

The Goals

- Provide *actionable* data for public and private sector decision-makers to incorporate climate risk into everyday activities
- Lead nonpartisan, business-focused national discussion on climate risk and the U.S. economy

The Approach

- **Nonpartisan** Risk Committee convened by co-chairs Paulson, Bloomberg and Steyer
- **Independent** peer-reviewed risk assessment commissioned by Risk Committee (Rhodium Group & RMS)
- **Assess risk without dictating solutions**

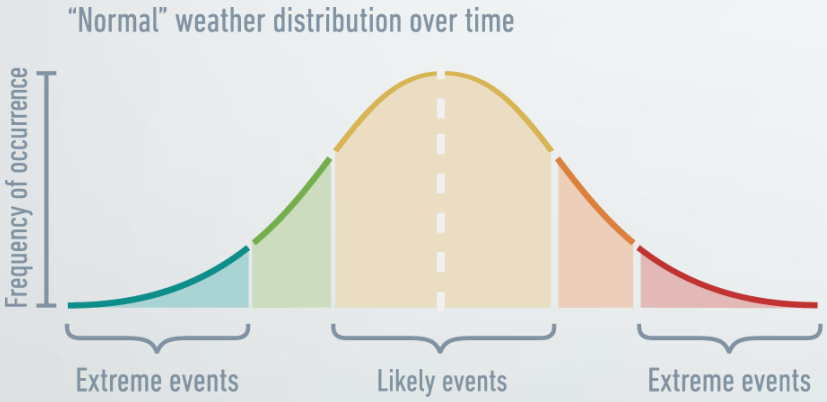
Risk Committee Members

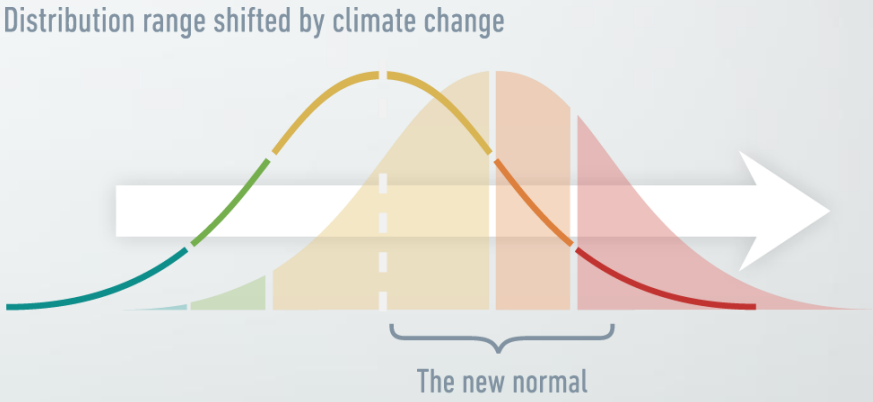


Expert Review Panel Members

- Kerry Emanuel *(MIT)*
- Karen Fisher-Vanden *(Penn State)*
- Katherine Hayhoe *(Texas Tech)*
- Douglas Holtz-Eakin *(AAF)*
- Larry Linden *(Linden Trust)*
- Robert Muir-Wood *(RMS)*
- Thomas Rutherford *(U of Wisconsin)*
- Sean Ringsted *(ACE Limited)*
- Gary Yohe *(Wesleyan)*
- Michael Greenstone *(MIT)*
- Geoffrey Heal *(Columbia)*
- Klaus Keller *(Penn State)*
- Linda Mearns *(NCAR)*
- Michael Oppenheimer*(Princeton)*
- Michael Spence *(Stanford)*
- Jonathan Samet *(USC)*

Why Take the Risk Approach?

