Preparing for the Storm: Minimizing Risk through Resilience

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Speakers

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Webinar agenda

01 Introduction to DNV GL

02 What is a resilient building?

03 Resilient building energy systems: Seattle City Light microgrid

04 Protecting vulnerable populations: Low-income multi-family

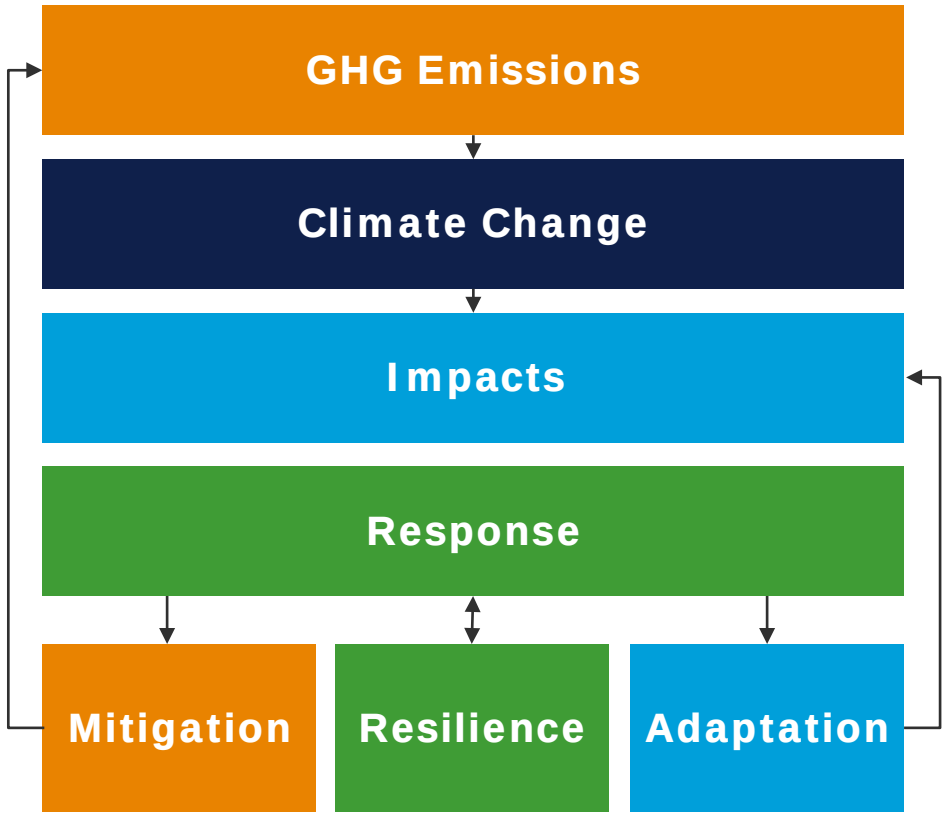
05 Q&A

About DNV GL


In a challenging world we make buildings and communities better prepared for the future
Vulnerability Mapping
Energy Audits of Building Systems
Zero Net Carbon Buildings
Emergency Preparedness
Climate Hazard Identification
High Performance Buildings
Resilient Building Design
Distributed Energy Resources

Setting the stage: What does it all mean?

- **MITIGATION** is action taken to reduce activities that drive man-made causes of climate change
- **ADAPTATION** involves actions taken to counteract new or changing environmental challenges and reduce the vulnerability of human systems to the effects of climate change
- Building **RESILIENCE** is the capacity of a building to continue to function and operate under extreme conditions, such as (but not limited to) extreme temperatures, sea level rise, natural disasters, etc.




$1 USD
spent on mitigation saves an average of
$6 USD
in damages

Florida’s building codes show investing in resilience pays off

What does a climate-ready building look like?

Elevated mechanical systems

Enhanced daylighting

Community center

Urban tree canopy

Solar PV and backup power source

Deployable flood barrier

Living shoreline and green infrastructure

Protected accessibility points

Optimized energy use

Low-energy mechanical systems and natural ventilation

Well-insulated envelope

Flood insurance

B-READY

Building Resilience Assessment Tool

Extreme weather events are on the rise
B-READY helps building owners prepare

B-READY helps building owners and managers translate climate-related risks into actionable resilience strategies

Simplify Actions

Resilience best practices into site-specific recommendations relevant to each building

Benchmark

Resilience index allows for benchmarking over time or across a portfolio of buildings

Be Holistic

Incorporates occupant awareness, health and well-being, and community equity measures

From A to Z: B-READY approach to assessing building resilience

B-READY considers the hazards to the building based on the occurrence of climatic events

Emergency covers impacts that could occur during any type of event, such as building evacuation.

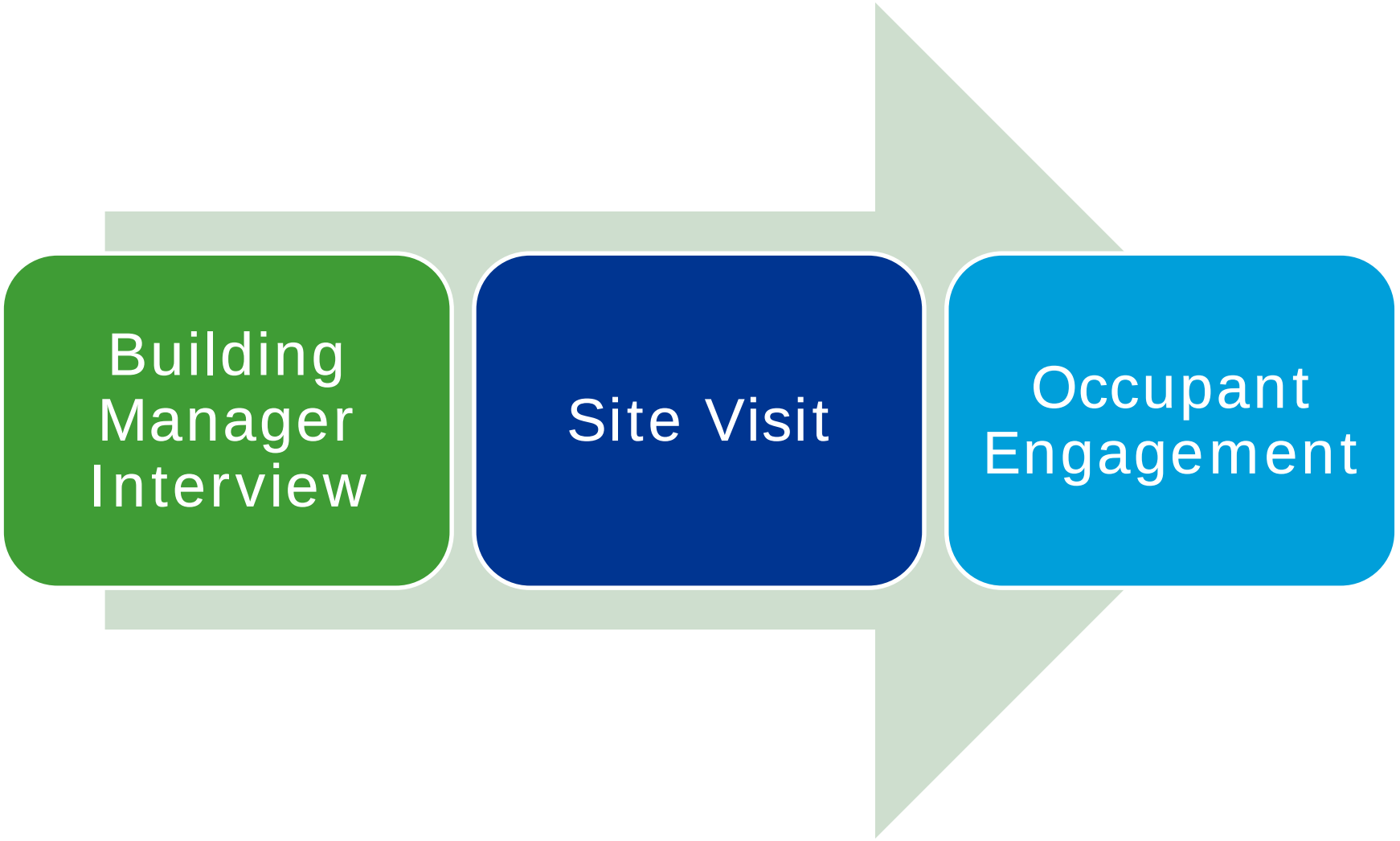
Climatic Event Hazard Matrix

Hazard Types

Climatic Event	Air Pollution	Damaging Winds	Extreme Cold	Extreme Heat	Extreme Rainfall	Fire	Flooding	Hail	Lightning	Power Disruption	Snowfall	Water Pollution	Water Supply Disruption	Emergency
Ambient Air Quality	■													■
Coastal Surge, Sea Level Rise, and Riverine Flooding					■		■			■		■	■	■
Drought				■								■	■	■
Earthquake						■				■				■
Extreme Precipitation					■		■	■	■					■
Extreme Winter Conditions		■	■				■	■			■		■	■
Heat Waves	■			■						■		■	■	■
Wildfires	■					■								■
Windstorms		■							■	■				■
Building-Specific Hazards														■

Site conditions and building history are taken into account in the hazard assessment. For example, a building not located in a floodplain but positioned such that unmaintained city storm drains could cause flooding.

