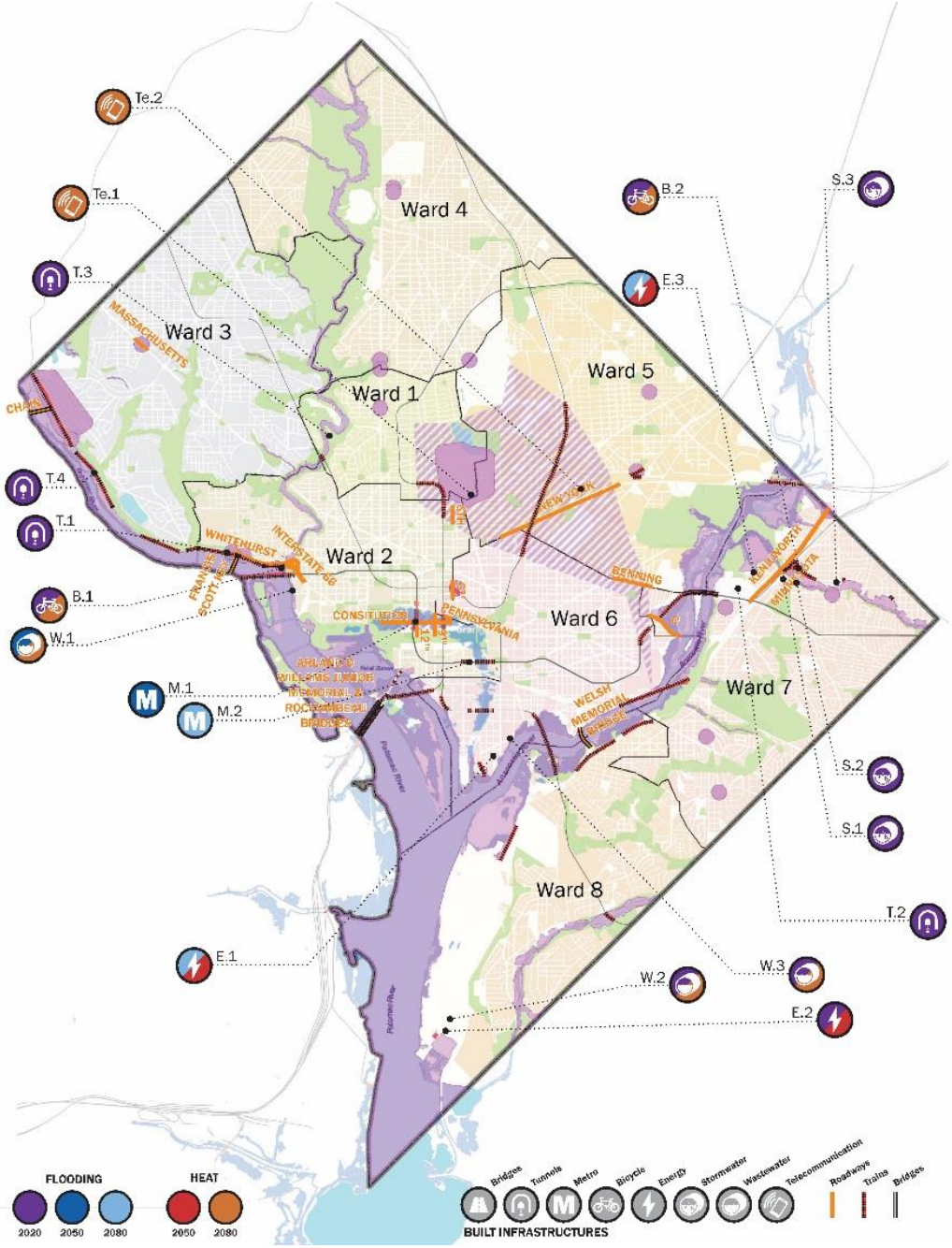
- NOAA Sea Level Rise Projection Tool
- Army Corps of Engineers Relative Sea Level Projection Tool
- FEMA Risk Index

DC CLIMATE ADAPTATION PLAN

Process

Task 2: Vulnerability Assessment

- Evaluating key elements within the city, and how the identified climate risks impact them.
- Infrastructure
  - Energy systems
  - Transportation
  - Water
  - Telecommunications
- Community Resources
  - Municipal resources
  - Human services
  - Schools
  - Public & elderly housing
- Population at Risk



IMPACTS

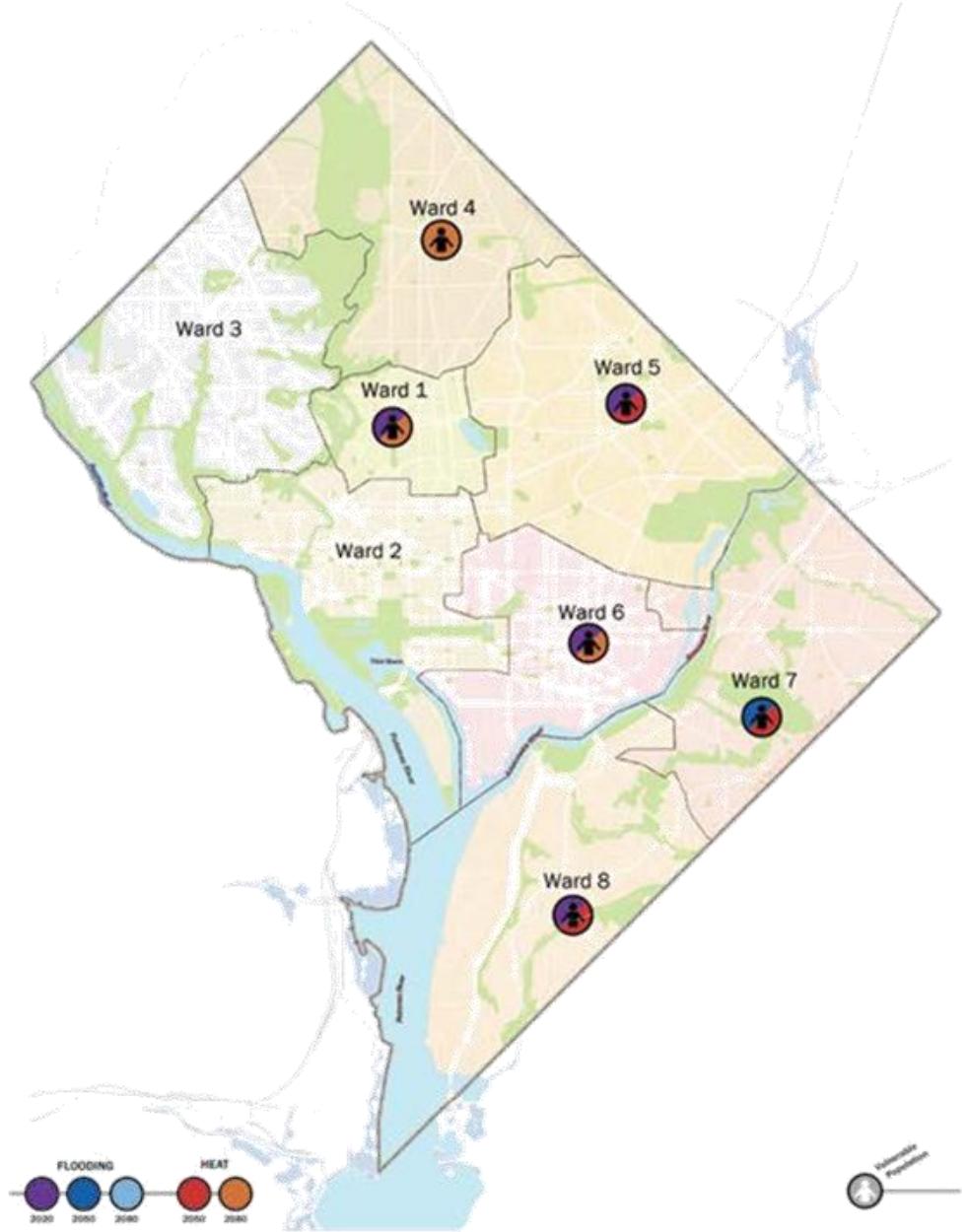
Results of the Climate Study

Task 2: Vulnerability Assessment

- Population at Risk
  - Assessing mobility and adaptability capacity

Sensitivity	Adaptive Capacity
Unemployment	Unemployment
Educational attainment (without HS diploma)	Educational attainment (without HS diploma)
Poverty prevalence	Poverty prevalence
Obesity	
Adult asthma	
Senior	

