

Managing the Risks of Climate Change

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W. Blaine Early, III
Stites & Harbison, PLLC
859-226-2284
bearly@stites.com

Kenneth J. Gish, Jr.
Stites & Harbison, PLLC
859-226-2293
kgish@stites.com

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Purpose of this Presentation

1. Identifies risks that a changing climate may present.
2. Discusses strategies to anticipate and manage the adverse effects of those risks.

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This Presentation is NOT

1. A debate on climate change and its cause(s).
2. An analysis of policy to respond to climate change.
3. A political discussion.



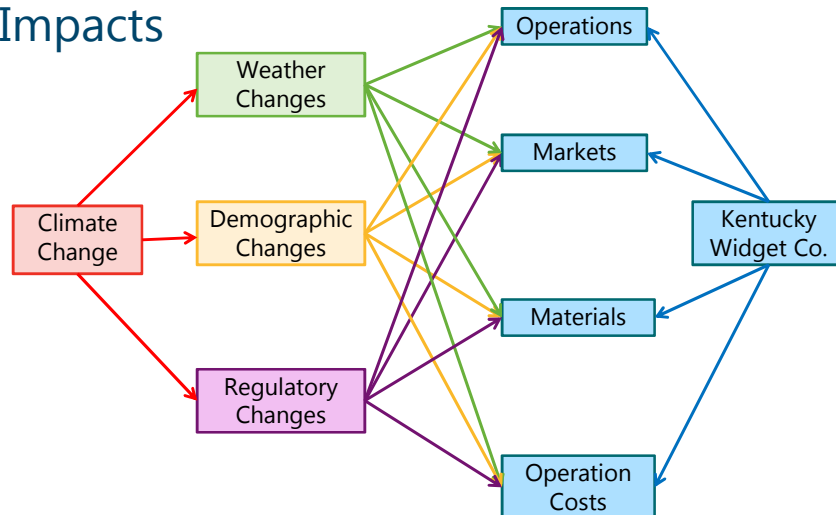
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Predicted Climate Change Effects



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Conceptual Model of Climate Change Impacts



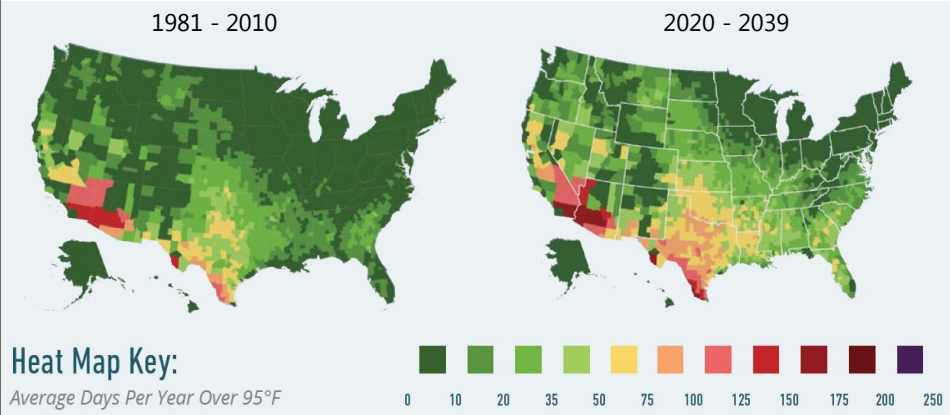
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Key Elements of Change

- Rising temperatures result in longer growing seasons and other impacts
- Changing precipitation patterns result in increases in some regions, decreases in others, but an overall increase in intensity of precipitation
- Incidents of severe weather increase (hurricanes, snowstorms, and rain leading to flooding)
- Rising global sea levels cause increased coastal flooding

