Climate Change & Insurance

Evan Mills, Ph.D.
Staff Scientist
U.S. Department of Energy
Lawrence Berkeley National Laboratory

DNV UC Berkeley Top Tech Program
Haas School of Business - UC Berkeley
April 23, 2009
Insurers are....
- messengers
- integrators
- risk assessors
- risk managers

but...
- vulnerable
- flying partly blind
- selective

and....
- part of the solution

Climate Change is an Emerging Risk to be Managed...
Roadmap

• Why insurance & climate change?
  – vulnerability
  – changing business environment
  – expectations from stakeholders

• Opportunities for insurers
  – Underwriting
  – Asset Management
  – In-house / governance

• Considerations for DNV
Disasters Look Different Through an Insurance “Lens”

Aggregate Global Impacts: 1980-2004

Source: E. Mills Science 309, 1040 –1044 (2005), after Munich Re
US CAT Losses: 1980-2005

Demographics playing a strong role, but.....

- Number of events is rising
- Trends are consistent with observed change
- Non-weather losses are growing more slowly
- Trend would be even steeper without prevention efforts

Excludes “small-scale” events & life/health losses

The ratio of losses to premium revenues is increasing. Risk is OK; Excessive Volatility is Not.
CATs Profoundly Influence Profitability (US P&C)

Note: CATs having increased influence on overall profitability

Source: A.M. Best & Co.
World Insurance Market

$4 Trillion in 2007
(16% in emerging markets)

Mature Markets ($3,646 B)
Emerging Markets ($631 B)
Central and East Europe ($74 B)
Latin America and Caribbean ($87 B)
South and East Asia ($393 B)
Middle East / Central Asia ($12 B)
Africa ($53 B)

Source: Swiss Re, Sigma
Perfect Storm

### 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

*Greater combined impacts than CATs in an average year*
Small-scale Losses: Soil Subsidence

Subsidence claims increase with drought: UK 1975-1999

Source: Association of British Insurers
Small-scale Losses: Lightning

Lightning-related claims accelerate with temperature

Each symbol represents a lightning storm event

Adapted from figure in Mills, Evan, 2005, Insurance in a climate of change, *Science* 309, pp. 1040-1044

Source: Hartford Steam Boiler Inspection and Insurance Co.
Small-scale Losses: Power Outages

499 Weather-Related Incidents

Index: 1 = # of incidents in 1992

- Undefine weather
- Wildfire
- Temperature extremes
- Ice/snow/winterstorm
- Thunderstorm, tornado, lightning
- Windstorm; hurricane; severe storm

Source: US Department of Energy

U.S. economy total cost: ~$80B/y
Average cost to utilities $49 million/storm; max. $890 million (EEI)
RMS Scenario: $2.7B for NY
Anticipated Insurance Losses

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

Life/Health
- Injury
- Infectious diseases
- Vector-borne diseases
- Heat stress
- Respiratory
- Pollution release
- Food safety
- Mental health
- Nutrition/water
- Roadway safety

Liability (Casualty)
- Products
- Negligence
- Nuisance
- Fiduciary
- Tort / BI
- Environmental
- Roadway liability insurance
Changes in Extremes

Source: IPCC, Third Assessment Report
Extremes Shift More Than Avg

Small changes in averages...

Warm nights

1901-1978
1979-2003

... but extremes are becoming normal ...

... and “tails” are getting longer

Source: Alexander, et al, J. Geophysical Research, 2005
Change in Frequency of Extreme European Heat Waves

Change in Risk is 4x

Under Human-Induced Climate Change (1.6°C above 1960-1990 mean)

Source: IPCC AR4, Corresponds to 1.6°C change in mean
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

Event was “six-sigmas” outside of norm. 16°F above average in France and Germany was a 1-in-10,000 event to 1-in-46,000 event

Changes in Severe US Heatwaves

Number of Heat Waves per Decade

- Lower Emissions
- Higher Emissions
Temperature of Public Opinion

• In 2007, twice as many people (US) believed climate change is here than did in 2004

• But public opinion lags scientific certainty by a significant margin

And.... diminishing differences by political party affiliation

The Business Climate is Also Changing


Investment by Type

Investment by Technology

* Sylvie Lemmet, Division of Technology, Industry and Economics, UNEP.
More Business!

