Creating **solutions for sustainability**

Our re/insurance solutions help to address key environmental and social challenges. We focus on natural catastrophes and climate change, food security, renewable energy, funding longer lives and advancing access to insurance.

By managing risks and covering losses, re/insurance creates stability and enables economic growth. However, some environmental and social challenges can undermine sustainable progress if left unaddressed. Helping our clients and society tackle such risks is a key part of our commitment as a responsible company and of our vision to make the world more resilient.

Currently, we focus on the following themes: natural disaster and climate risks, food security, sustainable energy and funding longer lives. We develop our solutions as part of our established risk modelling and underwriting activities or by creating innovative new products in close cooperation with our clients and partners.

Thus, our solutions frequently include:
- Public-sector partners: Besides direct insurers and corporate clients, we develop risk transfer solutions for, and in cooperation with, governments and various public-sector organisations;
- Index-based insurance products: We are a pioneer in creating innovative insurance solutions that use an index to determine payments;
- Insurance-linked securities (ILS) or cat bonds: We are a leading developer of these products, which enable cedents to transfer large risks to the capital markets.

Across our efforts, we seek to develop solutions that improve access to insurance protection, especially in emerging and developing countries.

If governments and communities are financially protected against risks such as windstorms, earthquakes, drought and flooding, they can better cope with the immediate consequences of a disaster.

Just as importantly, our solutions help to create the conditions for sustained social and economic development, as they help to safeguard investments, allow governments to stabilise budgets and give people the financial stability required to build and maintain businesses.

Natural catastrophes and climate change

Natural catastrophes are a key risk in our Property & Casualty (P&C) business. The damage caused by floods, storms, earthquakes and other natural disasters can affect millions of lives and the economies of entire countries. In 2016, the total worldwide economic losses from natural and man-made catastrophes were estimated at USD 175 billion – of these, USD 54 billion were insured. Having access to effective re/insurance protection against natural catastrophes creates significant benefits for our clients and for society at large. In 2016, we received USD 2.5 billion of P&C Reinsurance premiums for natural catastrophe covers (for losses larger than USD 20 million), which was equivalent to approximately 15% of total premiums in this business segment.

On average, both economic and insured losses caused by natural catastrophes have increased steadily over the past 20 years. The key reasons have been economic development, population growth, urbanisation and a higher concentration of assets in exposed areas.

This general trend will continue. But crucially, losses will be further aggravated by climate change. The scientific consensus is that a continued rise in average global temperatures will have a significant effect on weather-related natural catastrophes. According to the Special Report on Extremes (SREX, 2012) and the Fifth Assessment Report (AR5, 2014), published by the Intergovernmental Panel on Climate Change (IPCC, www.ipcc.ch), a

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USD
2.5 bn

Natural catastrophe premiums in our P&C Reinsurance business

(USD 2.6 billion in 2015)

A coastline in the US being battered by a hurricane. Understanding the impact of climate change on the frequency and intensity of natural catastrophes is vital for our business.

Natural catastrophe data
In our 2016 Financial Report we provide detailed quantitative information on natural catastrophe perils: the four perils with the highest expected annual losses (page 125) and the liquidity requirements stemming from four extreme loss scenarios ("insurance risk stress tests", page 73).

changing climate gradually leads to shifts in the frequency, intensity, spatial extent, duration and timing of extreme weather events.

If climate change remains unchecked, the makeup of the main drivers will thus gradually shift, with climate change accounting for an increasingly large share of natural catastrophe losses.

To assess our Property & Casualty business accurately and to structure sound risk transfer solutions, we need to clearly understand the economic impact of natural catastrophes and the effect of climate change. This is why we invest in proprietary, state-of-the-art natural catastrophe models and regularly collaborate with universities and scientific institutions.

While the impact of climate change will increase gradually over the coming decades, most of our business is renewed annually and our risk models are refined every few years. Risks are normally covered for 12 months (up to five years for cat bonds). Thus, reinsurance premiums do not reflect expected loss trends over the coming decades. Rather, for underwriting and risk management purposes, our models provide an estimate of the current risk. But as natural catastrophe losses continue to rise as a result of the different factors described above, our models will gradually factor in this trend, since they are updated and refined at regular intervals.

