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Risk revealed by Lloyd's

Clean technologies and hard-to-abate sectors

Lloyd's Futureset

AON

Carbon markets

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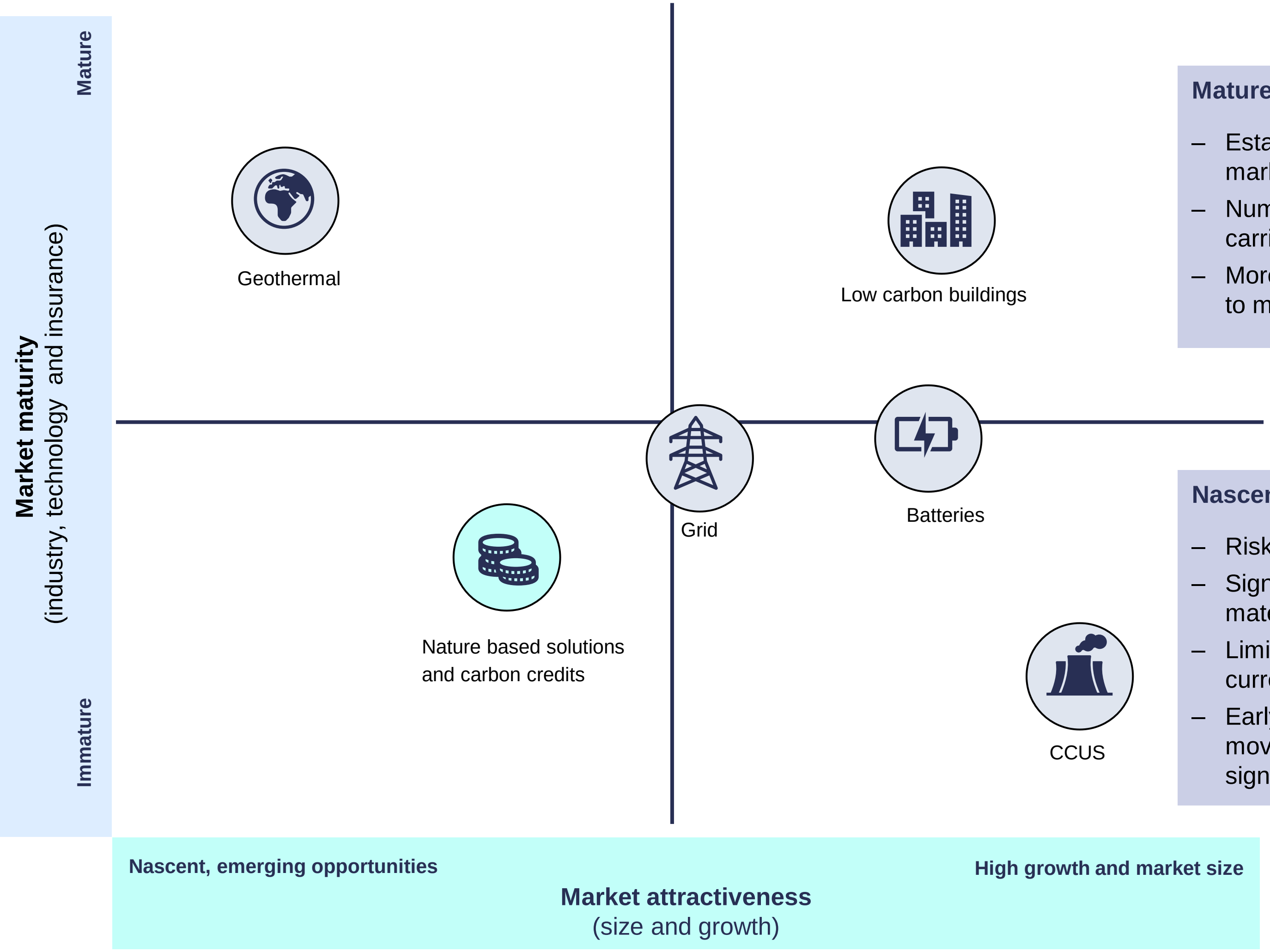
Building a larger presence in emerging 'transition' technologies could help the insurance industry to lead innovation and grow sustainably

Opportunity assessment

The relative positioning of opportunities for the insurance industry have been weighted by:

1. **Attractiveness,** which considers both the growth and size of the market, and
2. **Maturity,** which takes into account both the wider industry and insurance market

	Criteria	Weighting
Market attractiveness	Growth	50%
	Size	50%
Market maturity	Maturity of industry	25%
	Maturity of tech	25%
	Insurance capacity	25%
	Insurance product maturity	25%



Mature, sizeable existing markets

- Established insurance products in market
- Number of existing products and carriers
- More innovative products required to meet emerging risks

Nascent, emerging opportunities

- Risks currently less known
- Significant opportunity expected to materialise in the longer term
- Limited insurance capacity currently
- Early action could support early mover advantage and capture significant future growth

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Carbon offsets are one of the most effective ways to reduce the impact of emissions for hard-to-abate sectors while net zero technology pathways continue to develop

Industry and insurance market dynamics

Carbon offsets are one of the most effective ways to reduce the impact of emissions for industries that are particularly difficult to de-carbonise – currently natured based solutions (NBS) projects form the basis of most carbon offsets.