Changing Risk Profiles

The world is changing. We’re changing how we insure it.

Real estate challenges are changing the world. That’s why we created our Upgrade to Green™ coverage and Historic Rehabilitation Tax Credit insurance for commercial risks. These landmark coverages set a new standard and are just two of the 70 products we’ve developed since 2002 and 15 in 2007 alone. Because when a world changes this fast, you need an insurance company who can change right along with it.
F&C Investments Statement: September 2007

- F&C is an asset manager with $200 billion under management

- Concerned about climate-sensitivity of their investments in insurers
Shareholder Climate Resolutions
(United States)
Double-Whammy of troubled economy and high energy prices

can be explained by:
- fewer boat purchases
- more repossessions
- more time laid up

= Falling premiums and fewer customers

... but also fewer losses
Insurance Customers Impacted

Ski County April 1 Snowpack Loss, 1976 to 2085
Figure 16

*1976 represents the average from 1941 to 1990, and 2085 represents the average from 2070 to 2090.

Flathead County, Montana
- Big Mountain -34%

Bonneville County, Idaho
- Sun Valley -41%

Gallatin County, Montana
- Big Sky -33%

Teton County, Wyoming
- Jackson Hole -26%

Routt County, Colorado
- Steamboat -50%

Grand County, Colorado
- Winter Park -54%

Summit County, Colorado
- Breckenridge
- Copper
- Keystone -50%

Salt Lake County, Utah
- Alta
- Snowbird
- Solitude -84%

Eagle County, Colorado
- Beaver Creek
- Vail -57%

San Miguel County, Colorado
- Telluride -82%

Pitkin County, Colorado
- Aspen Highlands
- Aspen Mountain
- Snowmass -43%

Taos County, New Mexico
- Taos -89%

Gunnison County, Colorado
- Crested Butte -50%

Snowpack Loss: -X%
Availability & Affordability

- Exodus of insurers from coasts (*and* elsewhere)

- Quiet “hollowing out” of insurance

- Customers “going Bare”: 9 utilities (10% of membership) left in OIL Mutual Ins. Co. May 2007
  - Paid $100 million in fees to leave
  - CEO says “It was a stunning blow”

- RAND Report on commercial insurance in FL
  - In 2005: one insured paid $250k for $38m coverage
  - In 2006: paid $940k for $5m coverage, i.e. a ~29-fold bump in the “cost of risk”
“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
D&O Perceived Liability Risks: Next 5 years

- Inadequate technology security (e.g., exposure of confidential data): 45%
- Environmental damage (e.g., pollution): 40%
- Lack of transparency or disclosure in reporting: 38%
- Work-related stress: 34%
- Product liability issues (e.g., lead paint): 32%
- Climate change: 27%
- Inadequate security (e.g., against terrorist attack): 20%
- Electromagnetic fields (e.g., Wi-Fi, mobile phones): 20%
- Obesity: 13%
- Inadequate protection against pandemic: 7%
- Nanotechnologies: 6%
- Silica: 1%

* = also influenced by climate change

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
**Comparative Risk Assessment**

### Vulnerabilities to Changing Climate Conditions & Related Risks

<table>
<thead>
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- **Vulnerable to changes in diseases and pests**
- **Increased rainfall could improve productivity**
- **Corrosive ethanol complicates transportation & application**
- **Domestic fuels enhance energy security**
# Comparative Risk Assessment

**Vulnerabilities to Changing Climate Conditions & Related Risks**

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*X = downside risk, ✓ = upside benefit*
Climate Change is #1 Risk, According to >70 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 & strategy
8. Securities markets*
9. Legal risk*
10. Geopolitical or macro-economic shocks*

*Also influenced by climate change
Insurance Regulators 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 (deceased)
Nebraska Insurance Commissioner
Top Concerns: Survey of 139 Insurance Executives in 21 Countries

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<th>Rank</th>
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<td>Interest rates</td>
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<td>Asbestos</td>
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Source: Centre for the Study of Financial Information and PricewaterhouseCoopers survey: 2007
“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
Keeping The Promise