Assessing resilience at the site: Building walkthrough process



Scenario discussions: People remember experiences best

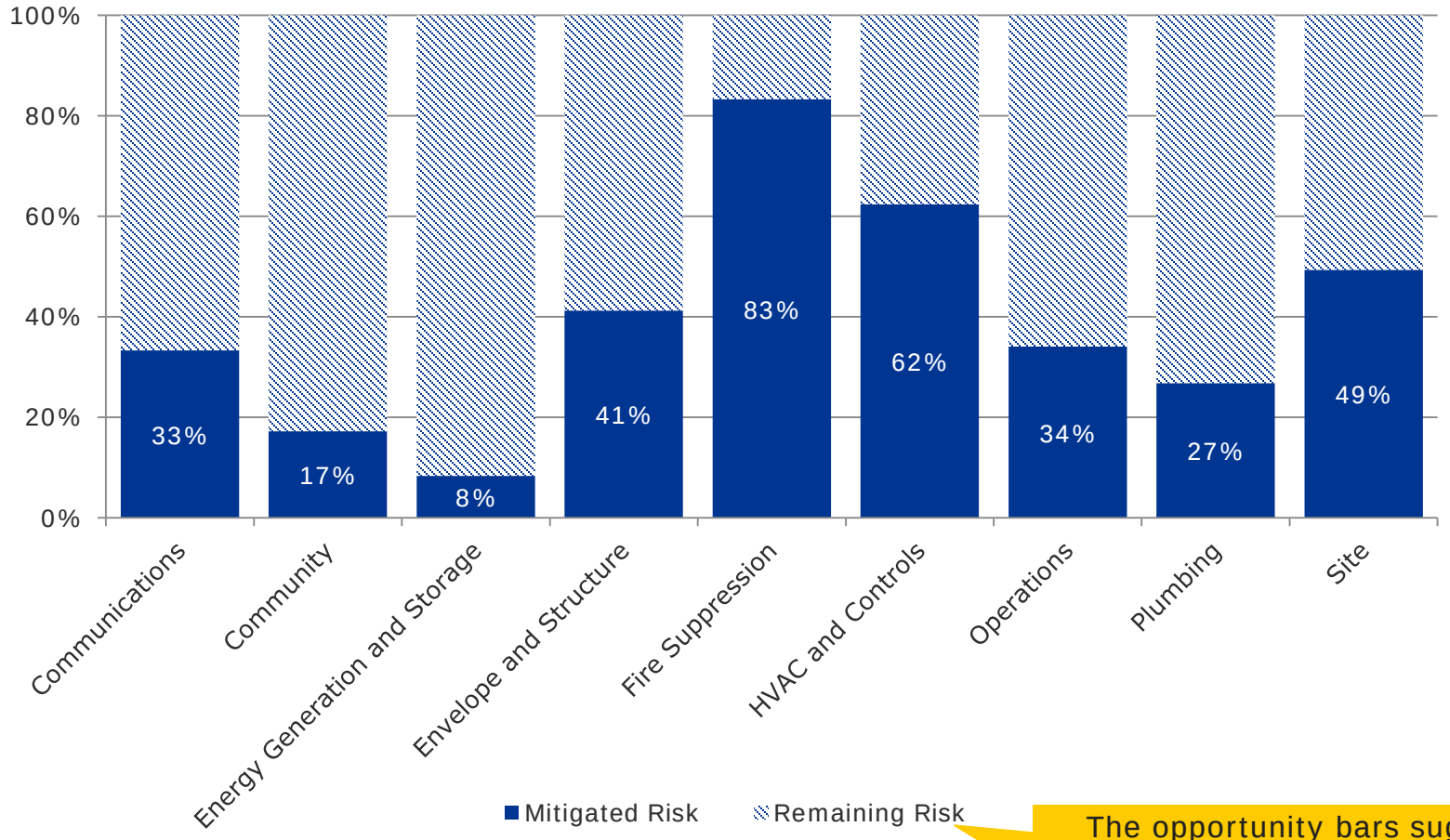
In a power outage…	What are your biggest problems?
	What do the occupants do?
	What would the occupants do if it was 90 degrees out?
	What would individuals with medical conditions do?

In a heat wave…	What systems would you be worried about?
	Would you provide any cooling services to the occupants?
	What would elderly/children or do?

If a wildfire was approaching…	How would the occupants be notified?
	Would mechanical systems be turned off?
	Are there evacuation procedures for the building?

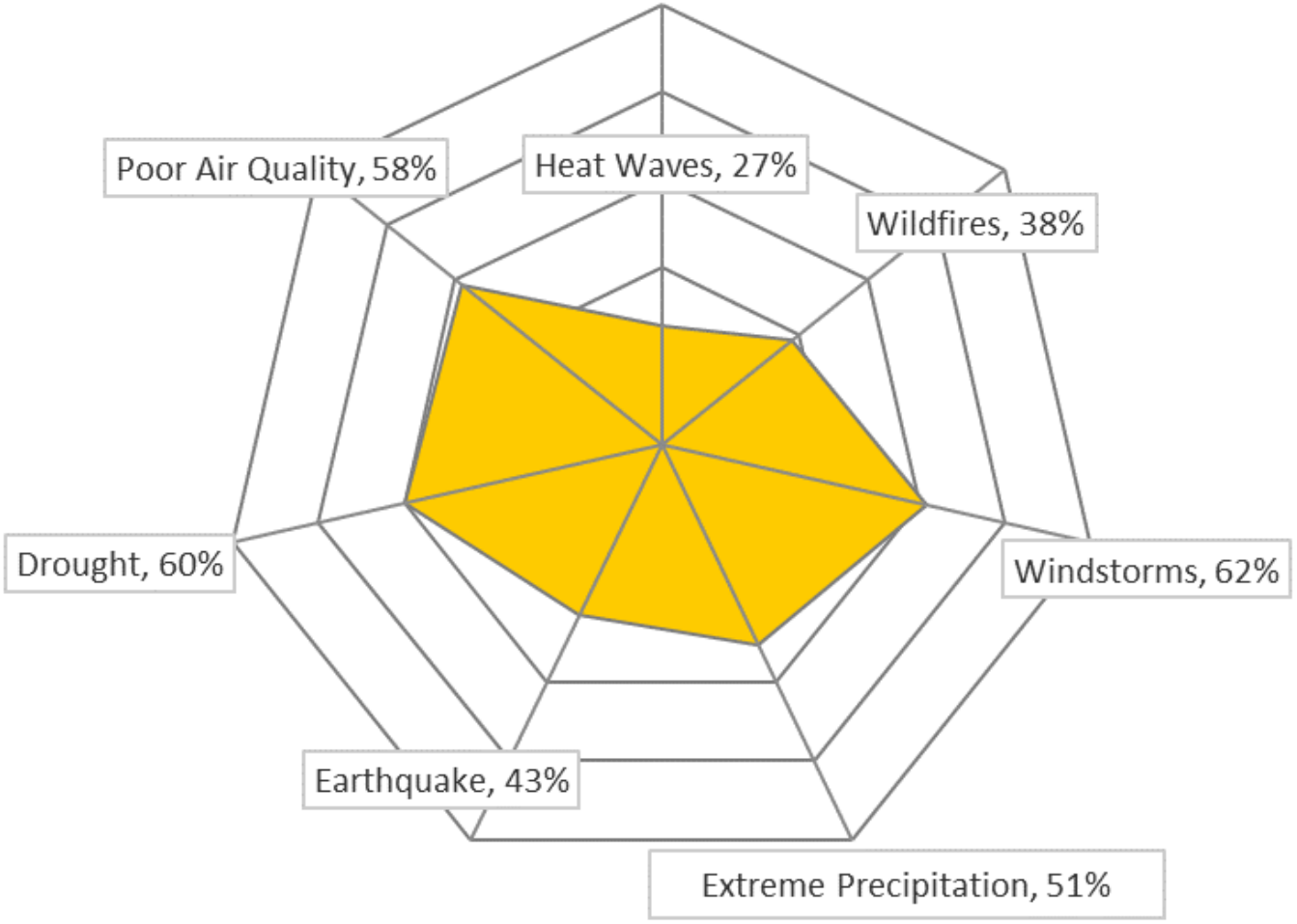
Resilience measures can be organized by hazard or building system, making it easy to understand system vulnerabilities

B-READY shows how resilient each building system is to the local hazards



The opportunity bars suggest areas that the building owner should invest in to improve building resilience.