For many companies that have committed to reaching net-zero emissions targets, carbon offsets will be needed to mitigate emissions they cannot otherwise avoid

Offset providers	Offset buyers
Native Energy	General motors (GM)
Sustainable Travel International	Barclays
Terrapass	Shell
MyClimate	Disney
3Dgrees	Toucan
	Delta

Increasing scrutiny is being placed on claims made by buyers of carbon offsets.

Delta Airlines currently faces a class action lawsuit alleging its carbon neutral claims, based on carbon offsets, are "false and misleading"

Key Growth Drivers	Headwinds
Net Zero targets	Worsening climate events
Market size and sophistication	Political risks
Growth in tech-based products	Carbon offset legitimacy

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Regulated entities in the real economy use compliance markets to meet their carbon emissions caps or baselines, while voluntary markets provide access to offsetting for all

Carbon markets overview

There are two key markets enabling the trading of carbon-related financial instruments, underpinned by a range of projects focused on emission avoidance and carbon removal:

Compliance markets (CCMs)

In a **compliance market**, regulated entities **buy and sell** **carbon allowances** to remain under pre-determined regulatory carbon emissions caps or baselines

Compliance markets are created and regulated by mandatory **national, regional, or international** carbon reduction schemes

Voluntary markets (VCMs)

In a **voluntary market,** individuals, companies and governments **trade** **carbon offsets** to reduce their carbon emissions footprint voluntarily

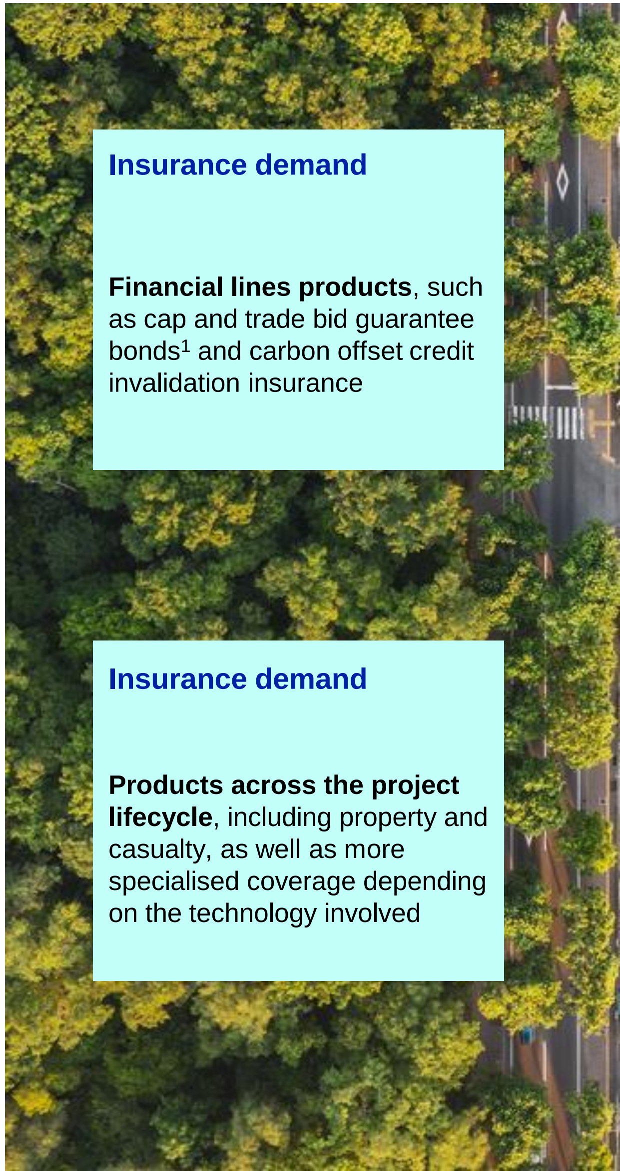
Participation in the voluntary market is **primarily motivated by corporate social responsibility (CSR)** and public relations, but many participants also treat carbon as any other financial instrument for trading