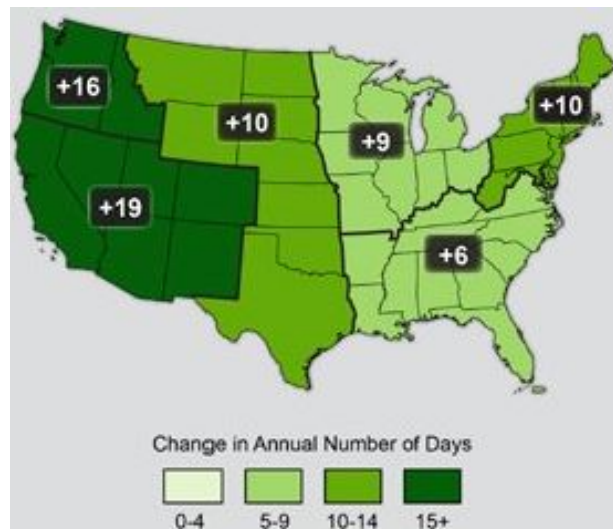
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Average Days Per Year Over 95° F



Source: U. S. Global Change Research Program

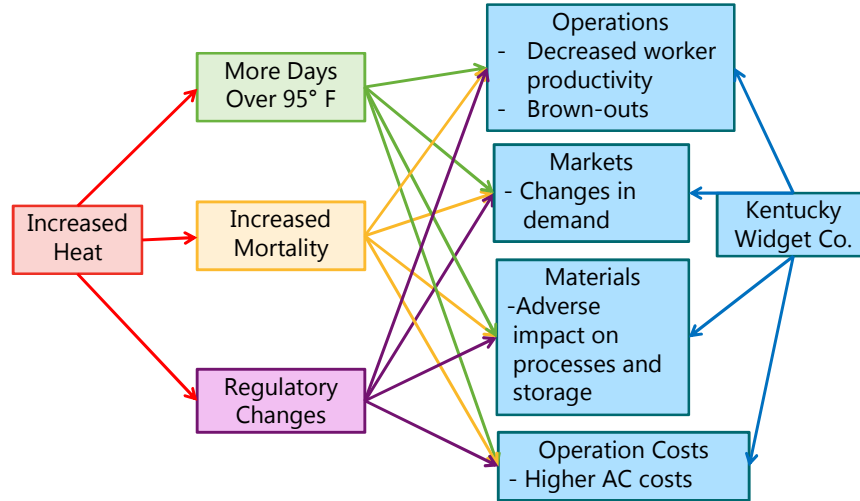
Observed Increase in Frost-Free Season



Increase in frost-free season length by region for years 1991 to 2012 compared to 1901 to 1960.

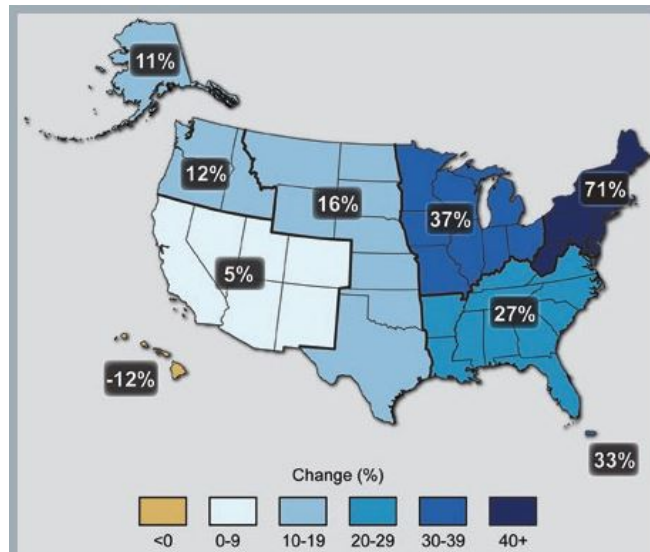
Source: U. S. Global Change Research Program

