


Climate adaptation and resilience



From risk transfer to risk reduction



Get a complete view from the trusted source for maritime data and intelligence



100% coverage of live fleet vessel movements



350m vessel positions processed daily



Our network of agents validate 5.4 million port callings per annum

Choose the trusted source

Contact us today on + 44 20 7017 5392 (EMEA) / +65 6508 2428 (APAC) / + 1(212) 502 2703 (US) or visit lloydslistintelligence.com

Climate adaptation and resilience

With 2023 the hottest year since global records began, the debate about climate change is no longer how to reverse global warming, but rather how to adapt to this new reality. For re/insurers, it means transforming themselves from agents of risk transfer to facilitators of risk reduction. And not only for insureds but also for the uninsured.



ittipol nampochai Alamy Stock Photo

| | | |
|---|--|--|
| INTRODUCTION 4 | MODELLING 34 | CLEAN ENERGY 58 |
| Triple planetary crisis is an unprecedented generational opportunity | Catastrophe models must keep pace with climatology | Extreme weather and the path to clean energy |
| NEW REALITY 7 | MODELLING 38 | CLEAN ENERGY 60 |
| Insurers must help world adapt to new climate reality | Climate should be in every conversation about risk | Insurance's interest in carbon capture market gathers pace |
| NEW REALITY 13 | MODELLING 42 | CARBON TRADING 61 |
| Climate risk and Pacific Small Island Developing States | Earth observation is a game-changer for climate resilience | Insurers ask whether their policy pays out cash or carbon |
| NEW REALITY 20 | MODELLING 45 | CARBON TRADING 65 |
| Insurability becoming uncertain beyond 2°C | Education key to mitigating basis risk in parametric policies | Insurers essential to voluntary carbon market |
| NEW REALITY 24 | PERILS 47 | CARBON TRADING 67 |
| Zurich Malaysia highlights takaful for climate-vulnerable communities | In climate risk analysis, do not be blindsided by numbers | Insuring credits to make carbon market credible |
| SCIENCE AND FINANCE 26 | PERILS 49 | LEGISLATION 69 |
| Insurance looks to climate scenarios, but are they the right tool? | Insurers brace for active 2024 hurricane season | US insurance regulators increase focus on climate risk mitigation |
| SCIENCE AND FINANCE 30 | PERILS 53 | LEGISLATION 71 |
| Climate risk demands a fresh take on investment return | Ten lessons from Dubai flooding event | Climate activists turn up the heat in 2024 |
| SCIENCE AND FINANCE 32 | CLEAN ENERGY 55 | LEGISLATION 73 |
| Re/insurers invited to learn ocean science for human good | Clean energy is much more than a climate change solution | Lessons from the challenge to UK's net-zero strategy |

Content editor

Louise Isted

Contributors

Francis Churchill, Ben Margulies, Queenie Shaikh

Production editor

Toby Huntington

Sub-editor

Jessica Sewell

Editorial

Insurance Day,
5th Floor, 10 St Bride Street,
London EC4A 4AD
Email: editorial@
lloydslistintelligence.com

Copyright © 2024 Maritime
Insights & Intelligence Ltd

Maritime Insights & Intelligence Ltd is registered in England and Wales with the company number 13831625 and address 5th Floor, 10 St Bride Street, London EC4A 4AD

Lloyd's List Intelligence is a trading name of Maritime Insights & Intelligence Ltd.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photographic, recorded or otherwise without the written permission of the publisher of Insurance Day.

Triple planetary crisis is an unprecedented generational opportunity

titioOniz/Alamy Stock Photo



The introduction to this Lloyd's List Intelligence special report on climate adaptation and resilience is by **Butch Bacani**, head of insurance at the UN Environment Programme

The insurance risk management continuum of understanding risk (risk assessment and quantification), preventing and reducing risk (loss prevention and risk reduction) and sharing and transferring risk (insurance) has a key role to play in tackling climate risk.

Climate change adaptation and mitigation are two sides of the same coin. They can be both viewed from a risk reduction lens. Adaptation and building resilience entails coping with the physical impacts of climate change through, for example, disaster risk reduction measures and insurance as a financial shock absorber. Climate change mitigation and the transition to a net-zero emissions economy can also be viewed as risk reduction as it addresses the root cause of climate change – greenhouse gas emissions. Therefore, insurance can also be a lever to support the decarbonisation of the real economy.

At the UN Environment Programme (UNEP), we believe the insurance industry has a triple role – as risk manager, insurer and investor – in building climate-resilient communities and supporting the transition to a net-zero emissions economy. Ad-

ressing both climate resilience and the net-zero transition – and across both sides of an insurance company's balance sheet – is a coherent and holistic approach to climate risk management.

In this context, UNEP has a range of pioneering insurance initiatives that build climate resilience and accelerate and scale up the net-zero transition.

Enhancing climate risk assessment

In 2019, UNEP's Principles for Sustainable Insurance Initiative (PSI) started a global, multi-year process that convened 22 leading insurers and reinsurers from around the world to pilot state-of-the-art climate risk assessment approaches – particularly the use of climate change scenarios – to better assess climate-related physical, transition and litigation risks in the insurance business.

The overall aim of the PSI pilot project was to contribute to the development of consistent and transparent analytical approaches that can be used to identify, assess and disclose climate change-related risks and opportunities in insurance underwriting portfolios in a forward-looking,

■ INTRODUCTION

scenario-based manner. This led to the launch of the 2021 PSI global report, [Insuring the climate transition: Enhancing the insurance industry's assessment of climate change futures](#). The 2021 PSI global report inspired a similar effort in Brazil and led to the 2024 report, [Insuring the climate transition in Brazil](#), a collaborative effort to enhance climate risk assessment involving the PSI and the country's insurance association the Confederação Nacional das Seguradoras, with technical support from Latin American sustainable finance consulting and evaluation practice Nint. With the PSI project's success in Brazil, similar efforts are being planned in other countries.

Protecting MSMEs

To help close the insurance protection gap, the PSI has a unique partnership with the Vulnerable Twenty Group of Ministers of Finance (V20). The V20 – originally 20 and now 68 climate-vulnerable nations in the Global South – has a combined population of 1.7 billion, a 5% share of global emissions and GDP of \$3.8trn.

A 2022 V20 report revealed within a span of two decades (2000 to 2019), climate change wiped out 20% of the collective GDP of V20 economies. Micro, small and medium-sized enterprises (MSMEs) are the backbone of V20 economies. They contribute 20% to 70% of GDP and export revenues and make up more than 80% of businesses. But MSMEs are constantly threatened by escalating climate risks.

Insurance can enhance risk management, absorb financial shocks and derisk cost-saving renewable energy and energy efficiency infrastructure. At the V20 Asia-Pacific meeting in Manila in 2017, I broached the idea of the world's first vulnerable country-led insurance facility of its kind and conceptualised the [V20 Sustainable Insurance Facility](#) (V20-SIF). Working together with the V20 and Munich Climate Insurance Initiative in the ensuing years, we announced the V20-SIF at the 2021 UN Climate Conference (Cop26) – a project pipeline development facility to assist

V20 economies scope the financial protection needs of MSMEs and facilitate concept and proposal development for funding vehicles.

A V20-SIF office hosted by the PSI was then set up with funding from Germany's economic development ministry, the Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, and we completed our global team of experts last year. This is why at the 2023 UN Climate Conference (Cop28), having developed a pipeline of projects spanning Africa, Asia-Pacific and Latin America and the Caribbean, we shared lessons in the V20-SIF journey.

For example, we believe “demand aggregators” – such as banks, micro-finance institutions, digital platforms and agriculture buyers – are key to insuring MSMEs that form part of supply chains and loan portfolios. MSMEs are highly vulnerable to climate risks, creating costs to larger companies (demand aggregators) that trade with and rely on MSMEs to produce or sell goods or repay loans. Demand aggregators' financial performance is impacted by MSMEs' risks and most want to offer insurance. But costs in serving MSMEs – whether via demand aggregators, brokers or insurers – is a major barrier and must reduce significantly.

The V20-SIF's goal is not to do more market diagnostics or pilots, but to understand key elements that work and can be replicated to scale and speed up insurance solutions that build climate-resilient MSMEs, in line with the underlying tenet of the UN Sustainable Development Goals of leaving no one behind. More V20-

SIF developments will be announced soon as it moves into its next level of implementation this year.

Accelerating and scaling net zero

In April, UNEP announced the creation of the [Forum for Insurance Transition to Net Zero](#) (FIT), a new UN-led and convened structured dialogue and multi-stakeholder forum to support the necessary acceleration and scaling up of voluntary climate action by the insurance industry and key stakeholders.

The creation of the FIT is a major new opportunity for UNEP, the insurance industry and key stakeholders; and takes into account the experience gained by UNEP's previous work with the insurance industry that first transformed net-zero insurance from theory to practice. In creating the FIT, UNEP met with a wide range of key stakeholders to discuss practical and effective ways in which insurance can support and accelerate the transition to a net-zero emissions economy. These consultations have validated a clear and urgent need to create a new, multi-stakeholder forum and have also identified work priorities.

As UNEP's head of insurance, I am honoured to chair the FIT. The FIT will work with insurance market participants (for example, insurers, reinsurers and brokers) and engage with insurance regulators and supervisors, net-zero standard-setters and initiatives, the scientific and academic community, civil society and other key stakeholders (for example, sustainability disclosure initiatives and real economy actors) to advance net-zero insurance thinking and practices globally.

By speeding and scaling up a just transition to climate-resilient and inclusive communities and net-zero and nature-positive economies, insurers can play a key role in tackling the triple planetary crisis of climate change, nature and biodiversity loss and pollution and waste, which require urgent and ambitious action

Initial priorities for the FIT include advancing frameworks for net-zero insurance metrics and voluntary targets and developing new net-zero insurance concepts; developing a net-zero transition plan framework for insurance market participants; engaging with the real economy on the development of net-zero transition plans by corporates across different sectors; and tackling challenges and opportunities to develop insurance solutions and taxonomies that would support the net-zero transition. The aim is to foster availability of insurance and finance for transition projects and technologies and net-zero activities.

Overall, the FIT is kickstarting its work with a critical mass and diverse group of 46 organisations from across the globe, made up of 19 insurers and reinsurers, 16 insurance regulatory and supervisory authorities and 11 renowned academic institutions and civil society organisations. It is expected more organisations worldwide will join the FIT in the coming months as it becomes fully operational.

Tackling nature loss and pollution

The world is facing a triple planetary crisis of climate change, nature and biodiversity loss and pollution and waste. Net zero and nature positive are two sides of the same coin, just like climate change adaptation and mitigation.

The Nature Positive Initiative defines nature positive as a global societal goal to “halt and reverse nature loss by 2030 on a 2020 baseline and achieve full recovery by 2050” and “it means ensuring more nature in the world in 2030 than in 2020 and continued recovery after that”. The science is clear. The world cannot reach net zero without becoming nature positive. Neither climate change nor biodiversity loss will be solved in isolation as they mutually reinforce each other and are interconnected.

With the adoption of the Kunming-Montreal Global Biodiversity Framework in 2022, as well as the ongoing

FIT founder members

There are 19 founding re/insurance organisations in the Forum for Insurance Transition to Net Zero:

Achmea
African Risk Capacity
a.s.r.
Aviva
Beazley
CNP Assurances
Co-operators
Crédit Agricole Assurances
Fatun
Fidelidade
Generali
Insurance Australia Group
Intesa Sanpaolo Vita
NamibRe
NN Group
Odeon Insurance Re
Singapore Life
Sonepar International Re
The Fidelis Partnership

inter-governmental process to forge an international legally binding instrument to end plastic pollution, there is a growing recognition of the importance of finance, including insurance, for nature, both in reducing nature-related risks and seizing nature-positive opportunities. Insurers can play a key role to halt and reverse nature loss so by 2030 nature is visibly and measurably on the path to recovery.

Ever since it was established in 2012, the PSI has been addressing nature-related and pollution risks – from tackling illegal, unreported and unregulated fishing, environmental pollution liability, plastic pollution and high-impact hydropower projects; to protecting Unesco World Heritage Sites and building climate resilience by protecting ecosystems such as coral reefs and mangrove forests.

Nature-related and pollution risks were also included in the first-ever environmental, social and governance guides for non-life insurance and life and health insurance that

were produced by the PSI. This is why in 2021, I conceptualised the agenda-setting Nature-Positive Insurance Series co-organised by the PSI and the UN Convention on Biological Diversity. This was followed in 2023 by the paper, [Nature-positive insurance: Evolving thinking and practices](#), produced by the PSI and UNEP Finance Initiative’s Nature Team.

The paper identifies how insurers can contribute to achieving the goals and targets of the Global Biodiversity Framework through a range of possible actions, from embedding nature in risk management frameworks and setting underwriting criteria and guidelines; engaging with clients and potential clients; and developing insurance products and solutions that cover natural ecosystems and economic activities that value, conserve, restore and wisely use biodiversity and ecosystem services.

This year, to advance nature-positive insurance thinking and practices globally, we are launching the PSI Nature-Positive Insurance Working Group, which I announced at the inaugural Global Sustainable Insurance Summit in Los Angeles in April and which will contribute to the aims of the 2024 UN Biodiversity Conference (COP16).

By speeding and scaling up a just transition to climate-resilient and inclusive communities and net-zero and nature-positive economies, insurers can play a key role in tackling the triple planetary crisis of climate change, nature and biodiversity loss and pollution and waste, which require urgent and ambitious action by all actors in society to protect lives, livelihoods and assets. By doing so, insurers can also seize the unprecedented generational opportunity to build a safer, healthier, prosperous and sustainable future for all. ■

Butch Bacani is head of insurance at the UN Environment Programme, programme leader of the UN Principles for Sustainable Insurance and chair of the UN Forum for Insurance Transition to Net Zero

Insurers must help world adapt to new climate reality

Milken Institute annual conference was set in the context of record-breaking climate events, which are 'just a preview of worse to come'

There is a vital need to galvanise private capital towards climate adaptation and resilience and re/insurers must play their part in this, according to a panel of experts at the Milken Institute's 27th annual global conference, writes Louise Isted.

Delegates at the session titled "The new climate reality" heard that globally only 2% of private funds are directed to addressing the climate crisis, of which the majority goes to mitigation. The Milken Institute said the panel discussion was set in the context of record-breaking climate events in 2023, which were "just a preview of worse to come".

Moderated by Aimée Christensen, chief executive of Christensen Global, the panel comprised Gillian Caldwell, chief climate officer and deputy assistant administrator at the US Agency for International Development (USAID); Jeff Goodell, *New York Times* bestselling author of *The Heat Will Kill You First*; Ekho-suehi Iyahan, secretary-general of the Insurance Development Forum (IDF); and Stacey Swann, founder and chief executive of Resilient Earth Capital.

"We're still underfinancing climate mitigation and we're dramatically underfinancing climate adaptation, resilience and recovery," Christensen said, adding philanthropic and public capital needed to help get private capital "off the sidelines" by derisking it. She said, at Cop28, 21 philanthropic foundations had come together to announce a commitment to adaptation and resilience financing. Ways needed to be found, she added, to leverage their

"risk-tolerant" capital towards mobilising private investment.

Goodell described the "vision of hope" he had that the world was at a tipping point in understanding the opportunity presented by climate change. He said the past 10 years had been the hottest on record, and 2023 the hottest year ever. "If you want to get into a fight with a climate scientist, ask him or her about whether or not this means climate impacts are accelerating," he said, "and it's very clear we are getting deeper and deeper in trouble."

In his book, Goodell described heat as "the engine of planetary chaos", which can be seen, for example, in the melting of the West Antarctic Ice Sheet, which is "like the cork in the wine bottle for the whole west side of Antarctica".

Its loss, he added, would be equal to 10 feet of sea level rise. He said disintegration of this ice sheet is under way and irreversible. "We're seeing *The Day After Tomorrow* scenario," he said, referring to the 2004 sci-fi action movie, "where the overturning circulation in the Atlantic stops or slows down significantly and causes tremendous changes in our planet."

Citing a recent article in the *Financial Times*, Goodell said the requirement for climate finance was \$1.2trn, adding there was a need to reach \$9trn by 2030 to achieve the goals of the Paris Agreement of 2015. "The question is how do we shift these great flows of money, not just to mitigation but, more powerfully and more importantly, and in a more complex way, to adaptation," he said.

The physical impacts of a warming planet are so obvious, Swann said, that investors are "starting to wake up" to the financial risks posed by climate change. "One of the tools that most people historically have been using is insurance, which is not a risk reduction tool, but a risk transfer mechanism, and investors are starting to understand that you can't transfer away this risk, you need also to reduce it. If you don't, then this impacts your revenues, your cost basis and your asset values," she said. Investors will have to "identify, assess and quantify" climate-related financial risk, which will lead to greater action in relation to "investing in the right things", she added.

Globally, only 2% of private capital is for addressing the climate

"We're still underfinancing climate mitigation and we're dramatically underfinancing climate adaptation, resilience and recovery"

Aimée Christensen
Christensen Global



“What underpins the ability of the industry to underwrite these risks is actually their technical capability to understand what risk actually looks like and how it is changing”

Ekhosuehi Iyehen
Insurance Development Forum



crisis, Caldwell stressed, and the vast majority of that is for the clean energy transition and mitigation. USAID, a branch of the US federal government, is the largest aid agency in the world, with a presence in 100 low- and middle-income countries. “Our focus is on the countries getting hit first and worst by the impacts of the climate crisis,” she continued. “And one of the first things we did after I started as a Biden appointee in 2001, was finalise a climate strategy that takes us through 2030.”

Co-led by USAID and the US Department of State, the Biden administration’s Prepare initiative aims to catalyse more private sector investment in climate adaptation and resilience.

Caldwell said 2022 was the year by which the UN climate negotiations had been projected to reach the \$100bn of investment countries had committed to under the Paris Agreement seven years earlier. “If public agencies can’t even get to \$100bn, then we’ve got to start to use our capital in more creative ways. So that’s concessional finance, loan guarantees, and the technical assistance necessary to establish deal flow that’s actually investable,” she said.

USAID has been directing a call to action to the private sector and announced at Cop28 it had recruited more than 25 companies that have committed a combined \$3bn in both cash and in-kind resources to advance adaptation and resilience. “That might involve strengthening

their own supply chains or the preparedness of their workforce but, even more importantly, it could also involve changes to the products and services that they’re offering,” Caldwell said.

One company joining USAID’s call to action, Jupiter Intelligence, is developing a product that can model how any location on Earth will likely be affected in the years from now until 2100 by eight climate risks, including heat, flood and drought, and quantifying the economic impact of those risks.

That insight will be “incredibly relevant”, Caldwell said, not just to businesses, but also to local communities, so they can think about how they can try to mitigate those risks.

Iyehen said, globally, insurers collect a premium volume of about \$7trn per year, of which as much as \$5.35trn supports financial resilience in the form of insurance claims and benefits payouts. “That’s significant but oftentimes we don’t think about this contribution that insurance makes in terms of supporting the ability of people to respond to shocks,” she said, adding it is the largest contribution society receives outside government funding.

The value of insurers within this context is threefold, Iyehen said. The first is their risk expertise and analytics. “What underpins the ability of the industry to underwrite these risks is actually their technical capability to understand what risk actu-

ally looks like and how it is changing,” she said.

The second value is underwriting. “Despite the big figures that I referenced, those payouts and those benefits are primarily concentrated in developed economies. As the Insurance Development Forum, our efforts are really focused on how we expand insurance and risk capabilities in emerging developing markets. That is relevant because in these markets, we are talking about 2% to 3% of insurance penetration rates.”

A third value and one that is also often overlooked, she added, is that insurers are more than underwriters – they are also institutional investors, having about \$40trn of assets under management. “It is inherently within the interests of the insurance industry to take climate risk, and resilience and adaptation seriously. If we are not investing adequately in risk reduction, then access to insurance becomes an issue and there are cascading impacts, which can be quite profound,” she said.

The role of insurers requires partnership with the public sector, which is “very easy to talk about” but translating it into action is “a completely different ballgame”, she added.

To that end, the IDF set itself the challenge of bringing together chief investment officers from a variety of insurance companies to find out what it would take to invest in these markets, particularly small and medium-sized enterprises. The result of those talks is a blueprint of consensus on their requirements, and the IDF is now working closely with BlackRock to operationalise this and to catalyse even greater action.

Fossil fuel subsidies

Public funding of the fossil fuel industry through government subsidies continues, Christensen said, and this amounts to \$5trn to \$7trn a year.

Goodell described that fact as “one of the most politically complex and politically volatile” parts of the cli-

mate change debate. “Let’s be very clear: burning fossil fuels is responsible for about 80% of the CO₂ that goes into the atmosphere, which is what is heating up our planet and causing all the adaptation that we’re trying to finance,” he said. “What is the responsibility of that industry towards economic fairness? What is the responsibility of the rich Global North, the people who caused this problem, to help the Global South with adaptation?”

The politics are shifting on this inequality, he continued, and it is “not by accident” that there are currently 2,180 lawsuits against the fossil fuel industry. People are asking what has happened to the “polluter pays” principle for an industry that made \$4trn in profits last year. “There is a very big river of cash that we need,” he said, “and so what role should they play in helping us to adapt to this hotter, more chaotic world that they’ve helped create?”

Caldwell pointed out that all the G7 countries had committed to phasing out fossil fuel subsidies by 2025 but “that’s not what’s happening”. The US, for example is “rife” with production and consumption subsidies, she continued.

The latest data is from 2022, in the wake of Russia’s invasion of Ukraine, and shows an estimated \$1.2trn in direct subsidies. That balloons to \$7trn, she added, when combined with indirect subsidies. “It’s bizarre that we’re investing in direct cross purposes with where we need to head in terms of mitigation and adaptation,” she said.

The big success story, however, is that renewable energy is still cheaper in the countries where USAID is working, to the extent that it has become the “energy of choice” there. But the political cycles of democratically elected governments tend towards short-term thinking on the clean energy transition, she continued. “[Oil and gas companies] have a great enough hold on politics that we don’t see decisions made in the public in-

“[Oil and gas companies] have a great enough hold on politics that we don’t see decisions made in the public interest; we see them more frequently made in private interests”

Gillian Caldwell
USAID



terest; we see them more frequently made in private interests.”

The public balance sheet “is an investor too”, Swann said, and in many countries this is “bearing the cost of the damages of the warming planet that we’re living in”. That needs to change so that public balance sheets catalyse private investment in climate adaptation, resilience and mitigation. She highlighted positive moves in that direction by the Inflation Reduction Act (IRA) and the Greenhouse Gas Reduction Fund (GGRF), stressing every sector in every industry stands to benefit. “It’s about thinking how to take the spectrum of capital and apply it in the most effective and efficient ways and the opportunity-set that investors are looking for.”

Caldwell highlighted a report produced by the Boston Consulting Group (BCG) in December 2023 in collaboration with USAID and the Global Resilience Partnership. Their research found every dollar a company invests in implementing adaptation and resilience measures can yield \$2 to \$15 in financial benefits.

The report, titled “From risk to reward: The business imperative to finance climate adaptation and resilience”, was launched at Cop28, alongside an announcement by US special presidential envoy for climate, John Kerry, and USAID administrator, Samantha Power, that BCG is responding to the Prepare Call to Action — a growing coalition of major private sector players committed

to advancing adaptation and resilience in developing countries.

The study is the first of its kind to detail the range of opportunities and financial benefits for the private sector to fund adaptation and resilience in both emerging markets and developing economies and advanced economies. “It’s focused on the business case for adaptation because nobody wants to hear an aid agency tell them how to do business,” Caldwell said. “We needed hard data to understand what’s happening with those capital flows, and what yield companies are getting from the investments they’re making.” The median yield for such investments, of \$9 for every \$1, is “a lot higher” than USAID anticipated because adaptation-related investments are not normally perceived as being as profitable as mitigation efforts are, she added.

The myth that adaptation is a more expensive investment than mitigation is being broken, Swann said. “I think that investing in resilience and adaptation is actually going to prove to be more financially sustainable, and also give a higher return,” she said. Caldwell added every \$1 spent on adaptation and resilience yields an estimated \$4 to \$10 in cost savings later on.

A new reality

The scale of the opportunity for private investors is hugely underestimated, Goodell said, adding there is a need to drop the assumption that the response to climate change

is to try and return to the past. “The amount of CO2 in the atmosphere is more or less permanent, meaning we have created a new climate that is very different to the one that all of us grew up in. And that means everything is going to change,” he said. “It’s a different world now and we’re not going back and if you get smart about that, then you understand there’s a lot of opportunities.”

Those opportunities need to be considered, not simply in terms of assets, but as the quality of human lives, he added. Citing medical journal *The Lancet*, he said around 400,000 people die every year because of extreme heat. “How does that get valued in this conversation? How is this predatory force put into the calculation of the investment changes that we are talking about?”

Iyahen agreed any conversation about climate adaptation and resilience was an opportunity to focus on people’s lives and livelihoods. “Historically, when we’ve talked about climate change mitigation at a high level, it’s almost been disenfranchising and made it inaccessible to ordinary people,” she said. The IDF therefore makes sure that any risk analysis it does, answers the question, “What does this look like?”

As an example, Iyahen said a flood in Mozambique can lead not just to a loss of infrastructure but, six months later, to an outbreak of cholera. Risk modelling and risk financing are therefore an opportunity to engage with communities about

how they are affected by climate change, she added.

Humanitarian financing totalled \$4bn last year. Half of that was driven by natural disasters but only 1.2% was pre-arranged finance. “That’s an extreme level of inefficiency,” Iyahen said. “If we’re talking about the climate transition, about climate justice, then the resilience and adaptation conversation is incredibly important.”

Attracting investors

On ways to attract institutional capital to climate adaptation and resilience, Caldwell highlighted Green Guarantee Company (GGC).

GGC is the first-ever privately run guarantee company devoted to catalysing green bonds and loans in partner countries. The company focuses on Africa, Asia and Latin America. With a \$100m balance sheet, it was launched at Cop28 to unlock an estimated \$1bn in new mainstream private capital for climate finance by 2024.

The GGC aims to solve the problem of bringing investors to “higher risk rating markets, where it’s difficult to get the foreign direct investment involved,” Caldwell said.

USAID is also working with financial institutions in Rwanda and Columbia, for example, to “help them understand how to green their own portfolios”. Caldwell explained global alliances are still “heavily dominated” by Western institutions but

the lines between the Global North and Global South are “not so hard and fast” because investments in reducing emissions are likewise investments in increasing adaptation. For example, a project to plant shade trees that can buffer coffee trees from prolonged droughts and extreme temperatures is “both a mitigation plan and a resilience play”, she said.

Swann highlighted the “pipeline problem”, in that large infrastructure projects take a long time to move through an investment process. She explained: “A project that’s being financially closed today was probably on the drawing board five or seven years ago, and the question is, were the developers or the investors asking the right questions about the climate-related physical risks and/or the resilience of that asset over its lifetime. The likelihood is they weren’t yet.” That is changing, however. For example, Resilient Earth Capital worked with Canadian pension funds several years ago on helping them “diligence a project around climate”.

More and more small- and medium-sized enterprises (SMEs), “on the frontline of communities”, are coming up with solutions to the types of climate hazards they are facing. “But those projects are small and so no pension fund or big asset manager is going to invest in them,” Swann said, “because anything less than \$5m is not on the radar of a lot of investors”. The need therefore is to build an ecosystem in the financial sector around such SMEs, she added, to increase the pipeline of these types of investments.

Swann mentioned she sits on the board of the Montgomery County Green Bank, which is “hyper local”. Two years ago, the legislators that control that bank adopted adaptation and resilience for their mandate, which mainly focuses on coupling energy and building efficiencies with resilience measures, such as flood management, for multifamily projects.

“I think that investing in resilience and adaptation is actually going to prove to be more financially sustainable, and also give a higher return [than mitigation]”

Stacey Swann
Resilient Earth Capital



Not a binary choice

Caldwell described work in the so-called blue economy, which includes mangroves and seagrasses as carbon-dense terrain. “If you invest in green rather than grey infrastructure, you’re protecting coastal communities against erosion and the incursion of water and sea level rise, even as you’re helping reduce carbon in the atmosphere,” she said. “The only way to capitalise these kinds of interventions in biodiversity and in restoring natural landscapes, is through the sale of carbon credits.” The challenge, she added, is to ensure the integrity, transparency and equity of carbon credit transactions so they create value for communities.

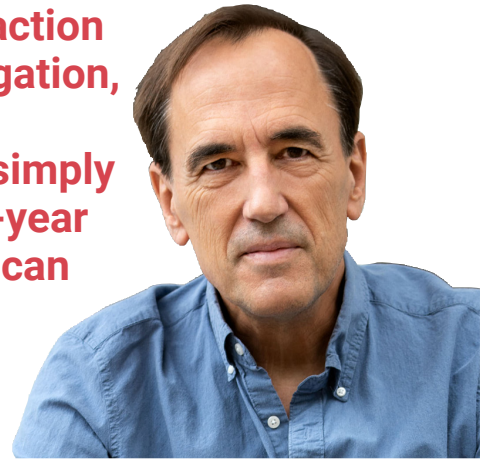
Goodell warned against the “binary conversation” of climate mitigation versus climate adaptation, underscoring they are not separate things. “The best adaptation practice we could take is to get off fossil fuels as quickly as possible because that is what’s driving all of these kinds of changes,” he said, adding that “mitigation is the most powerful form of adaptation”.

He said that Texas, where he resides, is the “belly of the Beast” in terms of US fossil fuel production and yet, two weeks earlier, 70% of the power on the state’s electricity grid was coming from renewables. “That’s not happening because Texas is full of tree huggers. The engine there, is economics and permitting,” he said. “Speed is essential to action on adaptation and mitigation,” he continued, “because speed equals justice and equity. We simply don’t have time for 10-year studies on whether we can put a transmission grid up or not.”

Iyahen agreed speed was vital to a community’s ability to recover from an extreme weather event, noting how regional risk pools are designed to inject capital into a government’s response. The IDF has worked with African Risk Capacity Group, a specialised agency of the African Union, on drought risk. “A

“Speed is essential to action on adaptation and mitigation, because speed equals justice and equity. We simply don’t have time for ten-year studies on whether we can put a transmission grid up or not”

Jeff Goodell
Author, *The Heat Will Kill You First*



farmer can’t wait for the traditional timeline of nine months before financing comes to him or her, and so a lot of our thinking, and some of the issues that we are also wrangling with within the insurance industry, is how to link risk analytics to finance with the dimension of speed,” she said.

She also highlighted the parametric insurance pool, brokered by Gallagher Re, that Morocco was able to draw from following an earthquake in September 2023. “That was a quick trigger of \$270m, but then there’s the challenge of how you actually get the money from the central treasury to communities?” The issue then, she added, is not only the speed of financing, but also “plumbing the structures” by investing in a country’s ability to deliver support to their citizens.

