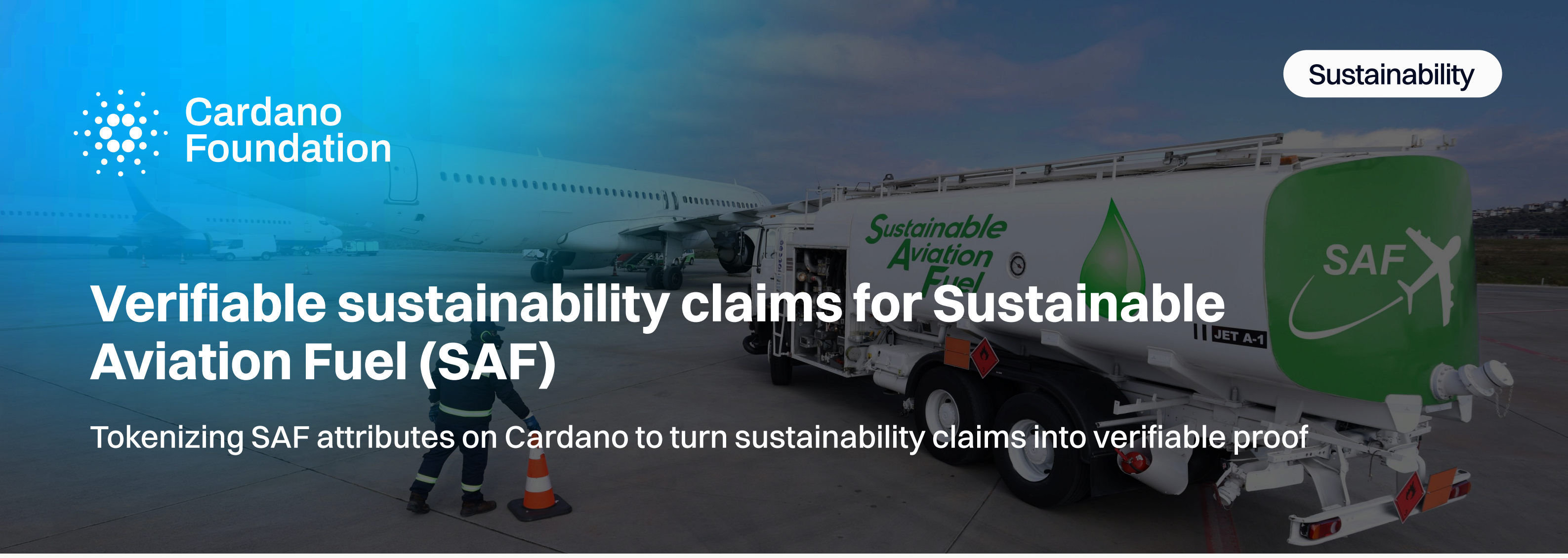
Cardano Foundation

Sustainability



Verifiable sustainability claims for Sustainable Aviation Fuel (SAF)

Tokenizing SAF attributes on Cardano to turn sustainability claims into verifiable proof

Challenge

Sustainable aviation requires credible proof

As aviation accelerates its transition toward lower-carbon operations, Sustainable Aviation Fuel (SAF) has emerged as a critical lever for emissions reduction. How much SAF is produced matters less than **whether the sustainability claims attached to it can be trusted.**

Traditional SAF certification relies on scattered documentation, siloed databases, and manual reconciliation across producers, airlines, and passengers. That fragmentation makes the process hard to audit and easy to exploit. **Double counting can go undetected, and traceability from origin to endpoint is the exception, not the norm.** Under a Book-and-Claim model, where environmental attributes are separated from the physical fuel itself, that trust gap widens further.

For the industry, a scaling SAF adoption means closing that divide. **The system needed to turn sustainability claims into something provable,** without adding operational friction or relying on a central authority to validate the data.

PETROBRAS

PUC RIO

Ledger Labs
Núcleo de Pesquisa em Blockchain e Criptoativos

Industry

- Oil and Gas (Energy)

Size

- USD 23.67 Billion (2026)[1]
- USD 28.82 Billion (2031)
- CAGR: 4.01% (2026-2031)

The challenge

- Fragmented SAF certification and reporting processes.
- Risk of double-counting environmental attributes.
- Limited auditability for regulators and third parties.
- Low transparency for airlines and passengers.

