



From Risk to Opportunity: Insurer Responses to Climate Change



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**EETD Seminar
LBNL, Berkeley, CA
March 20, 2008**





Climate Change is about Risk Management ...

Insurers are....

- messengers
- integrators
- risk assessors
- risk managers

but...

- vulnerable
- selective

and....

- part of the solution



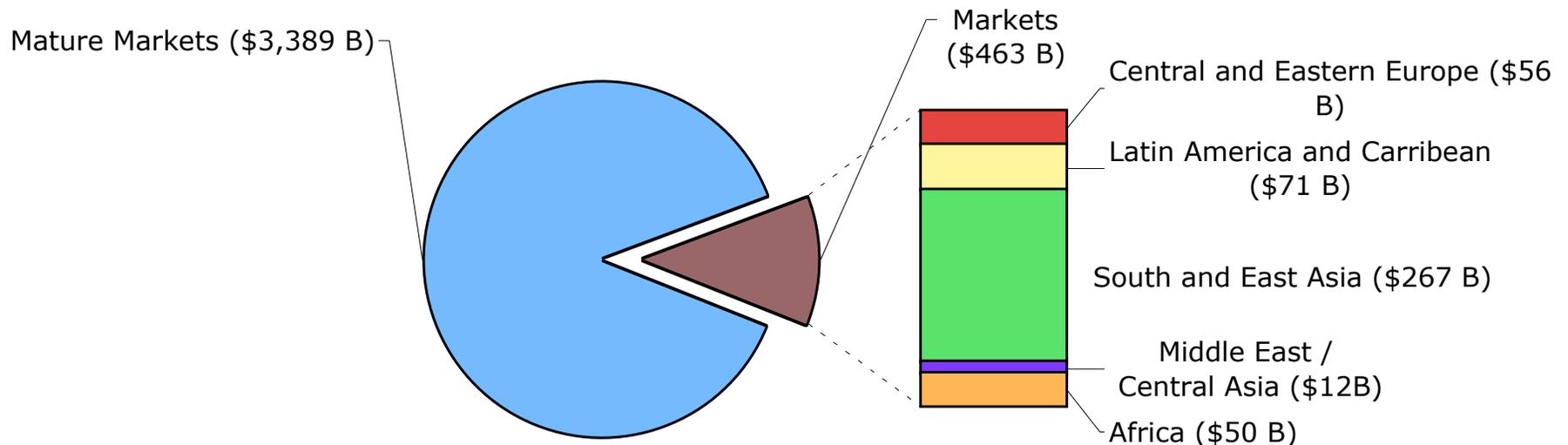
Relevance to the “Climate Community”

- Insurers are important *consumers* of climate research
- Interested in both mitigation & adaptation
- Through their core business, insurers have a significant footprint and influence in all sectors of the economy
- Insurers are major investors, including real estate
- Risk management has vastly more clout than do energy management
- Real or perceived adverse risk implications can scuttle an energy-efficiency project; benefits can be a boon!
- Collective efforts (e.g. with utilities or ESCOs) can yield farther reach, a richer offering, and cost-sharing

Insurance: World's Largest Industry

\$4 Trillion in 2006

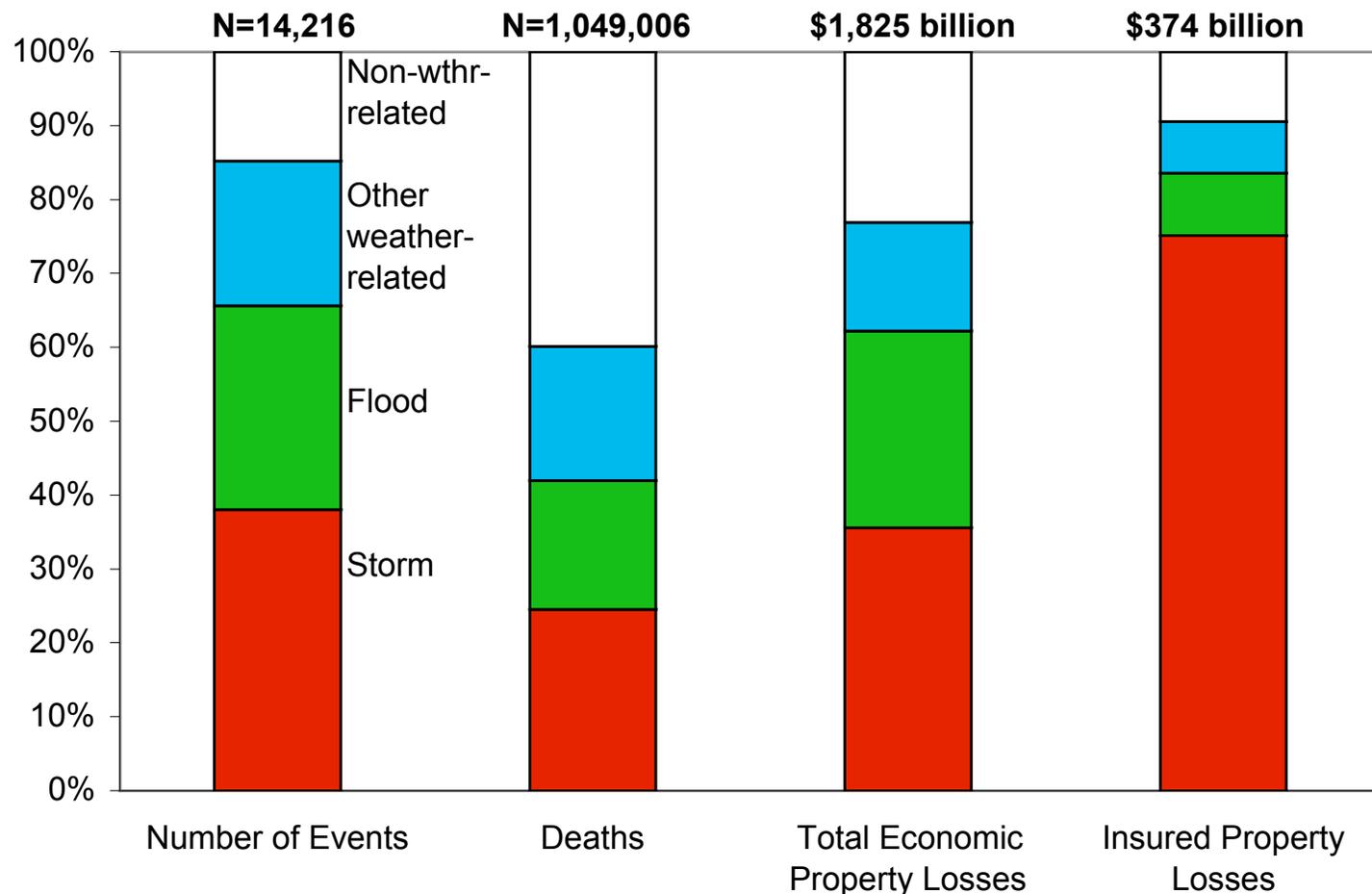
plus \$17 T in assets



And one of the most weather-sensitive sectors of the economy

Natural Disasters Through an Insurance “Lens”

Aggregate Global Impacts: 1980-2004

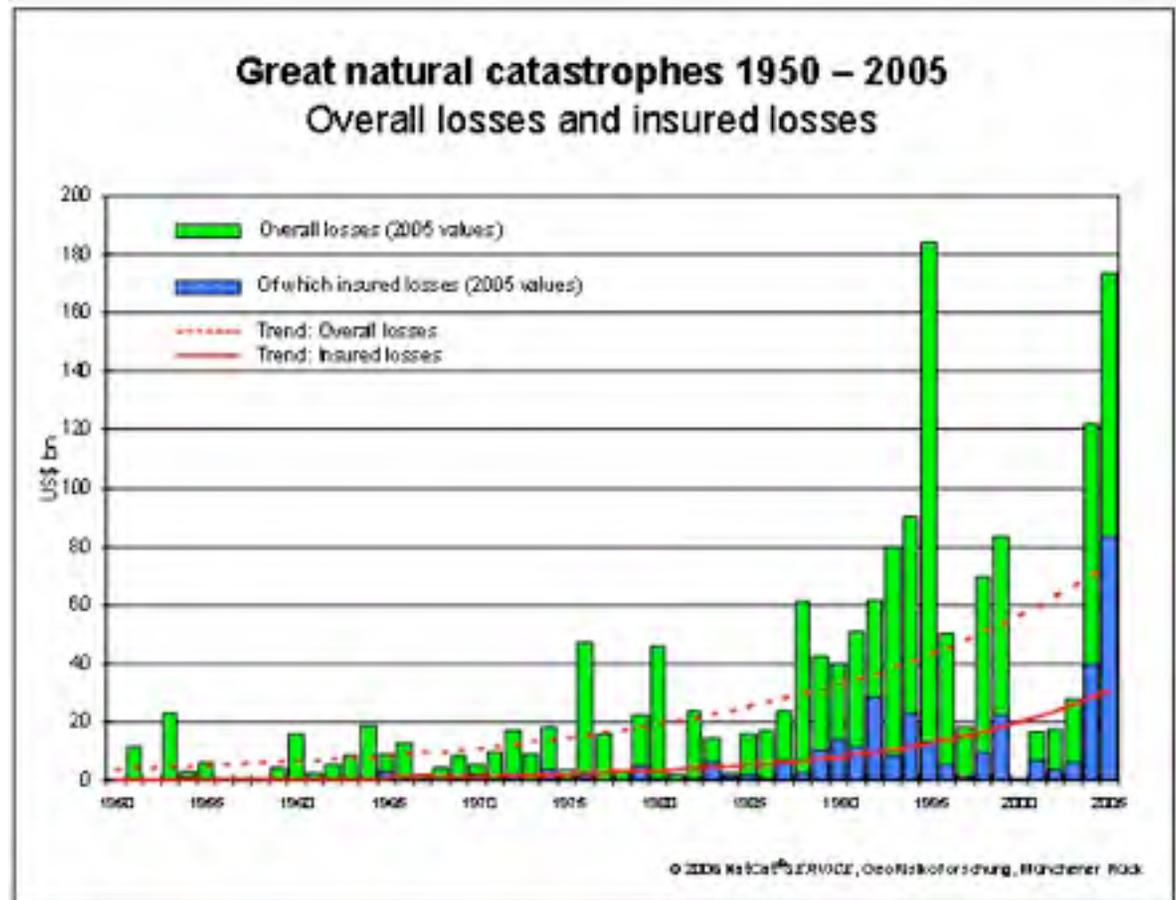


Source: E. Mills Science 309, 1040 -1044 (2005)