The GGRF in the US creates such “plumbing” to enable a fair and equitable transition to a clean economy, Swann said. Administered by the Environmental Protection Agency (EPA), the fund will invest \$27bn directly into financing projects like home retrofits, renewable energy development, clean manufacturing, and transportation to reduce pollution while supporting healthier communities and family-sustaining jobs. Funds from this programme will be distributed from EPA to green banks and other non-profit lending institutions around the country, as well as state, local, and tribal governments.

“Part of the plumbing issue we have around finance in many parts of the world is there isn’t a lot of connective tissue between the big and small players, but in the US, this pot of \$27bn is going to be flowing. By this September, hopefully, it will have flowed to a network of essentially frontline investors,” Swann said. “Many of these investors will be providing debt and not a lot of equity,” she said, “but that is going to fund the bottom-up work that needs to be done for the energy transition.” It is a “basket of incentives” and “concessional money in its flavour”, which is helpful in the current interest rate environment.

Swann explained: “When we had 2% interest rates a few years ago, it was hard to see how a 25-basis point discounted concessional loan was going to move the needle, but when you have 5% or 6% in the market and if you’re able to access capital to do residential energy efficiency, or multifamily housing, or electrification infrastructure in communities at a discount of 5% to 3%, then that could be material and so this is going to be really interesting to watch.”

Crucially, Swann added, the GGRF incorporates the Justice40 initiative, which is the US government’s goal that 40% of the overall benefits of certain investments flow to disadvantaged communities that are marginalised by underinvestment and overburdened by pollution. That component is crucial, she said, “be-

cause you can't assume that, left to its own devices, the finance sector is going to think about equity and justice on its own”.

Contrast that \$27bn with the carbon markets, which last year had about \$2bn of transactions, then the GGRF offers a lot and will be “impactful”. The IRA in its entirety amounts to \$360bn, she added. “If we had something like that for the Global South, that would be amazing.”

Good examples

Christensen asked the four panellists to each give an example of a project they wanted to highlight.

Swann said she had spoken with institutions that work with small and micro enterprises with experience of the Mastercard Center for Inclusive Growth, which aims to advance sustainable and equitable economic growth and financial inclusion around the world. These institutions, such as the Community Development Financial Institutions Fund in the US, “learned a lot” from the Paycheck Protection Program during the Covid pandemic in how to support small and micro enterprises. “Those are the same players who can be engaged to help to ensure that they can be part of both accessing insurance and other resources that they need to mitigate the harm of climate change, but also build new opportunities to tap into the IRA,” Swann said.

On support in countries most vulnerable to climate change, Iyahan highlighted work with the Self-Employed Women's Association in India to compensate women when they are unable to go to work because of a heatwave. “We're seeing a lot more of these innovative solutions emerging that I hope we can scale because they connect people and their livelihoods to finance,” she said.

USAID's Save our Seas initiative is focused on “tackling the scourge” of plastic pollution, Caldwell said, “which is very relevant to the cli-



A worker in Vietnam picks up plastic waste, an issue the USAID's Save Our Seas initiative aims to tackle

mate crisis because if the plastic life-cycle were a country, it would be the world's fourth-largest emitter of carbon emissions.”

USAID has been working with municipalities globally to target 40% of mismanaged plastic waste by building circular economies. That means supporting impoverished waste pickers in these communities, many of whom are women without access to capital. “We're trying to figure out how to formalise their engagement in the process of identifying plastic and building the infrastructure to recycle that and looking at things like extended producer responsibility to reduce the production of plastic in the first place, because so little plastic is recycled. But with many of these economies and interventions, we're thinking about how to make these good-paying jobs, which is so important.”

Goodell gave a “big shout out” to Paris city council for the initiative it launched last September called Paris at 50°C. “It's really inspiring when you think about how much can be done with the right political will and the right shifting of the flows of money,” Goodell said.

Paris is vulnerable to extreme heat because it is a densely populated urban area with little open ground and so ideas like “making the Seine swimmable on muggy days and putting up a lot more trees to turn the Place de la Concorde, which is now like a frying pan, into something that is habitable” are welcome, he said.

“The reimagining of even an ancient and iconic city like Paris, which includes rebuilding a lot of low-income architecture, is really important and it's one of the inspiring big-picture projects of how we can use this moment to reimagine our world,” he added.

Swann also highlighted how Resilient Earth Capital had worked with a bank in Tanzania to create an agriculture investment platform specifically focused on regenerative farming practices. “We helped them set up a facility where they could lend in local currency, provide capacity building and a technical assistance sidecar,” Swann said. This project, which was funded through the Green Climate Fund, is a good example of “country ownership, she said, for managing investment flows. ■

Climate risk and Pacific Small Island Developing States



Nature Picture Library/Alamy Stock Photo

The UN's resident co-ordinator to Fiji, Solomon Islands, Tonga, Tuvalu and Vanuatu, Dirk Wagener, outlines the impact of climate change on Oceania small island states to **Louise Isted**

What have been the impacts of climate change on these countries?

The vulnerability of Pacific Small Island Developing States (PSIDS) to climate change is complex. It stems from their distinctive characteristics, which not only define their uniqueness but also heighten their exposure to climate-related risks. Key sectors pivotal to the economies of many SIDS, including tourism, fisheries and agriculture, heavily rely on environmental stability, rendering them susceptible to shifts in climate patterns. Moreover, the economic fragility of SIDS exposes them to increased vulnerability during extreme weather events and subsequent disasters. Given their limited economies and populations, a single large-scale disaster can inflict significant national damage.

The convergence of hazards, exposure and vulnerability results in current impacts and anticipated risks. PSIDS are acknowledged to be enduring impacts and confronting

considerable risks arising from both sudden events like storms and floods and gradual processes such as rising sea levels, land erosion and alterations in the global water cycle. The consequences of climate change are broad and dire, including more loss of life, livelihoods and assets, health risks, water stress, ocean acidification, loss of species, declining crop yields, poverty and displacement.

All countries receiving Pacific Insurance and Climate Adaptation Programme (Picap) implementation are SIDS. The damages caused are worth millions of dollars every year. It is estimated between 1970 and 2020, SIDS have lost \$153bn owing to weather-, climate- and water-related hazards, while their average GDP is \$13.7bn.

Fiji, a country that experiences tropical cyclones every year with varying levels of impact has, since 2019, seen 14 tropical cyclones that have affected the country, either from direct landfall or increased wind and rainfall. A study by the Asian Develop-

ment Bank (ADB) shows the impact of climate change in Fiji will continue to be severe in the future. The ADB estimates higher temperatures and more extreme weather events will affect agriculture and the broader economy to reach a loss of 4% in annual GDP by 2100. The analysis shows other countries in the region, such as Samoa, the Solomon Islands, Timor-Leste and Vanuatu, could also experience negative impacts such as a significant decrease in rain-fed agriculture yields, reduced fish catches, widespread coral bleaching and falling tourism numbers.

In January 2022, Tonga experienced the largest volcanic eruption in modern history. The eruption, described as a "once in a millennium event" triggered massive tsunami waves of up to 15 metres and caused massive ashfall. The damage is estimated to be equivalent to \$182m – more than 36% of Tonga's GDP – with a particularly strong impact on communication infrastructure, roads and the entire tourism sector as well as ag-

riculture and fisheries. Although the volcanic eruption had the largest impact in recent memory, Tonga is also susceptible to other natural hazards such as heatwaves, droughts, floods, cyclones and storm surges.

One of the world's most hazard-prone countries, Vanuatu, has been severely affected by climate change. In 2015 Cyclone Pam hit Vanuatu and caused economic loss and damage estimated at 64% of GDP, with 60% of the population affected and 96% of food crops destroyed. The country was also affected by twin cyclones Judy and Kevin in March 2023, when two Category 4 cyclones hit Vanuatu in a matter of days. They affected approximately 66% of the population and caused damage to the amount of \$433m. Approximately 85% of Vanuatu exports in 2011 were constituted by food products and more than 40% of Vanuatu GDP is linked to the tourism sector. Consequently, extreme weather events have led to loss of income and endangered entire sectors.

Tuvalu is also affected by sea level rise since the country's highest point is only 4.5 metres above sea level. This year, king tides caused unprecedented floods and damage in Tuvalu, with heavy rainfall, strong wind and waves topping 3.4 metres during several days. The event pushed rocks on to land, inundated homes and destroyed crops, reaching areas that had never been affected in the past. Considering the impact of global warming on global sea level rise, Tuvalu is at risk of disappearing because of climate change.

What are their specific needs in adapting to climate change?

The impact of climate change in PSIDS highlights certain constraints in adaptation and in turn outlines certain needs to enable local resilience and adaptation capacity. These are as follows.

Climate finance: climate finance is vital for bolstering climate resilience in SIDS, yet access remains limited. The Covid-19 pandemic exacerbated the situation by depriving many SIDS

of crucial tourism revenues, impacting disaster risk reduction efforts. Despite contributing minimally to global emissions and being among the most affected, SIDS accessed only \$1.5bn of the pledged \$100bn in climate finance for developing countries in 2019. SIDS lack the financial resources for robust assessments of climate-related needs and priorities and to design and implement climate plans. Mobilising climate finance from international sources to support adaptation projects and disaster risk reduction remains one of their key needs.

The UN Capital Development Fund (UNCDF), the UN Development Programme (UNDP) and the UN University Institute for Environment and Human Security (UNU-EHS) together administer Picap, a multi-year, multi-country regional programme covering several PSIDS. The aim of the programme is to build the resilience to and preparedness of Pacific islanders for the impacts of climate change and natural hazards, with agriculture, fisheries, tourism and retail being the sectors of focus with cross-cutting focus on women, youth, micro, small to medium-sized enterprises and persons with disabilities. Working with private sector local insurers to develop and deploy appropriate and affordable market-based disaster risk financing instruments like parametric microinsurance, the programme creates local ecosystems – including agriculture/fisheries co-operatives, women's associations, fintech/insurtech providers, other financial service providers, advocacy partners – to reach the last mile.

UNCDF aims to boost financing for climate adaptation in least developed countries, including the Pacific Island Countries (PICs), prioritising vulnerable communities. Picap has launched micro- and meso-level parametric insurance in the countries of implementation. The improved and new climate disaster risk financing and insurance products range from a standalone windspeed cover to a multi-peril cover that includes windspeed, rainfall, earthquake and drought.

There are also macro-to-micro insurance products for social welfare beneficiaries and a meso-level insurance product – Anticipatory Action Insurance – in Fiji. The products are tailored to the country context after a demand- and supply-side study; hence each country has its own distinct climate risk insurance product. The Pacific Reinsurance Company (Papua New Guinea-based) has been onboarded as the primary reinsurer for the product. Payouts have been made in several instances. For Fiji, 1,097 claims were made in 2023 following four trigger events. A further 337 claims were paid in March 2024. More than 80% of these parametric microinsurance claim payouts have been made within a few days of the extreme weather event directly into the mobile wallets of the beneficiaries, thereby reducing administrative costs. These success stories demonstrate how innovative risk financing solutions as proposed by UNCDF can contribute to build financial resilience and preparedness against the increasing impact of natural hazards due to climate change.

Early warning systems and disaster preparedness: among all risk reduction and adaptation measures, early warning systems and early actions are one of the best-proven and most cost-effective measures to save lives and reduce the economic impact of natural hazards. Enhancing Early Warning Systems (EWS) stands out as a crucial necessity for PSIDS in their quest to bolster resilience against climate change impacts. Country-specific examples, such as Tonga and Vanuatu, showcase substantial investments made to improve early warning infrastructure and mitigate the risks posed by cyclones and storm surges. Additionally, Fiji and Samoa have been making efforts to establish community-based EWSs, aiming to empower local communities to respond effectively to climate-related disasters.

In this regard, Picap has developed a meso-level insurance product – Anticipatory Action (AA) – in partnership with the UN Office for Disaster

Risk Reduction (UNDRR). Meso-level insurance refers to insurance designed for aggregators, which include institutions such as development banks, microfinance institutions, provident/pension funds, associations and co-operatives. AA works on EWS and aims to pay out a part of the sum insured 48 to 72 hours before the event occurs so the community can be better prepared and take necessary actions to reduce the impact of the disaster. This ex-ante product was piloted in Fiji in October 2023, with four co-operatives being the aggregators that are insured. Plans are under way to expand the coverage to 10 communities in 2024 and scale the solutions to the Solomon Islands and Tonga as well.

Building better data and access to information: better data availability and access to information is vital for unlocking climate finance and developing EWSs in a country, creating more opportunities to build resilience. Analysing risk data and quantitative evidence enables governments to make informed decisions about financial protection against disasters. Effective decision-making involves actuarial analysis and tools to assess financial instruments and strategies, user-friendly interfaces to connect policymakers with technical models and quantitative analysis to use financial markets and private sector solutions. Further research is necessary to understand potential changes in cyclone seasonality and likely routes.

The demand for climate adaptation data is increasing, driven by political and practical needs. Countries are transitioning from planning to implementing adaptation measures, requiring specialised observational, projected and historical data. Actors at different scales contribute to data provision, with national meteorological and hydrological services playing a central role. However, gaps persist, including inadequate observation systems and limited down-scaled data. UNDP has supported Tuvalu to improve data about sea-level rise using Lidar (light de-



“PSIDS are acknowledged to be enduring impacts and confronting considerable risks arising from both sudden events like storms and floods and gradual processes such as rising sea levels, land erosion and alterations in the global water cycle”

Dirk Wagener
UN

tection and ranging) technology, informing adaptation efforts. Opportunities for improvement include leveraging big data, ensuring open access and closing remaining data gaps through long-term funding. Capacity development and guidance on managing uncertainty are essential for effective data use.

Disaster-resilient infrastructure: the PICs are susceptible to very high relative economic losses from disasters, with average annual losses ranging from 1% to 10% of GDP. In the case of Palau, Tonga and Vanuatu, average annual losses are estimated at more than 10% of GDP – 11.98%, 18.2% and 20.67% respectively.

Enhancing infrastructure to withstand extreme weather events

such as cyclones, storm surges and sea-level rise becomes vital. Building resilient coastal defences, including seawalls and mangrove restoration, helps to protect against erosion and flooding. In Kiribati, an ADB project co-financed by the Green Climate Fund involves constructing a sea-water desalination plant powered by solar energy, providing a climate-resilient water supply for South Tarawa. In the Solomon Islands, ADB financing supports infrastructure projects like bridges and culverts to improve connectivity and climate resilience for residents of East Guadalcanal.

Institutional and community capacity building: empowering local communities through education, training and awareness programmes to actively participate in climate change adaptation efforts is crucial and Picap engages in continuous capacity building workshops with relevant stakeholders and the private sector. Strengthening institutional capacity at the national and local levels helps to develop and implement effective adaptation policies and strategies.

In the Solomon Islands, several UN agencies, including UNCDF, are working with various national-level stakeholders like the meteorological department and National Disaster Management Office to build their capacities. The Regional Pacific Facility identifies various interventions including vulnerability assessment, disaster risk planning, financing and insurance initiatives for climate risks and support for resilience-building interventions.

What is the scope of the memorandum of understanding (MoU) Lloyd’s and the UNCDF signed last September?

Lloyd’s is the world’s leading marketplace for insurance and reinsurance and, on behalf of the Sustainable Markets Initiative (SMI) Insurance Taskforce, signed an MoU with UNCDF in September 2023 at Climate Week NYC to scale insurance access for climate-vulnerable countries.

The SMI was launched by King Charles III during the 2020 annual meeting of the World Economic Forum in Davos. SMI's mandate, called the Terra Carta, has a mission to build a co-ordinated global effort to enable the private sector to accelerate the achievement of global climate, biodiversity and Sustainable Development Goal (SDG) targets. SMI has 17 industry and financial taskforces under it, comprising chief executives across the private sector whose purpose is to drive collective action towards a sustainable future within and across industries in line with the Terra Carta, and one of the taskforces is insurance.

The MoU with UNCDF focuses on developing and increasing access to parametric insurance, particularly in the Pacific, Caribbean and Africa regions, for the last mile communities vulnerable to the consequences of natural hazards. The agreement outlines the co-operation is expected to contribute to progress on closing the protection gap, build financial resilience in climate-vulnerable countries, expand opportunities for the flow of adaptation finance, catalyse investments from the public and private sectors to accelerate the achievement of the SDGs.

What are the training workshop objectives of Lloyd's, UNCDF and the SMI's insurance taskforce?

While the MoU was signed between UNCDF and Lloyd's, the activities fall under the purview of the SMI and UNCDF only. Parametric insurance training workshops are organised by UNCDF, UNU-EHS and SMI, either at national or regional level. The most recent workshop was held in Suva, Fiji in March and saw the participation of insurance stakeholders from seven PSIDS. A separate national-level training workshop took place in Papua New Guinea.

The main objectives of these workshops are:

- Establish a common knowledge base in parametric insurance;
- Train insurance stakeholders in parametric insurance products;
- Explain the nuances and requirements of the same through a participatory approach; and
- Build stakeholder capacity to facilitate the introduction of new and innovative products in the market.

The workshops also help the participants gain insights into innovative insurance approaches. These events

bring together all the actors of the sector such as insurers, reinsurers, insurance regulators, governments and development partners. The workshops help foster networking, collaboration, knowledge exchange and can also bolster potential partnerships for future projects and initiatives.

The training workshops aim to offer insights into frontier concepts and evidence-based approaches related to parametric insurance. They also delve into the underwriting and product design factors associated with parametric insurance. The workshops also explore financial and capacity development tools related to parametric insurance; the objective being this expanded knowledge base and enhanced skill set contribute to more informed decision-making and effective implementation of insurance-related initiatives.

How will you measure the success of this training?

Participants are given surveys to fill in, which are used as an evaluation tool. At the beginning of the training workshop, a baseline survey is circulated to the participants to self-report their initial knowledge on the relevant topics (parametric/index

The aftermath of Cyclone Pam in Port Vila, Vanuatu



Newscom/Alamy Stock Photo

insurance or the focus of the workshop) as well as their expectations. The survey also captures the diversity of the participants by grouping them into various categories such as insurer, regulators and so on. This is supplemented by a final survey at the end of the training where participants report the major takeaways from the workshop, their knowledge enhancement and what more they would like to learn.

The survey also anonymously captures the country of work for the participants to analyse the success component by country level. This system of baseline and post-event survey allows the collection of essential data on training workshop impact and participant engagement during the event. Moreover, the information participants receive during the training remains accessible to them as the PowerPoint presentations are sent to them. This step is important to ensure knowledge retention and give the participants a reference document to use as a refresher on these concepts later if needed.

An additional metric of training success, although more difficult to measure, could be the successful design and implementation of parametric/index insurance products in the region and sharing of the experience. As the training allows the stakeholders to gain knowledge and capacity in this area, it could be expected they gain the essential tools to identify the opportunities to develop this market. It is also proposed to do an online survey of the participants six months after the training workshop to assess their application of the knowledge acquired in their business.

How does the UN process involve the tools and expertise of re/insurance?

Within the UN system, various organisations work in the areas of risk financing and insurance, specifically in the Global South, where the needs are greatest. Identifying the opportunities to foster the growth of risk financing and insurance requires the contribution of the re/insurance sec-

tor. Working at the micro, meso or macro level requires not only collaboration between the insurance providers and the UN organisations, but also the tools and expertise of the re/insurance sector to pursue a comprehensive approach.

Picap, through its completely market-led innovative approach to insurance, aims to offer Pacific Islanders immediate cash relief following extreme weather events, enhancing the financial preparedness of Pacific households, communities, small businesses, organisations and governments against climate change and natural hazards. Payments are automatically triggered when specific parameters are met (such as wind speeds or rainfall levels), reaching policyholders' accounts within two weeks.

Picap collaborates with local co-operatives and agencies to extend coverage to underserved communities and is partnering with the local governments to extend the cover for social welfare beneficiaries. It is also building a digital ecosystem to reach the last mile through a customer relationship management platform called iOnboard and leveraging on mobile money platforms for efficient service delivery/faster premium payments and payouts. Picap is also collaborating with international insurance players such as Howden Group (besides Lloyd's SMI). Howden was also one of the facilitators of the regional insurance training workshops held in Fiji and Papua New Guinea. In February 2023 it also provided subsidy support for the premiums of beneficiaries in Fiji who are most vulnerable to the impact of tropical cyclones and floods, including small-holder farmers, fishermen, market vendors, female-headed households and people with disabilities.

Under Picap, the Inclusive Insurance Solutions Hub was established to support the development of inclusive insurance markets in the Pacific. Through the hub, Picap – in collaboration with the UNDRR and a local insurer in Fiji, Sun Insurance – has also piloted an anticipatory action insur-

ance product in Fiji through four local co-operatives. A scoping study is also being completed in the Solomon Islands to assess the feasibility of this insurance product in the country.

Workshops have been organised with UNDRR on anticipatory action as a disaster risk reduction tool in the Solomon Islands and Fiji recently, which saw the presence of local and international insurers such as Tower Insurance. The objective of these workshops is to understand the importance of disaster risk financing, enable knowledge transfer for national and local capacity-building in the country and to apply practical methodologies in real-world contexts through interactive group work and exercises.

UNCDF and the World Food Programme (WFP) together launched a first-of-its-kind climate risk micro-insurance for welfare recipients in Fiji. The pilot covered 274 welfare recipients and in 2023, 2000 welfare beneficiaries were covered, with the number set to increase this year. The beneficiaries are identified by the Department of Social Welfare and the premium is financed by the Ministry of Women, Children and Social Protection. In addition, the WFP's [R4 Rural Resilience Initiative](#) integrates insurance tools with risk reduction activities like nature-based solutions and improved agricultural practices.

Moreover, sovereign insurance products like the [Africa Risk Capacity \(ARC\) Replica](#) offer pre-arranged funding for rapid responses to major disasters, protecting vulnerable people and communities. Through ARC Replica, in 2021 the WFP supported the governments of Burkina Faso, The Gambia, Mali, Mauritania and Zimbabwe, with expansions to Madagascar and Mozambique. WFP also offers forecast-based financing, which empowers proactive disaster mitigation efforts at both community and government levels by using reliable seasonal and weather forecasts.

In December 2022, UNCDF Pacific and UN Women forged a partnership to provide parametric microinsurance

coverage to women market vendors identified by the Markets for Change (M4C) project. UN Women also provided premium support to 400 Fijian women in 14 communities as part of the Women’s Resilience to Disasters and M4C projects in Fiji. This initiative, lasting until the end of 2024, offers a 50% premium subsidy in the first year, gradually reducing to 25% in the second year. Alongside, participants receive financial and insurance literacy training to enhance long-term adoption and resilience against climate change and natural hazards.

Since 2008, the International Fund for Agricultural Development (IFAD) has been dedicated to agricultural and climate risk insurance. Starting in 2018, IFAD’s agricultural and climate risk insurance programme, [Insured](#), has been integrating insurance tools into its programmes by combining it with other offerings like farming inputs and loans. This not only adds value for clients but also reduces risk for rural investments. Insured is carried out by the multi-donor Platform for Agricultural Risk Management and is funded by the Swedish International Development Cooperation Agency. By integrating insurance, development programmes can establish stronger ties with the private and re/insurance sectors to benefit from their tools and expertise to help vulnerable communities protect their livelihoods. Engaging insurers in development programmes can foster sustainable markets and promote investment in rural areas.

In markets where the insurance sector is facing challenges to grow, the tools and expertise of the reinsurance sector will be critical to leverage the full potential of climate risk insurance. However, fostering growth in the insurance sector is not sufficient to propose sustainable solutions to vulnerable communities. It must be coupled with education and technical assistance for all relevant stakeholders.

For instance, UNCDF has launched two index insurance training courses, in collaboration with the Access to Insurance Initiative. The two pioneer-

ing self-directed training programmes on parametric/index insurance are designed to empower insurance supervisors and other stakeholders engaged in the development of index insurance markets, particularly in emerging and developing economies. The first course is open specifically to insurance regulators and is certified, whereas the second course is publicly available for all stakeholders.

What direct role should re/insurers play in adaptation and resilience to climate change?

As the world’s biggest risk aggregators, re/insurers can play a crucial role in adaptation and resilience to climate change. The graphic below examines the role of the insurance industry in addressing climate risk.

With their expertise in risk management and their financial capacity, the re/insurance sector can contribute to several capacities, including:

Risk assessment and pricing: insurance and reinsurance companies, along with brokers, are crucial players in tackling climate change risks. They can support climate risk insurance through premium assistance

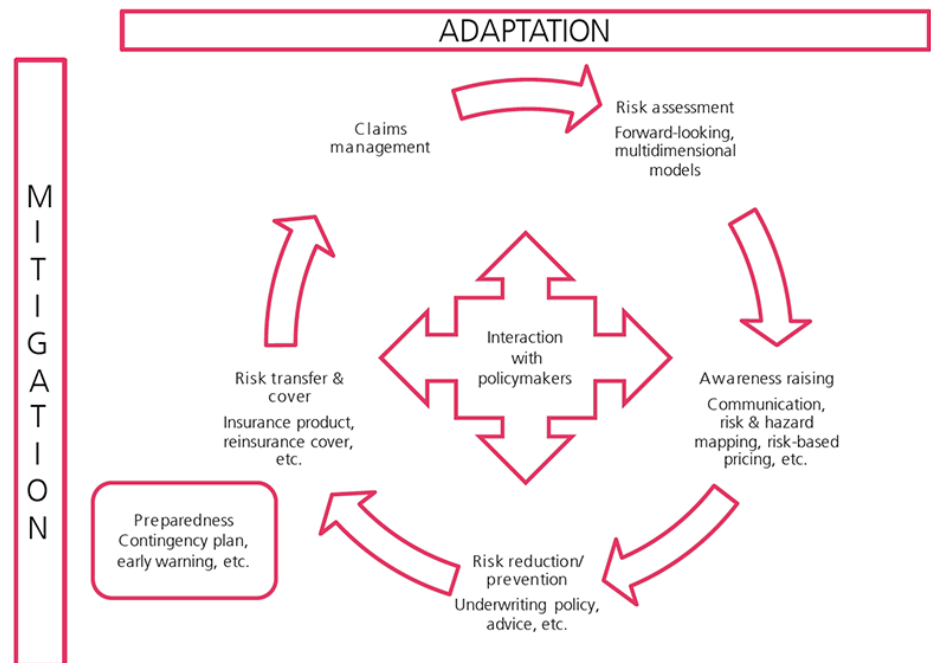
programmes. Leveraging their expertise, they can develop risk analysis tools, enhance assessment models and create sustainable insurance products. Collaborating with policy-makers, they can promote market-driven risk adjustments and advocate for climate resilience.

Innovative insurance products: they can develop innovative insurance products tailored to climate-related risks, such as parametric insurance that pays out based on pre-defined triggers like wind speed or rainfall levels. These products provide rapid payouts after a disaster, enabling quicker recovery.

Prevention and risk mitigation services: re/insurers can offer risk mitigation services to their clients, such as providing guidance on building resilient infrastructure, implementing disaster preparedness plans, and investing in renewable energy projects to mitigate climate risks. Through tools such as communication campaigns, tailored customer advice, and underwriting and pricing policies, they can motivate individuals to adopt preventive measures. Re/insurers can also work with ad-

Insurance is an integral part of the whole climate risk management cycle

Graphic: Roles of the insurance industry in tackling climate change



Source: Comité Européen des Assurances

ministrative agencies to develop preventive and adaptive public policies supporting a climate-resilient future.

Data and research: they can contribute to climate research by collecting and analysing data on climate-related risks and sharing insights with policymakers, businesses and other stakeholders to inform adaptation strategies. Insurance industry initiatives, like the Global Resilience Index Initiative, aim to provide open climate risk data to support resilience-building efforts.

Partnerships and collaboration: re/insurers can collaborate with governments, non-governmental organisations and other stakeholders to develop comprehensive adaptation and resilience strategies, leveraging their expertise and financial resources to maximise impact. They work with policyholders, policymakers and administrative agencies to develop climate-resilient public policies and recovery coalitions post-disaster. Promoting public-private partnerships and pooling mechanisms can offer affordable coverage, helping real economy actors absorb climate-related shocks, reduce default rates, and maintain creditworthiness.

Advocacy and awareness: re/insurers can advocate for policies that promote climate resilience, such as building codes that incorporate climate risk considerations or incentives for adopting resilient practices and communicate longer-term climate risk information as well as

potential adaptation options along with associated possible benefits to their clients (for example, premium reductions and discounts). They can also raise awareness among their clients and the public about the importance of adaptation and resilience efforts. Due to their expertise in understanding and quantifying risks, re/insurers can also support national and global conversations on the best practices in addressing and managing risks associated with climate change.

How should the re/insurance sector join the wider financial community to address climate risk?

Drawing from their expertise, re/insurance companies can share valuable insights on risk assessment and management, facilitating a deeper understanding of climate risks across financial institutions. By integrating climate risk considerations into investment strategies and lending practices, the financial community can align with climate goals and contribute to building a more sustainable and resilient economy. Collaborative efforts between the re/insurance sector and the wider risk financing community can also drive innovation in financial products, such as green bonds and climate risk insurance, mobilising capital towards climate-resilient projects. As experts in risk assessments, re/insurance actors can also act as a bridge between governments, development partners and the wider financial community.

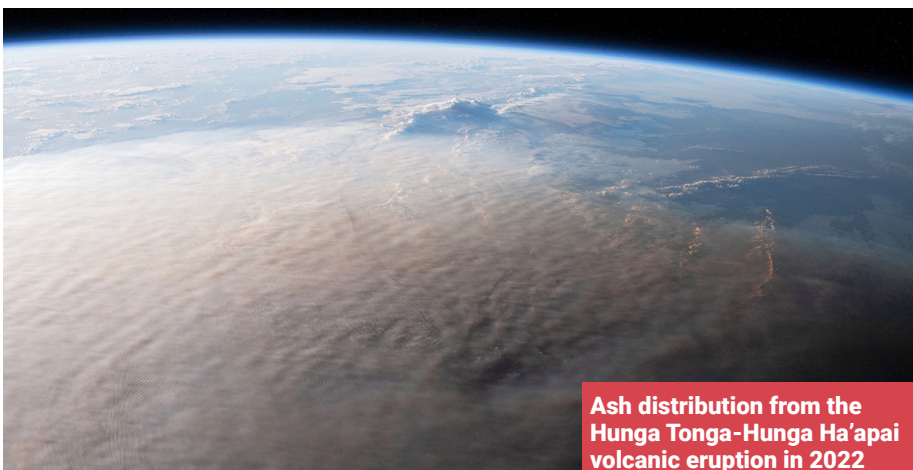
“By engaging clients, the wider financial community and other development partners, as well as advocating for change, the re/insurance sector can use its influence to catalyse action to address climate risk”

Dirk Wagener
UN

Additionally, sharing data and research on climate risk can enhance the collective understanding of financial risks associated with climate change. The re/insurance sector can partner with training and educational institutions to design learning programmes that would support wider financial community in understanding climate risk. Moreover, by advocating for policies that incentivise climate resilience and engaging in policy dialogue, the re/insurance sector and the wider financial community can create an enabling environment for sustainable finance initiatives. Through these concerted actions, they can harness their collective resources and influence to address climate risk effectively and transition towards a more sustainable and resilient future.

