How to use climate change analytics to activate resilient infrastructure investments

ICF

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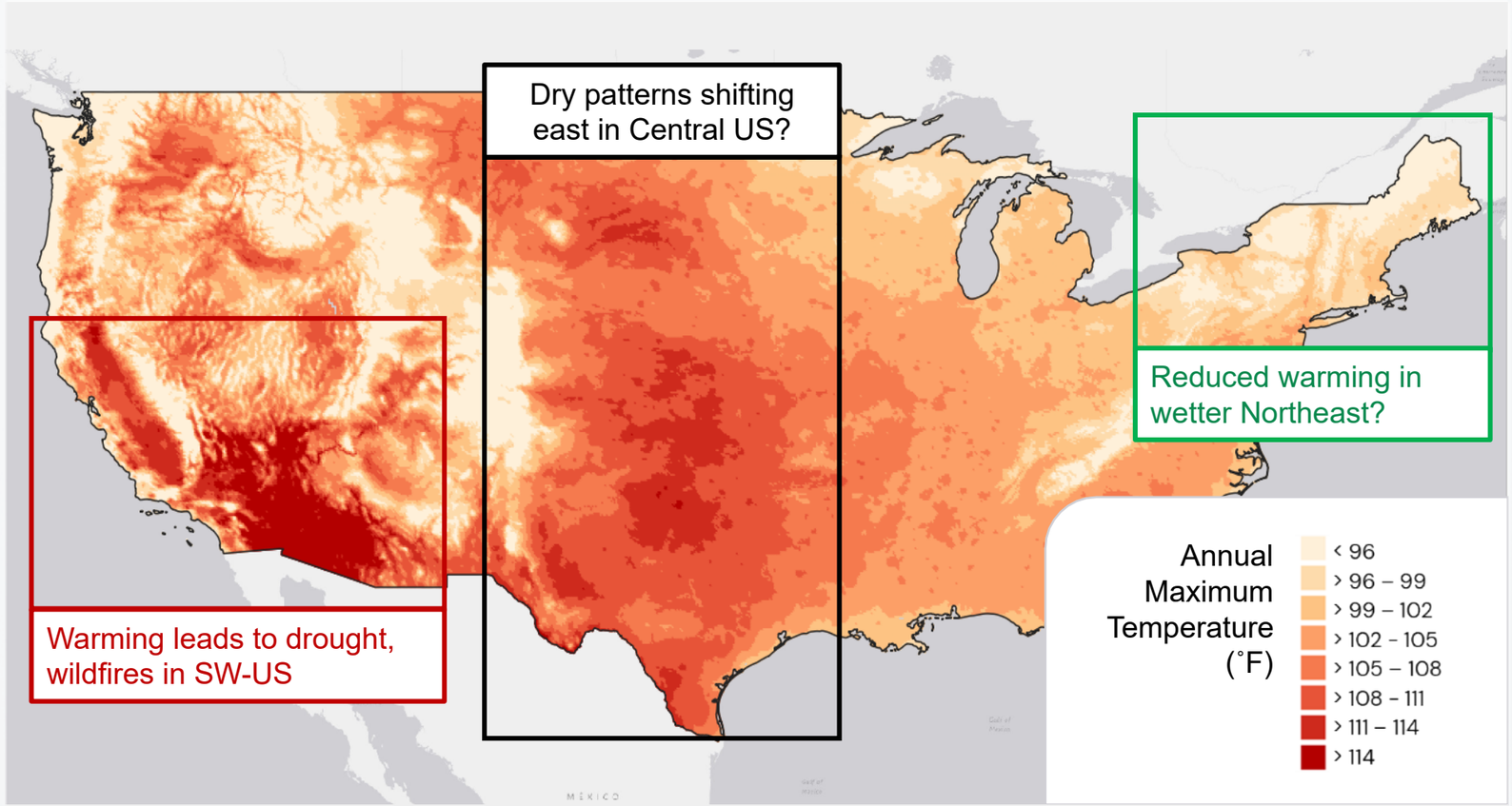
How is climate change impacting the United States?