Loss Trends



- Demographics **plus** warming
- Trends *consistent* with observed change
- Non-weather losses growing more slowly
- Trend would be even steeper without prevention efforts



Anticipated Losses



Property

- Property damage
- Mold/moisture
- Forest products
- Agricultural losses
- Fisheries
- Business interruption
- Roadway



Life/Health

- Injury
- Infectious diseases
- Heat stress
- Respiratory
- Pollution release
- Food poisoning
- Mental health
- Nutrition/water



Liability (Casualty)

- Products
- Negligence
- Nuisance
- Fiduciary
- Tort / BI
- Environmental
- Roadway liability insurance

WWW.BESTNEWSMAG.COM

August 2007

BEST'S REVIEW

Monthly Insurance News Magazine

Insurers • Agents & Brokers • Reinsurers

D&O Heats Up

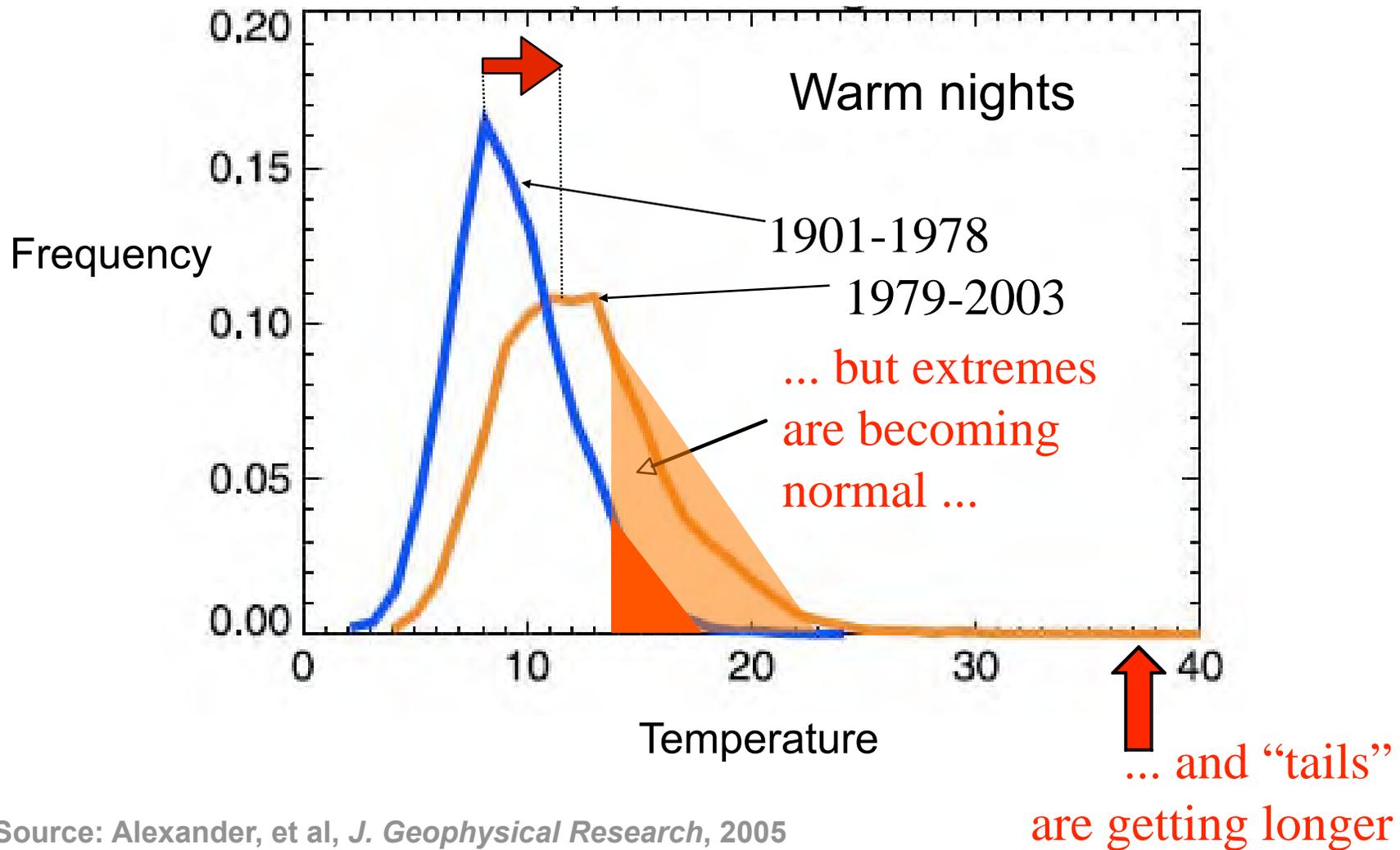
Climate change—a rapidly emerging insurance risk—has reached the world's boardrooms.

PAGE 24

A.M. Best's Exclusive Rankings:
Reinsurers, Reinsurance
Brokers—2006
[READ MORE](#)

Leading U.S. Property/Casualty
Writers by Line—2006
[READ MORE](#)

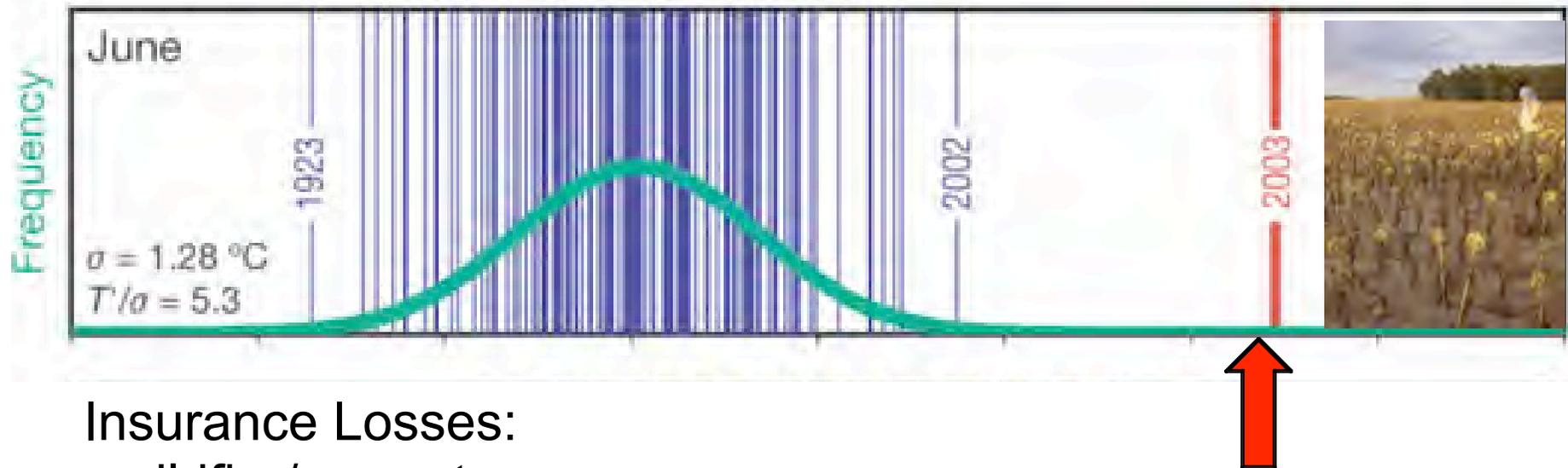
Extremes Shift *More* Than Avg's.



