ClimateWise
Insuring a sustainable future

Climate product innovation within the insurance sector

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ClimateWise

ClimateWise supports the insurance industry to better communicate, disclose and respond to the risks and opportunities associated with the climate-risk protection gap. This is the growing divide between total economic and insured losses attributed to climate change.

Representing a growing global network of leading insurance industry organisations, ClimateWise helps to align its members' expertise to directly support society as it responds to the risks and opportunities of climate change.

Authors and acknowledgements

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Table of Contents

Executive Summary

The insurance industry has a critical role to play in enabling the transition of the wider economy towards net zero, and in mitigating the risks associated with climate change. To date, when insurance firms have sought to address climate risk mitigation, they have tended to focus on the asset side of the balance sheet.[1] Insurers need to broaden their efforts and focus more energy and investment on innovating for climate transition risk mitigation across the 'core' value chain; that of the insurance product itself and how it's delivered. In this paper, we address this change in focus, and examine the role of underwriting and product innovation in contributing towards a net zero economy.

Given the urgency of action on climate change and the transformational changes this demands, insurance product innovation is key. This is required through a number of areas – how the industry helps and incentivises policyholders to decarbonise relevant assets and activities; how it underwrites to enable net-zero business models, technologies, and lifestyles; and how it decarbonises the claims process and ecosystem to establish more environmentally sustainable outcomes on the journey to net-zero. Opportunities exist through the design and pricing of policies, claims and risk advisory services to incentivise climate mitigation and to support the growth of low carbon solutions that support and accelerate the transition towards net zero.

The pace of change in the insurance industry on climate change is accelerating, but still falls short of that required to enable the development and scaling of new and existing low carbon technologies and of the infrastructure required to support them. New insurance products and accompanying risk mitigation offerings are required to support scaling of these low carbon technologies and infrastructure, and enabling capital to be deployed towards them. The industry needs to rapidly lean in, in order to meet the existing risk transfer and reduction needs of clients' decarbonisation pathways, to anticipate evolving demand, and to drive and incentivise their transition to net zero. This demands a more proactive approach where customer awareness may be low, and clients' own transition strategies are still relatively nascent, lacking the clarity required in terms of evolving risk transfer and advisory needs. Accelerating insurance product innovation demands a more collaborative approach – within firms, across the industry value chain, with clients and with the wider financial services sector to shift the economy towards net zero. There is more work that the broader insurance value chain can do, collaboratively, to orchestrate towards net zero outcomes, for a more rapid transition.

ClimateWise members seek to be at the forefront of product innovation, driving and enabling the transition. This white paper represents an initial contribution from ClimateWise, to showcase the role of innovation across the insurance value chain in driving the transition. Our aim is to support and accelerate the industry's response to the challenges of climate risk mitigation and the transition to net zero. We do this through highlighting the current market state, and further potential for development, across nine key priority areas in insurance product innovation to support climate mitigation:

1. Enabling and incentivising low carbon choices
2. Mainstreaming the encouragement of climate mitigation through efficient and resilient reinstatement
3. Implementing environmentally sustainable claims servicing
4. Enabling capital flows towards green solutions through risk transfer solutions
5. Creating removal-based carbon offsets through natural capital protection
6. Scaling emerging and existing low carbon and net-negative technologies and start-ups
7. Supporting the sustainable decommissioning of carbon-intensive assets
8. Developing risk advisory services to support clients' climate mitigation understanding and approach
9. Developing solutions for reducing climate liability and environmental litigation

To support action across these nine priorities for net zero insurance product innovation, we propose seven recommendations aimed at addressing barriers to innovation, to support, enable and accelerate progress on this urgent agenda:

1. **Actively engage with government** on transition protection needs and private-public partnership opportunities to facilitate blended-finance approaches to scaling risk-transfer capital, such as through state-backed reinsurance pools.
2. **Upskill to enhance an 'engineering' approach to underwriting**, building on close relationships with technology developers of all sizes.
3. **Coordinate across the insurance value-chain** across brokers, insurers and others to reduce duplication through a common industry framework that recognises the unique role each player should address to achieve net zero.
4. **Drive 'long-termism'** through a culture that incentivises innovation and works to reduce barriers that tend to embed static business-models.
5. **Enhance structuring of existing climate data and development of key climate models**, bringing together model-vendors, in-house analytics teams, and original equipment manufacturers (OEMs) to access key data sources and advise on best practice.
6. **Innovate product structures and new insurance offerings** that are aligned to client needs, ensuring clients and customers are aware of how newer products and structures, such as usage-based products or parametrics, can benefit them.
7. **Align insurance solutions with insurers commercial and climate objectives** so growth areas, such as IP insurance or risk consulting, appropriately integrate climate considerations in ways that enable additional innovation.

Together, these should inform the industry's focus on innovation and its enablement in the mobilisation of innovative solutions towards a net zero economy.

Introduction

2021 must be the year of action for protecting against the disastrous effects of climate change[2]. The science is clear; there is consensus that global emissions must drop by 50% within this decade for the world to have a chance of staying within 1.5 degrees of global warming and avoiding the most catastrophic consequences of climate change[3]. The process of transitioning to a low carbon economy, at the unprecedented scale and pace required, has clear and immediate implications for the entire global economy.

The Bank of England identifies three types of risk rising from climate change as having a material financial impact: transition risk, physical risk and liability risk.[4] Meeting – and even exceeding – the emissions reduction targets set by the Paris Agreement will require radical changes to be made[5]. No industry or sector will be left unaffected. The OECD estimates that, globally, EUR 6.35 trillion a year will be required to meet Paris Agreement goals by 2030[6], with major changes led by the business community and with support from consumers. The insurance sector will be critical to enabling the smooth flow of capital to facilitate this transition process, which will include the implementation of actions to mitigate climate change, and to reduce global emissions. The Taskforce for Climate-Related Disclosures (TCFD) defines transition risks as the: *"extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organizations."*

As 'society's risk manager'[7], the insurance industry has a critical role to play in enabling mitigation and adaptation in response to climate change. From risk services that help reduce transition risks for clients, to the creation of incentives towards a lower carbon economy, through the insurance products it offers to customers, the transition presents an opportunity to build a more sustainable industry for the future[8].

Net zero and the insurance value chain

Net zero refers to the concentration of greenhouse gases in the atmosphere, often with a focus on carbon dioxide. The IPCC's SR1.5 report[3] defines net zero emissions as "achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period." The Science Based Targets initiative specifies two conditions with which businesses that are working to achieve net zero emissions must comply:

1. "Achieve a scale of value-chain emission reductions consistent with the depth of abatement achieved in pathways that limit warming to 1.5°C with no or limited overshoot.
2. "Neutralise the impact of any source of residual emissions that remains unfeasible to be eliminated by permanently removing an equivale nt amount of atmospheric carbon dioxide."[9]

When considering the scope of action on net zero, we refer to Greenhouse Gas Protocol[10] which shapes focus on emissions measurements across direct and indirect emissions, as defined by the Scope 1, 2 and 3 Standards. Thoughtful and systematic planning is required in order to inform decision-making around interventions[11]. Drawing on the Race to Zero criteria[12] and categories in the recent assessments of net zero targets[13], insurers considering net zero alignment for underwriting are looking to focus on insured clients and the activities insured, as well as the lines of business offered. This will demand the development of new products, updates to existing insurance products and increasing sophistication in risk advisory services for climate mitigation. In order to drive change for net zero in insurers clients' activities through innovation in insurance offerings, collaboration will be required both upstream and downstream across the insurance value chain.

Climate-ready insurance products

The concept of net zero underwriting builds on the established need for "climate-ready" insurance products and their definition, defined by Icebreaker One's Standard for Environment, Risk and Insurance (SERI) programme as products that: *"incentivise certain behaviours in the business models of the companies and individuals buying insurance. This includes incorporation of net zero objectives and outcomes into their business model and operations and demonstrating greater resilience and adaptation in response to climate and environmental risks."*[14]

Brokers can work with insurers to provide commercially attractive opportunities that can help customers manage their own transition, whilst reducing the risk to the insurer. This can be achieved by incentivising positive climate mitigation behaviours in policyholders via reduced premium costs. It is critical that the industry's pace of innovation around insurance products to enable the transition is able to match the needs of the wider economy. We must avoid the creation of new 'coverage gaps' in the form of net zero technologies for which a lack of insurance coverage might hold back the development, adoption or scaling.

Further work outside the industry is required in order to identify the set of potential products in the property and casualty markets that can best deliver net zero outcomes in a 'just'[15] manner. Brokers and insurers will need to test the appetite of policy buyers and wider market participants, and to explore their transition challenges and risk management requirements, when exploring the means by which demand can be stimulated in order to accelerate the transition. Life insurers and their product offerings will further investigation, with the opportunities less immediately obvious.

This report represents a collaborative effort by ClimateWise, Deloitte and Icebreaker One to seek answers to a fundamental question: what are the major opportunities for product innovation in driving the transition to a net zero future with which senior leaders should engage, and what actions can the industry take to move forwards at pace? The report builds on previous research by ClimateWise, which examined policy opportunities to support net zero underwriting.

