Swiss Re

The effects of climate change: Storm damage in Europe on the rise

Climate change is affecting winter storms in Europe. Based on the findings of a scientific study, Swiss Re forecasts a significant rise in damage from storm events in the long term, creating additional risk for society and insurers to manage.

Focus report

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Climate change will lead to more frequent and intense winter storms in Europe, causing increased damage in the long term. This is the conclusion drawn by Swiss Re based on a study undertaken by the Swiss Federal Institute of Technology (ETHZ) in Zurich.

For the first time, scientists have linked Swiss Re's loss model with climate models to quantify the impact of climate change on European winter storm damage. Claims are forecast to increase by 16 to 68 percent over the period 1975 to 2085 in constant currency. The study confirms what many have been suspecting: climate change affects the insurance industry and creates the societal challenge of managing increased risk. For the insurers, this means ensuring that the impacts of climate change are systematically integrated into risk assessment and risk management processes. Swiss Re will incorporate the study results in its proprietary windstorm tool and Group steering model.

While the insurance industry is an important contributor, it cannot address the challenges of climate change on its own: a solution will require a concerted effort by all economic and social stakeholders.

The study analyses the effects of climate change on winter storms in Europe and quantifies the impact on insured claims. Natural perils experts from Swiss Re and scientists from the Swiss Federal Institute of Technology in Zurich combined several climatic models with a model of insured losses. A clear trend emerged: over the period 1975 to 2085[1], winter storms in Europe will lead to a 16 to 68 percent increase in claims, with a more pronounced impact for the more severe, less frequent events that are typically reinsured.

The results are best illustrated by means of a numerical example based on the mean values of the models used. Currently, the annual expected loss burden from winter storms in Europe is about EUR 2.6 billion. Assuming linear progression, this figure could increase by around EUR 11 million annually. At first glance, the rise may not seem all that dramatic, particularly since all models have some element of uncertainty and natural variability will confuse the signal of the underlying trend. However, this means that if claims were to increase by EUR 110 million, or almost five percent of today's levels within ten years, the expected annual insured loss from winter storms in Europe would be EUR 3.5 billion in 2085. That is EUR 0.9 billion more than at present.

Summary of the findings

- An increase in average annual loss of 16%–68% over the period 1975–2085[1], in constant currency, depending on the model
- A disproportionate increase in losses for less frequent events (in high insurance and reinsurance layers)
- Country-to-country variance in the increase in expected losses
- Changes to both storm severity and frequency

More importantly, the rarer and more significant the storm, the greater the increase in expected claims will be. The impact will depend on the country affected and the severity of the storms involved; that is, storm intensity will not increase uniformly in all countries. At the same time, shifting storm tracks will mean that certain regions may see an increase while others experience a decrease in storm activity. For some countries, the deviation from the mean values will be considerable. The impact on Germany, for example, is expected to be almost three times the corresponding European value.

In Europe, reinsurance cover for winter storms is frequently sold on the basis of a 100-year or 200-year event. These high layers are disproportionately affected by the expected rise in claims. Based on the current 100-year loss for Europe of EUR 21 billion, the study anticipates an annual increase of this level of almost EUR 200 million. A rise of EUR 2 billion in ten years represents an increase of around 10 percent compared to current loss levels. And the progression for a 200-year loss is even more pronounced.

The climate experts used two global and three regional climatic models in the study, generating a broad spread in expected losses. What is particularly meaningful, however, is that the underlying trend was consistent in all three models.

The study concentrated only on changes from wind exposure. To consider the complete impact on insured claims, it would also be necessary to consider such additional factors as inflation, the increased concentration of insured values, higher insurance penetration, and societal and private protection measures.

1 The climatic simulations compare the period 1961–1990 with the years 2071–2100.

The study did not consider the impact of climate change on flood risk, including the generally anticipated rise in precipitation and the effect of storm surge on coastal regions.

Implications for the insurance industry

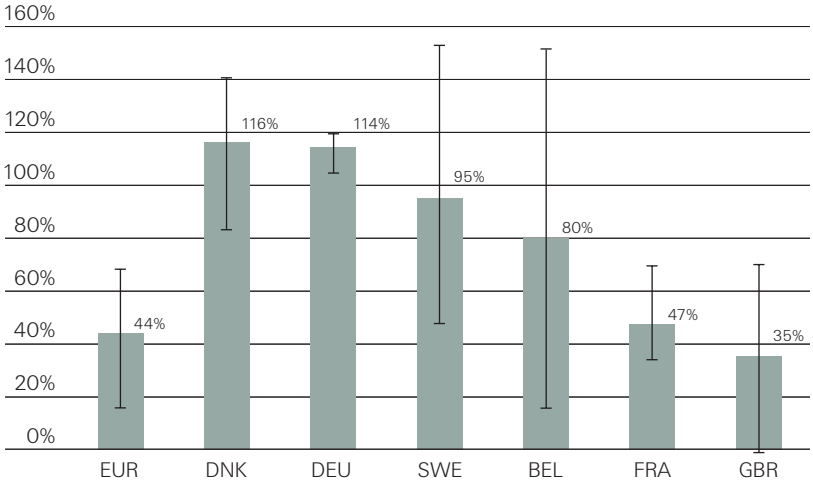
At the forecast pace of change, the insurance industry is well equipped to absorb the increasing winter storm risk, provided the exposure change is recognised and appropriate action initiated. However, it will be essential to acknowledge the trend and react proactively: merely considering statistics from past experience is no longer sufficient in a period of climatic change.

