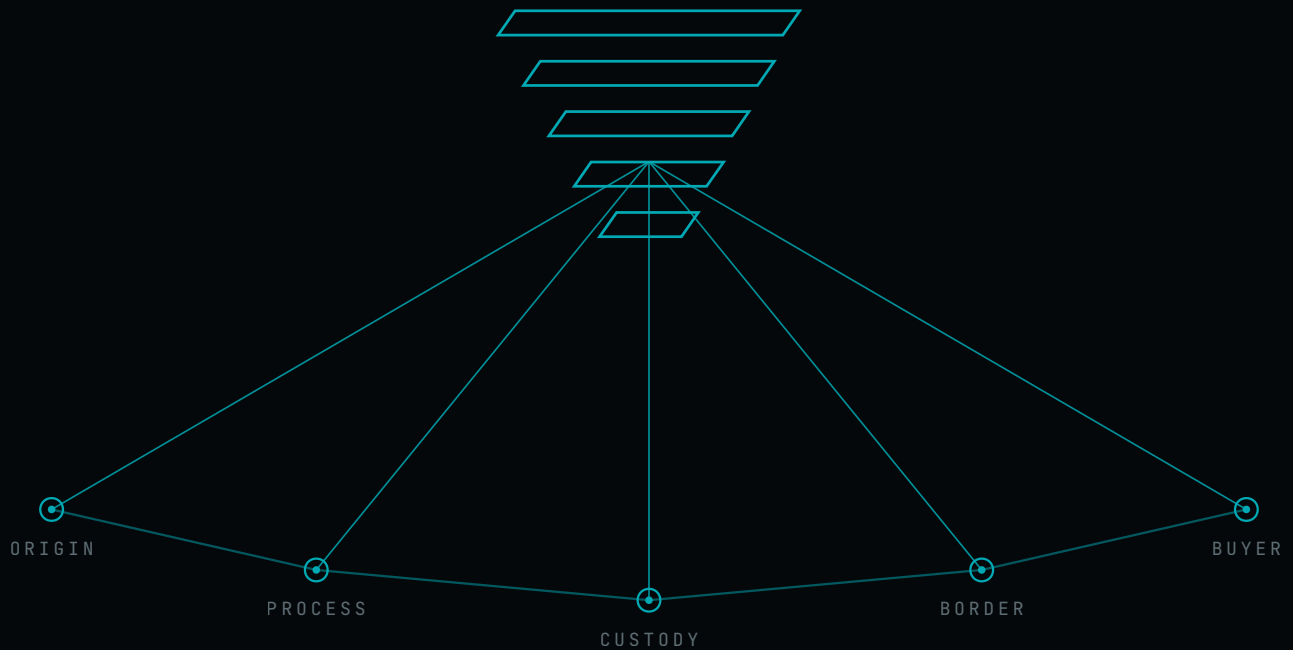


WHITEPAPER, 2026 EDITION

The Verifiable Supply Chain.



VOLUM

VERIFIABLE ORIGIN INFRASTRUCTURE

VOLUM LLC, WYOMING USA
ENGLISH, 30 PAGES

VOLUM WHITEPAPER

The Verifiable Supply Chain.

On regulated global trade, the collision between paper documentation and machine-readable regulation, and the platform architecture Volum has been built against.



VOLUM LLC, WYOMING USA
WHITEPAPER, 2026 EDITION
ENGLISH, 30 PAGES

COLOPHON AND NOTICES

DOCUMENT

The Verifiable Supply Chain. Volum Whitepaper, 2026 Edition. Published by Volum LLC, Cheyenne, Wyoming, United States.

OPERATING ENTITY

Volum LLC, a Wyoming limited liability company. The Volum Blockchain Platform is operated by Volum LLC under exclusive commercial licence of U.S. Patent 11,522,690 B2.

PATENT NOTICE

US Patent 11,522,690 licensed to Volum LLC. Bengala Technologies LLC, patent owner. U.S. Patent 11,522,690 B2, "Supply chain management system", filed 7 June 2019, granted 6 December 2022.

TOKEN

VLM is a fixed-supply ERC-20 utility token used to meter operations on the Volum platform. Maximum supply 320,000,000. Non-mintable, no further issuance. VLM is not marketed as an investment.

CONTRACT

Ethereum mainnet, ERC-20 standard.
0xe47396A2D91f521ae3fC5d3fbD9393FA4ee31A8F

STANDARDS

GS1 EPCIS 2.0 for the event model. W3C Verifiable Credentials 2.0 for the credential format. UNCITRAL Model Law on Electronic Transferable Records for electronic transferable records.

TYPOGRAPHY

Fraunces for display and text serif, Inter for body sans, JetBrains Mono for identifiers, references, and folios. Nevis for the VOLUM wordmark. Set on a twelve column grid, A4.

SOURCES

Every quantitative and regulatory claim in this paper is sourced from a primary regulator or an equivalent primary body. Section 08 lists the specific documents relied upon.

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This paper is a working document, provided for the information of institutional operators, regulators, and their advisers. Nothing in this paper constitutes investment advice, legal advice, or an offer to sell any digital asset. VLM is not marketed as an investment. Volum LLC does not solicit purchases of VLM and does not offer VLM through this site. Any person considering interaction with a digital asset should consult their own qualified legal, tax, and financial advisers in their jurisdiction.