Furthermore, the re/insurance sector can partner with governments and development institutions to extend protection to those who might not be able to afford it while allowing insurance companies to continue operating in markets that may seem unprofitable (for example, due to the increased frequency of extreme weather events and premium pricing regulation).

Finally, by engaging clients, the wider financial community and other development partners, as well as advocating for change, the re/insurance sector can use its influence to catalyse action to address climate risk. ■



Ash distribution from the Hunga Tonga-Hunga Ha'apai volcanic eruption in 2022

Insurability becoming uncertain beyond 2°C

WTW's ecosystem resilience practice lead urges insurers to co-ordinate climate risk transfer with risk reduction

Re/insurers should see adaptation and resilience as crucial components of safeguarding communities, economies and the environment against the impacts of climate change. They should also see them as critical to the survival of their own industry, according to the head of WTW's ecosystem resilience practice, *writes Louise Isted.*

"That might sound alarmist, but climate change is increasing the frequency and/or intensity of a range of climate-related perils, which could limit the affordability of insurance in the future," Sarah Conway says in an interview with *Insurance Day.*

"Beyond 2°C warming, insurability becomes increasingly uncertain," she continues, "leading to possible and serious economic and societal disruptions as future losses may be

carried by individuals, firms and governments, which are often the 'insurer of last resort'."

Risk reduction through adaptation may be the only sustainable means to limit the increase in future climate losses and damages, and potential disruptions to insurance markets. Therefore, risk transfer and risk reduction increasingly need to go hand-in-hand, Conway says, and the insurance industry is uniquely positioned to support this.

In risk transfer, insurance coverage provides households, businesses and communities with the funding they need to recover rapidly from climate events. Insurers also have the data and expertise to encourage risk-reducing activities, enable more resilient communities and directly invest in resilience.

Alongside mitigation, adaptation is one of the major responses to addressing climate change under the UN Framework Convention on Climate Change.

Broadly speaking, adaptation refers to adjustments in natural or human systems to address the impacts of climate change, with the intention of moderating harm or exploiting beneficial opportunities. Building resilience, similarly, is preventing, anticipating and absorbing the impacts of climate shock and slow-onset events.

Business imperative

Insurers are exposed to both transition and physical risks from climate change through their underwriting and investment activities. Understanding climate risk therefore is "not only important but a business imperative", Conway says.



Xinhua/Alamy Stock Photo

There is an increasing recognition that natural catastrophe models developed using historical loss data may be limited when it comes to assessing future impacts, she says, because climate change is modifying the baseline processes that drive risk. There is also awareness of the need to accurately represent changes to exposure because of the rising concentration of people in often higher-risk urban areas.

Conway says: “We’re seeing a lot more money and time spent on modelling that makes use of new technologies like artificial intelligence and satellites, and lots of new companies forming that provide real-time data for globally consistent coverage. As such, we can understand climate risk a lot better than we could 30-plus years ago when catastrophe modelling began.”

This trend is likely to persist, thanks to advanced analytics, augmenting climate change models with big data and predictive analytics which have “huge potential” to significantly broaden risk assessment considerations.

Furthermore, over the past few years, climate risk is increasingly discussed alongside biodiversity and ecosystem-related risk. Conway says this represents an increasing recognition of the need to bring “natural capital” within risk assessment and management frameworks.

In its latest [Natural Catastrophe Review](#), WTW highlights global insured losses from natural catastrophe events surpassed \$100bn for the

fourth year in a row in 2023. Conway says these losses are “becoming the norm, not the exception”.

“What’s driving this? Well, interestingly, the so-called secondary perils are a key contributor,” she says.

Primary perils, such as earthquakes and tropical cyclones, are historically defined as having the highest loss potentials. They are well-monitored and usually covered by catastrophe models. Secondary perils, like hail, flood, landslide, storm surge and bushfire, are those that generate small to mid-sized losses.

The economic and societal impacts of secondary perils have become a focal point for risk managers following a year dominated by severe convective storms, wildfire, drought and flood. It is the aggregation of these perils that poses a threat to re/insurers, Conway says. The distinction between perils is thus “increasingly blurred”, and secondary perils have acquired an alternative label – earnings perils – to acknowledge that they can, in aggregate, have a primary effect on re/insurance profitability.

Catastrophe model pros and cons

The availability of climate-conditioned hazard data means re/insurers can better understand the range in frequency and severity of potential events under a number of greenhouse gas concentration trajectories, known as “shared socioeconomic pathways”. This is a huge improvement, Conway says, from the early days of natural catastrophe modelling.

Modelling is, however, a “simplification of reality” and ultimately [only as good as the data it receives](#).

“There will always be model ‘misses’, where an event is not picked up adequately, but this highlights the importance of validation – post-event analysis – after an impactful event has occurred, especially in the context of climate change,” Conway says.

Another issue to flag, Conway continues, is that, typically, natural catastrophe models do not “capture” the risk reduction or protective value of ecosystems, such as the way coral reefs and mangroves mitigate storm surge and flood.

Ultimately, catastrophe models are a good first step in quantifying risk to transfer and price it, and they support an understanding of range, in terms of the frequency and severity of hazard events that could “plausibly occur” at a given geographic location, Conway says.

This is achieved through the stochastic event set, which can also be altered to incorporate climate change. As such, catastrophe models can help with stress testing and allow the user to understand the best- and worst-case scenario in terms of hazard for a given exposure, and the associated modelled losses.

Model resolution is important to ensure processes are not overly simplified or too generalised in their assumptions – otherwise the value of the model output would “deteriorate”, Conway says. This is particularly the case for flood, as its impact can change rapidly over small spaces depending on topography and land cover. Fine resolution models are thus needed for this peril, she adds.

Formulaic approaches to risk quantification can lead to the exclusion of important factors that cannot be easily quantified, she continues. For

“Beyond 2°C warming, insurability becomes increasingly uncertain, leading to possible and serious economic and societal disruptions as future losses may be carried by individuals, firms and governments, which are often the ‘insurer of last resort’”

Sarah Conway
WTW



instance, the differential impact that disasters have on vulnerable segments of society, or how risk perception plays into risk management. “Holistic risk assessment should seek to capture these other aspects alongside robust quantitative risk assessment,” she adds.

The outputs of catastrophe models can be used for planning in a range of areas, she continues. They can provide indications of the required budget for potential losses, help design adaptation plans and implementation of precautionary measures, and help to rationally price premiums.

Catastrophe modelling “simplifies the science” behind risk assessment and allows technical experts to effectively communicate potential scenarios to interested stakeholders, she adds. The outputs of the models can also be used in capacity building activities and to raise awareness amongst those managing the financial impacts of disasters, such as finance ministries.

A disadvantage is the lack of a universal skill set among conventional catastrophe modelling vendors globally, with risk better understood in areas where there is more data availability. Vendor catastrophe models are often “black box”, moreover, which means there are many “hidden assumptions that are not visible to users”, Conway says.

Parametric insurance

When WTW works to design parametric insurance solutions it prefers to use open-source data and modelling platforms rather than “black box” models, as a method can “easily be replicated and the assumptions are visible”. This is also helpful when placing parametric products in re/insurance markets, as these “defensible” sources help gain the trust of underwriters.

Parametric insurance, a risk transfer solution that enables innovative coverage to address impacts beyond direct, quantified loss, are designed to

WTW’s approach

WTW’s interdisciplinary global team of specialists in alternative risk transfer and disaster risk finance has offerings that contribute to adaptation and resilience – including insurance solutions, but also broader consulting services focused on disaster risk finance.

For example, the broker is working with the governments of the Bahamas and Pakistan on comprehensive disaster risk management and financing strategies, and with the Asian Development Bank on demonstrating how investments in tropical cyclone wind and flood adaptation measures in the city of Hue, in Vietnam, could lead to a reduction in insurance premiums.

On parametric insurance, WTW serves a range of public and private entities with solutions customised by geography, risk exposure, risk management objectives and the client’s budget.

Building on its work with the [MAR Insurance Programme](#), which is underwritten by Axa Climate, WTW recently helped to design and launch a [coral reef insurance programme](#) in the Lau Seascape of Fiji, working with Vatuvara Foundation as policyholder and with financial support from BHP.

“This programme not only recognises the value of immediate liquidity to support reef restoration, but also the need for community assistance in the aftermath of a cyclone event – provision of water and food – and has built this into the post-cyclone response plan,” Conway says.

On livelihood protection, WTW is working with conservation non-governmental organisation Rare, and with support from the government of Canada via the Ocean Risk and Resilience Action Alliance, looking to design a parametric insurance product that helps small-scale fishers in the Philippines to adapt to climate change. This aims to provide protection from lost income incurred because of bad weather days that prevent safe fishing.

WTW is kicking off a project funded by the US Agency for International Development to develop a climate-resilient insurance solution that [aims to unlock climate adaptation investment](#) from the private sector. Specifically, WTW will design a pilot facility to offer a parametric insurance solution – a “resilience wrapper” – that protects direct loans to private enterprises from climate-related shocks.

After having supported Unicef – the UN Children’s Fund – in developing the first [child-sensitive cyclone insurance mechanism](#), WTW is looking forward to turning the Today & Tomorrow Initiative, launched at Cop27 in 2022, from a pilot into a platform over the coming years, Conway says. The initiative includes response measures that promote climate-resilient, sustainable recovery and build-back-better interventions, such as the rehabilitation and reconstruction of health, education and nutrition infrastructure.

pay – trigger – a pre-agreed amount to the policyholder when specific and measurable event conditions, or parameters, occur – such as peak wind speed above a certain threshold – in a defined geographic location and timeframe.

Conway says parametric solutions can address both the direct and indirect impacts of climate risk. For example, they can be developed to capture the direct damage caused by wind and tailored to cover indirect losses, such as heat stress on power grids.

Parametric insurance traces its roots back to the 1990s, to the weather derivatives market and the birth of the catastrophe bond market. In recent years, its growth has been fuelled by three factors, Conway says. They are the increasing frequency and severity of natural catastrophes and the hard market resulting from this; an increased awareness that climate change risks are pervasive and far-reaching; and an increased need for alternative risk-transfer solutions.

“Ultimately, parametric insurance has allowed for a widening of what is insurable,” Conway says. “Any economic exposure arising from an event – whether a climate shock event or a cyber attack or a pandemic, to name a few – can be insured. As a result, uninsurable exposures become insurable, with the parametric trigger providing the ‘missing link’ to unlock contingent capital.”

Another notable feature is that, un-

“Without really doubling down on risk reduction – and recognising and rewarding the risk reduction value of intact ecosystems, for example – the insurability of certain perils and geographies will become increasingly questionable. Thankfully, the industry is well placed to inform and encourage risk reducing adaptation activities”

Sarah Conway
WTW

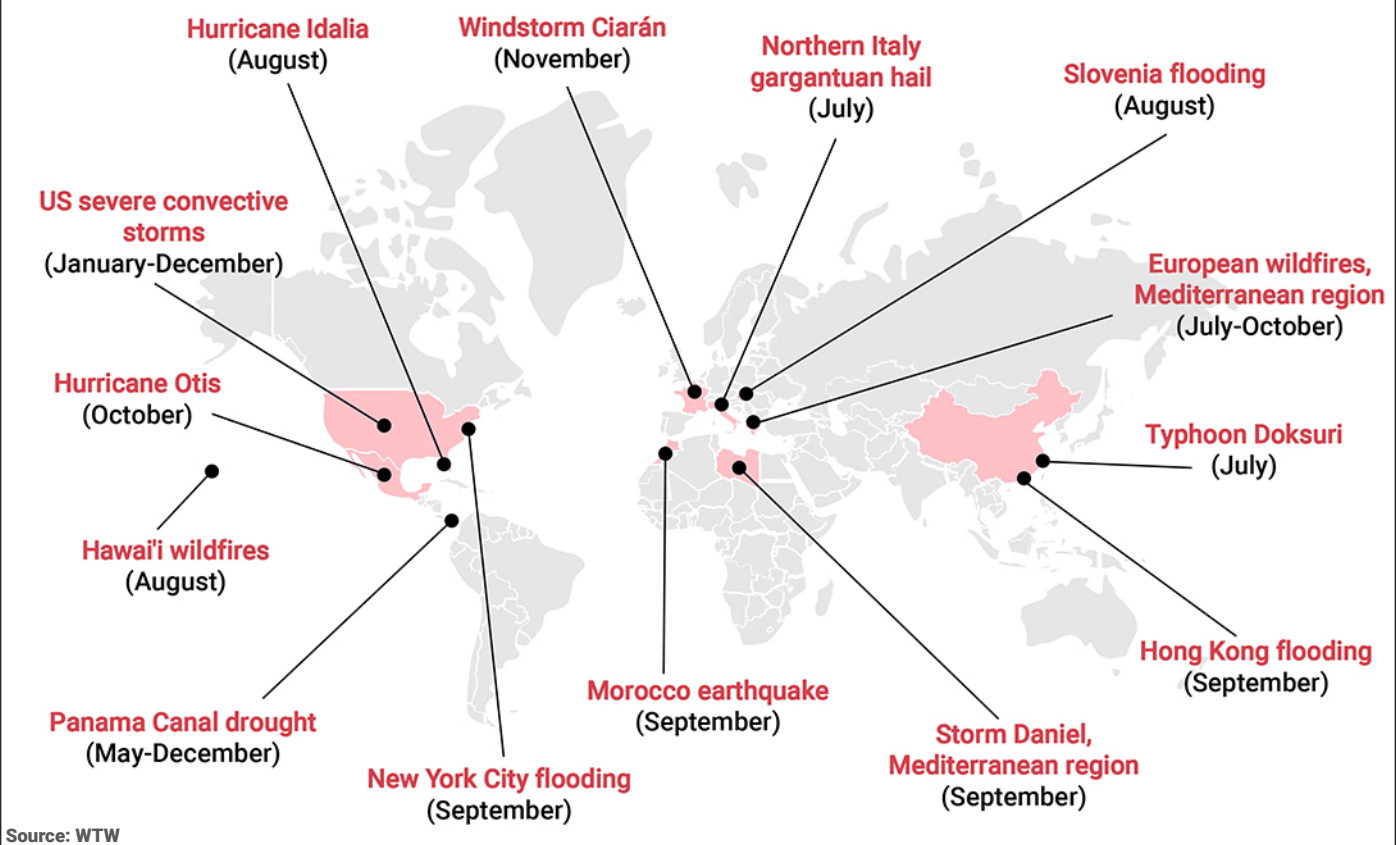
like indemnity products, which necessitate a potentially lengthy loss adjustment and claims process, parametric insurance pays out a pre-determined amount when specific, pre-defined parameters or triggers are met.

“Relying on objective and measurable data to determine payouts allows for money to flow within weeks of an event – when immediate liquidity can be critical,” Conway says.

She concludes: “Without really doubling down on risk reduction – and recognising and rewarding the risk reduction value of intact ecosystems, for example – the insurability of certain perils and geographies will become increasingly questionable. Thankfully, the industry is well placed to inform and encourage risk reducing adaptation activities and other investments that build resilience.” ■

‘Secondary perils’ make a significant contribution to 2023 insured loss bill

Map: Prominent natural catastrophes, July to December 2023



Source: WTW

Zurich Malaysia highlights takaful for climate-vulnerable communities



Islamic insurance can enhance financial resilience to impacts of climate change, the chief executive of Zurich General Takaful Malaysia Berhad says

Zurich Insurance Group plans to offer more products and services in Malaysia to help build the south-east Asian country's resilience to extreme weather events, *writes Louise Isted.*

These products include takaful, a type of Islamic insurance.

As climate change intensifies disaster risks, innovative solutions like takaful are needed to protect vulnerable populations, according to a webinar hosted by the Insurance Development Forum, Global Shield Financing Facility and the World Bank Disaster Risk Financing and Insurance Program.

Shamsul Azman, chief executive of Zurich General Takaful Malaysia Berhad, said floods have become the main environmental risk in Malaysia.

"Malaysia has been very fortunate in terms of major climate disasters. However, for the past few years, we have been hit by floods. It's a major issue in the country and, as an industry, we are struggling to come up with a

model that will enable us to offer the right protection," Azman said.

Massive floods in December 2021 and January 2022 affected 11 of Malaysia's 13 states, leading to the largest insurance claims payout for a flood event in a decade, according to a survey by Zurich Malaysia.

However, of the nearly \$2bn in flood damage, only 36% was covered by insurance and takaful. Such low levels of insurance penetration are a feature of the market despite the fact Malaysia faces annual, cyclical monsoon seasons.

"Together with the regulators, we have been exploring various models, as well as various potential solutions. We have not come to a conclusion yet on how to deal with this. It's a work in progress," Azman said.

The 2021 major flood event incurred economic losses equivalent to 0.4% of Malaysia's GDP. In 2022, flood events caused total losses equating to 0.03% of GDP.



"Malaysia has been very fortunate in terms of major climate disasters. However, for the past few years, we have been hit by floods. It's a major issue in the country and, as an industry, we are struggling to come up with a model that will enable us to offer the right protection"

Shamsul Azman
Zurich General Takaful
Malaysia Berhad

Evolution of takaful

From the Arabic word for “guaranteeing each other”, takaful is designed to meet sharia guidelines.

Malaysia’s takaful market began with the Takaful Act of 1984 and has since evolved as a component of the country’s Islamic financial system, which operates in parallel with its conventional financial system. The first takaful operator was established in 1985.

This had a composite licence, Azman said, meaning it had both family and general operations. This changed in 2017, when takaful operators were required to separate their composite licences into family (life) and general (non-life).

There are 11 family takaful operators in Malaysia at present but only four general takaful operators.

Malaysia’s insurance sector is regulated by the country’s central bank – Bank Negara Malaysia (BNM) – as part of its full supervision of the fi-

nancial industry, Azman continued. The latest evolution of its takaful sector includes retakaful (reinsurance). All non-life insurers in Malaysia, including takaful operators, have adopted the Malaysian Financial Reporting Standard 17, equivalent to the international IFRS 17, effective from January 1, 2023.

In contrast to conventional insurance policies, where policyholders pay an insurance company to insure them against risk, in takaful the contract participants are both the insurer and the insured. To manage the takaful contract and coverage, several models of contracts are used: wakalah (agency), mudharabah (profit-sharing) and a hybrid of the two.

In Malaysia, most insurance business follows the wakalah model, including Zurich.

“We ensure there is compliance with all aspects of sharia [guidelines],” Azman said. “For example, in underwriting we have permissible risks as

well as rejected risks, but there is also allowance for mixed risk, whereby a certain percentage of non-permissible risk is considered permissible. This means the sharia requirements are safeguarded by our takaful operational model.”

The model includes a Participants Risk Fund (PRF) based on a tabarru’ (contribution) contract.

A participant appoints a takaful operator to manage the PRF in return for a fee, which is an agreed percentage of the contribution. The contribution is credited to the PRF to be used for claims purposes.

Any surplus – after deducting claims, retakaful, reserve and related expenses – is distributed between participants and the takaful operator. That means the takaful operator takes some of the surplus as its “performance fee”, which is based on ju’alah (contract), and the remaining amount is distributed to the participants based on hibah (gift). If there is a deficit, then the takaful operator provides qard (interest-free loan) to the PRF.

According to AM Best, the total non-life gross premiums written in Malaysia in 2022 saw a 11.7% increase year on year, reaching Ringgit24.5bn (\$5.3bn). Of this growth, 31% was from the general takaful segment.

A challenge to growing takaful is not only awareness that insurers offer it, but also the perception of what it is, Azman said. “There is a widespread belief takaful at the retail end is only meant for Muslims and, as an industry, we have been trying to remove that perception.”

The industry is guiding the growth of takaful alongside developments in digitalisation as well as trying to achieve financial inclusion, Azman continued, in line with the BNM’s focus on insurance addressing the needs of the underserved and the unserved. In addition, it needs to take a “values-based approach” to climate risk and sustainability, he added. ■

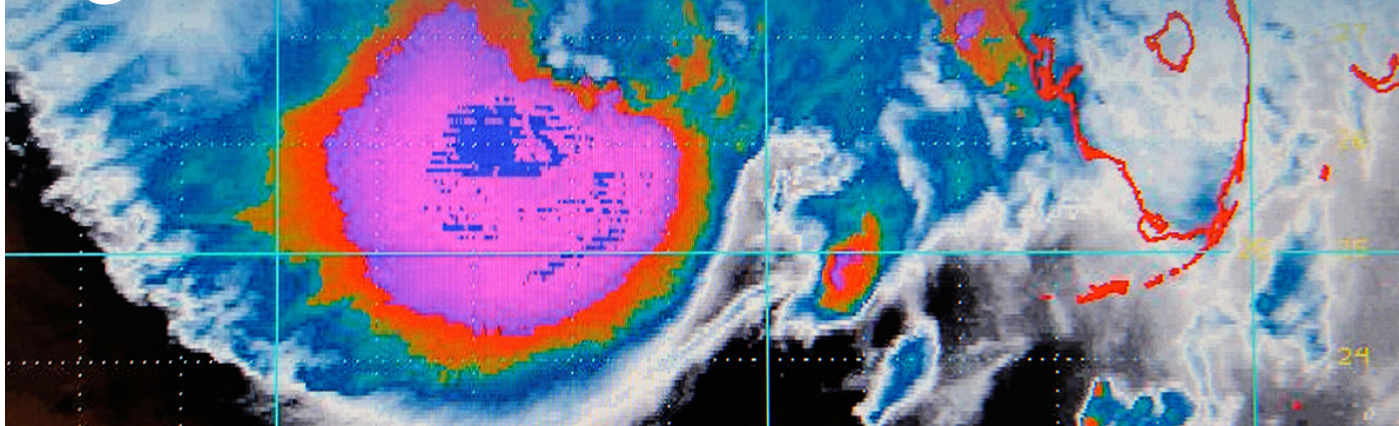
Flooding in Malaysia in 2022



Cloudyew/Alamy Stock Photo

Insurance looks to climate scenarios, but are they the right tool?

Imac/Alamy Stock Photo



Regulators urge using scenario analysis to test solvency risk, but this may not be useful for capital planning

When journalists and policymakers talk about the risk climate change poses to insurance markets, they often focus on the threat to consumers: the fear is increasing and unpredictable severe weather events, perhaps caused by climate change, will make coverage either too expensive or simply unavailable for businesses and households, *writes Ben Margulies*.

But severe weather can sink insurers, too. In the US, Louisiana saw four hurricanes in 2020 and 2021 – as a result, [a dozen insurers in the state went bankrupt](#) between July 2021 and February 2023. Florida has also seen a slew of carriers fail in recent years, with a state resolution authority listing 14 property/casualty (P&C) failures since the start of 2020.

Last month the National Association of Insurance Commissioners (NAIC) [published its National Climate Resilience Strategy for Insurance](#). Solvency testing was one of its five priorities, with a focus on using “scenario analysis”, a form of modelling, to quantify and guard against that risk.

Climate scenario analysis is not new – ironically, fossil fuel companies have a long history of trying to project how climate change will affect their infrastructure and assets. However, it is not clear whether present climate scenario tools are useful for measuring solvency – they involve different data, assumptions and timeframes. It also remains unclear exactly whether and how climate change shapes individual weather events, separate from other systems like El Niño.

Creating a clear link between solvency, weather and climate is a complex exercise dependent on hypotheses and projections – and so, inescapably, is a work in progress.

Capital at risk?

Ilana Winterstein, an environmental campaigner with the Sunrise Project, a global climate justice campaign network, says climate change presents a serious threat to the solvency of insurers because it “hits both strands” of their business.

“As underwriters they risk huge natural catastrophe payouts due to cli-

mate damage and as investors in the fossil fuel industry they risk stranded assets as environmental regulations will increasingly restrict oil and gas production,” she says.

In a survey of 44 European non-life insurer enterprises, published in 2022, the European Insurance and Occupational Pensions Authority (Eiopa) found these firms had €42.6trn (\$45.5trn) in windstorm cover, as well as €38trn in river and coastal flood cover and €22.8trn in wildfire policies.

Norbert Pieper, a spokesperson for Germany’s federal financial regulator, the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin), says P&C insurers are mainly exposed to physical risks, while transition risks are more of a problem for life insurers.

Other regulators, including the central banks of South Africa and New Zealand and Japan’s financial regulator, tell *Insurance Day* they interpret climate change as a risk to insurer solvency. Italy’s insurance regulator, the Istituto per la Vigilanza sulle As-

sicurazioni (Ivass), says it is “aware of the risks” posed by climate change to supervised insurers’ solvency and has been “constantly adapting” to EU regulation to encompass these new risks within its prudential supervisory tasks.

However, although severe weather and climate change can contribute to solvency risks, analysts argue in most cases it will not alone capsize a competently run insurer, especially not a larger one. Robert Chaplin, partner at law firm Skadden, Arps, Slate, Meagher & Flom, says climate change could cause “significant financial strain” to carriers in vulnerable zones, but a well-managed insurer is unlikely to collapse from its impact alone.

“Climate change in itself is not a risk to insurers’ solvency – the risk arises from how an insurer manages the effects of climate change, both with respect to physical climate risk and carbon transition risk,” Brandan Holmes, vice-president and senior credit officer at rating agency Moody’s, says.

Taos Fudji and Charles-Marie Delpuech, directors for Europe, the Middle East and Africa insurance ratings at S&P Global Ratings, tell *Insurance Day* they agree climate change-induced severe weather events may prove fatal for small property carriers in high-risk areas. However, they do not pose immediate threats to large, diversified insurers, which can also adjust their underwriting exposure every year or two.

Regulators’ warnings

Many insurance regulators are now pressing companies to assess climate

change risks as part of their corporate governance. In September 2020, New York state’s insurance regulator, the Department of Financial Services (DFS), instructed insurers to start considering climate risks.

In April 2021, Eiopa told national insurance regulators they “should expect insurers to integrate climate change risks in their system of governance, risk management system and Orsa [Own Risk and Solvency Assessment]”. BaFin, the Dutch central bank and Ivass all told *Insurance Day* they expect insurers to analyse climate risks in their Orsa exercise.

In November 2021, the Australian Prudential Regulation Authority (Apra) published a “prudential practice guide” informing the firms it regulates the agency “considers it prudent practice for the board to seek to understand and regularly assess the financial risks arising from climate change that affect the institution, now and into the future”. Apra is currently conducting a climate risk assessment survey, its second, across the financial services sector.

In Quebec, Canada the province’s financial markets regulator, the Autorité des Marchés Financiers (AMF), says the firms it regulates “are now expected to consider climate-related risks in their integrated risk management processes”.

Estimating catastrophe

To measure the risk from global warming, regulators and other experts recommend or require the use of scenario analysis. The International Association of Insurance Supervisors (IAIS) defines scenario analysis

as “a method of assessment that considers the impact of a combination of circumstances to reflect historical or other scenarios, which are analysed in light of current conditions”. The IAIS held a consultation on the use of scenario analysis in gauging climate risks to insurers between November 2023 and February 2024.

In the US, the NAIC strategy calls on state regulators to “embed climate stress testing and climate scenario analysis into routine financial analysis, data collection and financial surveillance”.

Some US state regulators now require insurers to conduct climate scenario analyses. In [guidance issued in November 2021](#), New York’s DFS said it would expect insurers to “use scenario analysis to inform business strategies and risk assessment and identification. Scenarios should consider physical and transition risks, multiple carbon emissions and temperature pathways and short-, medium- and long-term horizons”. Neighbouring Connecticut issued an identical guideline in September 2022.

In the EU, Eiopa guidance from August 2022 expects regulators to require firms “to consider at least two long-term climate scenarios”: one where temperatures rise no more than 2°C and one where they rise more than that.

In guidance issued last year, the Reserve Bank of New Zealand advised the firms it regulates, including insurers, to “develop capabilities in climate-related scenario analysis and stress testing or have access to external scenario analysis and stress

“There is a big challenge with climate change... [the Network for Greening the Financial System and Intergovernmental Panel on Climate Change scenarios] just provide climate assumptions on global warming, but you can’t really directly link those to what will happen to different periods”

Charles-Marie Delpuech
S&P Global Ratings



testing capabilities while internal capacities are developed”.

The central bank tells *Insurance Day* it encourages but does not require insurers to use scenario analysis. However, New Zealand law requires larger insurers to show “how they have analysed the resilience of their business model and strategy under a 1.5°C scenario, a more than 3°C scenario and another scenario of an entity’s choosing, which will assist their management of solvency risks”.

Japan’s Financial Services Agency (FSA) and the Bank of Japan piloted a climate scenario analysis with three banks and three non-life insurance companies, building on scenarios from the Network for Greening the Financial System (NGFS), an international association of central banks and financial regulators, in 2022. Japanese regulators concluded global warming would increase claims and are working on a second scenario

analysis, but the FSA tells *Insurance Day* it does not currently require insurers to use scenario analysis as work on methodology and data collection is still ongoing. However, “we consider it desirable for financial institutions to eventually utilise scenario analysis”, and notes some non-life insurers in Japan have done so.

The AMF tells *Insurance Day* it expects insurers to start using climate scenario analyses from the second half of 2024. It will also publish a climate risk management guideline this year.