Nearly every region in the U.S. is impacted by climate change

- Climate change is a global phenomenon
- Real-world impacts on local and regional scales
- Changes impact infrastructure and value of resilience investments

Local and regional climate variability tell stories…



High-Resolution Localized Constructed Analogs (LOCA 2) | 2050: 14 CMIP6 (SSP5-8.5) models, model average projections

Climate change impacts every sector

- Climate change impacts every sector:
  - Healthcare
  - Economy
  - Water Resources
  - Agriculture
  - Energy
  - And more…
- The past is no longer an analog for the future, only provides a portion of the story
  - Exceeding the historical normal
- Global Climate Models provide the means to quantify future impacts, so we can adapt to future risks
  - Develop adaptation and resilience strategies
  - Complex, dynamic models
  - Challenging to process & interpret

Climate risk analytics

ICF's ClimateSight

ICF ClimateSight

Helps organizations make informed decisions about their operations and investments.

ClimateSight **quantifies future climate change and impacts** across sectors for any time horizon and geography, from small towns to the entire globe.

ClimateSight's advanced climate projections and analytics combine with ICF's experts **create targeted risk assessments and solutions.**

Best available climate science

70+
custom climate variables

1.5M
locations and 150 years of data

25TB
of data

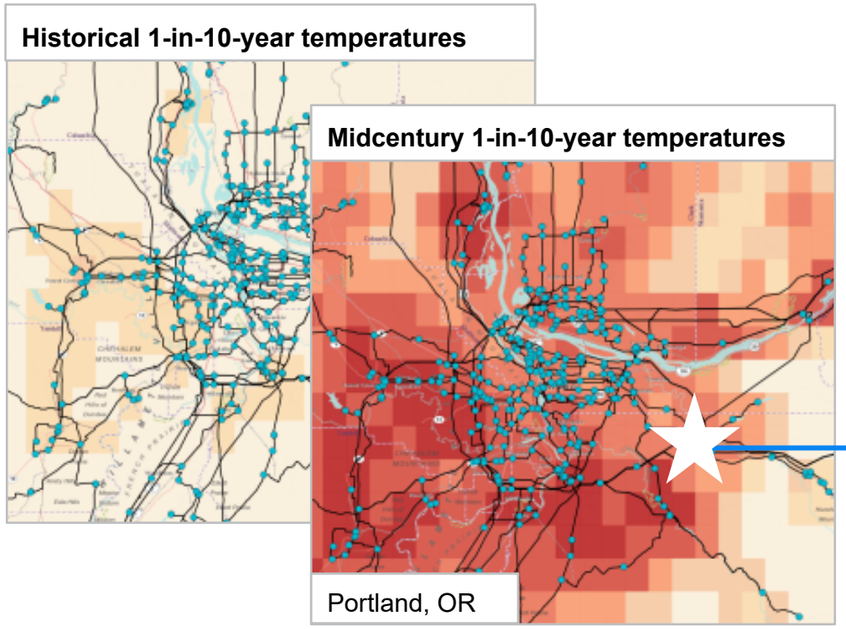
10,000+
lines of code

What is climate risk analytics?

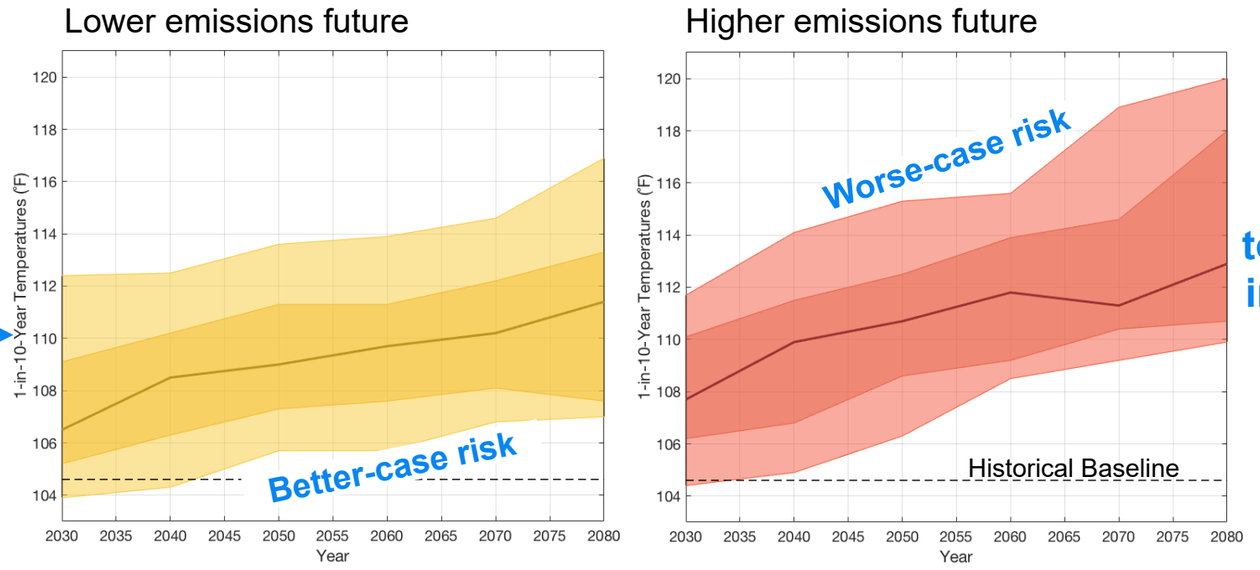
Helps organizations identify and manage climate-related risk and opportunities using climate data