In addition to providing re/insurance covers, we offer our clients strategic expertise and integral risk assessments of natural disasters and climate adaptation. These include our Economics of Climate Adaptation (ECA) studies, free access for our clients to Swiss Re's

For more information see
swissre.com/global_partnerships/

For more information see
swissre.com/climate_action/

Climate change adaptation
Our solutions offering re/insurance protection against extreme weather events and weather volatility help communities to adapt to climate change by making them more resilient against such risks.

CatNet® tool and our expertise publications. You can see a sample of our recent publications on pages 51 and 80–81.

CatNet®: free natural hazard information for our clients

CatNet®, Swiss Re's online natural hazard atlas, makes regions' risk profiles visible. Clients can view these profiles in maps that are complemented by a geographical database with detailed information on natural hazards such as earthquakes, tropical cyclones, winter storms, tsunamis and floods. CatNet® thus provides a professional overview and assessment of risk exposures across the globe, quickly and easily.

We completely overhauled our CatNet® tool in 2016. It is browser-based and available free of charge to our clients. You can find more information by visiting swissre.com/catnet

For more information see
swissre.com/rethinking/climate_and_natural_disaster_risk/

For more information see
swissre.com/clients/client_tools/about_catnet.html

Strengthening risk resilience: 2016 highlights

Hereafter, we describe some key transactions and initiatives we were involved in during 2016 to strengthen risk resilience. Covering a range of natural disaster and weather risks, they help communities become more resilient to such shocks by ensuring that adequate funding is in place for quick and effective responses.

Helping to make New Orleans more resilient

More than ten years have passed since September 2005 when New Orleans was hit by Hurricane Katrina and suffered massive damage through the ensuing storm surge and flooding. Culminating its fight back from disaster, the city's leadership launched Resilient New Orleans ("Resilient Nola", www.resilientnola.org) in 2015, the world's first comprehensive urban resilience strategy.

We have played a prominent part in this initiative, joining up with utility company Veolia to help make the city's vital systems more resilient to disasters, on the one hand, and to facilitate speedy relief and recovery on the other. At a ceremony celebrating Resilient Nola's first anniversary in September

Insurance-linked securities

We are a leading player in the insurance-linked securities (ILS) sector. ILS are capital market instruments, typically in bond or derivative format, designed to meet the risk or capital management needs of a transaction sponsor. In exchange for a coupon or premium payment, the sponsor receives single or multi-year collateralised protection for specified risk events. If such an event occurs, the sponsor receives all or part of the principal; otherwise this is paid back to the investors in full at maturity.

ILS are particularly well-suited to provide protection against peak risks – events that happen infrequently but tend to lead to large losses, for example earthquakes or windstorms. ILS are used for both risk and capital management purposes in the P&C and the L&H business. For reinsurers they are attractive because they free up scarce capital; for insurers and corporate clients they provide multi-year collateralised protection; and for investors they offer attractive diversification possibilities, as they are relatively uncorrelated with other asset classes.

In 2016, our registered broker-dealer subsidiaries arranged non-life ILS worth USD 1.33 billion, all of them for clients. This was equivalent to about a fifth of total new issuance in the non-life ILS market.

For more information see
swissre.com/investors/ils/

2016, the project's key measures were presented to the public. Since then, the baseline exposure and existing resilience of all the city's water, sanitation and related energy assets has been assessed to today's risk as well as the expected risk in 30 years' time, based on Swiss Re's proprietary catastrophe modelling and climate risk analysis.

With this analysis in hand, New Orleans is exploring ways to utilise the capacity of the private sector to ensure the city can respond faster after a disaster and safeguard its economic future.

Protecting homeowners in the UK against flood risk

In the UK, we started to provide support to Flood Re (www.floodre.co.uk), a pioneering scheme to make flood insurance more affordable for residential homeowners at risk. In recent years, floods have risen in frequency and intensity in the UK, causing unprecedented damage. Given the impact of climate change on northern European winter storms, this trend will likely continue or even increase.