FIGURE 4: Sensitivity and Adaptive Capacity Indicators[11]



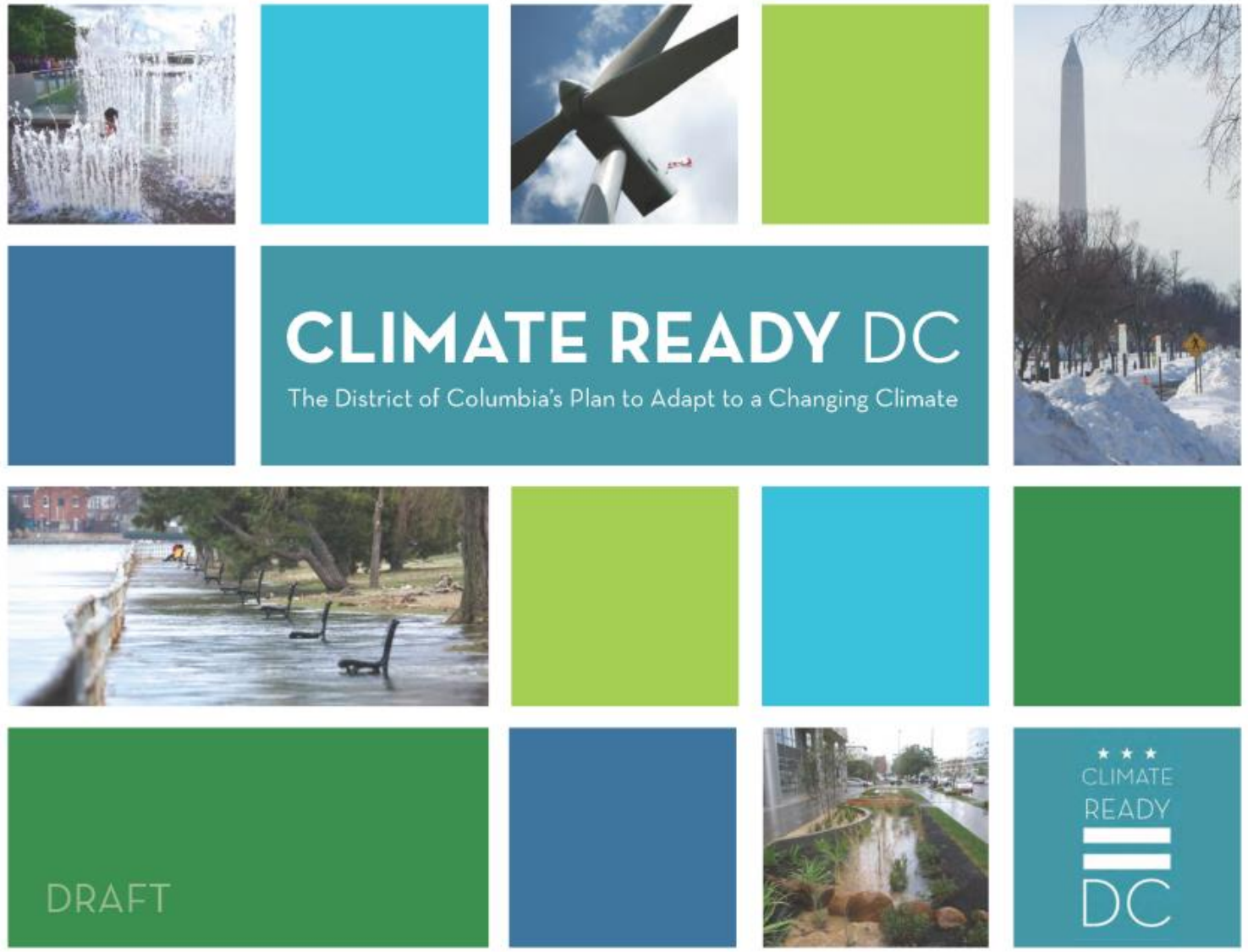
MAP 8: Vulnerable Populations per Ward (Source: Kleinfelder, February 2016)

DC CLIMATE ADAPTATION PLAN

Process

Task 3: Adaptation Plan

- **Transportation and Utilities**
- **Buildings and Development**
- **Neighborhoods and Communities**
- **Governance & Implementation**



Category

Action

Sub-action

ACTION (SUB-ACTION)				
TU – Transportation + Utilities Goal: Improve the nsportation and utility infrastructure maintain viability during periods of extreme heat, extreme weather and flooding.				
TU 1.0	**Develop site-level adaptation plans** for all transportation, energy, water & waste er, telecommunications + data (internet) facilities, functions and service areas identifie s at-risk from sea level rise and flooding based on the Vulnerability Assessment.			
TU 1.1	Identify at-risk facilities and develop adaptation or retirement plans for those facilities. Identify those facilities located in priority areas identified in the Vulnerability Assessment in order to prioritize which facilities should be adapted / retired soonest.	Sea Level Rise Flooding	HSEMA	Infrastructure owners and operators including DDOT, WMATA, DC Water, Pepco, Telecommunication Utilities
TU 1.2	Conduct near-term and long-term flooding evaluations for at-risk facilities based on projected increases in heavy precipitation (causing both inland and riverine flooding), increased storm-surge (due to combined sea level rise + more severe storms), and permanent inundation due to sea level rise.	Sea Level Rise Flooding	HSEMA	Infrastructure owners and operators including DDOT, WMATA, DC Water, Pepco, Telecommunication Utilities
TU 1.3	Perform updated modeling for the District periodically to unsure the more accurate projections are available.	Sea Level Rise Flooding	DOEE	HSEMA
TU 1.4	Periodically review / revise the design standards for water infrastructure to address any change in storms of greater intensity for precipitation and revise areas at risk for flooding caused by sea-level rise and / or storm surge.	Sea Level Rise Flooding	DOEE	USACE
TU 2.0	**Increase the resilience of all types energy systems**			
TU 2.1	Continue and expand energy efficiency programs and policies to increase grid stability and resource effectiveness by reducing energy demand at peak periods and during extreme events through energy efficiency.	Extreme Heat Flooding Extreme Weather	DOEE	DOEE, DC SEU, Pepco, DC PSC, Washington Gas
TU 2.2	Stabilize the power grid with distributed energy resources including storage, renewable energy and micro-grids capable of islanding. Prioritize locations that could provide backup power to critical facilities, or alleviate congestion on the distribution grid.	Extreme Heat Flooding Extreme Weather	DC PSC	DOEE, DC SEU, Pepco, DC PSC, Washington Gas

Climate risk targeted

Lead DC department or agency

Supporting DC & regional entities

IMPLEMENTATION

Looking Back

Interagency Coordination:

- Climate Implementation Plan
- Comprehensive Plan
- All Hazard Mitigation Plan Update
- Comprehensive Energy Plan