Source: Alexander, et al, *J. Geophysical Research*, 2005

Rare Extremes Cause Most of the Damages & Insured Losses

The European heat wave of Summer 2003



Insurance Losses:

- wildfire/property
- crop
- power sales
- health/mortality

Small-scale and Indirect Events & Consequences Often Overlooked

Greater combined impacts than CATs in an average year

Events

- Drought
- Hail
- Heat waves
- Ice Storms; float ice
- Insect infestations
- Lightning
- Sea-level rise
- Thunderstorms
- Tornados
- Torrential rains
- Wildfire
- Winterstorms

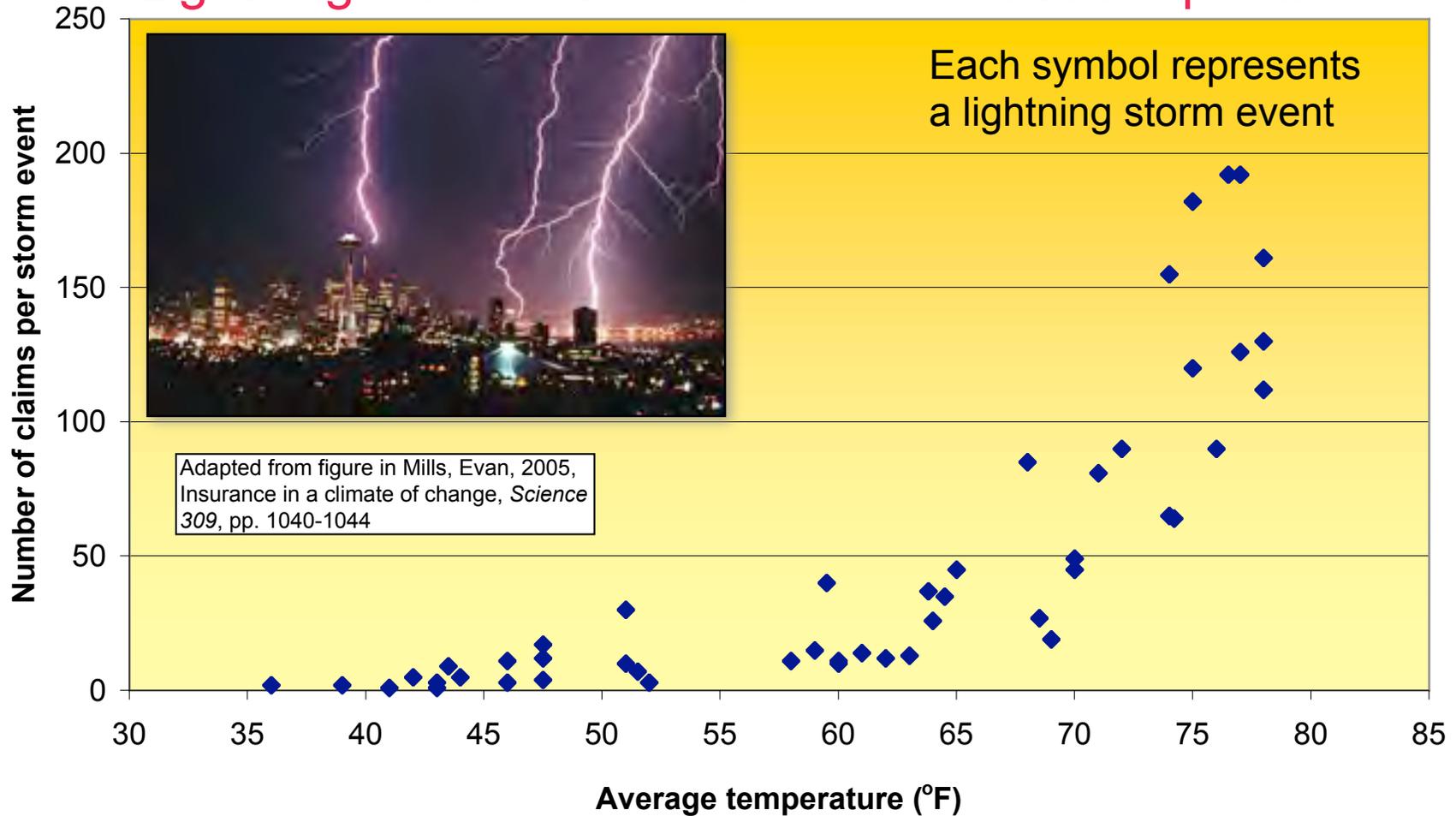
Consequences

- Blackouts
- Coastal erosion
- Crop/fishery damages
- Equipment breakdown
- Eroded air quality
- Eroded water quality
- Flooding
- Health impacts
- Mudslides
- Sinkholes/Subsidence
- Weather-related vehicle accidents



Temperature-Related Insurance Loss Experience

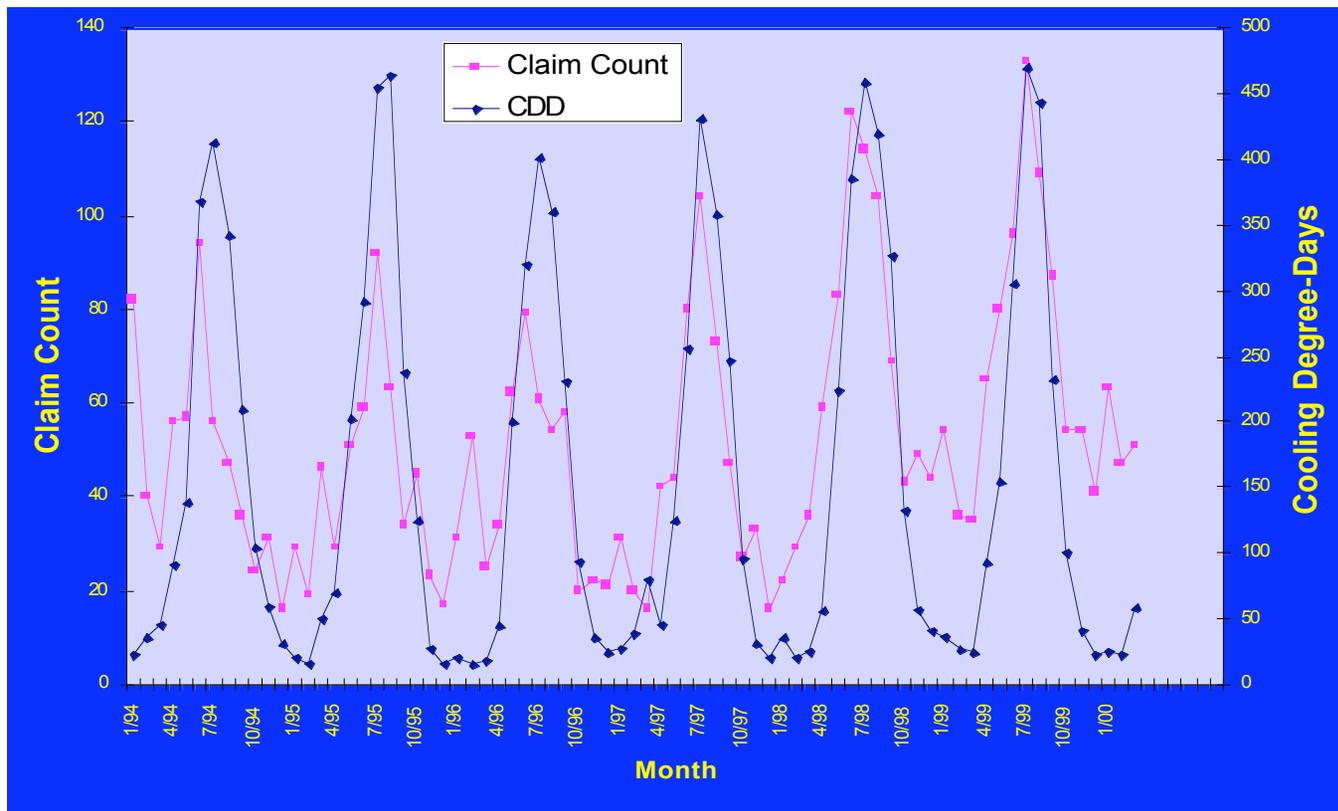
Lightning-related claims *accelerate* with temperature



Source: Hartford Steam Boiler Inspection and Insurance Co.

Temperature-Related Insurance Loss Experience

Air-conditioning breakdown claims increase with cooling degree days: 1994-1999



Source: Hartford Steam Boiler Inspection and Insurance Co, 2001

Risks Are Also Associated with Responses to Climate Change



- Green buildings
- Nuclear power
- Renewable energy
- Hydrogen
- Carbon capture & storage
- Carbon offsets/trading
- Geo-engineering
- Adaptation projects

Comparative risk assessments needed

Risks for Insurers

- Underwriting
- Operations
- Models
- Capital
- Investments
- Competition
- Shareholders
- Reputation
- Regulation
- Liability
- Contraction
- *Insurability*

“We'd be out of our minds if we wrote weather insurance on the opinion global warming would have no effect at all.”

Warren Buffett
2006 annual Shareholder meeting

Top Concerns: Survey of 139 Insurance Executives in 21 Countries

1	Too much regulation	12	Managing technology	23	Corporate governance
2	Natural catastrophes	13	Equity markets	24	Demographic trends
3	Management quality	14	Risk-management techniques	25	Contract wording
4	Climate change	15	Back office	26	Capital availability
5	Managing the cycle	16	Political shocks and pressures	27	Security of reinsurance
6	Distribution channels	17	Pricing new risks	28	Availability of reinsurance
7	Long-tail liabilities	18	Terrorism	29	Business continuation
8	Actuarial assumptions	19	Complex instruments	30	Fraud
9	Longevity assumptions	20	Retail-sales practices	31	Merger mania
10	New types of competitors	21	Pollution	32	Too little regulation
11	Investment performance	22	Interest rates	33	Asbestos

Source: Centre for the Study of Financial Information and PricewaterhouseCoopers survey: 2007