Paper outline

The first section of this paper recognises the unique role of the insurance industry in enabling the transition of the wider economy towards net zero. The next section focuses on the current state of product innovation in the market to support and incentivise climate mitigation, including progress in decarbonisation and the development and scaling of net zero solutions. This includes discussion of the key opportunities in underwriting for product innovation for net zero, examples of successful innovation and further opportunities, and barriers to growth. Thirdly, we examine how the insurance value chain can help in the transition, both as individual players and through increased collaboration. Finally, we look at key priorities and ways in which product innovation for a net zero future can be enabled and accelerated, and next steps.

Methodology

The concept for the report was developed in partnership with ClimateWise Members, who identified a need to explore industry innovation around climate change and potential barriers to insurer contributions in achieving net zero and building resilience.

The report was developed leveraging interviews with industry experts conducted between March and April 2021. The interviews focused on innovation, including:

- Examples of product innovation
- Approaches to driving and governing product innovation internally
- Market drivers and challenges
- Wider value-chain enablers and barriers
- The role of policy and regulation, and data and analytics
- Potential solutions to the challenges surfaced
- Recommendations to support increased climate product innovation

The interviewees spanned a range of insurance professions, industry types, organisations and regions across the world to gain a broad perspective from across the insurance value chain, including leaders in: innovation and incubation, underwriting, actuarial, international policy and engagement, strategy; and green technologies.

The role of the insurance industry in enabling the net zero transition

The role of insurance in technological advances for climate mitigation

Given the high risks from early-stage start-ups or technology, insurers play a critical role in supporting net zero technology innovation through underwriting, enabling low carbon industries and companies to develop, implement and scale. In this context, underwriting provides a mechanism for managing and mitigating the risk associated with net zero technology innovation. It can also provide confidence to investors, banks and project developers to explore and provide capital towards net zero technologies and companies, by de-risking the opportunities.

Underwriters can ensure that their risk models do not inhibit the ability of new technologies to scale, where often challenges exist in the lack of historical data against which to assess the risk. Via this mechanism, the industry directly enables the transition through underwriting support for new net zero products and services. The industry's deep risk expertise can also be used to reduce the risk in the development and deployment of net zero technology, from innovative construction methods through to new manufacturing processes. This is critical, given that in clean energy alone, it is predicted that global investments will need to more than triple by 2030 in order to achieve net zero emissions by 2050[16].

As low carbon technologies advance, there is also an important role to be played by the industry, as old technologies are retired in line with nationally determined contributions and sectoral decarbonisation pathways. In the context of the phase-out of fossil fuels, underwriting plays an important role in decommissioning the infrastructure and assets and the restoration of sites.

Net zero insurers and brokers

Insurers and brokers are increasingly examining the concept and implications of net zero. Many have made individual and public commitments, with timelines often more ambitious than government policy. Aviva was the first major insurer to commit to a target of net zero by 2040 earlier this year, exceeding the requirements of the Paris Agreement. Similarly, the AHJ Group recently attained the status of becoming the first "Climate Neutral" Lloyd's Broking House, when working with ClimatePartner.[17]As these commitments to net zero underwriting are made, the industry is considering how to align strategies with a pathway to 1.5^{o}C. Net zero underwriting strategies demand focus on the impact and opportunities this will create across the different lines of business, driving the need for iterations to existing products, and innovation for new offerings.

Industry coordination towards net zero

More broadly, there is recognition of the need for collective solutions to aspects of the transition, requiring industry-wide co-operation[18]. ClimateWise has an established group of insurance industry participants who are committed to underwriting portfolios aligned to net zero. Members of this group are piloting practices, tools and knowledge aimed at building capacity and enabling the insurance industry to make and act on the commitment. The Net-Zero Insurance Alliance (NZIA) of seven insurers and reinsurers (6 being ClimateWise members) will be launched at the 2021 UN Climate Change Conference in Glasgow (COP26) this November. Collective action between reinsurers and insurers is not, however, the only form collaboration required to support insurance product development. For the industry to most efficiently play its vital role in innovating for the transition, increased opportunity for collaboration exists across the wider insurance value chain – from brokers to loss adjustors, modellers and legal firms.

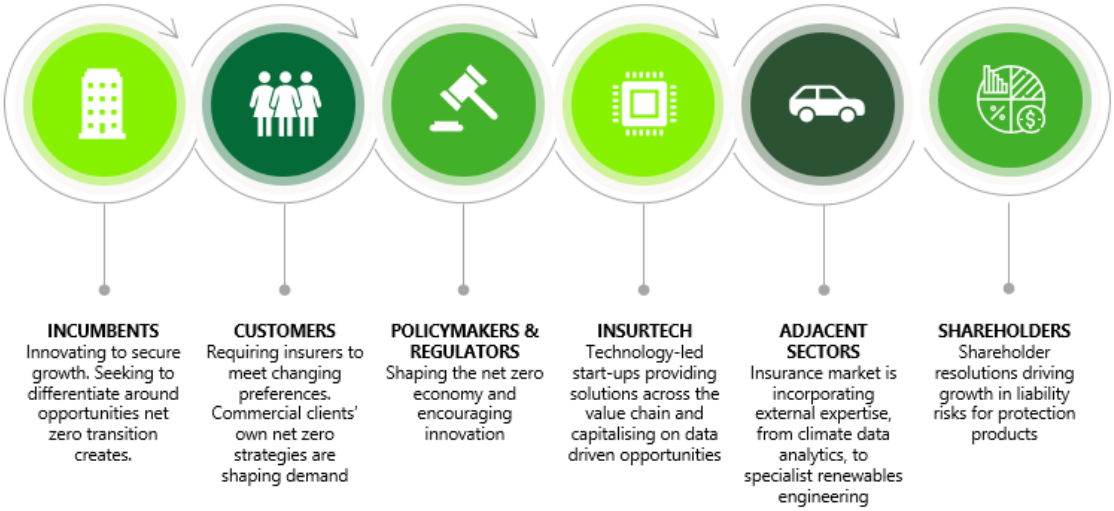
Just transition and insurance protection

In the industry's definition and pursuit of net zero, it is important that 'just transition' considerations are incorporated in order to avoid inadvertently widening the insurance protection gap. Protection gaps may arise from any new restrictions in cover, or in circumstances where the pace at which the industry innovates its protection products and risk advisory services does not meet the advances in demands from the wider economy's transition. The Paris Agreement states that Parties to it should take into account the imperatives of a just transition of the workforce, and the creation of decent work and quality jobs, in accordance with nationally defined development priorities[19]. The incorporation of just transition concepts into product innovation strategies for net zero can itself drive new product development opportunities, for example linked to workers' compensation insurance for adversely affected workers from carbon intensive sectors[20].

Insurance product innovation opportunities for net zero

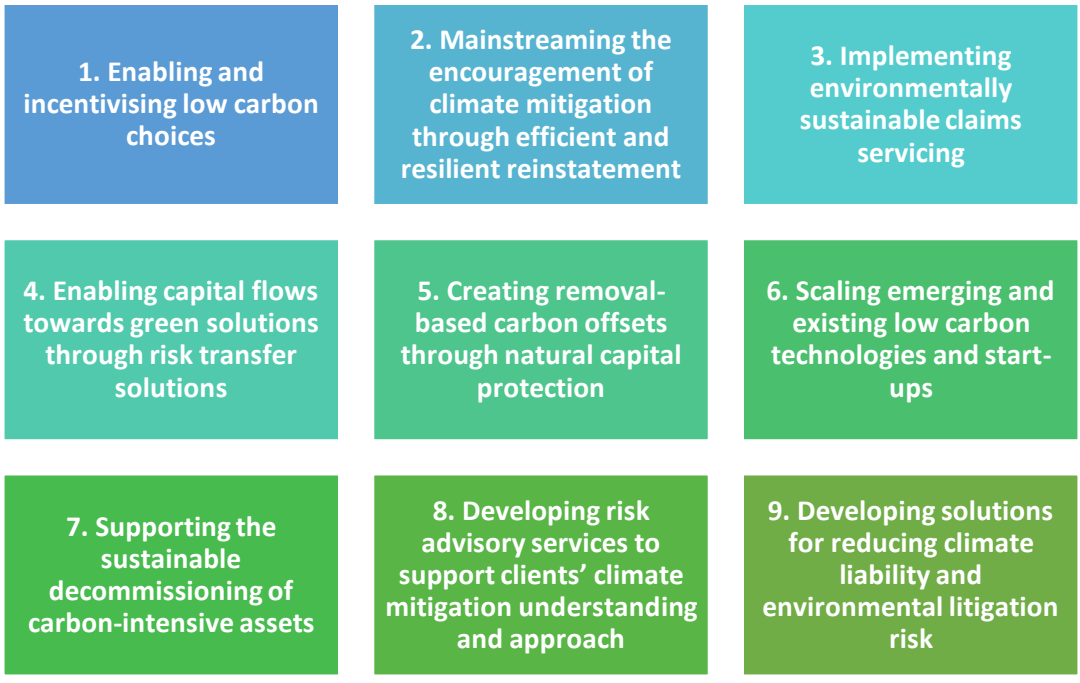
Our research has identified a number of driving forces that are shaping the demand and opportunity for product innovation for net zero across the industry (Figure 1):

