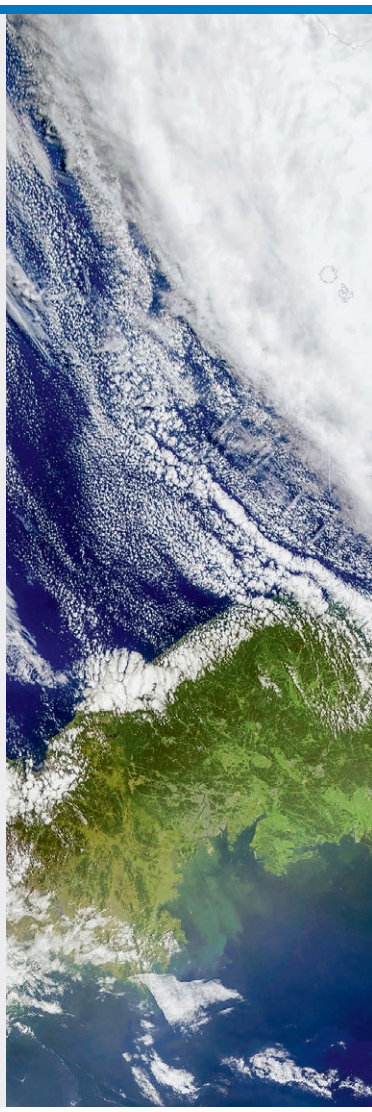
Creating **solutions for sustainability**

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



USD 2.3 bn

Natural catastrophe premiums in our P&C Reinsurance business

(USD 2.3 billion in 2017)

By managing risks and covering losses, re/insurance creates stability and enables economic growth. However, some environmental and social challenges may 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.

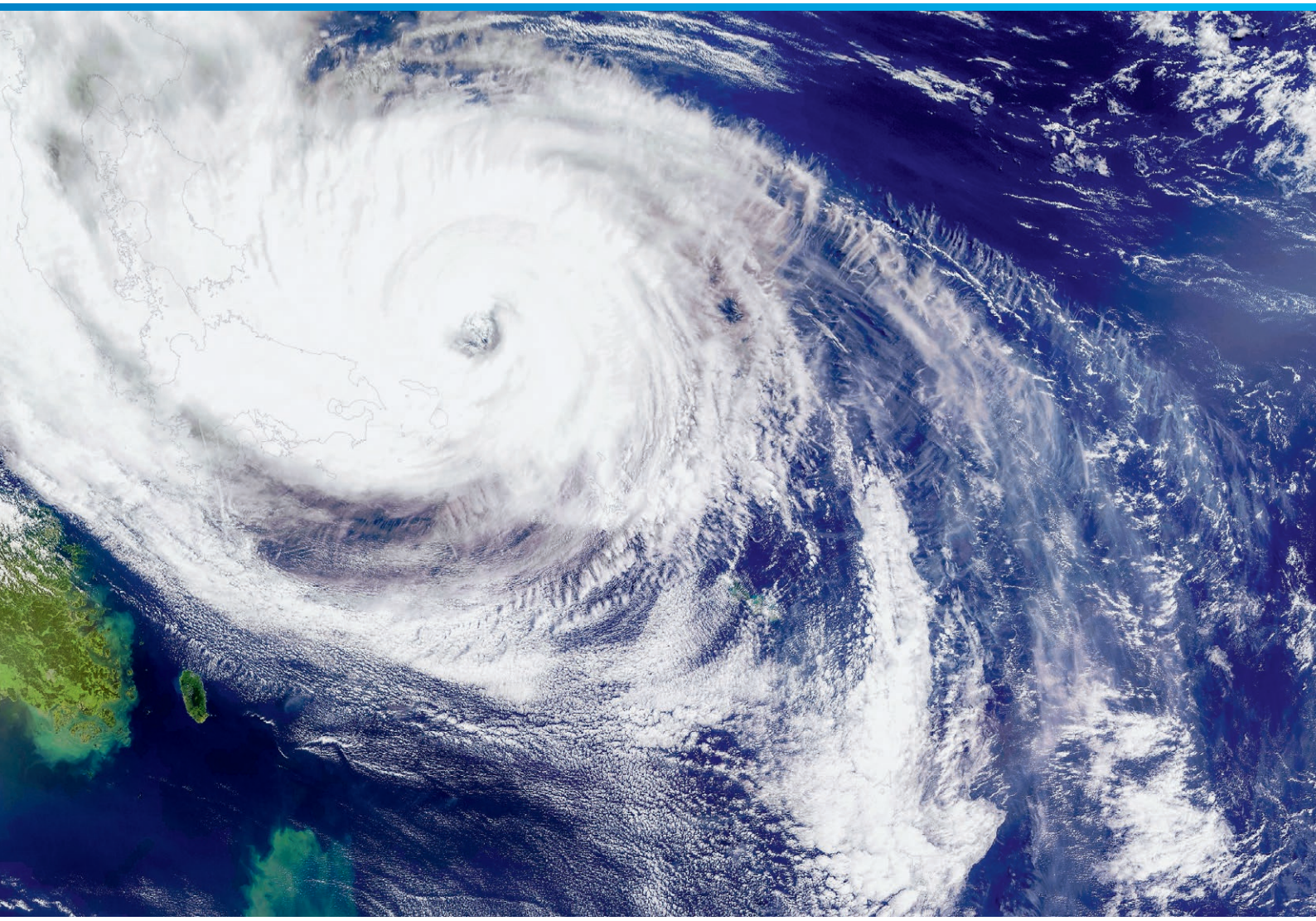
Currently, our focus is on the following themes: natural disaster and climate risks, food security, sustainable energy and longevity. We develop our solutions as part of our established risk modelling and underwriting activities or by creating innovative new products in close cooperation with our clients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