Based on a partnership between the UK government and the insurance industry, Flood Re manages a central fund that allows insurers to pass on the flood risk of individual policies. When a homeowner suffers damage from flooding and makes a valid claim, the scheme reimburses the respective insurer out of this fund. This reduces insurance premiums for flood-prone homes.

Swiss Re supports the programme as a lead reinsurer. In total, Flood Re has secured GBP 2.1 billion of reinsurance cover, making it one of the five largest natural disaster schemes in the world. Ultimately, it is expected to reach some 350 000 households in the UK, providing valuable learnings for other countries at high risk of flooding.

Ramping up natural disaster insurance in China

In 2016, we helped to establish two significant insurance pilot programmes against natural disaster risks in China. Both offer protection of up to around USD 350 million, which makes them the largest commercial natural disaster insurance schemes in China to date. Furthermore, both use parametric triggers, which means they can pay out quickly in the event of a disaster.

The first of the two programmes involves the government of Heilongjiang Province and the Sunlight Agriculture Mutual Insurance Company of China. It protects farmers in 28 poor rural counties of the province against the financial consequences of natural catastrophes, specifically floods, excessive rain, drought and low temperatures. Combining a weather index product and a satellite-based parametric product, the programme covers harm to lives and property as well as loss of income.

Many towns in the north of England have been hit by major floods in recent years. In 2016, we started to support Flood Re, a pioneering scheme set up to offer vulnerable UK homeowners more affordable flood insurance.

As the programme's sole reinsurer and technical adviser, we used advanced modelling techniques to design this innovative solution – the first of its kind.

In the second pilot, we act as sole reinsurer to protect ten prefectures of Guangdong Province against damage from tropical cyclones and excessive rainfall, in cooperation with local insurers, including the People's Insurance Company of China (PICC, www.picc.com). This, too, is a parametric product, using rainfall and wind speed indices to allow for faster payouts. Having quick access to emergency funding after a natural disaster is particularly important in Guangdong. It is one of China's most important economic hubs and home to many global companies, but faces a severe natural disaster risk.

You can read more about the background of these pilot programmes on page 48.

Supporting a national rice insurance scheme in Thailand
Thailand is one of the world's top rice producers. Rice farming is prevalent across the entire country and provides large parts of the population with their livelihoods. However, rice farmers in the country face the latent threat of natural disasters, in particular floods and droughts. To address this, a rice insurance scheme, complementing the Government Disaster Relief Programme, was launched together with the Thai General Insurance Association (www.tgia.org) a decade ago, offering further financial assistance to farmers whose crops have been damaged by destructive weather conditions.

Unfortunately, a typical problem of such traditional crop insurance schemes is that their administration costs are often too high in the early stages when they do not yet have the critical mass of policies to make them viable for their key stakeholders, ie governments, insurance companies and farmers. To overcome this obstacle and scale up the scheme, we have worked closely with the Thai government over the last two years.

As a result of these efforts, the scheme was approved for a milestone budget of THB 3 billion (approximately USD 90 million) in 2016, with the goal of covering two million rice farmers. The plan for the future is to extend the scheme to further crops and to widen the policy covers.

Enabling MFIs in Indonesia to cope with earthquakes
The provinces of Aceh and West Sumatra in Indonesia are highly prone to earthquakes. The devastation caused by the tsunami of 2004, which was triggered by a magnitude 9.1 earthquake, is still in everybody's minds. Five years later, in 2009, an earthquake with a magnitude of 7.6 occurred 55 kilometres west of Padang, the capital of West Sumatra Province. It is estimated to have caused total losses of approximately USD 2.5 billion, of which only USD 55 million were insured.

Such earthquakes not only cost many lives and destroy homes and buildings, they also have serious consequences for economic growth and development in the region. Responding to this threat, we have partnered with PT Asuransi Wahana Tata (Aswata, www.aswata.co.id) and Mercy Corps (www.mercycorps.org.uk) in Indonesia to develop the first parametric insurance solution benefiting microfinance institutions (MFIs) in the area. It is triggered by the measured strength of an earthquake and then pays out automatically.

MFIs are crucial for economic development in the area because they provide credit and insurance to numerous small businesses that could not survive otherwise. As the insured MFIs receive emergency funds quickly in the event of a strong earthquake, they have the means to help their small business clients to stay afloat and rebuild. Swiss Re supports this innovative solution with product structuring, pricing and underwriting, as well as reinsuring the risk.