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The argument in eight parts.

Each paragraph below is the opening statement of the section it introduces, reproduced without change. The sections that follow set out the regulatory record, the architecture, the standards, and the operating position in full.

01

THE PROBLEM

Every regulated import in the world today asks the same question, in a different form. Where did this come from, who touched it, under what conditions. The answer still travels as a PDF attachment, a retyped spreadsheet, and a stamped form that no downstream party can independently verify.

02

THE REGULATORY FRAME

The pattern is now consistent across trading blocs. Each authority has adopted its own vocabulary and its own signature framework, but the underlying requirement, a machine-readable, cryptographically verifiable claim about the origin and condition of a physical shipment, is identical.

03

THE VOLUM ARCHITECTURE

Volum runs as a supply-chain execution layer with five internal layers. Every shipment binds to one object identity. Every event references that identity. The record does not fragment across parties or across borders.

04

STANDARDS ALIGNMENT

A proprietary schema that does not conform to the standards used by GS1-registered retailers, MLETR-aligned carriers, or standards-compliant regulators cannot participate in the wider network. Volum implements the two governing standards natively.

FIGURE 01. WRITE ONCE, READ MANY

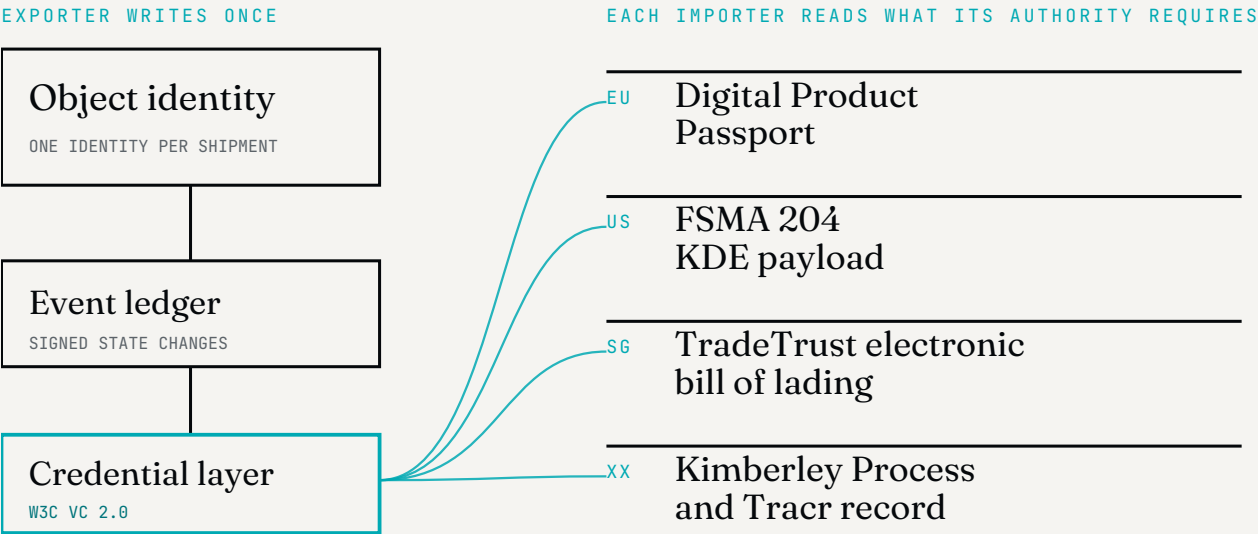


Figure 01. One object identity, four jurisdiction-specific views. The exporter writes once. Each importer reads what its authority requires. Instruments named as in sections 02, 03, and 04 of this paper.

- 05

VERTICAL PLAYBOOKS

Each of the eight verticals where Volum operates has a specific documentary problem, a specific regulatory instrument, and a specific practical workflow. The platform is deployed against the vertical, not against a general theory of trade.
- 06

VLM UTILITY FRAMEWORK

VLM is a fixed-supply ERC-20 utility token used to meter operations on the Volum platform. It is not marketed as an investment. Volum LLC does not solicit purchases of VLM and does not offer VLM through the platform or website.
- 07

GOVERNANCE AND OPERATING MODEL

The Volum Blockchain Platform is operated by Volum LLC, a Wyoming limited liability company, under exclusive commercial license of U.S. Patent 11,522,690 B2, granted on 6 December 2022 to Bengala Technologies LLC.
- 08

SOURCES AND CITATIONS

Every quantitative and regulatory claim in this paper is sourced from a primary regulator or an equivalent primary body. This section lists the specific documents relied upon.

01

Paper origin has run out of room.

Every regulated import in the world today asks the same question, in a different form. Where did this come from, who touched it, under what conditions. The answer still travels as a PDF attachment, a retyped spreadsheet, and a stamped form that no downstream party can independently verify.

The paper Certificate of Origin, in its familiar form, was designed for a world in which a shipment crossed one or two borders and was inspected by one or two authorities. That world does not exist anymore.

INSTRUMENT

C00 / paper
Issued per border
Not machine readable

A modern commodity shipment is now subject to four to seven separate origin instruments, each interpreted by a different authority, each with its own vocabulary, its own signature framework, and its own binding date. A container of coffee cleared into Germany in late 2026 must satisfy the EU Deforestation Regulation, must be legible to the customs authority in the port of Hamburg, must satisfy the buyer under its own supplier code, must be readable by the retailer running an EPCIS 2.0 event feed, and must satisfy the auditor at year end. A single paper certificate cannot carry that weight.