Anticipating Impacts - Heat



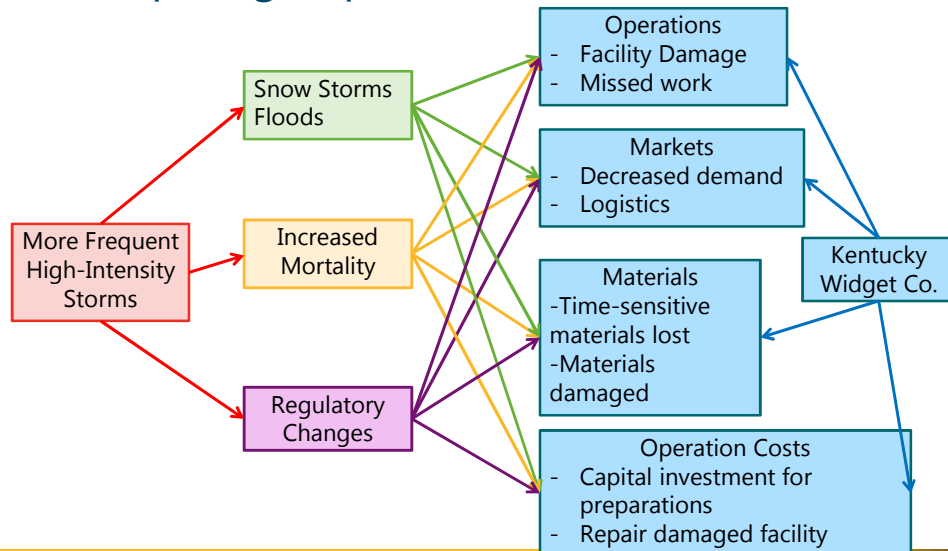
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Observed Change in Very Heavy Precipitation



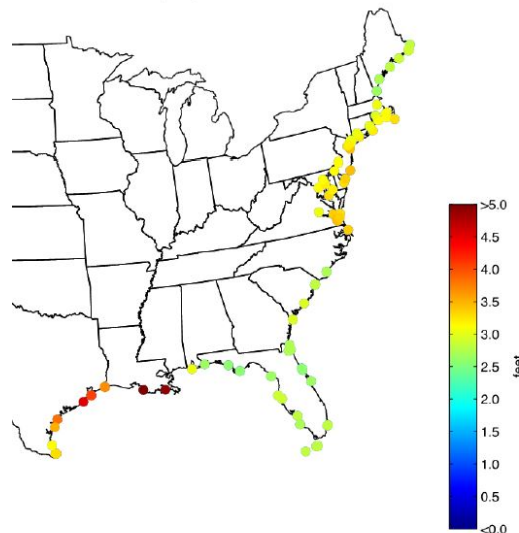
Percent changes in precipitation in the heaviest 1% from 1958 to 2012.
Source: U. S. Global Change Research Program

Anticipating Impacts – Severe Weather



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Local Sea Level Rise (feet) years 2000 to 2100



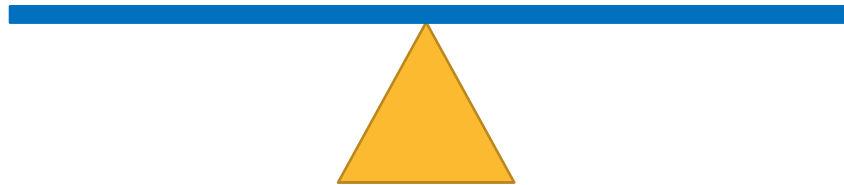
Median projected change (feet) in sea levels from year 2000 to year 2100.
Source: Rhodium Group, American Climate Prospectus

Climate Change Mitigation v. Adaptation

Mitigation



Adaptation



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Why should a business plan for changes in weather conditions?