Figure 1. Stakeholder drivers of net zero product innovation in insurance



In light of these stakeholder drivers, and recognising the vital role that insurance plays in enabling the transition of the wider economy, as well as the opportunities for influence throughout underwriting policy design, pricing and claims, we have identified nine priority areas where insurance product innovation can support climate mitigation:

1. Enabling and incentivising low carbon choices



There is a heightened public awareness of climate change, and of the need to make an impact in terms of managing and mitigating climate-related risks. Retail consumers are increasingly looking to businesses and service providers for guidance and assistance in this process.[21] For insurers, this represents an opportunity to promote and incentivise low carbon solutions with customers, and to incentivise environmentally sustainable behavioural change in policyholders. In doing so, insurers can raise awareness and accelerate demand for low carbon products, through their policy options and pricing. These techniques are widely being deployed in personal insurance, but not yet in commercial, despite the latent and growing demand evident in the doubling of corporate commitments to net zero over the past year[22]. Examples include:

- **Policy options to support climate awareness and mitigation:** Zurich is providing low carbon choices, in order to raise awareness of climate impacts and mitigation in the personal insurance space. This includes, for example, providing carbon offsetting optionality for personal travel insurance, and opportunities to select green initiatives to which company donations can be made, in zero claims years.[23]
- **Incentivising climate positive behavioural change:** RSA is incentivising customers to reduce their personal vehicle usage, through motor policy design and pricing for low mileage motorists, providing cheaper rates of insurance for those who use their car infrequently.[24]
- **Incentivising low carbon solutions:** The Hartford incentivises electric vehicle usage over petrol or diesel cars, through premium discounts to motor policies.[25]

Further innovation in product development is required in order to enable low carbon choices and incorporation of incentives for low carbon solutions and behavioural change across broader policies, business lines and customer segments.

2. Mainstreaming the encouragement of climate mitigation through efficient and resilient reinstatement

The claims process provides an opportunity to influence policyholders in making their homes and businesses more resilient to transition risks. This is not currently the norm, with the majority of climate-related reinstatement centring around adaptation and mitigation for climate change. Incentives towards building in decarbonisation measures through reinstatement can be provided both before and after an event. Effective innovation through reinstatement requires collaboration and education across the insurance value chain. This creates an opportunity to support customers' transition strategies, whilst enhancing the industry's own resilience to transition risks.

Examples of the industry building climate mitigation into the reinstatement process to date are largely centred around home insurance policies and commercial property insurance. This is critical, given that buildings account for approximately 40% of energy consumption and 36% of CO2 emissions across Europe. Examples include:

Supporting the retrofit of the built environment through reinstatement: Zurich's Commercial Insurance Property has built retrofitting into the claims process through cover including reinstatement and use of sustainable building materials. Their 'green endorsement' covers the additional costs of reinstatement with products or building materials from sustainable material manufacturers. Similarly, for personal customers, RSA provides customers with the option to make greener choices by recommending energy efficient replacements of damaged goods following a claim.

The innovation opportunity for reinstatement is relatively unexplored. This should be a priority for the industry to examine across wider business lines, with an initial focus on carbon-intensive policies, where cost-efficient lower-carbon or energy efficient alternatives exist.

3. Implementing environmentally sustainable claims servicing

Claims servicing can represent a substantial source of emissions within insurer's own supply chains, and servicing of claims can lead to waste and ongoing emissions. Implementing environmentally sustainable claims servicing - by encouraging repair over replacement, reducing waste or improving waste management, or by providing or requiring the use of recycled parts - can contribute towards decarbonising the claims process at either no or low cost[26]. Innovative responses to this challenge are widely seen in personal motor and property insurance, these are, however, yet to be adopted at similar scale across wider business lines:

- **Encouraging 'repair over replace'**: RSA is working with suppliers to encourage a 'repair over replace' philosophy by recommending sustainable claims solutions for customers to consider.[27] In 2019, through this repair over replace approach to claims servicing for motor insurance, RSA repaired 40,000 windscreens, saving 1,500 tonnes of carbon emissions and 540 tonnes of glass waste going to landfill. During this repair process, customers are also incentivised to use electric vehicles.

- **Giving policyholders recycled options:** Tokio Marine & Nichido also promotes repair over replacement, and promotes the use of recycled automobile parts for personal motor insurance customers for any repairs and replacements. [28]

4. Enabling capital flows towards green solutions through risk transfer solutions

There is a $23 trillion investment potential associated with mitigating the worst effects of climate change ahead of 2030[29]. There is increasingly widespread recognition of this opportunity across capital markets, with many investors, asset managers and banks committing to scaling up green financing in support of the transition. Through innovation in underwriting products, the insurance industry plays a critical enabling role in the wider economy's transition through de-risking green financing opportunities, supporting capital flows to green solutions that might otherwise have been deemed too high-risk.

For nascent net zero technologies such as carbon-capture storage (CCS), where limited loss-histories are available, or long-term capital is required, underwriting can provide the confidence to investors and project developers to support the scaling of these solutions. The industry also plays an important role in supporting the growth of low carbon companies, with limited loss histories themselves, by de-risking debt-based financing, to lower the cost of capital. Innovative examples of underwriting products that enable capital flows towards green solutions and companies include:

- **Use of a double trigger in warranty insurance to lower the cost of capital for smaller start-ups and support scaling of solar:** Munich Re has developed a tailored renewables technology underwriting offering for both manufacturers and investors in solar. This includes a warranty insolvency protection to lower the cost of capital for solar PV by ensuring that, in the event of a solar manufacturer's insolvency, the policy can be passed on to the registered buyer, providing investors with confidence over the coverage of any future warranty claims.[30]

Further work is required to raise awareness of the availability of insurance solutions such as these, amongst capital markets participants. There is an urgent need for greater collaboration across the wider financial sector, given that many of these emerging net zero solutions, and the firms providing them, are still in their infancy. This poses a significant growth opportunity for the industry, with predictions in Swiss Re's Sonar 2020 Insight Report that, by 2050, emerging technologies such as CCS have the potential to grow to a size that will rival today's oil and gas industries.[31]

5. Creating removal-based carbon offsets through natural capital protection

Whilst ambitions should very much be focused on the 'zero', rather than the 'net', element of the net zero equation, the practical reality is that some hard to abate sectors may have to rely on greenhouse gas removals – via carbon offsetting, for example – to compensate for unavoidable residual emissions.

Nature-based solutions can support with carbon removal through sequestration. A recent WEF report, published in May 2021, predicted that nature-based solutions could provide one-third of the climate mitigation to reach a 1.5- 2°C pathway by 2030 — and at a lower cost than other forms of carbon dioxide removal.[32] Through protection for natural capital resources, the insurance industry can contribute towards climate mitigation efforts and help support scaling the supply side of voluntary carbon markets for carbon offsets. It is estimated that the voluntary carbon market needs to grow more than 15-fold by 2030 in order to support the investment required to deliver the 1.5°C target.[33] Whilst innovative examples of nature-based protection exist, these are not yet replicated at scale:

Mangrove restoration insurance: AXA XL has been working to determine the feasibility of using insurance to cost-effectively help restore mangrove forests after extreme weather events. Mangroves are a critical nature-based solution offering increased resilience and helping protect against coastal flooding. A parametric insurance policy based on wind speed is most feasible and could be paired with a traditional indemnity policy to cover both short-term and longer-term restoration actions.

- **Coral reefs and carbon sequestration:** Swiss Re's innovative natural capital solution for coral reefs on the Yucatan Peninsula combines the carbon sequestration benefits of natural capital protection with their physical resilience benefits. The solution ensures rapid disbursement of funds to enable trained and experienced community members to respond to reef damage, resulting in the world's first nature-based solution to protect Mexico's coral reef.[35]

As the market for voluntary carbon offsets grows[36], the industry should maintain a focus on scaling proven innovation around protection for high-value nature-based offset solutions. Advances in initiatives that support the exploration of nature-based solutions, their opportunities and their valuation, such as the recently launched Taskforce for Nature-related Financial Disclosures (TNFD), are expected to drive growth in this area of product innovation, as the links between a nature-positive and net zero economy are better understood.

6. Scaling emerging and existing low carbon technologies and start-ups

The transition to net zero will require significant technological transformation. The International Energy Agency (IEA) states that, at net zero emissions, emerging low-carbon electricity, bioenergy hydrogen and hydrogen-based fuels will be required in the same share of final energy needs as currently provided by fossil fuels.[37] Innovating and tailoring underwriting products to provide support for high-risk early-stage start-ups or technology, by providing a mechanism for managing and mitigating the risks, can help prevent risk models from inhibiting the scaling of those critical technologies.