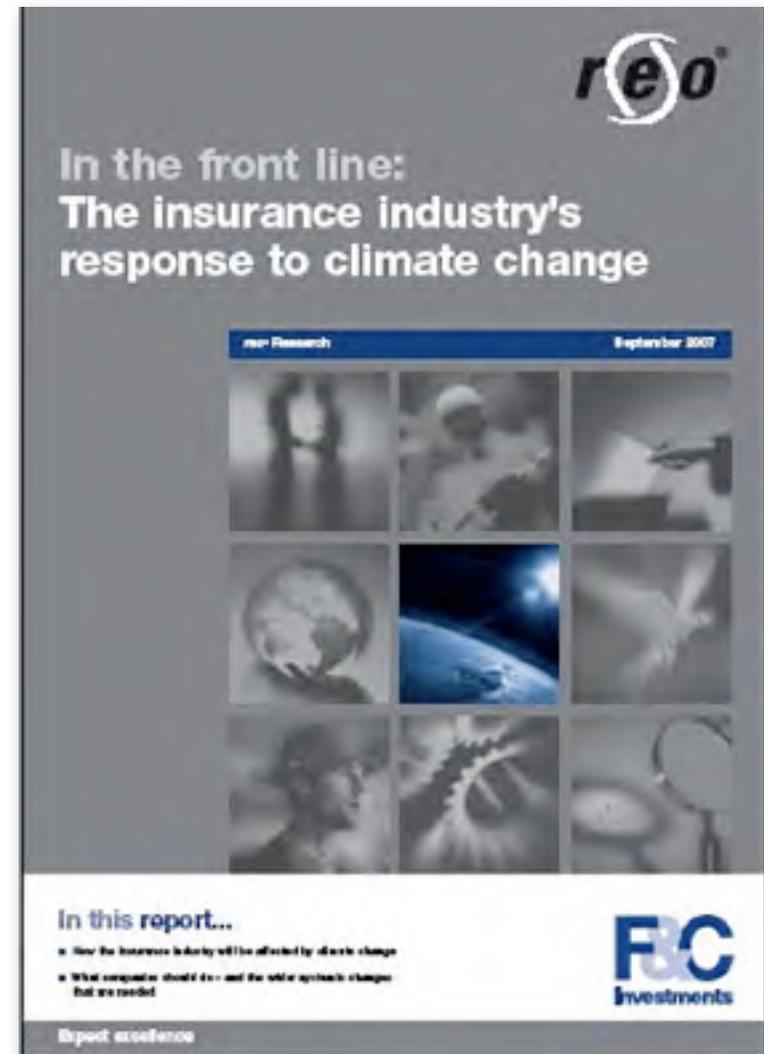
Top-10 Risks: Insurance Industry Analysts

(Ernst & Young Survey, March 2008)

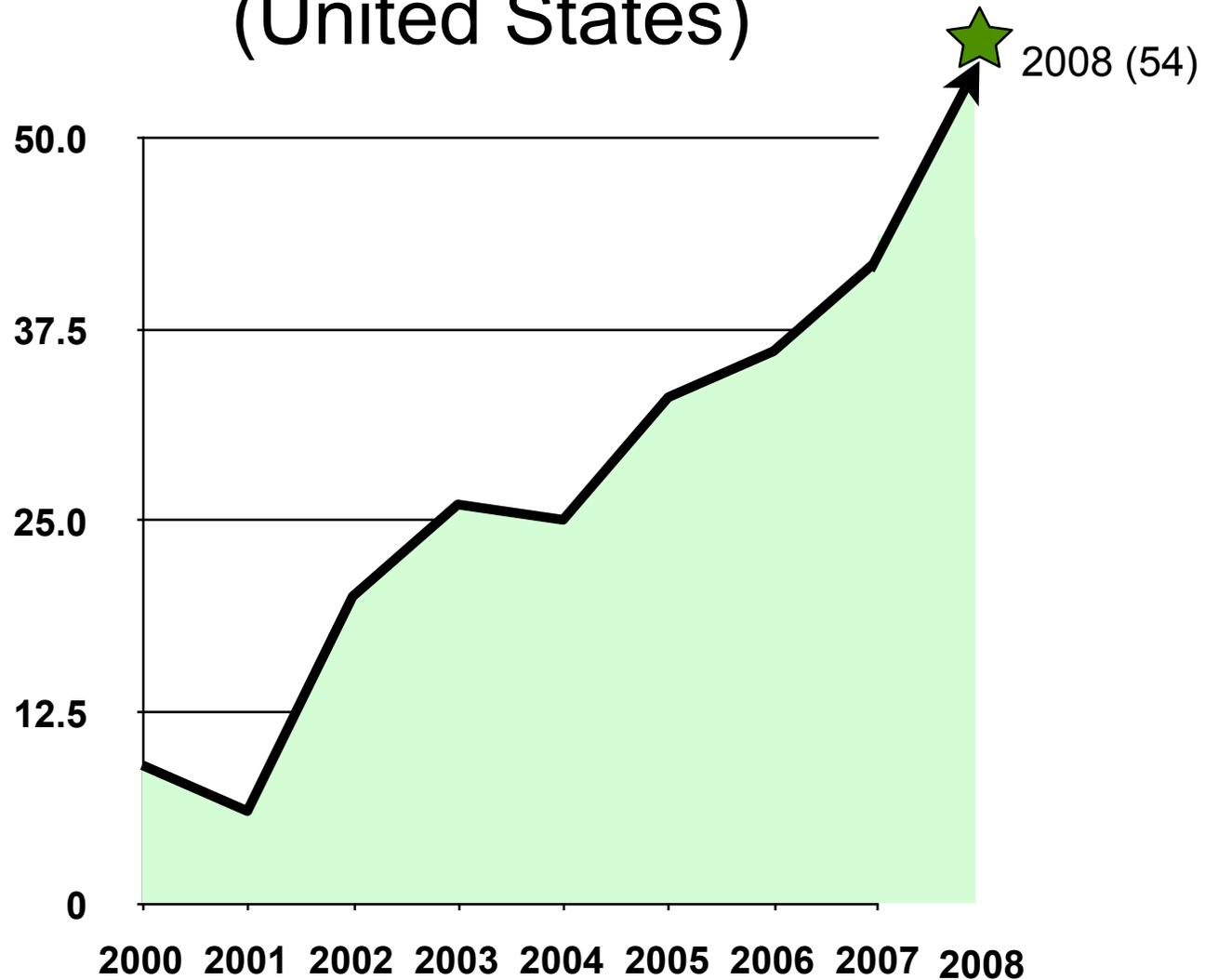
1. *Climate change*
2. **Demographic shifts in core markets**
3. **Catastrophic events**
4. **Emerging markets**
5. **Regulatory intervention**
6. **Channel distribution**
7. **Integration of technology with operations and strategy**
8. **Securities markets**
9. **Legal risk**
10. **Geopolitical or macro-economic shocks**

F&C Investments Statement: September 2007

- F&C is asset manager with \$200 billion under management
- Concerned about climate-sensitivity of their investments in insurers



Shareholder Resolutions Link Business Atmosphere to Climate Change Liability (United States)



2000-2006 Data: ISS 2007

2007 Data (as of 02.06.07): Ceres 2007& 2008

Insurance Regulators (via NAIC Taskforce) Recognize the Problem

“Global warming is upon us, and it poses unprecedented new threats to the insurance industry and vast segments of society that rely on insurance for peace of mind and financial security.”

Michael Kreidler
Washington Insurance Commissioner

Tim Wagner
Nebraska Insurance Commissioner

Energy Industry Responds

“Most scientists believe that greenhouse gas emissions from human activities are influencing the earth’s climate. Duke Energy shares that view.”

“... Congress needs to establish a national, economy-wide greenhouse gas mandatory program as soon as possible.”

Duke Energy (CEO Jim Rogers)
Corporate website as of March 2, 2008

EETD Activities

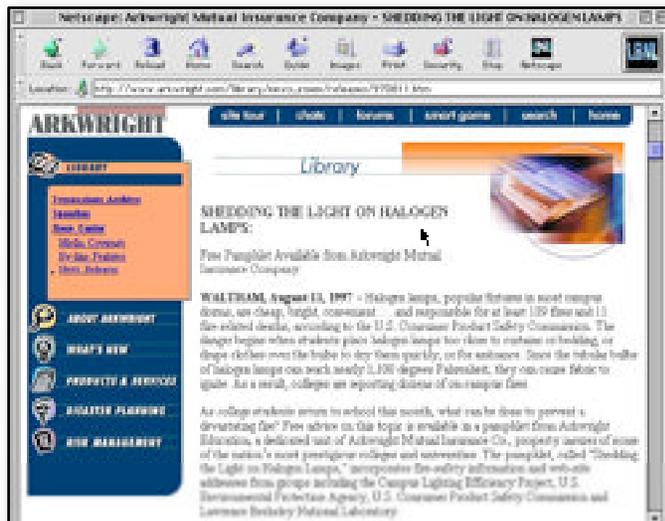
- Identifying insurer vulnerabilities
 - Property
 - Health: with P. Epstein (Harvard Medical School)
 - Liability: with Stanford, UCB, & UCLA Law Schools
 - Power outages: with J. Eto, et al (report for EPRI)
- Co-leadership of IPCC insurance chapter: with P. Vellinga (IVM, Netherlands)
- Insurance-relevant modeling
 - Wildfire: with M. Torn (ESD) and J. Fried (CDF)
 - Crop: with C. Rosenzweig (NASA-GIIS)
- Advising insurance regulators
- **Technology assessment (upside/downside)**
 - **EERE & IAQ: with E. Vine, and A. Chen (EETD)**
- **Cataloging “green” insurer activities**

Sponsors: DOE, EPA, AID, industry (in-kind)

Fire-Safe & Efficient Lighting

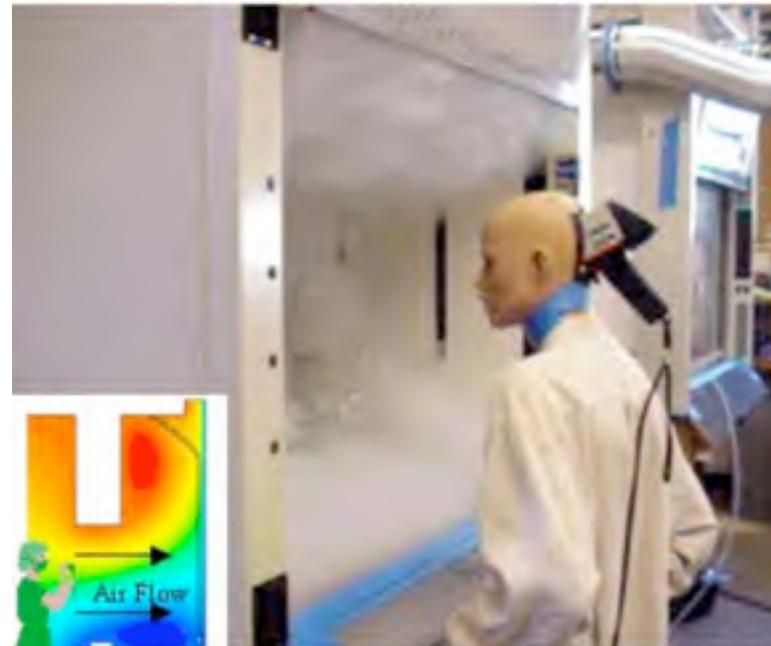
- **Arkwright Mutual (now part of FM Global):** replaced fire-hazardous halogen “torchieres” with compact fluorescent alternatives at Northeastern University student housing + seminars for risk managers