Typical sectors regulated with cap or baselines

Electricity and heat generation	Oil, acids and chemicals	Metals, glass, ceramics
Aviation and shipping	Pulp, paper and cardboard	Cement, lime

Projects issuing carbon offsets, certified and verified emissions reductions (CERs and VERs)

Forestry and land Use	Renewable energy	Chemical/ industrial	Household and community
Waste disposal	Energy efficiency	Agriculture	Transport



Insurance demand

Financial lines products, such as cap and trade bid guarantee bonds[1] and carbon offset credit invalidation insurance

Insurance demand

Products across the project lifecycle, including property and casualty, as well as more specialised coverage depending on the technology involved

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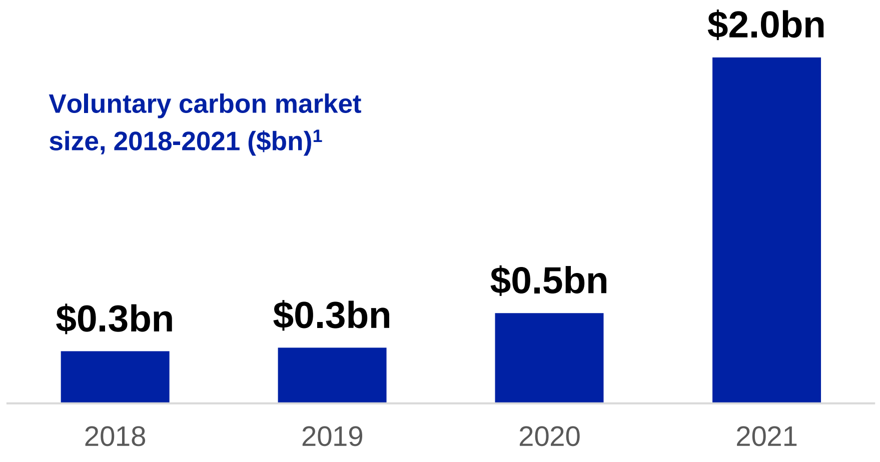
The term "carbon credits" is regularly used to describe "carbon allowances" and "carbon offsets"

Carbon markets overview

	Carbon allowance	Carbon offset
Definition	A **carbon allowance** is a tradable permit or certificate to emit one metric tonne of CO_2 or equivalent greenhouse gas (GHG)	A **carbon offset** is a certificate awarded for a proactive initiative that reduces or removes emissions
Associated market	**Compliance markets** ("cap-and-trade" and "baseline-and-credit" systems) **1. Primary markets** – Issuer is typically the state/a relevant authority of the state **2. Secondary markets** – CCM scheme participants trade allowances directly but also use secondary markets to trade allowances as spot trades, forwards, or derivatives (futures and options)	**Voluntary markets (VCMs) and compliance markets (CCMs)** **1. Primary markets** – CCM issuer typically the state/a relevant authority of the state **2. Secondary markets** – CCM scheme participants buy offsets directly, but also use secondary markets, trading allowances as spot trades, forwards, or derivatives (futures and options)
Regulation	**Compliance market** – Government or state-led schemes for carbon allowances	**Voluntary market** – The standard issuer or registry generally sets methodology and criteria for project certification and generation of carbon offsets, but project developers may also propose new methodologies for programme approval and adoption **Compliance market** – Individual regulators set their own rules defining which offset projects are eligible to count towards meeting compliance requirements. Voluntary offsets, unless explicitly accepted into the compliance regime, are not allowed to fulfil compliance market demand
Description	– In a **cap-and-trade scheme** (e.g. California cap-and-trade scheme, EU ETS[2] and the RGGI[3]), an upper limit (cap) on emissions is fixed, and carbon allowances are either issued for free based on specific criteria or auctioned – Under a **baseline-and-credit scheme** (e.g. the Technology Innovation and Emissions Reduction Regulation in Alberta, Canada), baseline emissions levels are defined for individual regulated entities, and credits are issued to entities that have reduced their emissions below this level, which they can sell to others looking to stay below their baselines	– In the voluntary carbon market, entities that are not regulated as part of an existing government scheme and even individuals, can purchase carbon offsets in order to reduce their carbon footprint – Some regulated entities may buy or trade carbon offsets to make up a small proportion of their emissions reductions (where permitted[4]), or to voluntarily exceed their required baseline, or reduce below their cap

There will be an increasing demand for insurance products to support organisations, as more start to leverage carbon offsetting to meet their emissions targets