Challenges to underwriting often arise, in terms of the lack of historical data against which to assess the risk for technologies still in their infancy. As these technologies develop, and a critical tipping point is reached whereby adequate data exists on loss histories, data-driven innovation opportunities are opened up. There are a number of interesting examples across the industry, in which competitive and tailored offerings have been developed for net zero technologies:

- **Providing packaged programmes of insurance to renewable technologies:** Tokio Marine & Nichido Fire (TMNF)'s Mega-Solar Package Program combines insurance coverage across property, liability and warranty, with risk consulting services, for solar power plant facilities. This packaged protection

programme provides confidence throughout the lifecycle of renewable technology, from development, testing and commissioning, construction, distribution and operation, to support their scaling.

- **Use of index-based insurance products to support renewables scaling where there's volatility in generation linked to weather-based factors:** Swiss Re has developed customised, index-triggered protection products for wind and solar energy, that safeguard against loss of income due to adverse high or low wind conditions, lack of solar irradiation or variations in water levels. The Solar Irradiation Index, an annual insurance product, provides protection for photovoltaic plant operators, should levels solar irradiation fall below that expected.[38]

Insurers should consider scaling packaged solutions currently offered for solar, to other maturing renewable technologies. There is also an opportunity to develop and leverage a more data-led approach to underwriting technologies, such as solar, as increased data becomes available on loss-histories. Furthermore, innovation opportunities exist to provide tailored protection products for more nascent renewable technologies such as hydrogen, CCS and battery storage.

7. Supporting the sustainable decommissioning of carbon-intensive assets

In order to meet the Paris Agreement, fossil fuels must be phased out. Currently fossil fuel assets, in particular coal plants, are not being shut down at the rate required in order to limit global warming to 1.5°C. Research shows that coal must be phased out globally by 2040 if we are to meet the commitments made in Paris.[39] In the context of the energy transition, and phase-out of fossil fuels, insurance products can support decommissioning the infrastructure and assets, and the restoration of sites. First and third-party protection products are being provided for oil and gas pipelines, platforms and infrastructure, and coal plants:

- **Providing bespoke protection products to support the decommissioning of fossil fuel assets:** Aviva's surety business provides guarantee for the reclamation work to remove oil pipelines and to restore land to its original state. Aviva holds the corporate guarantees or collateral as security, thus guaranteeing the completion of the reclamation work, which is vital in supporting the energy transition.

Further opportunities exist to scale tailored decommissioning protection products for broader technologies through the transition, both within and outside of the energy sector. As new net zero technologies reach the end of their lifetime, this will also include developing tailored new first and third-party protection products in the renewables, hydrogen and CCS sectors.

8. Developing risk advisory services to support clients' climate mitigation understanding and approach

Product innovation for net zero extends beyond protection products and into adjacent risk advisory services. Through the industry's deep risk expertise, a range of opportunities exist to support the transition. Risk advisory services can be deployed to reduce the risk in the development and deployment of net zero technology, from innovative construction methods, through to new manufacturing processes. Risk data, analytics and modelling solutions are also being provided to help clients identify climate risks and to manage them more efficiently:

- **Providing risk solutions to help clients identify measure and respond to transition risks and opportunities:** Willis Towers Watson helps the finance industry, corporates and governments successfully navigate the whole-economy transition to a net zero and climate resilient future through its suite of climate data and analytical tools, Climate Quantified™, leveraging the Climate Policy Initiative

(CPI)'s EF CVaR platform.[40] Climate Quantified provides support to financial institutions from portfolio analysis and financial hedging, through to applying strategic risk evaluation tools, to help the private sector develop transition risk management strategies.

- **Risk advisory services to support the scaling of low carbon technologies through insight on how to reduce, manage and mitigate risk:** Aon has a dedicated Renewable Energy Practice[41] which provides expert risk advice and broking services, supporting the management of risk throughout the lifecycle of renewable energy assets, from tidal to biofuel and small-scale hydro. Munich Re[42] is providing risk consulting and engineering expertise aimed at reducing risks to manufacturers of renewable energy technology, to support efficiencies in the innovation process and reduce risk throughout construction and development.

To date, a large focus of industry climate risk advisory services has been on building out adaptation and resilience capabilities. Open risk analytics can also increase confidence over transition risk analysis, build a wider view of transition risk, and create transition risk indices to benchmark and track resilience and progress. For example, the Climate Transition Pathways initiative (see box below) is designed to reward businesses that commit to transition to a low-carbon economy, with continued access to insurance capacity and capital.

Case Study: Supporting clients in their transition to net zero

Climate Transition Pathways (CTP) is an accreditation framework created by Willis Towers Watson and independent third-party groups including Volans, a consultancy responsible for the Bankers for Net Zero initiative, and the Climate Bonds Initiative (CBI), a global investment organization committed to climate resilience. Headed by a CTP governance committee, it supports business to access insurance capacity and capital while sustaining an orderly transition to low carbon commitments. Businesses benefit from an independently assured accreditation of their transition's alignment to the Paris agreement, helping them
to stand out from those making more unsubstantiated claims. Insurance and capital markets can then have confidence to allocate capacity/capital knowing that a rigorous assessment of a company's alignment to Paris, and its ability to deliver this plan, has taken place.

9. Developing solutions for reducing climate legal liability and environmental litigation risk

Climate change litigation is on the rise.[43] Examples of climate litigation include administrative cases against governments and public bodies, claims against corporations perceived as perpetrators of climate change, and claims from investors against corporations for failing to account for possible risks to carbon-intensive assets, or failing to disclose risks to business models and value chains in financial reporting[44,45]. Innovation is required in existing legal liability insurance products, in order to provide protection products that can keep pace with the evolving climate liability risk needs of the wider economy. It is anticipated that demand will continue to grow for these and for wider specialist climate legal services, as climate risk management and the associated disclosures become increasingly mandated.

The industry is already on the front-foot in examining updates to existing climate legal protection products, and in the provision of increasingly specialised legal services:

- **Considering updates to Directors and Officers (D&O) liability insurance policies from climate change:** Willis Towers Watson shared insights examining the impact of pending cases and litigation threats to directors and officers on the pricing, and coverage of D&O, including potential need for additional protection to cover long tail claims.[46] RSA has made amends to D&O liability insurance coverage, with exclusions from Directors and Officers cover for the fossil fuels industry.

- **Providing focused climate legal liability protection support to net zero technology innovation companies:** Chubb has partnered with Cleantech[47], the largest private sustainable, technology innovation company, to provide bespoke insurance legal liability solutions as Cleantech grows, including solutions focused on intellectual property rights and environmental liability.

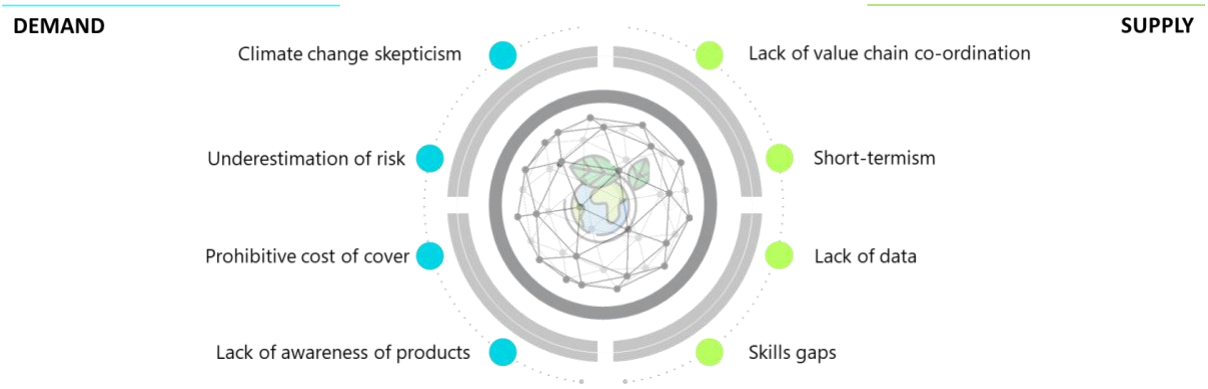
In the context of an increasingly regulated environment, extending beyond environmental law and regulation to areas such as asset management, finance, insurance, tax and many more, businesses are looking to their lawyers for deep knowledge of all the issues and out-of-the-box thinking to guide them through the transition. Further growth will be required in specialist climate legal expertise and services.

The insurance industry value chain, in partnership with advisory partners, plays a key role in raising awareness of best practice climate risk management with risk management professionals. For example, many brokers and advisory firms are helping insurers better understand the requirements of supervisory statements, such as SS/319 in the UK, that can improve risk management practices around climate risk. This deepening of understanding and sharing of best practice can help reduce risk that could lead to future litigation, thereby reducing future losses.

Barriers to growth in net zero product innovation

The market for climate insurance products is inhibited by barriers to growth on both demand and supply sides (Figure 2).

Figure 2. Key barriers to growth in product innovation for net zero



On the demand side, some potential customers, across both personal and commercial lines, remain sceptical of climate risk, or underestimate its impacts. Evidence from experiments in behavioural economics indicates that people tend to be poor judges of risk, and consistently underestimate it. For insurers, the challenge is compounded by existence of climate risk scepticism, as well as a reluctance

among many customers to share data with their insurance providers. In a recent global survey of potential new home insurance products, only 11 per cent of customers elected for a 'connected and cost focused' home insurance product that provides assistance with managing household running costs, as well as an opportunity for homeowners to reduce their carbon footprints[48].