Collaboration with Boston Edison & LBNL



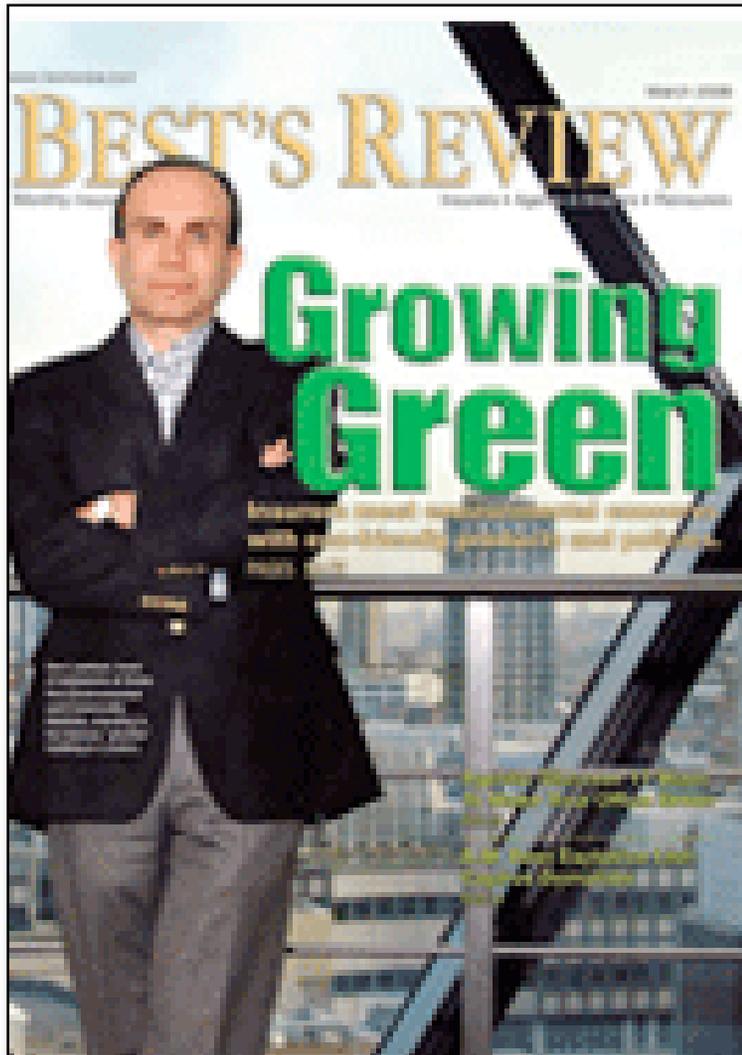
Safer & Energy-Efficient Laboratory Fume Hoods

- Fume hoods are intended to contain dangerous gases and particles, but do so poorly and with high energy use
- New design with low-velocity “air divider” *improves containment* with 75% energy savings.



Airflows in a standard hood.

Paradigm Shift



The image shows the cover of 'National Underwriter' magazine. The title is in large blue letters. The subtitle 'THE LEADER IN PROPERTY & CASUALTY NEWS' is at the bottom. The main headline is 'Insurers Brace For GLOBAL WARMING' in large, bold, orange and white letters. Below the headline is a photograph of a globe. To the left of the globe are several smaller headlines: 'TOP SCENARIOS OF THE WING: State Regulators, Legislators Close Ranks Against OFC', 'Cut Plus Stalls At NCOIL', 'EIN To Expand RRG Act Would Include Property Risks', and 'Battled The Party Proper?'. At the bottom right, there is a small inset with a portrait of a man and the text 'BACK TO THE FUTURE: Financial Products Face Little New Growth Since 2000'. The logo 'P&C' is in the top right corner.

“AIG sees opportunities to improve the environment, protect customers and reward shareholders by developing products and investing in technologies that can mitigate the risk and effect of climate change.”

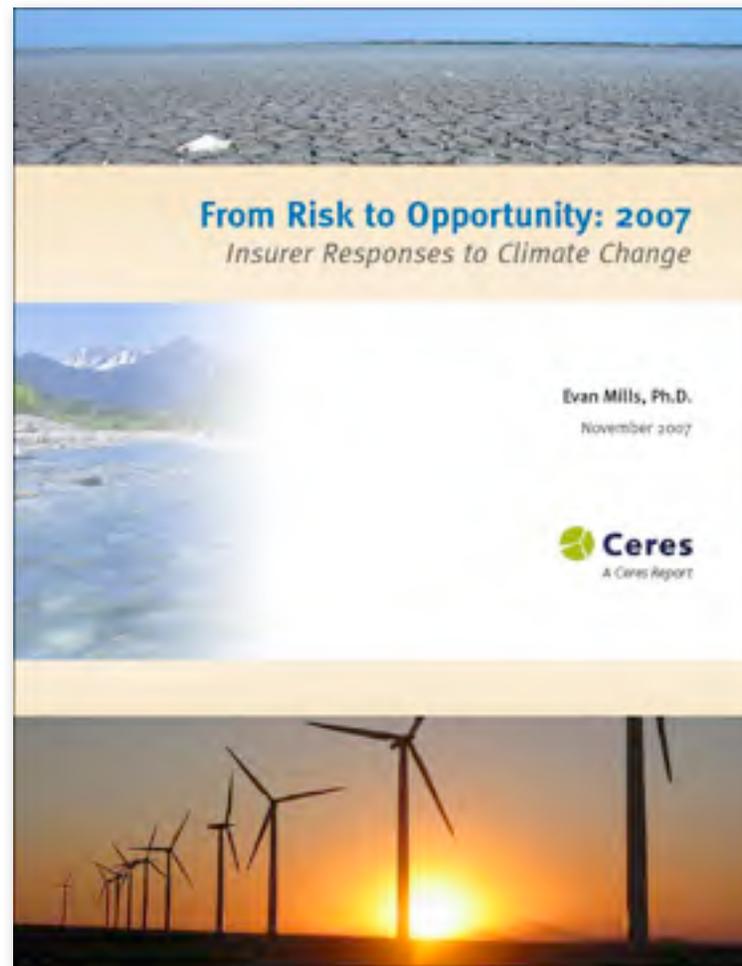
Martin Sullivan, CEO, AIG, 2007 Annual Letter to
Shareholders

Recent Invited Keynotes

AIG Energy Insurance Brokers Meeting
Black and Veatch Utility Executive Leadership Institute
Casualty Actuarial Society of North America
Connecticut Interlocal Risk Management Agency
Environmental Bankers Association
Fireman's Fund Insurance Company
Global Roundtable on Climate Change
International Association of Insurance Supervisors
Stanford School of Law
Mealey's Global Warming Litigation Conference
Munich Re - Presentation to Employees
National Association of Insurance Commissioners
Nationwide - Office of General Council Leadership Summit
New Jersey Governor's Climate Symposium
Swiss Re - Presentation to Employees
UC Berkeley School of Law
UCLA School of Law
UK Financial Services Authority
World Bank - Insurance Section

From Risk ... to Opportunity

**30 strategies; 422 examples;
~190 parties; 26 countries**



More Business!



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The fundamental strength to deliver customized insurance solutions.

XL is a leading provider of insurance solutions for businesses of all sizes. Our programs are designed to be flexible and scalable, allowing you to tailor coverage to your specific needs. For more information, please contact your XL broker.

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PROFESSIONAL
 Directors & Officers | Employment Practices Liability | Cyber Liability

SPECIALTY
 Aviation & Space | Entertainment | Marine | Boiler & Machinery | Construction

XL Insurance is a leading provider of insurance solutions for businesses of all sizes. Our programs are designed to be flexible and scalable, allowing you to tailor coverage to your specific needs. For more information, please contact your XL broker.

