University of Maryland
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Battery material supply chain traceability – addressing gaps in the supply chain and achieving sustainable growth

Brian A. Engle

Chairman, NAATBatt International

Chief Safety Officer, NAATBatt International
SAE Fellow

Chair, SAE Battery Standards Steering Committee
SAE International

Director, Business Development, Amphenol

+1 (248)978-5736

Brian.engle@amphenol-sensors.com

Current battery supply chains are highly vulnerable to disruption due to force majeure, geopolitical and economic issues. Tracing supply chain materials is required through the European Battery Directive for large format EV batteries sold in the EU. In the US, there is a voluntary effort guided by SAE to establish standard protocol for tracing critical battery materials in compliance with tariff and tax incentive purposes. This data may be highly confidential to battery manufacturers but with proper data security, could be highly informative of government industrial policy and support to ensure sufficient battery materials are available at scale to support industry growth at scale and can be informative to industrial strategy to provide appropriate levels of “onshoring” and “friendshoring” a complex supply chain to be robust against disruptions.

Global battery Initiatives to address Material needs

Relevant global policies

NORTH AMERICA

U.S. Securities and Exchange Commission draft proposal for Corporate Climate Disclosures

U.S. Dodd Frank 1502 – Form SD

California draft End-of-Life Policy for Lithium-Ion Batteries

Canada's Towards Sustainable Mining Guiding Principles

FSB Task Force on Climate-Related Financial Disclosures

Revising U.S. Mining Law of 1872

HR 8187

SAE Battery Traceability

EUROPE

European Union Battery Regulation

Germany BMWk **Battery Passport**

Circular Economy Action Plan

OECD Critical and Conflict Minerals

OECD Due Diligence Act

Sustainable Products Initiative

EU Carbon Border Adjustment Mechanism

FSB Task Force on Climate-Related Financial Disclosures

APAC

China MIIT Measures for the Management of Traceability of Recycling and Utilization of NEV Batteries

Australia Environment Protection and Biodiversity Conservation Act (EPBC)

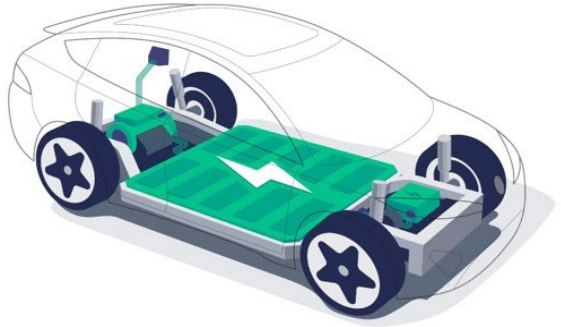
Canada's Towards Sustainable Mining Guiding Principles

Singapore Zero Waste Masterplan

Singapore Carbon Pricing Act

EU Battery Regulation requires more from industry

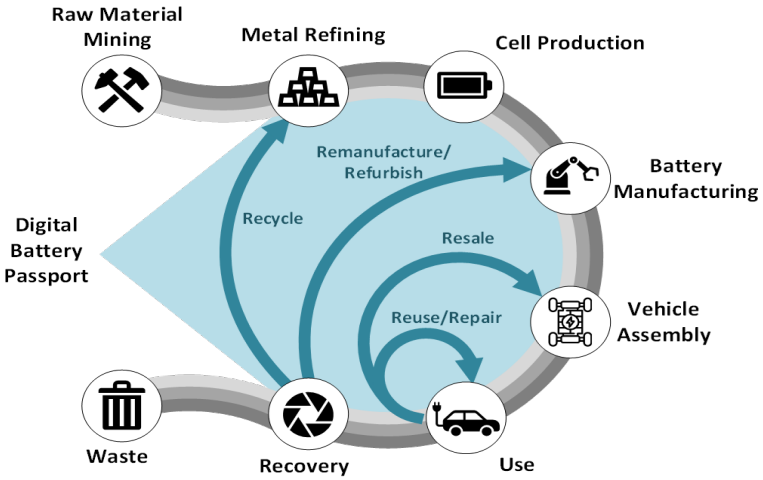
- Efficient & robust data collection
- Reputational and financial risks
- Increased time & resource required
- System interoperability



On average, OEMs know only 10% of their Tier 2 suppliers.

So what is the European Battery Directive?

The *Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC*, commonly known as the **Battery Directive**, regulates the manufacture and disposal of batteries in the European Union with the aim of "improving the environmental performance of batteries and accumulators"



It provides a legal framework for regulating battery technology, manufacturing, use, and recycling/disposal

…and what is the EU Battery Passport?