> *"Large corporates are not asking for climate related insurance products."*
> **Head of Innovation, International Insurer**

In addition, the cost of climate risk-focused insurance products - even in the case of innovative new products that can be cheaper than alternatives, such as parametric insurance - can be prohibitive. Other important would-be customers are often unaware of the tailored products that the industry has developed to support them. For instance, many small green technology companies, which play an important role in developing low-carbon technologies critical to the transition, are unaware of the insurance industry's solutions to their coverage challenges.

The role of insurance is often seen as secondary to sources of financing - a view which fails to appreciate the strength of linking these approaches together. Insurance products aimed at the risks facing emerging technologies and clean-tech start-ups can both facilitate their development and financing by de-risking, and in the case of the latter, giving greater certainty to investors. For example, parametric insurance can offer innovative ways of covering risks that may not be easily covered or priced with traditional indemnity insurance.

> *"Many of the investors do not understand this kind of insurance [which protects their financial investment in solar plants] exists as it is not broadly offered by climate insurers."*
> **Head of Green Tech Solutions, International Reinsurer**

On the supply side, growth is inhibited by a lack of co-ordination across the value chain. This manifests in multiple areas, such as a lack of data sharing across brokers and insurers, and duplication of roles across different links in the chain (e.g. product development split across brokers and insurers). The consequence is a diminishing of the division of labour enabled by the value chain's structure, and a lack of cross-industry collaboration on 'big' climate challenges.

> *"Brokers understand the client need best. They can cut out primary research by the insurer [on client needs] when they do this well. Brokers' strength is their network, which they can leverage for client research and product distribution."*
> **Head of Incubation Underwriting, London Market Insurer**

The property and casualty insurance industry largely runs on annual policy cycles that do not fit well with the long-term view required to respond most effectively to climate change. This is an issue for both clients and insurers, as the typical policy period is one year, after which point business may not be renewed. It is therefore critical that the industry is able to effectively communicate climate risks and the need for longer-term strategy development to their clients, and to explain why initiatives, such as the Climate Transition Pathways initiative, are starting to emerge. On the insurance side, compensation for underwriters is often tied to annual loss ratios, which incentivise 'sticking with what you know'. This is an issue that has been exacerbated by heavy claims in some areas of the renewable energy market, such as offshore wind, and one that will not change without the introduction of measures that link rewards to performance against climate incentives.

Data quality is also an issue. The data required in order to develop innovative products and to underwrite climate risks may not be available, or where it is available, it may be unstructured or of poor quality. Data may exist, but in an effectively unavailable form, locked up in systems that are not accessible or integrated with the tools used in risk modelling and product development. This makes it extremely difficult to form an holistic view of a risk, let alone an holistic view of many correlated risks, within an underwriting portfolio.

There remains a great deal of uncertainty around the future path and impacts of climate change, which is dependent on the outcomes of actions that are, in many cases, yet to be taken. This uncertainty renders many traditional catastrophe risk models, which do not encompass principles of either climate or scenario analysis, less useful as tools for understanding the impacts of physical risk ion assets. While climate stress-tests and scenario analyses are becoming more prevalent in the industry, they are not commonly integrated into underwriting decisions, portfolio management or financial planning.

The industry also faces skills gaps. For example, underwriters are often deep subject matter experts focused on relatively well understood risks but not emerging technologies, such as those being developed in the renewable energy space. A recent study of underwriter recruitment showed that less than one per cent of job descriptions required an understanding of emerging technologies[49]. We therefore include the development and scaling of technical approaches to underwriting as one of the seven key priorities to enable climate innovation in the insurance industry.

How the insurance value chain can help

A successful transition to a low carbon future hinges on two broad strategies. First, we must reduce greenhouse gas emissions as far as possible; and second, we must remove carbon from the atmosphere, and safely store it. Transition will only occur through the development and use of technology, infrastructure and a wide range of other 'green' assets. This demands transformational change in every sector.

Insurance can play a key role in helping enable the transition for customers and the wider economy by helping them understand, reduce and mitigate climate risks. By ultimately removing risk-based barriers to growth, it can enable a more confident and smooth transition.

As well as product solutions to physical, liability and transition risks, the players in the insurance value chain all hold pieces of the puzzle, and innovation will be needed in all areas to mitigate climate change. To enable a successful transition, the industry must accelerate the development and take-up of new and existing products for the net zero transition. Furthermore, a systemic problem requires a systemic solution. The industry needs greater co-ordination and collaboration across the different sub-sectoral players in the value chain.

Roles of the insurance value chain on innovating for net zero

Innovation around climate mitigation, which is a sub-set of broader innovation across the insurance industry, has been rapidly climbing the agenda. The past year has seen announcements from across the value chain committing to net zero, including the launch of new net zero industry initiatives, such as the Net Zero Insurance Alliance.[50]

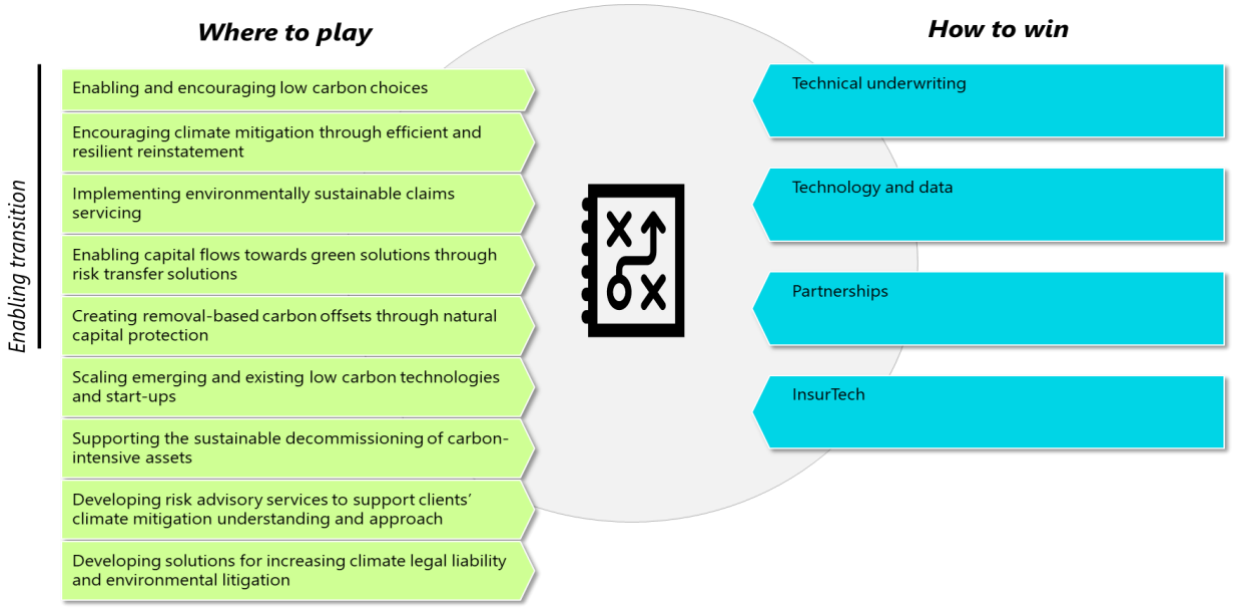
The industry's role in developing new products and services to support the transition and adapting existing ones demands action from each part of the insurance value chain:

- **Brokers** – understanding the client challenges and demands, their specific transition risks and risk transfer or wider risk service needs, co-developing products with insurers to meet current and evolving demand and most importantly, using their network to increase penetration for existing products and services that support net zero and raising awareness of these risk transfer and advisory solutions. As aggregators of risks across industries, brokers are in a unique position to create facilities that can 'crowd in' the insurance capital needed to scale the transition. For example, the London and International Insurance Brokers Association (LIIBA) has recently published a paper on the role of brokers in the industry's push towards net-zero.[17] As one of the largest brokers, Aon committed to net-zero carbon emissions by 2030 in March 2021.[51]
- **Insurers** – innovating underwriting, products and claims and wider risk advisory services required to enable the transition and support the scaling of low carbon solutions. Innovation in risk transfer solutions is required to enable, drive and accelerate the wider economy's transition. Leveraging and commercialising insurers' adjacent risk advisory services are also important to clients' climate mitigation understanding and approach. Aviva became the first major insurer worldwide to target net zero carbon by 2040 in March 2021.[52]
- **Reinsurers** – supporting direct writers, i.e. insurers, to develop and scale innovations, primarily through the provision of reinsurance capacity and risk expertise, reinsurance creates stability through the transition, and enables sustainable economic growth. Given their position in the value chain, they have a uniquely broad view of transitional climate risk. Swiss Re committed to ambitious carbon reduction targets across its investment portfolio, and net zero greenhouse gas emissions by 2050.[53]
- **Modellers and model-vendors** – given the complexity and interconnectedness of the transitional climate risk landscape, risk modellers and model vendors are critical in the provision of increasingly sophisticated multi-vulnerability models and analytics. These enable the provision of forward-looking forecasts of climate risks, leveraging latest developments in data, modelling, machine learning and AI tools.
- **Loss adjustors** – confirming the claim circumstances, the extent of any damage caused, and assessment of claims coverage by policies, including claims pay-out. Loss adjustors have a role to play in leveraging the claims process to incentivise and improve the environmental sustainability of any repair and reinstatement. As claims emerge in relation to emerging low carbon technologies, evolving skillsets are required to investigate, research and predict the frequency of claims.
- **Legal firms** – against the backdrop of rising regulation around climate change, whether linked to legislated net zero commitments, industry or environmental legislation, or the litigious environment and precedent, the risk and complexity in potential litigation and liability risks increases. Legal firms play an important role in advising on litigation risks, including liability under financial services regulations, corporate law, financial disclosures, risk management, directors' duties, environmental law and helping to identify opportunities for growth linked to the legislative landscape.