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New Insurer Business Units



“Office of Environment & Climate Change”;
“Advanced Energy Solutions”



“Climate Solutions”



“Agri-Fuels Group”



“Green Energy Team”



“Core Business Climate Change Project”



“Zurich -

Understanding the Climate Change Problem: Modeling

- *Modeling efforts underway:*

- *III*

- *AIG*

- *Lloyds*

- *Munich Re*

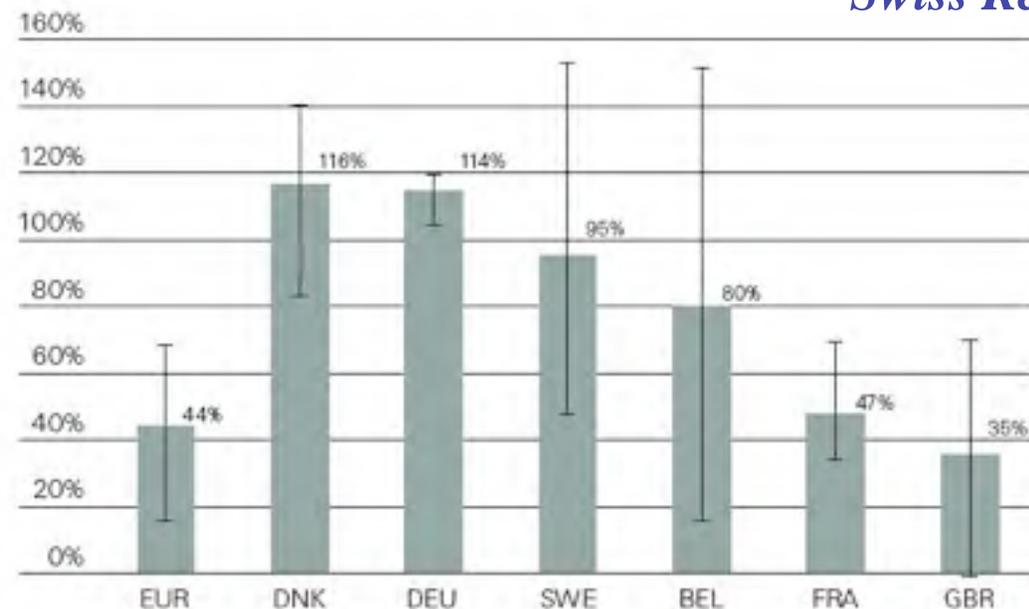
- *Swiss Re*

- *Willis*

- *RMS*

Expected increase in annual windstorm loss in Europe

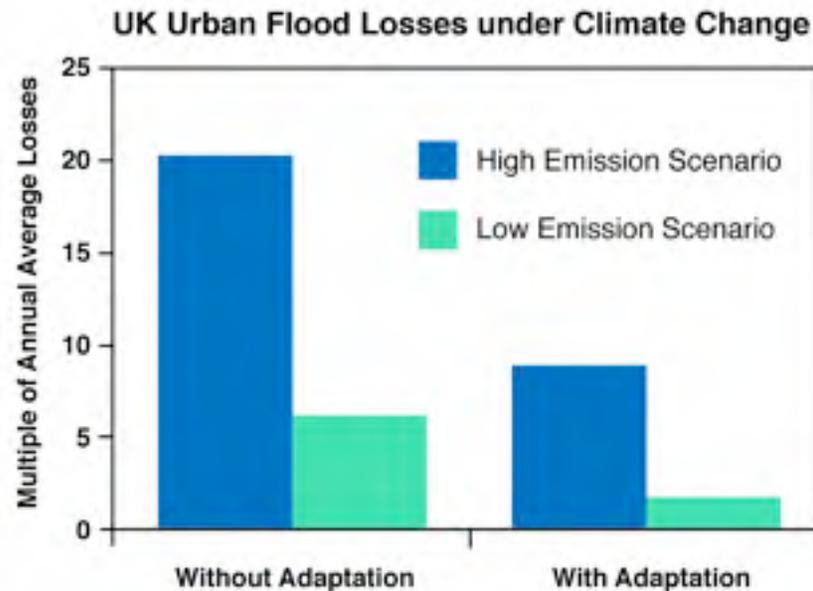
Swiss Re



Increase in annual expected loss for Europe (EUR), Denmark (DNK), Germany (DEU), Sweden (SWE), Belgium (BEL), France (FRA) and the UK (GBR) over the period 1975 to 2085 (in %). The broad bars represent the mean value of the climatic models, and the error bars show the spread of the results from all models

Understanding Climate Change: Land-use Planning

Association of British Insurers



CEA Report: 13 of 18 countries
have >10% penetration of
commercial flood insurance

Source: Modeling results for London. Adapted from Association of British Insurers, "Financial Risks of Climate Change" c: 2080s

Promoting Loss Prevention: Building Design

- *Institute for Business and Home Safety's* "Fortified... for safer living" stds.
 - Wind-resistant rigid foam panel walls and multi-glazed windows
 - Ice-dam resistant
 - Mold resistant
 - Water-resistant insulation



BASF Home - Patterson NJ

Some insurers giving premium credits for compliant homes

Promoting Loss Prevention: Wetlands Restoration

- ***Tokio Marine Nichido***: has reforested 12,200 acres of mangroves in Indonesia, Thailand, Philippines, Myanmar and Vietnam



Company states that 2005 Tsunami did less damage in these areas

Source: <http://www.tokiomarine-nichido.co.jp/english/index.html>

Aligning Terms & Conditions with Risk-reducing Behavior

- Insurance discounts of up to 40%

- **GMAC**
 - **Progressive**
 - **Norwich Union**
 - **Polis Direct**
 - **Rheinland**
 - **Versicherungen**
 - **Aioi**
 - **Axa**
 - **Hollard**
 - **Gerling**
 - **Unigard**
 - **Sompo and Tokio Marine & Nichido**
- 250,000 policies in Europe as of 2007; \$700M revenues projected by 2010



General Motors Acceptance Corporation (GMAC) PAYD discount schedule.

Miles/year	Discount offered
1 – 2,500 miles	40%
2,501 – 5,000	33%
5,001 – 7,500	28%
7,501 – 10,000	20%
10,001 – 12,500	11%
12,501 – 15,000	5%
15,001 – 99,999	0%

Some use GPS --> stolen-vehicle recovery; avoids reporting fraud

Aligning Terms & Conditions with Risk-reducing Behavior

- **Travelers, Farmers, Berkshire/GEICO, AXA, and Cooperative:** offer 5-10% premium discounts to drivers of hybrids
- **Swiss Re:** seeking D&O disclosure from insureds



■ Goes beyond fossil fuels.
And fossil insurance policies.

It's just like the rest of the world, we're moving forward thinking. At Travelers, we're always looking for ways to help you and your business. We've always been there for you, and now we're here to help you go further. From the latest in hybrid and electric vehicles to the latest in hybrid and electric insurance policies, we're always looking for ways to help you and your business. We're always looking for ways to help you and your business. We're always looking for ways to help you and your business.

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Win-Win Solutions

- ***Arkwright Mutual (now part of FM Global):*** replaced fire-hazardous halogen “torchieres” with compact fluorescent alternatives at Northeastern University student housing + seminars for risk managers

Collaboration with Boston Edison and LBNL



Innovative Products

- **Fireman's Fund:** first-ever U.S. *commercial* "Green-Buildings Insurance"
 - 5% premium credits for existing green features
 - Rebuild to LEED after loss
 - ~500 policies sold in first year (2007)
 - Premiums > \$35M in '07; Doubling quarterly
- **AIG (Lexington):** Commercial, and first-ever U.S. *residential* "Green-Buildings" insurance being launched this year
 - Rebuilding to LEED (or next-higher LEED level) after loss; LEED design and registration fees
 - Rewards use of EnergyStar-labeled equipment
 - Low-emission materials; IAQ testing
 - Solar "revenue loss" if downtime
- **AIG Environmental:** Sustain-a-Build *environmental liability* premium credit for green commercial buildings



Coverage for Under-served Market Segments

- ***Lockton Risk Services:***
 - group liability coverage for home energy auditors, if members of RESNET



Source: <http://www.locktonaffinity.com/RESNET/>

Coverage for Under-served Market Segments

- **Swiss Re:** Drought/Crop micro-insurance for 400,000 farmers in Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania and Uganda.



Innovative Products

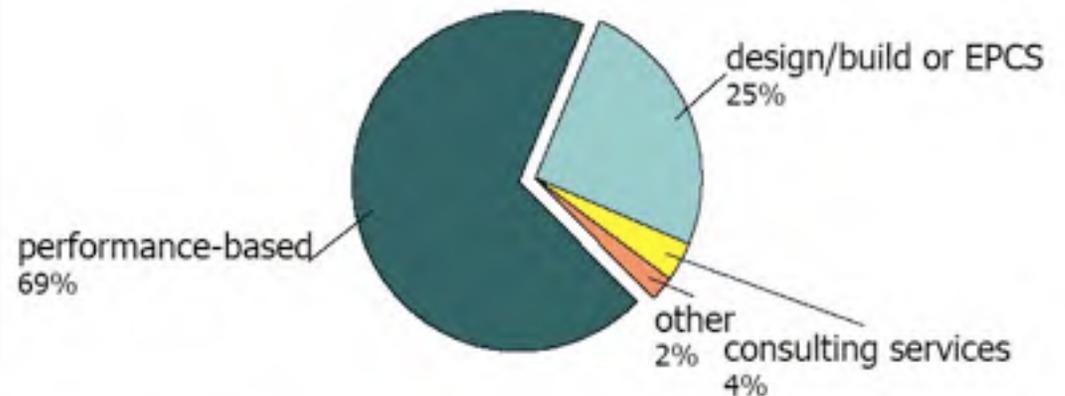
- **Energy Production:**
*Munich Re - geothermal,
Sompo - wind, others....*



- **Demand reduction:**
*AIG, Zurich and
others...*



U.S. ESCO Revenues
by Project Type: 2006



Innovative Products

- **Allianz, AXA, Cooperative:**
Car and travel insurance bundled with carbon offsets