• You’re in good hands....
• Just like a good neighbor ...
• We live where you live....
• Have you met life today?
• Go Ahead. You Can Rely on Us
• Insuring Your Future… Today
• Taking care of what's important
• Ready for tomorrow?
• We keep our promises to you
• Give your child an advantage for life
• Because Change HappenZ
• Responsibility. What’s your policy?
• It’s not just how you’re covered, it’s how you’re treated
Enterprise Risk Management

• Actuarial
  – variability
  – return periods
  – correlations
  – non-linearities
  – data “blind-spots”
  – model “blind-spots”
  – demographics
• Competition - Contraction
• Reputation & Trust
• Assets & share prices
• Own liability
• Macro-economy: higher energy prices, conflict ...
• Shareholder relations
• Regulation
• Insurability
Insurance Paradigm Shift
From Risk ... to Opportunity

34 strategies; 643 examples
278 entities; 29 countries ... and counting
**Offerings**

Insurers with Climate-friendly Products & Services (number)

- 43 instances of pay-as-you-drive insurance or credits for low-emission vehicles
- 13 microinsurance programs
- 22 companies offering 39 green-buildings products and services
- 9 companies offering carbon offsets to customers

**Investments**

Investment in Climate Solutions ($Billions)

- 24 companies making direct investments
- 13 instances insurer financing of green projects

**Disclosure**

Insurer Responses to Carbon Disclosure Project Survey (number)

- Carbon disclosure project: 66% reporting
- SEC Disclosures: 15% reporting in 2006
- See Appendix B for details: 2003–2008

**Leadership**

Carbon-Neutral Insurers and Intermediaries (number)

- 25 companies publishing corporate responsibility reports
- 23 companies with carbon-neutral commitments
- Date is year carbon neutrality achieved
Major Categories of Activity

- Leading by Example: 17%
- Crafting Innovative Insurance Products: 22%
- Building Awareness and Participating in Public Policy: 14%
- Offering Carbon Risk-management & Offsets: 5%
- Financing Customer Improvements: 2%
- Investment in Climate Change Solutions: 5%
- Understanding the Climate Change Problem: 6%
- Promoting Loss Prevention: 9%
- Aligning Terms & Conditions with Risk-reducing Behavior: 6%
Internal Responses: 18 companies*

* AIG (U.S.), Allianz SE (DE), Allstate (U.S.), Association of British Insurers (UK), AXA Group (FR), ClimateWise, The Co-operators (CA), MAPFRE (ES), McGriff, Seibels & Williams, Inc (U.S.), Munich Re (DE), Risk Management Solutions (U.S.), RSA Insurance Group (UK), Swiss Re (CH), Tokio Marine & Nichido Fire Insurance (J), The Travelers Companies, Inc. (U.S.), Willis (U.S.), XL Capital (U.S.), Zurich Financial Services (CH).
New Insurer Business Units

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

“Allianz
“Climate Solutions”

“Aon
“Agri-Fuels Group”

“CHUBB
“Green Energy Team”

“TRAVELERS
“Core Business Climate Change Project”

“Willis
“Climate Change Taskforce”

“ZURICH
“Climate Change Advisory Council”
Understanding the Problem: CAT+Climate Modeling

- **Trade Associations**
  - III [CAT Modeling Forum], with Ceres and others

- **Insurers**
  - AIG
  - Travelers
  - Lloyds

- **Reinsurers**
  - Swiss Re
  - Munich Re

- **Brokers**
  - Willis

- **CAT Modelers**
  - RMS
  - AIR

*Expected increase in annual loss in Europe*
Improved Land-use Planning

Association of British Insurers - modeling studies

UK Urban Flood Losses under Climate Change

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
Projections of UK Insured Losses

Improved Building Practices

- **FM Global** - hurricane-resistant building guidelines
- **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
- Some insurers giving premium credits for compliant homes
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
Promoting Loss Prevention: Wetlands Restoration

Tokio Marine Holdings

Company states that 2005 Tsunami did less damage in these areas

Source: http://www.tokiomarine-nichido.co.jp/english/index.html
Insurable Green Building Risks

