

From Risk to Opportunity: How Insurers Can Proactively and Profitably Manage Climate Change

Presented to Munich Re



May 15, 2007

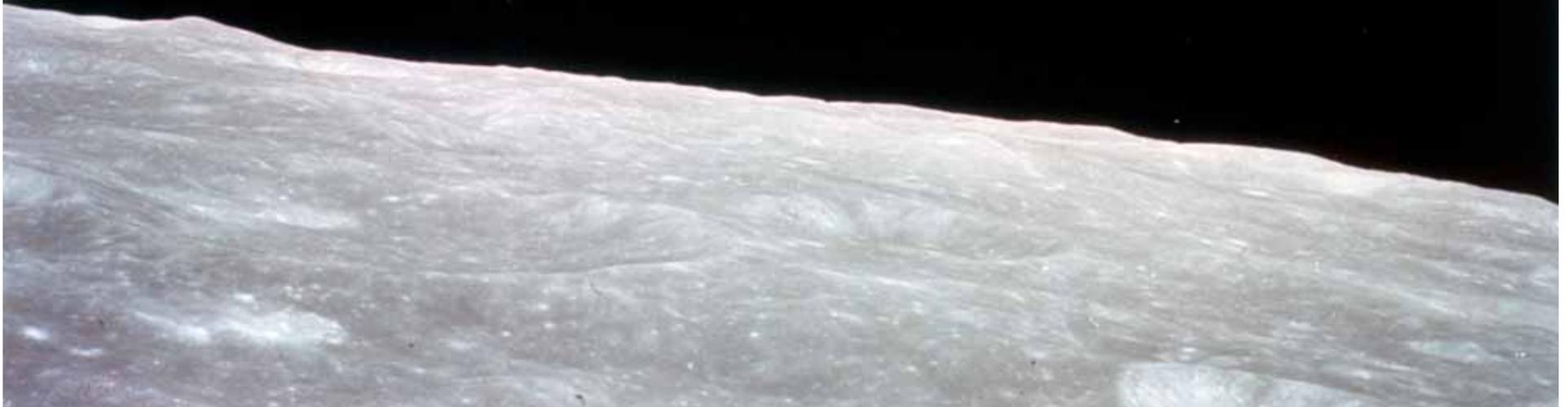
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Staff Scientist

University of California

U.S. Department of Energy

Lawrence Berkeley National Laboratory







From Thunder to Underwriting

Natural Phenomenon

(e.g. temperature increase)

Variability/Uncertainty

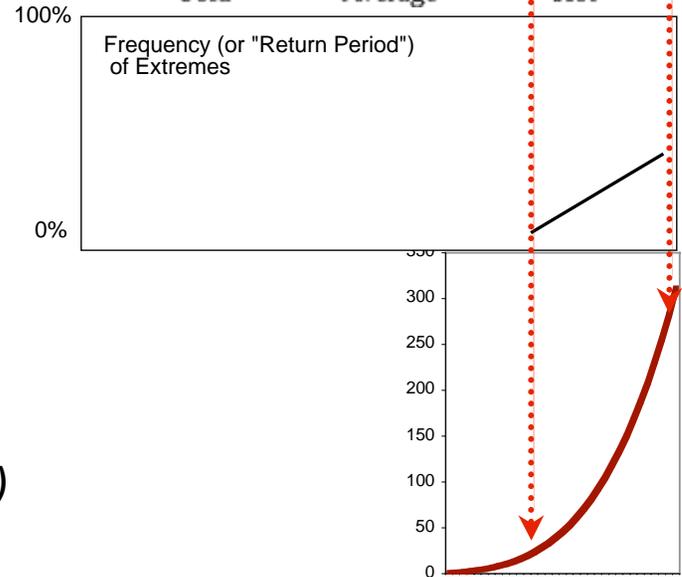
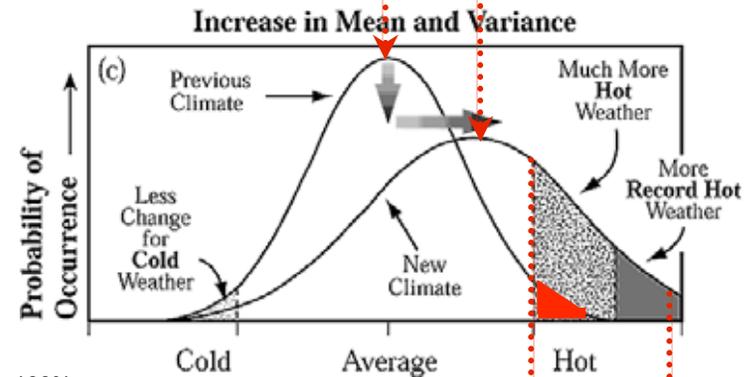
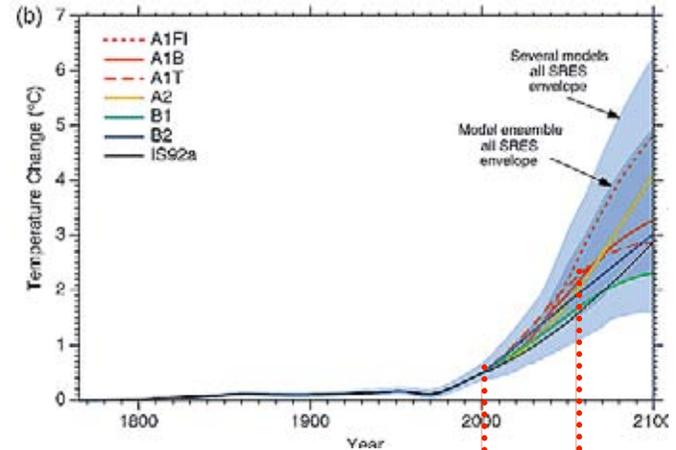
(e.g. temperature extremes)

Change in Likelihood of Extremes

(e.g. return period of heat waves)

Impact / Insured Loss

(e.g. loss of life; business interruption, etc.)



Insurance-relevant Consequences



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

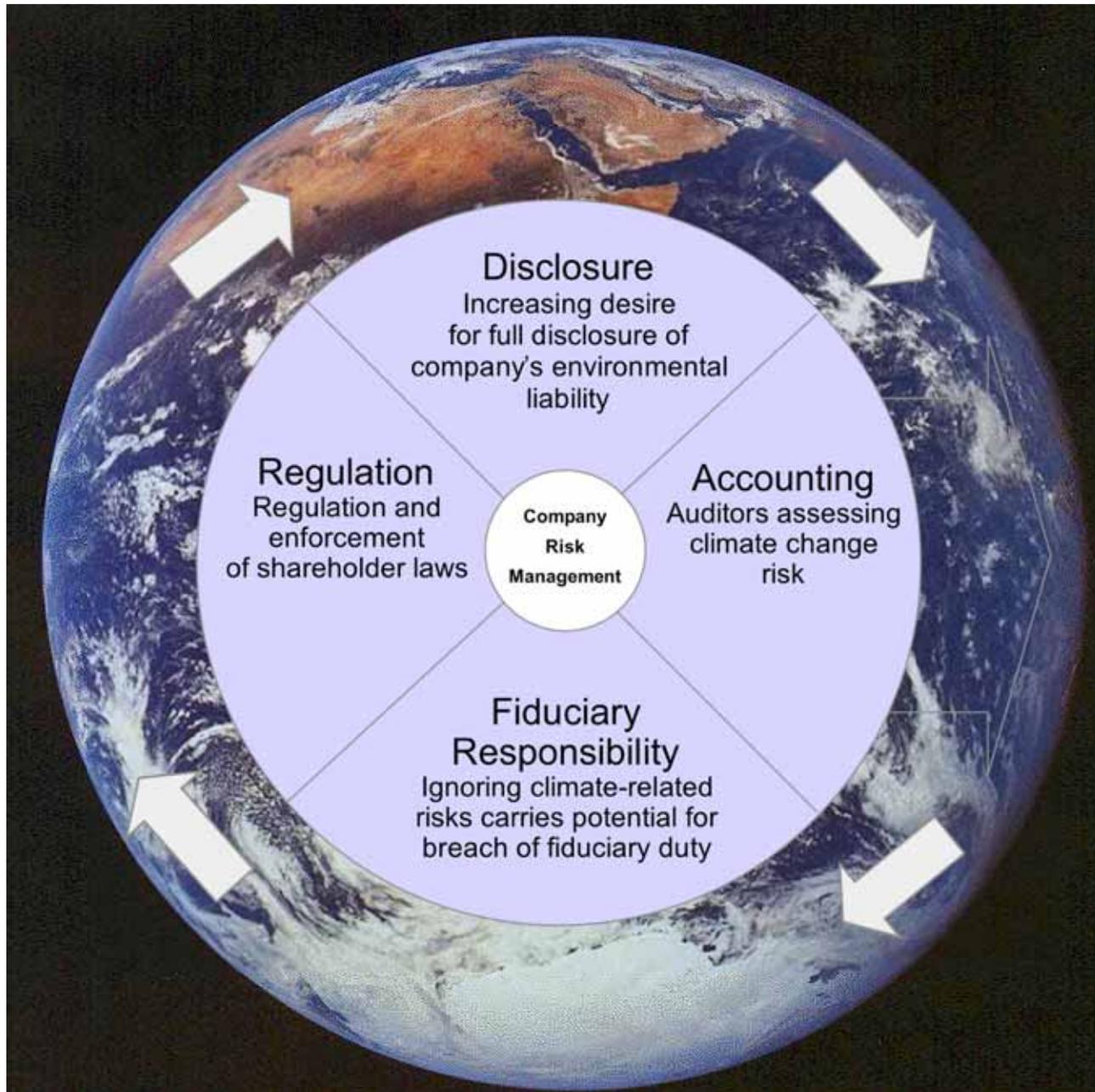


- Injury
- Infectious disease
- Heat stress
- Respiratory
- Pollutant releases
- Food poisoning
- Mental health
- Nutrition/water