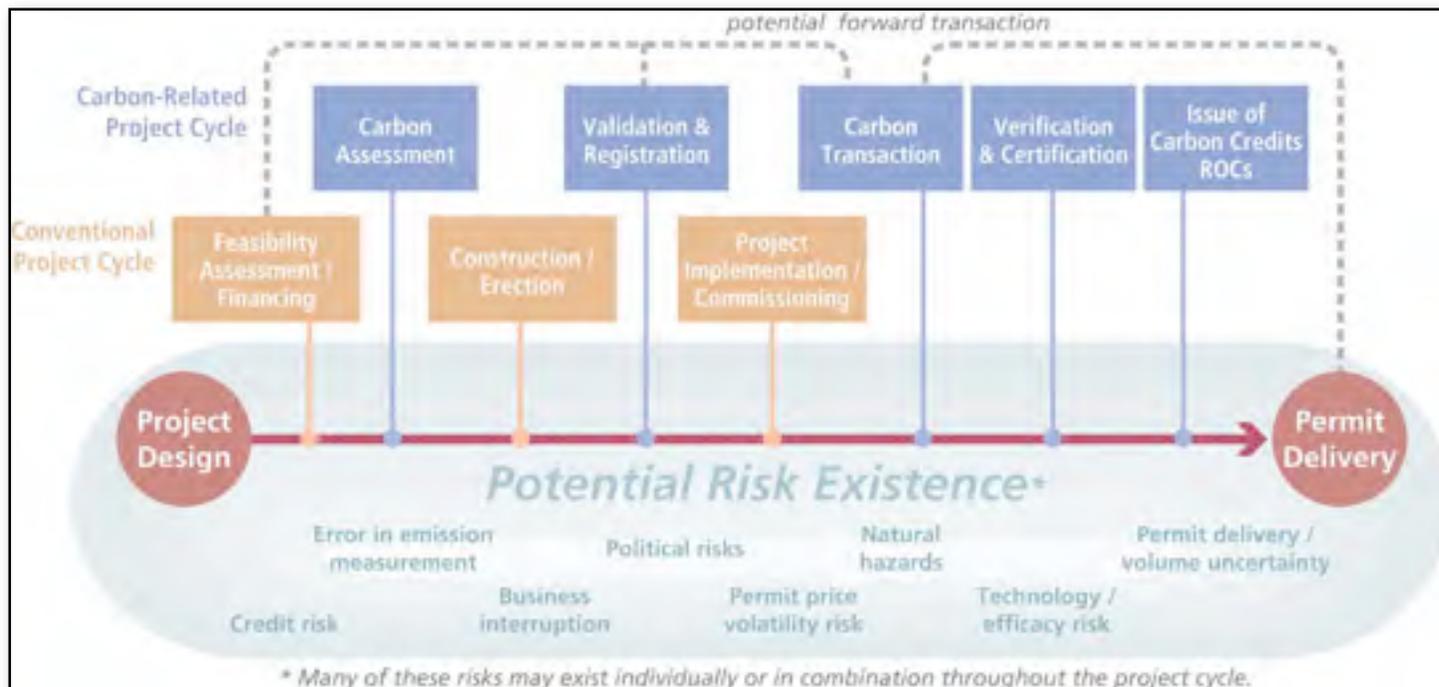
The screenshot shows the CIS Cooperative Insurance website. The header includes the CIS logo and the tagline "For insurance, savings, investments and pensions". A navigation bar features "My Portfolio" and "Get A Quote" with a dropdown menu set to "Motor Insurance". The main content area is titled "ecoinsurance" and features a graphic of a car made of green plants. Below the graphic, the text reads: "Offset 20% of your car's CO₂ emissions*" and "ecoinsurance is the UK's first car insurance policy to help offset some of the damage your car's CO₂ emissions cause to the environment."

The screenshot shows the climatepartner website. The header includes the climatepartner logo and the tagline "insured & insured team". The main content area is titled "great insurance cover" and lists several benefits: "Full car and travel insurance", "Full car and travel insurance".

The image shows an award certificate from Allianz. The text reads: "Allianz CO₂-neutral und effizient awarded rate: 749 g CO₂/km 2008 In Kooperation mit dem WWF". The WWF logo is visible in the bottom right corner.

Carbon Risk-Management Services: Project Risk

- ***AIG, Marsh, others:*** offering carbon project risk-management consulting services; insurance



Source: Marsh. 2004. "Responding to Climate Change Risks and Opportunities."

Carbon Project Risk Management

Solomon Associates Greenhouse Gas Services



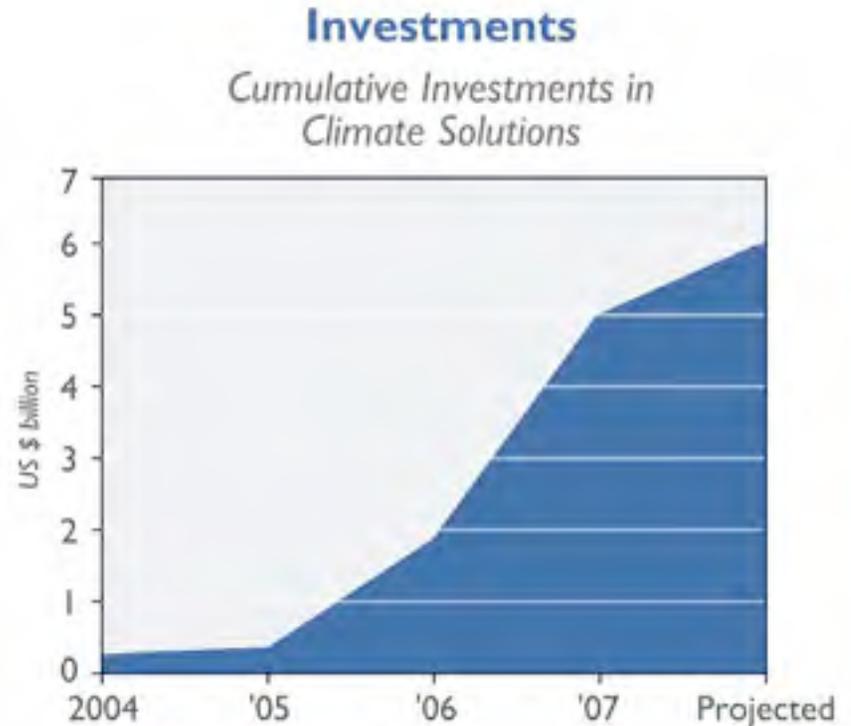
Financing Emissions-reduction Projects

- **AIG:** \$300 million lending facility for efficiency and clean energy
- **Fortis:**
 - Preferential lending rate for energy-efficiency upgrades +10% premium discount
 - \$106 million “Green Bank” loans
- **HSBC:** \$45 million for wind projects in India
- **Mitsui Sumitomo:** Loans for building-integrated solar systems



Direct Investment

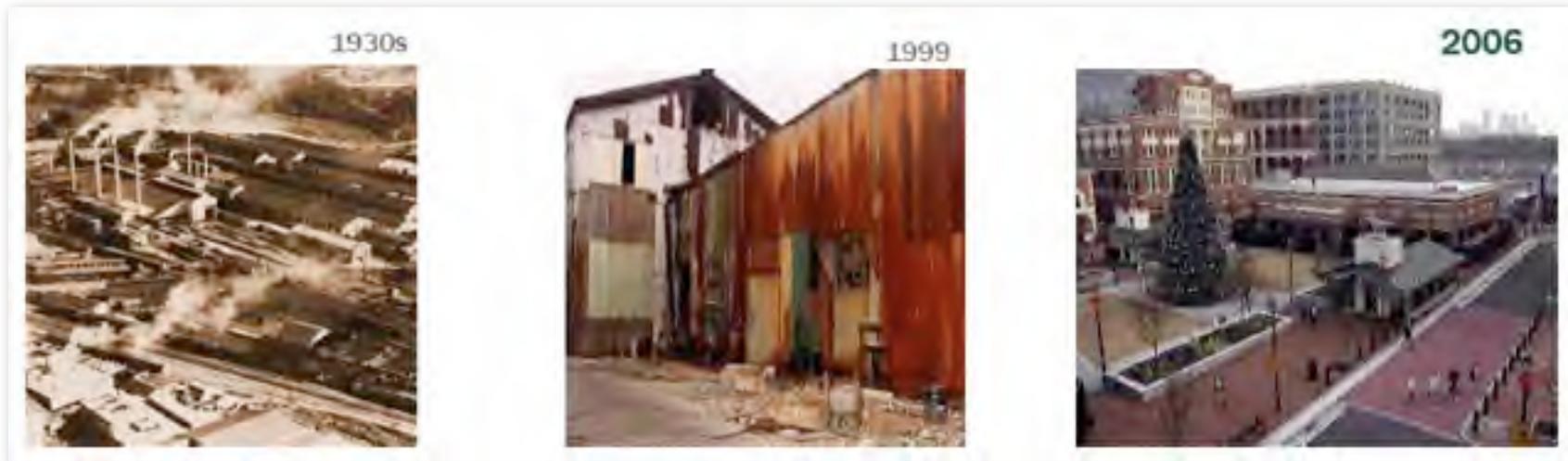
- **Allianz:** \$15 million in the European Carbon Fund; plans to invest between \$400 and \$650 million in renewable energy
- **Gerling:** Sustainable Development Project operates a \$100 million venture capital fund
- **ING:** Green finance - \$1.16 billion
- **Sompo Japan:** \$100 million green fund
- **Swiss Re:** \$429 million “clean energy” venture fund; \$320 million in individual investments



2008 CERA study predicts \$7 trillion investment in “clean-energy technologies”.

Investment in Solutions

- **AIG:** Atlantic Station
 - Brownfields redevelopment
 - 8 million square feet LEED registered



