

Material traceability for increased circularity in the **Chemical Industry**

A blockchain-based mass balance approach
using GreenToken by SAP





GreenToken by SAP is an end-to-end supply chain traceability and transparency solution focusing on commingled, hard-to-trace raw materials such as waste plastics recycled by mechanical and chemical means to new circular plastic and other products.

By leveraging the principles of tokenization, mass balance, and blockchain for chain of custody, GreenToken enables visibility of any one or more unique attributes (such as origin, circularity status or carbon footprint) of raw materials across global supply chain networks. GreenToken strives to create accountability and transparency across many kinds of material supply chains. The solution is designed to be industry-agnostic and has been successfully proven for various types of material flows in global supply chain networks including circular plastics.

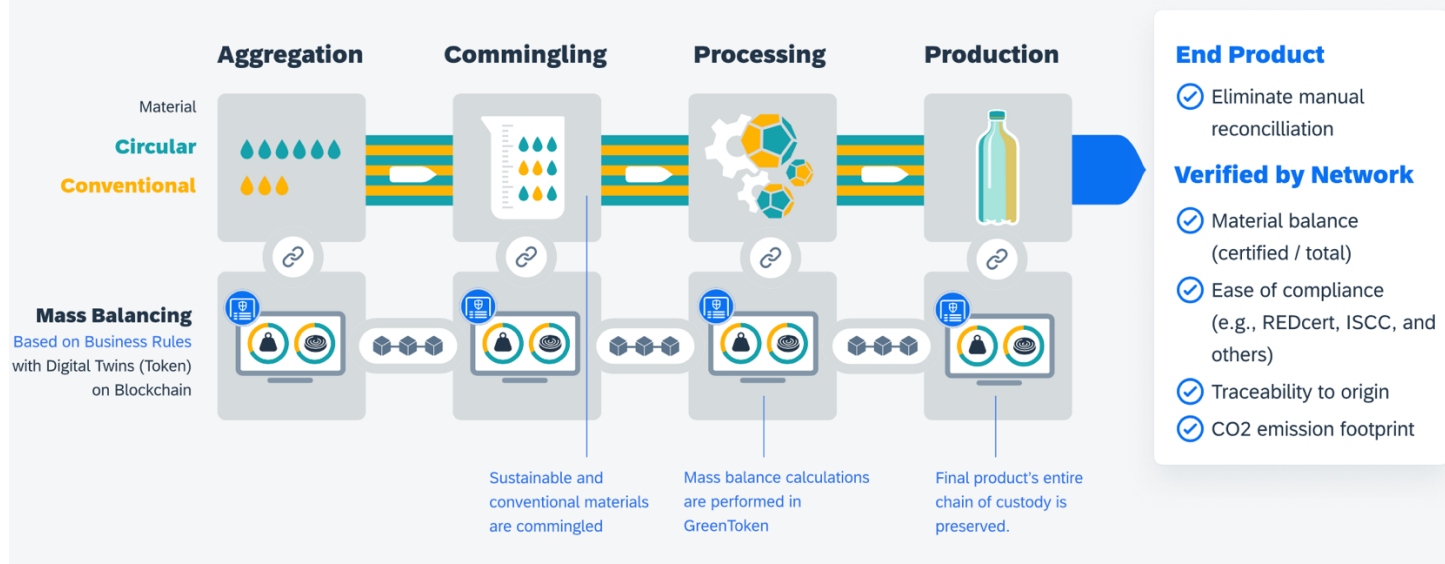
GreenToken has two main applications. Firstly, it can be used as a stand-alone internal solution to manage mass balance accounting and certification compliance and processes (for example, REDcert2 and ISCC PLUS) for tracking sustainability data and credits in raw materials, components, and products. Furthermore, GreenToken can be leveraged as an end-to-end supply chain traceability and transparency network solution.

Overall, GreenToken's benefits can be maximized by onboarding the supply chain network. All members of a supply chain do not have to join at once and can be phased in over time. Those who have joined will be afforded the ability to substantiate and audit their sustainability claims and visibility into volume origins while the remaining network can continue to use existing practices until onboarded.

GreenToken starts at the first point of aggregation, which is the point in the supply chain where various streams of materials from different origins with different unique attributes are identified and commingled. In order to ensure that visibility is not lost at this stage, a digital twin in the GreenToken system is created by the aggregator in the form of a token that represents a (configurable) unit of the physical material and captures its unique multi-attributes. Via the token, GreenToken is able to account for materials in a bulk traceability approach. This token mirrors the mass balance material flow of physical materials throughout the supply chain. All captured information (attributes) is collected and linked to the digital twin, even as physical materials are further commingled, refined, and processed as it moves along the supply chain.

Tokens are transferred from suppliers to down-stream partners to match the quantity of physical material delivered. The transfer of tokens from suppliers to buyers allows the valuable attributes related to the material to travel down the supply chain and its members. The certification claim represented by the tokens can be configured flexibly depending on the needs of the supply chain network and the requirements of the applied standard(s).

Basic principle for material and token flow
using the example of the chemical industry



By using a decentralized and immutable blockchain network to underpin transactions and enforce rules such as 'no double counting', all supply chain members are guaranteed process transparency and auditability while being assured of data privacy. Furthermore, while GreenToken applies organization specific parameters around the flow and conversion of materials (such as yield loss and conversion factors), this information remains privately stored in the organization's GreenToken instance and is not accessible to other supply chain members unless explicitly shared. Thus, each supply chain member controls their own data. GreenToken has been designed to accommodate a wide range of supply chains with different levels of transparency, hence there exist organization- and network wide configurations to ensure confidentiality is upheld.

Key Capabilities



Certification

Intra-Organization sustainability credits and **audit reporting to ISCC** and other certification standards. Provides scope 3 CO2 emissions tracking.



Mass Balance

SaaS solution that uses **mass balance** and tokenization on a **block-chain** ledger to create a **chain of custody** for materials to their origin.



Trust & Transparency

Data sharing while ensuring **data privacy and process transparency** through a distributed blockchain network with partner to partner communication.

As a result, the supply chain network and its stakeholders not only create transparency that allows them to verify and report on the certified sustainable or circular status of the materials they receive, but the token transfer from one party to the next builds up an



immutable and secured chain of custody based on the mass balance material movements.

The information provided by the platform provides organizations the ability to measure their performance against sustainability KPIs and make informed decisions on how to better meet circular, sustainability, ethical, recycled, and other commitments in their supply chain network. Ultimately, GreenToken can help accelerate the shift to certified sustainable material usage.

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NEW White Paper ONLINE
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