Protecting Kenyan livestock farmers against drought
Droughts are responsible for approximately 75% of livestock deaths in the Horn of Africa, repeatedly leaving herders, their families and entire communities destitute. To protect pastoralists against this persistent threat, we helped to launch the Kenya Livestock Insurance Program (KLIP), the first-ever government livestock insurance scheme in Africa.

KLIP was successfully piloted in late 2015 in Wajir and Turkana, two counties in the country's north, and is now being scaled up to benefit herders in remote areas across the whole of Kenya. It is an index-based livestock insurance scheme that uses satellite imagery to assess the state of grazing conditions by measuring deviation in the colour of ground vegetation. When a certain threshold is reached, the insured herders automatically receive a lump sum payment, allowing them to provide their livestock with feed and water.

The programme was developed with the support of Kenya's Ministry of Agriculture (www.mygov.go.ke), the World Bank (www.worldbank.org), local insurers and the International Livestock Research Institute (www.ilri.org) in Nairobi, with Swiss Re acting as the main reinsurance provider. Wholly funded by the Kenyan government, the programme involves preselection of beneficiaries from vulnerable households by county governments under the Hunger Safety Net Program (www.hsnp.or.ke). It covers up to five animals per household, but herders can choose to insure more animals at their own expense.

For more information see
swissre.com/rethinking/food_security/

A mother and daughter team preparing fresh black tortillas for a small restaurant in the northwest of Guatemala. Working together with MiCRO and other partners, we help to insure small businesses and smallholder farmers in the country against natural disaster and weather risks that may threaten their livelihoods.

Helping to insure small businesses in Guatemala

After the devastating earthquake that struck Haiti in 2010, Swiss Re helped set up the Microinsurance Catastrophe Risk Organisation, or MiCRO for short (www.microrisk.org). Combining the capital efficiency of the reinsurance market with donor capital, MiCRO specialises in developing attractive and affordable insurance solutions for low-income populations, especially micro-entrepreneurs and smallholder farmers.

In 2016, MiCRO launched a new product in Guatemala offering insurance protection against losses resulting from excessive rainfall, severe drought or earthquakes. It is an index-based solution, paying out automatically according to predetermined parameters and event data from objective sources, including NASA satellites. Local partners Banrural (www.banrual.com.gt) and Aseguradora Rural (www.aseguradorarural.com.gt) sell the policies. Swiss Re provided technical assistance during product development and reinsures the risks.

The agriculture and small business sectors are vital to the further development of Central American economies in general, but are highly vulnerable to weather-related risks. On top of this, climate change is expected to aggravate extreme weather events, increasing both their frequency and intensity. MiCRO plans to expand such index-based insurance products to further countries, and has already submitted one for approval in El Salvador. The goal is to reach 250000 people in the region by 2019.

Payouts to our clients in 2016
Innovative solutions, as described on these pages, all help to extend insurance protection. Three such solutions we have helped develop in recent years showed their practical benefits in 2016 by making payouts to their clients.

In the Caribbean, Hurricane Matthew caused many casualties and brought widespread destruction across the region. CCRIF SPC (www.ccrif.org), formerly the Caribbean Catastrophe Risk Insurance Facility, which we have been reinsuring since 2008, made payouts totalling USD 29 million to the governments of Haiti, Barbados, St. Lucia, St. Vincent and the Grenadines within two weeks of the disaster. This brought the total of emergency payouts to 21 since 2007, worth USD 68 million.

In southern China, Typhoon Haima fortunately had a less severe human toll but destroyed many houses and crops. The city of Shanwei in Guangdong Province is one of the prefectures that earlier in the year had signed up to our parametric insurance programme against natural disaster risks and so received a payout less than a week after the impact.

In Mexico, the MultiCat cat bond, which we helped to develop in 2009 in cooperation with the World Bank, made a payout of USD 50 million to the Mexican government early in the year. The payment was triggered by Hurricane Patricia in October 2015. When the storm formed off Mexico's western coast, it was one of the strongest hurricanes on record. Fortunately, it weakened before making landfall and took a track over more rural areas, sparing many lives.