The solution

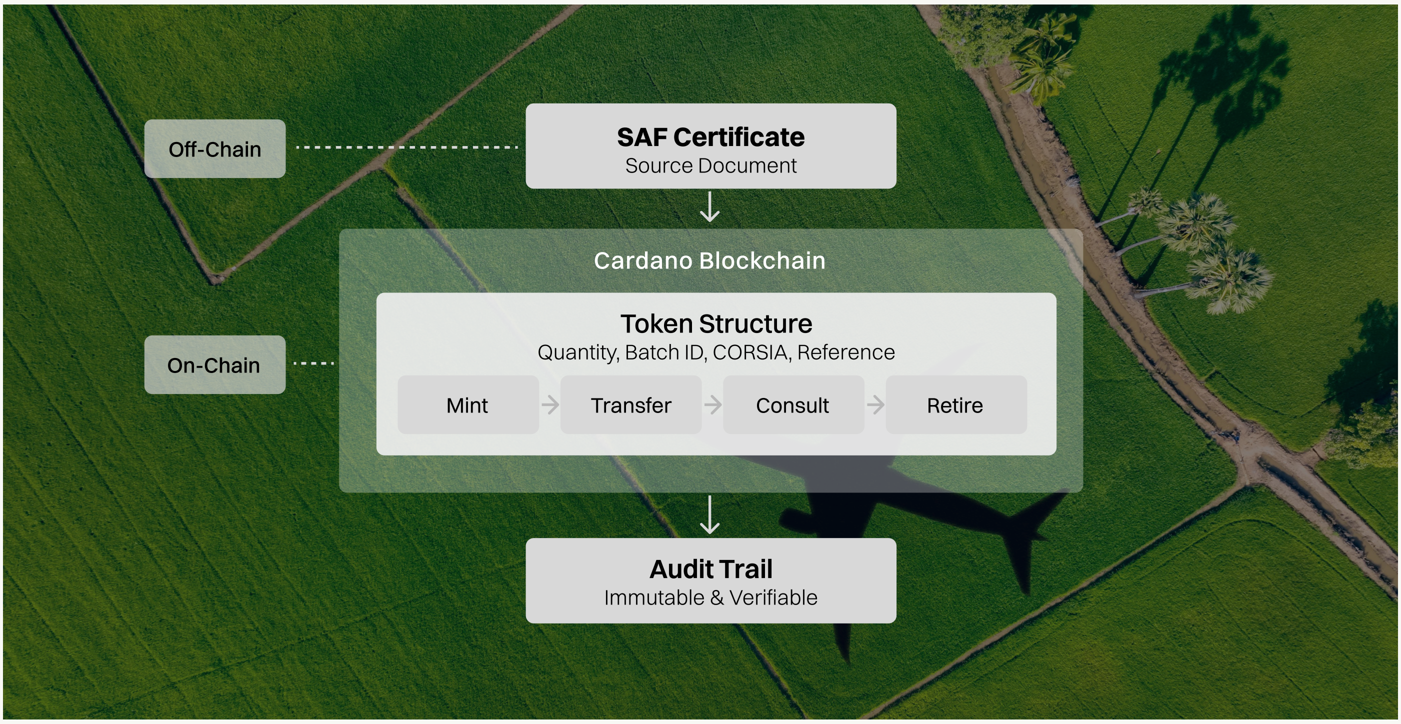
- Tokenization of SAF attributes on public blockchain.
- Book-and-Claim model with full traceability.
- Independent verification through on-chain tokens.
- Double-counting prevented through token retirement.

"The energy transition will depend as much on trust as it does on new fuels. As value chains become more complex, proving where environmental data comes from, how it moves, and who can rely on it becomes critical. Public blockchain gives us the opportunity to make that trust part of the system by design, providing industries with a shared, verifiable foundation for the next generation of energy markets"

Rafael Fraga
LATAM Business Development Lead, Cardano Foundation

Solution

Blockchain-based traceability for SAF attributes



As part of a research and development project, Petrobras, the Cardano Foundation, and PUC-Rio University's Ledger Labs built a platform to trace, certify, and manage Sustainable Aviation Fuel (SAF) attributes under a Book-and-Claim model. **Every verified SAF certificate is tokenized on Cardano,** creating a verifiable, auditable source of truth for environmental claims.

Each token, named CS-SAF, carries traceable metadata aligned with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). **These tokens can be minted, transferred, consulted, and retired,** keeping sustainability claims transparent, non-duplicative, and permanently auditable.

By anchoring SAF certification to public blockchain infrastructure, Petrobras establishes a scalable framework that **transforms sustainability reporting from trust-based assertions into verifiable data.**

Solution Walkthrough

PUC RIO

01. SAF certificates are validated against CORSIA and other recognized standards, confirming authenticity before they enter the system.

02. Verified certificates are converted into standardized tokens, each representing a defined quantity of SAF with embedded metadata.

03. Tokens are allocated to airlines or passenger journeys based on calculated emissions and route data, enabling transparent sustainability claims.

04. Individual passengers can also acquire and retire tokens directly through a dedicated application, receiving a certificate recording their name, route, distance, and token quantity.

05. Once claimed, tokens are permanently retired on-chain, preventing reuse and preserving a complete audit trail.

Results

A new standard for traceability and certification in energy

Verifiable sustainability claims
SAF attributes are recorded as immutable blockchain data, enabling independent verification of environmental claims.

Elimination of double-counting
Token retirement mechanisms ensure each SAF attribute can be claimed only once.

Improved stakeholder transparency
Airlines, passengers, and auditors gain clear visibility into SAF usage and associated emissions impact.

Operational scalability
The system supports automated minting, transfer, and retirement of SAF attributes without manual reconciliation.

Passenger-level access
Individual travelers can offset flight emissions directly, with neutralization verified through a certificate.

CARDANO Advantages

Proven resilience
Demonstrated security and reliability support continuous operation.

Scalable network
Future-proof infrastructure supports platform growth without sacrificing performance.

Secure data
Robust architecture protects sensitive data, minimizing the risk of breaches or fraud.

Sustainable operations
Energy-efficient consensus and ethical governance align with sustainability efforts.

Source
[1] Brazil Oil And Gas Market Size and Share

Cardano Foundation

The Cardano Foundation is an independent, Swiss-based not-for-profit advancing Cardano as a public digital infrastructure across a wide range of industries.

Contact us

cardanofoundation.org