- **Operations**

- Supply Chain
- Facilities and Infrastructure
- Utilities
- Employees
- Distribution
- Customers

- **Liabilities**

- Uninsured Losses
- Legal Liability (negligence)

- **Disclosures**

- Parent/Affiliates
- Customers
- Investors
- Lenders

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Regulatory Risk Related to Climate Change

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Climate Change Regulatory Risks

- CO₂ regulation
 - CPP or something else
 - COP 21 treaty?
- Water regulation
 - Water rights in the east?
 - Increased stormwater management obligations
- Increasing SEC filing requirements
 - February 2010 Interpretive Guidance on Disclosing Impacts of Climate Change

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Climate Impacts on Electric Utilities

- Increased heat = increased load
- CO₂ regulations likely to drive away from coal baseload
- Other baseload generating?
 - Natural Gas
 - Competition with use as heating fuel
 - Pipeline infrastructure?
 - Nuclear
 - Cost
 - Waste disposal
 - Hydro
 - Cost
 - Available locations?



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Renewable Energy

- Cost
- Integration into the grid
- Distributed generation?
 - Fixed costs for off hours generation?



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Managing Electricity Risk

- Increased Efficiency
- Managing load timing
- On-Site Distributed Generation
 - Potential Net Metering benefit
 - Potential increased cost for fixed costs



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Water Regulatory Risks

- Depends on Location
- Increased heat could lead to water scarcity
 - Water rates increase
 - Water “rights” become scarce
- Increased precipitation could lead to more stormwater regulations
 - More on-site treatment obligations
 - Increased stormwater management



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Managing Water Regulatory Risks

- Survey supply chain and markets
- Treat water like a scarce resource
 - Recycle?
 - Reduce waste
- Improve stormwater management at the design level



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SEC Disclosure Obligations

- SEC Guidance Regarding Disclosure Related to Climate Change (Effective Feb. 8, 2010)
- Application of existing disclosure obligations in climate change context
- Must disclose material impacts relating to:
 - Proposed/Implemented Legislation and Regulation
 - International Accords
 - Indirect Consequences of Regulations/Business Trends
 - Physical Impacts of Climate Change



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Risk Impact and Adaptive Responses

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Barriers to action

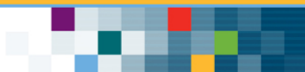
- **Uncertainty**
 - Timing of impact
 - Degree of impact
 - Regulatory/
Legislative delay
 - No clear mandate
- **Perception and Language**
 - “Climate Change”
vs.
Severe Weather
 - “The sky is falling”
vs.
Resilience

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Example Risk Matrix

Likelihood	Consequences			
	Insignificant	Moderate	Major	Catastrophic
Certain	Medium	High	Extreme	Extreme
Likely	Low	High	High	Extreme
Possible	Low	Moderate	High	High
Unlikely	Low	Low	Medium	Medium
Rare	Low	Low	Low	Medium

Factor	Impact	Adaptive Strategy
Severe Weather (snow, flood)	Supply Chain Disruption	Alternative supply routes, suppliers, stockpiles
Water Shortage	Reduced Process Water Cost	Increase efficiency in water use Alternative water sources Emergency water storage
Electricity Shortage	Cost Brown-Outs	Increase efficiency to reduce power use Alternative power sources



Factor	Impact	Adaptive Strategy
Increased Temperatures	Reduced Productivity	Invest in more efficient facility climate control
	Increased Heat-Related Mortality	Anticipate decreased labor supply

Examples of Corporate Adaptation

- The Coca-Cola Company
 - Recognized water security as critical concern
 - Implemented widespread evaluation of water source vulnerability and source water protection plans
- GlaxoSmithKline
 - Cooperating with other pharmaceutical companies and the University of Oxford, GSK identified needs for products related to the health impacts of climate change that include responses to asthma, anti-malarial medicines, and vaccines for viruses associated with diarrhea

Questions?

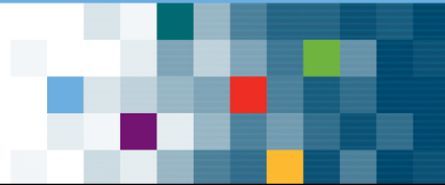
Contact

Blaine Early

859-226-2284 and bearly@stites.com

or Ken Gish

859-226-2293 and kgish@stites.com



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