Writing the scenario script

Regulators and insurers can write their own scenarios, but frequently rely on scripts produced by external associations. A common source is the NGFS, which has developed seven scenarios grouped into four categories:

- **Orderly**, which “assumes climate policies are introduced early and become gradually more stringent”;

- **Disorderly**, which expects policies are adopted more slowly and with less co-ordination;

- **Hot house world**, in which too little is done and “critical temperature thresholds are exceeded”, and

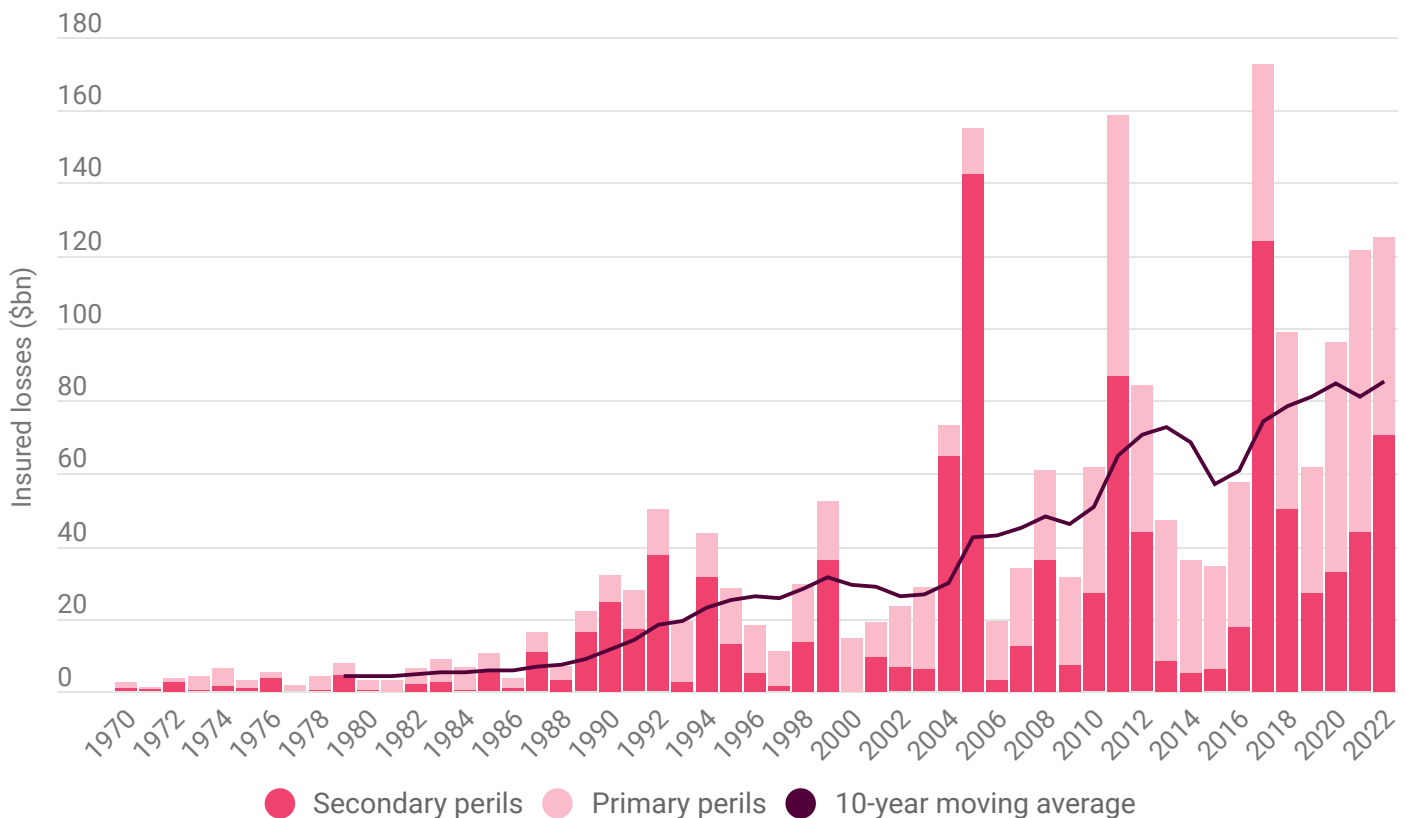
- **Too little, too late**, which also involves tardy and unco-ordinated policies and thus “elevated transition risks in some countries and high physical risks in all countries due to the overall ineffectiveness of the transition”.

The scenarios run to 2060, and project temperature changes ranging from 1.4°C – for example, if net zero is reached by 2050 – to 3°C or more if the world maintains current trends.

The Intergovernmental Panel on Climate Change (IPCC) listed five scenarios in its 2021 report, with escalating degrees of global heating – from 1.4°C to 4.4°C by 2100.

Annual natural catastrophe insured losses vary but the trend is upwards

Graph: Insured natural catastrophe losses, 1970 to 2022 (\$bn)



Source: Swiss Re Institute

In its [2021 Biennial Exploratory Scenario](#), the Bank of England proposed three scenarios – early action, late action and no additional action – which adopted 2050 as an end date. In the first two scenarios, temperatures rise no more than 1.8°C over this period; in the last, temperatures rise 3.3°C.

The Dutch central bank has published guidance for internal scenario analyses. It recommended firms employ “the principles of relevant stress tests as a basis for assumptions” in their scenarios, citing exercises conducted by Eiopa, the Dutch central bank and the UK’s Prudential Regulation Authority (PRA).

Ivass tells *Insurance Day* Italian carriers usually pick two NGFS scenarios, “one of orderly transition and the other of disorderly transition to assess the materiality of their exposure to both physical and transition risks”.

“Sometimes, insurers adapt these scenarios depending on the characteristics of their portfolios,” Ivass adds.

[Last month the PRA published a paper](#) advising insurers how to adapt macro-level scenarios to individual asset types.

Canada’s federal Office of the Superintendent for Financial Institutions and the AMF are jointly developing a Standardised Climate Scenario Exercise (SCSE), with the second part of a consultation beginning last month. The SCSE includes three sections dealing climate transition risks, covering credit, market and real estate exposure risks, as well as a physical risk section. The AMF says the SCSE “is not an exercise to obtain an absolute quantitative impact of climate change or predict the future, but to differentiate among risks”.

But is this the right tool?

Scenario analysis can help map risks to assets and property over time, but John Scott, head of sustainability risk at insurance giant Zurich, suggests climate scenario analysis is not a useful tool for assessing solvency risk.

One problem is differentiating between weather and climate. The existence of climate change is “incontrovertible”, Scott says, but the relationship between global warming and individual weather phenomena “is not as straightforward as we think”, he tells *Insurance Day*. “These are complicated issues of attribution and climate science, which are difficult to interpret,” Scott continues.

Delpuech says it is difficult to measure exactly how much climate change contributes to rising losses from extreme weather, partly because the precise impact of climate change on the frequency and severity of events is not well quantified. Fudji, referring to Swiss Re data, says in recent years natural catastrophe losses have risen. “The very high majority – I would say more than 80% – of the increase in the sum of insured losses for insurers is linked to the rise in property values,” he says, as opposed to more frequent and more severe extreme weather events.

Another problem Scott identifies is climate scenario analysis uses very different timescales and data from solvency assessments. Regulators and firms measure their solvency on an annual basis or perhaps over a few years, while climate scenarios run for decades. And while insurers measure things like credit or liquidity risk based on retrospective data, such as claims records, climate scenarios rely on hypotheses and projections, with no guarantee the risks will ever be realised.

“There is a big challenge with climate change,” Delpuech says. The NGFS and IPCC provide climate scenarios, “but the challenge is those scenarios... just provide climate assumptions on global warming, but you can’t really directly link those to what will happen to different periods” along the scenario timescale.

Delpuech adds IPCC and NGFS scenarios “don’t give any indication of how the physical risks linked to global warming actually play out... there is no quantification”. Insurers and

regulators must develop more exact specifications to gauge their solvency.

Another issue is whether analyses of long-term climate change risks should change the ways insurers allocate capital. Solvency management involves maintaining sufficient capital in today’s insurance markets to protect policyholders and for financial stability. That works very well for the existing severe weather-related risks, “but it could be destabilising to current pricing and markets, if regulators require capital to be applied today to something that may or may not happen” decades down the line, Scott says.

Holmes says “overestimating risk could lead to insurers forgoing profitable business and become uncompetitive in the market”.

“The more immediate risk of greater unpredictability of severe weather can be managed through more sophisticated data and modelling, which helps price risk more accurately,” Holmes adds.

Fudji says insurers can reprice or drop policies or acquire more reinsurance on a regular short-term basis – unlike banks, which have fixed-term assets in the form of loans. It is “not necessarily most relevant to make business decisions today on what could happen in 25 or 30 years’ time”, he says.

Scenario analyses may be plausible forecasts, but one cannot determine how probable they are, Scott says. If insurers start reserving capital for hypothetical long-tail climate risks, they will end up severely curtailing the availability of affordable insurance.

Scott distinguishes between solvency analysis, which tends to rely on historical data, and scenario analysis, which is more prospective and based on algorithms. He suggests regulators encourage the use of the latter, which includes the long-term “what-if” guidelines in the Taskforce for Climate-Related Financial Disclosures. “I think everybody’s learning still,” he says, “and especially in the regulatory space.” ■

Climate risk demands a fresh take on investment return

The real currency of adaptation and resilience is natural capital, the director of Resilient Planet Finance Lab says

To unlock the flow of capital needed for climate adaptation and resilience projects, re/insurance principles must be placed at the heart of global finance, according to Dr Nicola Ranger, director of the Resilient Planet Finance Lab at the University of Oxford and co-chair of the Resilient Planet Data Hub (RPDH), writes Louise Isted.

An accelerator research and innovation programme, the Lab sits with the RPDH under the Resilient Planet Initiative (RPI) being developed by the UN Climate Change High-Level Champions.

In an interview with *Insurance Day*, Ranger stresses the value not only of risk metrics but impact metrics. “We’re used to talking about the *negative externalities* for climate mitigation. Paying a price for the negative impact your actions have on others. But we need to start talking more about pricing in the positive impact of adaptation. To accelerate adaptation, I want to see the industry lead in pricing in the positive externalities of insurance and investing in resilience, as well as the risks of climate change,” Ranger says.

“The traditional insurance mindset is how to measure loss reduction – when we buy an insurance policy or invest in resilience, the story is always the risks that will be avoided,” she contin-

ues. “But this story is failing us – both the industry and society. We need to flip that mindset on its head and start building a set of metrics that capture the positive benefits of adaptation both for the insured and wider society. Insurance and adaptation are fundamentally positive investments with substantial ROIs [returns on investment] – unlocking investments, jobs, poverty alleviation or food security.”

Ranger says she and her colleagues are already doing this. To mobilise finance into mangroves, for example, they are building a set of metrics for insurers and investors that capture the potential positive return on investment for business, local communities and government. From there, they can work with financiers and governments to structure ways to mobilise finance effectively, she adds.

Mark Carney’s challenge

The RPDH began as the Global Resilience Index Initiative (GRII), which was launched at Cop26 by six founding partners, including three co-chairs from the Insurance Development Forum (IDF), the University of Oxford, and the UN Office for Disaster Risk Reduction. The initiative was supported by technical partners, such as the Global Earthquake Model Foundation and Oasis Loss Modelling Framework with their open data architectures.

The GRII was their response to the challenge set by Mark Carney, the former Bank of England governor, when he galvanised the finance community in time for the climate talks in Glasgow. Carney asked the IDF to come up with a metric that financial institutions could use to price risk and assess different adaptation options. Mitigation efforts, Carney argued, had a clear metric – a tonne of carbon – but adaptation did not. Enter the GRII to plug the information gap for aggregated risk decision-making and the guidance of capital flows towards resilience.

Ahead of Cop28, the GRII forged a partnership with the UN Climate Change High-Level Champions team to develop a transparent, freely available and globally consistent view of physical climate risk. Their participation in a “design sprint”, hosted by Google at Climate Week NYC, led to the creation of the Resilient Planet Initiative.

This development renamed the GRII to RPDH and led to the [creation of the Resilient Planet Finance Lab](#) to seek ways to mobilise finance for adaptation. The RPDH is thus now defined as a data service that includes future climate risk insight under the UN headings of “people, planet and prosperity”. The Oxford team recently launched a new partnership with the Howden Foun-



“The traditional insurance mindset is how to measure loss reduction – when we buy an insurance policy or invest in resilience, the story is always the risks that will be avoided. But this story is failing us”

Nicola Ranger
Resilient Planet Finance Lab, University of Oxford

dation to build the next generation of metrics needed for adaptation with a focus on “people and planet”.

The RPI’s aim for Cop29 is to launch a toolkit that brings data together with solutions. A recommended set of metrics will thus mark the RPDH’s move into “operational service”.

Ranger says: “This year we’re going from the enormous amount of knowledge we have built up, to a set of key metrics that are not only consistent with the needs of new regulations but can also guide financial flows towards areas that build resilience, such as resilient infrastructure, natural capital and agricultural systems.

“Boiling everything down to one metric is extremely difficult but we want to be able to show a set of core metrics around risk and impact in the context of people, planet and prosperity.”

Blueprint for investment

A key milestone on the road to Cop29 is the blueprint for investment in resilient architecture [recently announced by the IDF in collaboration with global asset manager BlackRock](#).

“This is exactly the type of initiative needed from the re/insurance industry to turn the dial on adaptation,” Ranger says. It is also the latest example, she adds, of the “catalytic” role the IDF is playing in mobilising the strengths of the industry – risk expertise, investment capital and underwriting – to reach the heart of the UN’s climate and sustainable development goals.

The aim of the blueprint is to help make the \$2.7trn that is invested in infrastructure globally each year resilient, Ranger stresses, and to bring another \$1trn into infrastructure in emerging and developing economies, including renewable energy, water, schools, hospitals and transport.

“I hugely congratulate the IDF on this critical new initiative,” Ranger says. “I hope to see it crowd in adaptation-aligned capital at scale from the industry as well as leverage the

industry’s wider strengths in risk knowledge and underwriting.”

Having worked on climate risk in a wide variety of contexts, including academia, government, banking and insurance, Ranger urges a holistic approach. “A big part of our work at the Resilient Planet Initiative is not just to support communities on the ground, but how to embed risk into the whole financial system. It’s about taking insurance principles and applying them to banking, pensions and other areas of investment so that we get the whole system supporting adaptation.”

The true value of investment in adaptation can clearly be seen in projects that are linked to nature, which is itself a form of infrastructure, she continues. “We’ve been looking at how to quantify and model the benefits of nature in terms of loss reduction, such as for our projects in Jamaica and Bangladesh,” she adds.

Ranger warns against seeing the concepts of mitigation, adaptation and resilience as separate entities in the real world. “It’s still frustrating for me that they aren’t being connected more,” she says. “By integrating them, we can design projects that give both the mitigation and adaptation benefits, as well as the societal benefit. However, at a global level, we still disconnect them far too much and in policy there are far too clear lines drawn between them.”

Another source of frustration is how adaptation is seen as a failure to tackle mitigation. “I’ve even heard some people say they’re scared to talk about adaptation because it will make them seem defeatist,” Ranger says. “That’s the wrong attitude because if we don’t do both, then there’s no way we can tackle this enormous risk.”

The role of re/insurers in driving investment towards climate projects cannot be overstated, she stresses. With about \$40trn in assets under management, insurers are themselves a significant part of global capital, she says. And reinsurers should

be playing their part in ensuring investments “build and not negate” resilience, she adds.

The success of the RPI will be measured, then, not merely by re/insurers using the toolkit it offers, but also by their willingness to spur efforts to have climate risk embedded into the whole financial system. Ranger says: “If our initiative can actually catalyse that bigger change then that, for me and the other co-chairs, would be success.”

Quantifying nature loss

Ranger is also director for “greening finance” at the UK Integrating Finance and Biodiversity Programme and one of the lead authors of a recent report that analyses the impact of the degradation of natural ecosystems. The report – [Assessing the materiality of nature-related financial risks for the UK](#) – presents the first quantitative evidence of the economic risk posed by nature degradation and the erosion of ecosystem services, both domestically and internationally, to the UK economy.

Damage to the natural environment is slowing the UK economy, the report says, and could lead to an estimated 12% reduction to GDP in the years ahead – larger than the hit to GDP from the global financial crisis or Covid-19. In addition, the report considers how this economic risk to GDP could translate into risk for the financial sector, as an indication of the potential impact of nature-related risk on financial resilience.

Ranger says: “Over the past decade, central banks and financial institutions woke up to the risks posed by climate change and we’ve seen meaningful steps to address them, including mandating disclosures, and beginning to shift capital flows toward green sectors and technologies.”

She concludes: “With this report, we comprehensively demonstrate that risks from environmental degradation and biodiversity loss are at least as severe and urgent, and indeed that, if not addressed, will double climate change losses.” ■

Re/insurers invited to learn ocean science for human good

Arizona State University and Bermuda Institute of Ocean Sciences 'uniquely placed' to offer insights into ocean ecology, industry veteran Stephen Weinstein says

A century of ocean research combined with an elite scientific resource offers unique insights into climate risk, according to re/insurance industry veteran Stephen Weinstein, writes Louise Isted.

Founded in 1903, the Bermuda Institute of Ocean Sciences (BIOS) documents the warming of the ocean in concert with rising global temperatures, changes in ocean chemistry and associated long-term changes to the ecology of the ocean.

In 2021, BIOS merged with the Global Futures Laboratory at Arizona State University (ASU), joining its mission to help sustain a habitable planet.

ASU-BIOS researchers leverage a variety of vessels and facilities operating at the edge of the Sargasso Sea in the north Atlantic to explore the ocean and address critical local and global environmental issues.

Among its recent achievements is being selected to "ground truth" NASA's new plankton, aerosol, cloud and ocean ecosystem satellite mission, which launched from the Kennedy Space Center in Florida in February.

Weinstein spent nearly 20 years at RenaissanceRe as group general counsel and chief compliance officer, a member of its executive committee and as chair of RenRe's Risk Sciences Foundation. He has held numerous roles dedicated to catastrophe and environmental research, including chair of the extreme events committee at the Reinsurance Association of America and now chair of BIOS.



"The sector is never going to have a precise number for most manifestations of climate-driven risk. Instead, we're going to have an estimate of risk and of the impacts of mitigating and adaptive features"

Stephen Weinstein
Bermuda Institute of Ocean Studies

Proven track record

A Harvard and Columbia University alumnus, Weinstein says the credentials of ASU cannot be overstated. "ASU is among the most pragmatic, nimble and solutions-oriented research institutions and it gives BIOS an opportunity to relaunch, with a much broader strategic ambit, something that has a proven track record of success," he says in an interview with *Insurance Day*, referring to the Risk Prediction Initiative (RPI).

BIOS launched RPI in 1993 to facil-

itate communication between the scientific and business community. A year before, Hurricane Andrew had galvanised Bermuda as the future risk capital of the world. RPI undertook research focused on making science on natural hazard risk available and understandable to stakeholders. According to Weinstein, RPI played a significant role in the aftermath of Hurricane Andrew in propagating a more robust, validated view of Atlantic hurricane risk, a peril of significant interest to the Bermuda market, as well as Florida-based, US national and global re/insurers.

Subsequent major topics of RPI-funded research include paleotempestology (the relationship between tropical cyclone activity and climate), improvement of best-track data and European storms. RPI members and stakeholders receive reports, data and research focused on addressing business-relevant information on the science of extreme events.

Weinstein says "RPI 2.0" will be focused on climate and technological innovation, with a concentration on finance risk, as well as mitigation strategies for reducing the impacts of rising CO2 on Earth systems, both ecological and human.

"Success has a thousand parents, but the validation BIOS offered in the period of uncertainty following Hurricane Andrew, as an independent institution with peer-reviewed standards, was enormously valuable. However, decades later, before our merger with ASU, to a degree RPI ran out of runway to continue to add more relevancy to the sector," Weinstein says.

“Today there is broad consensus that while more can be done and no model is perfect, we understand Atlantic hurricanes reasonably robustly. However, there are numerous hazards we don’t understand nearly as well, some of which are also climate-related, such as extreme heat.

“But the RPI’s proven model of governance and collaboration with industry, and the independent, robust and energised scientific research ASU-BIOS can offer, has a lot of value to accelerate a better, transparent view of these risks. In turn, these collaborations can reduce the risk of loss of life, promote community-wide resiliency and help launch exciting new financial and physical products to the market.”

Competitive advantage

The re/insurance industry is at a competitive advantage compared with many other sectors in understanding climate risk, Weinstein stresses, thanks to its “willingness to embrace uncertainty”.

“The sector is never going to have a precise number for most manifestations of climate-driven risk,” he admits. “Instead, we’re going to have an estimate of risk and of the impacts of mitigating and adaptive features.”

The pace of change with respect to climate-driven hazards is changing the nature of risk, he says, highlighting wildfire.

“To take one peril, we don’t understand wildfire risk as well as we need to and traditional methodologies based on past events are proving less effective for a peril and exposure set that are both rapidly changing. For example, experts in wildfire risk management have noted that, historically, population density centres in wildfire-prone regions are correlated with where wildfires used to not go. Paradise in California is a good example of this,” Weinstein says.

“But for a range of reasons, including changes in ocean heat, which have led to changes in wind patterns, we

are seeing changes to the scatterplot of where wildfires start and where they propagate towards. Current and developing conditions seem to be pushing some wildfires towards certain population centres and to high-value commercial property locations. As a result, the historical data, which remains important and valuable for certain hazards, seems to be less valuable for wildfire risk in a large number of locations.”

Mitigation efforts

The insurance sector wants to encourage businesses, governments, small and medium-sized enterprises and households to invest in site-specific, economically efficient mitigation, Weinstein stresses.

He says: “Collectively we have been engaged in trying to find ways to better communicate why mitigation can be valuable and to encourage policymakers to promote it and consumers to adapt it. One of those efforts was to come up with a metric. We got comfortable over a very long process, from my perspective, with communicating the premise at the time that \$1 invested in mitigation is worth \$4.

“Today, the consensus is to point to an even higher return on the mitigation investment. But whatever we agree to use, we can always acknowledge it’s never actually precise. To me it’s a positive we have found a way to communicate a more digestible message, while providing access to more complete assessments and research to stakeholders who want to dig beneath a single number.”

Re/insurers need to find a way to communicate “concisely and effectively” to the public, politicians and thought leaders, but climate change requires everyone to think differently.

“Traditional insurance underwriting is based on a framework and grounded in a foundation of historical data, but we don’t have data for the heat conditions of the next century or even the next decade,” Weinstein says. “We don’t have claims data for homes in the new wildfire scatter patterns. We

don’t have flooding data from homes that haven’t been at great risk before. Historical data is relevant but it’s not a complete tool to understand how to price risk today, nor to allocate capital for the time to come.”

Actionable insight

That is another reason, he adds, why capital allocators, investors, businesspeople, risk managers and re/insurers should engage with scientists, “to turn their hypotheses into tools that can be actionable in our sector”.

A not-for-profit research institute like ASU has been assembling data “for other purposes that in turn have renewed utility” in the re/insurance sector, Weinstein notes.

“It could be wildfire and extreme heat, but it could be artificial intelligence, it might be pandemic – there’s always data. It might not be the data of an underwriter’s dreams, it might be synthesised data, it might be comparable data, but in many cases I think a broadly gauged institute like ASU can begin by helping you with the potential of being able to access reasonably robust, potentially high-utility data.”

Weinstein invites re/insurers to attend the 121st anniversary of BIOS in June.

“We really want to keep introducing reinsurers, investors, entrepreneurs and other capital providers to the merged ASU-BIOS family and engage in a dialogue with them as to: Where can we help you the most? What are the perils that you fear the most? What are the perils you think you don’t understand as well as you’d like? And how can we work together to get to a better and more actionable understanding?”

Weinstein concludes: “We want to be in a conversation about what we can offer, what the scale of existing research is at ASU. And I’m willing to predict if our colleagues at ASU don’t already have the capability needed, they’ll explore with them ways to go get it. This is not the attitude of every other elite academic research institute.” ■

Catastrophe models must keep pace with climatology

Pioneer of catastrophe modelling urges re/insurers to switch focus from static event sets to dynamic science

Catastrophe modelling will remain the “global standard technology” for pricing and managing extreme event risk, but it must incorporate the latest climate science, the president and chief executive of Karen Clark & Company (KCC) says, *writes Louise Isted.*

Karen Clark pioneered the probabilistic catastrophe modelling techniques that revolutionised the way re/insurers and financial institutions manage their catastrophe risk.

She founded the first catastrophe modelling company, Applied Insurance Research (AIR), in 1987. In 2002, she sold AIR to Insurance Services Office, which later became Verisk Analytics. She [co-founded KCC in 2007](#) with Vivek Basrur, who created the first data standards and web-based applications for the catastrophe modelling industry in the mid-1990s.

The awards Clark has received include a Nobel Peace Prize certificate in 2007 for her contributions to the work of the Intergovernmental Panel on Climate Change (IPCC). Her close collaboration with climate scientists over decades means she is highly qualified among re/insurance veterans to speak about the value of mutual respect.

In an interview with *Insurance Day*, Clark says climate scientists sometimes make “derogatory” statements about catastrophe modelling because they fail to appreciate the “main crux”, which is that it is an event-based technology.

“Catastrophe modelling makes hundreds of thousands of projections of



“All the historical data KCC uses for weather-related perils are completely climate conditioned, so the science is an enhancement to our catastrophe models”

Karen Clark
Karen Clark & Company

potential future events to ensure insurance companies and reinsurance companies are not overly exposed. Scoring algorithms that make use of aerial photography and machine learning may be able to give highly valuable property-specific information, and they can complement catastrophe models, but not replace them,” Clark says.

Catastrophe models thus provide information far beyond that which is specific to a given property. “The point is that insurance companies use catastrophe models to ensure they have a good spread of risk and aren’t overly concentrated and

over-exposed to one event. If they are, then they need to buy enough reinsurance, or other types of risk transfer, to cover that exposure,” she adds.

The threat to catastrophe modelling, however, is a failure to encompass climate science. “All the historical data KCC uses for weather-related perils are completely climate conditioned, so the science is an enhancement to our catastrophe models,” she says.

Converting the industry

On a panel with Bermuda market veterans John Swan, Locke Burt, Fiona Luck and Brian O’Hara at the Bermuda Risk Summit in March, Clark said re/insurers themselves can have misconceptions about catastrophe and climate modelling.

“I’ve heard it said, wrongly, that catastrophe models were developed after Hurricane Andrew, which is not the case,” Clark told delegates at the conference.

Before the formation of AIR, she added, all property catastrophe re/insurance was written out of London or New York. The challenge was to convince those markets they needed a “new-fangled technology” called a computer model.

“AIR’s first product, Catmap, was for many underwriters in New York and Lloyd’s the first contact they had ever had with a computer application,” Clark said. It was hard to convince re/insurance underwriters of the value of computer models because the US had been “in a lull”, with respect to hurricane activity.

“Up to 1987, the most costly hurricane had been Alicia in 1983, which was a loss of about \$1bn. In 1989, Hugo hit, which was about \$4bn. And the industry thought, at the time of Andrew in 1992, that the worst-case scenario was about \$7bn,” Clark said.

The issue was that insurers had stopped tracking their exposures.

Clark explained: “Way back when, insurers used to have maps on the wall and put pins in where their insureds’ properties were. When they got too many properties, they didn’t have enough pins and so they weren’t tracking them at all. What were Lloyd’s underwriters using to model their exposure? Premiums. The only data reinsurance underwriters were getting were state, line of business premiums. That was it.”

To enable re/insurers to use catastrophe models, AIR created the first Industry Exposure Database, in 1987. This had exposure by five-digit zip codes, so it was a “reasonable resolution”, Clark said. Underwriters could run losses based on exposures and then use the premiums by state and line of business to calculate the market shares of individual ceding insurers.

“It sounds straightforward, but it

was difficult to get reinsurers to embrace this new technology. All the same, at the time of Andrew, we had about 30 Lloyd’s syndicates and New York reinsurers using the model, so we weren’t doing that badly, but it wasn’t a wave of people saying, ‘We want this technology’.”

AIR’s model indicated the worst-case scenario was “more like” \$60bn and not \$7bn, “so even our own clients didn’t really believe the numbers”. For Hurricane Andrew, AIR estimated the insured losses were likely to be more than \$13bn.

“That got faxed out, and our landlines started ringing off the hook. Lloyd’s underwriters argued with me, saying, ‘I bet you five quid it won’t be more than \$6bn’.”

The reason for their bet was that Hurricane Andrew made landfall about 50 miles south of Miami. “One underwriter told me it had to be less than Hugo, because Hugo hit Charleston and Andrew missed Miami. Well, what that underwriter didn’t realise is the property value in Dade County alone at the time was more than the property value in the whole state of South Carolina,” Clark said.

The full impact of Hurricane Andrew sunk in “about six months later”,

that the industry was going to have to pay out around \$15bn. The Bermuda Class of 1993 emerged, including RenaissanceRe, founded by one of AIR’s original clients, Jim Stanard, formerly of F&G Re.

Exposure information improved from zip codes to geo-coded locations, Clark said, improving the accuracy of catastrophe models, which in turn were adopted not just to assess individual risks and portfolios, but to build diversified portfolios.

Trapped capital

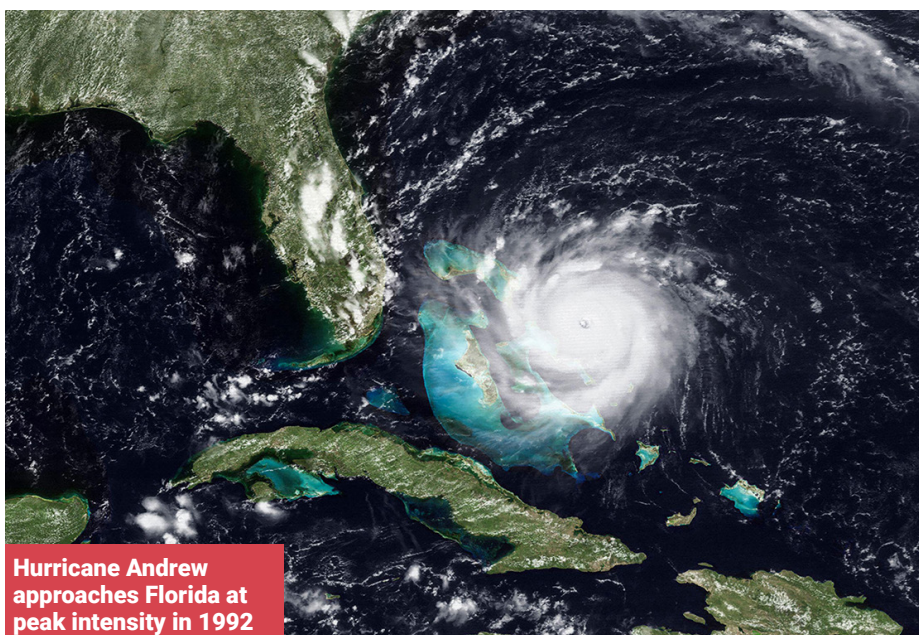
Noting the increasing appeal of parametric insurance to manage climate risk, Clark highlights the disquiet indemnity-based cover creates for providers of insurance-linked securities (ILS). The [final loss from Hurricane Ian in 2022](#), for example, is still unknown.

“What investors and reinsurers don’t like is trapped capital because indemnity cover means it could take years for them to know what their final loss will be after a major event. And there can be loss creep, like the cost to rebuild a home in that period can increase by 10% to 20%, which wasn’t accounted for when their contract was priced,” Clark tells *Insurance Day*.

The “beauty” of a parametric trigger, therefore, is knowing the contract can settle soon after an event. Catastrophe models inform parametric triggers, such as the probability of a certain wind speed in each location. Based on that probability, counterparties will price a parametric deal.

Climate risk does not spell the decline in indemnity insurance, however, because parametric products create basis risk for re/insurers.

Clark explains: “For example, there could be a 150 mph hurricane, but it just takes a certain track that is not really where the insurance company has a lot of exposure. That would mean they get a payout when they don’t need it. In contrast, there could be a hurricane with a lower maxi-



mum wind speed that goes directly through their exposures and causes them a huge loss.

“The rating agencies, like AM Best and S&P, want to know what kind of reinsurance protection an insurance company has, and they would not look as favourably on a parametric deal as they would on a pure indemnity product. And so, parametric is good for state and federal governments, for a quick payout for recovery, but I don’t think we’ll ever see a world where there’s no indemnity cover for insurers.”