- General
- Product
- Environmental
- Professional
- Political Risk
- Roadway

The Changing (Business) Climate



Business Valuation

- Negative impacts on company value, reputation & brand caused by ignoring climate change

Shareholder & Institutional Investor Demands for Action

Shifting Regulatory Environment

- Energy prices
- Carbon caps, etc.
- Corporate governance
- Compliance cost

Insurers: Reasons for Concern

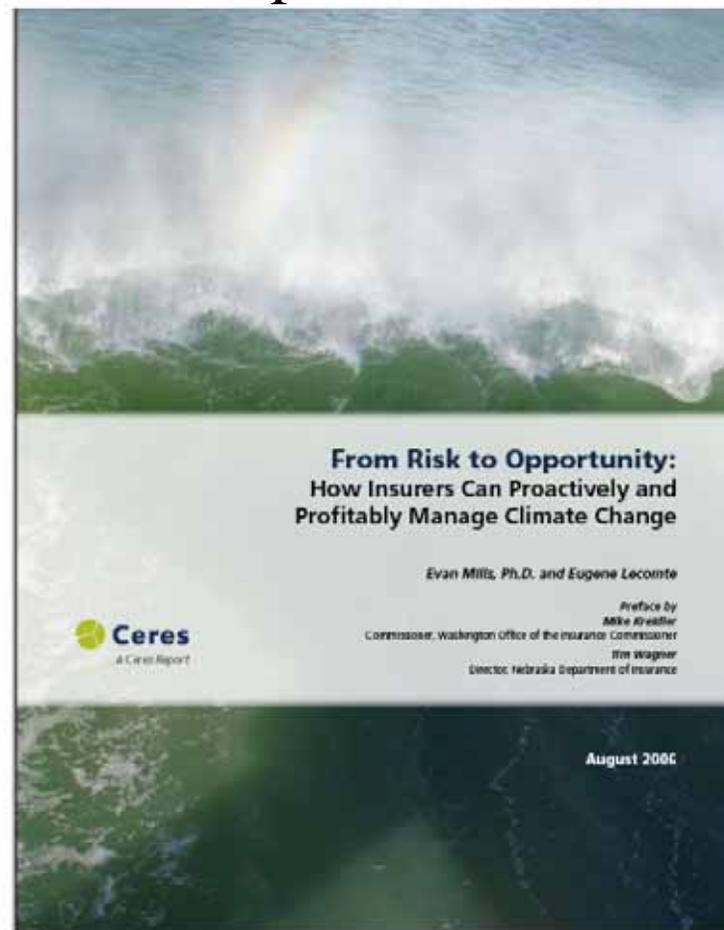
- Actuarial - losses in all lines (core business)
 - increased variability
 - unexpected correlation
 - affordability/availability
 - potential for abrupt change
 - CAT model deficiencies
 - difficult to function post-loss
 - data “blind-spots”
- Contraction
- Competitive risk
- Regulatory risk
- Reputation risk
- Own liability
- Assets & share prices are weather-sensitive; Ratings
- Macroeconomic downturn

From Risk ... to Opportunity

“The insurance sector has a key role to play in helping to mitigate the effects of climate change ... and by developing new products and solutions that can support emerging greenhouse-gas and renewable energy markets.”