Building Codes

Equity Advisory Group

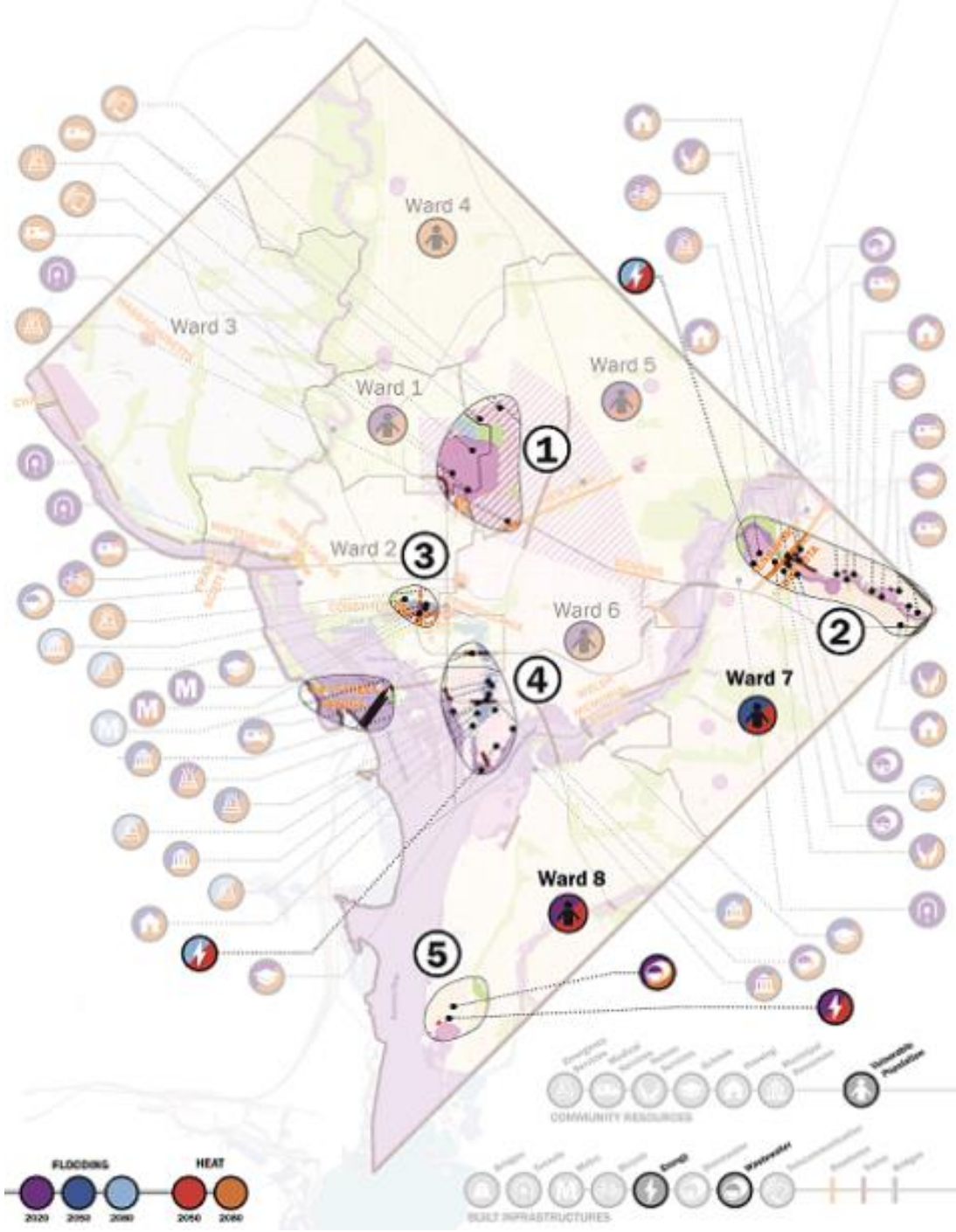
Resilience Cabinet

Resilience Guidelines

VULNERABILITY AND RISK ASSESSMENT

Priority Planning Areas

1. Bloomingdale & LeDroit Park
2. Watts Branch
3. Downtown/Federal Triangle
4. Southwest/Buzzard Point
5. Blue Plains
   - + Vulnerable Populations in Ward 7 & Ward 8



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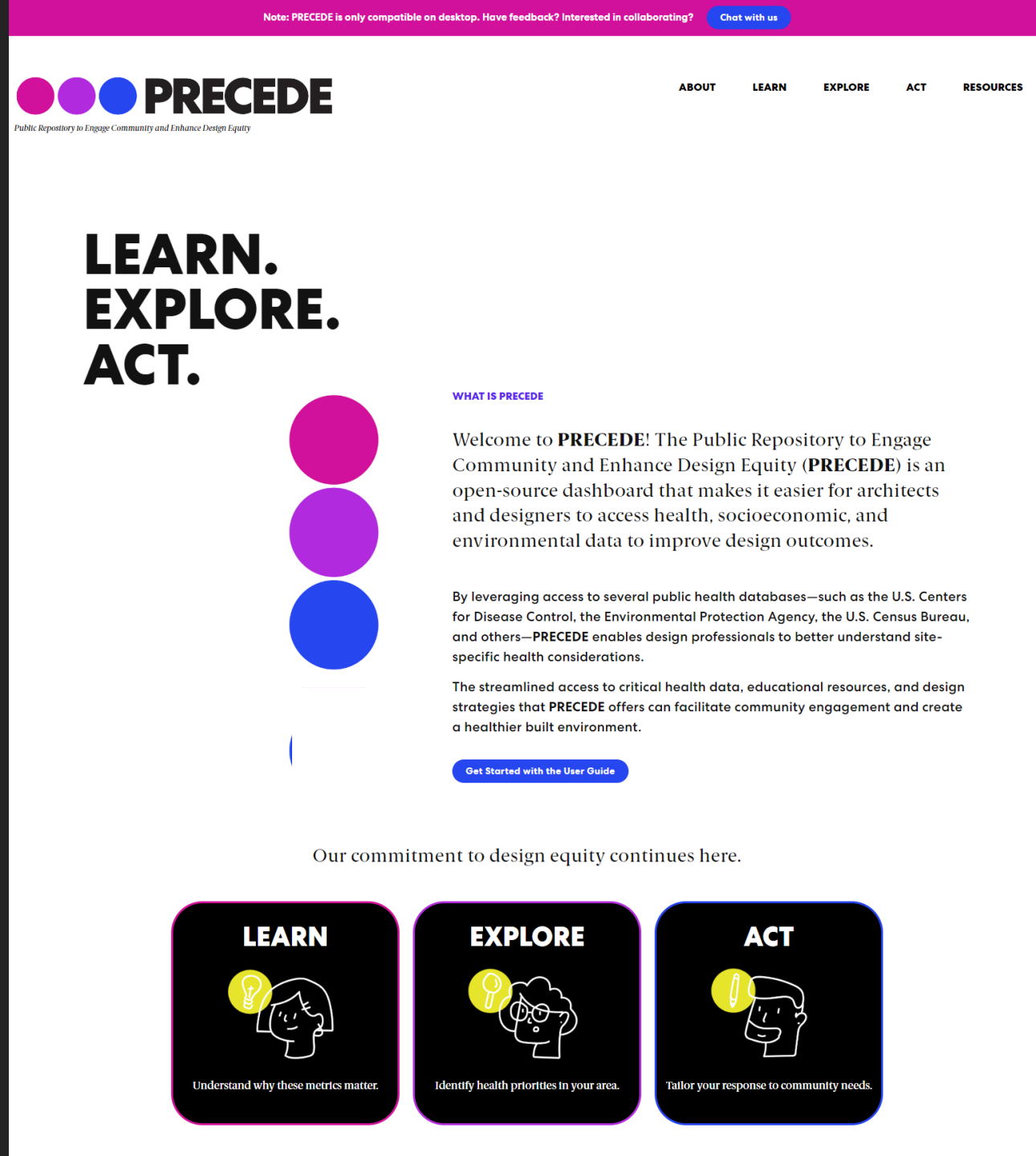
Case Study: Greenpeace Headquarters

PRECEDE is an open-source website — accessible to all!

precede.perkinswill.com



Where did PRECEDE come from?

PRECEDE

Public Repository to Engage Community & Enhance Design Equity

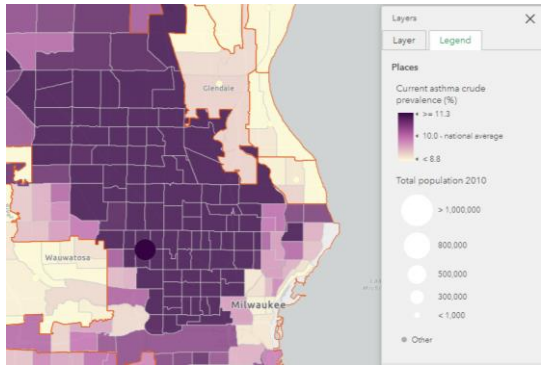
AMERICAN SOCIETY OF INTERIOR DESIGNERS

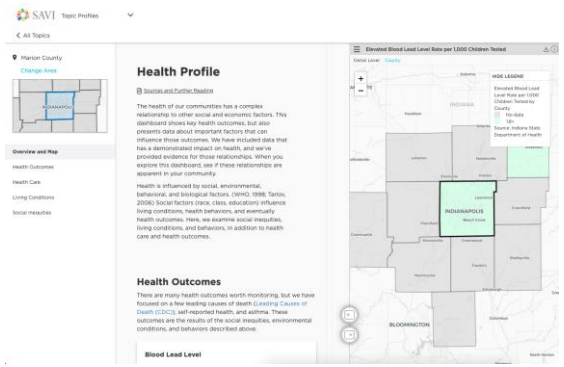
We were awarded the Transform Grant at the end of 2022 for $30,000

Matched by:

Perkins&Will

Why do we need a design-oriented tool like PRECEDE?





City Health Dashboard

- 500 of U.S. cities
- Comparative statistics to national average

CDC Places

- Provides data on preventative healthcare
- Does not provide information on environmental exposures

EJScreen

- Educate users on how to interpret the results
- Do not educate users on the significance of these health outcomes

SAVI Dashboard

- Provides a diverse set of health, access, and community indicators
- Provides useful context to indicator significance
- Only provides data for the Indianapolis Metro Area

Why do we need a design-oriented tool like PRECEDE?