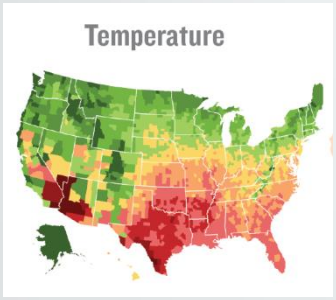


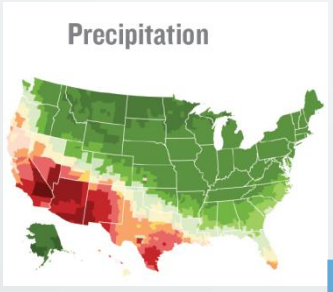


Research Approach

Interdisciplinary, Integrated Research

Physical Climate Projections

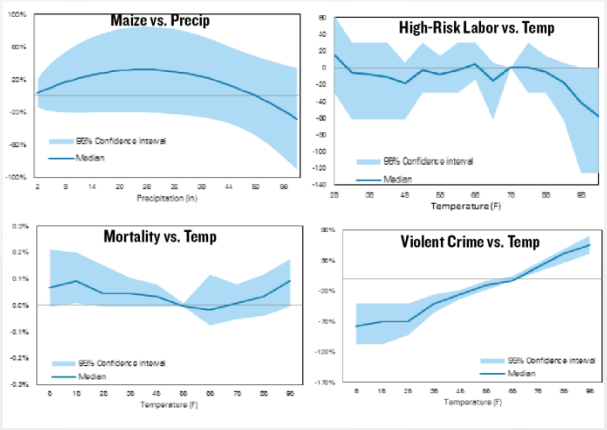




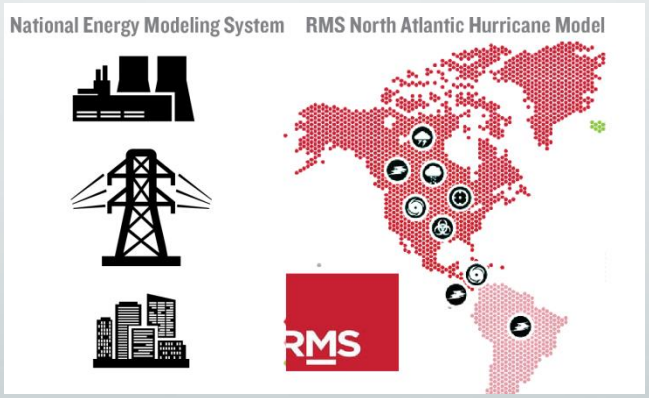




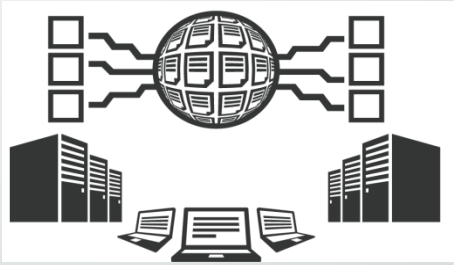
Econometric Research



Detailed Sectoral Models



Integrated Economic Analysis



Scope of Coverage

Science

- Temperature - averages and extremes
- Precipitation - averages and extremes
- Local sea-level rise
- Humidity - wet-bulb temperaure
- Strong positive carbon cycle feedbacks
- Ice-sheet collapse
- Ocean temperature and acidification
- Ecosystem collapse
- Unknon unknowns



- Included
- Limited
- Excluded

Agriculture

- Grains, Soy, Cotton yields
- Other crops: fruit, vegetables, nuts
- Livestock

Other Impacts

- Water supply and demand
- National Security
- International civil conflict
- Aid and disaster relief
- Tourism, outdoor recreation
- Fisheries
- Forests
- Wildfire

Methodology

- Full probability distribution, tail risks
- Market impacts
- Quality of life
- Biodiversity, ecosystem loss
- Ecosystem services
- International trade

Impacts

Coastal Damages

- Innundation from sea-level rise
- Hurricanes and nor'easters
- Changes in hurricane activity
- Transportation
- Infrastructure

Energy

- Energy demand
- Energy supply

Labor Productivity

- Hours worked
- Labor quality, health impacts

Health

- Heat/Cold-related mortality
- Respiratory impacts
- Extreme weather
- Vector and water-borne disease