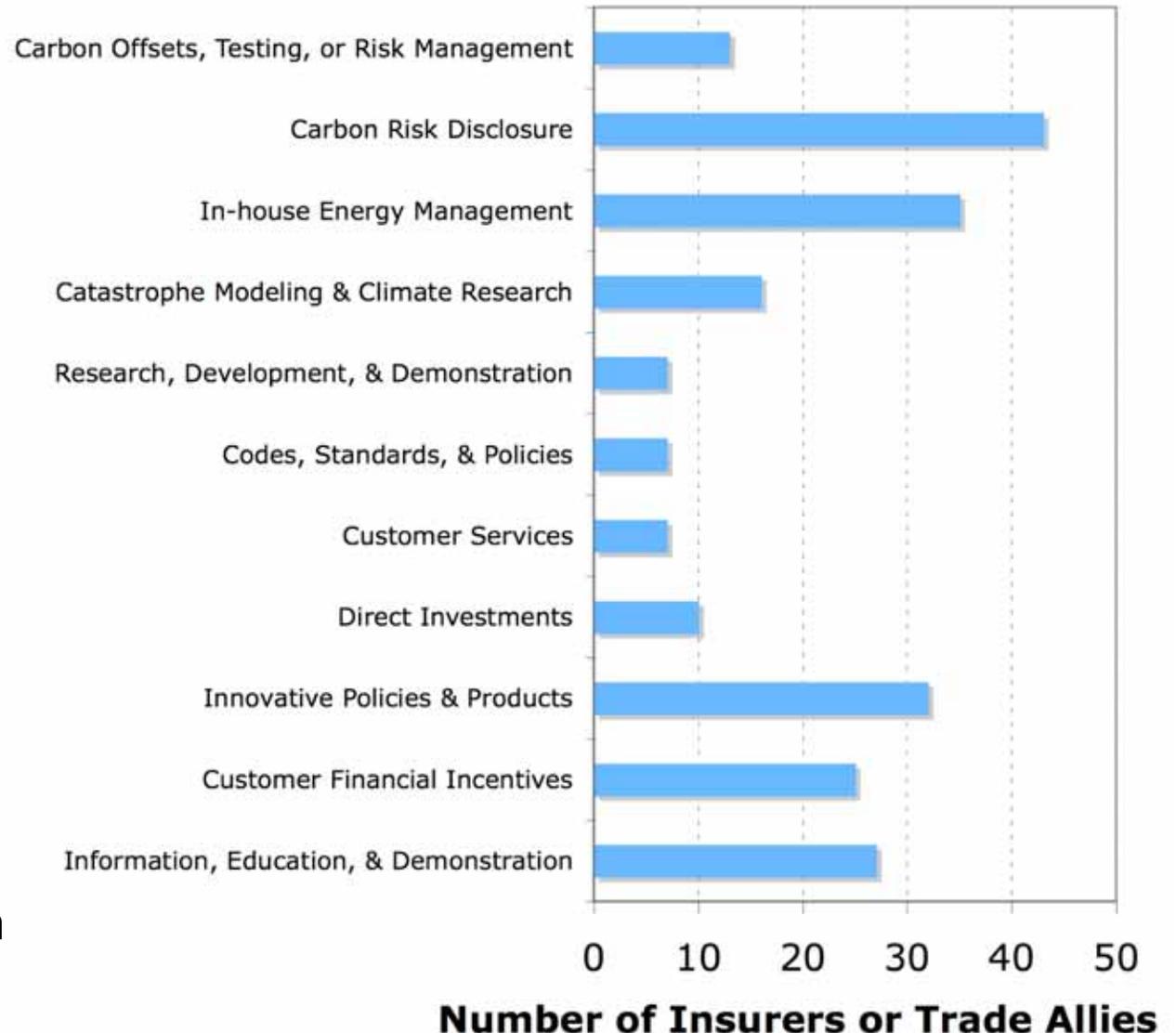
- Marsh & McLennan

Report: 25 strategies;
~225 examples; ~130 insurers

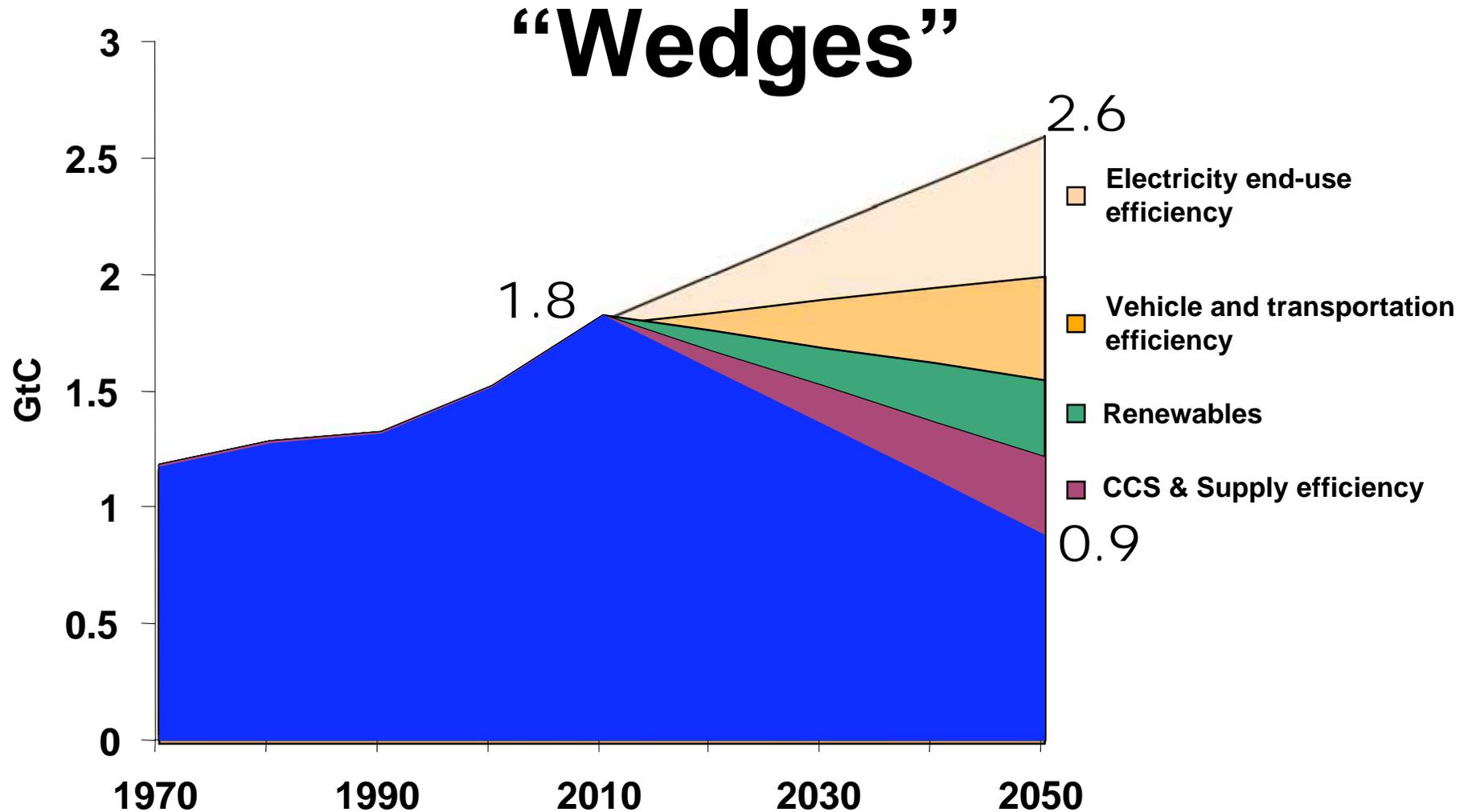


Range of Activities

- Australia
- Belgium
- Canada
- Switzerland
- China
- Germany
- France
- Italy
- Israel
- Japan
- Netherlands
- Norway
- South Africa
- Sweden
- Taiwan
- United Kingdom
- United States

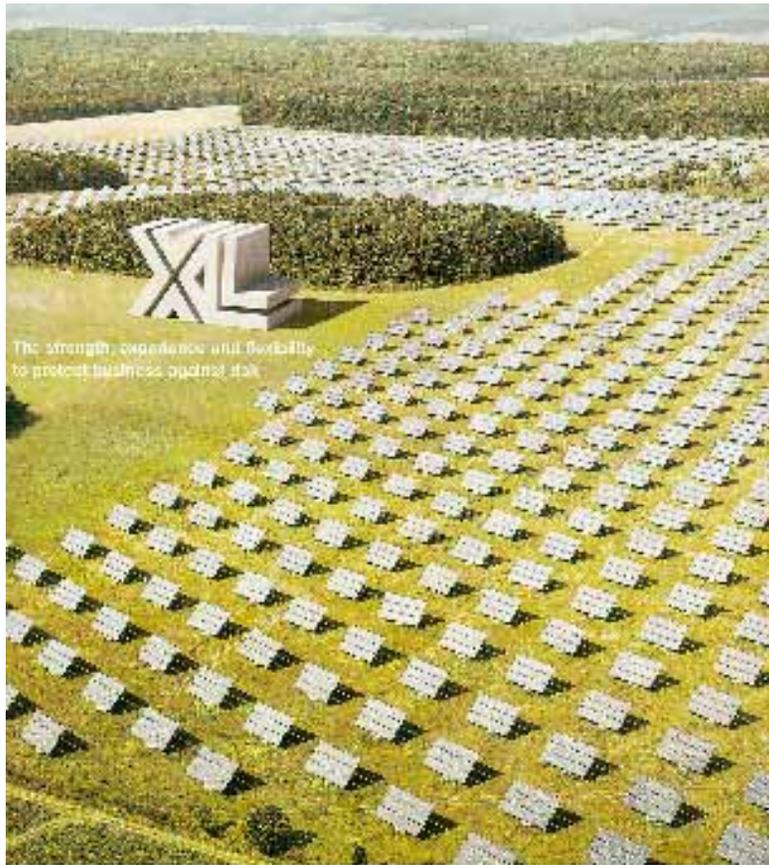


Cutting U.S. Emissions in Half with Climate-Stabilization “Wedges”



After Pacala and Socolow (*Science*)

More Business!



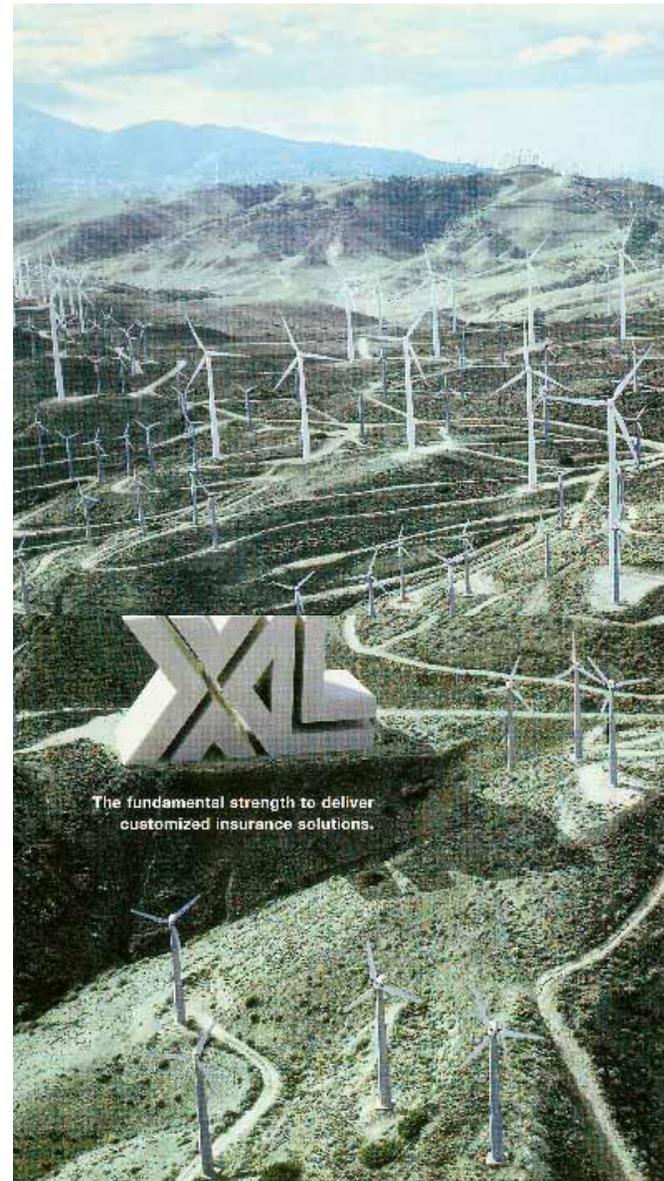
The strength, experience and flexibility to protect business against risk.

PROPERTY | CASUALTY | PROFESSIONAL | SECURITY

The XL Insurance Companies are there when you need them most. We help you with everything from a standard policy to a custom-tailored solution. We provide the right coverage for your business, your industry and your location. We're here to help you protect your business against risk.

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The fundamental strength to deliver customized insurance solutions.

THE XL INSURANCE COMPANIES are chosen by the world's leading firms not only for the strength of our capital and the depth of our experience, but also for the quality and variety of our products.