The current state of the market

At the industry level, strategies for climate change are relatively immature. Nonetheless, net zero strategies and their impact across business lines, products and services are emerging across a range of dimensions (Figure 4). In terms of selecting 'where to play' in the market, the industry is considering how to support the growth of net negative and low carbon solutions, incentivise and accelerate behavioural change, and enable the wider economy transition through new and updated products and services. When developing net zero product strategies there are a number of strategic choices which can be made, including 'where to play', to generate positive impact and leverage opportunities to influence the transition – and 'how to win' to enable successful insurance product innovation at pace. Strategies for 'how to win' are based on modifying the underwriting approach, risk advisory services and new data and technologies and partnerships.

Figure 3. Emerging net zero product strategies



Where to play – Many insurers are offering tailored solutions that support the scaling of emerging and existing renewable technologies and low carbon or cleantech start-ups. This includes support for net zero and net negative solutions; for example, nature-based solutions that can underpin removal-based offsets, or technological removal. As we have seen, some are considering, risk transfer solutions, such as performance guarantees or warranties. These can better enable capital flows from the wider investor and banking community towards green solutions. In deciding where to play, the industry is considering where it can best influence and encourage low carbon choices. Demand can be accelerated through, for example, efficient and resilient reinstatement and environmentally sustainable claims servicing. Consideration should also be given to how transition risks create further opportunities for product innovation; for example, when linked to the decommissioning of fossil fuel assets or increasing climate legal liability and environmental litigation.

How to win – In the case of new technologies for which data on loss history is lacking, some insurers are taking a more technical approach to innovating underwriting. They are leveraging external engineers or biochemists to understand how the technologies work in detail and to assess the risk, as opposed to more traditional approaches which use past loss data to predict future risk (see Munich Re case study on page 16). As low-carbon technologies evolve, tipping points often occur. This is observable in the case of solar, as sufficient past loss data is becoming available to support a more data and AI-driven approach.

Key priorities to enable climate innovation in insurance

Given the important role the industry plays in the transition to net zero, we have identified seven key priorities to enabling a more proactive approach to climate innovation:

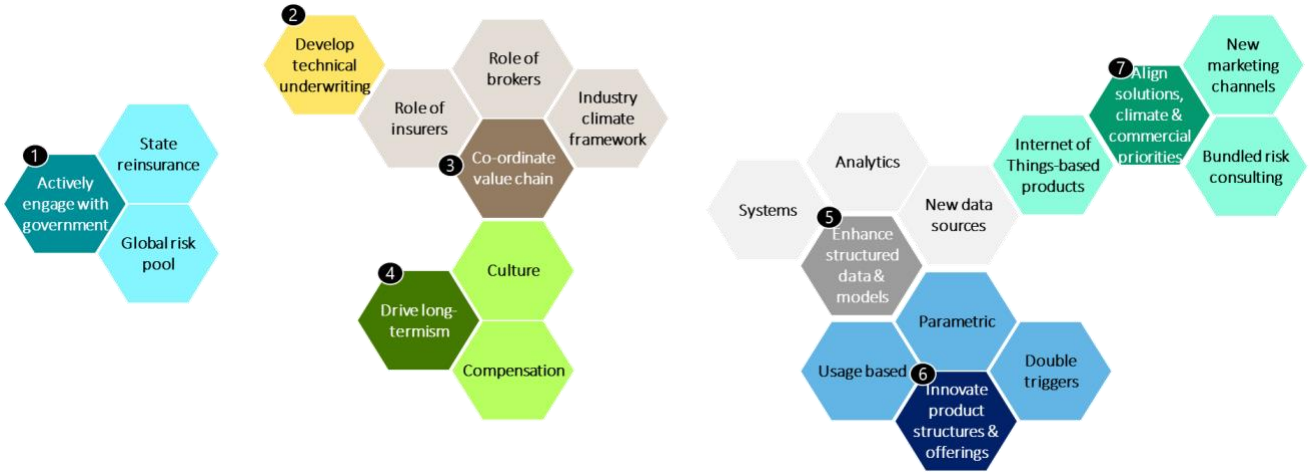


Figure 4. Seven key priorities to enabling a more proactive approach to climate innovation

1. **Actively engage with government** on transition protection needs and private-public partnership opportunities to facilitate blended-finance approaches to scaling risk-transfer capital, such as through state-backed reinsurance pools.
2. **Upskill to enhance an 'engineering' approach to underwriting**, building on close relationships with technology developers of all sizes.
3. **Coordinate across the insurance value-chain** across brokers, insurers and others to reduce duplication through a common industry framework that recognises the unique role each player should address to achieve net zero.
4. **Drive 'long-termism'** through a culture that incentivises innovation and works to reduce barriers that tend to embed static business-models.
5. **Enhance structuring of existing climate data and development of key climate models**, bringing together model-vendors, in-house analytics teams, and original equipment manufacturers (OEMs) to access key data sources and advise on best practice.
6. **Innovate product structures and new insurance offerings** that are aligned to client needs, ensuring clients and customers are aware of how newer products and structures, such as usage-based products or parametrics, can benefit them.
7. **Align insurance solutions with insurers commercial and climate objectives** so growth areas, such as IP insurance or risk consulting, appropriately integrate climate considerations in ways that enable additional innovation.

Recognise the role of government and engage

As the insurers of last resort, governments have a key role and have often looked to the insurance industry to help them understand their own risk exposure, as well as the role that private capital can play in efficiently transferring those risks. At present there are no risk pools to protect against events linked to climate change with global coverage[54]. The international risk pools that do exist, which provide insurance on a larger scale and at a lower cost that would otherwise be possible, are regionally focused (such as the as Caribbean Catastrophe Risk Insurance Facility) and tend to allocate a large proportion of claims to immediate post-disaster relief. Furthermore, these have largely focused on the physical risks of climate change rather than the energy transition. Looking forwards, the industry should look to align with government, building on the opportunities raised in the recent ClimateWise publication on policy opportunities on the road to net zero underwriting[1] and where specific gaps are identified.

Create new and enhance existing risk pools – Whilst challenging from a co-ordination perspective, there are certainly clear opportunities for governments and supranational institutions, such as the World Bank and European Union, to collaborate on risk pools that explicitly consider climate risks. Furthermore, to speed the transition, these pools could provide funds, not only for disaster relief but also for rebuilding damaged infrastructure on a sustainable basis. Recent examples include the parallel programme for the African Risk Capacity. Extended to a larger scale, this will require close collaboration and significant political will and commitment from multilateral stakeholders.

Just as governments have created 'bad banks' for poorly performing assets in the aftermath of financial crises, governments could also pool risks for carbon intensive industries that the industry may no longer want to insure, with provisions around decommissioning attached.

State reinsurance – Similarly, governments in advanced economies can support investment in emerging market green infrastructure via reinsurance. They can provide state-backed reinsurance for cross-border investment risk where the private sector has limited risk appetite. This would provide much-needed additional liquidity to the market, and also fit in with governments' role in promoting development and the fight against climate change. Additional benefits could accrue where the investment portfolios of the reinsurance placement must be aligned to net zero criteria or green asset ratios.

Case Study: Public-private innovation programmes for climate and disaster resilience

Willis Towers Watson and Hannover Re, as members of the Insurance Development Forum (IDF), together with the international humanitarian assistance and sustainable development organisation Global Communities, have joined forces to develop resilience strategies in communities susceptible to natural catastrophes in Medellín, Columbia. Collaborating closely with the city's government, the partnership will use climate risk insurance to integrate finance and supporting services, bringing protection to the most vulnerable exposed populations.

Co-ordinate the value chain on innovation for net zero

Recommendations for opportunities to increase industry collaboration across the value chain to support a more efficient and proactive approach to product innovation for net zero include:

Brokers – Focus on developing a deep understanding of clients' transition strategies, risks and needs, which they are in the best position to do, mitigating the need for insurers to run primary research on climate mitigation risk advisory, analytics, modelling and risk transfer needs. This can increase efficiency across the value chain in proactive client-centric product innovation towards net zero. Brokers can also work with insurers to raise awareness and scale the uptake of evolving innovations in net zero risk transfer and advisory solutions. Brokers can also help accelerate the scaling of transition solutions by creating dedicated facilities for low-carbon technologies that would pool a broader range of capital than might be accessible from a single insurer.