- Builders risk during construction
- Incremental costs for green replacement materials
- Upgrading after loss
- Fees for green consultants
- Additional removal/disposal/recycling of damaged property
- Business interruption for delays in obtaining green materials; certification
- Professional liability for specialized trades
- Mis-representation
- Crisis management

22 companies offering 39 products & services
Low-emission Vehicle Discounts

5-50% premium discounts to hybrid drivers

- AXA
- Berkshire/GEICO
- Cooperative
- Desjardins General
- Farmers
- Hybernia
- SECURA
- St. Paul-Travelers

18 companies offering improved terms
Mileage-based Auto Insurance

• 26 companies offering insurance discounts of up to 40%:
  - Aioi
  - Axa
  - GMAC
  - Hollard
  - Milemeter
  - Norwich Union
  - Polis Direct
  - Progressive
  - Rheinland
  - Sompo
  - Tokio Marine Nichido
  - Unigard
  - Versicherungen

Some use GPS → stolen-vehicle recovery; avoids reporting fraud.

250,000 policies in Europe as of 2007; $700M revenues projected by 2010.
Innovative Products for Energy Performance

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

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

- **Allianz, AXA, Cooperative, others...**
- **Insurance Australia Group:**
  Car and travel insurance bundled with offsets
Emerging Risk: Liability

Oil spill following Hurricane Katrina - LIFE
Directors & Officers Insurance

**Swiss Re:** “The Letter”

**Zurich:** D&O Side A coverage extension

**Liberty Mutual:** D&O Side A coverage extension

- Pollution defense-cost coverage
- Defense-cost coverage for global warming-related misrepresentations; and
- Defense-cost coverage associated with formal administrative or regulatory investigative proceedings

E.g. Native Village of Kivalina v. ExxonMobil Corp.
Political risk insurance for carbon credits

Zurich: coverage extension for carbon-credit projects, covering:

• Political risks and, in certain cases, the credit risks associated with operating in emerging markets

• Risk of a host government's actions that prevent an investor from receiving benefits associated with emission credits

• Political violence events, incl. war and terrorism, that disrupt operations
Carbon offset delivery securitization

- **Zurich**: CER/VER delivery securitization - Target buyer is a multi-lateral or multi-national bank

- **Swiss Re**: Kyoto-CDM risk insurance

- **Munich Re**: similar
Industrial Energy Efficiency Incentives

Allianz/FFIC Premium reductions of up to 5% via pricing credits or dividends on Workers Compensation, Property and General Liability coverages for manufacturers with sustainable processes or products, e.g.:

• Lean manufacturing - reducing material use and energy costs while also improving housekeeping reduces slips and fall injuries.

• Reductions in the use of flammable liquids - reduces carbon footprint since most flammables are petroleum based - also improves property safety and public/employee safety

• Newer, more energy efficient machinery - runs cooler (fewer fires) and has superior machine guarding (fewer injuries)
Microinsurance

Source: Microinsurance Centre, 2008
• **Swiss Re:** Drought/Crop micro-insurance for 400,000 farmers in Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania and Uganda.
Carbon Risk-Management Services: Offsets

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

Carbon Risk-Management Services: Project Risk

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

Source: Marsh. 2004. “Responding to Climate Change Risks and Opportunities”
Example of Insurer Carbon Risk Management Offerings

- **Carbon Counterparty Credit Risks Insurance**
  - Protecting buyers of carbon credits against political risk and expert credit risks (e.g., seller insolvency)

- **Carbon Risk Management (CRM)**
  - Risk identification and risk assessment for all market participants in carbon markets

- **Carbon All Risk Insurance (CARx version 1.0)**
  - Protecting seller and buyer of carbon credits in carbon markets (EI-ETS and Kyoto)
  - Insurance solutions for renewable-energy and emission-reduction technologies

- **Carbon Compliance Inventory (CCI)**
  - Compliance audit for industrial sites (EU-ETS)

- **Carbon Delivery Risk Assessment**
  - Actuarial tool for CER’s Nondelivery estimation

- **Carbon Delivery Guarantee Insurance**
  - Indemnifying industry in Certified Emissions Reductions (CER’s) when defined risks appear
Building Awareness & Participating 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
Building Awareness & Participating in Public Policy

• ClimateWise announced Sept 17, 2007 -- 41 insurers and trade allies pledged to lead the way in:
  – “Analysing and reducing risks
  – Support climate awareness amongst our customers;
  – Incorporate climate change into our investment strategies
  – Inform and engage in public policy debate
  – And reduce the environmental impact of our businesses.”