The consequence, across a global trade volume, is that the world has been quietly filing the same origin claim four or five times, in incompatible formats, at each stage of the chain. The declared purpose of digital passports and machine-readable trace obligations is to end that duplication. The declared purpose has now been written into binding regulation in every major trading bloc.

7,325

U.S. shipments held by CBP under UFLPA, FY2025

Feb 2027

EU Battery DPP mandatory for cells over 2 kWh

Fig. 01, sources: U.S. Customs and Border Protection UFLPA enforcement statistics FY2025; European Commission Regulation 2023/1542 (EU Battery Regulation), Article 77 and Annex XIII.

Verifiable origin is no longer a European story. Every major trading bloc has now dated a verifiable origin instrument into law. The instruments differ. The demand is identical.

Four failure modes of the paper certificate.

The paper Certificate of Origin fails in four specific and now regulated ways.

It is issued in a form no downstream system can read. A PDF or stamped booklet requires a human to open it, and no downstream party can verify it without contacting the issuer.

It can be re-typed, altered, or forged. Origin fraud is a documented multi-billion-dollar problem across coffee, cotton, minerals, seafood, and gold.

It is re-issued at every border. Each customs desk asks for its own paper, in its own format, in its own language, delaying release and multiplying handling cost.

It carries only one field of information. Modern regulations require geolocation, due diligence statements, and composition data. Paper cannot carry that volume of structured information.

02

Dated in every jurisdiction.

The pattern is now consistent across trading blocs. Each authority has adopted its own vocabulary and its own signature framework, but the underlying requirement, a machine-readable, cryptographically verifiable claim about the origin and condition of a physical shipment, is identical.

REGION	INSTRUMENT	IN FORCE	REQUIREMENT SUMMARY
European Union	Battery Regulation DPP (EU 2023/1542)	18 Feb 2027	Machine-readable passport for every EV, LMT, and industrial battery over 2 kWh. Unique identifier, carbon footprint, recycled content.
European Union	Deforestation Regulation (EU 2023/1115)	30 Dec 2026	Geolocated deforestation-free due diligence for beef, soy, coffee, cocoa, palm, rubber, timber.
European Union	CBAM definitive regime	1 Jan 2026	Verified embedded-emissions data with priced allowances at import for steel, aluminium, cement, fertilizer, hydrogen, electricity.
European Union	Textiles ESPR delegated act	2027	Digital passport for apparel and footwear under the Ecodesign for Sustainable Products Regulation.
United States	CBP enforcement, UFLPA	Active, FY2025	Rebuttable presumption on forced-labor origin, 7,325 shipments held in FY2025. Certificate alone does not clear.
United States	FDA DSCSA electronic tracing	2026 stabilization	Package-level interoperable trace for prescription drugs across manufacturers, distributors, dispensers.
United States	FSMA 204 food traceability	20 Jul 2028	Federal deadline. Retailer mandates (Walmart, August 2025) already binding practical timeline.
Singapore	IMDA TradeTrust framework	Live 2026	Legally recognised electronic trade documents interoperable across jurisdictions under UNCITRAL MLETR.

REGION	INSTRUMENT	IN FORCE	REQUIREMENT SUMMARY
Korea	K-DPP battery pilot	Q2 2026	National pilot aligned to EU Battery Regulation for exports into the EU market.
Australia	Modern Slavery Act reporting	Active	Reporting obligation for entities over AUD 100m turnover, with proposed civil penalties from 2025 review.
Global diamonds	Kimberley Process, De Beers Tracr, GIA stake	Active, 2026	Government paper certification supplemented by industry-owned blockchain provenance.
Global shipping	IMO Net-Zero Framework	Approved 2025	Global fuel standard and emissions pricing for international shipping.

Table 02, sources: European Commission Regulations 2023/1542, 2023/1115, 2023/956; U.S. CBP UFLPA statistics FY2025; U.S. FDA DSCSA guidance; IMDA Singapore TradeTrust framework; International Maritime Organization MEPC 83; Kimberley Process Certification Scheme.

The four vocabularies now settled are: Digital Product Passport (EU), Key Data Elements (U.S.), electronic transferable record (Commonwealth), and industry-owned provenance (diamonds and select minerals). The underlying data is the same. The reader is jurisdiction-specific.

United States: interoperable Key Data Elements.

The U.S. approach is not a passport. It is an event-based traceability model built around Critical Tracking Events and Key Data Elements shared across the whole chain, in a format the responsible authority can query within twenty-four hours. FSMA 204 codifies this for food. DSCSA codifies it for prescription drugs. UFLPA enforcement rests on it operationally.

VOCABULARY

Key Data Elements
Critical Tracking Events
24 hour response window

European Union: the Digital Product Passport family.

The EU approach is a persistent unique identifier per product, machine-readable, hosted by the economic operator, verifiable by any market surveillance authority in the internal market. The Battery Regulation is the first binding implementation. Textiles, tyres, aluminium, electronics, and cement follow through 2028 under the Ecodesign for Sustainable Products Regulation.

VOCABULARY

Digital Product Passport
Persistent unique identifier

Commonwealth and Singapore: MLETR-aligned electronic transferable records.