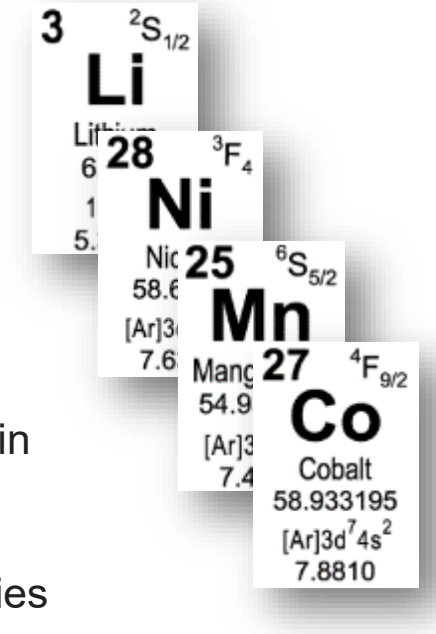
The digital battery passport will be a core tool to enable the sustainable scaling of battery value chains globally. While decarbonization and dematerialization are overarching goals of the European Green Deal, more ambitious action from both business and politics is required. Battery Passport is a lighthouse example of using innovation to achieve these goals, support legal implementation, and empower companies to take informed decisions on their supply chains and products.

…A tool for tracking battery materials from extraction through recycling

https://thebatterypass.eu/

…and why is it so important to the EU?

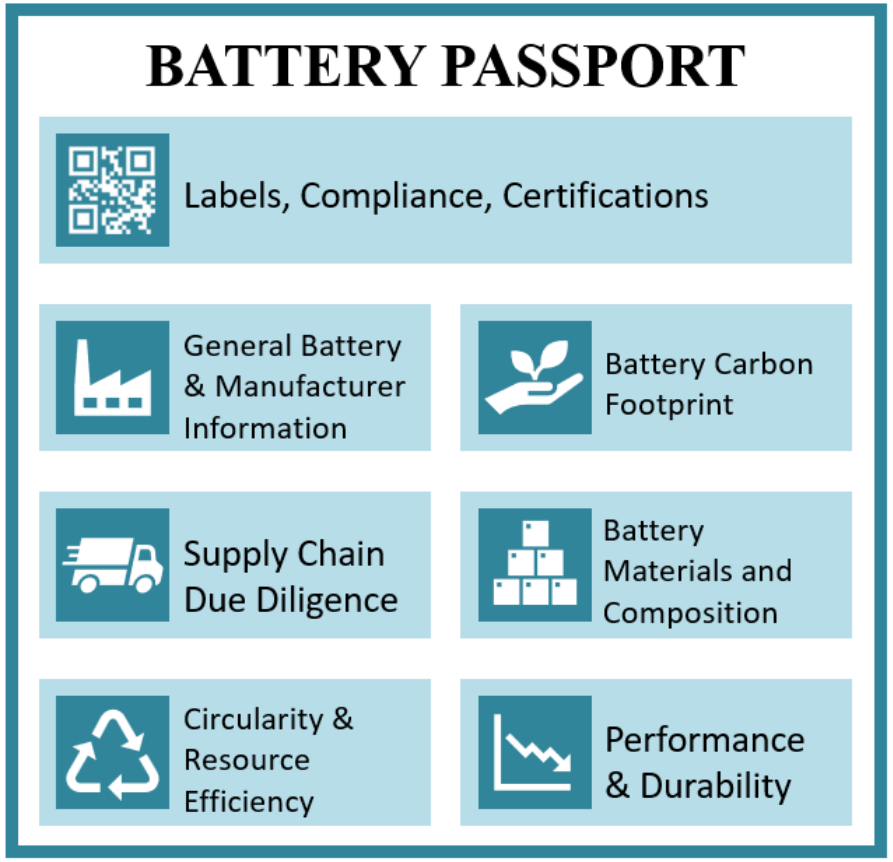
- The EU **lacks critical raw materials** in region to support a regional supply chain for lithium-ion based battery technologies
- Historically, the EU has purchased products it cannot manufacture from sources abroad. The critical nature of electrification and energy storage and **recent global events have shown the need for a level of independence.**
- Materials such as those in batteries are historically aggregated and **shipped outside EU** for reclamation/recycling in regions where environmental law is less strict.
- This has driven the EU to develop a policy to capture and retain these critical materials “in region”
- The regulation will require battery manufacturers to begin **using recycled materials** beginning in a phase-in starting as early as 2027.
- The vision is to have circular supply chain similar to the 99.99% recyclability of conventional Pb-acid batteries
- The Battery Passport is also designed to place focus on **material provenance, carbon footprint from manufacturing, and Environmental/Social Governance (ESG)**



