

Direct Air Capture Insurance: Understanding the Risks Behind Carbon Removal Projects

Direct Air Capture (DAC) insurance is becoming an increasingly important consideration as the technology enters a pivotal phase of commercial development. Long-term carbon removal agreements, growing private investment and, in some territories, policy support are underpinning a pipeline of increasingly sophisticated facilities across North America and Europe.

For insurers, supporting this nascent but expanding industry will be contingent on understanding and differentiating between technology that is genuinely novel, and equipment and systems that are already well established and understood across energy and industrial processes.



Understanding the insurance risks associated with Direct Air Capture

While the DAC market is pursuing a variety of technology approaches, there aren't, yet, established underwriting protocols for these assets of the kind typically found across energy and industrial projects using more mature technologies.

DAC projects can employ different capture technologies, configurations and supporting infrastructure. Some may make greater use of modular equipment, while others can more closely resemble larger industrial process facilities. Their requirements for power, heat, water, CO₂ handling and associated infrastructure can also vary.

This divergence in design and operational technology can change how a project is built, the nature of potential losses and, ultimately, how insurers assess the risk.

Rather than assuming every DAC project presents the same challenges, brokers and underwriters will therefore need to develop an appropriate understanding of the individual asset.

How proven is the technology?

Although 2026 is seeing an increase in projects, commercial DAC remains in its infancy compared with other industrial processes and low-carbon technologies. The relatively small number of commercial reference projects currently deployed limits the amount of long-term operational and claims data available to insurers.

However, "new" doesn't necessarily mean "uninsurable."

As with other emerging technologies, insurers are likely to consider the maturity of the technology, its operational track record and the extent to which components or processes have been proven in comparable applications.

For developers and their retail brokers, providing relevant evidence of operating experience can therefore help insurance markets better understand the risk. Where the technology itself has limited history, evidence from earlier generations of the technology and comparable industrial applications may provide useful context.



Where does technology risk sit within a DAC project?

A DAC project may combine proprietary capture technology with equipment that insurers have been underwriting for decades.

Electrical infrastructure, pumps, fans, instrumentation and other conventional industrial equipment may all be familiar. The capture process itself – whether using sorbents, solvents, filters or other emerging systems – may be less so.

From an underwriting perspective, identifying the differentiation between new and established technology can be important in assessing risk. Conventional equipment is more likely to have established maintenance practices, replacement strategies and supply chains. Proprietary capture equipment or materials may have less operational history and different repair or replacement considerations following a loss.

For DAC insurance, the challenge is therefore not necessarily treating the entire facility as an emerging risk, but understanding where established industrial processes meet newer technology.

How resilient is the facility?

Another important consideration for insurers is how the design of a DAC facility affects its resilience following equipment failure.

Some technologies employ modular or parallel systems that may allow a facility to maintain a degree of operation while individual equipment is maintained or repaired. However, modularity should not automatically be mistaken for resilience: common infrastructure or balance-of-plant equipment can still affect wider operations.

The extent of redundancy within a project and the availability of replacement equipment can consequently influence both operational resilience and potential business interruption exposure.

For developers and their brokers, understanding how the physical design of a project translates into potential financial loss will therefore form an important part of the wider insurance discussion.



How will the facility actually be built?

The differences between DAC technologies also extend into construction.



Projects using modular construction may benefit from shorter construction timelines and the ability to complete work in stages. Greater factory assembly can also alter where construction risk is concentrated, shifting some exposures away from site construction towards transportation, lifting and installation.



Larger integrated DAC facilities may look quite different, potentially involving substantial civil works, process integration and multiple contractor interfaces.



Testing and commissioning will also be important. For an emerging technology, reaching mechanical completion does not necessarily demonstrate that the plant can achieve its intended capture performance reliably at commercial scale.

For insurers, understanding how a facility gets to commercial operation can therefore be just as important as understanding how it subsequently performs.

What are the environmental liability risks for DAC projects?

Although Direct Air Capture is fundamentally a carbon-removal technology, the facilities themselves may still introduce environmental risks. Different DAC processes use different materials to separate CO₂ from ambient air, creating differing process and material-handling considerations.

The nature of those materials, how they are stored and handled, and the potential consequences of an accidental release may therefore form part of the overall risk assessment.

Those considerations can extend beyond property damage into third-party and environmental liability exposures. The risk picture may also extend beyond the capture plant itself where DAC is integrated with CO₂ compression, downstream transportation or permanent geological storage.



How dependent is the facility on surrounding infrastructure?

Few DAC facilities operate as completely standalone assets, and their infrastructure dependencies can differ substantially.

Power is one obvious consideration. Depending on the technology and location, DAC projects may rely on grid electricity, dedicated or contracted renewable generation, heat sources or other energy infrastructure. Other projects may also have significant water, transportation or CO₂ storage requirements.

For brokers and insurers, the risk picture can therefore extend beyond whether the DAC equipment itself is reliable.

Dependencies on utilities and third-party infrastructure can influence operational resilience and business interruption exposure, including circumstances where an interruption elsewhere prevents a facility from operating normally.

Understanding those dependencies – and how they interact with the insured project – can consequently form an important part of assessing the overall risk.

Key insurance considerations for Direct Air Capture projects

Area	Insurance consideration
Technology maturity	Operational history and maturity of the technology
Plant design	Project configuration and use of established versus emerging technology
Critical equipment	Availability and replaceability of key equipment
Operational resilience	Redundancy and potential business interruption exposures
Construction	Construction methodology, transportation, installation and commissioning
Supply chain	Availability of replacement components and specialist equipment
Environmental exposure	Process materials and potential third-party or environmental liabilities
Infrastructure	Dependence on power, utilities and other supporting infrastructure

Understanding DAC insurance starts with understanding the project

Direct Air Capture presents an interesting challenge for insurers because individual projects can combine established industrial engineering with genuinely novel carbon-removal processes.

For developers and retail brokers, successful placement will depend on demonstrating not simply what the technology does, but how the facility is designed, constructed and operated.

For specialist wholesale brokers, that means beginning with an understanding of the engineering.

Building an appropriate picture of the technology, construction methodology and operational dependencies allows insurers to distinguish between risks they already understand and those where genuinely new exposures are being introduced.

As DAC moves further into commercial deployment, making that distinction will become increasingly important in developing insurance programmes capable of supporting projects through construction and operations. As the wider carbon-removal market develops, insurance solutions will similarly need to evolve alongside the technologies and projects they support.

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To learn more about how Amwins can help you place coverage for your clients, reach out to your local Amwins broker.

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