Crime

- Property crime
- Violent crime

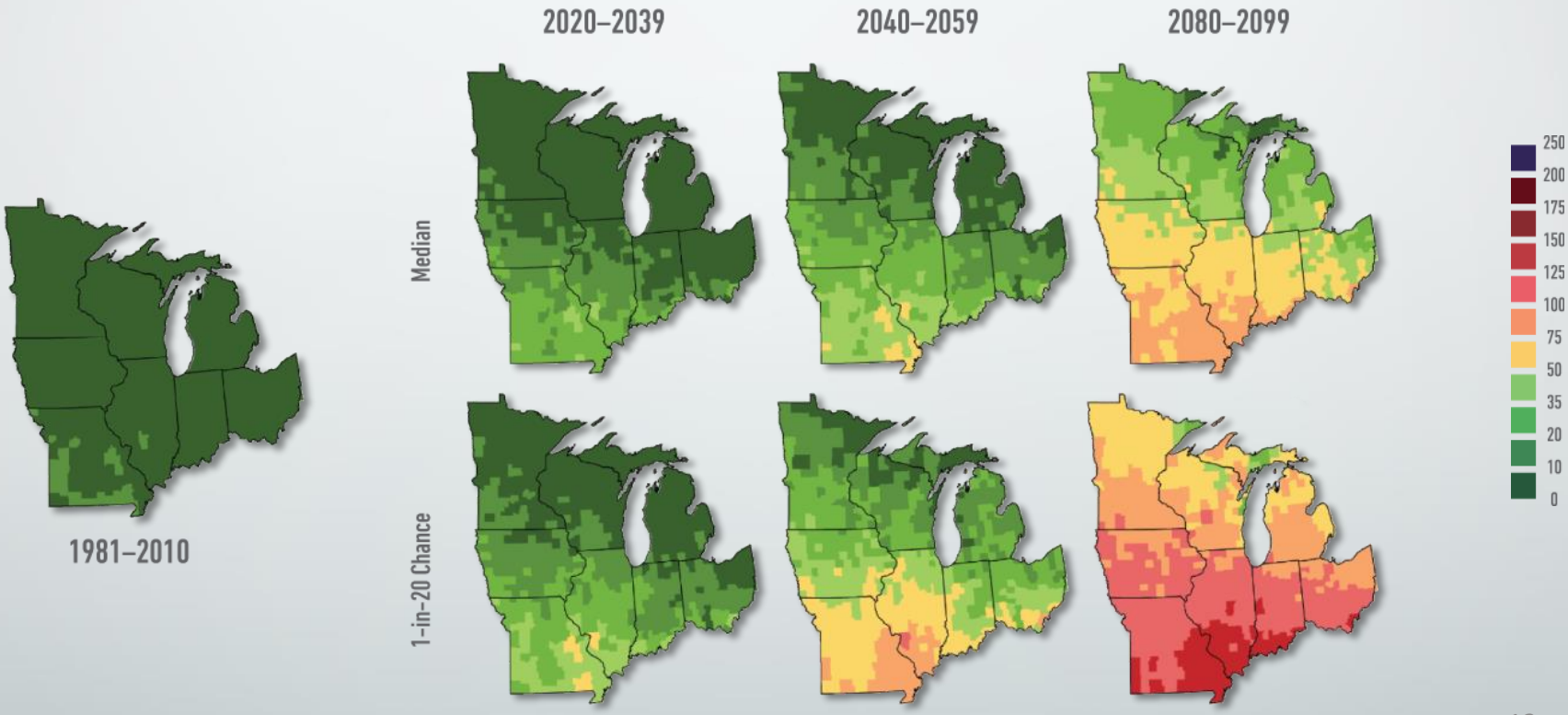
Midwest Metro Areas



Risk Assessment Findings

Extreme Heat: Days over 95°F by 2100

Average days per year over 95°F



Warmer Winters: Days below 32°F by 2100

Decrease in cold days region-wide

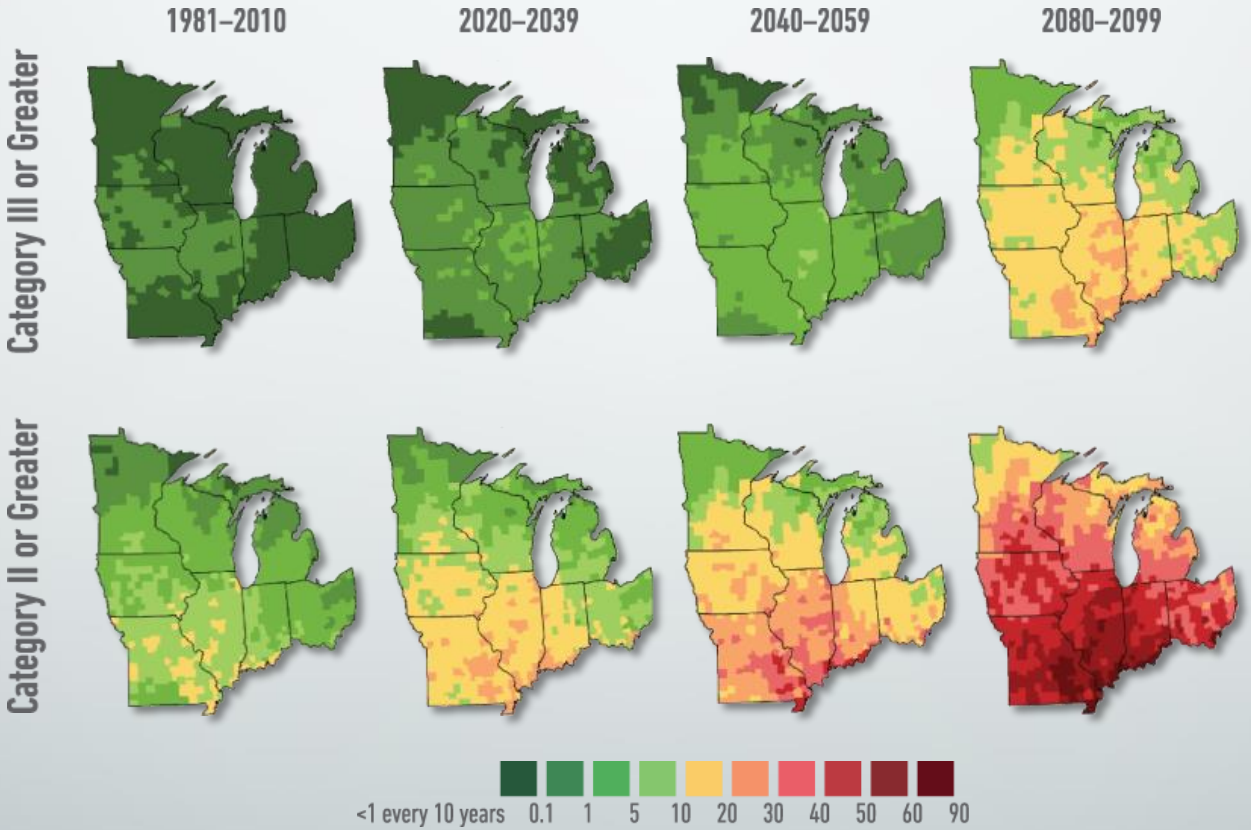
For example, Madison & Milwaukee: 97 - 119 days likely by mid-century (historical av: 137d)

Threatens MW winter sports industry (over 35,000 workers)



Health: Humid Heat Stroke Index

Mean number of days in a typical Midwest summer when the temperature and humidity could reach HHSI category II, III, or even greater. These are days when the heat and humidity could be so high that it will be dangerous for humans to remain outdoors.