B-READY provides analysis and recommendations in a concise report, helping owners prioritize



Key opportunities for improved resilience

Recommendations:

Capital investments

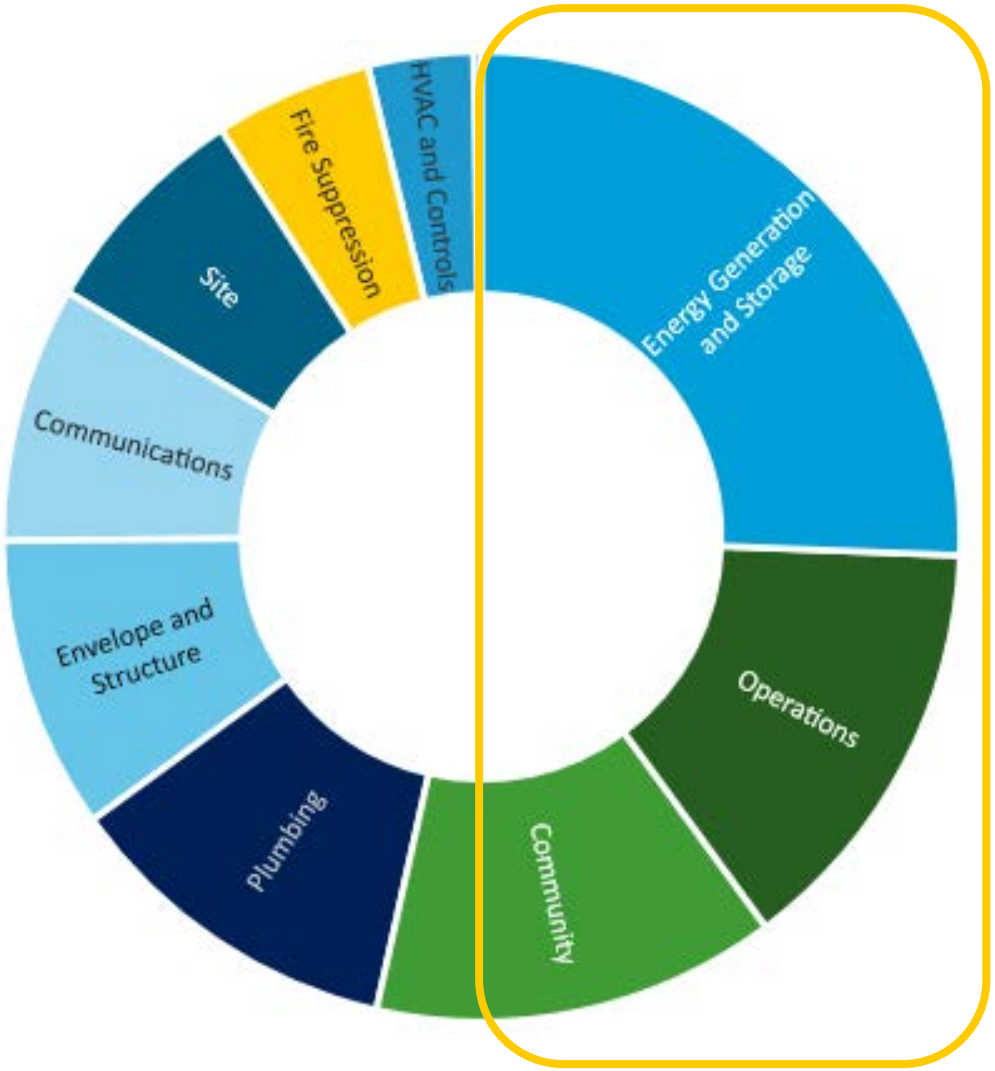
External communication systems, reliable backup power, CO_2 sensors, water storage, bioswales

Labor investments

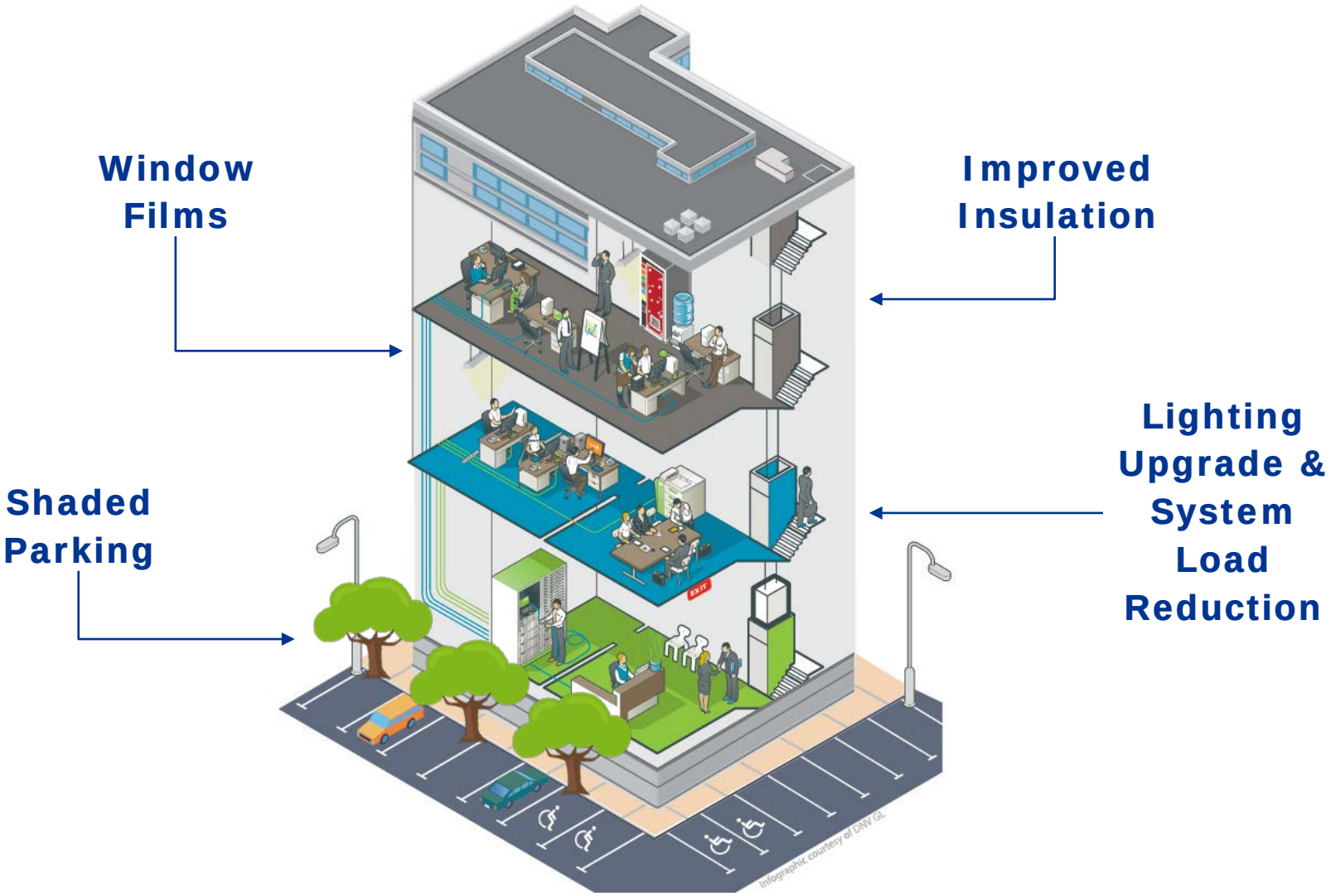
Retro-commissioning, fire mitigation techniques, safeguard toxic materials, operations and materials plans