PROPERTY

General All Risk | Property | Damage & Business Interruption | Energy & Construction All Risk | Fine Art | Clean Technology

CASUALTY

Professional Liability | Global Public & Products Liability | Automobile Liability | Directors & Officers Liability

PROFESSIONAL

Directors & Officers | Employment Practices Liability | Errors & Omissions

SPECIALTY

Aviation & Space | Environmental Liability | Marine | Marine & Marine Cargo | Programs

people providing tailored solutions and services to meet your individual insurance requirements. If you expect more, visit www.xlinsurance.com or call us toll-free: 800-608-2510.

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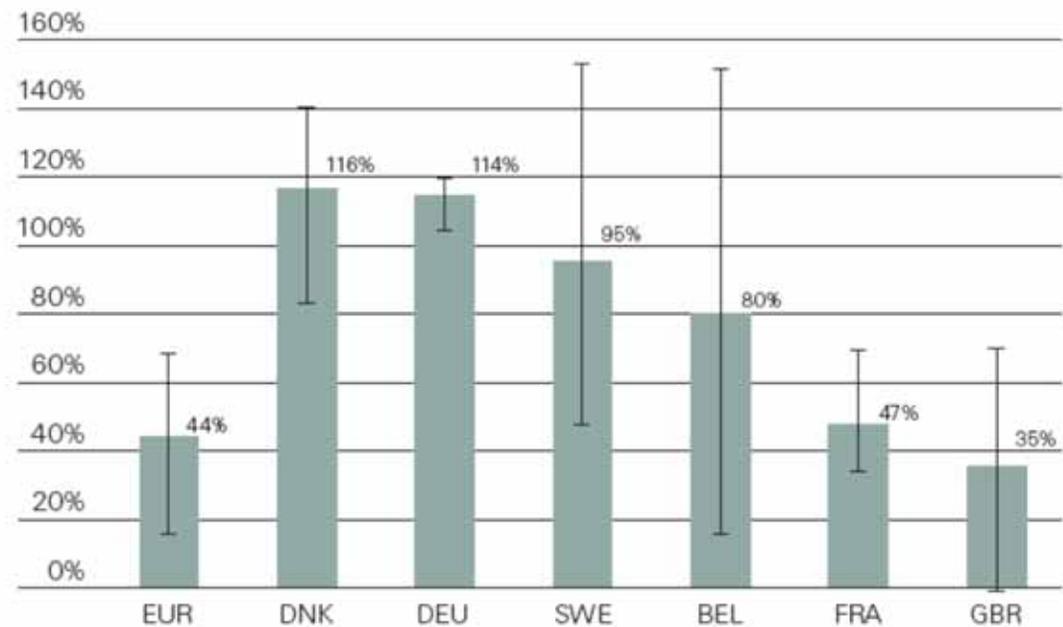


Modeling Losses

Catastrophe Modeling & Climate Research for Risk Management

- *Efforts underway:*
 - *AIG*
 - *Lloyds*
 - *Munich Re*
 - *Swiss Re*
 - *Willis*
 - *RMS*

Expected increase in annual loss in Europe



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

Promoting Loss Prevention

Traditional Risk Management

- Meets *Institute for Business and Home Safety*: “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



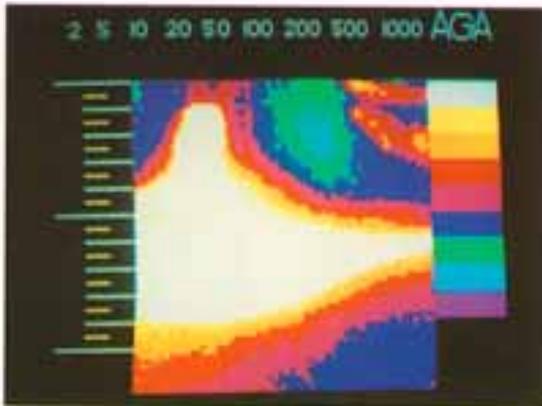
Some insurers are giving premium credits....

Integrating Energy Management & Risk Management

Munich Re Brochure circa 1995 on Infrared Cameras

3 Thermographic inspections in the construction trade and water installations

Insulation faults, heat build-up, and excessive moisture in masonry and roof structures can be identified by means of a special application and this can contribute to energy savings.



Thermogram of a leak in a warm water pipe laid in the floor.

Leakages in heating installations, water systems, and sanitary installations can be located quickly and accurately.

● A leak in the warm water system in the sanitary area of a commercial firm would have necessitated opening up large areas of the floor in order to find the leak if had not been for thermography. An infrared in-



Leak after opening up the floor.

spection showed up the leak as a "warm spot" in a bend. All that had to be done was open up a floor slab measuring 60 by 60 cm in order to gain access to the place where the water was coming out and repair the leak.

This example shows that once leaks have been located using thermography, pinpointed repairs can be carried out, thus avoiding the high cost of tearing open and replacing expensive floor coverings.

4 Closing remarks

Thermography can be used to draw the thermal profile of technical objects while they are in service. Proper analysis of the data gathered in the inspection reveals thermal faults before they can cause a loss. Infrared thermography should therefore be viewed both by insurers and by their clients as a valuable part of the toolkit for non-destructive loss prevention.

Energy-Efficiency --> Fire Safety

- *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



Better Management of Forestry, Agriculture, and Wetlands

- ***Tokio Marine & Nichido:*** reforested 7,500 acres of mangroves in Indonesia, Thailand, Philippines, Myanmar and Vietnam. 5,000 more in progress



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

“Rebuilding Right” Following Losses

- ***Fireman’s Fund***: first-ever “Green-Buildings Insurance”
 - Rebuild green after loss

Very popular:

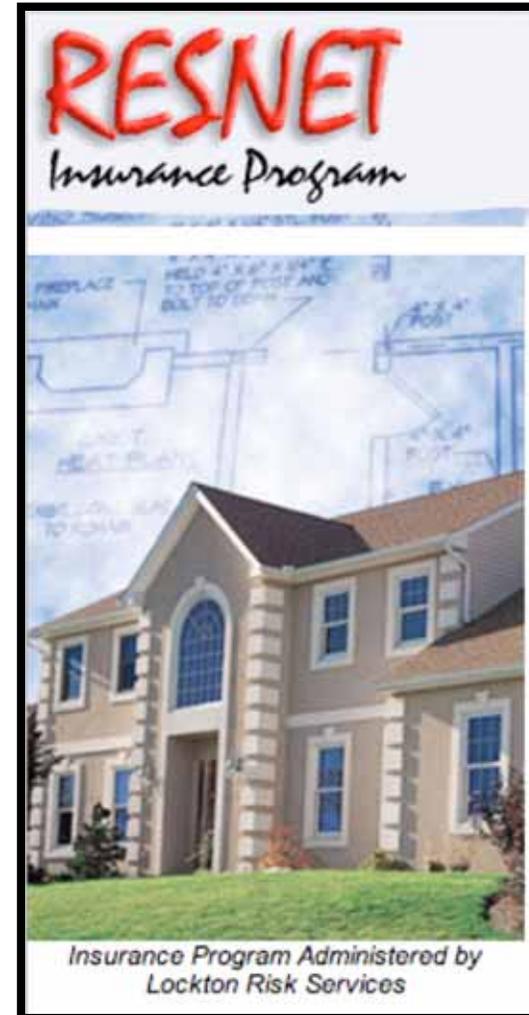
- > \$5,000,000 of new business in first 6 months;
- > Instrumental in renewals;
- > Wall Street Journal



Crafting Innovative Insurance Products and Services

New Products for Energy Service Providers

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



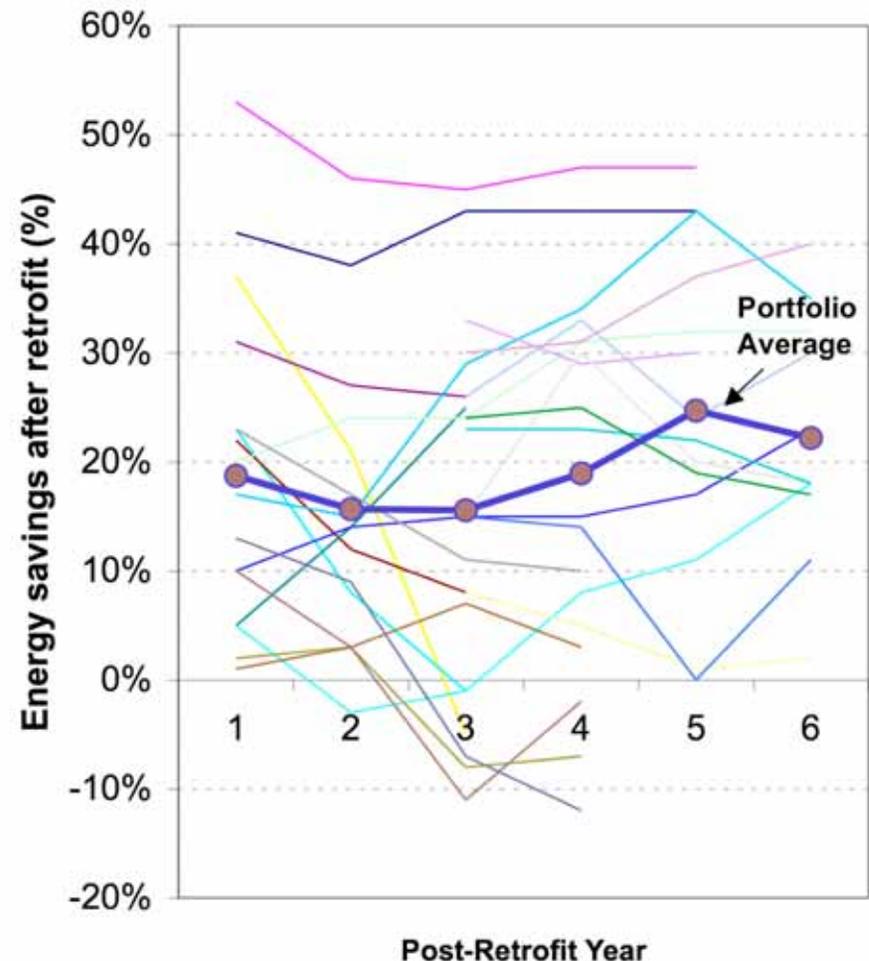
Source: <http://www.locktonaffinity.com/RESNET/>