Agriculture – Key Results

Changes in temperature + precipitation will impact crop yields, with gains in some crops offset by losses in others

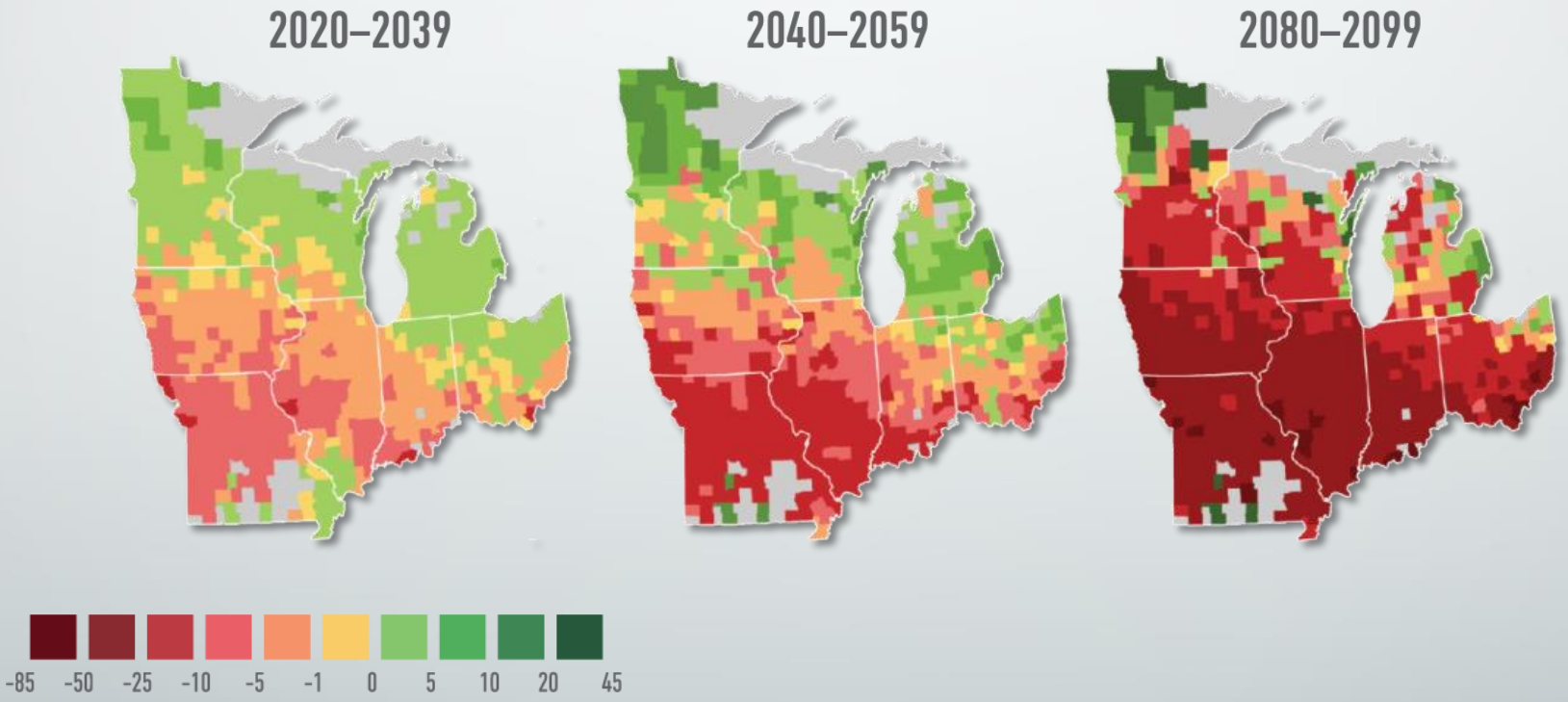
Overall losses for corn and wheat of 11 - 69% (1-in-20 chance >80%) by end of century



Agriculture

Projected Change in Corn, Soybeans, and Wheat Yields

Median percent change in yield of corn, soybeans, and wheat relative to current production without significant adaptation



Energy Costs - Overview

Increased temperatures mean greater electricity demand + lower power generation capacity