Example Stressors	Example Metric		Example Design Response
Population of People of Color	Heavy Precipitation	—	Humidity Control
Absenteeism	Extreme Heat	—	Reduce GHG Emissions/ Back-up Power
Unemployment	Asthma	—	Material Selection/ IAQ
Neighborhood Racial Segregation	High Blood Pressure	—	Active Design
Violent Crime	Cancer Deaths	—	Material Selection
Income Inequality	Mental Health	—	Daylight and Views/ Biophilia/ Inclusion
	Linguistically Isolated	—	Iconography Based Signage
	Transportation Noise	—	Acoustic Performance
	Outside Air Quality	—	IAQ

Explore.

Data Integration

United States Census Bureau

EPA

CDC

USDA

USGS science for a changing world

City Health DASHBOARD

Empowering cities to create thriving communities

Climate Mapping for Resilience and Adaptation

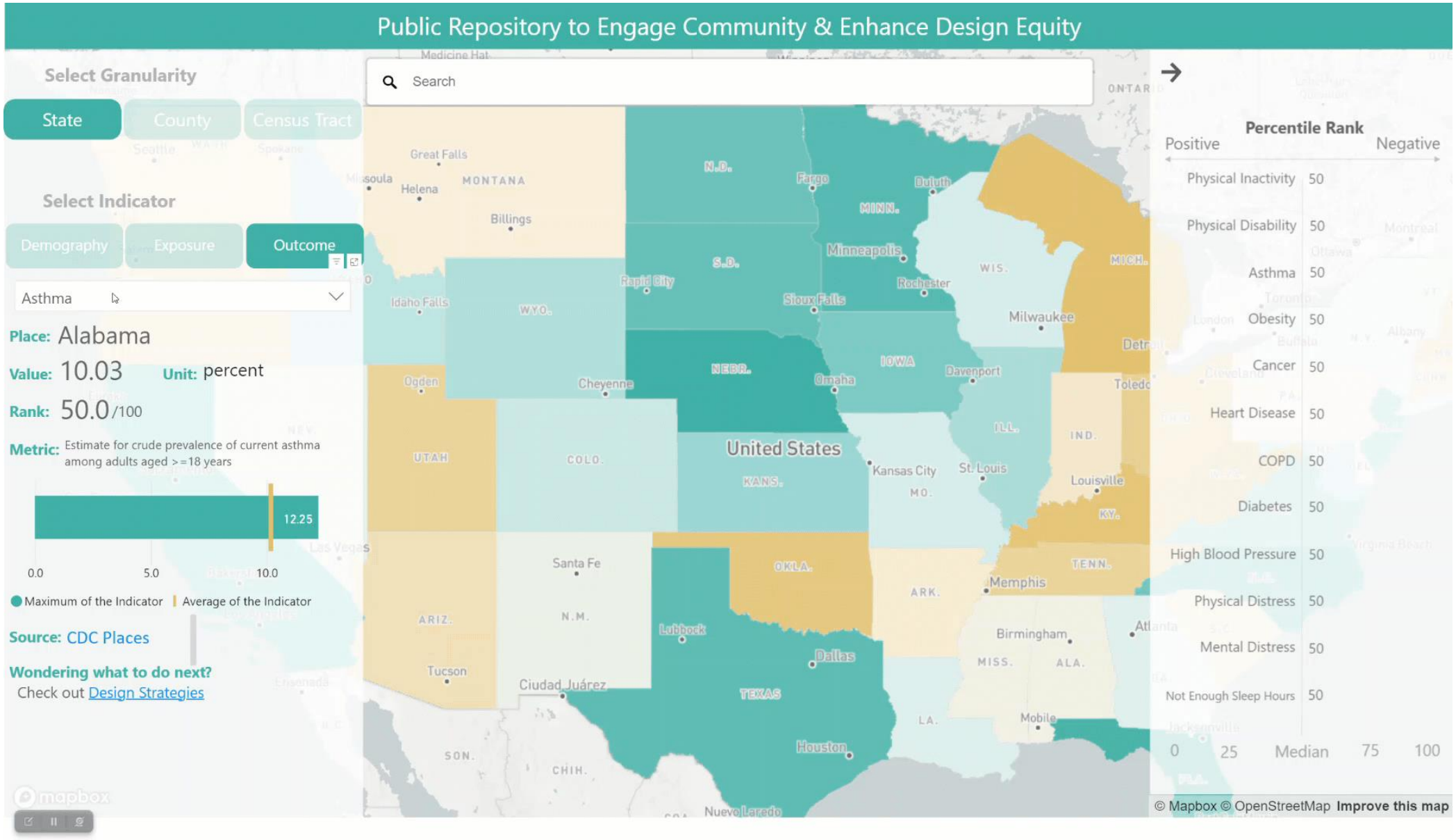
Contains **39** indicators
with **three levels** of granularity
(State / County / Census Tract)

PRECEDE **brings together a vast network of existing data platforms** designed to visualize socioeconomic factors, environmental quality, and health outcomes within time and place.

PRECEDE **increases the accessibility** of these health-related metrics and **helps designers to make decisions** to improve the health and well-being of occupants, and the community at large.

Explore.

Demonstration



Greenpeace Headquarters

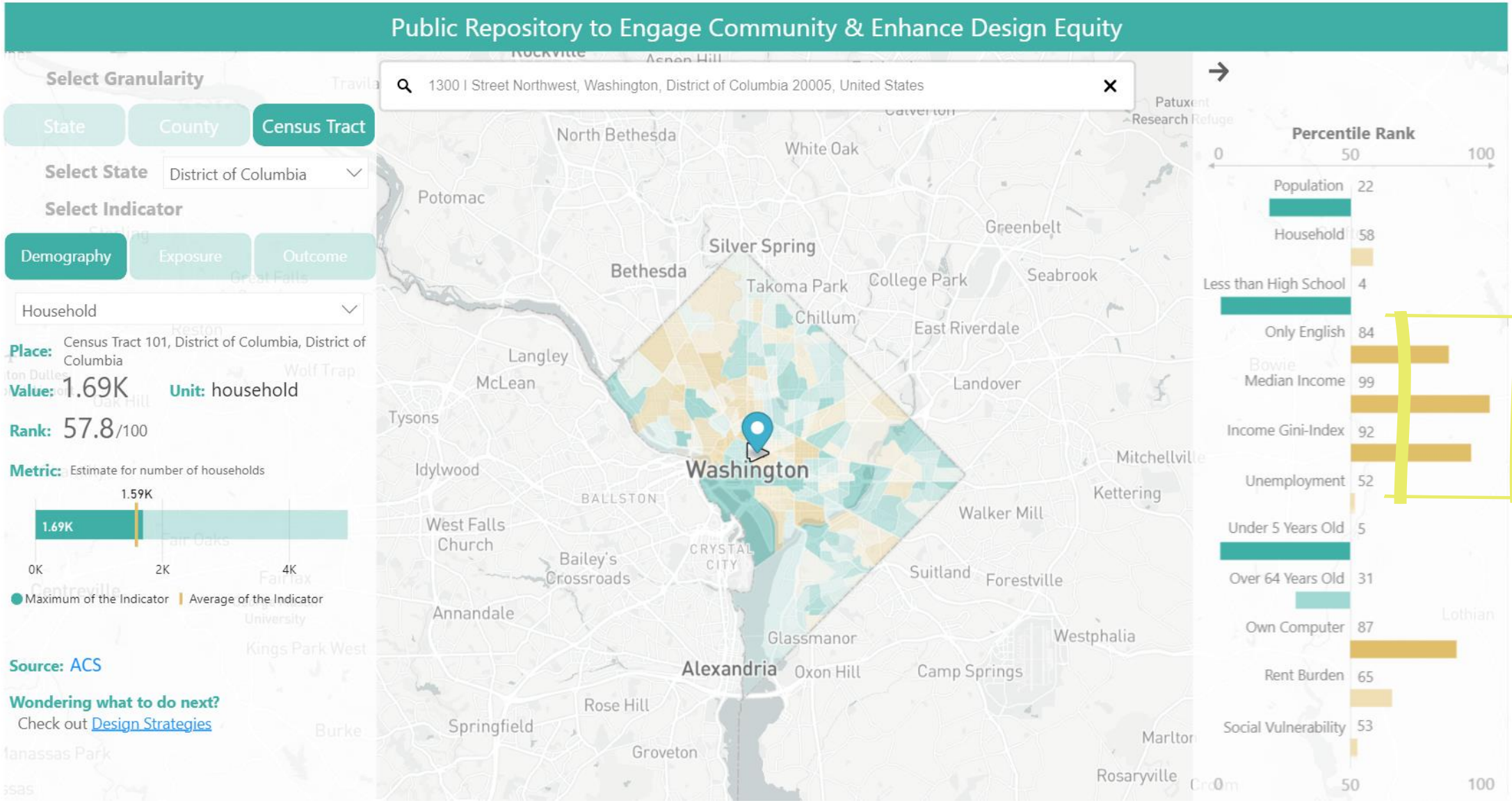
Washington, D.C.