Global investment breakdown



Current market trends

- The voluntary carbon market declined at a -21% CAGR from 2011 - 2017, before growing significantly at an 89% CAGR between 2018 and 2021
- The **281% increase in market size from 2020 to 2021** was driven by rising prices for traded carbon offset credits for projects such as reforestation, “blue” carbon from initiatives involving coastal and marine ecosystems, and avoided forest conversion
- Global climate and sustainability goals, such as net zero pledges, are driving growing demand in the voluntary carbon market

Growth drivers

Net zero targets – Already over 20% of the world’s largest 2,000 companies have committed to reaching net zero emissions, and more are continuing to do so. Carbon offsets play a key role for many of those companies

Market size and sophistication – Voluntary carbon markets are becoming larger and more sophisticated, providing more options for companies to purchase offsets

Growth in tech-based projects – NBS carbon offsets are currently the focus of carbon offset projects, however post 2030 it is expected that tech-based offset projects will likely outpace nature-based solutions

Headwinds

Worsening climate events – Many naturally-based carbon offset projects are particularly exposed to natural catastrophe events such as forest fires and hurricanes. Worsening climate conditions could pose a significant threat to the industry

Political risk – The Zimbabwean Government recently announced all existing carbon contracts will be voided to introduce a new revenue split arrangement for emission reducing projects. This could occur in other nations, opening up further political risks

Carbon offset legitimacy – Some NBS schemes have come under investigation over their credibility. A study on schemes in the Brazilian Amazon found they had overstated their emission reductions. Additionally, new EU proposals aim to ban environmental claims based solely on carbon offsetting

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Carbon offset projects require both standard and specialist products. Insurers are well placed to work with developers to tailor their offerings whilst facilitating positive solutions

(Re)insurance class of business impact

Accident and health	-
Casualty	High
Cyber	Low
Financial lines	Med
Marine, aviation, transport (MAT)	-
Motor	-
Property	High
Other	High

Impact

High	Med	Low	-

Key coverage sought for NBS projects

Property: Protection against physical losses to assets that generate carbon offsets. For example, natural disasters and pest infestations can damage or destroy forests, wetlands and mangroves. Coverage for project developers can include ecosystem restoration costs and carbon revenue loss protection for specified events

Casualty (environmental liability): Protection against the risk of carbon offset projects resulting in negative environmental impacts. This may include compensation to 3rd parties for property damage, clean-up costs, statutory clean-up notices and natural resource damages

Other – political risk: Protection against the changing political landscape and instability in some of the project host countries. Specifically, policies can protect against invalidation, seizure, and other political and regulatory risks arising from government actors

Other – financial lines[1]: Protection against losses arising from commercialisation of the Carbon Credit such as crime coverage to help protect against illegal logging and fraud, credit insurance, surety bonds and carbon credit invalidation insurance as well as negligent or deliberate misrepresentation

Gaps in coverage currently offered

- Risk of **property damage** from natural catastrophes are well covered in the existing insurance market but increased frequency and severity means **capacity is reducing at a time when demand is increasing**
- There is an increasing demand for **parametric solutions** to provide indemnity in case of severe weather-related risks, due to quick deployment of a pre-determined payment. However, lack of understanding in the market, difficulty in assessing the data in a changing landscape, and lack of reinsurance capacity means there are **few offerings currently in the market**
- **Environmental liability** products on offer for NBS generally are limited to high value projects with only the large global carriers having appetite due to the complex and rapidly changing regulatory environment
- Some carriers have started to offer protection in the event of **carbon storage site leaks** via Environmental Liability insurance but products in this area are currently very limited
- **Regulatory risks** are not covered in the market and regulatory bodies have stepped in to offer political risk cover in the absence of offering from the private market. E.g. The World Bank's insurance arm, the Multilateral Investment Guarantee Agency (MIGA) announced in June 2023 that it intends to step in to offer political risk insurance and facilitate investment in NBS
- **Cap and trade bid guarantee bond products** have been developed for the compliance market to guarantee pay out if an auction participant is awarded carbon credits. However, these are in their infancy with only one product currently on the market and product design considerations will be key to conform with regulatory guidance and requirements
- Also available in the market is **underperformance**, **reversal and fraud cover** which includes risks such as same credits being sold to multiple owners as well as other cover such as third-party negligence
- There is currently no coverage for products that specialise in carbon offset verification for example, errors and omissions cover