Energy Savings Insurance

- *Lloyds*, and various others....
- Owner-advocate
- Enhances “bankability”
- Small step to extend from energy to carbon warranty

Mills, E., S. Kromer, G. Weiss, and P.A. Mathew. 2006. "From Volatility to Value: Analysing and Managing Financial and Performance Risk in Energy Savings Projects." *Energy Policy*, 34:188-199.

Variation in Weather-Normalized Energy Savings in 24 Public Housing Projects, versus Portfolio



Renewable Energy Project Insurance

Cumulative availability (e.g. 77% of insurers offer property damage for onshore wind projects).
Full penetration of all forms of insurance would correspond to 800% on the x-axis.

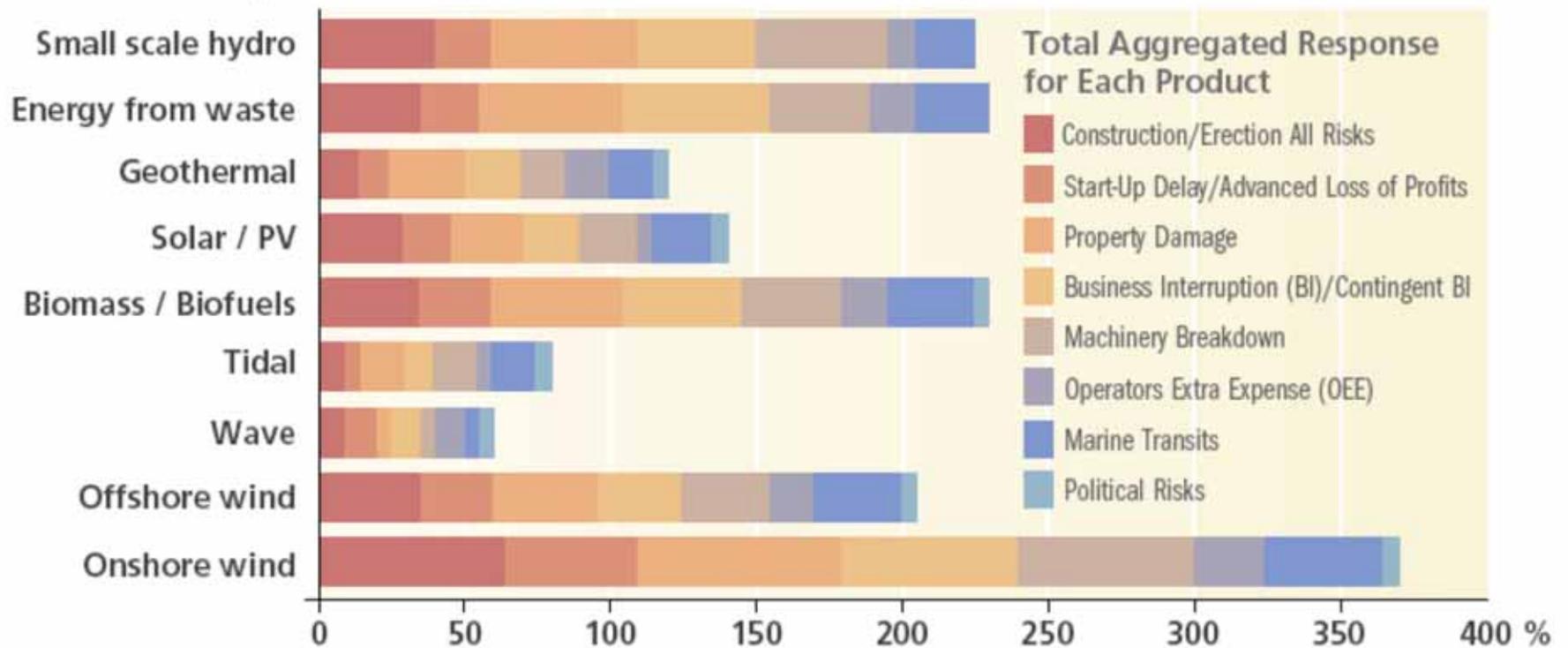


Figure 6. Availability of insurance products for different renewable energy technologies

Source: Marsh. 2006. "Survey of Insurance Availability for Renewable Energy Projects." March, 15pp.

Green Buildings Insurance

- ***Lloyds of London (Naturesave)***: personal lines; commercial lines
 - 10 percent of premiums donated to environmental projects
 - environmental performance surveys offered to policyholders
- ***Fireman's Fund***: commercial lines - premium credits for “LEED-certified” buildings



Pay-As-You-Drive Insurance

- Insurance discounts of up to 40% for low mileage:

- **GMAC**
- **Progressive**
- **Norwich Union**
- **Polis Direct**
- **Rheinland Versicherungen**
- **Aioi**
- **Pay-per-K**
- **Hollard**
- **Gerling**
- **Unigard**



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 --> avoids reporting fraud

Climate Change Insurance

- ***Munich Re:***
Climate insurance Initiative (MCII) for under-served markets in developing countries
 - New products
 - Loss reduction measures