WEBSITE
You can find out more about insurance-linked securities at:
www.swissre.com/investors/investors-ILS.html

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 such risks as windstorms, earthquakes, drought and flooding, they can better cope with the immediate consequences of a disaster.



A typhoon approaching Japan. Natural catastrophes and the impact of climate change are key risks in our core business.

NATURAL CATASTROPHE DATA

In our 2018 Financial Report, we provide detailed quantitative information on natural catastrophe perils: the four perils with the highest expected annual losses (page 184) and the liquidity requirements stemming from four extreme loss scenarios ("Insurance risk stress tests", page 91).

Just as importantly, our solutions help create the conditions for sustained social and economic development, as they protect 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 catastrophes can affect millions of lives and the economies of entire countries. Following a relatively benign first half of the year, the second half saw a number of natural catastrophes, contributing to make 2018 the fourth-costliest year for the insurance industry according to the Swiss Re Institute.

Swiss Re's estimated combined claims from natural catastrophes were USD 2.2 billion in 2018.

These figures underline the significant benefits that access to effective re/insurance protection against natural catastrophes creates for our clients and for society at large. In 2018, our clients in P&C Reinsurance paid us USD 2.3 billion of natural catastrophe premiums (for losses larger than USD 20 million), equivalent to approximately 14% of total premiums in this business segment.

Even before 2017 and 2018, both economic and insured losses caused by natural catastrophes had steadily increased on average over the past 20 years. The main reasons are economic development, population growth, urbanisation and a higher concentration of assets in exposed areas.

This general trend will continue. But crucially, economic 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 the Fifth Assessment Report (AR5, 2014) and the Special Report on Global Warming of 1.5 °C (SR15, 2018), published by the Intergovernmental Panel on Climate Change (IPCC, www.ipcc.ch), a 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 and repriced 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, re/insurance 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 listed above, our models will gradually factor in this trend.

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 free access for our clients to Swiss Re's CatNet® tool (swissre.com/reinsurance/property-and-casualty/solutions/property-specialty-solutions/catnet.html), which includes our recently launched Global Storm Surge Zones service, and our expertise publications.