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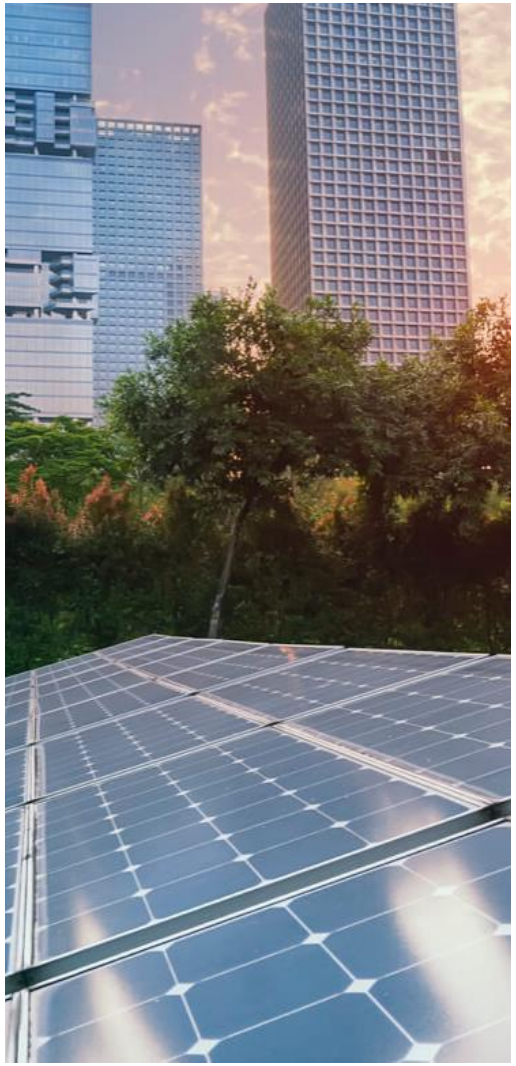
New insurance solutions are being developed to protect both compliance and voluntary carbon markets

Example market offerings



Provider	Product	Market	Product description
Marsh	Carbon offset credit under-performance, reversal & fraud	Voluntary	– Marsh's insurance addresses key risks associated with buying carbon offset credits in the unregulated VCM – Risks include schemes not delivering anticipated amount of sequestered carbon, captured carbon being lost, or purchaser being a victim of fraud
AON	Cap and trade bid guarantee bonds	Compliance	– The bonds serve as a financial guarantee to the auction administrator that the qualified bidder will remit payment for any allowances the bidder wins at auction – These bonds are used in California to meet its goal of reducing GHG emissions
HOWDEN	Carbon offset credit fraud and negligence cover	Voluntary	– Protects purchasers of carbon offset credits in the voluntary market in partnership with Respira International and Nephila Capital, launched in 2022 – Provides cover for third-party negligence and fraud, backed by lead capacity from Nephila and other Lloyd's syndicates
VOLANTE	Carbon offset credit invalidation insurance	Both	– Protects carbon offset credit purchasers against loss due to the invalidation of credits held on their balance sheet – In the event of invalidation, the product provides funds to purchase replacement credits
Kita	Carbon Credit Purchase Protection cover	Voluntary	– Kita was part of the Lloyd's Lab eighth cohort and was approved as a Lloyd's coverholder in December 2022 – Kita launched its product in early 2023, which protects the purchaser of carbon offset credits against under-delivery where seller fails to deliver credits on the terms specified in purchase agreement
Oka	Comprehensive carbon offset credit protection[1]	Both	– Oka is seeking to offer comprehensive insurance policies to replace carbon offset credits that have been reversed, invalidated, double-counted, or stolen – Oka launched in early 2023, raising over $7m in a seed funding round led by Aquiline Technology growth
Parhelion	California Air Resources Board carbon offset credit invalidation insurance	Compliance	– Provides protection to the project developer in the case of carbon offset credit invalidation per the California Cap & Trade Programme Regulations, with the owner of the underlying credits receiving the relevant compensation – This is the oldest product in the carbon credit market, launched in 2011

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Notes & Sources (1)

Page number	Source	Notes
3	IEA; International Council on Clean Transportation; McKinsey Insights: Scaling the CCUS industry to achieve net-zero emissions; Global Data; McKinsey; UN PRI	1. The total 2025 global market size estimates for both operational and capital expenditure were obtained from IEA Net Zero and UN PRI Forecast Policy Scenarios
4	Carbon Offset Guide; California Air Resources Board; EY; EU ETS; Center for Climate and Energy Solutions: Secondary Carbon Markets; ISDA: Role of Derivatives in Carbon Markets	1. Subject to product designs adhering to regulatory guidance and requirements
5	Carbon Offset Guide; California Air Resources Board; EY; ISDA	1. OTC – "Over the counter" direct trading, 2. Emissions Trading System, 3. Regional Greenhouse Gas Initiative – "Cap-and-invest" scheme, 4. California allows 4% carbon offset credits, rising to 6% in 2026;

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