Munich Climate Insurance Initiative

Mission statement

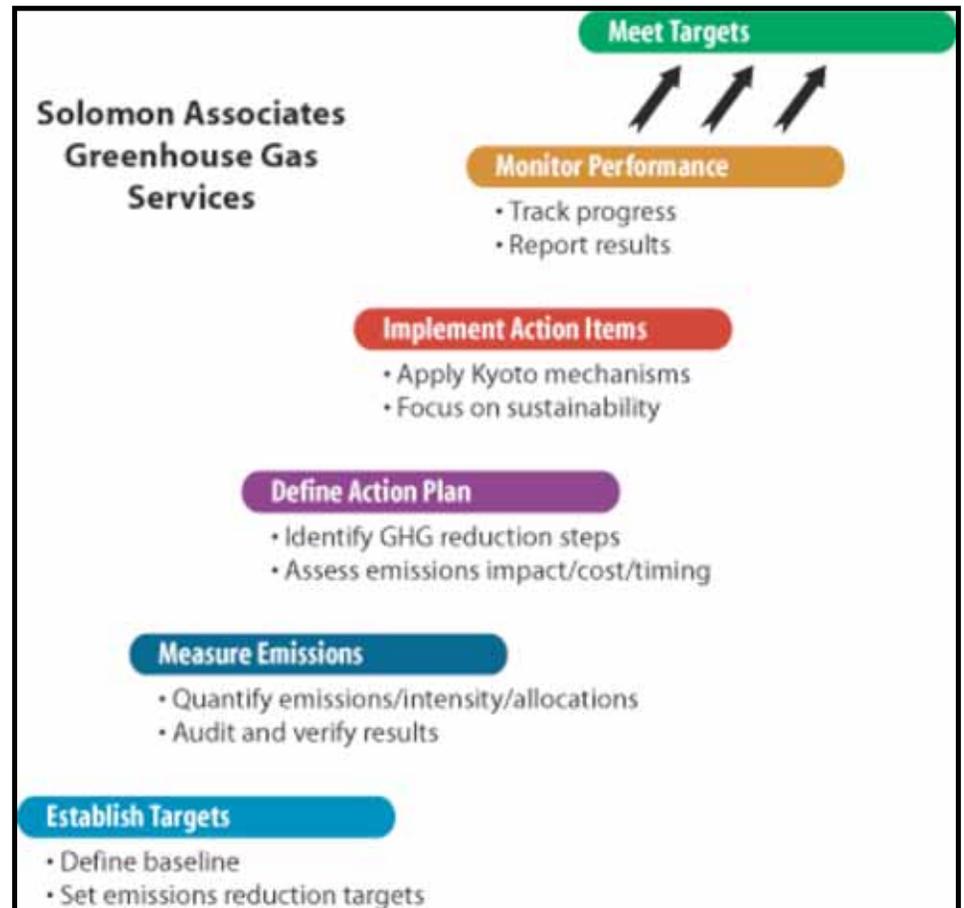


 MCII

Offering Transactional and Risk-Management Services for Carbon Markets

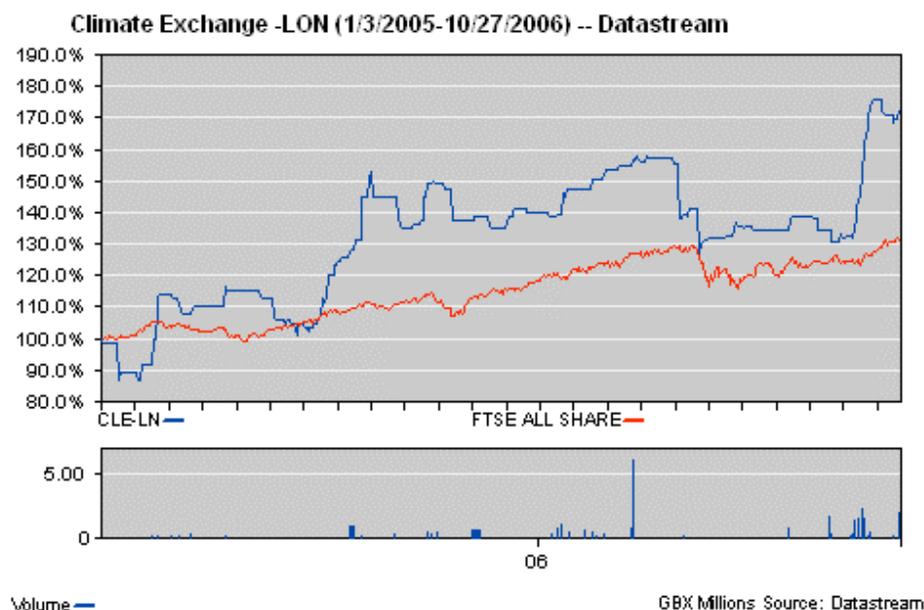
Climate Risk-management Services

- **Solomon Associates, subsidiary of HSB (AIG):** Greenhouse Gas Services
- **AON:** Climate Change Solutions Group



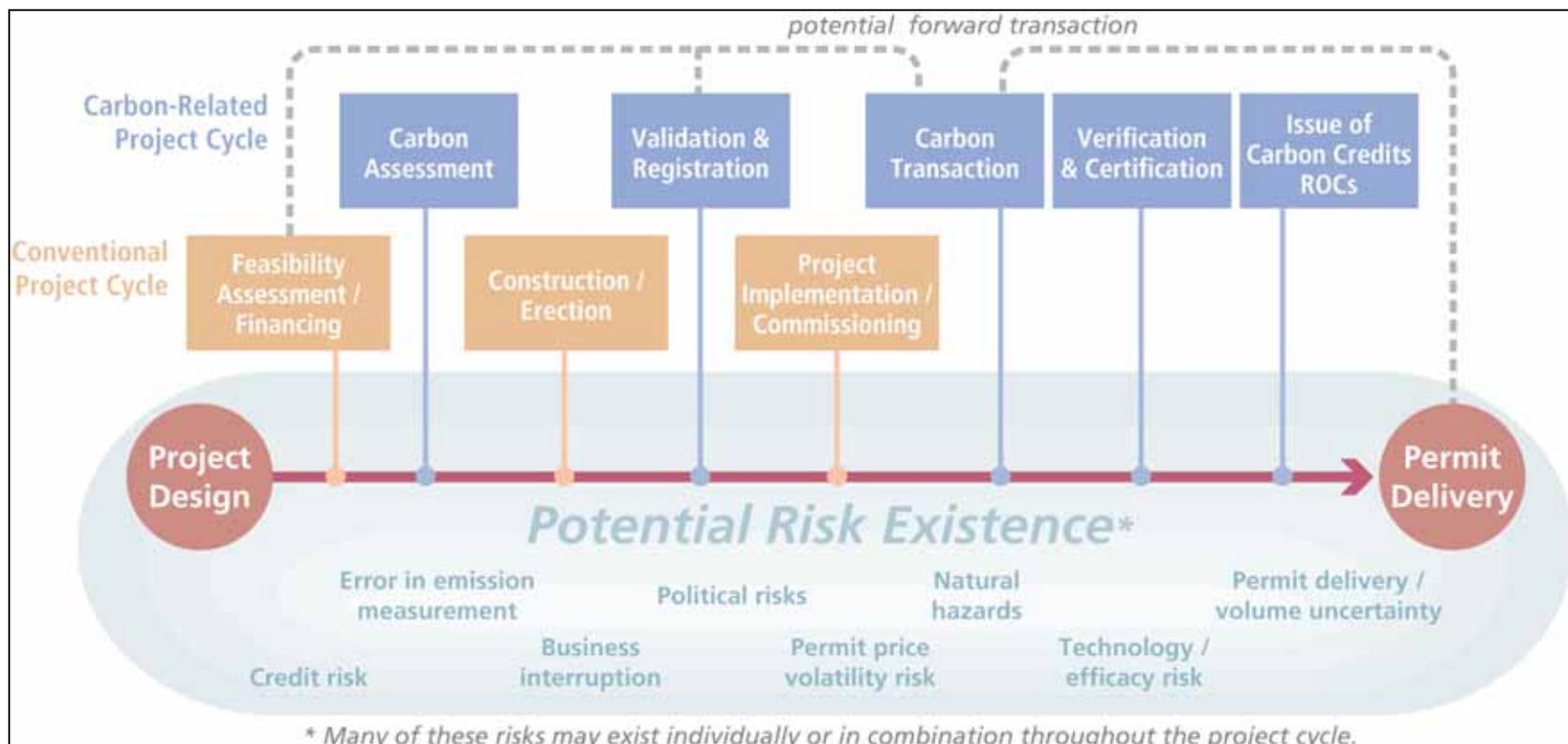
Facilitating Carbon Trading

- **Swiss Re:**
 - Contingent-Cap Forward for Emissions Reduction Trades (cost risk hedge)
 - Carbon credit price volatility product
 - Carbon-delivery insurance



Managing Risk for Clean-Development Mechanism (CDM) & Carbon-Trading Projects

- *Marsh* risk management service



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

Enabling Customers to Purchase Carbon Offsets

- **Insurance Australia Group:** on-line automobile carbon-offset service for customers



The screenshot shows the landing page for the Climate Help service. At the top, there are four navigation buttons: 'Calculate your CO₂', 'Offset your emissions', 'Take our survey', and 'Play the game'. The main content area is divided into two columns. The left column contains a 'Climate Help' header and a list of links: 'Climate change', 'Going carbon neutral', 'What we're doing', 'How you can help', 'FAQ', and 'Contact'. The right column features a headline 'Don't underestimate the effects of climate change.' followed by a paragraph about recent events like Hurricane Katrina and bushfire seasons. Below this is another paragraph explaining the 'Climate Help' program and how it offsets car emissions using carbon credits. An illustration shows a car on a road emitting CO₂, with trees on a hillside absorbing it. A 'Next >>' button is at the bottom right. The NRMA Insurance logo is in the bottom left corner.



The screenshot shows the payment page for the Climate Help service. The header includes the NRMA Insurance logo, 'Climate Help Pay for your emissions', and a 'Back to Climate Help' link. The main content area starts with a paragraph explaining that paying for emissions is one of the simplest things to do to help the environment, followed by a small padlock icon. Below this is another paragraph stating that a certificate will be sent to confirm that emissions will be offset. The 'Calculate your CO₂' section shows a dropdown menu for 'Choose your car type' set to 'Small', a text input for 'How far do you drive each year?' set to 'Between 10,000 kms and 15,000 kms per year', and a result stating 'Your car emits 2.1 tonnes of CO₂ emissions annually'. The 'To offset your emissions for' dropdown is set to '12 months', with a result of 'you need to pay \$32.93*'. A note below states '*It costs \$15.68 to offset one tonne of CO₂'. The 'Pay for your emissions' section contains a form with fields for 'Title', 'First name', 'Surname', 'Email', and 'Age' (set to '18-24 years'). There are also checkboxes for 'Are you an NRMA Insurance customer?' and 'Are you an IAG staff member?'. Below these are fields for 'Name on credit card', 'Credit card number', 'Expiry Date' (set to '01 / 06'), and 'Credit Card Type' (set to 'Please select'). A note at the bottom of the form states 'We do not accept AMEX or Direct Club'. The final section shows 'You are paying \$32.93' and a 'Next >' button. The NRMA Insurance logo is in the top left corner. The footer contains copyright information and a disclaimer.