Insurers – Assess the impact of net zero strategies across business lines and customer segments to proactively identify required updates to existing risk transfer solutions and advisory services that mitigate climate change. Working together, insurers can more effectively tackle the big challenges on climate insurance, such as a lack of structured risk data. For example, InsurTech Hailios is working with Lloyd's of London insurers to create grids of sensors that could be used as a market-data solution. Through engagement with the wider industry value chain insurers can: drive efficiencies in the product innovation process; address distribution challenges where awareness of evolving products is low; and increase capacity towards a just transition to net zero.

Reinsurers – Given their position in the value chain, there is an opportunity to share a more systemic and aggregate view of transition risk with insurers. This can drive the identification of new opportunities. It can also help the industry to avoid unintentionally widening the protection gap through any coverage restrictions as insurers activate net zero strategies, and to underpin the rate of innovation required to keep pace with the wider economy's risk transfer needs.

Loss adjustors – Focus on how the claims process can be decarbonised and collaborate with insurers to proactively drive innovation in mechanisms to leverage the claims proves to improve environmental sustainability through reinstatement. Trends in policy claims coverage linked to the transition can be proactively shared, driving further innovation and identifying any emerging 'just' transition challenges.

Legal firms – In the context of an increasingly regulated and litigious environment on climate change, legal firms can proactively help the wider value chain to identify and manage emerging liability risks linked to the transition, opportunities for growth linked to the legislative landscape, and updates to existing liability insurance offerings.

There are also opportunities for increased collaboration with the wider financial sector, and potential to build hybrid insurance-capital markets solutions that can better support the transition to net zero. For example, as parametric products and their pricing strategies have evolved, insurers have gained expertise that often overlaps with derivatives markets. Whereas both derivative and parametric solutions can be used as hedging instruments, an insurance approach has generally been used for low-probability high-impact risks, with a derivatives approach being taken for high-probability, low-impact risks. In some instances, the lines between the two can begin to blur, and this has created additional regulatory challenges. For example, a parametric insurance product might be reclassified as a derivative by regulators. The insurance firm offering the product would then be required to obtain authorisation under MiFID in the UK or EU, with significant regulatory capital and operational impacts. In order to address these edge case challenges arising from product innovation, a more joined-up approach to regulating banks and insurers may be required.

Drive long-termism

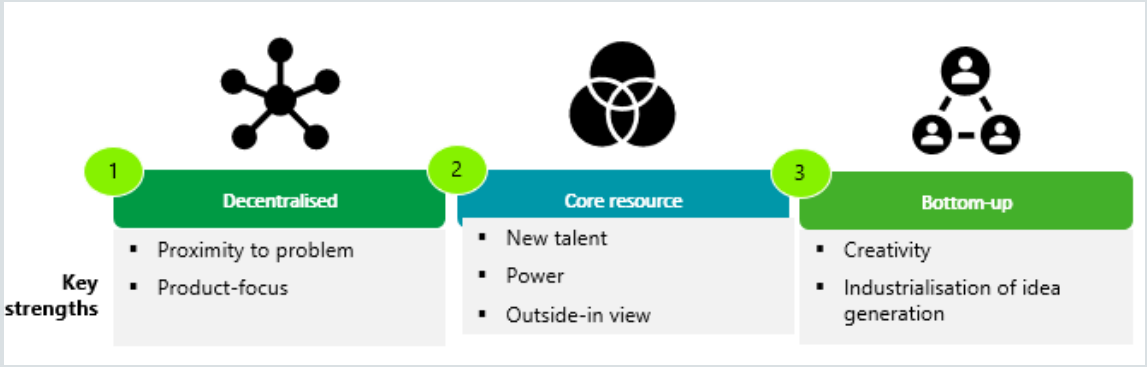
The University of Cambridge Institute of Sustainability Leadership (CISL) promotes increased long-term value creation by companies and in the economy as a whole, as well as more sustainable business practices by companies[55]. A lower carbon future will require a more strategic approach to climate change to be taken. This in turn demands a longer-term view of transition risks, and of customers' risk advisory, reduction and risk transfer needs, as opposed to traditional, short to medium term planning cycles.

Compensation – Adjust compensation structures so that they better incentivise underwriters and asset managers to take a longer-term view, as opposed to the current system of bonuses tied to annual loss ratios. This could include factoring multi-year profitability and the net carbon-intensity of underwriting portfolios into compensation, or a blend of these and other factors

Lessons from market innovation strategies

There is no single, universally applicable, optimal strategy and structure that firms can use to implement and accelerate their own net zero transition. At present, insurers are using a variety of structures to support their innovation efforts, of which three stand out as most frequently employed. Each has a different mix of strengths and challenges, such as those outlined for three common structures in Figure 5. Regardless of the innovation structure adopted, success in individual organisations is derived, to a significant extent, from senior leadership sponsorship and support, enabling each structure to thrive in ways unique to the culture of the firm.

Figure 5. Key strengths of different innovation structures



Decentralised – the firm spreads innovation responsibilities across multiple areas of the business. For example, product innovation may be split across incubation (e.g. developing new products for renewable energy technology) and development (e.g. improving how standard covers respond to climate-related natural catastrophes). Technology innovation may be run as a 'horizontal layer' spanning multiple business areas given its broad applicability.

A key strength of the decentralised structure lies in the ability to situate relevant expertise 'close' to the problem. For example, responsibility for adapting existing products to encompass new risks might sit with underwriting teams that already understand the relevant products and are closely connected with affected clients. Product teams may also have the end-to-end capability to take an idea from concept to live product. For this reason, a decentralised structure is best suited to product innovation, as opposed to other types of innovation. In some cases, business model innovation may require an 'outsider' perspective to be brought into the mix, for example from clients or from other industries and firms which have successfully implemented change.

"We are problem-led to avoid generic solutions that don't fit the client problem. We often need to reach to clients to understand their challenges and codify into problem baskets to develop applicable solutons."
Head of Incubation Underwriting, International Insurer

Core-resource – the locus of innovation responsibilities resides with a core team. For example, an innovation team may sit at the corporate level, within the CEO's office, and is tasked with examining innovation holistically, rather than from a deep functional perspective. This structure typically includes a Head of Innovation. The team may be supported by dedicated resources, including technology and project management.

The key strength of this structure is that the innovation team has a clear mandate from senior leadership to 'get things done' and can take a firm-wide view. Furthermore, given their range across the business, centralised innovation teams have the purview to tackle major innovation questions, such as how to disrupt the business model. In turn, this remit can be a powerful magnet for attracting new talent from outside the industry, given that some of these teams require and bring together diverse skill sets.

Bottom-up – the insurer operates a system for uncovering, assessing and commercialising innovative ideas from employees. Employees may be encouraged and incentivised to identify potential solutions to problems, gain feedback, refine and then pitch them to, say, an innovation council. Whilst cultural or strategic changes within an organisation must always be led from the top down in order to be successful, this approach encourages contribution from the bottom-up. The key strength of this governance structure is that it systematically creates a culture of creativity.

Case Study: 'bottom-up' innovation governance

Argo Group, a Bermuda-based speciality insurer, has an innovation framework designed to marry creativity with execution:

- **Bottom up** – employees, who are closest to client problems, identify a problem and pitch a solution. This is designed to facilitate creativity. In turn, senior managers clear away obstacles to help employees realise their ideas and spur execution.
- **Software-enabled** – employees add ideas to an online portal where they are viewed, liked and commented on by 1,500 other Argo employees.
- **Triaging** – the innovation council evaluates popular ideas on the portal, which are then operationalised, stored in a library or – for the big, transformational, ideas – put forward to the so-called Shark Tank, which is a panel of Argo's most senior leaders.

Enhance data and models

The modelling of catastrophe risk has long been a mainstay of insurance underwriting, and has made a key contribution to enhancing a wider understanding of physical climate risks. However, there is a need for better quality data to support scaled product innovation. Where climate datasets do exist, they can often be unstructured (e.g. in the form of text information), insufficiently granular, or created for other purposes, such as academic research, and therefore not immediately translatable to be applied to the insurance problem in question.

Effective modelling of physical risk is vital to furthering the transition. Nevertheless, uncertainty around the future path of climate change and its impacts renders many standard approaches to modelling, which assume a relatively static distribution of extreme event occurrences, redundant. In order to address this, new approaches are being developed, such as conditioning catastrophe models to look at the differences in loss between different climate scenarios. As noted in the 2020 Weather, Climate & Catastrophe Insights report published by Aon, "these forward-looking, probabilistic models help companies make strategic and risk management decisions under complex and changing environmental conditions"[56].