Greenpeace

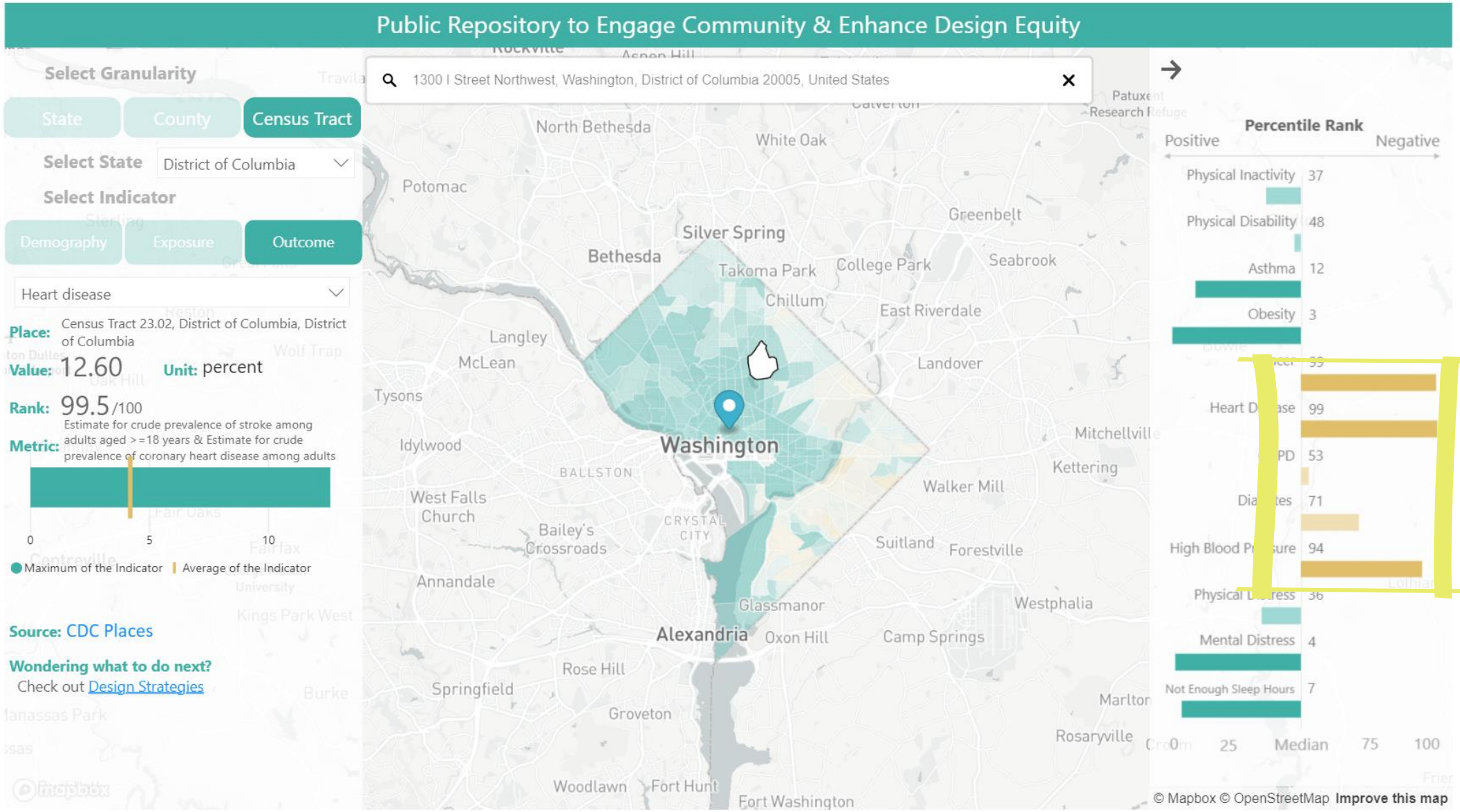
- National Non-profit
- Focused on reducing impacts from climate change
- Promote inclusive workplace