KCC has therefore developed a new product, called a modelled loss transaction, to provide additional reinsurance protection to insurers who have found that traditional reinsurance capacity is shrinking relative to increasing risk.

“A few weeks after a hurricane like Ian, we can run a company’s exposures through our model and give an estimate of the actual loss and that is the number on which the contract will settle, eliminating the issue of trapped capital. There’s still a little bit of basis risk in that, but a lot less than there would be from a parametric trigger,” Clark says.

KCC is providing the necessary information for a lot of these covers now, she adds, especially for severe convective storm, for which reinsurers are requiring insurers to raise their retentions. “We’re innovating with different types of reinsurance transactions, and there will be innovation going forward, but I don’t think parametric-based is the ideal solution for insurers.”

Physical techniques

The main output of a catastrophe model is the exceedance probability (EP) curve, which indicates the likelihood of losses of different sizes via a stochastic model output.

The EP curve is based on hypothetical events but the modelled loss transaction triggers are based on the actual event, Clark stresses.

“If we really want risk reduction as a society, then we’re going to have to do more than give insurance mitigation credits. We’re going to need to stop building properties in areas highly exposed to sea-level rise, for example”

Karen Clark
Karen Clark & Company

“At KCC, we’ve implemented very advanced physical modelling techniques – that ingest high-resolution radar, atmospheric and satellite data – and that can accurately reproduce the complexities of frequency perils such as severe convective storm. We model the physics of the atmosphere in four dimensions, including time,” she says.

KCC has adapted numerical weather prediction used by weather forecasters to catastrophe modelling.

“Our models automatically produce every morning, by 7am Eastern time, a hail and a tornado wind footprint that insurers use to estimate their claims that day. And of course, those are the same footprints that will be used to settle modelled loss transactions. It’s a very advanced technology, based on the physics of the atmosphere and not on a parameterised model,” Clark adds.

A catastrophe model can quantify risk reduction, enabling insurers to give credits to insureds who have mitigated their risks, incentivising property owners to “do the right thing”. Beyond that, however, climate risk reduction needs societal and political will. “If we really want risk reduction as a society, then we’re going to have to do more than give insurance mitigation credits. We’re going to need to stop building properties in areas highly exposed to sea-level rise, for example,” Clark says.

Sourcing the best and latest data is a constant pursuit, Clark says, noting that, the higher the resolution, the more chance there is for mistakes.

That means data must be continually tested and verified, she says. However, there is an issue with data on commercial and industrial properties, which are not always in the best format nor of the highest quality, she adds.

California problem

On incentives for insurers to continue to provide cover, Clark describes the situation in California where potential losses from wildfire have made it unprofitable for some of them to stay.

As insurers have reduced writings in the state, homeowners can obtain only [limited coverage from the Fair Plan Association](#), established in 1968 to meet the needs of California homeowners unable to find insurance in the traditional marketplace. This is a syndicated fire insurance pool comprising all insurers licensed to conduct property/casualty business in California.

Clark highlights the problem it creates of not allowing the use of catastrophe models to assess the risk. “If insurers can’t use the catastrophe models, then they’re not going to write as much there,” she says. “In the US, a lot of the regulators are elected politicians and, of course, they want to keep their constituents happy, but insurers need to charge homeowners the true cost of the risk.”

There are reasons to be hopeful, however. KCC is among the companies working with the California insurance commissioner on [how to allow the use of catastrophe models in the state](#). The California Department

of Insurance held a hearing on catastrophe modelling and insurance on April 23 to discuss a proposed regulation that would allow for the use of wildfire and flood catastrophe models for residential property insurance ratemaking. Not only would it allow the state to use the tools the rest of the insurance industry uses, but it also establishes an independent review process that aims to provide transparency about the scientific appropriateness of these models.

“They’re moving in the right direction,” Clark says, “because homeowners have to understand that climate change is happening, property values are going up, and this is increasing the risk, which has to be paid for.”

Confidence levels

The science continues to evolve. Clark notes that, in its last two reports, the IPCC has expanded its established focus on changes to atmospheric variables to also include what catastrophe modellers already analyse – extreme weather events.

“For example, current scientific consensus is that hurricane severity is increasing, not frequency, but severi-

ty. With respect to wildfires, it’s both frequency and intensity that are increasing. The same with floods.

“In their most recent assessment report, AR6, the scientific community assigned confidence levels to their projections. There’s high confidence in the impacts of climate change on hurricanes, but confidence is lower for severe convective storms. It is very important for insurers and reinsurers to know, not just what the projections are, but how much confidence we have in those projections. And of course, as time goes on, we’ll get more and more confidence across more perils.”

Clark encourages re/insurers to drop the term [secondary peril](#), which the sector created to explain events, such as severe convective storms, that were not expected to produce solvency-impairing losses. Instead, KCC has always used the term frequency peril and started modelling severe convective storm as long ago as 2015.

“KCC has always put a big emphasis on the frequency perils – not secondary perils, frequency perils – with severe convective storm, winter storm

and wildfire being the challenges of today. What the industry is focusing on a little bit more, is not necessarily the tail of the distribution, but the lower return period losses, and how climate change and other factors are influencing those losses.

“A lot of the disruption we’re seeing in the market is coming from the frequency of medium-sized losses, and it’s generally accepted that we shouldn’t be using the term secondary because these events are just as important as hurricanes and earthquakes,” Clark says.

Frequent perils need frequent updates and Clark warns re/insurers against catastrophe models that do not keep pace with climate science. So that updates are “evolutionary rather than disruptive”, KCC refreshes its weather-related peril models “at least every two years, if not every year”.

Clark concludes: “The industry has been in a world where most of the catastrophe models they’re using are very static, with an update once every five to six years or longer. That simply isn’t going to cut it in the world of climate change.” ■

KCC has always used the term frequency peril for events such as wildfire



Diarmaid Curran/Alamy Stock Photo



Climate should be in every conversation about risk

Just as they faced ‘silent cyber’, re/insurers must be alert to ‘silent climate’, Aon’s global head of climate risk advisory warns

The essential factor behind the [tool Aon recently launched](#) to help its clients visualise and understand their exposures to physical climate risk is it is “in the hands” of each of its brokers, according to the company’s global head of climate risk advisory, *writes Louise Isted.*

Climate Risk Monitor (CRM) assesses an organisation’s present and future exposures to key chronic risks – drought, extreme rainfall, extreme heat, freeze and wildfire – under different climate change scenarios, providing diagnostic reports on individual asset and portfolio impact, as well as geographical visualisations.

In an interview with *Insurance Day*, Liz Henderson stresses the CRM will

be applied to every product line in the broker’s ambit.

“Climate change is essential to every conversation our colleagues are having with a client about risk and this tool will be in all our brokers’ hands as part of their day-to-day work. The success of the CRM will be when I can go to any part of the world and find our brokers and clients are making better decisions about their business through that climate lens,” Henderson says.

The CRM is Aon’s first release of a specifically climate-focused tool that looks at chronic perils over a long time horizon and it is global. This enables the broker to add data to its “suite of capabilities” in a way that is “additive to the perils” it models.

“This opens up the conversation to a wider audience of our clients and helps them begin to know what they are exposed to in terms of climate adaptation and resilience, then to understand how that’s going to change over time,” Henderson says. “It means really digging into loss control, risk engineering, asset resilient investment, those types of services we’re able to unlock with an initial conversation that is data-driven.”

‘End-to-end partnership’

The most important way Aon is investing in adaptation and resilience, Henderson continues, is by forming a team that brings together its risk capital colleagues spanning reinsurance and commercial risk – who are close to the insureds – and its risk

engineers, who have in-depth knowledge on the ground. This “end-to-end partnership” helps the broker “expand the conversation into parts of the world where there hasn’t been access to great data”, she says, and also into insurance for humanitarian causes by creating solutions for underserved communities.

The team launched last year but began the process of working together four years ago, when Aon first started talking “more specifically and practically” to financial institutions about their climate-related risks.

This tool will be part of a client’s platform, among its Aon “suite of capabilities”. Henderson says: “Our clients are on a journey where they’re first trying to get their arms around climate as an entirely new class of risk. Financial institutions are excellent at understanding credit risk and investment-related risks, but climate-related risk is a new data set and a new way of thinking for them. The most sophisticated banks have made investments in data, modelling and teams of people to help them to assess this risk, but mid-sized and small institutions need access to this data as well and this tool is the first step to giving them the information they need to understand this class of risk in their portfolio.”

This journey is not new for re/insurers, Henderson says. “Finding solutions for resilience is in our DNA as an industry that understands how to quantify and transfer risk and we have helped make developed economies safer and more resilient over time. That knowledge can be translated into broader infrastructure investments, especially in the developing world where the insurance markets are not as sophisticated and where the benefit of having a risk-minded partner in their economy has been missing.”

Aon is also working on how to model hail to support developers of solar plants. “A lot of the solar project developers in Texas, for example, were using about two years of data to de-



“Finding solutions for resilience is in our DNA as an industry that understands how to quantify and transfer risk and we have helped make developed economies safer and more resilient over time”

Liz Henderson
Aon

cide if hail was going to happen or not. Anyone who works in modelling will tell you two years of information is completely wrong if you’re trying to do site selection for hail-related risks,” she says.

“We can help those project owners make better decisions just by showing them the full model output of hail, where the events can occur and how extreme they can be. Even if they still decide to build there, they’ll be baking that risk into their costs and their project estimates, which will help them to navigate potential volatility.”

Bringing its risk capital and risk engineering teams together, Aon is creating a model of hail risk to a polygon solar field, instead of a single house, which is what most catastrophe models are limited to. The broker is also working with underwriters to help them embed that view of risk into their pricing.

“We’re in the early days of that project, but we’re getting so much interest from insurers because it’s a perfect example of bringing all our insight, data and analytics together to fill a gap in the market,” Henderson says.

Insurance and finance “make the economy happen”, Henderson stresses, and both are needed to get an energy project off the ground. “The Inflation Reduction Act in the US offers more than \$370bn in tax incentives for investment in clean energy and the insurance industry is ready to build capacity and product to support that investment, but I don’t see it happening at scale quickly enough.”

New clean energy technologies carry risks and so insurers need to “get creative and innovative” to address the concerns of investors to unlock the investment that is needed. This creativity could take the form of, for example, technology performance guarantees, revenue swaps, intellectual property insurance products and parametric solutions. “There’s so much we can do. It just requires a focus and an investment in talent, skills and data to meet that demand.”

Parametric potential

A form of innovation that can help unlock investment in clean energy projects is parametric insurance. At Cop28 last year, Henderson noticed a theme emerging of the difficulty indemnity insurance poses to financial institutions.

She says: “A client at a financial institution explained to us the time it takes for a traditional insurance policy to pay out makes it very difficult for a project to pass its risk control criteria. Indemnity insurance products don’t help move a project from non-bankable to bankable, so we have to get creative. Parametric insurance has been the Cinderella of the ball for a decade, but now it can be a solution to addressing that specific problem.”

Although re/insurers are “still better

■ MODELLING

positioned than anyone else” on climate risk, a “reckoning is coming” on how climate change is affecting extreme weather events,” Henderson says.

Managing the risks posed by natural catastrophes as solvency-impacting events are “super critical to a healthy industry”, but recent years have shown climate change can affect losses in ways that are not as big and extreme. Instead, these losses are “hidden in the earnings” on re/insurance balance sheets, she adds.

“It’s really important for the industry to understand and isolate how those trends are impacting their overall loss outcome. The blind spot is around chronic perils, like heat stress and extreme precipitation, which are not captured in catastrophe models and are not event-based, but that start to erode the value of properties, impact people’s lives and their insurance policies,” Henderson says.

There is also the challenge of understanding climate risk in terms of the transition to net zero, she continues, because the industry’s focus is traditionally on physical risk. “There’s a lack of information and data regarding how new energy technologies and systems are going to affect our overall risk environment. There are also casualty-related risks to the life, health and workers’ compensation lines of business.”

Climate data transparency is extremely important, she continues, especially for non-physical risks, especially since companies are being asked to self-report on the transition disclosure requirements, meaning the onus is on the organisation itself to assess if a risk is material or not and thus whether it even has to disclose it.

Problems with self-reporting

Self-reporting creates a significant amount of uncertainty in the data for investors and insurers, and there has been a huge push on them from

activists to look at their financed and insured emissions.

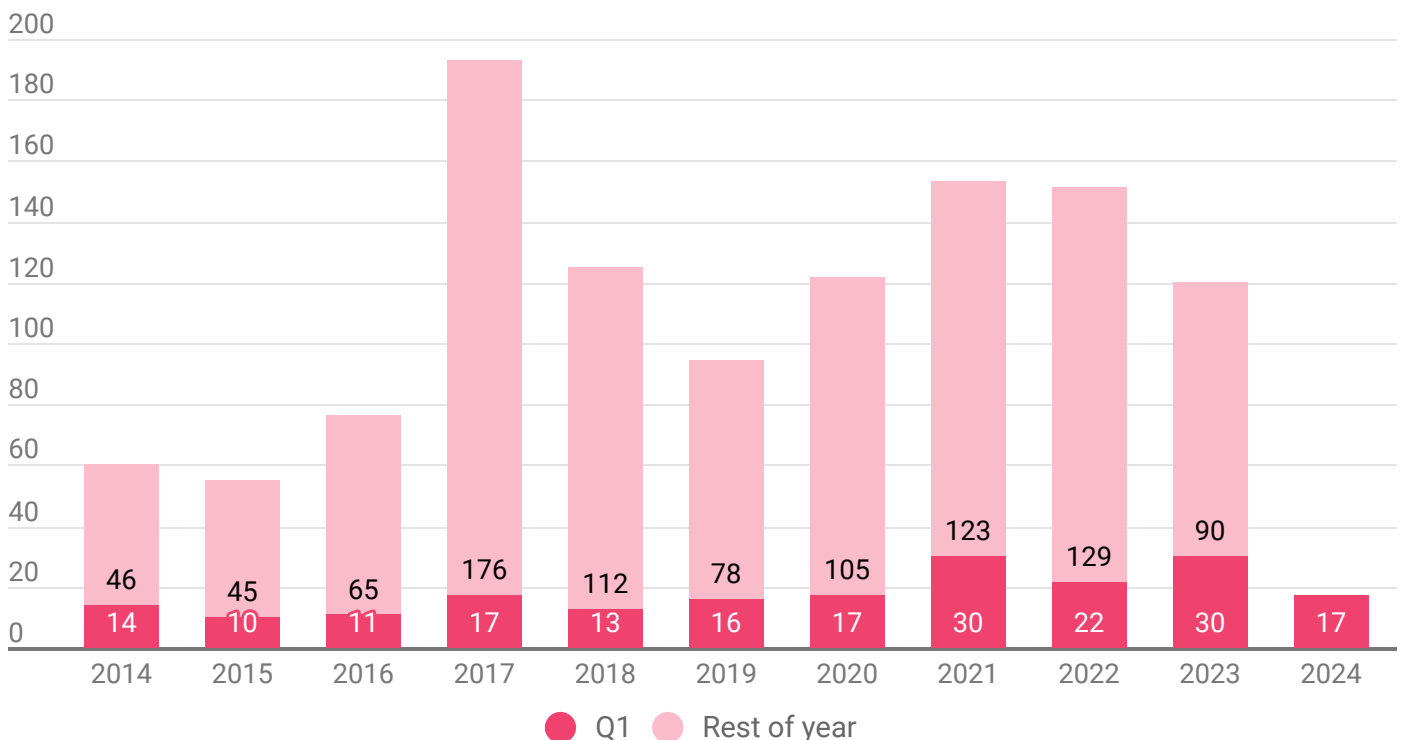
“A lot of re/insurers struggle to be able to say what’s in their underwriting portfolio from an emissions standpoint. If it’s an oil and gas refinery, that’s probably pretty easy, but it’s much more complicated with insureds in manufacturing and retail businesses,” Henderson says.

“I think there’ll be a real push in the next couple of years in getting access to better, more reliable information to be able to assess what their exposure is,” she says.

“There have been so many start-ups providing climate data and transition-related data for the physical risks space, but the pure ability to look at a portfolio and deduce credible, reliable asset-level information about emissions and the transition really doesn’t exist yet. But once an insurable asset is tied to that kind of data and information then the insurance industry will be able to lean in

US severe convective storms and winter weather events drive Q1 loss total

Graph: Global insured losses from natural disasters in Q1, 2014 to 2024 (\$bn)



Source: Aon

and puts its stamp on a project,” Henderson adds.

Aon is working on a product for the voluntary carbon offset market, which Henderson says is “where the true opportunity lies” for non-regulated oil and gas companies.

The firm is looking at ways to create an insurance product that gives a purchaser of a carbon offset confidence its project is getting the right kind of auditing and servicing and calculations are standardised in how a credit is valued.

This equates to financial protection that should create a stronger and more resilient carbon offset market, Henderson says, with better projects coming through and more confident buyers.

“Oftentimes, when you’re in the room with people who operate in the carbon offset space, it’s like they’ve forgotten insurers exist, but we’re starting to see underwriters who really want to focus on that market and create bespoke products for it, which will lead to a more stable market.”

‘Silent climate’ challenges

Just as re/insurers faced “silent cyber”, they are now grappling with “silent climate”. A good example of this, Henderson highlights, is the commitments energy companies, financial institutions and insurers have made to becoming net zero. These have the potential to be retracted with a change of chief executive or a change to the geopolitical environment.

“There’s a growing movement to hold the company boards accountable to those past statements,” Henderson says. “We haven’t seen massive rush to litigation, but climate-related cases globally have more than doubled in the past five years. Greenwashing claims are one of the fastest-growing areas, so board members need to look at whether their directors’ and officers’ policy covers climate disclosure-related risks or not.”

At the same time, regulators are requiring companies to disclose their transition plans, so it will be “interesting to see how carriers respond and start carving it out or removing the protection or at least defining it more clearly”, Henderson says.

A more obvious feature of “silent climate” is so-called secondary perils, in aggregation, are now having a significant impact on re/insurers’ results.

“These non-catastrophe catastrophes are not individually going to be tail events but they are affecting companies that don’t have much diversification benefit, which might be more regional and directly exposed to these perils. A big trend in the reinsurance space is an increase in insurance company retentions for their catastrophe treaties, which is having a direct effect on insurers’ earnings, which will translate into higher premiums for insureds,” Henderson says.

It is difficult to calculate how climate change is affecting those perils. Aon published a report on the 20-year trend in losses from severe convective storms. Its analysis looked at the impacts specifically of inflation, property valuation and exposure concentration, to be able to isolate the impact of this peril.

“We found 80% of the increase in severe storm losses are attributable to those factors, whereas the remaining 20% is unexplained,” she says. “It could be a climate signal, but it’s difficult to say with certainty, and it doesn’t explain the entire trend on its own.”

According to Aon’s latest research, global insured losses from natural disaster events in the first quarter of 2024 are estimated to reach at least \$17bn. This is close to the average since 2000 (\$16bn) and notably higher than the median (\$12bn) for the period. Notably, severe convective storms and winter weather events in the US generated \$7.7bn of that global total.

Modelling climate risks

It is clear, Henderson says, catastrophe modelling and climate modelling “need to come together to address the full suite of climate risks”. To achieve this, a way needs to be found to bridge the gap between the short and medium-term outlook of catastrophe modelling and the long-term projections of climate models.

“Certainly, we need to know 20 years out for longer-term investment decisions, but I’d also really like to know what that gap is for the next five years, so I can make decisions for my business in that timeframe,” she says.

Another gap to fill, Henderson adds, is taking the combination of hazard-exposure-vulnerability components used in catastrophe models and applying that to climate models. Something catastrophe models do not offer and which Aon is thinking about is the “chronic” nature of non-event-based risks that manifest themselves not just in property but in other lines of business as well. “What does extreme rainfall that isn’t a flash flood event mean for a property five years from now? Catastrophe models won’t show that, but climate models can, so we need to bring them together,” she says.

Above and beyond the fact re/insurers are well placed to help manage the challenges of climate change, by leaning in to their long-standing role in risk management, is the moral obligation to support humanitarian work, Henderson says. Last year, for example, Aon, Lloyd’s Disaster Risk Facility and the Centre for Disaster Protection created a risk-transfer mechanism that provides a backstop for the International Federation of Red Cross and Red Crescent Societies’ Disaster Response Emergency Fund.

Henderson concludes: “As the developed world, we’re the big polluters and there are dues we should pay the developing world. That means leveraging our insights and experience for partnerships with development banks and other organisations to get better protection into the vulnerable parts of the world.” ■

Earth observation is a game-changer for climate resilience

Iceye



Executives at Finnish microsatellite maker Iceye outline how fast and reliable natural catastrophe data before, during and after events creates a ‘sweet spot’ of resilience

Earth observation has the potential to transform the way re/insurers model and respond operationally to natural catastrophe perils, according to Stephen Lathrope and Rupert Bidwell, respectively senior vice-president of solutions and global head of insurance at Iceye, *writes Louise Isted.*

The Finnish microsatellite manufacturer and operator owns the world’s biggest privately owned synthetic aperture radar (SAR) satellite constellation that detects and responds to changes in any location on Earth. Its objective and near-real-time insights are gathered day and night, even in low-visibility conditions.

In an interview with *Insurance Day*, Lathrope and Bidwell outline how such insights empower re/insurers and other organisations in adaptation and resilience to climate change.

They highlight Iceye’s collaboration since 2020 with Tokio Marine to develop new insurance products and services. “Tokio Marine is able to

use our data to manage claims more effectively,” Bidwell says. “Combining Iceye data and its customer-supplied data helps to reduce the need for onsite adjusters. That’s a game-changer.”

Lathrope says Iceye data can be “dropped into” existing systems and encourages re/insurers to “experiment” with SAR data. “Tokio Marine started that way three years ago and is now making really important business decisions using our data.”

Other projects Iceye has been involved in with its public and private partners include: providing flood and bushfire data for the Australian government to strengthen disaster response; [working with Guy Carpenter and Swiss Re](#) on a parametric pilot programme to protect low-income communities in New York City from flooding; and supporting a UN Development Programme (UNDP) and Insurance Development Forum (IDF) initiative to increase flood resilience in Ghana and Nigeria.

Iceye recently announced a [new contract with the US Centers for Disease Control and Prevention](#) (CDC), which provides the federal agency with access to Iceye flood insights for events across the US and its territories. As part of the agreement, Iceye will deliver flood impact data and analysis to teams at CDC’s Geospatial Research, Analysis and Services Program.

Iceye’s reach extends to ecological disasters that are not weather-related, such as the breach of the Kakhovka Dam in Ukraine in June 2023, and also to defence, which includes its August 2022 contract with the Serhiy Prytula Charity Foundation, which allows the Ukrainian armed forces to receive radar satellite imagery on critical locations with a high revisit frequency.

Synthetic aperture radar

SAR technology overcomes the size-versus-resolution issue presented by real aperture radar (RAR), which is limited by the size of the antenna that can be sent into space. To produce high-resolution imaging

of the Earth's surface, the antenna of an RAR needs to be hundreds of times greater in size than a satellite can carry. An SAR, on the other hand, uses movement of its antenna to "synthesise" a larger aperture that collects signals from brief, closely spaced successive pulses.

Lathrope says although satellite technology has existed for more than 70 years, there has been a "quiet revolution" in the past 15. For example, the number of spacecraft launches increased from 53 in 2017 to 1,743 in 2021. A major purpose of such launches is to place satellites into orbit, which now number close to 10,000. Key enabling factors behind that number are the miniaturisation of technologies, lighter materials and lower launch costs.

"There's a huge range of satellite-borne sensors in orbit and they can be used to observe weather systems," Lathrope says, "by measuring temperatures, CO2 levels in the atmosphere and moisture in soil, as well as ice formations, forestation and a whole host of other things that are either understood to be factors that influence climate change or are indicators climate change is happening."

SAR technology is evolving all the time to provide better resolution, volume and timeliness of information. One of the "real differentiators" Iceye brings, Lathrope says, is it has launched more than 35 SAR satellites into orbit – a figure he believes is substantially more than other operators. Uniquely, he adds, Iceye has a strong focus on natural catastrophe reporting, particularly for insurers and for governments.

SAR technology is well suited to the observation of natural catastrophe events, Lathrope says, because it sends its own signal and then receives the signal that bounces back from whatever it encounters on the Earth's surface.

"That's important because it doesn't rely on light from the Sun like optical imagery does. As a result, it can



"We're focused on enabling our customers to help communities, businesses and their insured customers deal with the impacts of climate change. Their resilience and response to individual events is a core focus"

Stephen Lathrope
Iceye

monitor the Earth day and night. The particular wavelength we use, moreover, also enables us to see through clouds, smoke and dust, which means radar eyes on the ground, whatever the conditions."

For example, Iceye demonstrated the flexibility of its technology for recent volcanic activity in Iceland. "In collaboration with the Icelandic Met Office, we did some work monitoring that seismic activity. And we were able to see deformation of the land around that event by six or seven centimetres over a nine-day period. So, we can measure quite specific, quite detailed, and quite small movements on the ground using that technology," Lathrope says.

Within its SAR constellation, Iceye can electronically move the antenna, either to zoom out to scan hundreds of square kilometres of an area, such as to monitor hurricanes making landfall, or zoom in to meas-

uring millimetres of change, such as the thermal expansion of buildings. Lathrope describes balancing these actions as a "trade-off" between levels of resolution.

Iceye takes multiple images as one satellite passes over a given area and this enables it to observe movement – of direction and of speed. It can also make three-dimensional images of structures by looking at them from different sides as an SAR satellite passes overhead. Each satellite completes an orbit of the Earth every one-and-a-half hours.

"We don't speed them up or slow them down as they're passing but we do have the ability to adjust their orbits slightly, to direct radar imaging at different angles," Lathrope says.

Climate change impacts

Iceye is at the "sharp end" of the management of climate risk, Lathrope stresses. "We're focused on enabling our customers to help communities, businesses and their insured customers deal with the impacts of climate change. Their resilience and response to individual events is a core focus for Iceye," he says.

"We're building a really powerful back catalogue of analyses of events, which are going to be very useful to a number of organisations in understanding what the impact of climate change is over time," he adds.

Iceye uses its technology and data analytics to provide near-term predictions of events and then report on how they are evolving. "We're at the sharp end of the change, rather than reporting on the big trends that represent climate change overall," Lathrope says.

Being able to provide data over time is "powerful" in helping re/insurers refine their catastrophe models, but Lathrope is clear about the boundary between Iceye and the catastrophe modellers.

"Even having completed 200 flood analyses and delivered those to our customers around the world over

the past three years or so, we don't second guess the modelling companies," he says. "What we can do is help with resilience in response to an event, based on an understanding at a much higher resolution of what has happened on the ground."

Iceye analysis supports the development of parametric insurance solutions to help close the protection gap, Lathrope says. Citing an estimate by Swiss Re in 2021 that 80% of economic losses from flooding were uninsured, he highlights IDF and UNDP projects in Nigeria and Ghana that Iceye supports.

Bidwell stresses how SAR satellites also serve climate risk analysis by capturing extreme weather events where and when they are not normally expected to occur, such as the [flooding in Dubai last month](#) and the [Marshall fire in Colorado in December 2021](#). "The characteristics, frequency and severity have significantly changed just in the past two or three years and we can see that from our data," he adds.

The ability of re/insurers to respond rapidly to catastrophe events is thus more important than ever. "The secondary perils, which we focus on, are now becoming as expensive as primary perils," Bidwell says. "A hurricane is a peak event but a big element of it will be large-scale flood damage."

A series of named storms and consequent flooding in the UK was unexpected, given before 2021, in terms of insured losses, "it was actually relatively quiet", Bidwell says. "From an insurance perspective, named storms are operationally very stretching because there's a huge volume of claims, many quite small but alongside some large claims. This creates a huge operational stress for most insurers, particularly if the named storms come in quick succession," he adds.

Iceye recently announced the launch of its high-resolution Flood Early Warning and ongoing customer pilots of Flood Rapid Impact solutions for the UK insurance market.

The Flood Early Warning provides four days in advance flood impact forecast prediction. This is at building-level resolution and is overlaid with the respective UK Environment Agency's flood hazard zones. Iceye's Flood Rapid Impact is a rapid satellite data-derived flood extent map, delivered within 12 hours of the start of the flood and at eight to 12-hour intervals thereafter, enabling insurers to track the progression of the flooding.

Three main goals

Iceye supports approximately 30 insurers, brokers and reinsurers across the globe at present and Bidwell outlines the team's three main goals.

The first is to provide critical natural catastrophe data insight, "as fast and as reliably as possible", before, during and after events. That means insurers can "transform" their claims processes, he says, "and don't need to wait for customers to notify them before taking action".



"The secondary perils, which we focus on, are now becoming as expensive as primary perils. A hurricane is a peak event but a big element of it will be large-scale flood damage"

Rupert Bidwell
Iceye

The second is for insurers to "proactively intervene" by protecting their insureds from a flood or wildfire ahead of an event itself. "It is so much better to protect the customer than having to restore a customer," he says.

The third goal is for Iceye to build an historic catalogue, which Bidwell says will help refine risk engineering interventions.

Iceye provides flood early warning data for about 15,000 locations. One of its clients for this product is Nordic insurer If. "We're able to alert individual client managers to when there is a flood potentially about to impact one of their insured's locations," Bidwell says.

Iceye's leading client in Australia is Suncorp group, which has invested in a 24-by-7 event control centre to manage their catastrophe event response. "This is a control room with a number of screens where they are monitoring all manner of different weather phenomena occurring across Australia, and our data is used to inform their critical decisions around flood and wildfire, before, during and after the actual event," Bidwell says.

Bidwell's advice to re/insurers is "not to be held back" by any preconceptions about satellites. "Historically, a lot of insurers have experience of aerial drones and optical satellites and they found they missed a flood or a fire, but visibility isn't a constraint using synthetic aperture radar satellites because they can see through clouds and through the dark," he says.

Data gleaned from SAR satellites offers "real value for relatively limited effort", he stresses. "You don't need huge IT investment or to start off with IT integrations but, as and when you do want to make your use of the data more industrial, it can be embedded in policy admin claims systems and geospatial exposure management platforms, through APIs. To start with though, you can be tactical and get value very quickly." ■

Education key to mitigating basis risk in parametric policies

Miller's head of parametric solutions, Alice Glenister, outlines how to present parametric insurance to insureds

Miller has put a “high degree of focus” on educating its insureds about basis risk associated with parametric insurance policies, according to Alice Glenister, head of parametric solutions at the re/insurance broker, *writes Queenie Shaikh.*

In an interview with *Insurance Day*, Glenister says basis risk is more prevalent in parametric insurance as a result of the policies’ pre-determined payouts at certain trigger thresholds. [Glenister joined Miller in March](#) from Mastercard, before which she was a parametric underwriter at Generali Global.

Miller’s solution has been to try to understand exactly what insureds need a parametric insurance policy to do and to make sure the payout structure reflects the potential damage they would sustain should that given event occur.