Social investments

Emergency plans, first aid, security, areas of refuge, risk awareness education, flexible dress codes and scheduling



The energy efficiency connection: Identifying resilience co-benefits



Seattle City Light – Microgrid for Resilience

Site Selection and Owner's Engineering

Clean Energy Fund - $12.6M to five WA utilities

Avista of Spokane

"Shared Energy Economy"

Seattle City Light

Community Emergency Microgrid

Orcas Power & Lighting

Community Solar System

Snohomish Public Utility District

Vehicle to Grid Integration

Energy Northwest

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Seattle City Light microgrid project

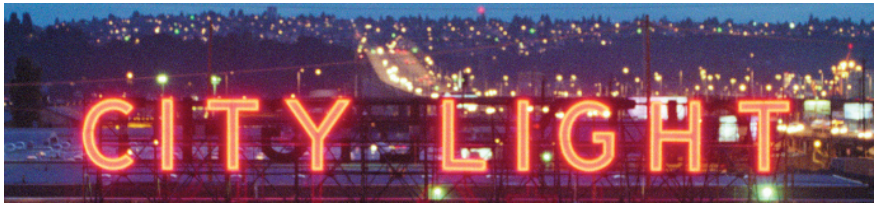
- **Primary goal:** to ensure that electric supply is maintained during periods of emergency or grid outage.

Why Miller Community Center?

- Maximize positive community impact, including serving a low-income community
- Increase resiliency, reliability
- Carbon-free power source during emergencies

City Light project inception

- Many Stakeholders
  - Department of Commerce – funding
  - Seattle Department of Parks & Recreation – host site
  - City Council
  - Office of Emergency Management
  - Office of Sustainability & Environment (Resiliency)
  - Many internal City Light Divisions
- First Technology Innovation Division project

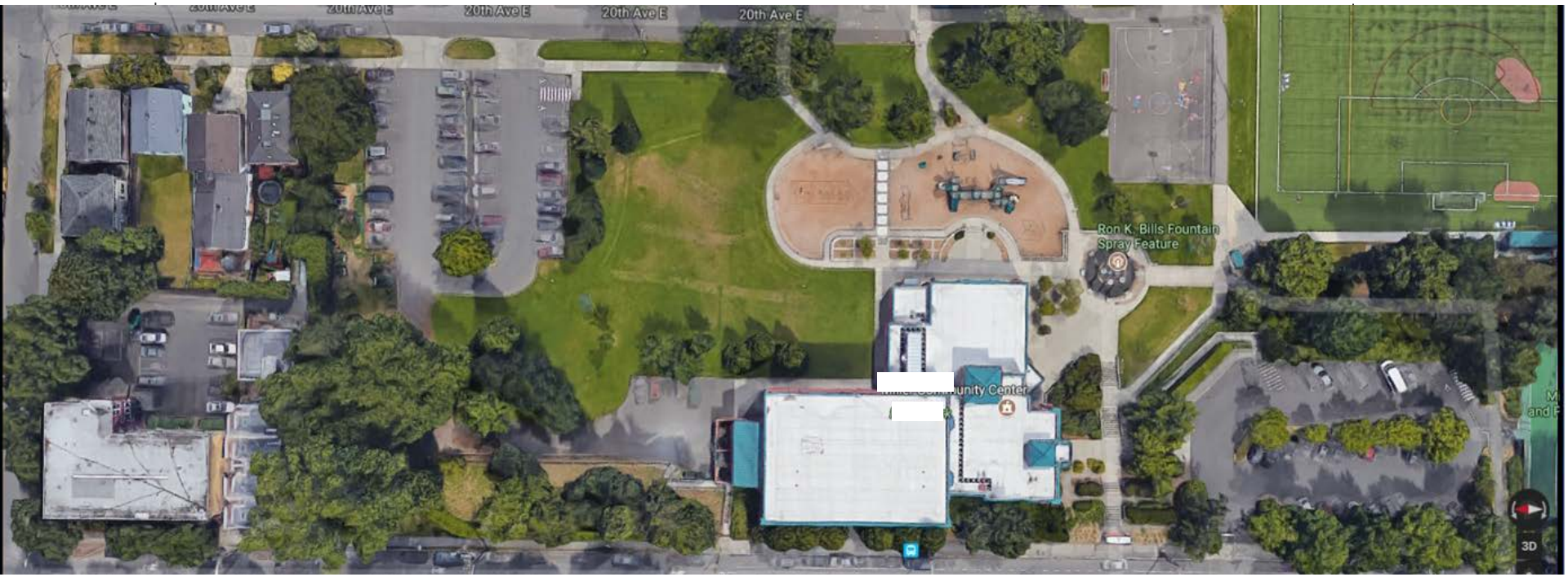


Three year schedule from inception to commissioning

Scope of Work	Timeline
Site evaluation	Oct 2017
Building loads estimation (normal and emergency)	Nov 2017
Site analysis and down-selection	Dec 2017
Preliminary (30%) design, CapEX estimate, high-level schedule	March 2018
Drafting of technical specifications for RFP	June 2018
Bid evaluation and interviews	**Oct 2018**
Design review (50%, 90%, IFC)	Jan-April 2019
Construction monitoring	June-Dec 2019
Commissioning oversight	Dec 2019
Training, O&M	Jan 2020

Harnessing the power of storage for resilience

Sample aerial view from Google Maps



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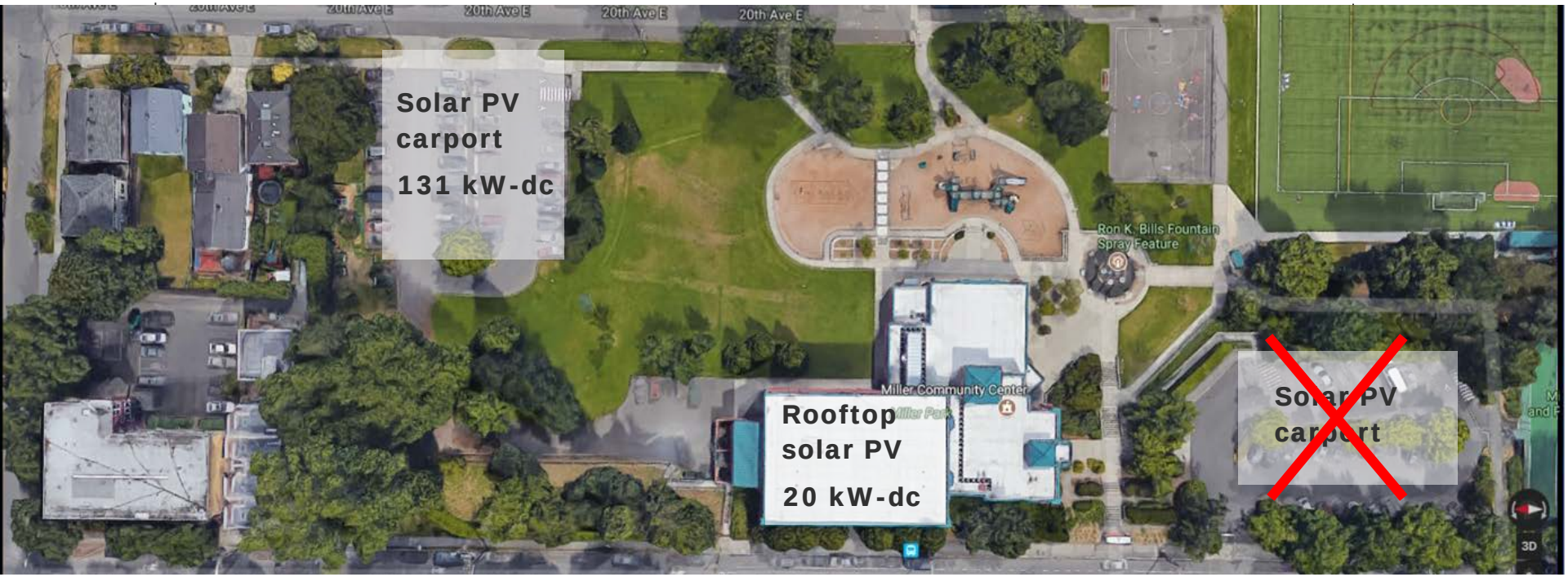