ICF's risk-based framework: inform decision-making and develop strategies to mitigate climate risk and capitalize on climate-related opportunities

- Leverage big data to understand plausible climate risks and prepare for potential losses
  - Likelihood and consequence of climate and weather extremes in future
  - Forecasting future risk to systems, people, and assets



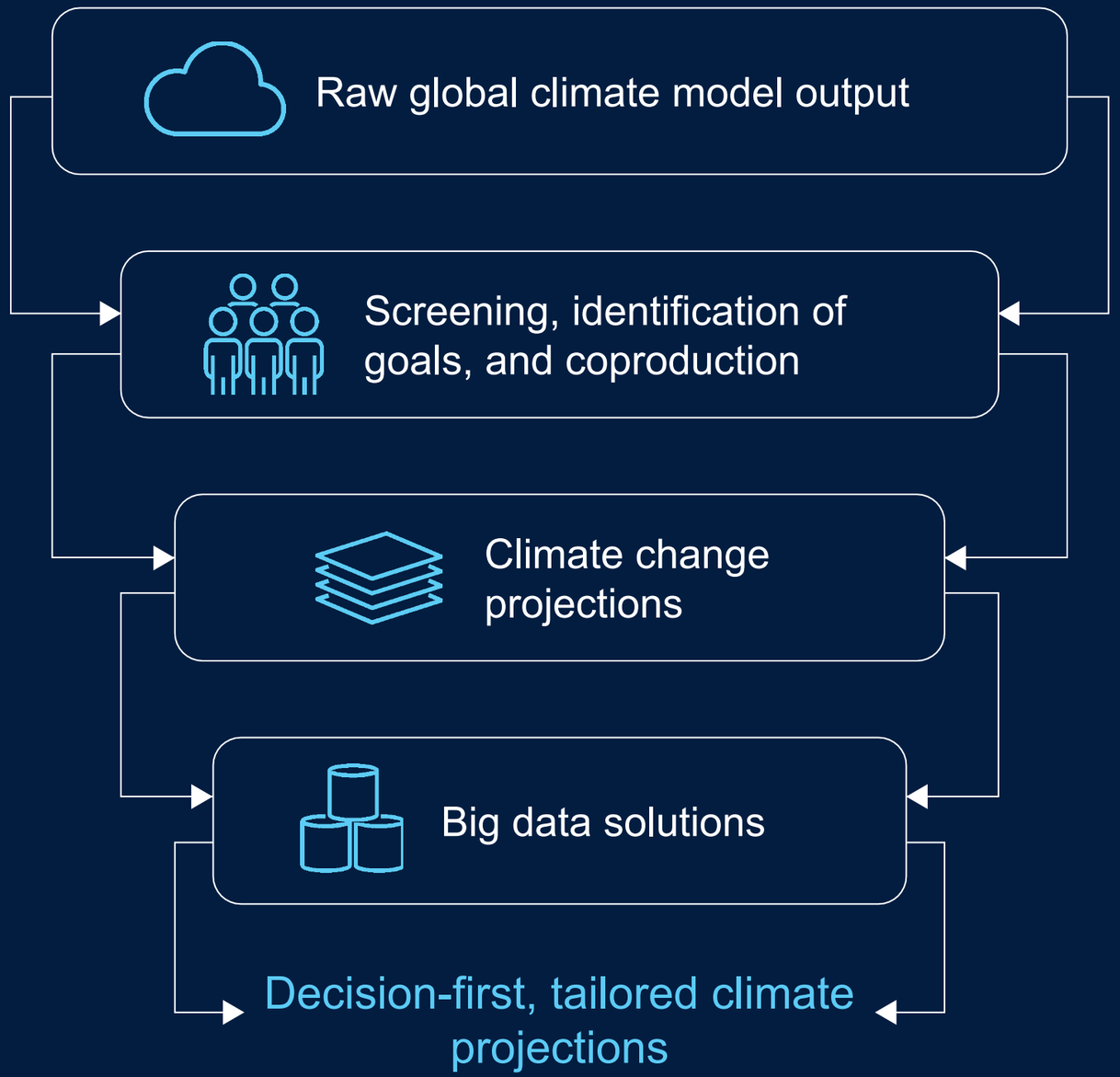
Probabilistic modeling – uncertainty



Range of risk tolerance to inform risk-based decisions

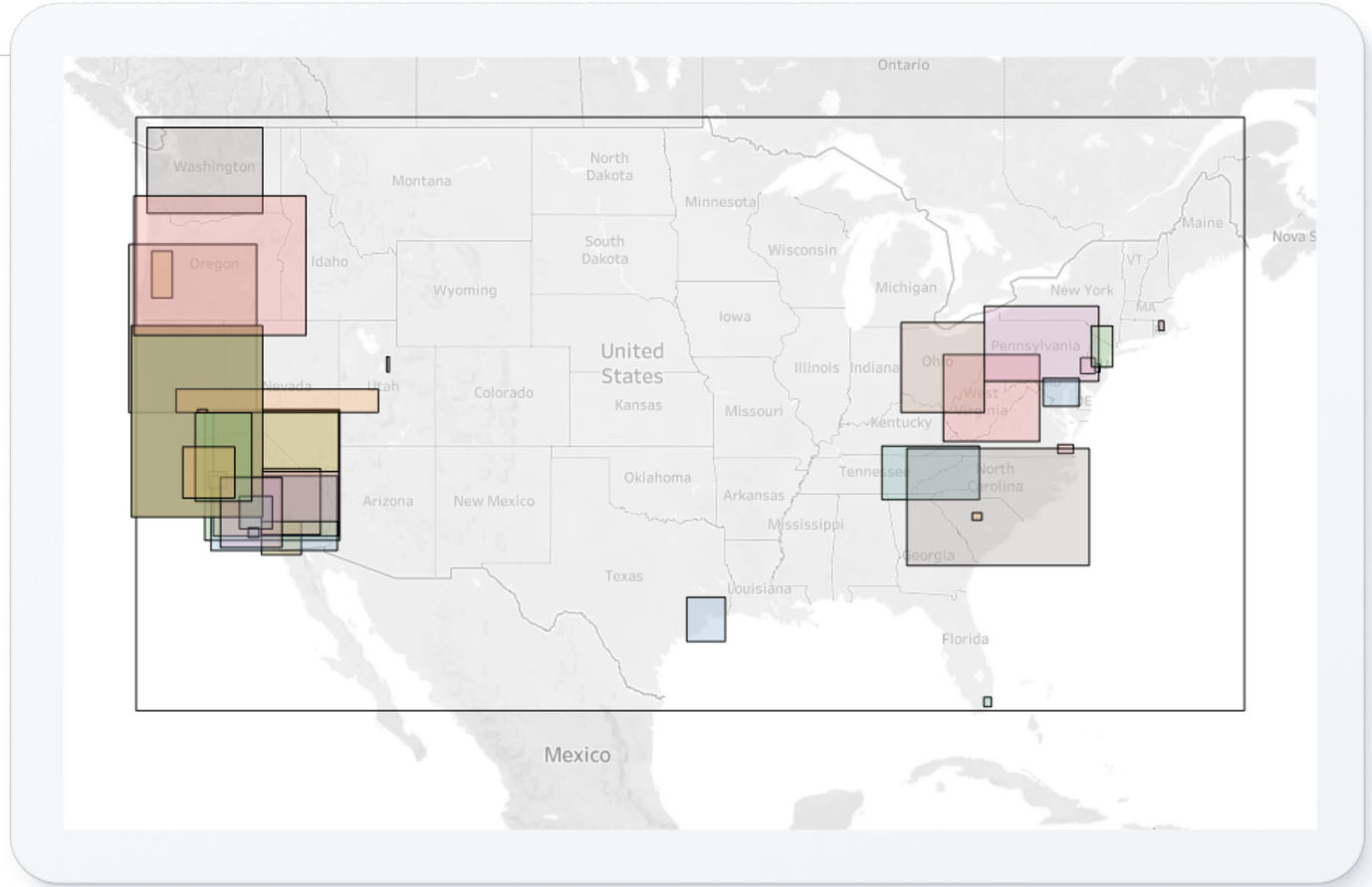
ClimateSight is driven by expert analysis