CONTENT IN THE 2018 FINANCIAL REPORT
You can view our Climate-related Financial Disclosures in the "Corporate responsibility" chapter, pages 172–189.

Strengthening risk resilience: 2018 highlights

In this section, we describe a selection of the innovative transactions and initiatives we were involved in during 2018 to strengthen risk resilience. These transactions help address the following of our Corporate Responsibility Topics, often more than one at the same time:

- Managing climate and natural disaster risk
- Partnering for food security
- Advancing access to insurance

They help our clients and their communities become more resilient to the risks they face by ensuring that adequate funding is in place when it is needed.

Flood insurance for homeowners in Florida

As hurricanes Harvey, Irma and Michael underlined once again, many homeowners in Florida are exposed to the risk of flooding. Until recently, however, adding flood insurance to an existing homeowners insurance policy was rarely an option. Because flooding risk is sensitive to each specific location, it has been difficult to price accurately. In a joint venture with Security First Insurance (www.securityfirstflorida.com), we helped develop a flood insurance solution that overcomes this challenge.

The key to this innovative solution is that it uses Swiss Re's proprietary flood model. Based on the unique characteristics of a specific exposure such as location of the structure, type of construction and insured value, our model generates a premium that more accurately reflects the actual risk. Furthermore, the solution combines flood and wind risk in one policy with one deductible, meaning there is no longer a need to distinguish whether a loss has been caused partially by flood or partially by wind.

The customers of Security First can now choose to add the new, optional flood and water backup coverage to their existing homeowners policies. The fact that they can get comprehensive flood insurance protection at reasonable prices through one policy shows that flood risk is insurable in the private market. Beyond sharing the information of our flood model, we support the solution with claims, regulatory, marketing and underwriting expertise, all backed by reinsurance capacity.

Windstorm insurance in four US states

In 2018, Swiss Re Capital Markets structured and placed the issuance of USD 350 million of insurance-linked securities by Frontline Re Ltd on behalf of Frontline Insurance (www.frontlineinsurance.com). The transaction is Frontline's debut catastrophe bond and covers windstorms in Alabama, Florida, North Carolina and South Carolina for a period of four years.

It represents the largest cat bond of a Florida-based insurance company (that is, a non-government entity) to date. The innovative transaction uses an indemnity trigger, featuring an event-adjusted attachment level. For the first time in the cat bond market, this determines payments by ranking the size of events that occur during an annual risk period.

Swiss Re Capital Markets acted as the sole structuring agent and bookrunner for the transaction, which was well received by investors.

Protection against earthquake risk for four Latin American countries

Chile, Colombia, Peru and Mexico are all exposed to the threat of earthquakes. The most recent in a string of major earthquakes occurred in Mexico City in September 2017, taking more than 450 lives and causing economic losses of approximately USD 12 billion. Previously, Chile had been hit in 2010 and Peru in 2007.

In 2011, the four countries founded a regional integration initiative known as the Pacific Alliance (alianzapacifico.net). Working together through this organisation, the countries' governments recently took an important step to improve their financial protection against the potential losses of earthquakes, by sponsoring a catastrophe bond issued by the World Bank's International Bank for Reconstruction and Development (IBRD, www.worldbank.org/en/who-we-are/ibrd). With a total notional of USD 1.36 billion, it is the largest sovereign-sponsored catastrophe bond to date.

Swiss Re Capital Markets acted as joint structuring agent and bookrunner on this landmark transaction. Further, utilising its rated balance sheet, Swiss Re acted as transformer between Mexico and IBRD to facilitate Mexico's access to the capital markets. The flexible nature of the parametric trigger allows the four countries to customise their individual coverage in line with their exposures and overall disaster risk financing strategies. As a result, the countries can now receive fast payouts once the coverage is triggered and are therefore able to accelerate their emergency response following a qualifying earthquake event.