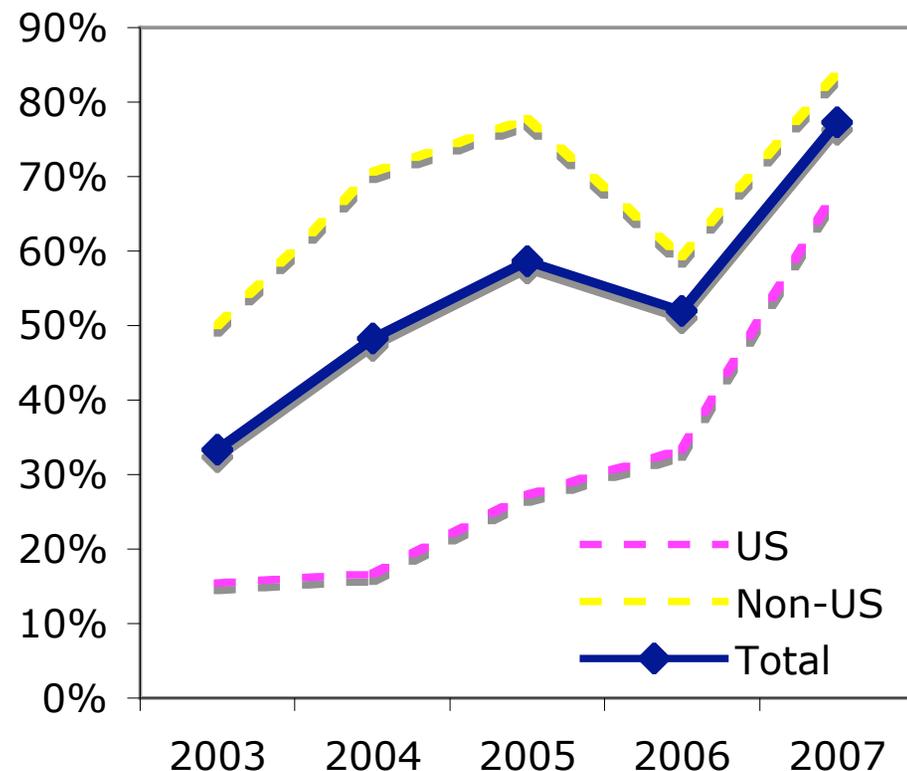
Among institutional investors, U.S. life insurers hold 22% of all commercial real estate

Carbon Risk Disclosure

Carbon Disclosure Project: Annual Global Survey by Institutional Investors (\$41 Trillion under management)

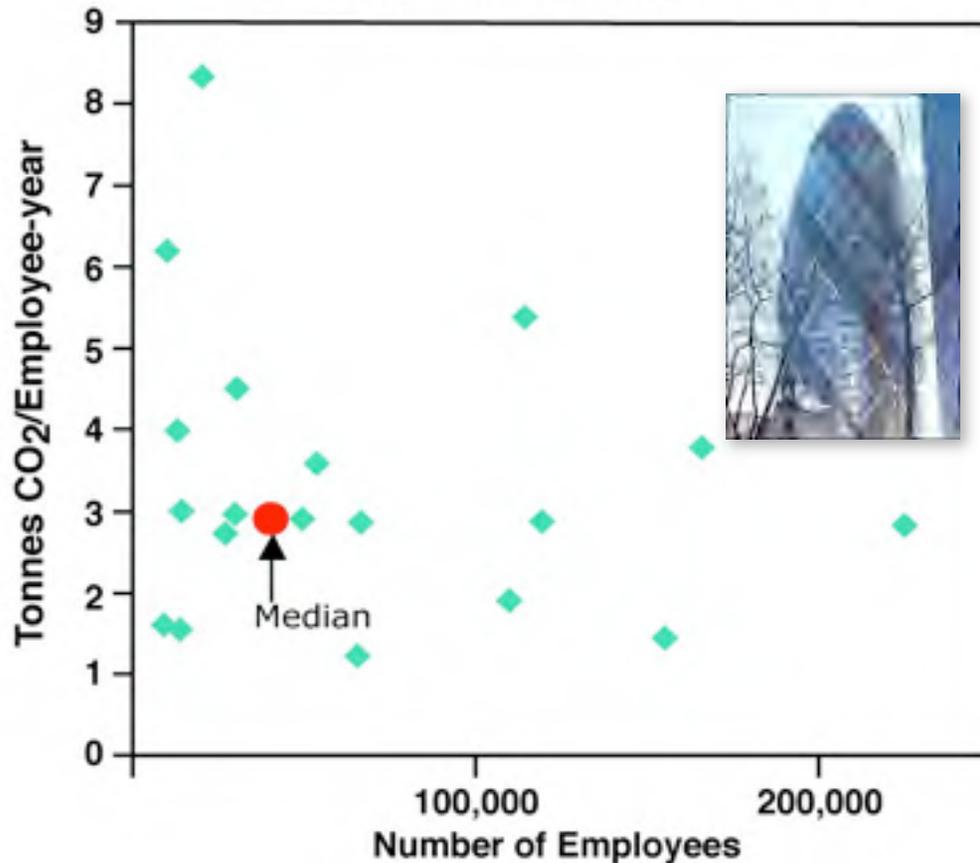
113 Insurer responses:
2003-2007 - *AIG, Allstate, Aon, Chubb, Marsh, MBIA, Safeco, St. Paul Travelers, Unum Provident, Munich Re, others...*

Carbon Disclosure Project Full Response Rates over Time

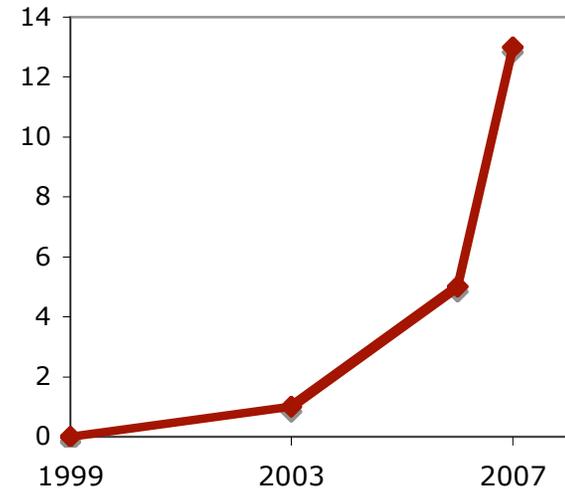


Leading by Example

Insurer CO₂ Emissions Intensity
(20 companies reporting to CDP5)



Insurers with Carbon-Neutral Goals



Carbon Neutrality

- *Rutherford* (US)
- *Munich Re* (DE)
- *Insurance Australia Group* (AU)
- *Folksam* (SE)
- *Aviva* (UK)
- *Royal Sun Alliance* (UK)

Swiss Re gives up to \$5k to employees for carbon-reductions in their homes

Building Awareness & Participation in Public Policy

- ***American Insurance Association:*** endorses public transportation; reduced speed limits; telecommuting based on win-win benefits to insurers
- ***Insurance Institute for Highway Safety:*** supports tightened CAFE standards
- ***Firemen's Fund, IBHS, ICLR:*** have endorsed energy-efficient building codes





"We are committed to a pathway that will slow, stop and reverse the growth of U.S. emissions while expanding the U.S. economy."

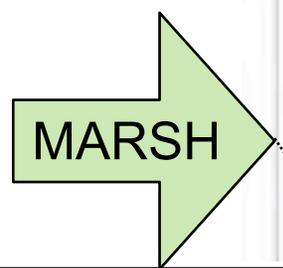
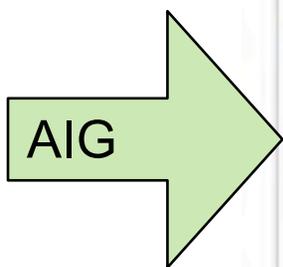
- Home
- About Us
- Policy Statements
- FAQs
- Newsroom
- Background Materials

Welcome to the U.S. Climate Action Partnership (USCAP) Web Site

United States Climate Action Partnership (USCAP) is a group of businesses and leading environmental organizations that have come together to call on the federal government to quickly enact strong national legislation to require significant reductions of greenhouse gas emissions. USCAP has issued a landmark set of principles and recommendations to underscore the urgent need for a policy framework on climate change. [More >](#)

USCAP Members Include:

- Alcan Inc.
- Alcoa
- American International Group, Inc. (AIG)
- Boston Scientific Corporation
- BP America Inc.
- Caterpillar Inc.
- Chrysler LLC
- ConocoPhillips
- Deere & Company
- The Dow Chemical Company
- Duke Energy
- DuPont
- Environmental Defense
- Exelon Corporation
- Ford Motor Company
- FPL Group, Inc.
- General Electric
- General Motors Corp.
- Johnson & Johnson
- Marsh, Inc.



Our Report: A Call for Action

Our solutions-based report, titled [A Call for Action](#) (PDF- 1.18 MB), is the result of a year-long collaboration. It lays out a blueprint for a mandatory economy-wide, market-driven approach to climate protection.



Our Six Principles

- 1 Account for the global dimensions of climate change;
- 2 Create incentives for technology innovation;
- 3 Be environmentally effective;
- 4 Create economic opportunity and advantage;
- 5 Be fair to sectors disproportionately impacted; and
- 6 Reward early action.

What's New

January 8, 2008 - [Top Five Socially Responsible Investing News Stories of 2007 - SocialFunds.com](#) reports that USCAP was a key catalyst in the business community in pushing climate change to the forefront in 2007.

January 2, 2008 - [Top Corporate Social Responsibility News of 2007 - CSRWire](#) reports about USCAP's role as a leader in the business community on this issue.

December 10, 2007 - [USCAP Event at UN Climate Change Conference in Bali](#) (53- 943 KB)

October 23, 2007 - [U.S. Climate Action Partnership](#)

Opportunities for LBNL

- R&D and tech-transfer partnerships (emerging technology risks & opportunities)
- Modeling & vulnerability assessment
- Insurance program design & facilitation
- Program evaluation
- Convener



“When the winds of change blow,
some build walls ... others build
windmills.” - *Chinese Proverb*



<http://insurance.lbl.gov>
emills@lbl.gov