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USD 3.9 billion

Total amount of climate protection offered to sovereigns and sub-sovereigns since 2014

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1 million

Smallholder farmers benefiting from the Grow Africa Partnership in 2016

Our commitments

... to the United Nations

Many of our recent efforts to expand insurance protection cover losses from natural catastrophes and weather volatility (eg drought or excessive rainfall). As climate change is predicted to increase these losses, such transactions also help communities to strengthen their climate resilience. Furthermore, we have found that partnering with public sector clients, especially national and regional governments, is an effective way to develop solutions.

Building on these experiences, we made a significant commitment to the United Nations at its Climate Summit in September 2014. Personally addressing the government leaders present at the summit, our then Group CEO Michel M. Liès made the following pledge: "By the year 2020, Swiss Re commits to having advised 50 sovereigns and sub-sovereigns on climate risk resilience and to have offered them USD 10 billion against this risk."

We have agreed with the United Nations to report publicly on the progress we make on this commitment. By the end of 2016, we had advised 26 sovereigns and sub-sovereigns on climate risk resilience and offered them a total of USD 3.9 billion in re/insurance protection.

... to the Grow Africa Partnership

In our work to bring risk protection to underinsured communities, in recent years we have put a focus on the African continent, in particular Sub-Saharan Africa. In 2012, we made a commitment to the Grow Africa Partnership (www.growafrica.org), an initiative launched by a number of organisations to promote public-private collaboration and investment in African agriculture. As most smallholder farmers in Sub-Saharan Africa have had no access to insurance protection to date, addressing this problem is crucial to protect families' livelihoods, facilitate economic development and reduce poverty.

Our commitment to the Grow Africa Partnership centres on the following three goals:

- Give farmers in Sub-Saharan Africa access to tools such as weather and yield index insurance products;
- Invest in resources equivalent to about USD 2 million per year to support the development of sustainable agricultural risk management markets;
- Provide agricultural insurance for up to 1.4 million smallholder farmers.

Working together with different partners, we helped to bring weather insurance to 1 million smallholder farmers in 11 Sub-Saharan countries by the end of 2016. This is less than the 1.6 million recorded in the previous year. The reasons for this decrease are twofold: Firstly, developing schemes that promise to become commercially viable continues to face significant challenges, in particular regarding the creation of effective distribution networks and overcoming market fragmentation. Secondly, the entry of additional capacity providers into some existing schemes has led to a reduction of Swiss Re's participation share in them.

Climate change mitigation
By facilitating the construction of offshore wind farms, these solutions support efforts to reduce CO_2 emissions and hence mitigate climate change.

35

Offshore wind projects we have participated in over the last five years

Sustainable energy solutions

Sustainable energy sources play a crucial role in reducing CO_2 emissions and securing future energy supplies. Given our strategic focus on climate change, we are keen to support energy generation from renewable sources. But as sustainable energy projects increase in scale and complexity, so do the risks associated with them. However, innovative risk transfer solutions can help reduce these risks and drive investment in the sector.

Offshore wind is considered one of the most promising renewable energy sources. But like renewable energy in general, it presents very complex risks. Unlike traditional lines, there is no long loss history to refer to. Underwriting such risks is therefore challenging from an insurance perspective.

Swiss Re Corporate Solutions takes a special interest in offshore wind as it has both the large capacity and the technical expertise to help manage the associated risks. We are continually enhancing our understanding of these risks and share our insights with our clients as well as other insurers. As a result, we are now considered a "lead market" for offshore wind risks.

In the last five years, Swiss Re Corporate Solutions has participated in 35 offshore wind projects, including wind farms, standalone offshore substations and standalone export cables. In 2016, we were involved in nine offshore wind farm projects worldwide and were the lead insurer in five of them.

Rentel offshore wind farm
These five projects include two we signed in 2016 as co-lead insurer. One of them is Rentel (www.rentel.be) in the Belgian North Sea, situated approximately 34 km from Zeebrugge and 40 km from Ostend. It is being developed by a consortium of eight Belgian shareholders with a strong track record in offshore wind, who joined forces in a strategic competence centre. The insurance cover offers Rentel compensation for material damage and loss of profit, both in the construction phase and the first three years of the farm's operational phase.