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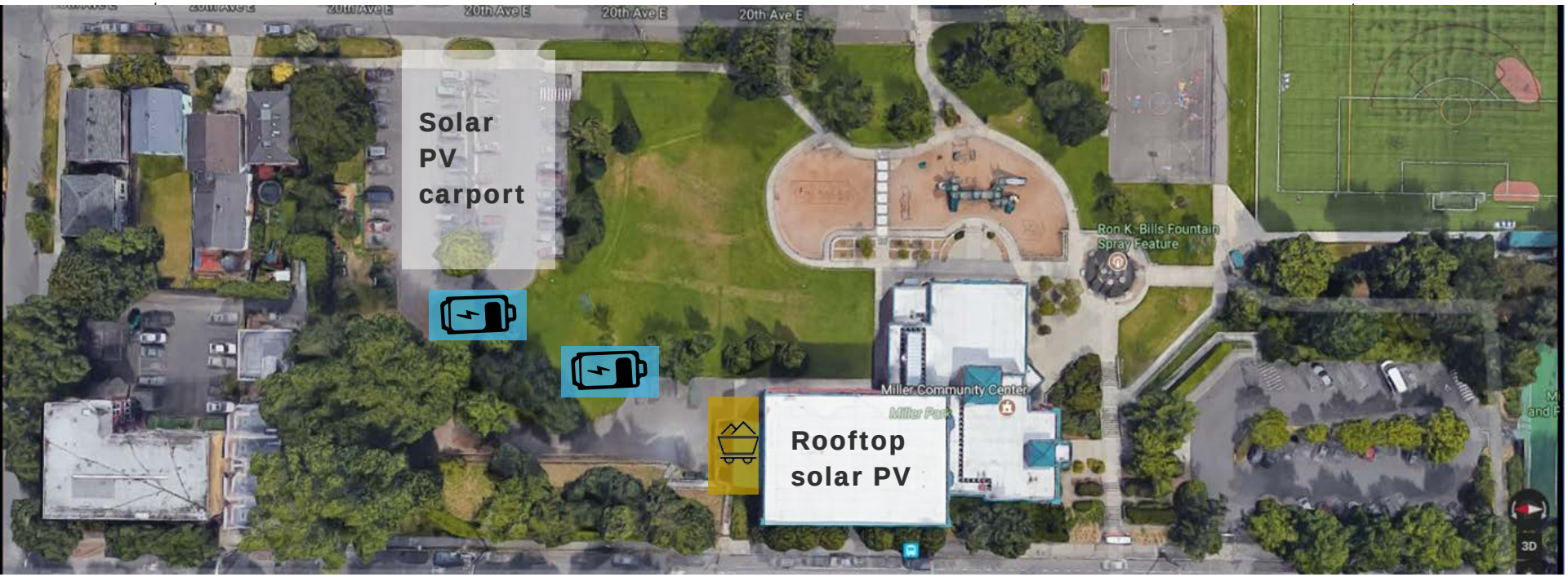
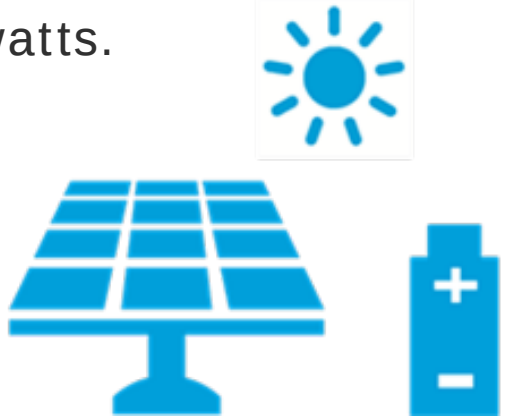
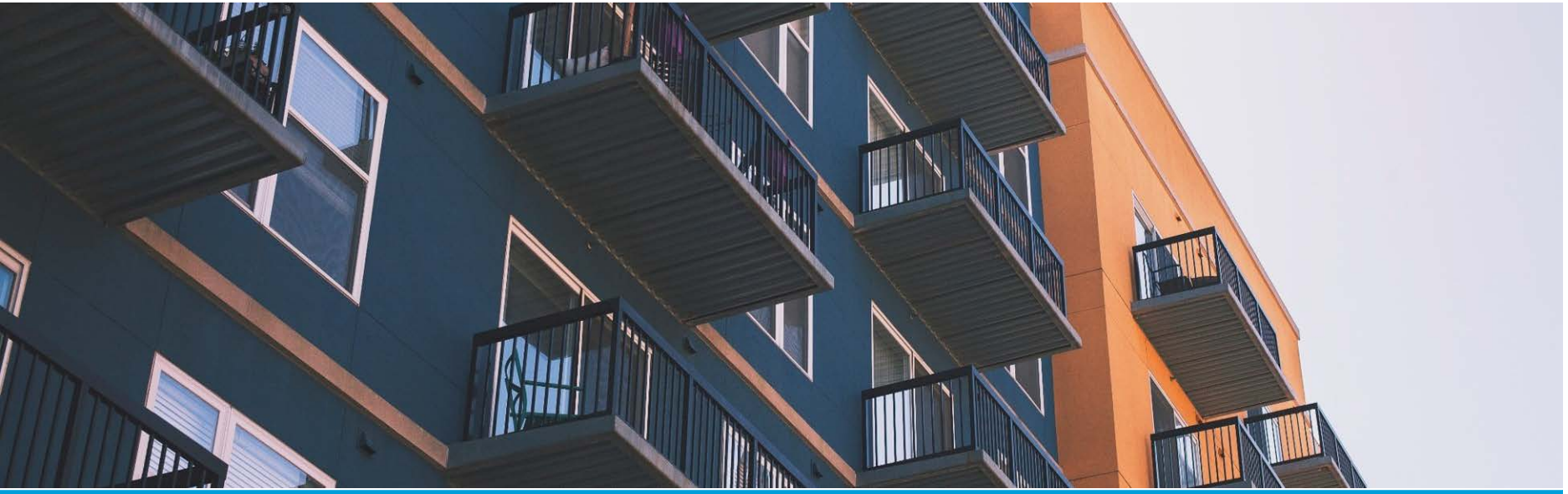


Conceptual design

- Miller Community Center
  - Emergency peak load 70 kW, annual energy consumption ~300 MWh
- The System will island and operate autonomously in the event of an outage to provide back-up electric power for at least 16 hours.
- A battery energy storage system with power capacity in the range of 200–250 kW and energy capacity in the range of 750–1,000 kilowatt hours.
- A rooftop PV array in the range of 40–50 kilowatts.