The results of the climate study underline the need for sustainable risk management. The findings obtained from this and other scientific studies need to be reviewed and integrated in the insurance industry's operational framework.

This means that the risk premium should reflect the changes in exposure, and the increased risk must be reflected in capital and capacity steering models. By doing so, insurers can determine with more accuracy individual risk and capital costs, and ensure that the allocated capacity and accompanying diversification more fully reflect the actual exposure.

Since we are already 30 years into the period which lies between the two climatic reference periods of the study, one must assume that some of the change has already taken place, although natural climate variability does not allow the corresponding statistical evidence to be produced. This is particularly important to consider when the storm hazard of a risk assessment model is calibrated against historical storm frequencies and intensities. Any risk analysis under such a premise will underestimate today's storm risk to some extent, unless the estimated accumulated climate change impact up to now is specifically adjusted for.

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

Also relevant for insurers is the appropriate level of coverage, given the disproportionate increase in damage from less frequent large events. Storms that are currently classed as 100-year events may, as the result of climate change, become 60- or 70-year events in the decades to come. Insurers may therefore choose to build in a margin for uncertainty when structuring their reinsurance programmes, or introduce other loss mitigating measures.

It is in the interests of all stakeholders, including insurers, to create incentives for clients to implement protective changes and structural modifications for their properties. Preventive building maintenance can considerably reduce storm damage, especially as vulnerability rises disproportionately to wind speed.

Tackling climate change

Today's economy would not function without effective and efficient mechanisms to transfer risk, and insurers and reinsurers play a key role in this process. To ensure their vitality and contribution, changes in the risk landscape need to be identified and communicated at an early stage.

The task is not an easy one, as it is often difficult to separate the impact of fortuitous, major winter storm events (or their absence) from the underlying trend. It is therefore essential not to become complacent and treat each storm event as simple "bad luck". Scientists and insurers have a clear role in communicating actively the changing risk exposure, and encouraging public dialogue on the issue.

Of course, underwriting adjustments are only one part of the solution. An optimal outcome is not achieved solely by having insurers increase premiums. The principles of sustainability are important, and significant effort should be devoted to working collaboratively to mitigate the impact of natural events.

Climate protection efforts need to be accelerated, and politicians and the public are increasingly aware of the significant role they can play. This includes reducing greenhouse gas emissions and energy consumption, and developing new, environmentally friendly technologies. Promoting adequate settlement planning, establishing appropriate construction standards and developing an early-warning system are other important factors.

Swiss Re's commitment to the issue of climate change goes well beyond offering traditional property insurance: the organisation has committed itself to sustainability as a fundamental tenet of business activities. Swiss Re continues to develop alternative forms of risk transfer to manage the financial consequences of a changing climate: catastrophe bonds and weather derivatives are two such examples. At the preventive level, Swiss Re is actively engaged in activities to mitigate further global warming, including developing products and services that support Kyoto-based instruments and emissions trading, investing in renewable energy sources and actively encouraging political debate on the international stage.

Swiss Re takes its commitment seriously. The study is one of the ways in which it is fostering risk dialogue – and all economic and social stakeholders are encouraged to contribute, too.

Methodology of the study[2]

As part of a study to quantify the impact of climate change on winter storm damage in Europe, scientists from the Swiss Federal Institute of Technology and Swiss Re's natural catastrophe experts used state-of-the-art numerical simulations to evaluate the effect of the climate now and in the future. The scenario used in the models (A2, IPCC 2001, Intergovernmental Panel on Climate Change) is based on significant population and economic growth and a two-fold increase in CO_2 concentrations by the end of the century.

Natural perils experts combined two global and three regional climatic models with Swiss Re's winter storm loss model and used it to calculate the annual expected loss and loss frequency curve for a pan-European insurance portfolio representative of today's market. They were thus able to quantify the effects of climate change for Europe as a whole and also arrived at a breakdown into individual countries.

2 Study "Modelling European Winter Wind Storm Losses in Current and Future Climate", submitted to the journal Climatic Change.
Authors: Schwierz (ETHZ), Heck (Swiss Re), Zenklusen (Meteo Schweiz), Bresch (Swiss Re), Schär (ETHZ), Vidale (ETHZ) und Wild (ETHZ) 2006.

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