Unlike traditional indemnity-based cover, parametric insurance pays out a pre-determined sum if a specific event or trigger occurs, such as if wind speed or rainfall is recorded to have breached a certain threshold.

Recent growth

The concept of parametric insur-

ance dates back to the late 1990s, but its recent growth has been spurred by the increasing amount of data insurers can use to verify a parametric claim.

These policies are positively predisposed to weather and climate-related events for exactly this reason, Glenister stresses, as insurers can call on thousands of accredited datapoints to assess claims to ensure policy conditions are met.

However, all of this can amplify basis risk. One commonly cited example is home insurance that covers fire damage but excludes fire damage caused by extreme weather events. While parametric insurance would provide a reliable payout if the pre-determined condition is met – the house fire – it might fall short of covering the actual costs of the trigger event.

“To mitigate basis risk, we make sure we fully understand the insureds’ needs and the parameters selected closely align with their exposures,” Glenister says.

Basis risk needs to be mitigated in both directions, both negative and positive, she continues. While not

common, positive basis risk – where payouts exceed actual losses and risks are underpriced – have occurred in recent years, particularly in the agricultural sector.

For example, Oxfam successfully negotiated a payout from Sri Lankan insurer Sanasa to cover policyholders whose crops had been affected by extreme drought, despite short bursts of rain exceeding the parametric policy’s maximum rainfall threshold.

Glenister adds in some cases, Miller designs a “stepped payout policy” to mitigate basis risk.

This is designed to pay out a larger amount of money for more extreme events, rather than a binary payout.

“We want to make sure payouts reflect damage ratios,” Glenister says. “You wouldn’t get a 100% payout for a Category 3 hurricane, but you would for a Category 5. It’s important we’re not creating binary payouts.”

It is incumbent on brokers to explain the benefits of parametric insurance to support its continued growth. “If brokers don’t understand the upsides, there will be re-

“If your roof has been blown off by a hurricane, you don’t want to wait a year for the loss adjuster to come round. You want to repair your roof. We are trying to give people the resources they need to recover quickly. That’s why parametric insurance is so powerful”

Alice Glenister
Miller



duced demand... hindering growth and innovation,” she says.

Lack of traditional capacity

Parametric policies have been a welcome form of innovation for the insurance sector over the past two decades, Glenister points out. She argues a prevailing lack of traditional capacity – the maximum amount of risk indemnity insurers can underwrite based on the capital they have available to cover claims – is being stretched thin in certain markets by the increasing frequency and severity of certain natural catastrophe perils. “This is why it’s important to think about non-traditional means to manage risks,” she says.

This is particularly the case for perils such as Florida wind risk, where more severe weather events have left the traditional market struggling to find capacity.

“It’s quite hard to get capacity for wind risks in Florida the closer you get to wind season. The sad reality is climate change is making events more frequent and parametric insurance provides us with ways to transfer risk, even in sophisticated markets like North America.”

The principal benefit of a parametric insurance policy in the case of a weather event is to cut the time between claims and payouts, she says, while traditional indemnity insurance provides no certainty a claim is covered and payouts can take months or even years.

“If your roof has been blown off by a hurricane, you don’t want to wait a year for the loss adjuster to come round. You want to repair your roof,” Glenister says. “We are trying to give people the resources they need to recover quickly. That’s why parametric insurance is so powerful.”

The combination of trigger-based policies and swift payouts gives parametric insurance the potential to work in several markets, including agriculture, cyber and marine, she adds.

Moral hazard

As well as basis risk, brokers should also educate their clients about the way parametric insurance can reduce moral hazard, by incentivising policyholders to mitigate risks up to their first trigger indexes. A moral hazard is the probability the insured may engage in riskier behaviour or neglect risk management practices because the payout is triggered by

pre-defined parameters rather than actual losses.

Miller partly mitigates against moral hazard with its stepped payout policies, which encourage policyholders to carry out maintenance or take mitigation measures.

Independent third-party data has a significant role to play in mitigating moral hazard, Glenister says. “It’s very important to ensure neither the insured nor the insurer can influence the reporting of an event to inflate or deflate final payments,” she adds.

The insurance market is only scratching the surface of what parametric insurance products can do, Glenister stresses, but she is confident they can only continue to develop over the next several years. Notably, digitalisation of global business means parametric solutions are no longer the preserve solely of large corporate clients.

“Because data is ever improving the way we’re measuring risk, the way we can gauge risk, the way we can handle large quantities of data, [parametric] is only going to get better and better,” she concludes. ■

A Florida home damaged by Hurricane Irma in 2017



In climate risk analysis, do not be blindsided by numbers

Re/insurers should think about climate data storylines, rather than fixating on modelling outputs, Lloyd's director of portfolio risk management, Kirsten Mitchell-Wallace, says

Re/insurers that narrow their focus to a single extreme weather event are “on a fool’s errand” in their understanding of climate change, according to Lloyd’s director of portfolio risk management, *writes Louise Isted.*

In an interview with *Insurance Day*, Dr Kirsten Mitchell-Wallace says the industry is unlikely ever to understand the full impact “in a really granular way”, so climate-conditioned catastrophe modelling should be seen as “one tool in the whole discussion about what climate risk means to a business”.

Informed decisions about climate risk would be better based on “communication of what we can know and what we can’t know and on what our risk appetite as a business is in the context of all that uncertainty”, she adds.

Better communication includes identifying the limitations of catastrophe modelling. “People want to understand the potential impact of climate change, but they also want to have one number that tells them whether there’s going to be a financial loss,” Mitchell-Wallace says.

“I’m really keen that, as an industry, we move more towards thinking about climate data storylines to explore the potential risk and don’t make the mistakes of the past where we get really fixated on model outputs. Models need to become one of the tools that help us explore the potential risks to our business.”

Value of models

Despite its limitations, the value of catastrophe modelling is clear. “What

a fortunate position we are in, comparatively as an industry, to have the catastrophe models, because they are tools that allow us to really understand the risk associated with climate perils. And we have this ability to combine the hazard, the vulnerability of the structures and the financial information with the description of the exposures to get a loss distribution,” Mitchell-Wallace says.

“When we look around at understanding climate risk, a lot of people tend to work in separate disciplines or certainly historically did. And having catastrophe models, which cross all of the disciplines associated with risk, I think has given us a real advantage to have these tools as an industry.”

Catastrophe models are not always complete, however, and do not necessarily contain all aspects of the source of a potential loss. This means having to make adjustments to them and Lloyd’s has been doing a lot of work with the market on that over the past four or five years.

For example, hurricane models his-

torically did not have precipitation included in them, but rainfall rather than wind was the key driver of losses from 2017’s Hurricane Harvey. “It’s very important to understand what a model covers and what it doesn’t and make sure you are up to date and you have the complete sources of loss covered,” Mitchell-Wallace says.

Another limitation of catastrophe models is the length of history, which is used to calibrate the model, given the fact the climate is changing.

She says: “To develop a model, you need to understand the physical characteristics, frequency and severity of the events. If that history you are using is no longer representative of the risk then your model is no longer representative of the current risk, so one of the things we have said to the market is we expect the models they are using to be reflective of current-day risk. And when they provide us with a validation of that model, it needs to have a section in it, explaining why the model they are using is appropriate for today’s risk and the testing has been done on that.”

“I’m really keen that, as an industry, we move more towards thinking about climate data storylines to explore the potential risk and don’t make the mistakes of the past where we get really fixated on model outputs”

Kirsten Mitchell-Wallace
Lloyd’s



That validation is “up to the individual company” to decide, although many rely on model vendors to provide that information “because it’s a difficult question that requires quite a lot of technical understanding” and not all Lloyd’s users have scientific expertise in-house.

Climate risk understanding

Lloyd’s understanding of climate risk has evolved thanks to the time and money it has invested in learning about the science of climate change. This includes employing scientists and fostering links with academia. “As the science evolves, we’re going to get a clearer understanding of the impact of the risks. We know claims are already increasing and will continue to do so because of exposure and inflationary factors. Our key message is we really need to be prepared because, by the time we see these climate impacts manifesting consistently in claims, the change will already have happened and it will be too late,” Mitchell-Wallace says.

Scientists have reached “different levels of consensus” about the impact of climate change on the various weather perils, while climate modelling is “complicated and not very good at resolving extreme events”.

Mitchell-Wallace says: “We’re most certain about the impact of rainfall and sea level rise; those are virtually certain. And we know heavy precipitation will become more frequent and more intense globally. These factors are likely to increase rainfall-based flooding. But there are many other perils where the impact is less clear cut and I’d call out severe convective storm, particularly in the US, as well as tornado and hail, because it is less clear how they are going to be impacted in a warming world.”

It is “irksome”, she continues, when climate risk and climate change risk are treated as one concept. The industry is already familiar with climate risk – extreme weather events – but what it needs to learn more about is the risks associated with climate change. A good place to start is defin-

ing perils correctly. “We don’t use the term ‘secondary’ perils at Lloyd’s and we never have because they can have really extreme impacts on the places they hit – humanitarian and also in terms of claims. It’s devastating for people who are affected by them, so to call them secondary is a bit minimising,” she says. Instead, Lloyd’s calls them frequency perils, which include flood, wildfire, tornado and severe convective storm, “because we see these much more often”.

The notion of secondary perils was “invented” at least a decade ago to cover unmodelled weather events, she adds, and because the losses they produced were seen as less severe than the so-called primary perils.

The level of attention paid to frequency perils relates to how individual re/insurers use catastrophe modelling and the focus on pricing or for accumulation to set capital. Mitchell-Wallace says: “Frequency perils are really important to pricing, because we see them in aggregate annually, but they are as important to capital, which will tend to be driven by larger peak peril losses. Frequency perils may form a portion of the risk, but they’re never going to drive it, so you need to think about the way you’re using the models and also how you’re talking about the perils.”

New peak perils

Lloyd’s announced in March it has four new peak perils: US flood, US severe convection storm, US wildfire, and New Zealand earthquake. Mitchell-Wallace says these are now material perils for Lloyd’s and as material as the lowest of the LCM5 peak perils, which was Japan typhoon, in the tail. “We are responding to a change in our underlying portfolio, and we’ve extended the definition of our peak perils because of the size of their contribution to the overall Lloyd’s potential loss,” she says.

Lloyd’s previously had five peak perils: north Atlantic hurricane, North America earthquake, European wind-storm, Japan earthquake and Japan typhoon. “If the risk from another

peril approaches the lowest of those five or it’s up to three-quarters of the way above that then we include it in our leaderboard of perils,” she adds.

Lloyd’s collects data from syndicates annually, looking at the relative size of all the perils outside its peak perils list. “We’re constantly monitoring to see if things are growing and whether they may need to be included in our explicit representation,” she says. “We’re pretty confident at the moment the four peak perils should capture the changes we need for at least a couple of years.”

Mitchell-Wallace highlights how Lloyd’s enables collaboration via FutureSet, an openly accessible global platform and community, to create and share risk insight, expertise and solutions to the world’s most challenging problems. “Lloyd’s is a convener and our ability to influence the market as a whole helps with finding solutions that are global,” Mitchell-Wallace says, “and climate change requires us to have more sophisticated and more innovative products globally.” An example of this is Lloyd’s collaboration with Moody’s Analytics to develop a tool to help quantify greenhouse gas emissions across managing agents’ underwriting and investment portfolios.

Product innovation is key, she continues, highlighting some of the graduates of Lloyd’s Lab: Kita’s carbon purchase protection cover; Flood-Flash’s parametric flood insurance sensor; Yokahu’s parametric insurance product for financial institutions; and FireBreak’s mobile app for self-inspection of property wildfire risk. “Lloyd’s is uniquely placed to get involved with global influencing and really link into the broader sustainability agenda as well,” she says, adding she would like to see the development of products that reward climate mitigation and adaptation efforts.

She concludes: “Re/insurers should think qualitatively about risk because that will help us explore the consequences of climate change in a way that mitigates the risk for which numbers could provide false comfort.” ■

Insurers brace for active 2024 hurricane season

Elen/Alamy Stock Photo



Early forecasts suggest a busy year but more hurricanes does not necessarily mean higher losses, analysts say

Multiple early hurricane forecasts for 2024 have predicted higher-than-average activity this year, writes Francis Churchill.

In April the Colorado State University (CSU) forecasting team said it expects an [“extremely active” Atlantic hurricane season](#) this year, with 23 named storms, of which 11 will become hurricanes and five will reach major status.

Tropical Storm Risk (TSR) [made a similar early forecast](#), in which it said to expect 70% more storm activity than the 1991 to 2020 30-year norm.

The forecasts should come as no surprise, as the conditions are right for high levels of hurricane activity.

Sea surface temperatures are perhaps the biggest component driving aggressive early seasonal hurricane forecasts, Josh Darr, global head of peril advisory at broker Guy Carpenter, says. By early May this year, they were running at the same lev-

els normally seen in August, which is the start of peak hurricane season. The day he spoke to *Insurance Day* marked the end of a 418-day streak of record Atlantic Sea surface temperatures.

The other big driver is the El Niño-Southern Oscillation (Enso) cycle. An El Niño period is when the tropical Pacific experiences warmer water temperatures than normal, while La Niña is a period of cooling.

La Niña conditions tend to create less wind shear, which allows thunderstorms to develop vertically more rapidly and spin with more strength. This helps convert warm sea surface temperatures into thunderstorms, which can then become tropical depressions and potentially hurricanes.

There is evidence La Niña increases insured losses. CSU recently published research suggesting during an El Niño period, the probability of a \$10bn US hurricane loss is 10%; during La Niña that is closer to 60%.

The effect of La Niña is also tilted more towards Florida and the US East Coast, Darr says, whereas the Gulf Coast is largely unaffected by the Enso cycle.

“There’s well-known connections to Enso and La Niña in terms of the havoc it can wreak on the world insurance industry and nations around the world,” Andrew Siffert, senior meteorologist at broker BMS Re, says.

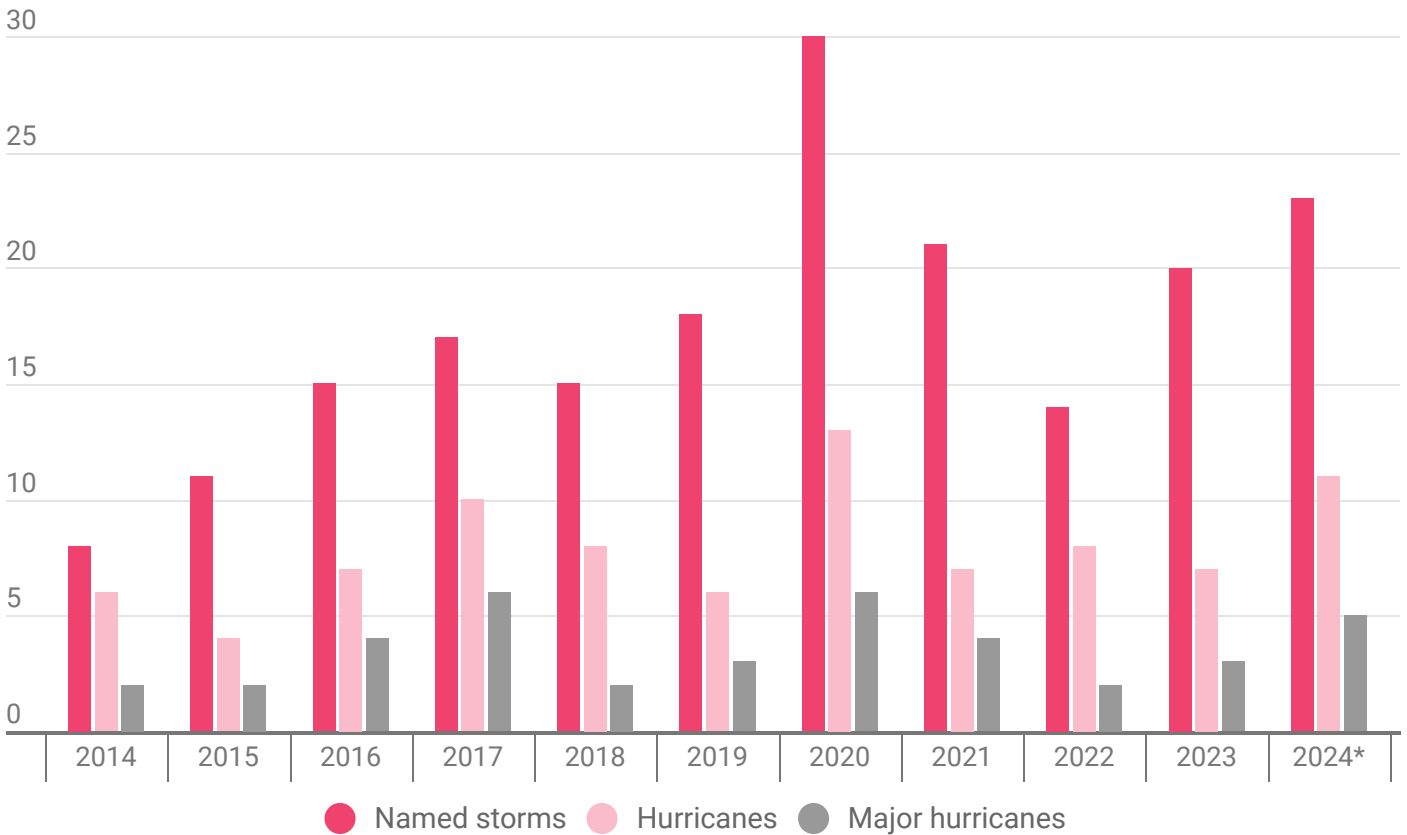
However, whether this translates to an increased number of landfalls – and whether these landfalls then turn into insured losses – is a more difficult question to answer.

More storms but not more losses

Last year was a perfect example of how increased activity does not necessarily translate to losses: 2023 was the fourth-most active season for storm count with 20 named storms and seven hurricanes, of which three were major. But there was only one landfall, by [Hurricane Idalia](#), which landed in a largely unpopulated area.

CSU predicts 2024 will be one of the most active recent storm seasons

Graph: North Atlantic named storms and hurricanes, 2014 to 2024



*estimate

Source: Colorado State University

“We just got extremely lucky about where it was,” Elizabeth Harris, vice-president for modelling and research at Lloyd’s re/insurer Ariel Re, says. “You don’t have a significant industry loss until you have a major hurricane make landfall in one of five metropolitan areas of the US.”

If the storm had made landfall just 100 miles further east, it would have hit the heavily populated Tampa area, Darr points out.

Early hurricane projections have little “skill” – meaning their ability to forecast accurately is little better than using a historic average. They do improve slightly by June and are usually quite good by August, Harris says, “but by then it’s not a forecast really. It is a forecast for September and October but by then we already have everything locked in place.”

This is echoed by Siffert. “There’s basically no skill in forecasting April named hurricane activity,” he says, even given the advancements in data and technology over the past 10 years.

“I always wonder what we do with this information anyway,” Siffert adds. “Ultimately a lot of [reinsurance] treaties get placed in June; they’re already in the market. And is one forecast going to change the rating environment? Not necessarily.”

Increasing frequency

Hurricanes have increased in frequency since the 1980s, but perhaps not for the reasons expected, Harris says. Climate change is likely to be one factor but there are other “much stronger signals” to explain the trend.

Part of the cause is a natural slow-down in ocean circulation in the tropics, leading to less heat in the

north Atlantic. The other cause Harris points to is linked to a clean-up of sulphates from the atmosphere that has had a warming effect on sea surface temperatures.

High levels of sulphates in the 1970s and 1980s had a shading effect and removing those sulphates has allowed more shortwave radiation to reach the surface of the ocean. “Cleaning up air pollution has, unfortunately, led to more north Atlantic hurricanes,” she says.

There has also been a trend of increasing landfalls since 2017 compared with the previous 12 years. Between 2006 and 2016 there were no major Florida landfalls, “which is something we’ve really struggled to explain”, Harris says.

The devil is in the detail, Siffert adds. While 2023 was particularly active

for an El Niño year, half of the storms seen were very short-lived and did not amount to anything.

“In the broad scheme of things, we really only had 12 robust named storms, which is right where you would expect in terms of average,” he says. “Our classifying of these named storms is very different from how it used to be, much more trigger-happy.”

Convective storm losses

Severe convective storms have different drivers from hurricanes and are perhaps more difficult to predict. “Severe convective storms are often highly localised and can happen with very little warning,” Rich Coyle, US commercial director at parametric insurer FloodFlash, says.

These losses have been on the rise for a while now, reaching record levels in 2023. Severe convective storms caused \$71bn in insured losses last year, Gallagher Re reported, representing 57% of all insured catastrophe losses. Of this figure, \$60bn of severe convective storm losses incurred in the US.

Last year was also the first time insured losses surpassed \$100bn without a single event topping \$10bn. However, the rise in losses is less to do with frequency and more to do with increasing exposure growth.

Overall, the frequency of severe thunderstorms has remained pretty constant, Darr says. What has changed from a meteorological viewpoint is the hail and tornado belt in the US has shifted further east, away

“I always wonder what we do with this information. Ultimately a lot of [reinsurance] treaties get placed in June; they’re already in the market. And is one forecast going to change the rating environment?”

Andrew Siffert
BMS Re



from the sparsely populated plains of Nebraska, Oklahoma and Kansas to more heavily populated cities, including St Louis, Nashville and the Texas Triangle.

There has also been a change in seasonality, Darr says, with a disproportionate amount of activity now being seen in the off-season winter months and more bursts of activity during prime season.

But this is only a minor part of loss propensity, he continues. The bigger problem is population sprawl over the past 30 years, particularly the growth of connecting cities across the US’s interstate system.

“You can’t go anywhere in the US anymore without going off an exit and seeing a small subdivision, enclave or major factory placed there,” Darr says.

Over the past 10 years overall population migration in the US has been towards the south – caused by a range of social factors, starting with

the 2008 financial crisis and accelerating with the pandemic. As a result, high-risk places like Nashville have experienced a population boom.

Not only does that contribute to population swell, but it also introduces a population that is not attuned to the disaster risk of an area, potentially exacerbating the impact of a storm or hurricane when it happens.

Add to this the high inflationary environment, which has greatly increased the cost of materials and labour, and it is a perfect storm for rising losses. “We’ve seen 40% to 50% increases [in reconstruction costs] in the past five years. That pretty easily turns an \$800m loss into \$1.4bn,” Darr says.

This is echoed by other analysts speaking to *Insurance Day*. “Really, there’s no clear signal in [loss data] with large-scale climate oscillations or climate change for convective storm,” Harris says. “Are they correlated? I don’t think we have any evidence in our short loss record that that is the case.”

These non-peak perils have been around for a long time, according to Siffert, who prefers the term “non-tail risk” to the increasingly outmoded term “secondary peril”. “There are many different things that are now bringing some of these non-tail risks to the forefront,” he says.

The human element

A lot of this is man-made. Most US wildfires are triggered by human causes, often electrical-based fires

“There’s no clear signal in [loss data] with large-scale climate oscillations or climate change for convective storm. Are they correlated? I don’t think we have any evidence”



Elizabeth Harris
Ariel Re

from downed power lines or ageing infrastructure. Similarly, damage from Winter Storm Uri in 2021 was largely a man-made loss event caused by a utility company that “maybe wasn’t as prepared as it should have been”.

“That would have been a pretty manageable event if the electricity had stayed on,” Siffert says.

He also cites population growth as a big driver of increasing losses, with more and more people moving to the “wildland-urban interface” – high-risk areas for forest fires. “It’s not always about climate change and it’s very easy to point the finger,” he adds.

But being part of the problem also means humans can be part of the solution. “We’ve got to encourage homeowners to mitigate the [wildfire] risk by building defensible space, making sure they have the right type of roofing materials, doing little things that will increase the chances of limiting fire damage to structures,” Siffert says.

This is being done both through education and through policy changes, such as increasing deductibles. Better risk models allow better risk assessments that provide much more detail than 10 years ago and these insights are being passed on to property and business owners.

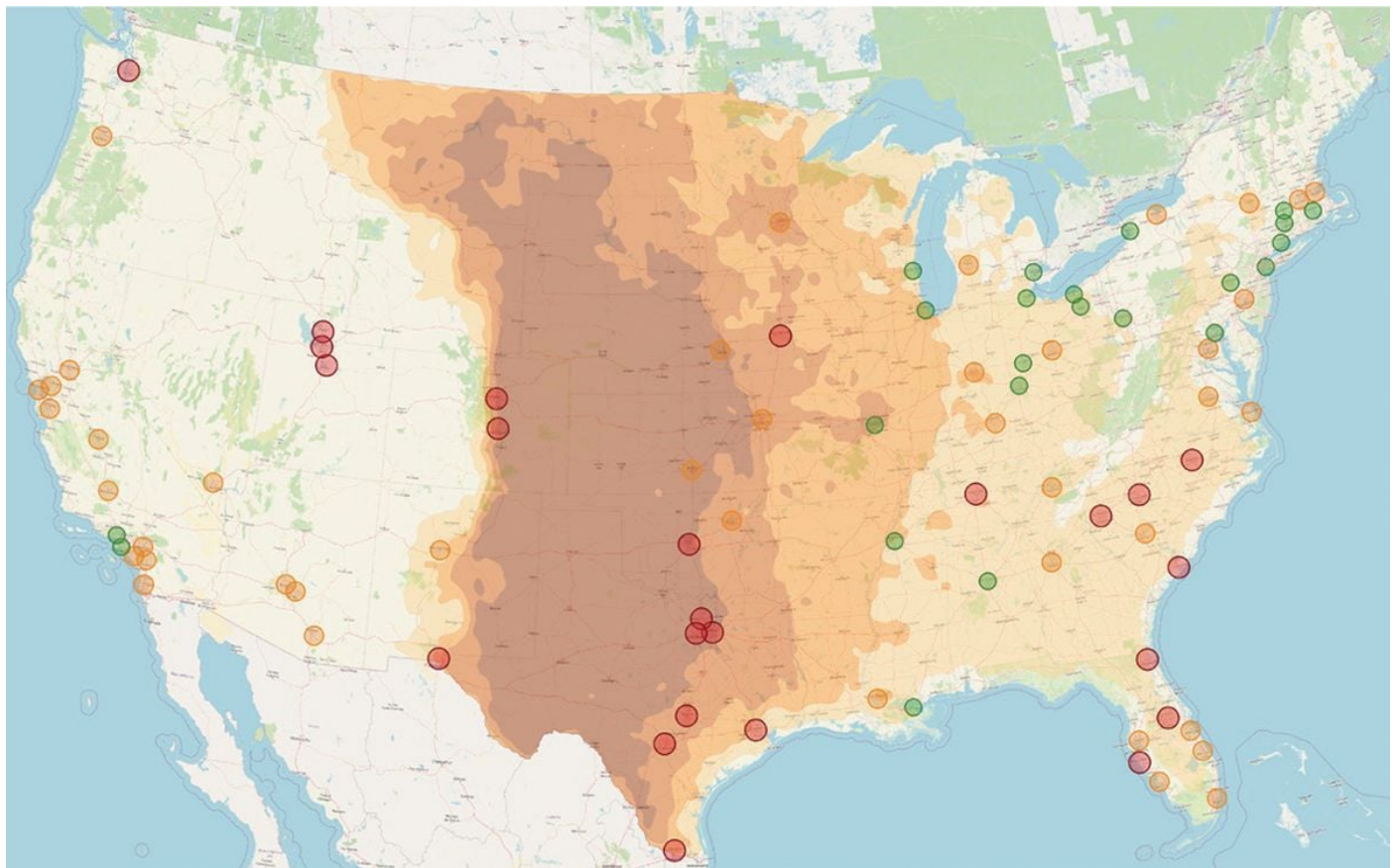
Building codes are also improving. Af-

ter Hurricane Charley in 2004, which hit Cape Coral and south-west Florida, residents built back to better codes. These made a tangible difference to losses when Hurricane Ian hit in 2022, where roof damage was less severe. “We’re seeing the insurance industry is becoming more collaborative with policymakers and helping provide an avenue for insurance to help push for mitigation efforts and build longer-term stability,” Siffert says.

He concludes: “If insurance becomes unavailable in an area, you’ve got to change something. You’ve got to change your way of thinking, change how that building is going to be rated by building in more risk measures.” ■

Population growth in hail-exposed areas adds to convective storm losses

Map: Hail risk and major population centre growth in the US, 2010 to 2020



Circles represent area within 30 miles of major metropolitan centroid with >500k population

- >12% housing unit growth (top 25th percentile)
- 5% - 12% housing unit growth (middle 50th percentile)
- <5% housing unit growth (bottom 25th percentile)

Source: Gallagher Re



Kairi Aun/Alamy Stock Photo



Dubai's recent cataclysmic flooding highlights the urgent need for improved flood resilience and preparedness measures, Previsico's Jonathan Jackson says

Ten lessons from Dubai flooding event

Dubai's lack of awareness about the flood risk it faces can be attributed to several factors, writes Jonathan Jackson, Previsico.

First, the city is not traditionally prone to heavy rainfall and flooding because of its arid climate. Consequently, infrastructure and urban planning may not have accounted for such extreme weather events. Additionally, rapid urbanisation and development may have outpaced the city's ability to adapt and implement adequate flood prevention measures. Flood insurance too, while available, is often not bought by the public.

What can be done to minimise the risk of future flooding, based on a "prepare, act and prevent" approach?

Investment in infrastructure: Dubai's rapid urbanisation and expansion have strained its infrastructure, leading to drainage systems

that may not adequately cope with heavy rainfall. Investing in resilient infrastructure, such as improved drainage networks and flood barriers, is crucial to reducing the impact of flooding.

Enhanced forecasting technologies: traditional weather forecasting methods may not always accurately predict extreme weather events like the heavy rainfall that caused Dubai's flooding. Furthermore, weather forecasts warn the level of rain heightens the risk of flooding in a wide geographic area and does not forecast where flooding is predicted to occur. By leveraging advanced technologies, such as real-time data analysis and internet of things sensors, Previsico delivers accurate and timely flood forecasts, allowing authorities to take proactive measures to protect lives and property. This has been proven to work in flood-prone areas like Devon in the UK.

Community engagement and education: many residents and businesses in Dubai may not have been adequately prepared for the possibility of flooding. Community engagement and education initiatives can raise awareness about flood risks and provide guidance on preparedness measures, such as securing property and creating emergency plans.

Integration of climate change considerations: climate change is exacerbating the frequency and intensity of extreme weather events, including flooding. It is essential to integrate climate change considerations into urban planning and development strategies, particularly in a historically dry place such as Dubai, ensuring infrastructure and policies are resilient to future climate scenarios.

Collaboration and co-ordination: effective flood management requires collaboration and co-ordination among various stakeholders, including government agencies, private sector organisations and community groups. By working together and sharing resources and expertise, we can enhance our collective ability to respond to and recover from flooding events.

