Managing a complex risk landscape – Towards building a more resilient and decarbonized economy

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The Geneva Association

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About the Geneva Association: Strategic think tank of the insurance industry

Launched in 1973, members: 85+ CEOS of largest insurance and reinsurance companies (P&C and Life) globally with AUM ~USD 24 Tri.

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Approach to research: We identify, lead and implement highly strategic forward-looking topics through industry-collaboration and cross-sectoral partnerships.
Only in the last few years, the climate change debate has evolved from an environmental, scientific and corporate social responsibility to a key driver of socio-economic development, energy security, technology and trade leadership and a major concern for financial resilience and stability.
Question 1: With rising risks associated with extreme weather events, how to keep insurance affordable and accessible for home owners, industrial facilities and infrastructure systems looking ahead?

Question 2: Can re/insurers help unlock financing and expedite market readiness of a wide range of emerging climate technologies for energy transition and industrial decarbonization?
Question 1: How to keep insurance available and affordable in the market?

Setting the stage

- Rising frequency, severity and geographic scale of extreme weather events (acute) and slow changing climatic trends (chronic)
- Rising exposure and vulnerabilities with increasing concentration of people and assets in high risk zones, urbanization, development choices, aging infrastructure and supply chains
- Rising insured losses from weather-related extreme events have more than quintupled over the past three decades, mostly driven by macroeconomic factors.
- Rising economic losses, roughly three times insured losses and the gap is growing
- In the absence of risk reduction and risk prevention measures, some risks may no-longer be insurable through the commercial insurance markets, requiring other interventions
- Cost of climate change adaptation will become prohibitive in the absence of climate change mitigation
Complexities of climate risk landscape

- Physical, transition and litigation climate risks and their interactions
- Direct, indirect and compounding risks
- Inherent uncertainties and stochastic nature of the transition
- Past not a good estimation of future – move to forward-looking (exposure, vulnerability)

Need for next generation of forward-looking stochastic climate risk modelling methodologies!
How to keep insurance available and affordable in the market? (My next research)

- **System-based approach** -
  - Who/how risks are being created (e.g. land zoning, permitting, standards to build)? who has the mandate or can manage risks? How to incentivise behaviour change towards risk reduction and risk prevention? How to address the residual risk?

- **Risk-based approach** – Risk-based insurance premiums offer a signal to the level of risks that needs to be managed

- **Assets’ life-cycle** – e.g. Housing, industrial facilities & infrastructure systems

- **Enabling and incentivizing a holistic approach to risk management to reduce residual risks**

- **Implications for the insurance business model**, products and services innovation, opportunities for PPPs

- How can financial services regulatory bodies support?
Two questions that are keeping me up at night

**Question 1:** With rising risks associated with extreme weather events, how to keep insurance affordable and accessible for home owners, industrial facilities and infrastructure systems looking ahead?

**Question 2:** Can re/insurers help unlock financing and expedite market readiness of a wide range of emerging climate technologies for energy transition and industrial decarbonization?
Geneva Association report series on bringing climate tech to market for Industrial decarbonization and the powerful role of insurance

Cross-sectoral partnership involved:

- 12 insurance and reinsurance companies
- 3 Managing General Agents
- Finance: Breakthrough Energy, HSBC
- Government: US DoE
- Engineering: Worley
- Industry: Mission Possible Partnership

Plus over 150 experts from climate tech hubs, associations, think tanks and academia

Report 1
Climate tech for industrial decarbonisation: What role for insurers?

Report 2
Bringing Climate Tech to Market: The powerful role of insurance
Latest Developments to Expedite Industrial Decarbonization


2. Transformative Public Policy and Government Subsidies

3. Alliances to Expedite Market Development

4. Coordinated Investments

5. Sustainable Finance Taxonomy and regulations

6. Innovation/climate Technologies and Tech Hubs

7. “Adoption Readiness Framework” for emerging technologies

Source: The Geneva Association 2024

Maryam Golnaraghi – NYU Stern School of Business (26 April 2024)
Focus on expediting industrial decarbonization

>30% of global GHG emissions

- Steel
- Concrete and cement
- Aluminium
- Chemicals
- Aviation
- Trucking
- Shipping
Decarbonization targets in these sectors by 2030 (some examples)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Technologies</th>
<th>2024</th>
<th>In 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation</td>
<td>Sustainable Aviation Fuel (SAF)</td>
<td>0.24 Mt p.a.</td>
<td>40 Mt p.a.</td>
</tr>
<tr>
<td>Steel</td>
<td>Green steel</td>
<td>1.2 Mt p.a.</td>
<td>170 Mt p.a.</td>
</tr>
<tr>
<td>Shipping</td>
<td>Net-zero emission fuel</td>
<td>24 ships</td>
<td>200 ships</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Clean hydrogen (blue and green)</td>
<td>2 Mt p.a.</td>
<td>6.5 Mt p.a. (of all green H₂)</td>
</tr>
<tr>
<td>Carbon Management</td>
<td></td>
<td>49 Mt p.a.</td>
<td>700 Mt p.a.</td>
</tr>
</tbody>
</table>

Mt p.a.: Million tonnes per annum
Need to expedite at-scale commercials deployment of wide range of emerging climate technologies to meet these targets

Challenges

- **Massive investment gap**: ~USD 8 – 10 trillion USD annually until 2050.