Programmatic approach to resilience

Lessons learned from NYC and Sonoma County

5 Sonoma County Multifamily Buildings – Pilot with StopWaste

Goal: Tie in Energy Audits + Resilience Assessments using DNV GL's B-READY tool

NYC Housing Authority

- Pilot resilience assessments of 10 NYCHA buildings with funding support from NYSERDA
- **Goal:** Address resilience in low-income multifamily housing

Identifying portfolio-level vulnerabilities

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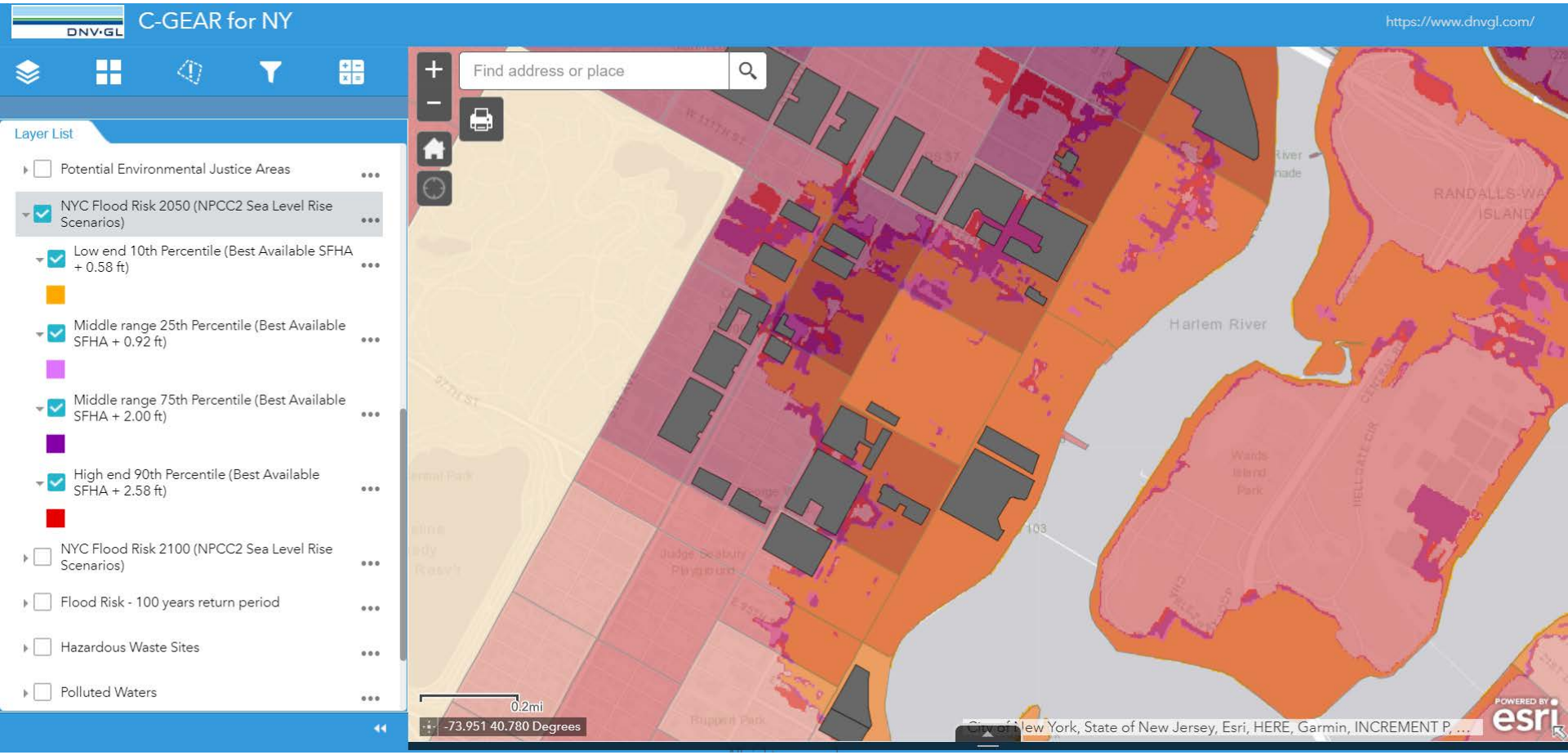
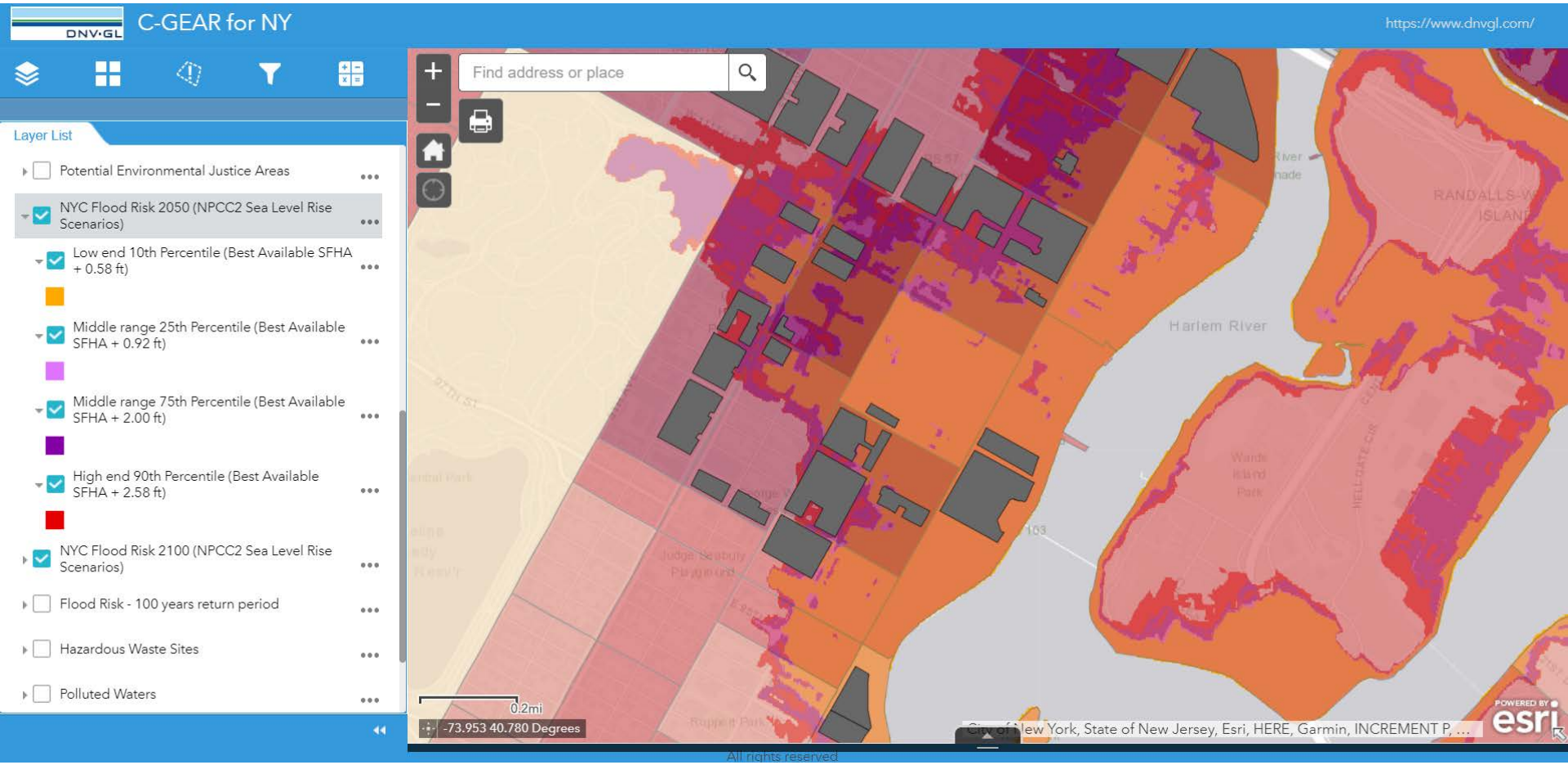
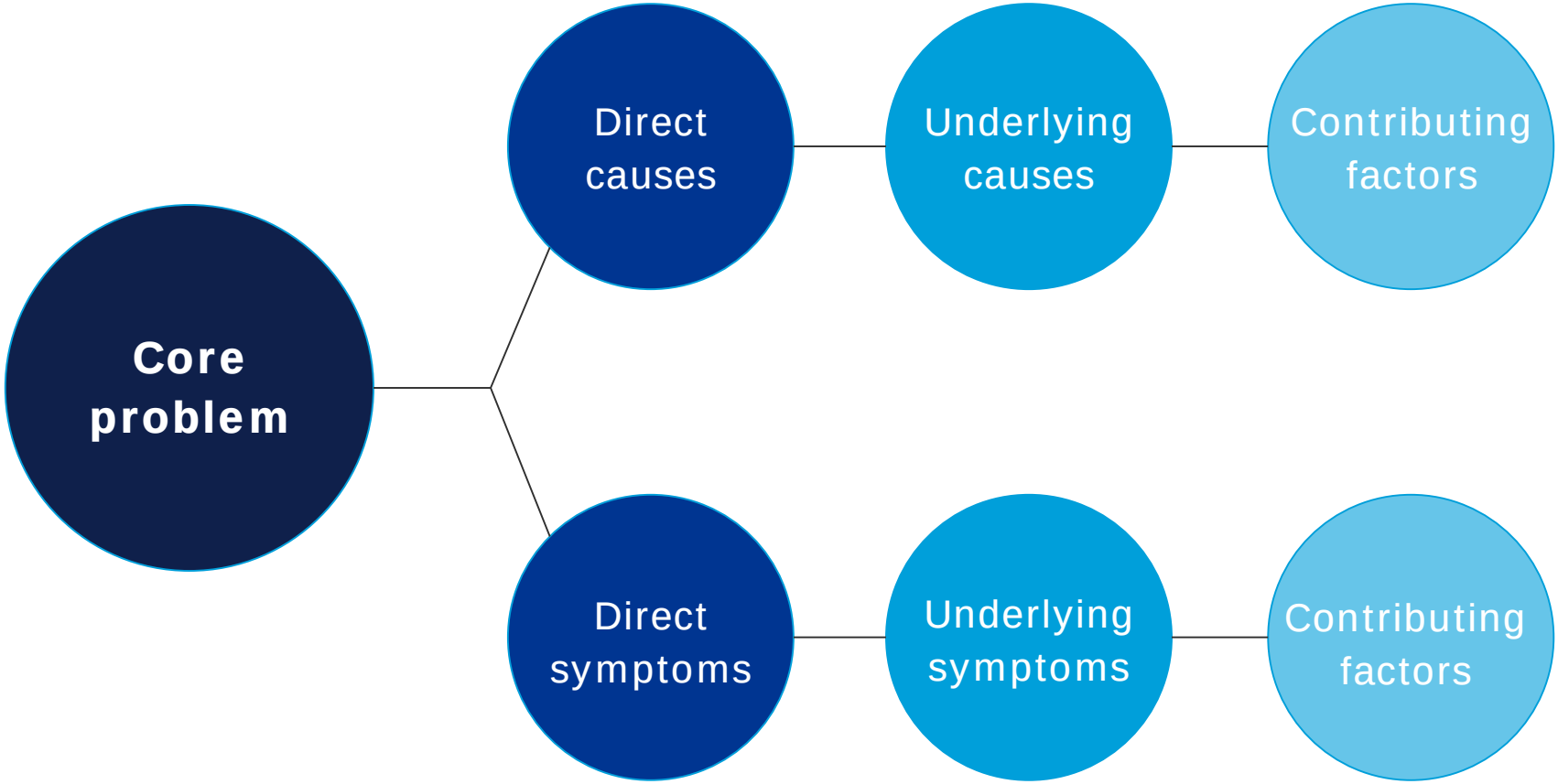