Insuring homeowners in Mexico City against earthquakes

In addition to our involvement in the World Bank's earthquake catastrophe bond for the Pacific Alliance (see above), we also supported a local insurance solution addressing earthquake risks in Mexico City. When the large earthquake of September 2017 occurred, almost 6 000 houses in the city were affected – 61% of which were partially damaged and 39% totally destroyed. This in turn led to social unrest, as most of those affected were low-income homeowners, with neither private insurance nor financial resources to rebuild their homes.

In response, the city government sought ways to leverage its existing natural disaster fund and to provide homeowners with better financial protection against potential losses from earthquakes. In cooperation with a local cedent, Swiss Re has helped develop an innovative programme that offers the city government insurance protection against losses in excess of its own disaster fund, from earthquakes with a magnitude of 8.5 or more.

This insurance scheme automatically covers homeowners who meet a number of requirements. One of them is that they have fully paid their property taxes at the time of an event, which creates a strong incentive for tax compliance and increases the city's revenues. In combination, the insurance solution and the additional revenue will help Mexico City reduce the protection gap connected with major earthquakes.

Protecting coral reefs against hurricane damage

Around the world, coral reefs harbour rich marine ecosystems and are vital for coastal protection. However, they are under threat from a number of sources: disease, bleaching events, diminishing herbivores, algae overgrowth. The most important short-term risk affecting reef structures comes from strong hurricanes: A category 4 to 5 hurricane can destroy 20–60% of live coral cover.

In 2018, we supported the design of a new type of insurance product that offers protection against hurricane damage on the Mesoamerican Barrier Reef System. Stretching over 1 000 km, this is the second-longest reef system in the world and the longest in the Western hemisphere. Not only is it home to some of the world's most important and unique coral reefs, mangrove forests, fish species and marine mammals, it also protects the Riviera Maya, Mexico's primary tourism hub.

The new, innovative parametric insurance solution is designed to protect the coral reef and the beach sand. When triggered by a strong hurricane, it will automatically pay out, thus funding essential restoration measures. Premium payments for the programme will come from the Coastal Zone Management Trust, set up by the state government of Quintana Roo (www.qroo.gob.mx) with support from The Nature Conservancy (www.nature.org) to protect coastal areas in the Caribbean. The trust in turn will collect funds as a portion of tourism taxes and other government sources.

Giving low-income women in Egypt access to life and health insurance

Lack of health insurance is a major protection gap in many parts of the world. In Egypt, for example, many low-income women work in the informal sector, by running a market stall with fruit or vegetable, offering laundry services and similar activities. To date, these micro entrepreneurs usually lack any sort of insurance protection against loss of income due to illness.

In Egypt, most women who run a small business in the informal sector lack any sort of life and health insurance. In 2018, we worked with several partners to expand a pioneering microinsurance programme that addresses this protection gap.

In 2018, we helped expand a pioneering health microinsurance programme that targets this challenge. Originally conceived by Women's World Banking (www.womensworldbanking.org) and the Lead Foundation (lead.org.eg), a dedicated microfinance institution, the programme offers insurance linked to the micro loans Lead offers to its clients.

Called Hemayet Lead (which means "Lead's protection" in Arabic), the solution combines two benefits: a hospital cash benefit of EGP 300 for every night spent at hospital, with limited exclusions (maternity, in particular, is covered), and life insurance for an amount equal to three times the customer's micro loan. Together with AXA Egypt (www.axa-egypt.com), we are strategic partners of Hemayet Lead: AXA Egypt in its primary role of direct insurer, and Swiss Re as the main reinsurer and providing technical support.

At the end of 2018, the programme covered around 200 000 clients, 90% of them women. Such basic but ground-breaking microinsurance and microfinance solutions play a vital role in promoting economic development in emerging countries, and the rapid growth of Hemayet Lead demonstrates that there is strong interest from the informal sector in Egypt.

Supporting an agricultural e-voucher scheme in Zambia

Small-size farms are the main source of livelihoods for about 70% of Zambia's population. The productivity of these farms is generally low, threatening household income and food security. Starting in 2002, the government-run Farmer Input Support Program (FISP) has given the country's smallholder farmers access to improved inputs such as inorganic fertilisers and seeds. However, due to its overly rigid, top-down design and narrow focus, the programme's impact on productivity and, thus, rural poverty remained minimal.