Source: <http://www.climatehelp.com.au/>

Aligning Terms and Conditions with Risk- Reducing Behavior

Assigning Directors & Officers Liability

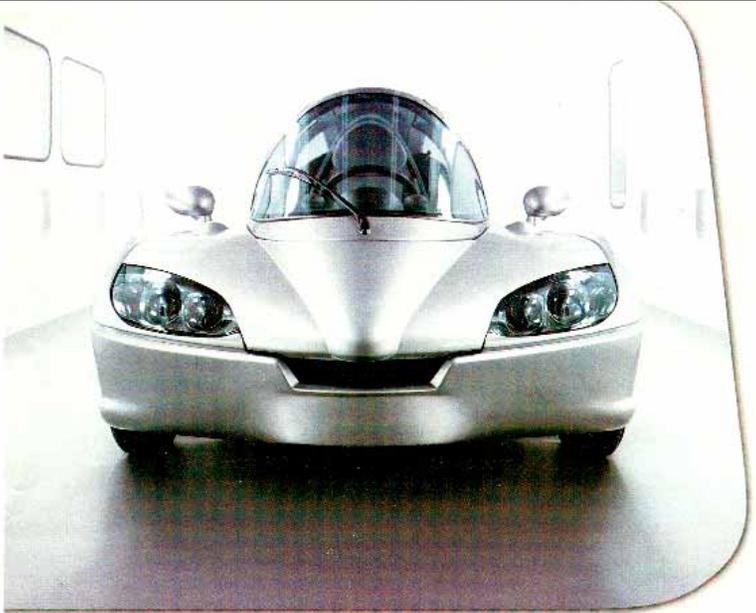
- **Swiss Re:** added climate change to its primary insurance D&O underwriting process
 - Reviews CDP response (if available)
 - May request completion of questionnaire

Questionnaire

- Countries/jurisdiction of company operations
- GHG accounting/reporting system
- Gases assessed
- Outline of company intentions to address regulation-related potential liabilities
- If available, report of data: (1) Gross emissions; (2) GHGs/\$ gross revenues; (3) GHGs/\$ EBITDA; (4) GHGs/\$ current assets; (5) GHGs/\$ long-term debt; and (6) GHGs/\$ market cap

Recognizing and rewarding correlations between sustainable practices and a low risk profile

- **Travelers:**
10% auto premium discount to drivers of hybrids



**☑ Goes beyond fossil fuels.
And fossil insurance policies.**

It's just what the insurance world needs—more like sky thinking. At Travelers, we're always working to identify changes in the world and to make sure your policies stay in-synch, from the discount we offer forward-thinking hybrid drivers to our monitoring of new risks, we help insurance keep up with life—whatever the road ahead may bring. Call an independent agent. After all, your world is always evolving. So should your insurance.

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Investing in Climate Change Solutions

Equity Investments

- **Swiss Re:** participated in an \$18.4 million round of financing in Evergreen Solar
- **Gerling:** Sustainable Development Project operates a \$100 million initiative including venture capital for new technologies to help address climate change risks
- **Allianz:**
 - has invested 10 million euros in the European Carbon Fund; plans to increase investments in renewable energy by 300 to 500 million euros
 - will invest between \$350 and \$600 million in renewable energy

Sustainable Asset Management

- **Munich Re:** membership in sustainable investment indices; screens its own investments
- **Allianz:** endorsed the Ceres/INCR "Call to Action"
- **Gerling:** Select 21 Fund includes energy and environmental criteria in the selection of securities.



Building Awareness

Educating Fellow Insurers

- **Swiss Re:** has run *regular* full-page adds on climate change in major U.S. insurance trade journals for several years

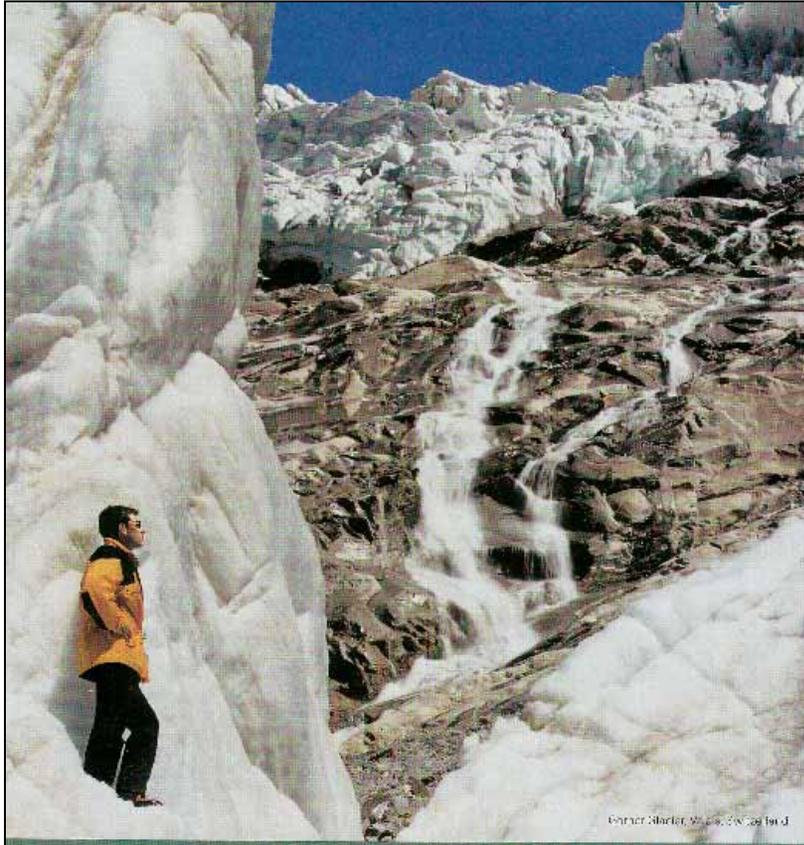


Photo: Martin W. Schmalz

Ivo Menzinger, Sustainability Expert, Swiss Re

"Today, climate change is a fact. And change presents us with both risks and opportunities. Ivo Menzinger and his team identify environmental risks and help develop sustainable strategies to cope with them. Swiss Re was among the first to recognize the potential impact of climate change on the financial services industry and to study all viable ways of managing associated risks. Combining expertise and financial strength, Swiss Re is ideally positioned to provide your company with tailored solutions to mitigate your exposure and protect your lossable stock - insuring in a climate of uncertainty. Visit www.swissre.com

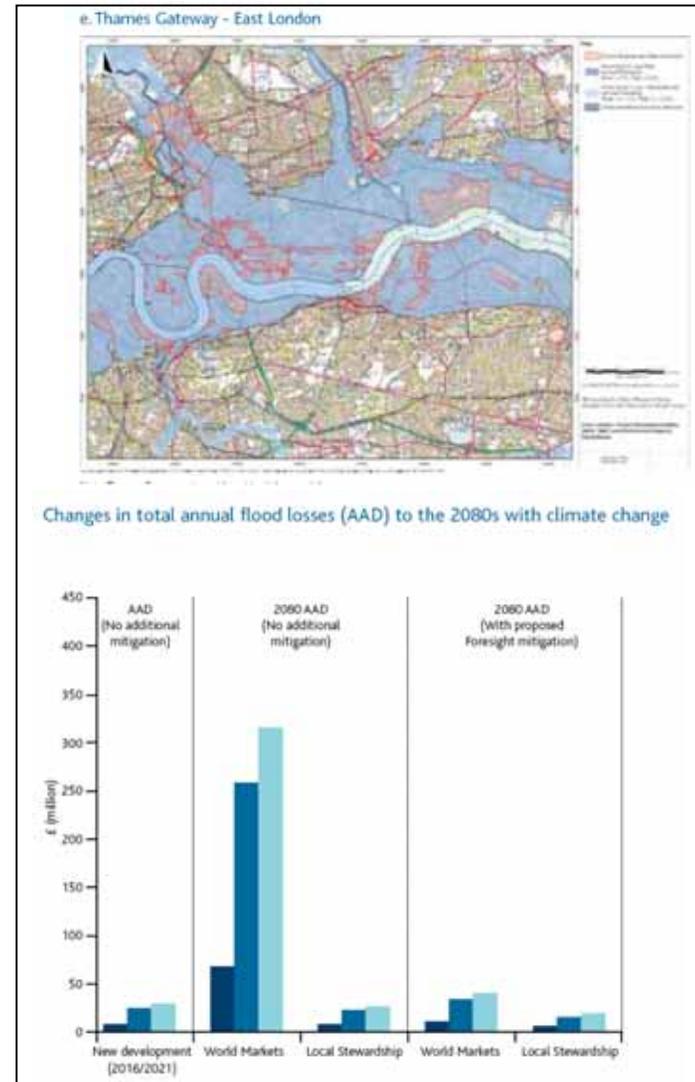
Expertise you can build on. **Swiss Re**



