The need for climate adaptation
Leading scientists expect a continuing rise of the global mean temperature

IPCC AR4* multi-model averages and assessed ranges for surface warming**

A 2°C outcome would be desirable, but very unlikely to be achieved
Even if we stop all emissions today, climate is still going to alter
We need to adapt to a changing environment
Climate risks are highly inter-connected

- GHG emissions
- Storms
- Flood
- Sea level
- Drought
- Ecosystems
- Energy security
- GHG regulation
- Investments
- Migration
- Conflict
- Food security
- Health effects

Climate Change
As global warming accelerates, scientists expect increasingly drastic impacts.

<table>
<thead>
<tr>
<th>Temperature change (relative to preindustrial)</th>
<th>1º C</th>
<th>2º C</th>
<th>3º C</th>
<th>4º C</th>
<th>5º C</th>
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<tbody>
<tr>
<td><strong>Weather</strong></td>
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<td>Threat to local water supply due to loss of glaciers</td>
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<tr>
<td>Rising intensity of storms, forest fires, droughts, flooding, and heat waves</td>
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<td><strong>Water</strong></td>
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<td>Changes in water availability, threatening up to 1 bn people</td>
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<td>Major world cities threatened by sea-level rise (e.g., London)</td>
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<td><strong>Food</strong></td>
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<td>Falling crop yields in many developing regions</td>
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<td>Yields in many developed regions decline</td>
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<td><strong>Ecosystem</strong></td>
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<tr>
<td>Coral-reef ecosystems extensively and eventually irreversibly damaged</td>
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<td>Considerable number of species face extinction</td>
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<td><strong>Social</strong></td>
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<td>More than 1 bn people at risk of having to migrate – increased risk of conflicts</td>
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<td><strong>GDP</strong></td>
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<td>Loss of GDP in developing countries</td>
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<td>Potential loss of up to 20% of global GDP</td>
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</table>

Source: Stern Review; IPCC
The main levers for combating climate change

- **Mitigation**: Reduction of greenhouse gas emissions, or increase greenhouse gas sinks
  - Energy efficiency, renewables, clean tech/low-carbon growth

- **Adaptation**: Increase the ability to adjust to a changing environment
  - Risk prevention
    - Physical infrastructure
    - Process/technology optimization
  - Risk transfer and financing
    - Incentivize prevention

→ In general the more mitigation there is, the less will be the impacts to which we will have to adjust, and the less the risks for which we will have to try and prepare.
The need for climate-resilient development

"Business as usual" high-carbon growth is no longer an option

Mitigation is aligning with the broader development agenda as people accept that high-carbon growth is unsustainable

Adaptation will require incremental funds beyond business as usual; adaptation and development are often indiscernible
Swiss Re's climate change strategy

Coping with climate change requires both mitigation and adaptation measures

<table>
<thead>
<tr>
<th>Assess and manage the risk</th>
<th>Seize business opportunities</th>
</tr>
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<tbody>
<tr>
<td>- Advance knowledge</td>
<td>- Solutions for mitigating and adapting to climate change</td>
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<tr>
<td>- Address in risk management, underwriting/pricing</td>
<td>- Catastrophe insurance</td>
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<td>- Weather risk solutions</td>
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<tr>
<th>Influence the business environment</th>
<th>Lead by example</th>
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<tr>
<td>- Dialogue with regulators, investors, clients, and employees</td>
<td>- Greenhouse neutral since October 2003</td>
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<tr>
<td>- Support climate policy development</td>
<td>- Reduced emissions per employee by 50.6% by 2010 (2013 target met)</td>
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<td>- COYou2 Programme since 2006</td>
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</table>
Natural catastrophe losses are on the rise

Natural catastrophe losses 1982-2012, in USD billion (2012 prices)

* 2012 Loss numbers are a preliminary estimate

Note: Insured losses: property and business interruption, excluding liability and life insurance losses
Source: Swiss Re sigma
The key driver so far

Ocean Drive, FL, 1926

Ocean Drive, FL, 2000
Climate adaptation is an urgent priority

- Decision makers of national and local economies ask
  - What is the potential climate-related loss to the economies and societies over the coming decades
  - How much of that loss can we avert, with what measures?
  - What investments will be required to fund those measures and will the benefits of that investment outweigh the costs?
Economics of Climate Adaptation
Key Messages

- Adaptation measures are available to make societies more resilient to the impacts of climate change and should be an urgent priority for the custodians of national and local economies, such as finance ministers and mayors.

- Decision makers need the facts to identify the most cost effective investments.

- The Economics of Climate Adaptation (ECA) methodology provides decision-makers with a fact base to answer these questions in a systematic way.

- It allows decision-makers to integrate adaptation with economic development and sustainable growth.