Photo: Halkin-Mason

Greenpeace – Vulnerability Assessment



Greenpeace – Vulnerability Assessment



Greenpeace – Public Health Characteristics

Asthma

Cancer

Cardiovascular Disease

High Blood Pressure

Physical Inactivity

Mental Health

Income Inequality

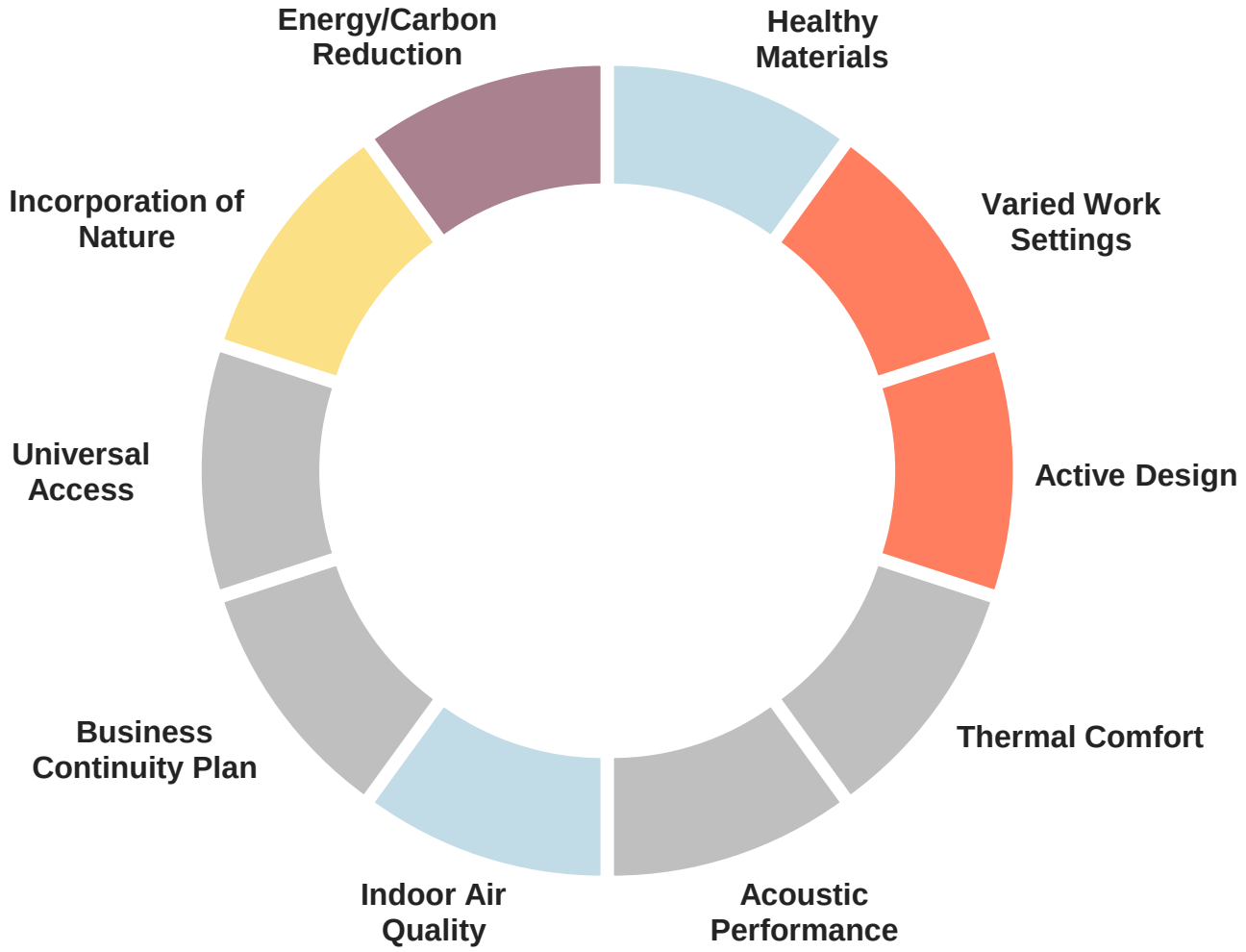
Linguistically Isolated

Violent Crime

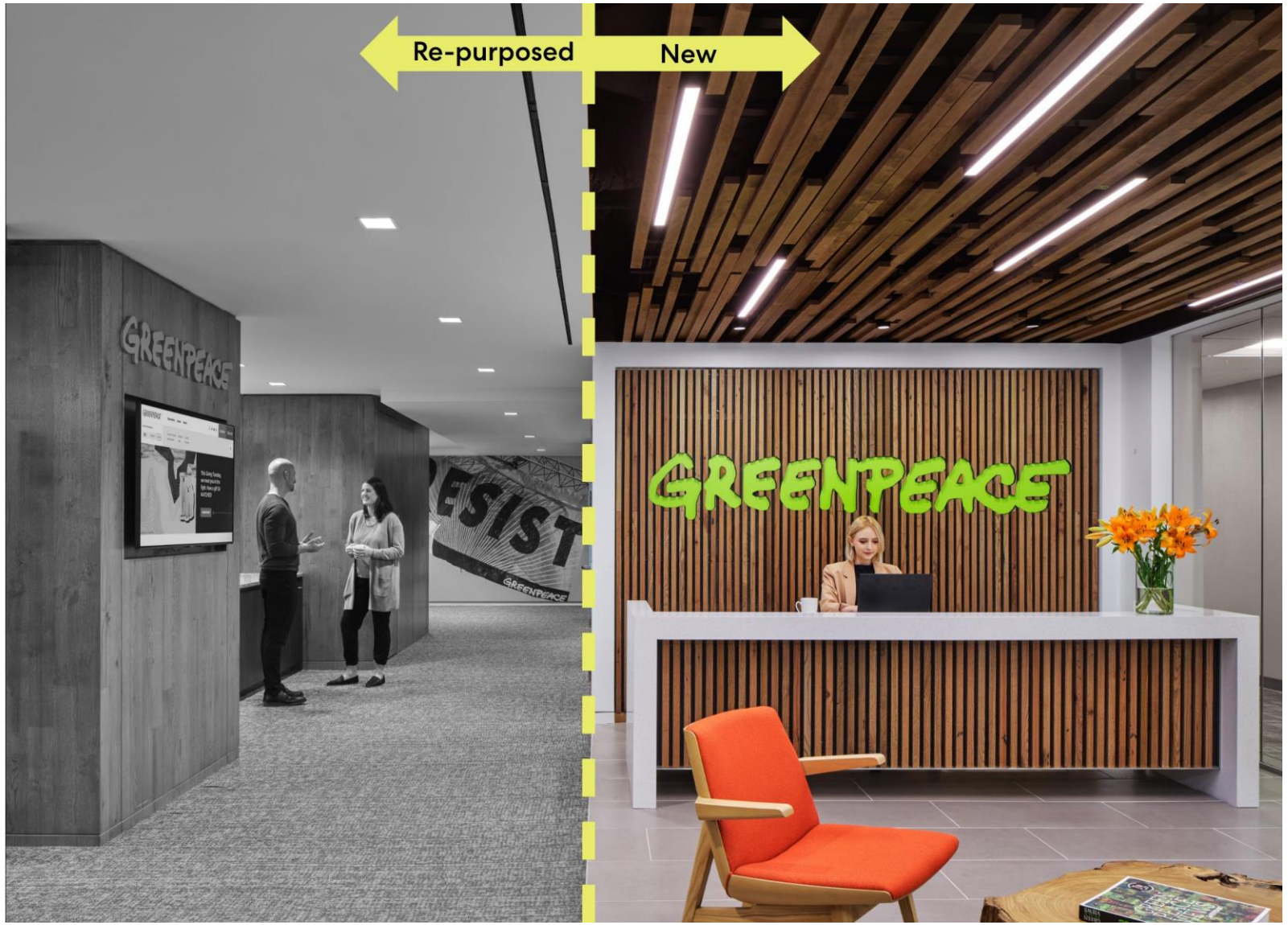
Extreme Heat

Severe Storms

Greenpeace Mission



Greenpeace – Public Health Characteristics Case Study



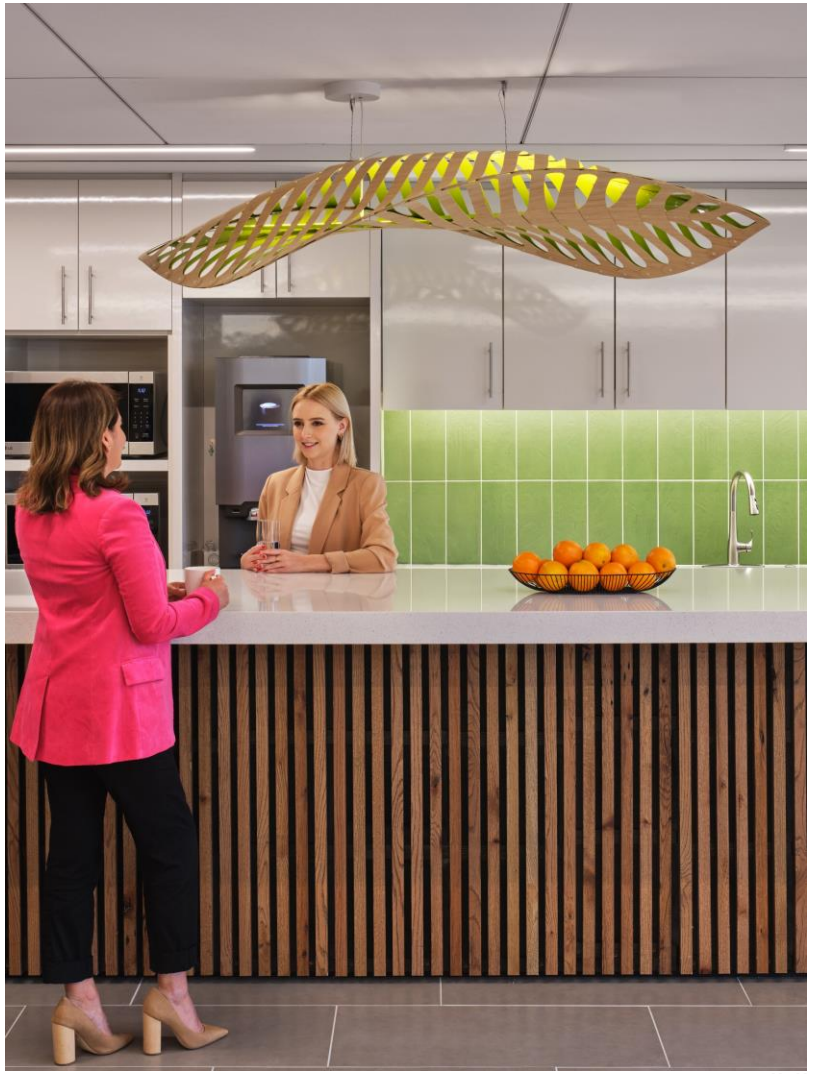
Greenpeace – Public Health Characteristics Case Study

Material Reuse and Application

1. Existing Elements, Fixtures, and Finishes
2. Carbon Neutral Carpet Tile
3. Reclaimed Wood
4. Carbon Neutral Quartz
5. Designing for End of Life Disassembly and Reuse
6. Salvaged Materials

Living Design

- Incorporation of Nature
- Energy & Water Reduction
- Varied Work Settings
- Physical Activity
- Healthy Materials
- Embodied Carbon Reduction
- Improved Indoor Air Quality
- Mental Focus
- Acoustics