Encouraged by local institutions such as the Indaba Agricultural Policy Research Institute (www.iapri.org.zm), the government changed the programme's delivery mode by introducing electronic vouchers and launched a pilot in 2015. The revamped E-FISP programme offers a more diversified range of products and gives farmers much more flexibility to acquire those inputs that best meet their actual needs based on local conditions. All inputs are insured through a weather index insurance programme designed by local insurance partners. Swiss Re has supported E-FISP by offering pricing and reinsurance capacity.

E-FISP has now been rolled out to the whole country. Regarding its insurance element, we have recently started to engage with the Zambian government on potential areas that need improvements, including product design, distribution and stakeholder engagement.

OUR COMMITMENT TO THE UNITED NATIONS

USD 8.2 billion

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

(USD 5.3 billion by 2017)

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 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 2018, we had advised 96 sovereigns and sub-sovereigns on climate risk resilience and offered a total of USD 8.2 billion in re/insurance protection.

CLIMATE PROTECTION OFFERED TO (SUB-)SOVEREIGNS

	2016	2017	2018
Number of (sub-)sovereigns advised	26	66	96
Amount of climate protection offered (in USD)	3.9 billion	5.3 billion	8.2 billion

Insuring a Chinese county against natural disasters

In China, we helped develop and implement the first-ever natural catastrophe programme at county level. It provides the government of Mao County with comprehensive parametric insurance protection against losses from natural disasters, covering earthquakes, landslides, heavy rainfall and public safety accidents.

Mao County is a minority autonomous area in Sichuan Province, close to the epicentre of the devastating Wenchuan earthquake of 2008. With a magnitude of 8.0, the disaster claimed more than 80 000 lives, left millions of people homeless and caused total damage estimated at RMB 845 billion, with only a small portion covered by insurance.

Alongside the Mao County Government, this pioneering new partnership involves the Groupama-AVIC Property Insurance Company (www.groupama.com.cn/en) as direct insurer. Swiss Re is the programme's sole reinsurer and has played a leading technical role in ensuring its successful implementation. A particular and noteworthy aspect of the programme is that it includes parametric insurance protection against losses from landslides, an innovative technical breakthrough.

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.

We offer a range of re/insurance solutions to manage the risks of different kinds of renewable energy projects. At the end of 2018, we were providing risk cover to more than 3 300 wind and solar farms.

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 an initiator and co-founder of the European Wind Turbine

Offshore wind farms pose complex risks. We have the technical expertise and financial capacity to offer effective risk transfer solutions to our clients in this important renewable energy sector.

Committee established in 2009, we were instrumental in launching the Offshore Code of Practice (OCoP), a best-practice guide for risk management in the sector. Mirroring these efforts, we are now considered a lead market for offshore wind risks. In the last five years, Swiss Re Corporate Solutions has participated in numerous offshore wind projects, including wind farms, stand-alone offshore sub-stations and stand-alone export cables.

In 2018, we were involved in a number of new offshore wind farm projects, some of which illustrate new trends in the sector: accelerated development in Asia and the advent of floating technology.

Offshore wind farms in Taiwan

Until recently, most large offshore wind farms have been constructed in Europe. Construction activity has now also started to pick up in Asia, particularly in Taiwan. Swiss Re Corporate Solutions is currently involved in this growing market with two projects. One of them is the Formosa 1 OWF Phase 2, owned by Formosa Wind Power. Building on a successful pilot with two wind turbines generating 8 MW, the project is now into its second phase. This comprises the construction of 20 turbines with a total capacity of 120 MW. Distanced two to six kilometres from Taiwan's north-western coast, the wind farm will be able to supply approximately 85 000 homes with clean energy, cutting CO_2 emissions by 170 000 tonnes per year (data as provided by www.4coffshore.com).