Investment in research and innovation: continued investment in research and innovation is essential for developing new technologies and solutions to address the challenges posed by flooding. This includes the development of

Climate change is exacerbating the frequency and intensity of extreme weather events, including flooding. It is essential to integrate climate change considerations into urban planning and development strategies, ensuring infrastructure and policies are resilient to future climate scenarios

flood-resistant building materials, innovative drainage systems and predictive modelling tools.

Adoption of nature-based solutions: nature-based solutions, such as green infrastructure and wetland creation, can help absorb excess rainfall and reduce the risk of flooding. This would be challenging in Dubai, but integrating these approaches into urban planning would enhance flood resilience while also providing additional environmental benefits.

Resilience planning for critical infrastructure: critical infrastructure, such as power plants, hospitals and transportation networks, must be resilient to flooding to ensure the continued functioning of essential services during and after an event. Implementing resilience measures, such as flood-proofing and redundancy planning, can minimise disruptions and save lives.

Preparedness and response exercises: regular preparedness and response exercises, including simula-

tions and drills, can help authorities and emergency responders refine their procedures and identify areas for improvement. Also, raising public awareness about flood risks and promoting community preparedness can enhance the city's overall resilience. These exercises are essential for ensuring a co-ordinated and effective response to flooding events.

Long-term planning and adaptation: flooding is a complex and evolving challenge that requires long-term planning and adaptation strategies, which may involve revising building codes to ensure flood-resistant construction. By incorporating flexibility and adaptive management principles into our planning processes, we can better respond to changing flood risks and uncertainties.

Insurers also have a vital role to play in this, as despite best efforts it will never be possible to mitigate all flood risk. In Dubai, where flood insurance is already widely available, but there is low penetration, the focus may shift towards ensuring the adequacy, affordability and awareness of existing insurance products in light of recent flood events.

The recent flooding in Dubai serves as a stark reminder of the importance of proactive flood management and preparedness. By implementing the lessons learned from this event and investing in a resilient infrastructure, advanced forecasting technologies, and community engagement, we can build more flood-resilient cities and communities for the future. ■

Jonathan Jackson is chief executive of Previsico



Kairi Aun/Alamy Stock Photo

Clean energy is much more than a climate change solution

Broker's head of renewables, power and energy describes an evolving market that embraces climate, security of supply and geopolitical risks

Renewable energy is a serious business opportunity for re/insurers that are clear-eyed about the transition to net zero, according to McGill and Partners' head of renewables, power and energy, Tom Sexton, *writes Louise Isted.*

Sexton has more than 30 years of energy broking experience, including at Aon and Marsh. "I get a bit frustrated with talk about new energy, new technologies, the energy transition itself to a certain extent, because it's business as usual in my mind," Sexton says in an interview with *Insurance Day*. "The energy sector as a whole is developing rapidly but it's more an evolution than a revolution."

The appeal of wind, solar and battery storage lies in the varying pace of technological change.

Sexton says: "Every risk that comes to market is slightly new, but it's always based on something that's gone before, which makes it exciting and interesting. The whole energy space, but definitely renewables, is a sector you have to live and breathe. You can't just dip in and dip out because you need to go on a journey to help clients navigate the risks of evolving technologies and get the best products out of the insurance market. You must be fully immersed in the sector to stay abreast of the changes."

A development Sexton recently helped spearhead at McGill is [bespoke catastrophe models for offshore wind portfolios](#). This collaboration with Renew Risk is a response to the trend of



"A lot of the traditional oil and gas insurers have really stepped in and in a very positive, technical way. They're looking to develop their renewable energy understanding... It's a fairly balanced situation in the marketplace right now, so things have definitely improved over the past five years"

Tom Sexton
McGill and Partners

siting wind energy assets further offshore and, potentially, into highly exposed natural catastrophe zones.

These models will assist both offshore wind clients and insurers to

access more efficient risk-transfer capital, Sexton says, and will enable re/insurers to price coverage more accurately, understand asset class aggregations and assess offshore wind's impact on other lines of business. These were "previously inaccessible" insights, he adds.

Government support

But the pace of growth in renewable energy depends as much on government support as it does on market innovation. "We've recently seen a few renewable energy auctions fail around the world and that's definitely going to put a hiatus on major projects in some countries for a year or two, which is a worry," Sexton says.

This interruption reflects political pressure from the inflationary costs embedded into projects, which has made them commercially less attractive, Sexton says.

"Auction prices secured on some of the power purchase agreements have gone down while the costs of installing those assets have gone up. That disconnect is a concern for insurers and their clients because the pipeline of projects and risks they thought may be coming in the next few years could be delayed."

There are encouraging signs, however, from the relaunch of wind power auctions in the UK and the US.

The UK held the sixth allocation round (AR6) of its contracts-for-difference (CfD) scheme between



Lee Ramsden/Alamy Stock Photo

March 27 and April 19. The assessment window closed on May 20.

AR6 had the biggest budget of any CfD round to date and saw a range of renewable technologies, including offshore wind, onshore wind, solar and tidal stream, compete for government support. A budget of more than £1bn (\$1.25bn) was allocated for the auction, which is a substantial increase from the £227m set for the previous one. The 2023 auction saw no offshore wind project bids because the prices guaranteed were considered too low by developers.

Meanwhile, progress in the US includes two proposals for offshore wind energy auctions off the coast of Oregon and in the Gulf of Maine. The two sales, proposed by the Bureau of Ocean Energy Management, reflect a multi-year planning process that has included engagement with tribes, local communities, federal and state agencies, ocean users and stakeholders to balance the social, environmental and economic factors.

Energy sector success

Insurers that succeed in the energy sector come into it “with their eyes open”, a willingness to be flexible

and an ability to add value. “No insurer or client wants to have a bad risk because losses and claims are not going to help them commercialise a sector they’ve strived to develop,” Sexton says.

“There was concern in the early days of renewable energy that insurers were going to be the research and development department of some of these new technologies. That assumption dissipated quite quickly because, on the whole, people want to develop the technology in a commercial and prudent manner and I think insurers have responded well to that.

“Now, there’s a fairly strong collaboration between both sides because it’s in everyone’s interest that the renewable energy sector grows – from a climate change perspective, from a security of supply perspective and for all the other reasons why we need to accelerate the transition to clean energy.”

Sexton warns against seeing clean energy as a short-term opportunity. “Get the best talent you can to understand the technologies and the risks associated with them in the lo-

cations they might be in. Try to understand the engineering risks associated with them to manage your exposures. Don’t take too big a line too early and make prudent use of reinsurance protection so you have longevity and build up your statistical background and claims understanding so you can make better decisions,” he says.

As for clients, Sexton continues, they are often experienced power utility and renewable energy companies that have done a substantial amount of due diligence with their new technology, “so by the time they’re ready to engage with the insurance market, a lot of the hard work has already been done”, he adds.

There are typically two types of insurers in the renewable energy market: leaders and followers.

“Those that lead want to understand the technicalities of the risks, to be able to price them effectively and to add value. That attitude is valued by our clients because they want to learn from insurers and educate the insurers at the same time, so it’s of mutual benefit for both parties to work together.

“Then the other type of insurer is providing follow-type capacity. They are prepared to let the others do the hard work, but that’s absolutely fine, because we need the capacities as the projects scale up. Not everyone can find or hire the technical capability required to be a leader, so I don’t undervalue those follow markets at all,” Sexton says.

Plentiful capacity

Insurance capacity for renewable energy projects is “strong” at present, Sexton continues, with a flow of new entrants over the past 18 months.

“A lot of the traditional oil and gas insurers have really stepped in and in a very positive, technical way,” he says. “They’re looking to develop their renewable energy understanding, which goes to hydrogen, carbon capture and the traditional renewable energy technology as well, like wind, solar and battery storage. It’s a fairly balanced situation in the marketplace right now, so things have definitely improved over the past five years.”

Sexton recommends curbing enthusiasm, however, for green hydrogen and carbon capture, utilisation and storage (CCUS). “At the moment, if it comes purely down to value at risk and premiums in the market, the role of these new technologies is overstated,” he says, “because there isn’t much green hydrogen or CCUS in the marketplace.”

He continues: “There’s a huge amount of on- and offshore wind and large-scale battery storage projects are definitely on the march, but I think hydrogen and CCUS have got a long way to go and they’re probably taking up too much of the airtime.”

Re/insurers generally are not looking as far ahead as the potential risks from decommissioning renewable energy assets.

“They are looking at it from a physical loss-type of exposure. We’re now seeing decommissioning of offshore wind farms, for instance, and that is

being insured, as well as the liabilities associated with it.

“But, from a day-to-day perspective, insurers are less involved in the long-term ability to recycle material or equipment. I imagine that comes into the environmental, social and governance requirements in their investment arms and less in their underwriting,” Sexton says.

The scale of renewable energy globally is already “huge” and the limitations these technologies face are mostly related to government policy and planning regulations.

“The not-in-my-backyard concerns probably aren’t going to go away, but if you look at some of the offshore wind farm developments, the scale is absolutely enormous and will continue to be so,” Sexton says.

Role for nuclear

According to the International Energy Agency (IEA), electricity generation from low-emissions sources – which includes nuclear and renewables such as solar, wind and hydro – is set to cover all global demand growth over the next three years. They are forecast to account for almost half of the world’s electricity generation by 2026, up from 39% in 2023.

McGill has a team specialising in nuclear energy, which Sexton says is an integral part of the global energy mix. “Nuclear is a very important

sector we think definitely has a future role to play, although that will obviously be bigger in some territories than others. It’s something we are looking to develop further, as and when the opportunities arise,” he says.

The IEA’s [World Energy Outlook](#) in 2023 showed for the first time demand for oil, natural gas and coal would each peak in each of its scenarios before 2030. Consumption of fossil fuels, however, is unlikely to decline for the foreseeable future, Sexton says.

“It’s a matter of decarbonising the production of those fuels and to transition over time. It would be naive to think it’s going to change overnight. We’re on a journey here. And those climate change targets are, I hope, at the forefront of everyone’s mind to try to reach those 2030 and 2050 goals.”

The main thing for re/insurers to know is they can come into the renewable energy sector with more certainty regarding loss performance.

Sexton concludes: “People are making money in that sector from an insurance perspective and a reinsurance perspective. And I think the growth trajectory is an exciting proposition. But, obviously, come into that sector with your eyes open, be sensible how you do it and provide good, sustainable capacity to your clients into the future.” ■



Extreme weather and the path to clean energy



Climate change brings a wide array of challenges and opportunities for the insurance industry, Kearney's Antonio Serrapica says

With 2023 being the warmest calendar year on record since 1850, Europe grappled with extreme weather events, bringing the growing threat of climate change to the forefront.

Climate change brings a wide array of challenges and opportunities for the insurance industry as a result of trends including more volatile weather patterns, the transition to sustainable energy and the potential for more black swan events such as pandemics.

Against this backdrop, companies need to consider different strategies for climate change adaptation to remain competitive and resilient in the changing environmental landscape.

The rise in severe weather incidents has had an impact on the technical balance in underwriting, as measuring, predicting and apportioning risks accurately has become increasingly challenging because of the unpredictability of these events. Climate change has been compounded by the frequency and severity of adverse weather, putting overall business sustainability into question.

The push from local regulators for

increased coverage presents an exciting opportunity for insurers to expand their market reach and develop innovative product offerings to meet the evolving needs of consumers and businesses. However, when considering the likelihood of catastrophic weather events, new risk models are needed, as is a more tenable distribution of risk and value across insurers, reinsurers and alternative risk-transfer systems.

Clean energy transition

Global investments in renewables have been on the rise, with capital expenditure in renewable technology rising from \$215bn in 2018 to \$495bn in 2022, as shown by Kearney's [The State of Global Insurance in 2024](#) report.

This is still less than one-third of what is needed each year to hit sustainability targets in the battle against climate change. Insurers can play an important role here and help ensure the success of the clean energy transition.

Specifically, insurers can incentivise carbon-intensive and high-emission industries to reduce their carbon footprint by proactively derisking

investments in low-carbon technologies. Not only will this support the transition to sustainable technologies, but it will also require future pricing models to align with the growing popularity of eco-friendly technology.

Further to this, expanding policy terms can help finance the clean energy transition, creating a more favourable environment for investment in sustainable technologies. Offering more flexible and comprehensive insurance coverage will mitigate the risks associated with clean energy products, ultimately attracting more investors and increasing the availability of capital.

Growing threat of pandemics

One of the more alarming factors at play is the possibility of future black swan events. Many diseases have emerged over the years, including Sars, Ebola and Zika, all of which

have originated from animal populations living in difficult environmental conditions.

The unpredictable nature of future health threats and pandemics casts a dark shadow over the long-term strategies of insurance firms. The Covid-19 pandemic, for example, led to increased claims and investment income decreases for health insurers.

The potential for future global health crises in the near future is also somewhat of an unknown, with Microsoft co-founder Bill Gates putting the odds of another pandemic within 20 years at more than 50%.

As a result, companies are having to re-evaluate risk assessment models and the development of new products in the face of emerging health threats to society. This shift in approach is crucial for insurers to remain resilient and responsive to the

evolving healthcare landscape and consumer needs.

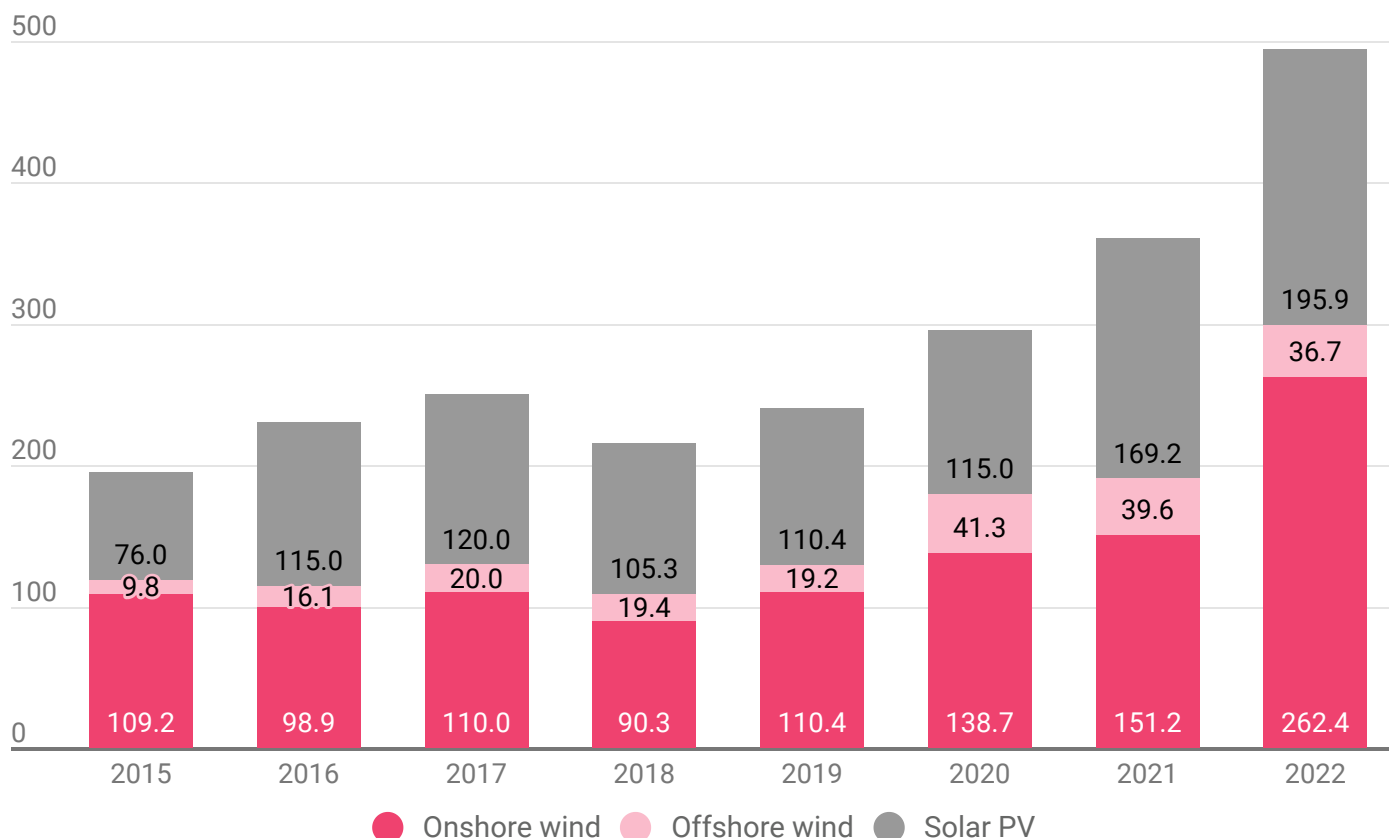
That said, the pandemic also prompted the industry to adapt, with new innovations in remote claims processing and adjustments to policy terms, demonstrating the industry's resilience and flexibility in the face of volatile circumstances.

Ultimately, changing environmental conditions and healthcare advancements, fuelled by technological progress and evolving consumer expectations, will require the insurance industry to adopt a more strategic approach to future planning. Refreshing product offerings and innovating service delivery infrastructure will be essential as the threats of future environmental shifts will increasingly need to be front of mind. ■

Antonio Serrapica is a partner at Kearney

Renewable investments on the rise but still short of sustainability targets

Graph: Capital expenditure on renewables, 2015 to 2022 (\$bn)



Source: ABC Company, Kearney analysis

Insurance's interest in carbon capture market gathers pace

Aon has become the latest company to create a product supporting the emerging carbon capture and storage sector

An increasing number of brokers and insurers are turning to the carbon capture market to support customers in their transition to net zero, writes Francis Churchill.

Earlier this month Aon became the latest to join the fray with a carbon capture and storage (CCS) product aimed at international transport and storage companies.

The global broker claims the product is the first “fully comprehensive” CCS insurance product, covering aspects including the integrity of carbon storage reservoirs and indemnity for loss of tax credits associated with carbon leaks.

The product is a result of Aon's involvement with the [HyNet North West project](#), a clean hydrogen production project being developed in the north-west of England – clean hydrogen being one of the potential alternatives to fossil fuels. The project, which also aims to build a hydrogen pipeline and storage facilities through the region and into north Wales, will include a carbon capture and transportation element that will pipe captured carbon into undersea storage.

Aon, which acted as a broker for one of the project's lead developers working on the carbon pipeline, says the scheme is among the first commercial-scale carbon sequestration and capture projects in the UK.

The cover provided by the product includes the construction and repurposing of existing assets as well as the operational phase of projects.

Like other carbon insurance prod-

Carbon capture and storage is a mixed bag including a variety of technologies ranging from removing carbon from the output of existing fossil fuel-burning industries to trying to extract existing carbon directly from the atmosphere

ucts, Aon hopes that by providing relevant insurance products, it can help bring in investment to support what is still a developing technology by de-risking some of the financial aspects.

Earlier this year, global broker Howden released its own facility [providing cover for the leakage of carbon from commercial-scale CCS plants](#).

Led by Scor, the Lloyd's facility provides balance-sheet protection for environmental damage and loss of revenue arising from either a sudden or gradual carbon dioxide leak associated with CCS technology.

Managing general agent CFC has taken a different tack, placing a bet on the voluntary carbon market by [launching a product protecting against non-delivery of voluntary carbon bonds](#). Like its peers, CFC hopes that by providing buyers of voluntary credits guarantees with a refund if a carbon capture or offsetting project fails either fully or partially, it will encourage more industry players to invest.

CCS is a mixed bag including a variety of technologies, ranging from removing carbon from the output of existing fossil fuel-burning industries to trying to extract existing carbon directly from the atmosphere.

While the former is seen as a sticking plaster – with the only viable solution the phasing out of fossil fuels – the latter has often been touted by some as one of the best hopes for mitigating global warming.

What is generally agreed is neither approach is happening at a scale required to offset the total emissions being created by human activity. The International Energy Agency (IEA), an inter-governmental organisation, estimates there are just 40 commercial CCS facilities in operation today.

Momentum is growing. There are around 500 projects in various stages of development across the CCS supply chain, including plans for 50 new carbon capture facilities to be in operation by 2030, capturing around 135 megatonnes of carbon a year.

However, the IEA says this would still be about a third of the 1.2 gigatonnes of carbon capture capacity needed to meet net zero by 2050.

However, far from being a lost cause, the IEA is calling for increased government focus, public funding and cross-boarder collaboration on CCS projects. Increasingly, the insurance industry is also finding ways to support the technology. ■

Insurers ask whether their policy pays out cash or carbon

The growth of carbon credits creates a new insurance market with new business models – and some insurers are redeeming policies in carbon credits instead of cash

Insurers want to help get carbon out of the atmosphere: the physical dangers alone pose an alarming challenge for carriers and both they and their clients want to be environmentally conscious and responsible, *writes Ben Margulies.*

One of the most visible ways to tackle climate change is to participate in carbon markets. While many large polluters must participate in mandatory governmental emissions trading systems (ETSs), anyone can buy carbon credits in the smaller – but growing – voluntary carbon market.

The novelty of the carbon market has posed challenges for insurance, which is only now beginning to insure carbon credits on a significant

scale. The market is changing at speed, but not every peril in the carbon market can be covered by existing insurance products or systems. Because markets effectively have their own internal currencies – carbon credits – some firms are offering policies that pay out in those credits, rather than cash.

Origins of carbon markets

ETSs originated in the US as a measure to reduce sulphur dioxide emissions, which are a cause of acid rain. Global carbon ETSs emerged following the signing of the 1997 Kyoto Protocol, which launched global efforts to control greenhouse gas emissions.

Carbon credits take two forms. The first are permits issued by govern-

ments and traded on government-backed ETSs, sometimes called the compliance market. The EU's ETS dates from 2005 and China launched its own in 2021. In the US, the state of California has operated an ETS since 2006. The [World Bank reported](#) revenue from ETSs and carbon taxation came to nearly \$95bn in 2022.

In addition to state-backed ETSs, there are also private sector voluntary carbon markets. Voluntary markets trade credits, rather than permits. Removal credits, seen as the most reputable form of voluntary credit, are tied to projects that remove a certain amount of carbon dioxide from the atmosphere.

The voluntary exchanges are much

Hellisheidi geothermal power plant in Iceland has carbon capture and storage facilities



Cavan Images/Alamy Stock Photo

smaller than the ETSs; German energy company [E.on cited figures](#) claiming carbon offsets worth €1.5bn (\$1.6bn) were traded in 2021. [Deloitte reported](#) as of 2022, total issuance of carbon credits came to close to \$1.3bn.

In November 2022, the European Commission proposed a regulation to create “a Union certification framework for carbon removals”. Any accredited instrument must produce a “net carbon removal benefit”, which is quantifiable net the carbon generated by whatever activity is providing the offset.

The EU’s carbon market regulation also mentions insurance, calling for “appropriate liability mechanisms” to provide for cases when sequestered carbon leaks, among them “up-front insurance mechanisms”.

Coenraad Vrolijk, chief executive of CarbonPool, a new insurer that plans to offer carbon market insurance, says the voluntary and compliance markets are gradually converging. This is because official ETSs are starting to accept some removal credits as equivalent in carbon value to an official emissions permit.

George Beattie, head of innovation at managing general agent CFC, says the 2015 Paris Agreement could grant legal status to voluntary carbon market credits, which would make them valid for regulatory compliance. The Paris Agreement established a goal of “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and [pursuing] efforts to limit the temperature increase to 1.5°C above pre-industrial levels”.

Vrolijk says photosynthesis – that is, forests – will be the main tool for drawing carbon from the atmosphere over the next decade. There are other methods, including carbon capture devices, which are very expensive, Vrolijk adds. Maynard mentions converting biomass into charcoal, called “biochar”, and spreading carbon-absorbing rock over fields.



“We take carbon liabilities and we charge people premiums in dollars or in [other] cash, but we invest that cash in our carbon removal projects. The core of our business model, of course, sits around the fact carbon is its own distinct currency in this climate space and it is acutely scarce”

Coenraad Vrolijk
CarbonPool

Slow progress

Natalia Dorfman, chief executive of carbon insurance specialist Kita, says some “nascent” insurance initiatives emerged in the compliance market around 2005 and 2006, but these largely faded away as a result of the start of the global financial crisis two years later. The line revived again with the Paris Agreement.

Beattie places the market’s revival a bit later, saying: “Only since 2022 have things really picked up, probably due to the growing sophistication and size of the voluntary carbon market.”

Hayley Maynard, head of innovation at specialty re/insurer Chaucer, which has partnered with Kita and

provides its underwriting sponsorship, says “when we first started working with Kita... you had existing carriers dabbling in this space”, but now the market has “carbon-specific entities” specialising in these fast-moving markets.

Kita is among these new entrants: a Lloyd’s coverholder, it partnered with Chaucer to offer carbon market insurance in early 2023. The two companies began working together via the Lloyd’s Lab. “Lloyd’s has been very, very supportive to us, as has Chaucer,” Dorfman says. Lloyd’s provided access to both capital and experienced insurance professionals, she adds.

Maynard stresses Kita gives Chaucer vital insight into a rapidly changing market, to which it can add its “insurance expertise”. Dorfman sees Kita as “the bridge between the carbon markets and the insurance markets”, which is important because not all carbon risks can be insured. She points out carbon sequestration is supposed to last for a century, meaning clients will seek infeasible 100-year policies.

CarbonPool has not started offering policies yet and is in the process of seeking a licence from the Swiss Financial Market Supervisory Authority. In the interim, Vrolijk says the company is “pre-assessing” potential clients, building up capital reserves and researching potential carbon-offsetting projects.

[CFC unveiled its “carbon delivery insurance” in March](#) but Beattie says market volume remains quite small. Though there are no exact figures, he says there may be fewer than \$5m in gross written premiums for carbon insurance. “This is like the cyber market in the year 2000,” he adds.

Categories of risk

There are a number of participants in the carbon market. There are corporates purchasing credits or permissions, but also firms that offer carbon offset projects and their investors.

“I would be concerned, as an insured, about having my claim paid in carbon credits from projects I don’t know about and whose value I can’t easily deduce and that may be worth less than the credits I’ve lost... We believe, right now, purchasers of carbon credits would rather have a cash payment”

George Beattie
CFC



But they all essentially need insurance for either the failure of the carbon project – for example, because a forest burns down or suffers stunted growth – or because an actor has polluted more than it was allowed or had committed to.

CarbonPool plans coverage against three categories of risk: excess emissions beyond what is provided by a policyholder’s carbon credits; accidental release of sequestered carbon; and a failure of purchased offsets to absorb sufficient carbon. Vrolijk says most of the insurance perils that could cause a shortfall in offsets can be accurately modelled and insured against, with some exceptions – mainly large-scale political risk.

Dorfman says Kita covers “delivery risk”, focusing on the earlier phases of carbon abatement projects before the new facility is producing carbon credits and undergoing auditing. “We’re looking at the investment into those projects to enable them to scale up and protecting the investor against the risk the project fails to meet its performance expectations,” Dorfman says.

Relevant risks include natural disasters; counterparty risks like bankruptcy, fraud and negligence; or “the carbon standard or its methodology being invalidated”, Dorfman says.

Beattie says CFC’s product does cover political risks: “CFC’s carbon delivery insurance protects forward purchasers of voluntary carbon credits against non-delivery arising from any cause and we are the first to combine coverage for natural perils and political risks under one coverage.”

In cash or in kind

What makes CarbonPool and Kita unusual is they plan to pay out on their insurance policies in carbon credits rather than in cash. Vrolijk points out paying out in kind is not unprecedented – motor insurance policies, for example, sometimes provide roadside services instead of cash cover.

Vrolijk argues that because carbon markets are not very liquid, it would be difficult simply to buy replacement credits with cash – much as a stranded motorist cannot simply buy a mechanic in the middle of nowhere. In most cases, “cash can make you good” – but emissions markets use “this currency of carbon, which is completely illiquid and scarce”.

CarbonPool deals with this peculiar market “by basically running a carbon balance sheet. We take carbon liabilities and we charge people premiums in dollars or in [other] cash, but we invest that cash in our carbon removal projects”, Vrolijk says.

“The core of our business model, of course, sits around the fact carbon is its own distinct currency in this climate space and it is acutely scarce,” Vrolijk says, adding “carbon is the currency of net zero”.

Kita also offers cover in carbon credits, although it will also pay out in cash. “We feel it’s very important to have flexibility in how we pay a claim, because what a client wants is going to be based on how and why it’s engaging in the carbon market,” Dorfman says.

Dorfman gives two examples: one company might be insuring against

a failure to meet a net-zero target, which means it needs carbon credits. On the other hand, a bank that loans funding to a failed carbon offset project will need cash.

One challenge for insurers is carbon credits are not necessarily fungible. Dorfman says some clients want their carbon removals attached to specific projects or locations. She gives the example of a South American forest project – should it burn down, the client might not want credits from a different operation in south-east Asia. Kita uses a “best match” model to match credit demand with potential substitutes.

Beattie is sceptical of this business model: “I would be concerned, as an insured, about having my claim paid in carbon credits from projects I don’t know about and whose value I can’t easily deduce and that may be worth less than the credits I’ve lost.” Beattie adds carbon credits may all nominally equal one tonne of carbon dioxide, but the projects that produce that credit “can be very different, so it’s felt voluntary carbon credits are in fact quite non-fungible”.

“We believe, right now, purchasers of carbon credits would rather have a cash payment that allows them to rectify a non-delivery in a way that suits them,” Beattie concludes.

Kita and CarbonPool develop portfolios of carbon offset projects to provide them with the necessary carbon credits. Kita has a “carbon supplier pool, which are carbon project developers we have vetted and that have the right type of carbon credits

available”. Since January, CarbonPool has been “building a pipeline of investments ourselves in these carbon removal projects”, so it can start buying or reserving removal credits before the end of 2024.

Certain growth

Beattie expects the carbon market and the demand for carbon credit insurance will continue to grow. He cites estimates the voluntary market will be worth \$30bn by 2030.

Dorfman says as the market adopts standard contractual language and definitions of key terms – something Kita is actively involved in crafting – it will be able to attract more capacity. She sees a large number of deals in the carbon market reaching completion towards the end of 2024 and start of 2025.

The Kita chief executive cites a [report from Oxbow Partners](#) that predicts carbon credit insurance could account for \$1bn in gross written premiums by 2030 and between \$10bn and \$30bn in 2050.

Vrolijk also expects very rapid growth in the voluntary market, as



“We feel it’s very important to have flexibility in how we pay a claim, because what a client wants is going to be based on how and why it’s engaging in the carbon market”

Natalia Dorfman
Kita

increasing numbers of large corporations purchase carbon credits – “it will be billions spent this year on carbon removals”.

The CarbonPool chief adds the number of major corporations buying carbon credit appears to be doubling annually. “It’s going very, very fast right now and the amounts people are spending on this is also not less than \$100m each a year,” he says.

“Right now, these credits are not covered, but once these big players face an unexpected shortage of carbon credits in a new market, the demand for insurance will swell,” he adds.