- Advanced analytics with robust industry knowledge leads to targeted risk assessments and solutions
- Evaluate information, requirements and objectives based on decision-relevant goals
- Develop actionable climate projections and information for targeted decision-making



Where do we use ClimateSight?

- Analyses have covered the entire continental U.S. and all continents
- Wide range of clients:
  - Federal Government
  - State & Local Government
  - Electric and gas utilities
  - Transportation agencies
  - Investment managers



ClimateSight sits within ICF's broader climate analytics capabilities

Atmospheric Hazards

- Temperature
- Precipitation
- Humidity and heat index
- Wind speeds
- Hydrologic variables

Sea Level Rise

- Flood extent and depth
- Storm surge

Riverine flooding

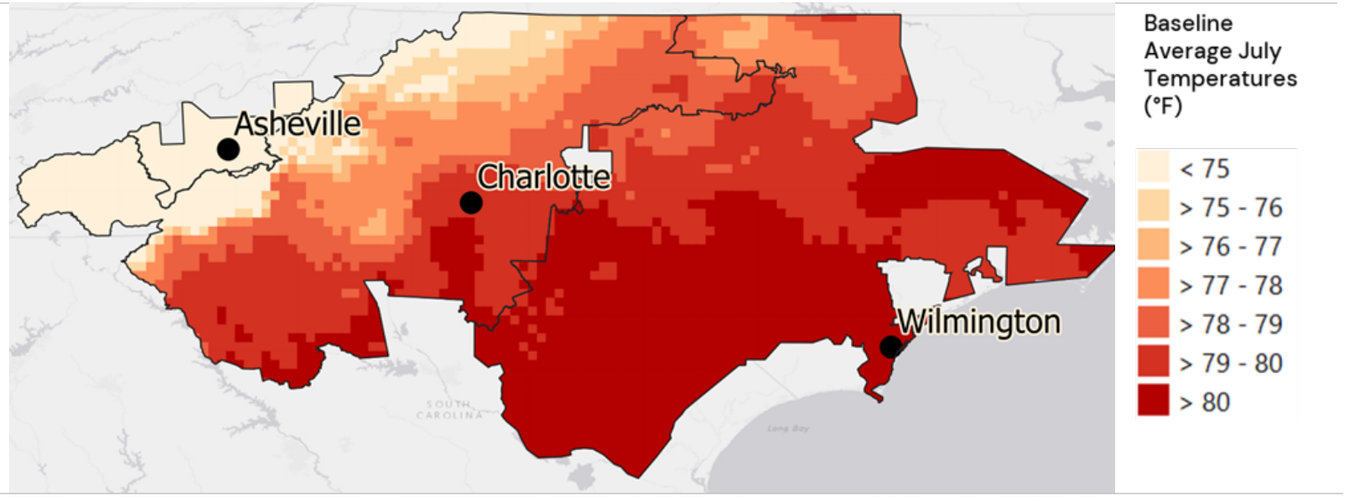
- Flood extent and depth

Wildfire

- Burn areas
- Fire weather

Extreme Weather Events

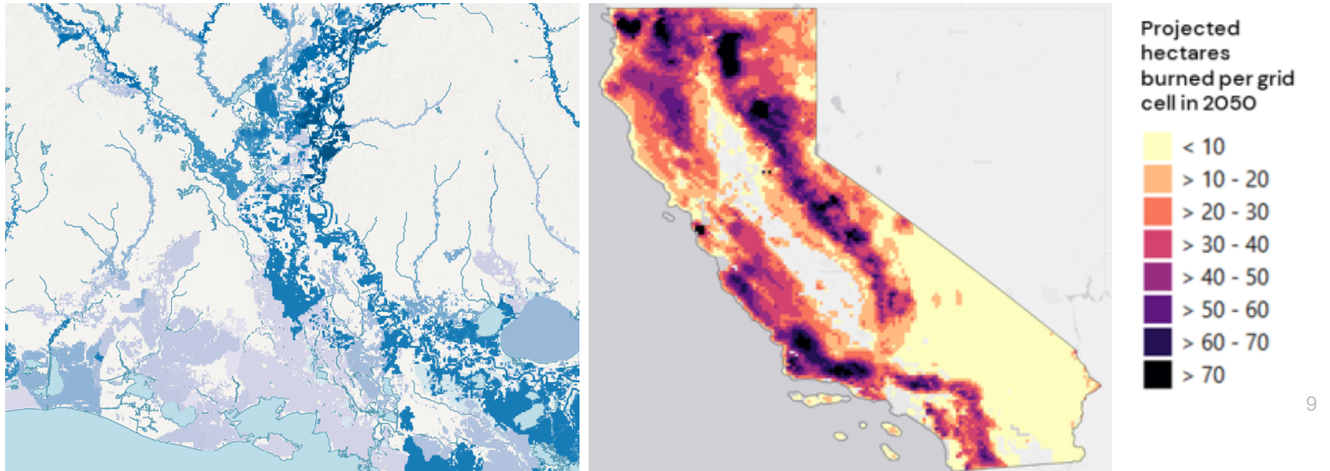
High-resolution temperature and precipitation models



Sea level rise and storm surge models

Left: Riverine flood models

Right: Wildfire models



Climate Change Vulnerability and Resiliency Studies

Miami Beach Investment Case for Stormwater Resilience

Problem:

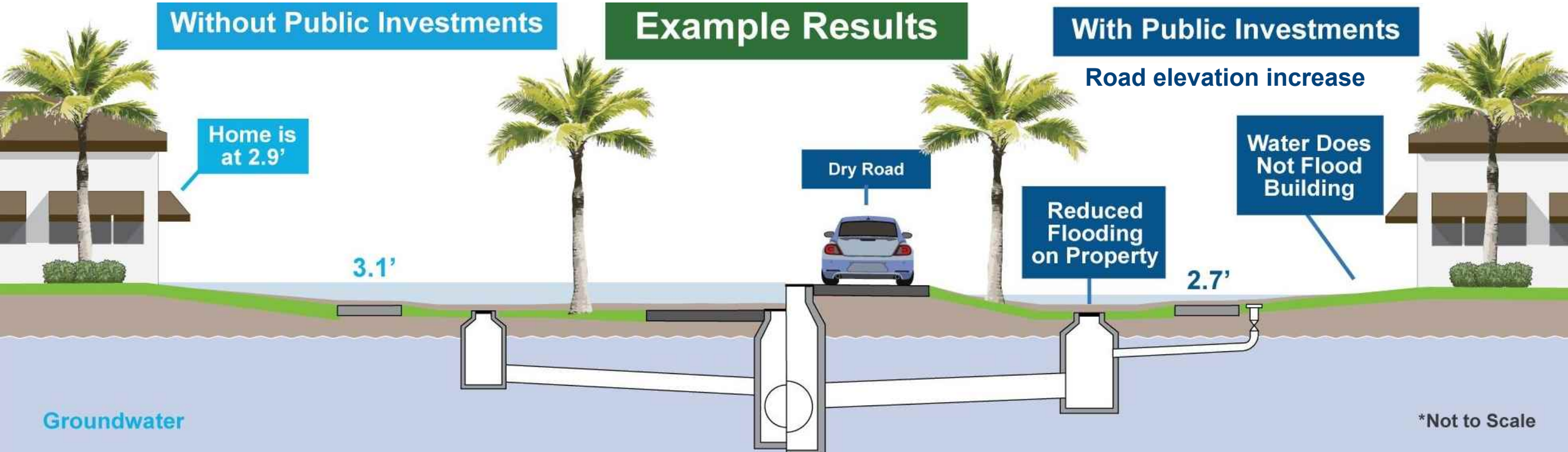
- Miami Beach experiencing **sea level rise and high flood risk**
- Understand and communicate the need for stormwater resilience investments to safeguard infrastructure & community

Approach:

- Surface and groundwater model for flood risk
- AIR Tropical Cyclone model for storm surge losses
- Property value model to understand value of resilience investment

Results:

- Citywide investments of $2 Billion would be cost beneficial, increasing residential property value by as much as 14%.
- **Economic benefits of adapting far outweigh the costs**



Con Edison Utility Resilience

Problem:

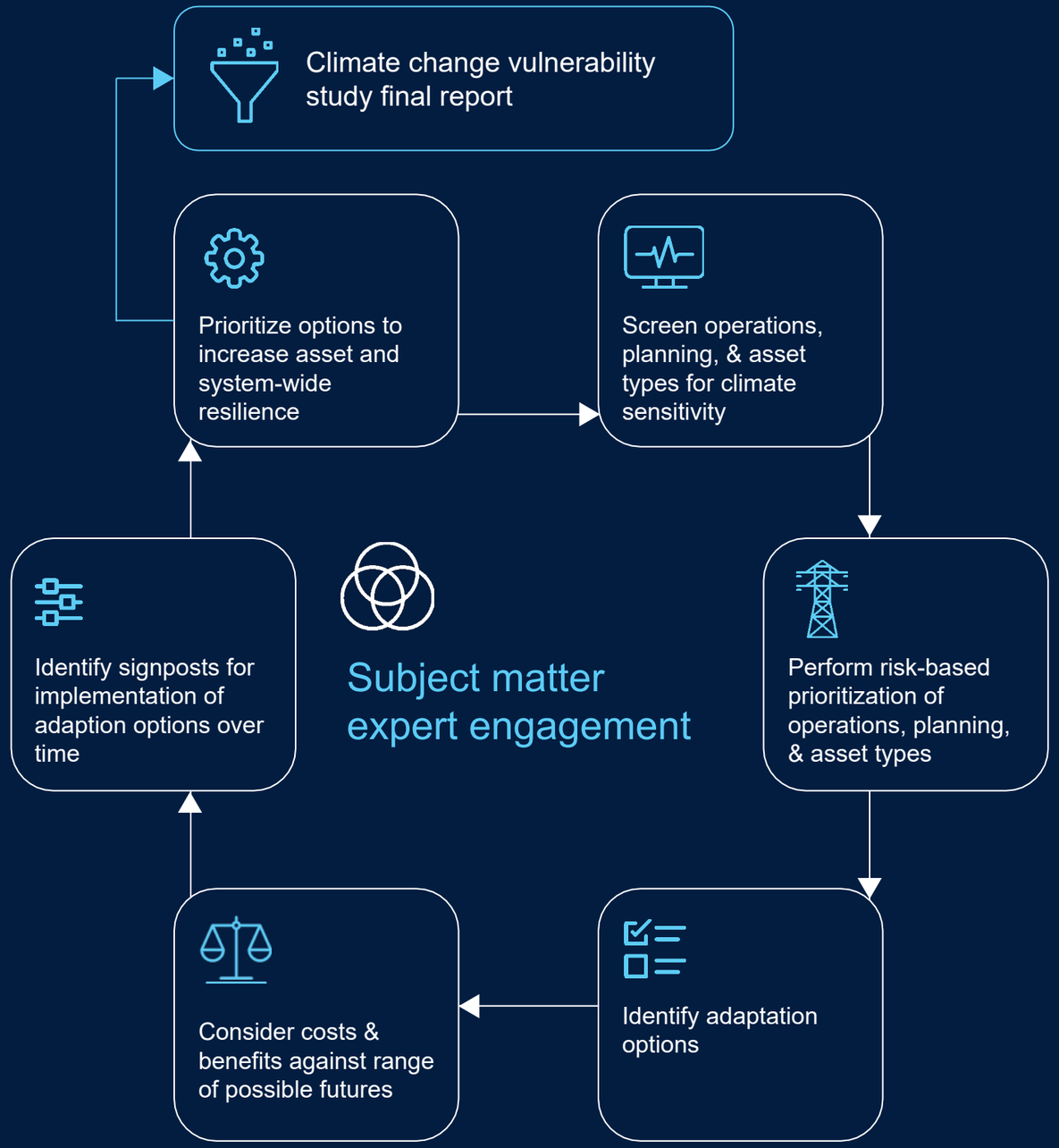
- Climate change impacts energy utility operations, planning, and physical assets