Participating in the Formulation of Public Policy

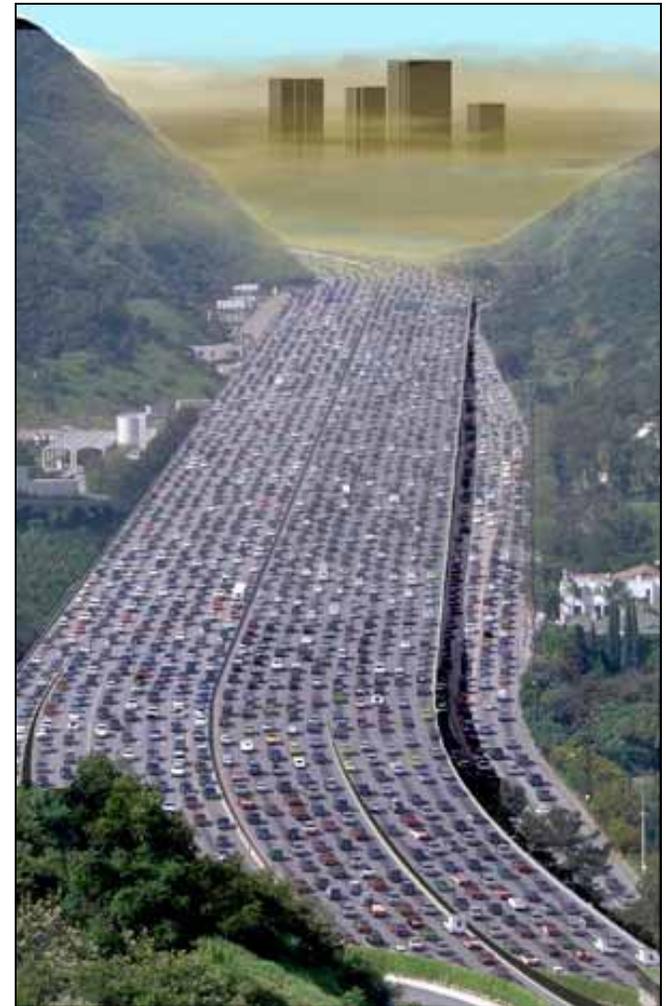
Having a Voice in Public Policy Discussions on Climate Change

- **Association of British Insurers:** advising City of London on land-use planning and flood defenses
- **Allianz:** endorsed the CERES/INCR “Call to Action” 50 companies; \$4T invested
- **UNEP Initiative**



Endorsing Voluntary Energy-Saving Policies

- *American Insurance Association:*
Endorsing public transportation; reduced speed limits; telecommuting based on win-win benefits



Promoting Energy-Efficiency Codes and Standards

- **IBHS**
- **Building Code Assistance Project**

• B C A P •
Building Codes Assistance Project

I want to subscribe to the bi-monthly Status of State Codes Newsletter Yes No
Last Updated May 9, 2007, 11:31 PM

Home About Us Contact Us

The Building Codes Assistance Project is dedicated to assisting states in the adoption and implementation of statewide building energy codes.

The value of energy efficiency in properly implemented construction standards is universally recognized as the easiest and most cost-effective way to help consumers save energy and money, make housing more affordable, and reduce air pollution. All of these benefits are difficult or impossible to capture if not taken into consideration at the time of construction.

BCAP was established in 1994, as a joint initiative of the Alliance to Save Energy, the American Council for an Energy-Efficient Economy, and the Natural Resources Defense Council. Support for this website and for BCAP's advocacy and technical assistance work comes from the US Department of Energy.

"Reducing the Nation's energy consumption through the adoption, implementation, and utilization of building energy codes and standards."

Latest News:

- [Louisiana](#) - Legislative efforts to roll back the 2006 IRC May 10, 2007
- [Tennessee](#) - Senate passes bill mandating 2003 IECC May 10, 2007
- [Oregon](#) - Code proposal for 2008 ORSC under review May 07, 2007
- [Wisconsin](#) - Wisconsin reviewing 2006 IECC for adoption May 07, 2007
- [New Mexico](#) - New Mexico to adopt 2006 IECC May 07, 2007

Committee formed for development of green building standard.

The U.S. Green Building Council (USGBC), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and the Illuminating Engineering Society of North America (IESNA) have completed formation of the committee charged with the [development of Standard 189P](#), the ASHRAE/USGBC/IESNA minimum standard for high-performance green building. The proposed green building standard is being developed by the three organizations to help drive green building into mainstream building practices and is scheduled for completion in 2007.

ICC proposed changes online. View the proposed changes by clicking [here](#).

IRS Issues Guidance on Commercial Building Tax Deduction. View Guidance Notice [here](#).

2006 IECC is Printed and Available for Purchase [Read more](#) or [purchase](#) the code

The Clean Energy-Environment Guide to Action: Policies, Best Practices, and Action

Status of State Codes Maps & Overviews

Leading by Example

In-House Energy/Carbon Management

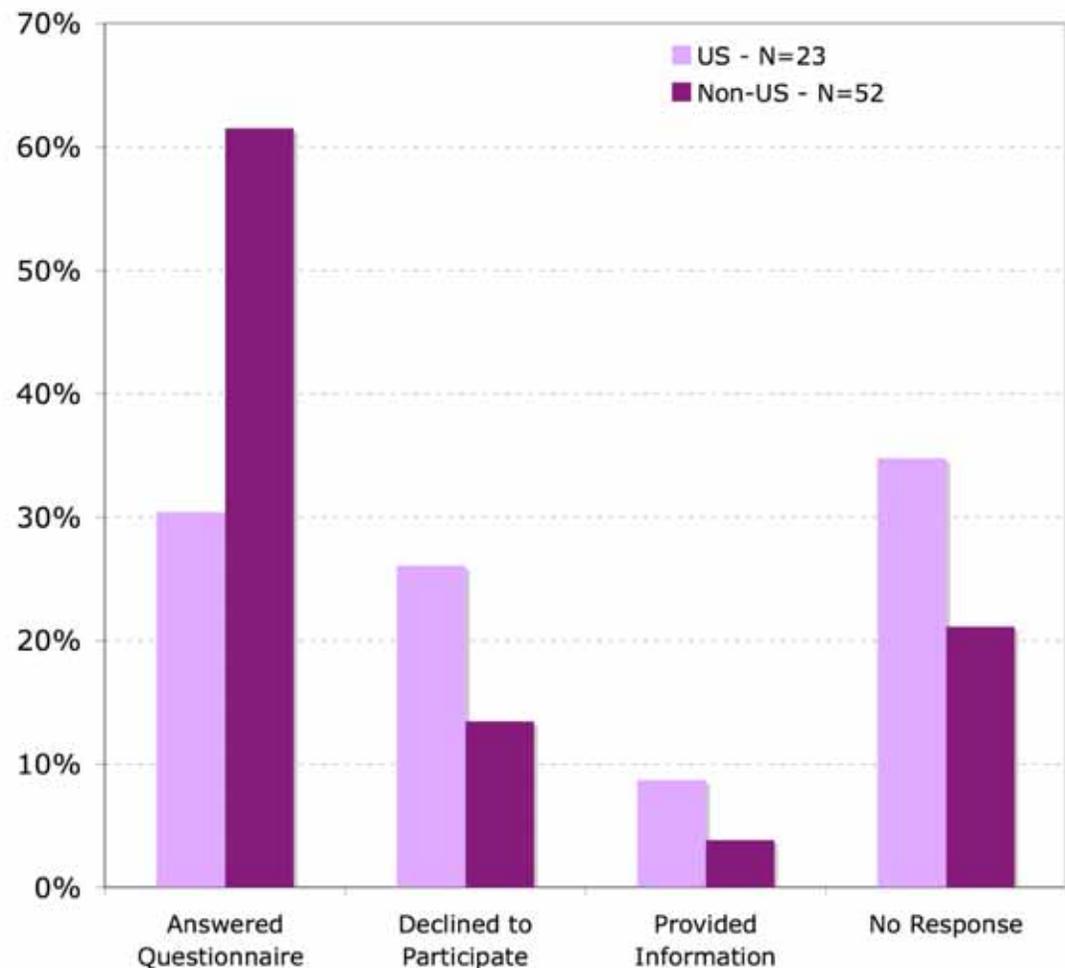
- **Swiss Re:** “Gherkin” building (London)
- **Rutherford:** first insurance broker to go “carbon neutral”
- **West Bend Mutual Insurance Company:** reported a 7% increase in productivity following energy-efficiency upgrades



Disclosing Climate Vulnerabilities & Liabilities

Insurers responding to the Carbon Disclosure Project survey:
AIG, Aon, Marsh & McLennan, MBIA, Safeco, St. Paul Travelers, Unum Provident, Munich Re, others...

Insurer Response Rates to Carbon Disclosure Project (CDP) Survey: 2006



Source: <http://www.cdproject.net/>