Identifying portfolio-level vulnerabilities



Assessing social systems for resilience

Identifying core challenges for low-middle income communities



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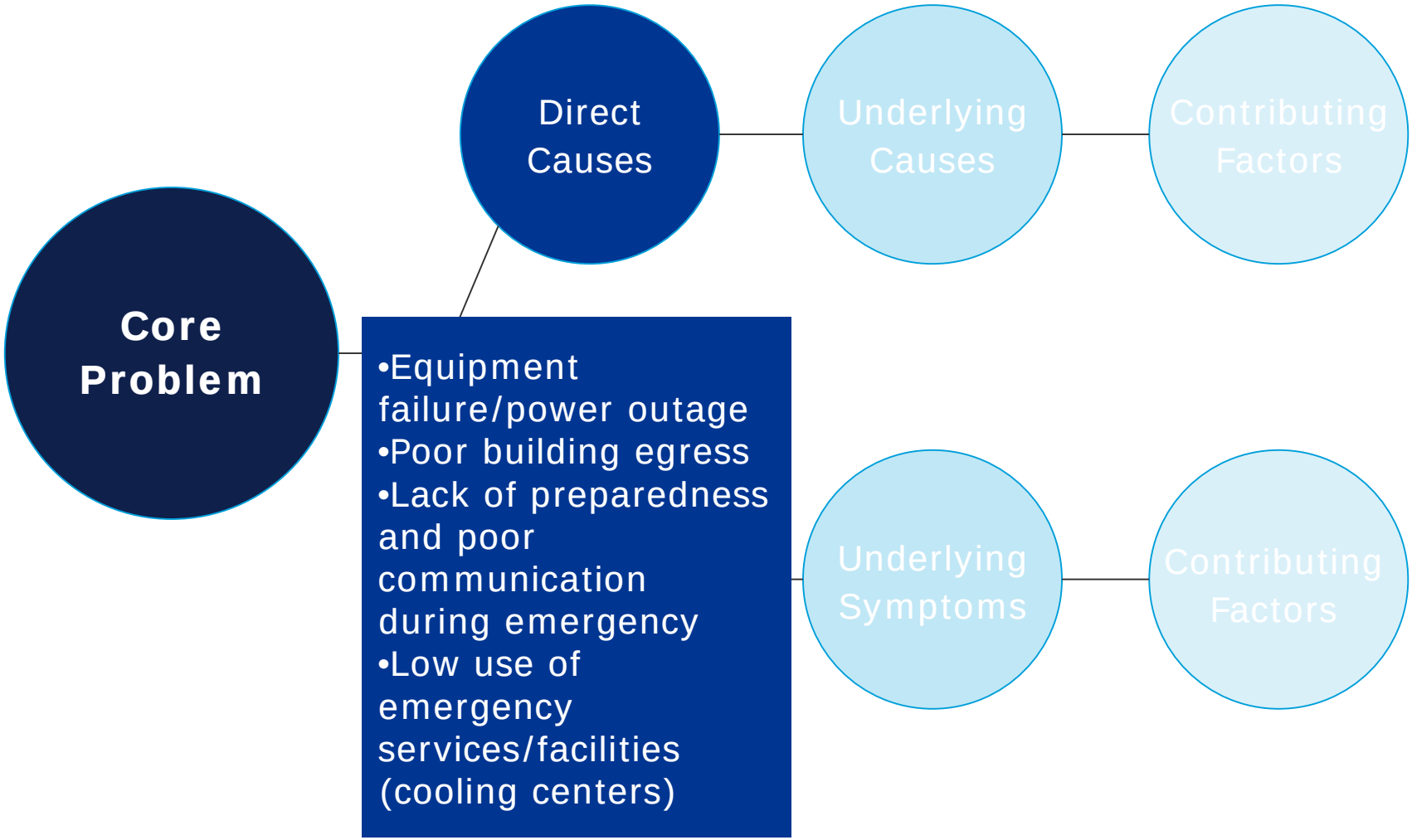