Singapore, the United Kingdom, and a growing set of Commonwealth jurisdictions have adopted the UN Model Law on Electronic Transferable Records. This gives legal recognition to electronic bills of lading, warehouse receipts, and negotiable trade instruments, and it gives them cross-border reciprocity between the participating jurisdictions.

Global diamonds: industry-owned provenance.

The mined-diamond value chain has settled a hybrid model. Government certification (Kimberley Process) continues at the state level, supplemented by industry-owned blockchain provenance (Tracr, in which the Gemological Institute of America now holds a stake). For high-value stones, the industry-owned provenance record has effectively become the buyer-facing instrument.

FIGURE 03. THE REGULATORY FLOOR, 2026 TO 2028

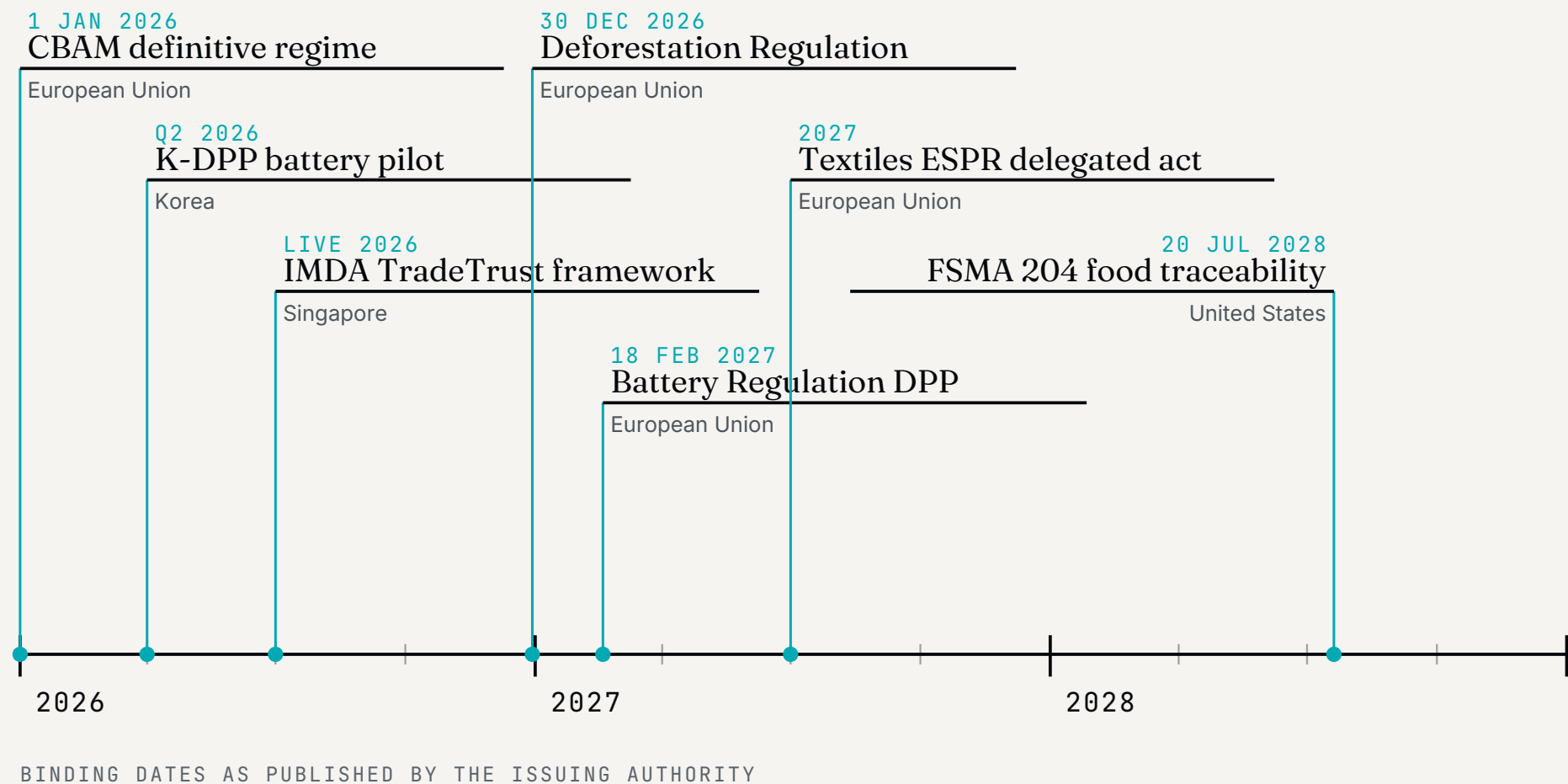


Figure 03. Binding dates for the instruments listed in the table in section 02, plotted on a single axis. Sources: European Commission Regulations 2023/1542, 2023/1115, 2023/956, and 2024/1781; U.S. FDA Food Safety Modernization Act Section 204; Infocomm Media Development Authority Singapore TradeTrust framework; Republic of Korea Ministry of Trade, Industry and Energy K-DPP battery pilot programme.

03

One shared record. Five layers against it.

Volum runs as a supply-chain execution layer with five internal layers. Every shipment binds to one object identity. Every event references that identity. The record does not fragment across parties or across borders.