Offshore wind farms come with complex risks. Swiss Re Corporate Solutions has the financial capacity and the technical know-how to offer effective insurance for such risks.

Rentel will comprise 42 wind turbines of 7.35 megawatts each, in total producing 309 megawatts at peak. The turbines are connected to an offshore transformer station, from which the power will be transmitted to an onshore substation at Zeebrugge and fed into the grid. The electricity generated by the wind farm will supply approximately 285 000 households with climate-friendly energy. Construction started in early 2017 and is expected to be completed by the end of 2018.

Merkur offshore wind farm

The second new facility we underwrote in 2016 is Merkur Offshore Wind Park in the German sector of the North Sea, 45 km off the island of Borkum. It is a joint venture between Windreich and Belgium-based DEME. Merkur, too, is insured against material damage and loss of profit in its construction phase and the first three years of its operational phase. Beyond this, the insurance cover also protects the manufacturers of the wind turbines and foundations.

Merkur will consist of 66 wind turbines of 6 megawatts each, resulting in a total installed capacity of 396 megawatts. As the wind park is located a considerable distance away from the German mainland, the power it generates will be transmitted to a converter station currently being built (DolWin gamma) and converted to direct current. This technology makes it possible to minimise transmission losses over the 80 km long sea cable.

Award for an innovative wind risk hedge

In 2016, Swiss Re Corporate Solutions won the second consecutive award from Environmental Finance magazine for a particularly innovative transaction in the "weather risk management" category. The award recognised a wind risk hedge we developed for Infigen Energy, the largest owner of wind energy capacity in Australia. This hedge is the first of its kind because it looks at actual energy production across multiple sites. In contrast, traditional wind protection solutions are tied to single sites and are based on modelled wind speed indexes.

In practice, the new product pays Infigen Energy a fixed amount for each megawatt hour of energy production lost due to low wind, below a specified trigger across its entire 557 megawatt Australian portfolio of six wind farms. This helps our client to raise cash flow predictability and to reduce earnings volatility. As renewable energy investment continues to grow, we expect demand for effective risk management solutions such as this to increase substantially over the next few years. We already won this award in 2015 for a solar hedge for photovoltaic power plants in China, underlining our ability to respond to this demand.

Life & health insurance and funding longer lives

Life and health (L&H) insurance products play a crucial role in creating stability for individuals and society. They provide financial security in the event of death or illness, give access to medical treatment and offer dependable income in retirement. We help primary L&H insurers and other clients from the private and public sector to manage such risks efficiently, thanks to our specialist knowledge of mortality, morbidity and longevity trends.

Longevity and health insurance remained two of our strategic priorities in the L&H business. The demand for longevity solutions is expected to grow further as demographics shift. We have invested in research and development to improve our ability to predict mortality and longevity trends.

Demand for commercial health insurance solutions has also been growing, driven by several major demographic and socio-economic trends. These include: the greater healthcare needs of ageing societies; rising healthcare expectations of the new middle class, especially in growth markets; and healthcare finance reform, particularly in mature markets. We offer a variety of health reinsurance solutions to meet these needs, from short-term protection against the risk of volatility in medical expenses for insurers or employers, to very long-term protection against the financial impact of disability or critical illness.

Longevity solutions

With life expectancy rising, pension schemes face the risk that they will not be able to meet all their commitments. Longevity transactions cover this risk by insuring the schemes' liabilities in case their members live longer than expected.

In recent years, we have completed a number of landmark longevity transactions with different clients in the UK:

- The Scottish & Newcastle Pension Plan (19 000 members)
- The Aviva Staff Pension Scheme (19 000 members plus partners)
- One of AkzoNobel's pension funds (17 000 members)
- The LV= pension fund (more than 5 000 members)
- The Royal County of Berkshire Pension Fund (11 000 members).

We have described these transactions in more detail in recent editions of our Corporate Responsibility Report.

For more information see **swissre.com/rethinking/sustainable_energy/**

For more information see **swissre.com/rethinking/longer_lives/**