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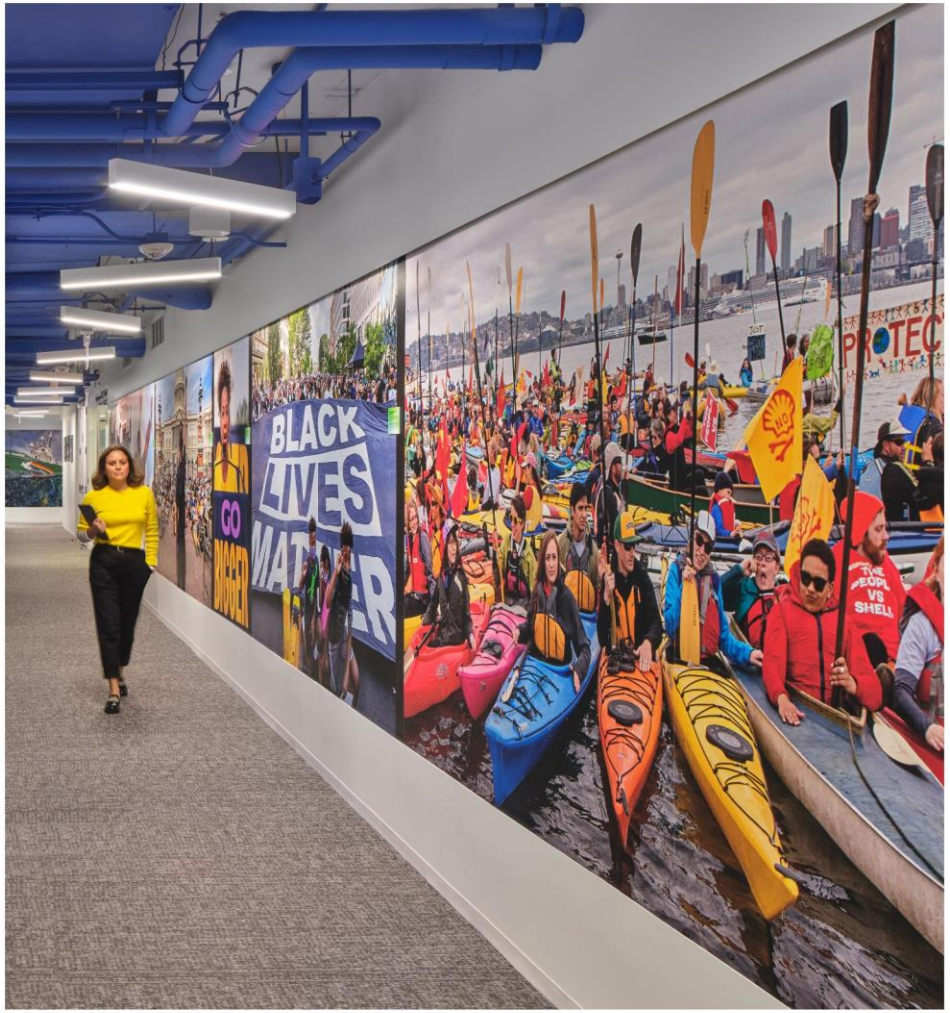
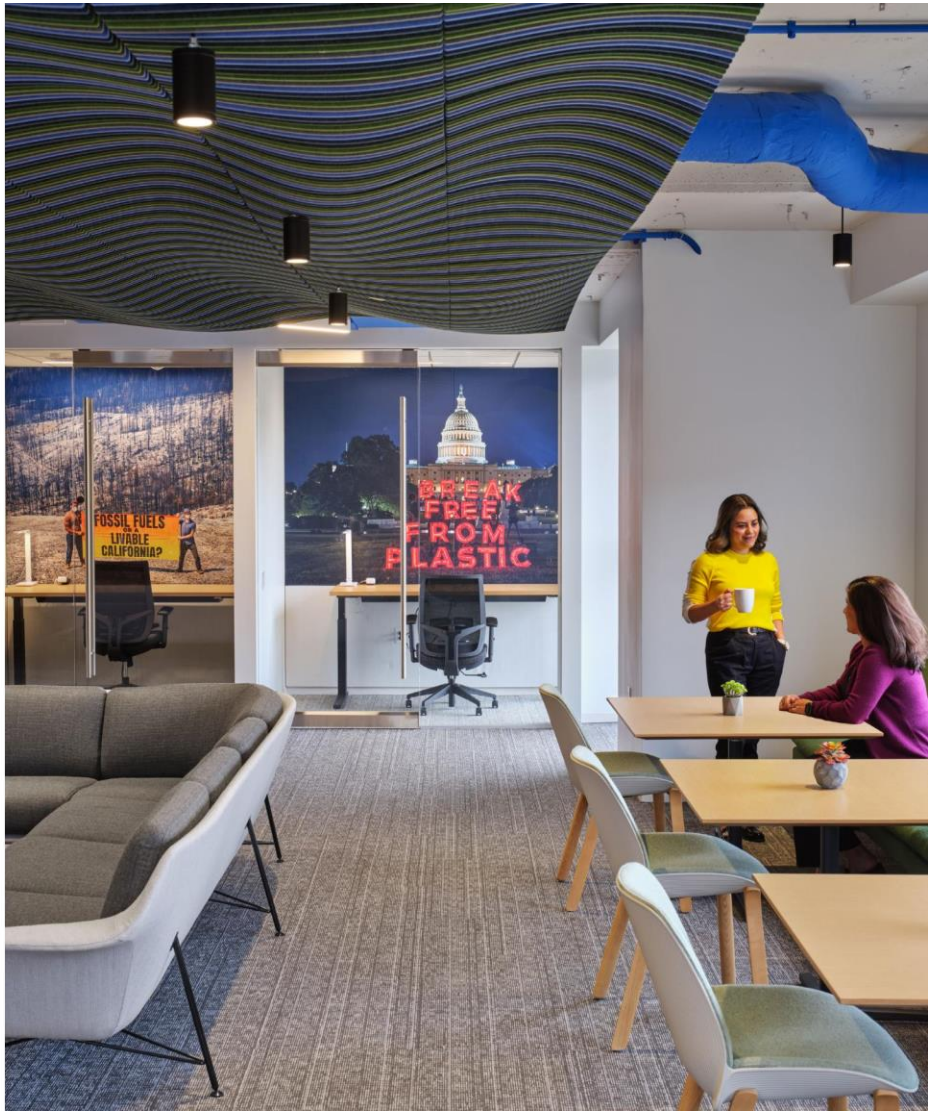




Greenpeace – Public Health Characteristics Case Study

Preliminary Life Cycle Assessment

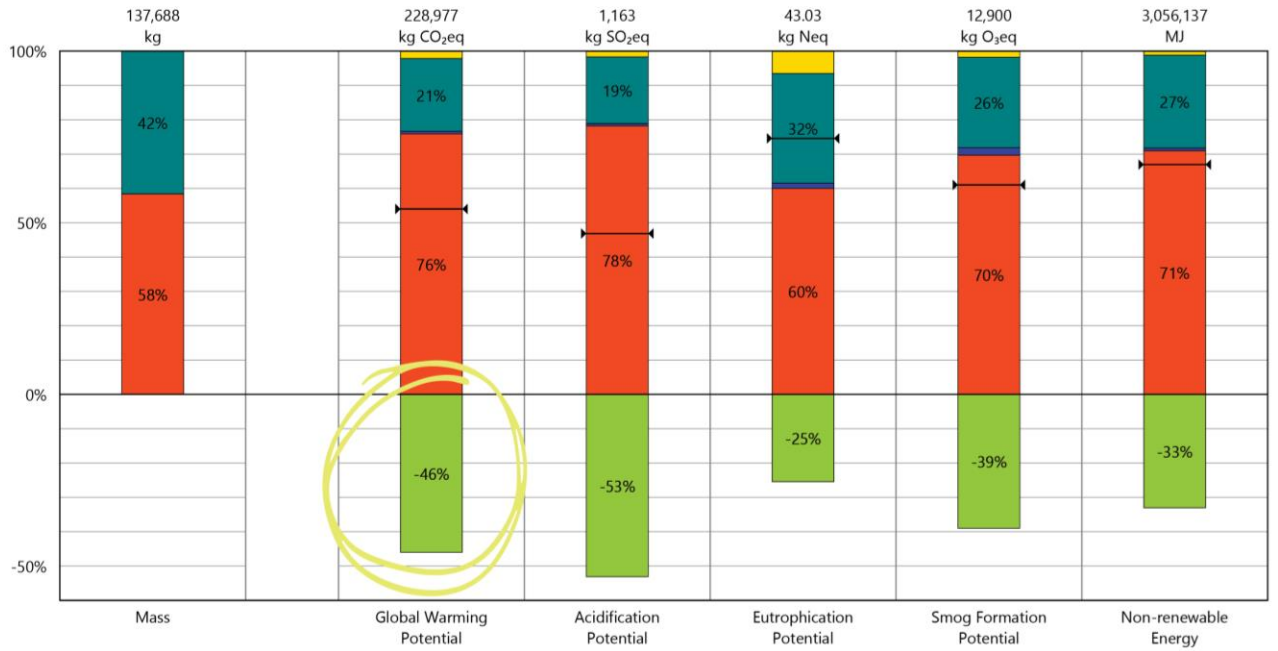
Results by Life Cycle Phase

Legend

- Product [A1 - A3]
- Transportation [A4]
- Maintenance and Replacement [B2-B5]
- End of Life [C2-C4]
- Module D / Reuse [D]

Highlights

1. Greatest embodied carbon impact associated with Product Stage [A1-A3] which includes the full manufacturing stage (raw ingredient extraction and processing, intermediate transportation, and final manufacturing and assembly)
2. Prioritizing materials with 3rd party environmental reporting to optimize material selection and minimize embodied carbon impact
3. Module D indicates embodied carbon offset due to material reuse and recycling strategies, and energy recovery opportunity.