FIGURE 02. THE FIVE LAYERS

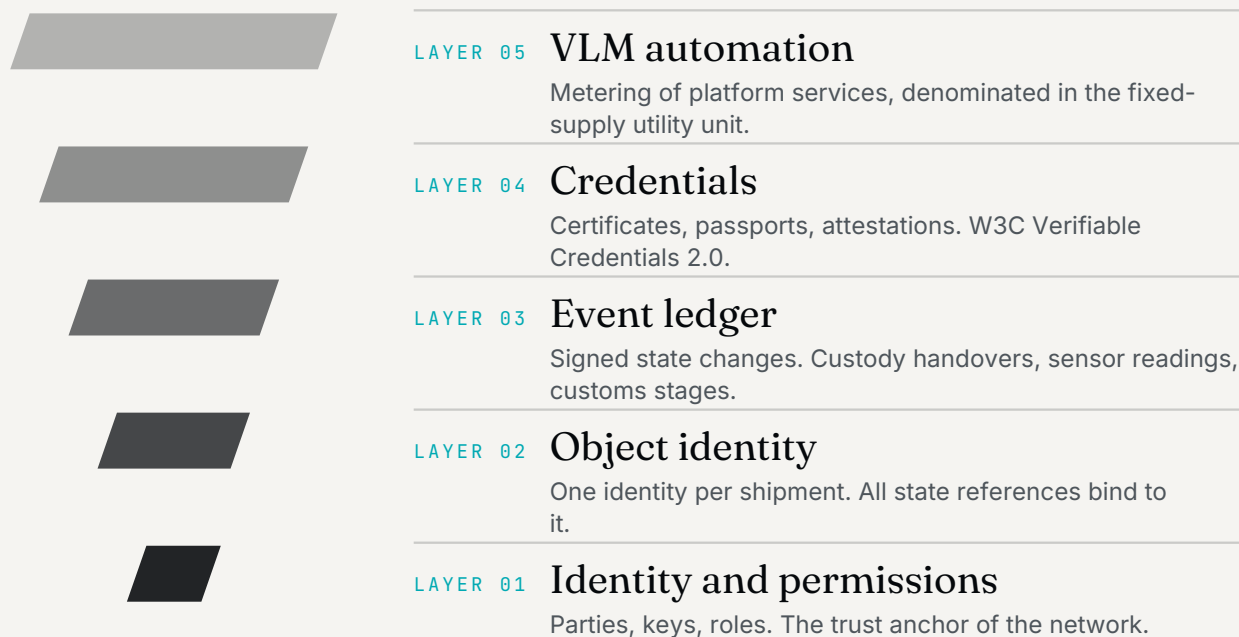


Figure 02. The five internal layers of the Volum platform, set into the VOLUM mark. Layer names and descriptions as given in this section.

The five-layer separation is the discipline that makes the platform operable in regulated markets. Nothing that would create a GDPR or commercial-confidentiality exposure is written to the shared ledger. What is on the ledger is what needs to be independently verifiable. Everything else is encrypted and shared bilaterally, addressed by cryptographic anchor.

Object identity is the load-bearing element.

The reason most supply-chain blockchain projects failed between 2018 and 2022 was that they treated a shipment as a series of documents. Volum treats a shipment as an object. Every document is a statement about that object. Every event is a change of state on that object. This is what allows a customs officer in Hamburg and a buyer in Osaka to read the same record.

DESIGN RULE

A shipment is an object,
not a stack of documents

STORAGE DISCIPLINE

On chain: object identity, event ledger, credential anchors, hashes. Off chain and encrypted: commercial documents, pricing, party-specific detail. Bilateral: buyer-supplier deep data with mutual encryption keys. Public: certificate anchors, revocation lists, standards manifests.

The event ledger is the audit trail.

Each state change on the ledger is a signed event, timestamped, addressed by the shipment object identity, and attributable to the party that produced it. Reconciliation at period end does not exist as a separate function. The ledger is the audit trail. The auditor reads what happened, in the order it happened, signed by the party responsible.

The credential layer issues instruments per jurisdiction.

The same underlying record produces the specific instrument each jurisdiction demands. An EU Battery DPP, a U.S. FSMA 204 KDE payload, a Singapore TradeTrust electronic bill of lading, and a Kimberley Process supplemented Tracr provenance record are all views of the same object. The exporter writes once. Each importer reads what its authority requires.

04

GS1 EPCIS 2.0 and W3C VC 2.0.

A proprietary schema that does not conform to the standards used by GS1-registered retailers, MLETR-aligned carriers, or standards-compliant regulators cannot participate in the wider network. Volum implements the two governing standards natively.

GS1 EPCIS 2.0 as the event model.

GS1 Electronic Product Code Information Services 2.0, ratified in 2022¹, defines the event model, Core Business Vocabulary, and REST APIs that let trade partners share visibility data regardless of the underlying platform. Every event Volum writes is native EPCIS 2.0. Retailers running an EPCIS event feed, regulators subscribing to a supply-chain visibility service, and certification bodies auditing an operation all read Volum data without adaptation.

W3C Verifiable Credentials 2.0 as the credential format.

The World Wide Web Consortium published Verifiable Credentials 2.0 as a Recommendation in May 2025². The specification defines a tamper-evident issuer, holder, verifier model with cryptographic proofs. Volum Certificates of Origin, Digital Product Passports, and equivalent instruments are issued as W3C VC 2.0 credentials. The verifier does not receive a photocopy of an earlier document. It receives the object itself.