Approach:

- Assess risks and strategies using downscaled global climate models and system sensitivities to climate
- Develop comprehensive plan to improve utility and customer resilience

Results:

- Climate change may require investments of **$1.8-5.2 billion by 2050** to safeguard electric, gas, and steam delivery systems, customers



EPA Heat and Mental Health

Problem:

- Long-term warming linked to **greater incidences of mental health effects**, including suicide rates

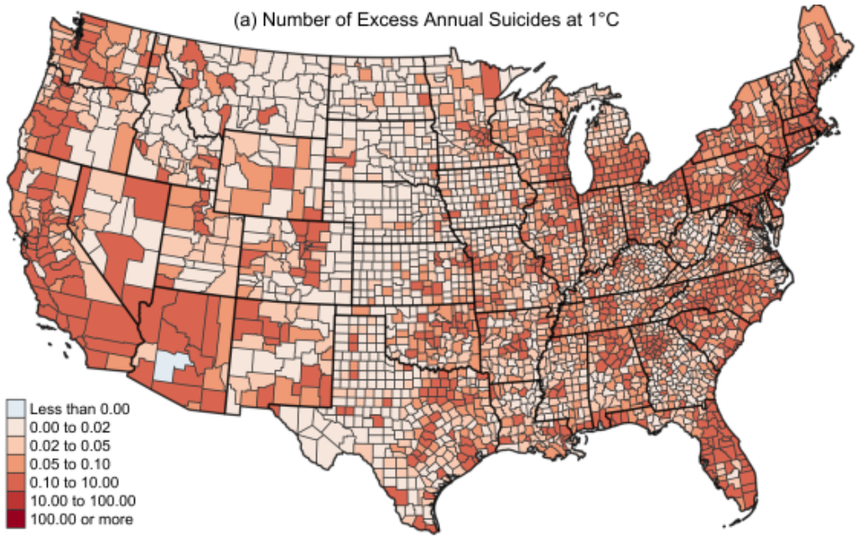
Approach:

- Projected change in suicide incidence in response to warming using global climate models, historical suicide rates, and impact modeling
- US EPA value of statistical life to estimate economic impact of avoiding mortality

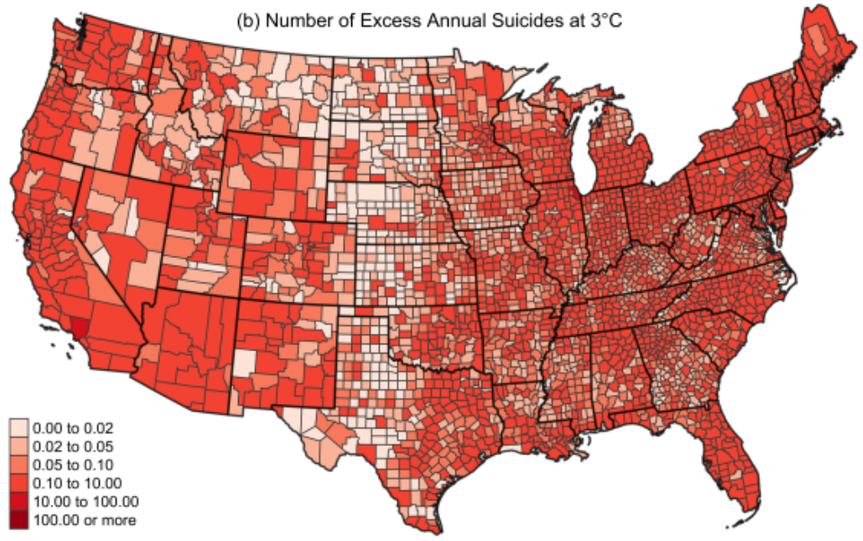
Results:

- Warming of up to 6°C could result in up to **1,660** excess suicides annually
- Economic value of avoiding these impacts: up to **$3 billion**
- **Need for effective mental health intervention**

1 ℃ is projected to arrive by 2011-2025



3 ℃ is projected to arrive by 2044-2082



Summary

- Climate change demands a greater need to understand value and impacts of resilience investments
- Climate risk analytics enables us to apply the best available climate science and data to measure and assess the risks posed by climate change
- ICF's in-house ClimateSight tool and expertise provide the means to develop actionable climate projections and information for targeted decision-making

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