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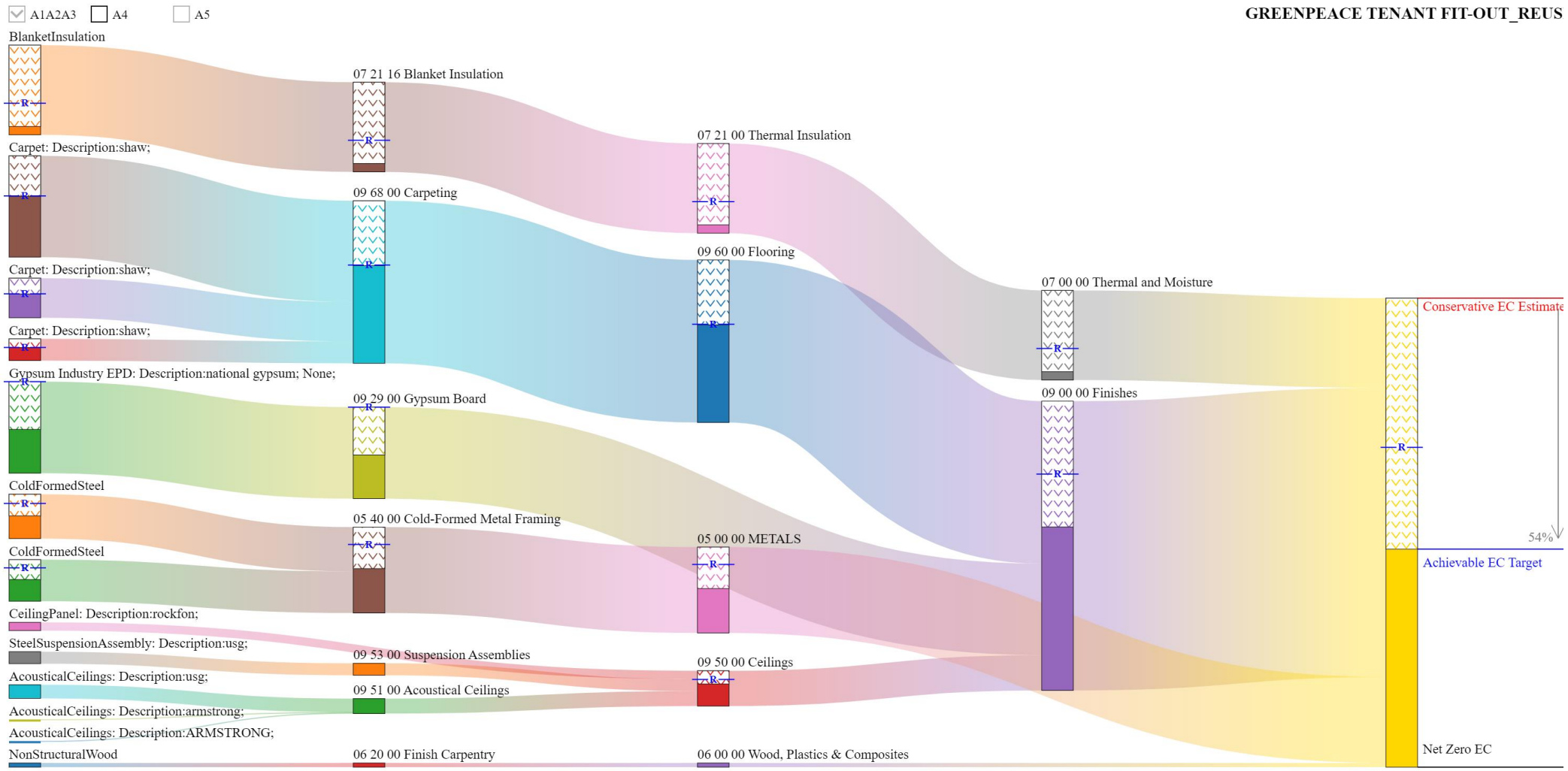

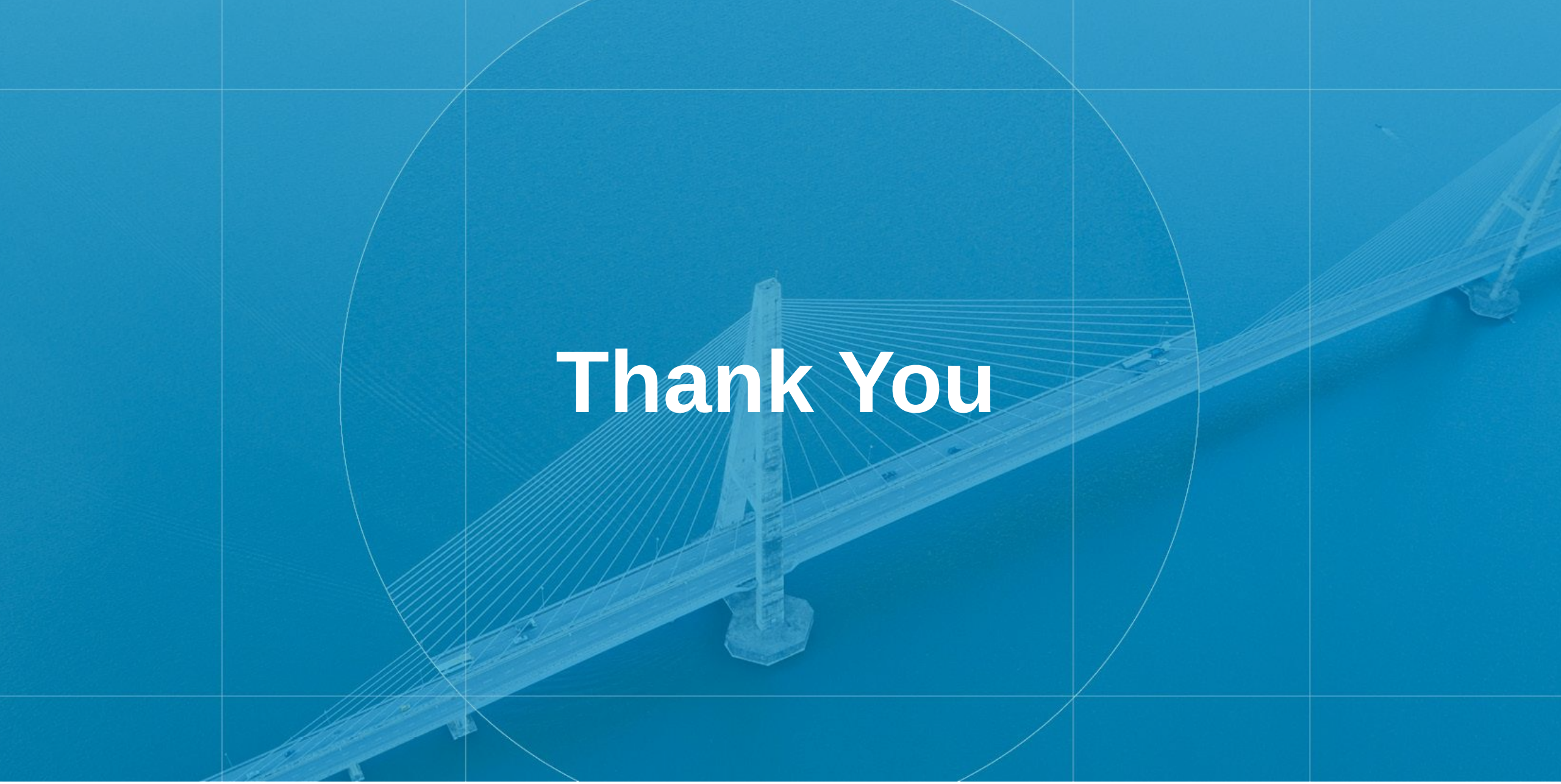

Thank You

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