UNCITRAL MLETR for electronic transferable records.

The Model Law on Electronic Transferable Records provides the legal framework for electronic bills of lading, promissory notes, and negotiable trade instruments³ to have the same legal effect as their paper equivalents. Volum operates within this framework in every jurisdiction that has adopted it, including Singapore, Bahrain, Papua New Guinea, and the United Kingdom under the Electronic Trade Documents Act 2023.

¹ GS1 Electronic Product Code Information Services 2.0 specification, ratified 2022.

² World Wide Web Consortium, Verifiable Credentials Data Model 2.0, Recommendation of 15 May 2025.

³ United Nations Commission on International Trade Law, Model Law on Electronic Transferable Records.

FIGURE 04. THE CERTIFICATE AS AN OBJECT



Figure 04. Field structure of a Volum Certificate of Origin. Braced entries are field slots, not values: no specimen data is shown. Field names follow the credential and event layers described in sections 03 and 04. The code resolves to the public verification endpoint.

05

From batteries to diamonds.

Each of the eight verticals where Volum operates has a specific documentary problem, a specific regulatory instrument, and a specific practical workflow. The platform is deployed against the vertical, not against a general theory of trade.

Batteries and industrial cells.

The EU Battery Regulation, in force from 18 February 2027 for EV, LMT, and industrial batteries over 2 kWh⁴, requires a machine-readable passport carrying unique identifier, carbon footprint, recycled content, materials origin, and end-of-life instructions. Korea has aligned its K-DPP battery pilot. China is developing its own equivalent. Volum issues the passport at the cell manufacturer, binds it to the pack assembly, and carries it through export.

Apparel and textiles.

The Uyghur Forced Labor Prevention Act creates a rebuttable presumption in U.S. Customs practice on any cotton, tomato, or polysilicon touched by Xinjiang production. 7,325 shipments were held under this framework in FY2025.⁵ Certificate of Origin alone does not clear. Volum records geolocated ginning, spinning, and weaving events, binds them to the finished garment, and produces the raw-material origin evidence CBP requests.

Coffee, cocoa, and EUDR commodities.

The EU Deforestation Regulation, in force from 30 December 2026 for large operators⁶, requires geolocated plot data and a due diligence statement for beef, soy, coffee, cocoa, palm, rubber, and timber. Volum records plot-level data at the cooperative, binds it to the lot, and carries it through the exporter, importer, and roaster to the retailer.

Pharmaceuticals.

The Drug Supply Chain Security Act requires package-level interoperable electronic tracing across manufacturers, distributors, and dispensers. Volum operates as an EPCIS 2.0 layer for U.S. pharmaceutical distribution, with signed events at every custody handover.⁷

Food and grocery.

FSMA 204, the U.S. Food Traceability Rule, requires event-based tracing on a set of high-risk foods with a federal deadline of 20 July 2028⁸.

⁴ Regulation (EU) 2023/1542 of 12 July 2023 concerning batteries and waste batteries, Article 77 and Annex XIII.

⁵ U.S. Customs and Border Protection, Uyghur Forced Labor Prevention Act Statistics, FY2025.

⁶ Regulation (EU) 2023/1115 of 31 May 2023 on the making available on the Union market of certain commodities and products associated with deforestation and forest degradation.

⁷ U.S. Food and Drug Administration, Drug Supply Chain Security Act Implementation Plan and Stabilization Period Guidance.

⁸ U.S. FDA Food Safety Modernization Act, Section 204, Requirements for Additional Traceability Records for Certain Foods.

Walmart supplier mandates have made the standard practically binding since August 2025. Volum operates as the interoperable KDE layer for suppliers to major U.S. retailers.

Diamonds and precious materials.

The Kimberley Process operates as government paper certification. De Beers Tracr, in which the Gemological Institute of America now holds a stake, operates as industry-owned provenance for individually identified stones.⁹ Volum records refinery due diligence, OECD-aligned conflict-mineral evidence, and buyer-side attestations bound to the stone identity.

Critical minerals.

Lithium, cobalt, nickel, and rare earths are subject to a growing set of allied-market origin requirements, from the U.S. Inflation Reduction Act clean-vehicle credit sourcing rules to the EU Critical Raw Materials Act. Volum records documented non-China provenance for allied-market battery, defence, and electronics buyers.

Cross-border trade generally.

Post section-321 suspension, formal entry documentation is now required in the United States at a scale legacy tools cannot support. Volum operates as the electronic entry documentation layer for high-volume importers.

⁹ De Beers Group, Tracr platform documentation; Gemological Institute of America announcements on Tracr participation.

06

A metering unit for the platform.

VLM is a fixed-supply ERC-20 utility token used to meter operations on the Volum platform. It is not marketed as an investment. Volum LLC does not solicit purchases of VLM and does not offer VLM through the platform or website.

Role on the platform.

VLM is consumed by services that write to the shared ledger. Each signed shipment event, custody handover, or IoT reading anchored to the ledger consumes a fractional VLM unit against the underlying network resource cost. Certificate issuance, revocation, and amendment are metered to the issuer. Smart-contract execution for programmable routing, escrow release, and multi-party approvals is denominated in VLM. High-frequency read access to aggregated network views is metered to institutional consumers of the data.