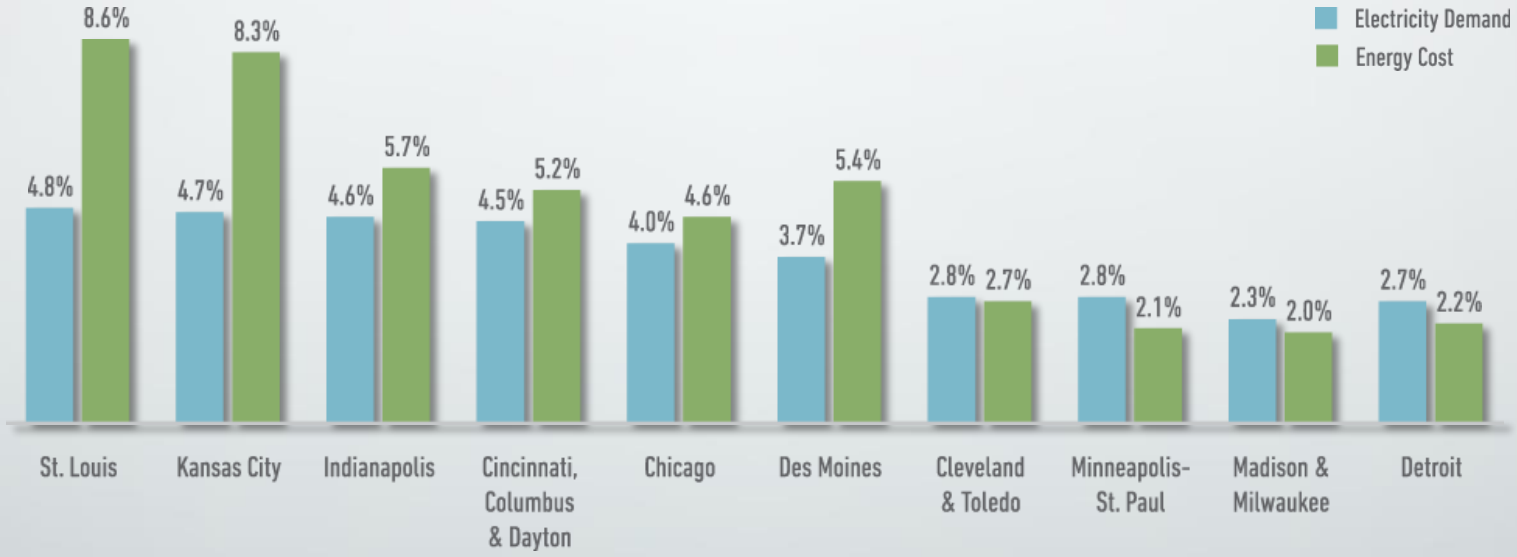
Likely result: 95 GW of new power generation capacity nationwide by 2040 with cost of up to $12B per year



Energy Costs - Midwest

Projected Change in Electricity Demand and Energy Costs by Metro Area

Median projection, mid-century (2040–2059)



Health: Heat-Related Mortality

Rising temperatures increase heat-related mortality

For example, up to 24 additional deaths per 100,000 residents likely in Kansas City by end of century



Labor Productivity

Rising temperatures reduce labor productivity, esp in high-risk sectors

For example, up to 3.3% likely decline in productivity in high risk industries in St. Louis by end of century



Crime

Higher temps are one of the factors that affect violent crime rates

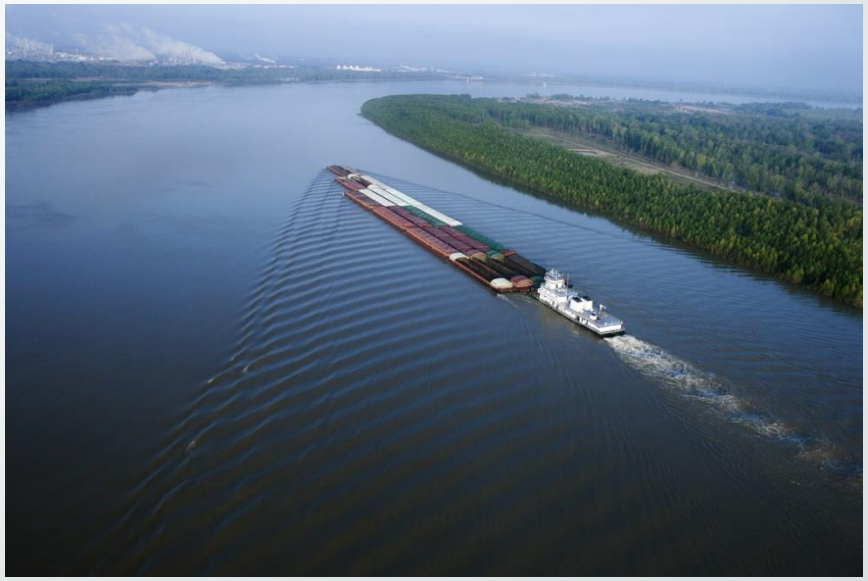
For example, up to 6.4% likely increase in violent crime in Minneapolis-St. Paul by end of century