In 2018, we also agreed to provide insurance protection to the Changhua Demonstration Offshore Wind Farm, owned and developed by the Taiwan Power Company (Taipower, www.taipower.com.tw/en). It is located between 6.7 and 8.7 km off the Taiwanese east coast and will consist of 21 wind turbines generating a total capacity of 110 MW. This will be sufficient to power approximately 77 000 homes and avoid 156 000 tonnes of CO_2 emissions.

Pilot projects with floating structures

Offshore wind farms are not just evolving in terms of geographic location but also technologically. So far the large majority of wind farms has been built as fixed structures. However, floating structures have a much larger technical potential globally, since they are suitable for deep-water environments and can offer significant cost reductions. Swiss Re Corporate Solutions takes an interest in this evolving technology and has been involved in several pilot projects using floating structures, all of them in Europe. These pilots have the purpose of demonstrating both the technological and the commercial feasibility of floating windfarms.

One of the earliest projects we insured is the Hywind Scotland Pilot Park. It comprises five wind turbines generating a total capacity of 30 MW. When fully operational, it is predicted to power approximately 21 200 homes and avoid 43 000 tonnes of CO_2 emissions per year (compared with fossil fuelled power generation). Another, newer project is the Kincardine Offshore Windfarm (pilot-renewables.com) off the Aberdeenshire coast. We have provided insurance cover for its initial phase, which used just one turbine. Kincardine will be expanded to seven turbines with a total capacity of 50 MW. It is expected to power approximately 35 400 homes and avoid 71 500 tonnes of CO_2 emissions per year.

First solar revenue "put"

in 2018, we were also involved in the development of a pioneering risk transfer solution for the solar energy sector. Solar farms are faced with an inherent risk: output is unpredictable to a degree, because production rises and falls with the length and intensity of local irradiation conditions as well as actual panel and equipment production. In 2018, Swiss Re Corporate Solutions and our partner Kwh Analytics (www.kwhanalytics.com) collaborated to sell the industry's first solar revenue "put", an insurance product that can guarantee up to 95% of a solar farm's expected output.

The solar "put" works like this: the Swiss Re policy sets a floor production level for electricity output from the solar farm. Our client pays a premium, and if the plant does not generate enough power to reach the floor, Swiss Re covers the difference. Underlying this new risk management solution is a large database of historical production of US solar power plants, developed by kWh Analytics.

As offered, the solar "put" significantly reduces the financial risk of a plant and makes debt financing available on better terms. This in turn lowers the plant's overall cost of capital, enabling developers to fund more solar projects and contributing to the "decarbonisation" of the US power generation stock.

Life and health re/insurance

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 have 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 keep investing 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.

Solutions for longevity risk

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 previous Corporate Responsibility Reports, we have described a number of landmark longevity transactions completed in recent years 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).

Life Capital: iptiQ

Our Life Capital Business Unit was created in January 2016 and dedicated to developing Swiss Re's primary life and health business. It operates through three wholly owned subsidiaries in three lines of business: ReAssure for closed books, elipsLife for Group L&H insurance and iptiQ for individual L&H insurance.

iptiQ reflects Swiss Re's commitment to introducing more people in society to the benefits of financial protection against life's uncertainties – in particular to closing the gap between the amount of savings or insurance that someone has and the amount needed in the event of misfortune. iptiQ does not sell directly to consumers. Instead, it works in partnership with established and trusted brands, combining Swiss Re's vast experience and expertise in designing protection products with the partner companies' own know-how.

Offering products for term life, whole of life, critical illness and disability, iptiQ's overriding goal is to offer simple, streamlined, digital solutions that remove the traditional hurdles to purchasing protection. Our partners can choose from more than 140 product configurations in order to get easy-to-understand, non-advisory products with clear and transparent pricing and optional add-ons. IptiQ has grown strongly since its creation in 2016, with the amount of new policies sold more than doubling for the second year in a row in 2018.

CONTENT IN THE 2018 BUSINESS REPORT
Learn more about how we help address diabetes, on pages 32–35.