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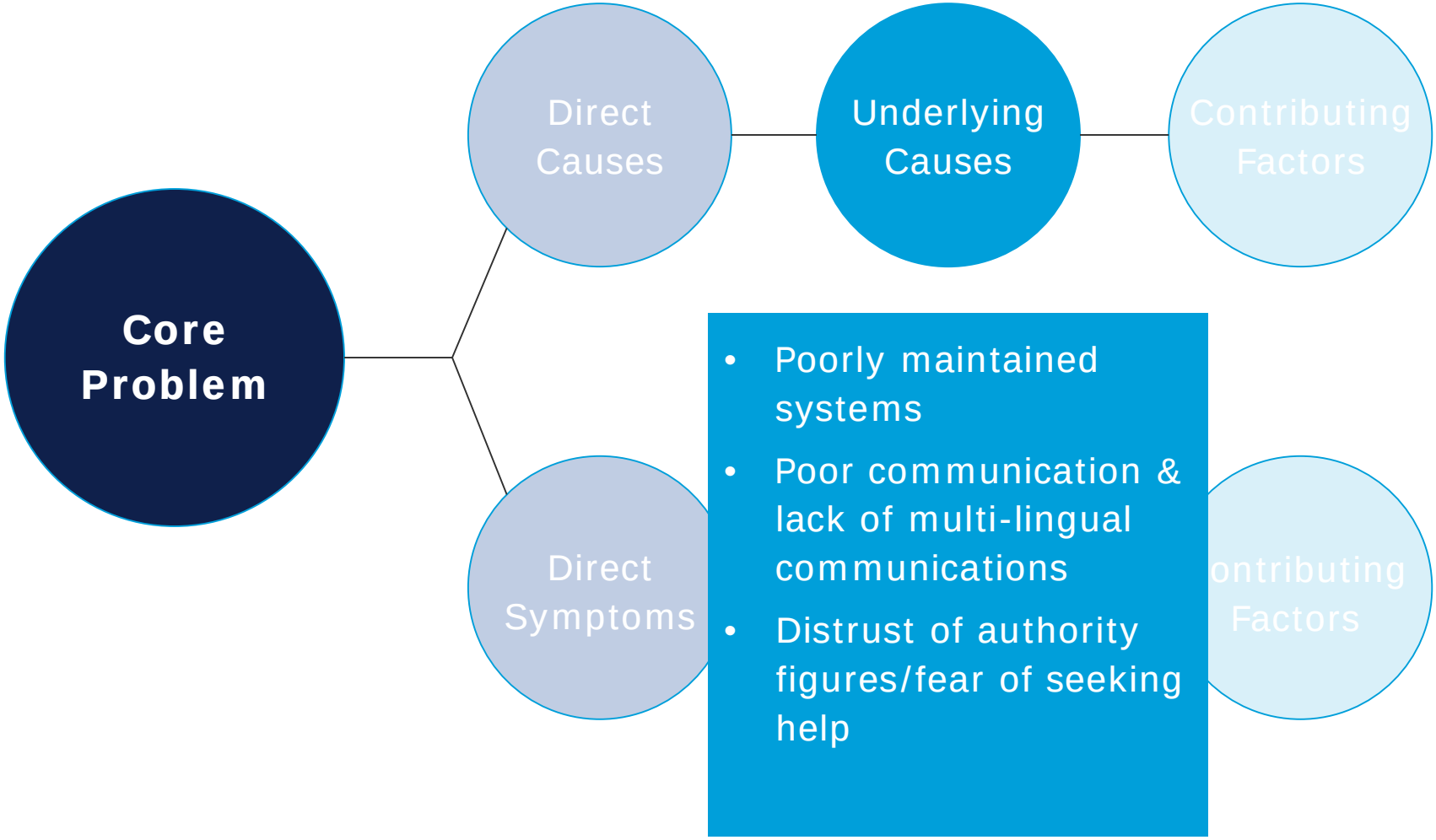

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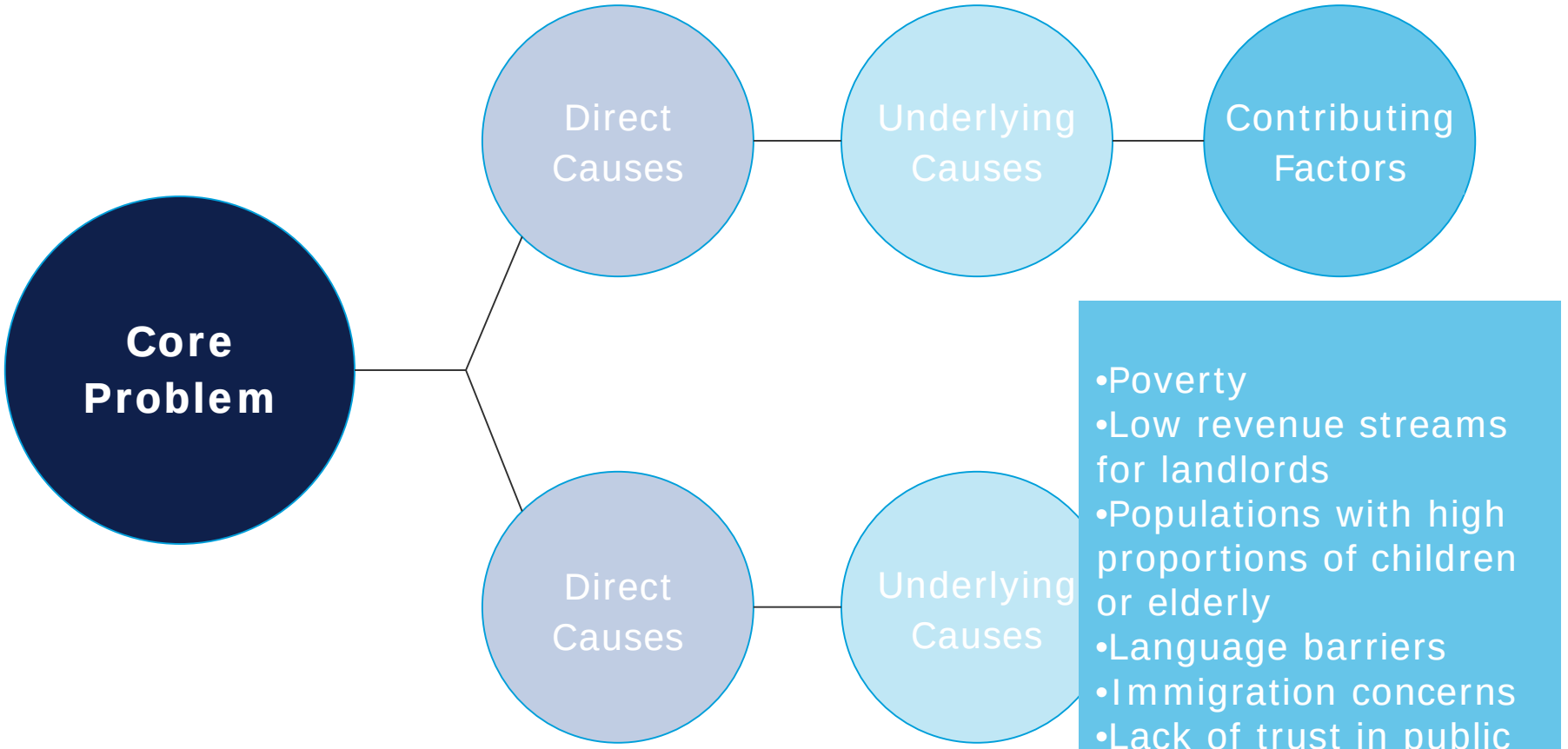
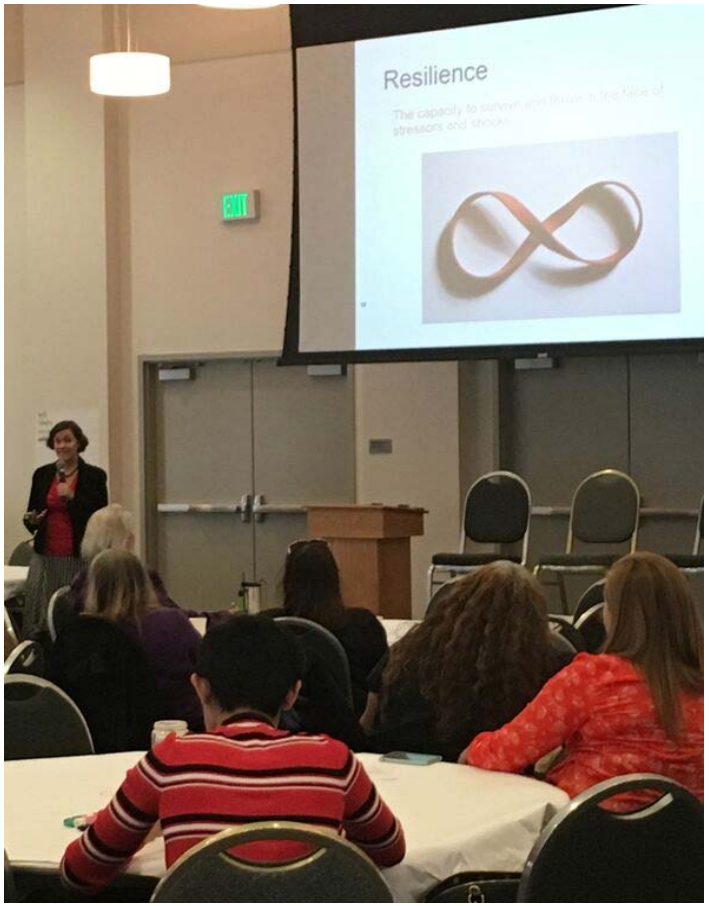


Using workshops to engage residents

Resident awareness is socially motivated

Tenant engagement is minimal, with limited reach to socially isolated groups

Improved communication is needed



Develop a set of measures to assess social resilience

Empowered community champions

Communication with tenants, including ensuring appropriate multilingual communications

Strong social fabric through community events

Resilient buildings reduce risk and add immediate value to the community

Questions?

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