…it will take years to scale fully closed-loop li-ion battery recycling

Batteries manufactured or placed into service in EU will need to fulfill:

1. **Sustainability and safety requirements**
   - Carbon footprint, recycled content, performance and safety
2. **Labelling and information requirements**
   - Sustainability information, battery state of health
3. **End-of-life management provisions**
   - Collection targets, recycling efficiencies, materials recovery
4. **Product and due diligence requirements**
   - Enforcement of product requirements and supply chain due diligence
5. **Electronic information exchange systems and battery passport**
   - European Management System and digital battery passport
6. **Mandatory green public procurement**
   - Sustainable government procurement
7. **Other provisions on conformity assessment**
   - Notification of conformity, market surveillance



Battery Pass: Battery Passport Content Guidance
https://thebatterypass.eu/resources/

Many of the detailed elements of the Battery passport are still being defined

EU Commission's European Electronic Exchange System

Creates "transparency along supply and value chains for all stakeholders"

Digital "Battery Passport"

Data to be made available to the public

Data Avail. to certain participants

General

- Battery manufacturer
- Battery type
- Model
- Date placed in market
- Manufacturing place and date
- Battery composition, incl. critical raw materials

Responsible Sourcing

- Carbon footprint declaration meeting EU methodology
- Proof of adhering to EU supply chain due diligence regulations
- Proof of recycled content in accordance w/ EU requirements

Performance & Durability

- Rated capacity
- Capacity fade
- Minimal, nominal and maximum voltage, with temperature ranges
- Original power capability and limits
- Power fade
- **…and more…**

Dismantling & Safety

- Detailed composition
- Dismantling information
- Safety measures
- Date placed in market
- Results of test results
- **…and more…**

From Circulor

EU Battery Regulation requires:

As currently written, OEMs, pack manufacturers and cell manufacturers must prove:

- the product's CO2 through production as early as 2024,
- origin and compliance with OECD Due Diligence guidelines,
- amount of recycled content, as early as 2027.

And must provide a digital "Battery Passport" that stores this information as early as 2026.