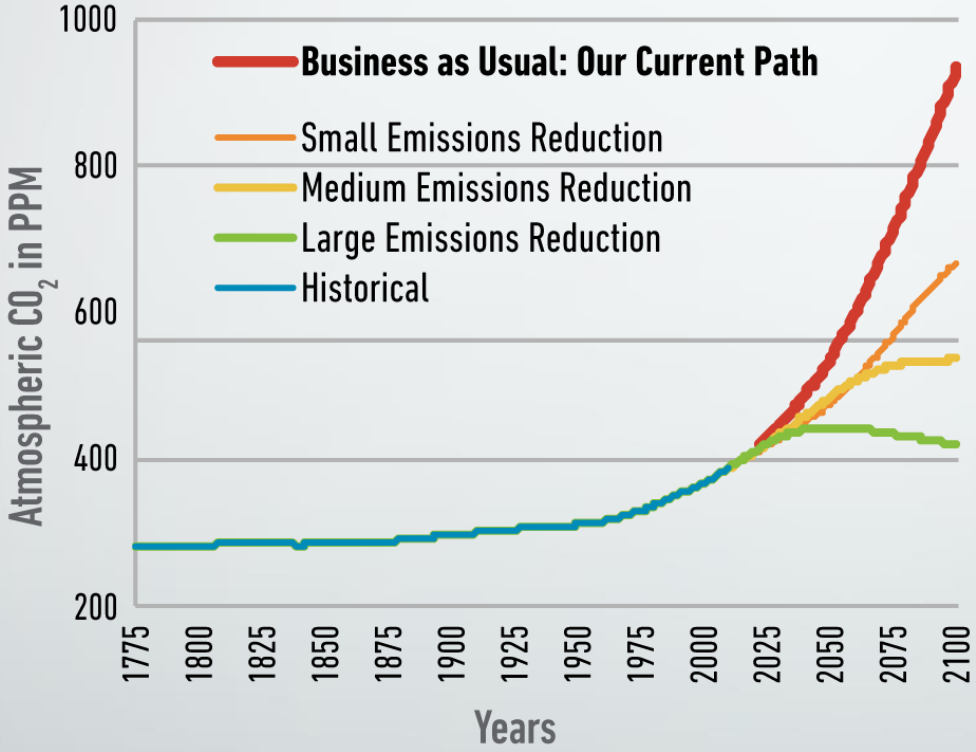
Precipitation

Average annual precipitation likely to increase overall by end of century but with more extreme patterns

Impacts on Mississippi River, Great Lakes & water quality



Risks are Not Inevitable



If we act immediately, we can still avoid most of the worst impacts.

The only reasonable and responsible course is to alter the path we're on, and bring our carbon emissions down toward zero.

Policy & Business Risk Mitigation Varies by Region, Industry, Vulnerability









Mitigating Risk

- SEC Disclosure
- Portfolio management
- Divest/Re-invest strategies
- Accurate pricing of risk by long-term investors

CDP
DRIVING SUSTAINABLE ECONOMIES

Ceres

ASSET OWNERS DISCLOSURE PROJECT

SUSTAINABILITY ACCOUNTING STANDARDS BOARD
SASB

Carbon Tracker Initiative

Private sector action alone is not enough





"We do not face a choice between protecting our environment or protecting our economy. We face a choice between protecting our economy by protecting our environment — or allowing environmental havoc to create economic havoc."

—Robert Rubin