- The insurance industry is an important partner in future adaptation plans because of its experience in risk management and modeling, and in developing new insurance products.
No need to take notes... → www.swissre.com/climatechange

- The full report, 8 case studies, 164 pages

- Factsheet on urban resilience, 3 pages
Climate-resilient development needs to **assess** and **address** total climate risk

**Objectives**
- Provide decision makers with the **facts and methods** necessary to design and execute a climate adaptation strategy
- Supply insurers, financial institutions, and potential funders with the **information** required to unlock risk prevention funding and deepen global risk transfer markets

**Methodology**
1) Follow a rigorous risk management approach to **assess local total climate risk**, the sum of
   - today’s climate risk,
   - the economic development paths that might put greater population and value at risk
   - the additional risks presented by climate change
2) Propose and prioritize a basket of adaptation measures to **address** total climate risk on an economic basis
A framework for assessing total climate risk

1. Where and from what are we at risk?
2. What is the magnitude of the expected loss?
3. How could we respond?
4. How do we execute?
5. What are the outcomes and lessons?

- Measure success to incorporate lessons learned as inputs in next climate risk decision cycle
- Implement a portfolio of responses considering barriers and feasibility
- Identify most relevant hazards, areas and populations most at risk
- Calculate the expected loss across multiple climate scenarios to assess uncertainty
- Build a balanced portfolio of responses with detailed cost/benefit assessments
The working group studied 17 regions with diverse climate hazards.

Expected loss from exposure to climate
High climate change scenario, 2008 USD millions

The initial portfolio of responses cost-effectively averts much (~80%) of the expected losses

- Expected loss is driven by current risk, agricultural growth, and climate change
- Agriculture income growth would contribute to an additional 23% of 2030 high change loss
- Climate change (occurring in combination with income growth) will account for 35% of 2030 high change loss

- 80% of the expected loss can be addressed by measures. The remaining 20% is “residual” loss, which will require additional penetration of insurance, or relief and rehabilitation
- ~50% of measures have lifetime economic benefits greater than costs
- Micro irrigation measures, watershed management and insurance are key measures (addressing 70% of the expected loss)
- 3 of these measures have negative costs, which means that they save costs along with averting loss
Drought is the largest threat to food security in China with $8bn losses in recent years.

Climate change could lead to 50 percent increase in drought loss in Northeast China by 2030, while having limited impact in North China.

Under the moderate climate change scenario, the total loss rises to more than $2.5bn in 2030.

Measures costing $15bn for the period 2010-2030 have the potential to avert 50 percent of drought loss by 2030.

A combination of irrigation measures, planting measures, and seed-engineering measures can be used to cost-effectively reduce climate-related losses.

Engineering measures appear not to be cost-effective.

40 percent of the capital investments would come from individual farmers.
Georgetown, Guyana
Managing Flash Flood Risk

- Rain related flooding is the primary climate hazard
- Even if flood risks decreases, Guyana faces significant loss due to the current low level of climate resilience
- The probably range of expected climate-related losses in 2030 ranges from 12 to 19 percent of GDP

- A balanced portfolio of prevention, intervention and insurance measures can be used to proactively manage total climate risk
- Most of the losses can be cost-effectively averted
- The conservancy repair measure is cost-effective in the high climate change scenario, while in the low climate change scenario the cost-benefit ratio is 1.98

Annual expected loss from exposure to climate
Extreme climate change scenario, USD millions

The initial portfolio of responses cost-effectively averts more than 60 percent of the expected losses

Cost/benefit ratio

Averted loss (2008 USD millions)
Conclusions

- ECA methodology provides decision-maker
  - with a **fact base**
  - enables to **understand the impact** of climate change on their economies
  - enables to **identify actions** to minimize the impact at the lowest cost to society
  - allows to **integrate adaptation** with economic development and sustainable growth

- Natural catastrophe modeling is the essence

- Climate is a strategic issue
## Will adaptation or mitigation be the prevailing strategy?

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Mitigation</th>
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<tbody>
<tr>
<td>“Direct concrete effect, but only treating the symptoms, not the disease”</td>
<td>“Addresses the underlying issue in the long term, but impact not visible in the short term”</td>
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<tr>
<td>✓ Immediate effect of investments (in 1-2 years)</td>
<td>✓ Long term effect of investments (&gt;20-30 years) – benefit comparable to global insurance</td>
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<tr>
<td>✓ Obvious self-interest</td>
<td>✓ Very indirect link to self-interest</td>
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<tr>
<td>✓ No dependence on other stakeholders for benefits to be realized</td>
<td>✓ Large dependence on many other stakeholders for the benefit to be realized</td>
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<tr>
<td>✓ Much more expensive in the long term than mitigation</td>
<td>✓ Cheap compared to adaptation in the long term</td>
</tr>
<tr>
<td>✓ Cannot protect in the long term against all global warming effects</td>
<td>✓ Addresses the root cause and solves the problem</td>
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**either or? how to combine?**
Thank you
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