SUPPLY

320,000,000 VLM
ERC-20, non-mintable
Contract 0xe473...96A2...
Ethereum mainnet

Fiat abstraction at the interface.

Enterprise customers pay a subscription or per-shipment fee, denominated in USD or EUR. The platform handles VLM metering internally. Requiring a warehouse operator, a compliance officer, or a customs desk to hold, exchange, or price a digital asset would defeat the point of the platform.

VLM TOKEN FACTS

Type: fixed-supply utility token / Standard: ERC-20 / Ticker: VLM / Network: Ethereum mainnet / Maximum supply: 320,000,000 / Mint policy: non-mintable, no further issuance / Consumption: metering of platform services

Historical U.S. legal analysis.

The VLM utility framework was reviewed against U.S. Securities Act tests by independent counsel in May 2019, applying the investment-contract framework from SEC v. W.J. Howey Co., 328 U.S. 293 (1946). That analysis, addressed to a predecessor entity (Volum Holdings Ltd, Tortola BVI), concluded that the utility structure did not present the characteristics of a security under U.S. law at that time. The analysis is retained on the Volum site as part of the historical record of the project. It is not current legal advice and does not address any jurisdiction other than the United States, any legal framework other than federal securities law, or any product structure adopted after May 2019.

Volum LLC, Wyoming USA.

The Volum Blockchain Platform is operated by Volum LLC, a Wyoming limited liability company, under exclusive commercial license of U.S. Patent 11,522,690 B2, granted on 6 December 2022 to Bengala Technologies LLC.

Patent and licence.

U.S. Patent 11,522,690 B2 was filed on 7 June 2019 and granted on 6 December 2022.¹⁰ The specification covers a blockchain database maintained by network nodes, tokens held in that database, smart contracts executed on state changes, ERC-20 and ERC-721 token formats, hybrid public and consortium chain architecture, and data spanning payments, purchase orders, compliance, taxation, shipment management, Letters of Origin, customs documents, inventory, parcel tracking, IoT, analytics, and end-product traceability.

Bengala Technologies LLC holds the patent. Volum LLC operates the platform under exclusive commercial licence for supply-chain applications. Bengala does not itself operate the platform.

Network validators and issuer accreditation.

Consortium validators are drawn from participating operators, regulators, and standards bodies. Issuer accreditation is administered by a rotating council of standards-aligned issuers, with revocation policy governed by a published framework and recorded on the shared ledger.

Design partner programme.

Volum is currently onboarding a small number of design partners against specific 2026 and 2027 regulatory deadlines. Priority is given to importers, forwarders, regulators, and institutional buyers of provenance data with volume commitments against a named regulatory instrument.

¹⁰ United States Patent and Trademark Office, Patent 11,522,690 B2, "Supply chain management system", filed 7 June 2019, granted 6 December 2022, assignee Bengala Technologies LLC.

08

Primary sources.

Every quantitative and regulatory claim in this paper is sourced from a primary regulator or an equivalent primary body. This section lists the specific documents relied upon.

EUROPEAN UNION

Regulation (EU) 2023/1542 of 12 July 2023 concerning batteries and waste batteries (EU Battery Regulation). Regulation (EU) 2023/1115 of 31 May 2023 on the making available on the Union market of certain commodities and products associated with deforestation and forest degradation (EUDR). Regulation (EU) 2023/956 of 10 May 2023 establishing a carbon border adjustment mechanism (CBAM). Regulation (EU) 2024/1781 of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products (ESPR).

UNITED STATES

U.S. Customs and Border Protection, Uyghur Forced Labor Prevention Act Statistics, FY2025. U.S. Food and Drug Administration, Drug Supply Chain Security Act Implementation Plan and Stabilization Period Guidance. U.S. FDA Food Safety Modernization Act, Section 204, Requirements for Additional Traceability Records for Certain Foods.

SINGAPORE, COMMONWEALTH, AND ASIA-PACIFIC

Infocomm Media Development Authority Singapore, TradeTrust reference implementation and legal framework. United Nations Commission on International Trade Law, Model Law on Electronic Transferable Records. Republic of Korea Ministry of Trade, Industry and Energy, K-DPP battery pilot programme.

DIAMONDS AND PRECIOUS MATERIALS

Kimberley Process Certification Scheme, KPCS Core Document. De Beers Group, Tracr platform documentation. Gemological Institute of America announcements on Tracr participation.

SHIPPING AND INTERNATIONAL

International Maritime Organization, Marine Environment Protection Committee 83rd session outcomes on the Net-Zero Framework.

STANDARDS BODIES

GS1 Electronic Product Code Information Services 2.0 specification, ratified 2022. World Wide Web Consortium, Verifiable Credentials Data Model 2.0, Recommendation of 15 May 2025.

VOLUM PATENT

United States Patent and Trademark Office, Patent 11,522,690 B2, "Supply chain management system", filed 7 June 2019, granted 6 December 2022, assignee Bengala Technologies LLC.

NOTICE

This paper is a working document, provided for the information of institutional operators, regulators, and their advisers. Nothing in this paper constitutes investment advice, legal advice, or an offer to sell any digital asset. VLM is not marketed as an investment. Volum LLC does not solicit purchases of VLM and does not offer VLM through this site. Any person considering interaction with a digital asset should consult their own qualified legal, tax, and financial advisers in their jurisdiction.