Source: http://www.climatewise.org.uk/

Additional signatories as of 11 June 2008: ACE, Amlin, ARK, Beazley, BIBA, Caitlin, Chaucer, Diagonal Underwriting, Equity Group, Hardy’s Underwriting, Heritage, Hiscox, Legal & General, Marketform, Navigators, NFU Mutual, Prudential, QBE European Operations, RJ Kiln, RMS, Spectrum, Standard Life, UNUM, XL
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
- Exxon Corporation
- Ford Motor Company
- FPL Group, Inc.
- General Electric
- General Motors Corp.
- Johnson & Johnson
- Marsh, Inc.
- Microsoft Corporation
- Nucor Corporation
- Procter & Gamble
- Shell Oil & Gas Company
- Toyota Motor Corporation
- United Technologies Corporation
- US Steel Corporation
- Wal-Mart

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 (PDF - 943 KB)

October 23, 2007 - U.S. Climate Action Partnership
Funding Innovation

- **Progressive** $10-million “X-Prize” for Ultra-fuel-efficient cars

Imagine a world where super-efficient cars are desirable, affordable and everywhere... where gasoline no longer makes history, but is history...
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”. 
# Direct Investment

## Prudential

**Powered by wind**

A state-by-state look at Prudential’s wind-energy investments and how many homes can be powered by each

<table>
<thead>
<tr>
<th>State</th>
<th>Capacity (Megawatts)</th>
<th>Households Powered*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>619</td>
<td>185,580</td>
</tr>
<tr>
<td>Colorado</td>
<td>301</td>
<td>90,150</td>
</tr>
<tr>
<td>Washington</td>
<td>205</td>
<td>61,410</td>
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<tr>
<td>California</td>
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<tr>
<td>New York</td>
<td>116</td>
<td>34,650</td>
</tr>
<tr>
<td>Minnesota</td>
<td>101</td>
<td>30,150</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,642</strong></td>
<td><strong>491,940</strong></td>
</tr>
</tbody>
</table>

Source: Prudential website
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

- **TrygVesta:** $10k financing for “climate-friendly home energy upgrades” after loss.
Improved Governance

Leading by Example

Carbon footprint of the world’s insurers equals:

- 12 million tons CO2/year
- 2.4 million US cars
- 4 large electric plants
- 57k train cars of coal

Source: Truecost and LBNL Analysis
Improved Governance

Carbon-neutrality
(23 companies)

- AIG*
- Aviva
- Bradford & Bingley
- Folksam
- Fortis
- FP Marine
- HSBC
- Independent Insurance Services
- ING
- Insurance Australia Group
- Munich Re
- Royal & Sun Alliance
- Rutherfoord
- Solar Group
- Specialized Broking
- Storebrand
- Swiss Re
- Tokio Marine Nichido
- Xelector

*Conversion of marginal farmlands back to grasslands (North Dakota)

*Reduced Agricultural fossil fuel inputs (China)

*Biogas from waste for cooking and lighting (China)

*Improved forest management (California)
Improved Governance

Carbon-risk disclosure

Carbon Disclosure Project: Annual Global Survey by Institutional Investors ($57 Trillion under management)

110 Insurers surveyed: 2003-2008: AIG, Allstate, Aon, Chubb, Marsh, MBIA, Safeco, St. Paul Travelers, Unum Provident, Munich Re, many others...

Source: http://www.cdproject.net/
Risks & Opportunities for DNV

• Internally Focused
  – Dynamics with emitting customers
  – Emerging risks & performance of climate solutions
  – Own risk retention / limits

• Customer Focused
  – Help understand climate risks
  – Provide new services for managing carbon risk
    • benchmarking or carbon-footprinting
    • climate risk modeling
    • training: operations, loss control, board coaching; disclosure
    • commissioning
  – Help aggregate demand for “green” insurance
“When the winds of change blow, some build walls ... others build windmills.”

- Chinese Proverb

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