The industry is also experiencing wider data challenges where data is not accessible, not in a usable format, not machine readable, lacking in any standardisation or common structure. Icebreaker One's SERI programme seeks to bridge the data gaps between finance and climate change. SERI's goal is to create a detailed data governance framework that can open up the potential of sector-wide data sharing in insurance, enabling the development of climate-ready financial products[57]. Emerging technoloy and data paradigms can help the industry to address these data challenges:

New sources of data – Use new sources of data to sharpen underwriting. This applies to risks caused by climate change (e.g. insuring a house against a wildfire caused by rising temperatures) as well as those unrelated to climate change that threaten the net zero transition (e.g. machinery breakdown cover for a biomass power plant). Networks of sensors and devices connected to the internet, also known as the Internet of Things (IoT) can be used to capture real-time local data on risks, forming one of the most important, yet under-developed, sources of data (see case study below). Finally, a growing proliferation of financial disclosure requirements from regulators can be a potentially useful source of company climate risk data. Examples include the UK's introduction of mandatory TCFD reporting across all sectors of the economy, beginning in 2022, and the EU's Non-Financial Reporting Directive.

Case Study: Using the Internet of Things to insure the transition

Hemp is an important crop for addressing climate change. It is a low-carbon construction material, which also functions as a store for atmospheric carbon dioxide.

IoT-based solutions can capture the data underpinning development of innovative insurance products for the hemp industry. For example, InsurTech Hailios placed sensors around a hemp farm to gather local risk data, which were augmented with radar analysis. Descartes Underwriting used the data to build a parametric insurance product (see case study on parametric insurance) tailored to the farm. Without the sensor data, this would not have been possible.

Better structured data systems – Combat unstructured and siloed data with digital technologies. A range of powerful new digital technologies are unlocking the value in unstructured data. For example, natural language processing (NLP) can be used to automate processing and analysis of large volumes of policy wordings. Insurers can also use cloud-based solutions to connect disparate data silos.

More advanced analytics – Use digital technologies to develop more sophisticated analytics. For example, artificial intelligence / machine learning (AI / ML) can be used to model climate-related risks on a far more granular and accurate basis than in the past (see case study).

> *"Predictive models are a game changer for pricing of risk"*
> **Head of Innovation, International Insurer**

Upskill functions with a deeper technical understanding of climate risks and opportunities

Collaboration with technical experts from academia and industry can help insurers to stay on the cutting edge of technology without having to hire expensive talent with a deep yet narrow skill set. There is an opportunity for more formalised consortiums of groups of insurance experts that combine broader skill sets such as R&D, technology experts and science. This can help the insurance industry learn more about emerging technologies and leverage expertise in a faster manner.

Case Study:
using technical underwriting to grow green technology insurance

Munich Re has a three-pronged approach to technical underwriting of solar power plants:

- **Academic partnerships** – Work with academic partners including the Fraunhofer network of 72 research institutions throughout Germany;
- **Industrial partnerships** – Examine the manufacturing of solar plant components, including via site visits; and
- **In-house co-operation** – Collaborate with technical experts across Munich Re.

Munich Re's technical expertise on solar technology is enabling the reinsurer to provide high-value risk consulting services to clients. The reinsurer provides recommendations for improvements in the solar manufacturing process to around three-quarters of clients, many of which are implemented.

"Everything in the offshore wind market is prototypical, which makes it difficult for insurers as they use past data for predictions. There have been hundreds of claims, which means that learning is expensive and insurers might become less keen to stimulate development [in this market]."
Head of Commercial Risk, Broker

Innovate product structures

Innovative product structures can help to overcome some of these fundamental challenges around insuring climate-related losses and incentivising capital flows towards emerging green technology:

Parametric insurance – This type of cover pays out when an event takes place, based on a pre-defined range of parameters that are often measured by an index created for this purpose. Parametric solutions are rapidly gaining in recognition for their ability to model and respond to potential losses caused by climate change. They can be cheaper and faster than traditional insurance, as there is no need to assess damage before a claim can be paid. Insurers can also construct indices for addressing specific event types, enabling them to avoid potential climate-risk protection gaps arising from a lack of data on past losses (see case study on parametric insurance for a coral reef).

Moreover, parametric products can greatly expand the pool of capital available to protect against climate risks by tapping capital markets. A growing number of institutional investors are investing in catastrophe bonds designed around parametric triggers. Such products are relatively easy to understand and relatively transparent, compared with the two main types of trigger for traditional catastrophe bonds, which are based on claims for a (re)insurance company or claims for the (re)insurance industry.

Case Study: Parametric coral reef insurance in Quintana Roo, Mexico

The coverage, designed by Swiss Re, uses a parametric structure: pay-outs are triggered when wind speeds reach a pre-determined index level. If this happens, funds are paid quickly for debris removal, initial repairs and to repair the reef by planting new corals.

Double triggers – Insurers can design products with 'double triggers' that help lower the cost of capital for green technology projects (see case study in box below). In a double trigger, the limit, premium or retention is linked to an event outside of the insured hazard.

Case Study: Solar panel warranty insurance with a double trigger

Solar panel makers issue performance warranties on their panels. These are contracts to pay the user of a solar panel (e.g. a solar farm) in the event of non-performance of a panel (e.g. faulty manufacturing, defects or excessive aging). Munich Re has created a product that protects both parties to a solar panel performance warranty:

- **Panel maker** – Insured against the risk of making 'excessive' payments under its performance warranties.
- **Farm** – Insured against the risk that the solar panel maker cannot pay under warranty because it is insolvent.

The insurance is based on a double trigger: claims are paid either in the event of excessive payments by the manufacturer or in the event of the manufacturer's insolvency, in which case the insurance is transferred to the solar farm. Farms that buy panels from manufacturers with this type of insurance can also benefit from lower costs of capital.

Usage-based – Insurers can reduce the cost of insurance for green technology by charging on a usage basis. This can be applied across any sectors in which there is an element of seasonal fluctuation in the use of technology. For example, farmers are increasingly using drones on a seasonal basis to reduce waste (e.g. crop monitoring). Insurers can create products that charge based on drone usage (e.g. by duration of flying time) rather than on an annual basis, which is more expensive for such infrequent usage.

Incorporate the management of climate risk in commercial priorities

Insurers can stimulate customer demand in a variety of ways. The most powerful tool in our view, is to build products that align clients' commercial priorities with fighting climate change, and therefore incentivise clients towards net zero-enabling commercial strategies.

Insurers are developing products that have the potential to reduce costs as well as protecting clients from climate-related risks (see case study in box below), whilst also providing added commercial incentives to close the climate-risk protection gap. Nonetheless, there are few existing examples of this type of cover, and penetration is low, with much scope for additional development.

Case Study: products that save energy and respond to climate change

Shepherd Analytics harvests data on building energy consumption from sources such as building management systems, utility bills and wireless sensors connected to gas and electricity supplies. The InsurTech uses this data to model losses associated with energy use, such as fire, and provide risk prevention insight. It is working with insurers and their insureds to reduce claims. This insight can also be used to reduce insured's operating costs (by up to 25%) and carbon footprints, providing multiple benefits.

Approaches to aligning clients' climate and commercial priorities with insurance solutions:

Bundling – Some insurers are growing their risk engineering capabilities, a solution long offered by brokers. These may include data, tools and insights that can help clients make more informed decisions on risk management strategies, for example, reviewing cargo flows to reduce idle time in transport.

Action: Recommendations that integrate climate benefits should be clearly demarcated, with respect to both emissions reduction and climate adaptation. This can help increase clients' understanding of climate-related risks, incentivising them to act. It can also highlight challenges that underwriters may need to address when low carbon technologies are seen to increase other types of risk, such as fire risk associated with cross-laminated timber commercial buildings, or hail risk associated with roof-mounted solar PV panels.

Client and distribution channels – Insurers may be targeting the wrong economic buyers or missing critical influencers who can stimulate demand for innovative climate-aligned products. This can involve targeting the investor rather than the owner or operator of an asset or bundling insurance solutions with investment capital. For example, the industry has developed a range of solutions that facilitate early-stage financing of green technology (see Munich Re case study on solar panel warranty insurance with a double trigger on page 21). These solutions benefit the venture capital community in addition to the policyholder. Insurers can therefore go to market via the investor community, a relatively under-developed channel, or potentially bundle insurance with tranches of investor capital.

Actions and next steps

Insurance solutions are a key enabler for the transition to a net zero economy. They can open up access to contingent capital that gives customers, clients, and investors the confidence to take the necessary steps needed to decarbonise our economies. To successfully develop and scale a broader range of innovative, climate-aligned insurance solutions and products, we have identified three key actions for the insurance industry:

1. Build relationships with clients and understand the barriers they experience in extracting maximum value from the current range of products, as well as the associated problems they are experiencing along their own value chain.

2. Encourage internal experimentation and market collaboration, with the aim of innovating around the client's value chain. This may involve closing coverage gaps through adapting existing products, creating new products, or increasing understanding through risk advisory and consultancy services. Insurers should recognise that they may not be the right provider for every area, and partner with third-party service providers and academic groups where appropriate

3. Incentivise action through targets and training, and support this with upskilling within the firm, and embracing science-based insight.

Insurers have risen to numerous challenges as new technologies and business models have emerged over time, though the pace of change has never been so fast nor the need so critical. The time to act is now.

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