- A **significant portion** is needed for development and deployment of **new climate technologies** that remain in pre-commercialization stages (e.g. green hydrogen, carbon management, Sustainable Aviation Fuel, Long-Duration Energy Storage)

- Climate technologies are **capital intensive, highly complex**, many **untested risks**, challenges with **scaling** and **market readiness**, **scarcity of data** for assessing risks and **insurability conditions**

Addressing these challenges requires new ways of doing business, i.e. cross-sectoral collaboration to innovate risk management and financing solutions.
It took over four decades for renewables to become cost-competitive and still have not realized their market potential – We don’t have time!

1975 → 2021
World

1975
115.28 USD per watt; 0.54 megawatts

2021
0.27 USD per watt; 848,404.56 megawatts
Traditional approach to technology commercialization is focused on addressing technological risks

Technology Readiness Level Framework

<table>
<thead>
<tr>
<th>At-scale commercial deployment</th>
<th>9</th>
<th>Wide-scale commercial deployment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>Early commercial deployment</td>
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</tbody>
</table>

Traditionally reinsurers engage in commercialization stages

<table>
<thead>
<tr>
<th>Demonstration and early deployment</th>
<th>7</th>
<th>Complete system demonstration in an operational environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>Early field demonstration and system refinement completed</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Early system validation demonstrated in a laboratory or limited field application</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Subsystem or component validation in a laboratory environment to simulate service conditions</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Research and development</th>
<th>3</th>
<th>Proof-of-concept validation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>Technology concepts and/or application formulated</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Exploratory research transitioning basic science into laboratory applications</td>
</tr>
</tbody>
</table>
A number of other risks hinder climate technologies’ market readiness delaying deployment
Launch of Adoption Readiness Level Framework Launched by the US DoE

<table>
<thead>
<tr>
<th>I. Value Proposition</th>
<th>II. Market Acceptance</th>
<th>III. Resource Maturity</th>
<th>IV. License to Operate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Functional</td>
<td>5. Market Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td>Chain</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Infrastructure</td>
<td>12. Workforce</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>15. Permitting &amp; Siting</td>
</tr>
</tbody>
</table>

Source: Modified by GA from U.S. Department of Energy

18. Insurability and availability of affordable insurance
Expediting climate tech market readiness requires new approaches

Utilising traditional Technology Readiness (TRL) Level and ARL Frameworks with early engagement of re/insurers

Source: Modified by GA from U.S. Department of Energy
Mutual benefits of engaging re/insurers’ risk engineering teams from the pre-commercialization stages across projects

Benefits of early engagement of re/insurers and climate tech stakeholders

- Data
  - Increased transparency, data sharing and enhanced knowledge
  - Identification of data needs and monitoring requirements for risk assessment

- Standards
  - Expedited development of risk management standards, guidelines and codes of practice
  - Identification of unique, tech-specific insurance needs

- Scope
  - Setting reasonable expectations as to which risks can be transferred to the insurance industry

- Relationship
  - Strengthened collaboration with climate tech stakeholders
  - Exposure to more projects as the technology matures

- Diversification
  - Development of a 'pool of projects' to establish insurance pools to transfer the risks

Source: The Geneva Association
Offered a novel Insurability Readiness Framework (IRF)
Expediting assessment of insurability conditions for emerging climate tech

- The IRF classifies climate tech risks into 7 categories with related issues that need to be considered for assessing insurability conditions
  - 1) technology risk; 2) project information and organisation risk; 3) legal, finance and compliance risk; 4) physical risk at project location; 5) business interruption and supply chain risk; 6) long-term risk; and 7) environmental, social and governance risk.

- IRF
  - Enabling a more informed conversations between climate tech stakeholders and re/insurers from early stages to ensure that risks are considered and mitigation strategies are developed in line with insurance expectations.
  - Helping pinpoint areas within climate tech projects that pose the greatest challenges to insurability and identify risks that may require different interventions, such as PPPs or government backstops.
  - Identifying data requirements on a tech by tech basis

- IRF is being adopted by key platforms investing in climate tech (DoE, Breakthrough Energy)
Re/insurers have a crucial role to play in supporting the rollout of new climate technologies, but significant progress needs to be made to unlock their potential contributions. This will necessitate:

- How to get re/insurers’ risk engineering teams directly and more efficiently engaged from the very early stages of technology development and projects?
- Exploration of how insurance markets could be best leveraged to expedite the development and deployment of climate tech
- What are insurance needs for funding climate tech projects through debt and capital market financing?
- How industrial sectors adopting these emerging technologies, implications for their business models and subsequently insurance needs?
Rewire

New ways of doing business

Unprecedented cross-sectoral collaboration

Breakdown institutional silos
Thank you

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Classification of climate litigation cases (Based on analysis of over 1800 cases)

Three categories and seven types

Category I: Lawsuits against companies
Type 1. Lawsuits against companies for causal contribution to climate change
Type 2. Lawsuits against companies, fund managers and/or their fiduciaries for miscommunication or failure to adapt to climate change risk
Type 3. Lawsuits seeking to force companies to align their emissions plans with the Paris Agreement
Type 4. Litigation challenging companies' projects or technologies

Category II: Lawsuits against governments with indirect impacts on companies
Type 5. Cases challenging governments' policies or approval of projects or technologies
Type 6. Litigation to accelerate climate policy (which could accelerate the transition and so change the competitive landscape for companies)
Type 7. Lawsuits against governments or utilities for failure to adapt to climate change risk

Category III: Lawsuits brought by insurers against governments or utilities

Source: The Geneva Association 2021b. Sources against companies and governments and implications for insurers
Benefits of rethinking re/insurers touchpoints in project finance

Building risk Mitigation into project concept and design from early phase

1. Risks are considered, assessed and managed holistically to enhance insurability, potentially shortening the due diligence process

2. Provision of feedback on important decisions, such as site and technology selection, and risk mitigation strategies