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A

Technical architecture reference.

Volum runs as a supply-chain execution layer with five internal layers. Every shipment binds to one object identity. Every event references that identity. The record does not fragment across parties or across borders.

A.1 LAYERS

LAYER	NAME	FUNCTION
Layer 05	VLM automation	Metering of platform services, denominated in the fixed-supply utility unit.
Layer 04	Credentials	Certificates, passports, attestations. W3C Verifiable Credentials 2.0.
Layer 03	Event ledger	Signed state changes. Custody handovers, sensor readings, customs stages.
Layer 02	Object identity	One identity per shipment. All state references bind to it.
Layer 01	Identity and permissions	Parties, keys, roles. The trust anchor of the network.

A.2 STORAGE DISCIPLINE

On chain	object identity, event ledger, credential anchors, hashes
Off chain and encrypted	commercial documents, pricing, party-specific detail
Bilateral	buyer-supplier deep data with mutual encryption keys
Public	certificate anchors, revocation lists, standards manifests

Appendix A. Layer names, functions, and storage discipline as stated in section 03 of this paper. Nothing that would create a GDPR or commercial-confidentiality exposure is written to the shared ledger.

B

Standards mapping.

Two open standards do the interoperability work. Everything else is scoped to those two shapes. The tables below map each standard and each instrument to the function it performs and the date on which it binds.

B.1 The two carrying standards.

STANDARD OR INSTRUMENT	FUNCTION	STATUS	SCOPE AS STATED IN THIS PAPER
GS1 EPCIS 2.0	Event model, Core Business Vocabulary, REST APIs	Ratified 2022	Every event Volum writes is native EPCIS 2.0.
W3C Verifiable Credentials 2.0	Credential format, issuer, holder, verifier model	Recommendation, 15 May 2025	Certificates of Origin, Digital Product Passports, and equivalent instruments are issued as W3C VC 2.0 credentials.
UNCITRAL MLETR	Legal framework for electronic transferable records	Model Law	Adopted in Singapore, Bahrain, Papua New Guinea, and the United Kingdom under the Electronic Trade Documents Act 2023.

Appendix B.1. Compiled from sections 04 and 05 of this paper. Dates as published by the standards body.

B.2 The instruments that demand it.

STANDARD OR INSTRUMENT	FUNCTION	STATUS	SCOPE AS STATED IN THIS PAPER
EU Battery Regulation DPP	Machine-readable product passport	18 Feb 2027	Unique identifier, carbon footprint, recycled content, materials origin, end-of-life instructions.
EU Deforestation Regulation	Geolocated due diligence statement	30 Dec 2026	Beef, soy, coffee, cocoa, palm, rubber, and timber.
EU CBAM	Verified embedded-emissions data at import	1 Jan 2026	Steel, aluminium, cement, fertilizer, hydrogen, electricity.
EU Textiles ESPR	Digital passport for apparel and footwear	2027	Delegated act under the Ecodesign for Sustainable Products Regulation.
U.S. FSMA 204	Critical Tracking Events and Key Data Elements	20 Jul 2028	Event-based tracing on a set of high-risk foods.
U.S. DSCSA	Package-level interoperable electronic tracing	2026 stabilization	Manufacturers, distributors, and dispensers of prescription drugs.
U.S. UFLPA	Rebuttable presumption on forced-labor origin	Active, FY2025	7,325 shipments held in FY2025. Certificate alone does not clear.
Singapore TradeTrust	Legally recognised electronic trade documents	Live 2026	Interoperable across MLETR-aligned jurisdictions.
Kimberley Process and Tracr	State certification plus industry provenance	Active, 2026	Government paper certification supplemented by industry-owned blockchain provenance.

Appendix B.2. Compiled from sections 02, 04, and 05 of this paper. Dates as published by the issuing authority. Full citations in section 08.

C

Index of instruments and dates.

Every instrument named in this paper, with the date on which it binds and the authority that issues it.

18 FEB 2027	Battery Regulation DPP (EU 2023/1542), European Union
30 DEC 2026	Deforestation Regulation (EU 2023/1115), European Union
1 JAN 2026	CBAM definitive regime, European Union
2027	Textiles ESPR delegated act, European Union
ACTIVE, FY2025	CBP enforcement, UFLPA, United States
2026 STABILIZATION	FDA DSCSA electronic tracing, United States
20 JUL 2028	FSMA 204 food traceability, United States
LIVE 2026	IMDA TradeTrust framework, Singapore
Q2 2026	K-DPP battery pilot, Korea
ACTIVE	Modern Slavery Act reporting, Australia
ACTIVE, 2026	Kimberley Process, De Beers Tracr, GIA stake, Global diamonds
APPROVED 2025	IMO Net-Zero Framework, Global shipping

C.1 THE FOUR SETTLED VOCABULARIES

Digital Product Passport	European Union
Key Data Elements	United States
Electronic transferable record	Commonwealth
Industry-owned provenance	Diamonds and select minerals

Appendix C. The underlying data is the same. The reader is jurisdiction-specific.



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US PATENT 11,522,690 LICENSED TO VOLUM LLC. BENGALA TECHNOLOGIES LLC, PATENT OWNER.