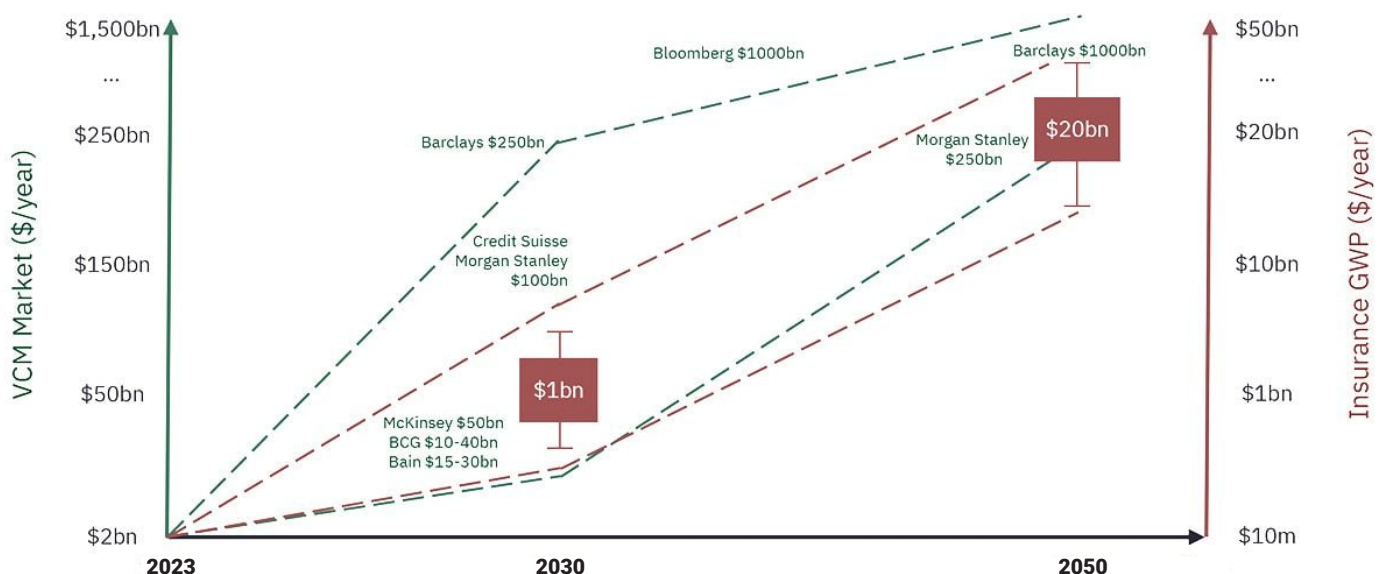
Although “the climate deniers obviously slow down this process” of decarbonisation, Vrolijk does not expect them to stop the expansion of carbon markets, since the obvious effects of climate change are worsening.

“The urgency will go exponential,” he says, until “there’s a complete panic moment.” That is when the world will need an insurer with a long balance sheet in carbon credits, he adds.

“I don’t think we’ll be overwhelmed,” Vrolijk concludes. “We may not be able to reach the goals we set... but that’s not going to be because we are overwhelmed and insurance can’t handle it.” ■

Carbon markets present a significant growth opportunity for insurance industry

Graph: Insurance gross written premium and voluntary carbon market growth



Source: Kita, Oxbow Partners

Insurers essential to voluntary carbon market

By derisking certain aspects of carbon forward contracts, CFC hopes to accelerate trading, its head of innovation says

Insurers have a key role in the development of the voluntary carbon market in measuring the quality of projects, according to the head of innovation at CFC, writes Francis Churchill.

George Beattie tells *Insurance Day* insurers could help improve the quality of what is still a largely unregulated market by handling much of the due diligence for smaller businesses looking to offset their carbon emissions.

He adds CFC is placing a long bet on a future where tougher regulations on emissions will make buying offsets common for businesses of all sizes.

CFC made its first move into the car-

bon offsetting space earlier this year with the [launch of its carbon delivery product](#), which protects buyers of credit forwards if a credit is not delivered.

The product offers cover for a broad range of risks depending on the carbon project being insured, including political risk and natural catastrophe.

“If you put \$1m into a project and you get 50% of the credits you expect – for any cause – we refund you \$500,000. No deductible, no performance franchise,” Beattie says.

The underwriter can write up to £5m (\$6.2m) of exposure per project and provide cover for multiple projects under a single policy.

Confidence to invest

In the first instance, Beattie says the hope is the product will support the growth of the voluntary carbon market by giving buyers of carbon forward contracts the confidence to invest.

But he also envisions a future where buyers of carbon forwards will be reluctant to put money down on projects that are uninsurable. “You’ll have a super high-quality end of the market that is insurable and you’ll have everything else,” he says.

“If a corporate is looking at a project and they can’t get it insured, they will want to understand why that is, so the diligence that insurers do can feed into a real quality dynamic for this market, which is critical.”



Fahoni/Alamy Stock Photo

Beattie is adamant the voluntary carbon market is a vital way to transition to net zero. Unlike compliance carbon markets like the EU's "cap-and-trade" emissions trading system, voluntary credits are generated by projects that avoid or remove carbon from the atmosphere.

This means each credit corresponds to a "real-world" tonne of carbon that has been avoided or removed.

However, while compliance carbon markets tend to be heavily regulated, the voluntary market lacks any central oversight and finding high-quality carbon bonds that deliver on their promise is a challenge.

Rapid growth

This has been exacerbated by the rapid growth of the sector, which Beattie forecasts will grow from \$2bn this year to \$30bn by 2030. This hockey-stick growth has attracted bad actors, he says, creating an oversupply of poor-quality credits at one end of the market, while at the high-quality end there is an undersupply.

Buying carbon forward contracts is not the same as buying futures on tangible goods such as steel or oil, Beattie continues, because a carbon credit is not fungible in the same way. There are standards for products like steel, but a voluntary carbon credit cannot be easily replaced by another.

"It's not the case that if I've invested into a basket of 1,000 [carbon] projects, I don't care where the credits come from. That's not the zeitgeist," Beattie says.

"Although a carbon credit is a tonne, there is a big difference between the projects."

There are a lot of potential stumbling blocks for buyers of forward contracts, which often do not know their counterparty's reputational or credit risk.

"Are they still going to be here in a



"If a corporate is looking at a project and they can't get it insured, they will want to understand why that is, so the diligence that insurers do can feed into a real quality dynamic for this market, which is critical"

George Beattie
CFC

year? Some sellers are highly prestigious, but relatively unknown to those outside the industry... these kinds of problems are slowing down and gumming up the market," Beattie says.

By derisking this aspect of carbon forward contracts, CFC hopes to speed up deal-making by allowing buyers to focus on other aspects of the projects they are looking to invest in, such as whether they are a good ethical or strategic fit.

The carbon market has had an "imperfect start", Beattie concedes, but one that was made in good faith.

"We need it to succeed because we need to protect our natural assets," he says, arguing it is an important economic incentive to prevent the exploitation and destruction of vital natural resources.

Regulation

Tighter regulation is also a big part of CFC's bet on the voluntary carbon market. "In the future, there won't be a [separate] voluntary market and compliance market. It will be one regulatory regime where everybody has to participate: every industry, every size of company," Beattie predicts.

While the largest players such as energy companies already have sophisticated internal teams conducting due diligence, "in the future the little guy is going to want to use insurance – not as a rubber stamp... but as a proxy for quality," he says.

CFC has already seen sellers of voluntary credits recognising the role insurers can play.

"We have a lot of project developers approaching us and saying 'we know we're not the target policyholder, but if CFC can underwrite our project and can offer coverage to our potential buyers, it'll speed up the deal-making process'," Beattie says.

For CFC, carbon delivery is the first of what could become a suite of products across the carbon credit supply chain, with carbon cancellation insurance likely to be the next. This would protect businesses in the event a credit is cancelled after delivery – for example, if a forest that has been planted later burns down.

Beattie says there are another three to six similar products CFC would like to launch in the next couple of years.

Of the voluntary market, Beattie says, "Yes, it's complicated, but it's an honourable mission the market is trying to achieve."

He concludes: "We want to be part of that and make sure the market grows in a sustainable and ethical way and in the right direction towards proper value add, proper science and proper carbon removal improvement." ■

Insuring credits to make carbon market credible

Chris Slater, chief executive of Lloyd's syndicate-in-a-box Oka, discusses the role of insurance in carbon credit markets

"I, on a personal basis, was drawn to actually try to get out of insurance," Chris Slater, chief executive of specialty insurer Oka, says, *writes Ben Margulies*.

Slater spent more than a decade building an online commercial insurance retailer, Simply Business, which was sold to Travelers in 2017.

He started a second business in the niche, but growing, market for carbon credit insurance. Taking its name from a word in Tupí-Guaraní languages that means "home", Oka was established at the turn of 2023 and, once it had received regulatory approval, began selling insurance policies from January 1 of this year.

In an interview with *Insurance Day*, Slater says he came back to insurance to help "solve one of the existential crises of our lifetime" by using his industry experience. "And I think young kids do that for you," he adds.

His company is one of a small group of new entrants that provide cov-

er in the voluntary carbon market, where corporations trade various privately sourced credits that – at least nominally – represent a tonne of carbon removed or not emitted into the atmosphere.

By providing cover for carbon credits in the private, voluntary carbon market, insurers like Oka can signal to corporate investors the credits are solid assets, smoothing the entry of new capital into carbon abatement more generally.

The carbon market in 200 words

Governments first established emissions trading schemes (ETs) in the late 20th century, first to fight acid rain, then global warming. Governments including the EU, California, South Korea and several Canadian provinces operate regulatory ETs covering certain polluting sectors.

More recently, a voluntary market has developed, in which private actors can purchase credits tied to various projects that compensate for carbon emissions. Many promise to

avoid carbon emissions that would otherwise be released – called avoidance credits – while others offer to actively capture carbon by planting forests, sequestering CO₂ in the ground or using carbon capture technology.

Carbon credits normally equal one tonne of carbon dioxide. Voluntary credits are not usually accepted in official ETs, but this is beginning to change – Slater says Singapore is beginning to permit the use of some voluntary credits and some insurers in the field expect the voluntary and mandatory markets to converge in the near future.

Insurers have only begun operating in this market in recent years. Slater estimates there are about \$100m to \$200m in gross written premiums at present. In February Kita, a Lloyd's coverholder that offers carbon insurance, [co-published a report with Ox-bow Partners](#) predicting the market will reach about \$1bn in gross written premium by 2030.

The birth of Oka

Oka is a primary insurer that writes its own policies. Slater decided to establish a "full-stack insurer" rather than an agency because he wanted to be able to tailor the product. "This is a new market and because it's fast, evolving, real, you need control over product, you need to be able to build product that meets customer demand," he says.

At Lloyd's, Oka operates syndicate 1922, a "syndicate-in-a-box" managed by Asta. [Lloyd's granted syndicate 1922 preliminary approval last October](#), followed by final approval in early January.



Brian Scantlebury/Alamy Stock Photo

Slater says Oka turned to Lloyd's to take advantage of the high-quality capital and "technical and specialist knowledge", and also because the market has a global reach. "I think writing these risks anywhere else would have been a little less straightforward," Slater says.

One of Oka's rivals, Kita, also operates in the Lloyd's market as a coverholder, in partnership with Chaucer. The two companies began their partnership in the Lloyd's Lab.

Oka operates through a managing general agent in the US market, and Slater says the US was initially meant to be Oka's primary market. However, Lloyd's allowed Oka to extend its business elsewhere: the firm also operates, or will soon operate, in the UK, Australia, Canada and the Bahamas, with plans to enter the EU market as well.

What Oka insures and how

Slater says Oka's business focuses on "post-issuance" coverage, insuring the carbon credit itself in case it becomes incapable of representing a tonne of withdrawn or unemitted CO₂. This could happen, for example, from the failure or destruction of the underlying carbon abatement problem – a forest burning, for example.

This contrasts with competitors such as Kita, CarbonPool and CFC, which cover or plan "pre-issuance" coverage for the carbon-mitigation projects themselves, to facilitate them producing the credit.

Slater compares Oka's insurance to a warranty. "We insure the credits, we show the serial number and if something were to happen that impairs that credit, we effectively pay out," he says. The insurance payment can go to either the issuer of the carbon credit or to the purchaser.

Oka has "had over 300 conversations and quoted over 70 projects over the last three months", Slater says. In March, Oka announced it would insure credits produced by an Oregon biochar producer, which



"This is a new market and because it's fast, evolving, real, you need control over product, you need to be able to build product that meets customer demand"

Chris Slater
Oka

manufactures a carbon-absorbing material similar to charcoal that is used to enrich soils.

Slater says Oka has reinsurance backing through what he calls "a fairly typical quota-share agreement", with Liberty Mutual as lead reinsurer.

Cash or carbon

Carbon market insurance is somewhat unusual in that some carriers offer, or plan to offer, to pay out claims in other carbon credits.

Kita offers such policies in some cases, although it pays out cash in others. Switzerland-based CarbonPool will primarily pay out claims in carbon credits once regulators in that country grant approval, arguing carbon credits can be difficult to replace on open markets.

Oka pays out in cash. Slater says "credits today aren't fungible... the market hasn't been designed for that". A carbon credit may be worth one tonne of CO₂ in theory, but their precise valuation can be debatable.

Slater says corporations often choose carbon projects because they are located in specific regions, meaning the credits have a non-commercial or reputational value. It would be very difficult to source credits from a narrowly defined region, Slater says.

Finally, carbon credits are an asset, which means they carry the risk they will devalue and undermine the financial health of the insurer.

One of the reasons Slater wants to extend insurance coverage in the carbon markets is precisely to stabilise the value and credibility of carbon credits.

The policyholder can use cash from on Oka policy to buy new carbon credits in the market, Slater says. However, they can also choose to use the policy payout to settle regulatory or legal claims deriving from its failure to meet environmental rules or commitments.

The bigger picture

Slater believes corporate buyers may hesitate to purchase credits because of the market's fungibility problem – it is difficult to know whether one credit really equals one tonne of CO₂. "I think specifically for the carbon market, what I worry more about is ensuring insurance is providing that signal of quality," he says. This can in turn draw liquidity into the market.

"What I'm hoping for is our insurance and our peers' insurance can help really unlock demand [and] bring that confidence," he says, adding he especially wants to draw in buyers from the financial sector. Banks and other financial sector players "can really move the middle market into making the commitments that can drive carbon out of the atmosphere".

However, the carbon market will not be a substitute for government regulation, including hard caps and bans on greenhouse gas emissions. "Carbon markets are not the silver bullet," Slater concludes. ■

US insurance regulators increase focus on climate risk mitigation

The National Association of Insurance Commissioners has made property improvements central to its new climate resilience strategy, but some fear these efforts may not be enough

As several US states face insurance crises driven by extreme weather events, insurance commissioners are striving to strengthen properties against the resulting hazards, *writes Ben Margulies.*

However, some experts doubt these risk mitigation efforts will succeed in lowering insurance premiums and say regulatory initiatives do not address the issue that some areas have been rendered unsafe because of weather hazards.

The National Association of Insurance Commissioners (NAIC) has risk mitigation as one of the five key pillars of its [first National Climate Resilience Strategy](#). The document, which was published in April, calls on regulators to take a greater role in educating the public about adapting and protecting their properties and it urges insurance commissioners “to advocate on where federal and state mitigation dollars... will generate the most benefits to insurance access”.

The NAIC’s plan arrives in the wake of storms, floods and wildfires that have withered private insurance markets in some US states. In Louisiana and Florida, hurricanes have blown [numerous insurers into bankruptcy](#), while in California, [capacity has dried up](#) after years of extreme wildfires.

Across all three states, private insurance has become prohibitively expensive for many or even unavailable, forcing hundreds of thousands of people to take out policies with state-owned insurers of last resort.

Governments can encourage risk mitigation through tax incentives and financing, education, updating and enforcing building and land use regulations, and improving infrastructure.

Focus on resilience

Tim Temple, a Republican who was elected as Louisiana’s insurance commissioner last year, says: “We’re beginning to see a rapid shift towards a focus on resiliency in states across the country.”

In Louisiana, the state is providing funds for homeowners to reinforce their roofs, a policy that “enjoys broad, bipartisan support”.

Many states have regulations that require insurers to provide premium discounts to policyholders if they take steps to make their homes more resilient. “This is especially prevalent in hurricane-prone states,” Mark Friedlander, communications director at the Insurance Information Institute (III), says.

Louisiana, for instance, requires insurers to provide premium discounts for policyholders who [improve their roofs to the Fortified standard](#).

The Insurance Institute for Business & Home Safety runs the Fortified programme, which provides guidelines for hardening roofs and has organised a network of qualified contractors. According to figures from the institute, close to 37,000 homes had qualified for the Fortified standard in May 2022, more than 80% of which were in Alabama. Temple says Louisiana is “following Alabama’s lead”.

“Louisiana and other states can do more than we’re doing now, but I think we understand that and are moving towards an even stronger emphasis on resiliency,” Temple says. “I’m looking for significant progress on widespread adoption of the most updated building codes and/or the Fortified roof standard over the next decade, as well as for those codes to be effectively enforced.”

Temple’s goal is for residents to be able to “continue living and working



Allen JM Smith/Alamy Stock Photo

“Part of the problem is elected leaders don’t like to talk about climate change as climate change. There is wide acceptance climate change is real, but property owners and voters resist the enforcement of existing risk mitigation measures”

Jenny Shuetz
Brookings Metro



in our coastal region with appropriately priced insurance coverage”.

However, Jenny Schuetz, senior fellow and urban economist at Brookings Metro, says simply hardening existing properties is insufficient.

The US needs to stop building homes, businesses and infrastructure in areas “we know are going to be at risk from climate events”, she says. Authorities will also need to evacuate people and move infrastructure from the most vulnerable zones, she adds.

Dave Snyder, vice-president of policy, research and international at the American Property Casualty Insurance Association, says risk mitigation efforts may instead encourage people to remain and continue building in these imperilled areas.

“Experience has shown when mitigation credits are designed to simply make insurance premiums ‘affordable’ and don’t reflect the risk, this typically creates a false signal in high-risk areas, as the true costs of insurance are masked or subsidised.”

This will ultimately compound the insurance affordability crises, since new storms or fires will bring “even higher losses, resulting in significantly higher insurance costs and less choice for consumers”, Snyder says.

Politics

In the US, decisions about land use are made by local governments, which Schuetz says lack the expertise, resources and political motivation to stop developing in high-risk areas. Local governments in the US rely heavily on property taxes, which

makes it hard to refuse new developments, she adds.

Political considerations also limit what policymakers can do to mitigate climate-related perils. “In the south, part of the problem is elected leaders don’t like to talk about climate change as climate change,” Schuetz says.

In California, “there is wide acceptance climate change is real, but property owners and voters resist the enforcement of existing risk mitigation measures”, she continues.

“The fact insurance commissioners are elected officials in many states doesn’t help,” Schuetz says. This is the case in California, Florida and Louisiana.

As a representative body of insurance commissioners from both US parties, the NAIC itself must negotiate conflicting political interpretations of climate change and the role of government. The NAIC strategy does, for example, discuss climate risk, but not greenhouse gas emissions or their impact on global temperatures. The strategy “was a product of compromise”, Snyder says.

Measuring progress

There are also questions about how to measure the success of risk mitigation efforts. Friedlander says regulators can, for example, count how many homeowners sign up. “However, the biggest measure of success is to see how properties fare against hazards,” he says.

Bob Carey, superintendent of the Maine Bureau of Insurance, says his

state is “at the beginning stages of working on risk mitigation strategies”. He says reinforcing structures can lower premiums, either directly or by reducing the size of losses carried by insurers.

Snyder says risk mitigation can save money – up to \$11 for every \$1 spent, potentially – and can also be a profitable investment. “States and local communities should also promote resilience benefits that cannot be quantified following a catastrophe, such as the loss of lives and irreplaceable family heirlooms, and for peace of mind,” he adds.

But Schuetz says there is no single metric for measuring whether a risk mitigation strategy has succeeded, because genuine risk reduction involves not just hardening existing properties, but also ceasing to build in risk-prone areas. “How do you measure things that aren’t constructed?” she says.

Schuetz suggests the federal government will need to develop common guidelines, adding data needed for effective mitigation is often held privately, and not available to governments and policyholders. “Private data is not a substitute for public data,” she says.

For states where extreme weather threatens to make private homeowners’ insurance unaffordable or unavailable – like California, Florida and Louisiana – risk mitigation will not suffice, Schuetz says. It might slow down the rate at which premiums increase, but real reductions would require relocations, she adds. ■

Climate activists turn up the heat in 2024



Litigation remains the most significant tool for climate activists, DAC Beachcroft's Toby Vallance says

This year has already witnessed climate activists succeed in the European Court of Human Rights, challenge the UK's national climate strategy for the second time and secure a significant greenwashing victory against KLM in the Netherlands, *writes Toby Vallance, DAC Beachcroft.*

What should insurers be looking for throughout the rest of the year?

Litigation remains, arguably, the most significant tool for climate activists seeking to challenge and influence the policymaking of states and corporates; however, the volume and spread of climate actions can make it difficult to spot the wider trends.

While such decisions may not immediately impact insurance risk, we are already seeing related actions against insurers about the application of a pollution exclusion in response to a claim for defence costs.

Actions against public bodies

Since the landmark 2019 decision in *Urgenda v State of the Netherlands*, climate activists have used litigation to challenge national climate policies and define states' human rights obligations. The recent dismissal of the UK government's Carbon Budget Delivery Plan is the second time since 2022 the courts have ruled the UK's net-zero strategy is inadequate.

The continued challenges to the construction of Europe's largest plastics plant in Belgium by Ineos provide another example of the appetite of ClientEarth and other non-governmental organisations for confrontation in the courts. Having successfully challenged construction because of omissions in documentation detailing the environmental impact, they have picked up the baton again, following the reissue of the building permit by the Flemish authorities.



rudall30/Alamy Stock Vector

Back in the UK, the focus has moved to another activist-led action seeking a judicial review of the UK's National Adaptation Programme (in *R v Secretary of State for the Environment, Food & Rural Affairs*). It is argued the UK's Adaptation Programme fails to consider the unequal impacts of climate change on protected groups in society, with interested parties including care home residents vulnerable to overheating during seasonal heatwaves and property owners at risk of losing their home and possessions to rising sea levels and coastal erosion.

The landmark European Court of Human Rights decision in April this year in *Verein KlimaSeniorinnen Schweiz v Switzerland* also resulted from similar concerns about the effects of climate change on an association of Swiss women over the age of 75.

This decision upended orthodox understanding of states' obligations in relation to the European Convention on Human Rights, finding the right to a private and family life encompasses effective protection from serious adverse effects of climate change. States, therefore, have a primary duty to adopt and effectively apply measures to mitigate climate change, including a substantial and progressive reduction in greenhouse gas emissions.

It remains to be seen how governments and domestic courts will respond to the decision, but we expect it will generate further rights-based litigation seeking to influence domestic policymaking. Changes in domestic policymaking may result in additional regulations or measures for business to comply with and fail-

ure to comply with such standards will generate litigation.

Latin America and South Korea

There is important activity in Latin America and South Korea. In 2023, Colombia and Chile requested an advisory opinion from the Inter-American Court of Human Rights to "clarify the scope of state obligations, in their individual and collective dimension, to respond to the climate emergency within the framework of international human rights law" as guaranteed by the American Convention. The opinion will address issues such as the potential need for regional standards bearing in mind population groups and nature. To date, the first three days of the public hearing have been heard, with three further days to follow.

Similarly, in South Korea, the first hearing relating to a number of consolidated human rights-related actions has recently been heard. The constitutional claim of *Byung-In Kim and others v South Korea* challenges South Korea's nationally determined contribution plan to cut emissions and its failure to protect the claimants' fundamental human rights. The action also has the novel element of including a claimant who was a foetus at the time the relevant claim was commenced.

Attribution and biodiversity

Claims seeking to give a voice to Indigenous and vulnerable communities often also raise complex questions relating to attribution science and biodiversity risk. The landmark attribution claim of *Lliuya v RWE*, in which the claimant alleges the approximately 0.5% contribution

of RWE to global emissions has contributed to [increased flooding risk to his farm in Peru](#), has been ongoing since 2015.

There have been significant milestones in the protection of biodiversity affected by extractive activities and climate change. The Marañón River in Peru was recently granted legal personhood and protections following a campaign by Indigenous communities reliant on the river for sustenance.

This kind of legal framework for protection may be replicated worldwide.

The New Zealand Supreme Court has also acknowledged Māori customary conceptions of loss, which are neither physical nor economic, must be considered in the ongoing claim of *Smith v Fonterra Co-operative Group Ltd*.

In Australia, judgement is expected this year in *Pabai Pabai and another v Commonwealth of Australia*. The action not only seeks a reduction in Australia's greenhouse gas emissions but also the implementation of adaptation measures to protect the Torres Strait islanders, their marine environment and cultural rights.

The similar action of *Asmania v Holcim* brought by four inhabitants of the Indonesian island of Pari seeks compensation for climate-related damages and financial contribution to adaptation measures from the Swiss concrete manufacturer.

Such demands for financial compensation to support adaptation measures alongside action to reduce corporate or state greenhouse gas emissions accurately reflect the twin drivers of activity we are seeing in climate change litigation. Corporates, directors and officers will increasingly be expected to consider their companies' exposure to liability, physical and transitional risks associated with climate change. ■

Toby Vallance is a partner at DAC Beachcroft

The *KlimaSeniorinnen Schweiz v Switzerland* decision upended orthodox understanding of states' obligations in relation to the European Convention on Human Rights, finding the right to a private and family life encompasses effective protection from serious adverse effects of climate change

Lessons from the challenge to UK's net-zero strategy



The decision in the case brought against the UK's secretary of state for Energy Security & Net Zero serves as a reminder to the insurance industry climate change policies will be scrutinised closely, including by the courts, Brodies' Niall McLean and Sarah Keir write

In a recent court case, [Friends of the Earth, ClientEarth, Good Law Project v Secretary of state for Energy Security & Net Zero](#), the claimants successfully challenged the UK government's [Carbon Budget Delivery Plan \(CBDP\)](#) made under the [Climate Change Act 2008 \(CCA\)](#).

Three non-governmental organisations – Friends of the Earth, ClientEarth and the Good Law Project – challenged the legality of the CBDP, published in March 2023. The CBDP aimed to outline the UK's approach to meeting the sixth carbon budget (covering 2033 to 2037) and to set the path towards achieving net zero greenhouse gas emissions by 2050.

This plan replaced the [Net Zero Strategy](#), which the [High Court ruled did not comply with the CCA](#) in July 2022 after a successful challenge by Friends of the Earth, ClientEarth, and the Good Law Project. In the most recent legal challenge to the revised plan, the claimants argued the CBDP was flawed and the UK government had failed to comply with the CCA.

Legal basis

The legal challenge was about specific provisions of the CCA, including:

- **Section 13(1):** this section mandates that the secretary of state must prepare such proposals and policies as are necessary to ensure the carbon budgets set by the UK government are met.
- **Section 13(3):** this provision requires these proposals and policies must contribute to sustainable development; and
- **Section 14:** the secretary of state must publish reports on proposals and policies, detailing how they will enable the carbon budgets to be met, and to lay these reports before parliament.

The claimants had five grounds of challenge:

Breach of section 13(1): they argued the secretary of state failed to consider all mandatory material considerations. Specifically, the CBDP assumed all planned policies and proposals would be delivered fully and on time, which was not justified by available evidence.

Unlawful lack of contingency planning: the second ground focused on the CBDP's absence of robust contingency planning. The claimants highlighted the plan lacked mechanisms to address potential under-delivery of key policies and was incapable of guaranteeing carbon budgets would be met.

Irrational lack of contingency planning: for similar reasons set out in the second ground, the secretary of state's decision was irrational in determining the proposals and policies would enable the carbon budgets to be met.

Breach of section 13(3): according to the claimants, the secretary of state's assertion the CBDP was "likely" to contribute to sustainable development was insufficient. The statutory requirement was the policies "must" contribute, which implies a higher degree of certainty and accountability.

Breach of section 14: this ground alleged the secretary of state failed to include essential information. The claimants maintained such omissions prevented meaningful parliamentary scrutiny and public engagement, violating the transparency requirements of section 14.

Justice Sheldon upheld the claimants' first four grounds, finding the



Robert Evans/Alamy Stock Photo

secretary of state's decision irrational and unlawful because of the failure to consider the risk of non-delivery of policies and the lack of sustainability assessment.

However, the fifth ground was not successful, as the court found detailed risk information on individual policies was not required in the plan itself.

As a result, the secretary of state must produce a new report by May 2, 2025, outlining credible policies and proposals to meet the sixth carbon budget.

Insights for insurers

This decision serves as a reminder to the insurance industry that climate change policies will be scrutinised closely, including by the courts. Insurers should understand the importance of comprehensive plans and policies, including for:

Risk management and assessment: robust plans provide insurers with clear, actionable data that is essential for accurate risk assessment and management. Detailed and reliable information on climate change enables insurers to

forecast potential risks more effectively. Without detailed plans that consider climate change, insurers face increased uncertainty, making it difficult to predict and price risks accurately.

Financial resilience: climate change exacerbates the frequency and severity of natural disasters, leading to higher claims. Robust climate plans help insurers to prepare for these eventualities to ensure they remain solvent and capable of meeting claims, even during periods of increased climate-related incidents.

Regulatory compliance and reputation: governments are tightening regulations governing climate risk

disclosure and management. Robust climate plans ensure insurers are not only compliant but also perceived as responsible and proactive in addressing climate risks. This maintains the insurer's trust and reputation in the industry.

The judgement in this case highlights the importance of robust climate change policies and sustainable development considerations.

Insurers should ensure they are prepared to implement effective plans to address the evolving risks of climate change. ■

Niall McLean is a partner and Sarah Keir is a trainee lawyer at Brodies LLP

Justice Sheldon upheld the claimants' first four grounds, finding the secretary of state's decision irrational and unlawful because of the failure to consider the risk of non-delivery of policies and the lack of sustainability assessment. However, the fifth ground was not successful

Predictive Fleet Analytics

Access a new level of reliable and accurate voyage data

Predictive Fleet Analytics saves you time, money and resource by enabling you to accurately track vessels, predict vessel movements, and anticipate port congestion and delays in minutes.

NEW! Market first

Know a vessel's Estimated Time to Berth (ETB)

Understand port congestion and turnaround metrics

See expected vessel arrivals in the next 5 days

Know a vessel's Predicted Destination

Know a vessel's Estimated Time of Arrival (ETA)

Evaluate vessel trading information and timeline

Understand trade lane traffic

NEW! Market first

Know a vessel's Estimated Time of Departure (ETD)

To find out more about Predictive Fleet Analytics [click here](#) or contact us on:

UK/Europe: +44 (0)20 8052 0560
Americas: +1 212 600 3460
APAC: +65 6989 6604

Lloyd's List Intelligence 