Provenance

+

Co2 Tracking

+

ESG

→

Battery Passport

→

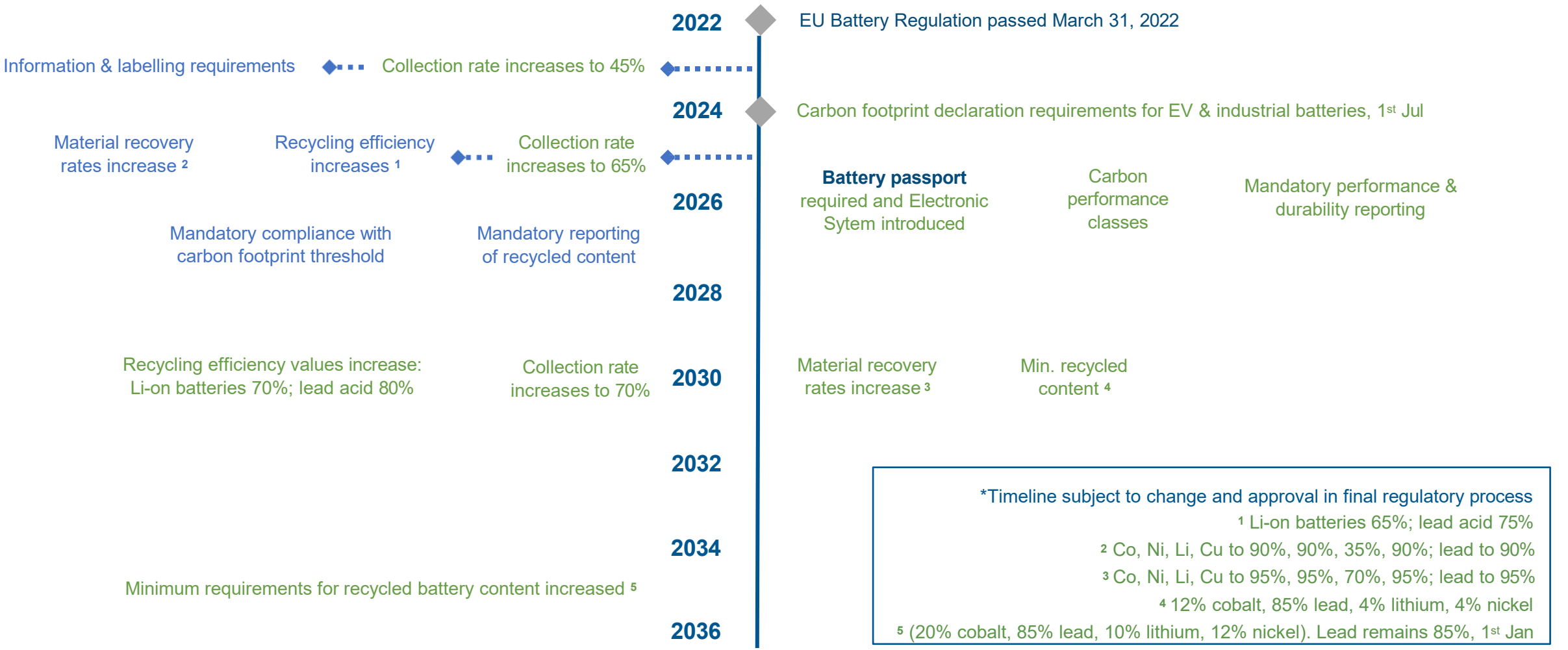
European Electronic Exchange System

*Light Mobility Transportation (scooters, e-bikes)

…EVERYTHING that is part of a "battery pack" is required to be tracked

From Circulor

EU Regulation Requirement Timeline*



*Timeline subject to change and approval in final regulatory process

1 Li-on batteries 65%; lead acid 75%

2 Co, Ni, Li, Cu to 90%, 90%, 35%, 90%; lead to 90%

3 Co, Ni, Li, Cu to 95%, 95%, 70%, 95%; lead to 95%

4 12% cobalt, 85% lead, 4% lithium, 4% nickel

5 (20% cobalt, 85% lead, 10% lithium, 12% nickel). Lead remains 85%, 1st Jan

German government launched pilot "Battery Pass”

In consortium with:

Bundesministerium für Wirtschaft und Klimaschutz

- German government selected eleven companies to design content, technical, and cross-industry standards for battery passport.
- Circulor leads "Battery Pass Demonstrator" work package, using content and technical standards to simulate data flows and system transactions.
- Demonstrator is to standardize dataspace to manage passports and has high potential for global adoption.

In harmonization with:

DIN Spec 99100:

- A comprehensive specification for the data to be included in the EU DPP for batteries
- Based on German Battery Pass
- 100% overlap with the key data points identified by industry
- Goes much further into areas beyond our scope, however (e.g. carbon footprinting, recycling)
- Requirements include:
  - Materials used in cathode, anode and electrolyte
  - a) The battery passport must contain information on the detailed composition of the battery.
  - b) Information on the detailed composition must include materials used in the cathode, anode and electrolyte.
  - c) Information on the detailed composition must relate to the battery model.
  - d) Information on the detailed composition must be accessible to persons with legitimate interest and the commission

Information to be displayed on the label	Subclause	BattReg reference
The carbon footprint and the carbon footprint performance class[a]	6.2.4 Carbon footprint label; 6.3 Battery carbon footprint	Article 7(2) via Annex XIII (1c)
Information identifying the manufacturer: — name; — registered trade name or registered trademark; — postal address, indicating a single contact point; — web address, if available; — e-mail address, if available.	6.1.2.4 Manufacturer identifier and information	Article 13(1) via Annex VI Part A (1)
Information identifying the battery: — model identification; — batch or serial number; OR — product number; OR — element allowing identification.	6.1.2.2 Battery identifier	Article 13(1) via Annex VI Part A (2)
Battery category	6.1.3.5 Battery category	Article 13(1) via Annex VI Part A (2)
Place of manufacture geographical location	6.1.3.1 Manufacturing place	Article 13(1) via Annex VI Part A (3)
Date of manufacture month and year	6.1.3.2 Manufacturing date	Article 13(1) via Annex VI Part A (4)
Battery mass	6.1.3.6 Battery mass	Article 13(1) via Annex VI, Part A(5)
Capacity	6.7.2.2 Rated capacity	Article 13(1) via Annex VI, Part A(6)
Chemistry	6.5.2 Battery chemistry	Article 13(1) via Annex VI, Part A(7)
Hazardous substances present in the battery, other than mercury, cadmium or lead	6.5.5 Hazardous substances	Article 13(1) via Annex VI, Part A(8)
Critical raw materials present in the battery in a concentration of more than 0,1 % weight by weight	6.5.3 Critical raw materials	Article 13(1) via Annex VI, Part A(10)
Usable extinguishing agent	6.2.5 Extinguishing agent	Article 13(1) via Annex VI, Part A(9)
Symbol for separate collection	6.2.2 Separate collection symbol	Article 13(4) via Annex VI, Part B, Annex XIII (1q)
Symbol for elements	6.2.3 Symbols for cadmium and lead	Article 13(5)
QR-Code	5.2.1 Access to battery passport information	Article 13(6) Annex VI, Part C
CE-Marking[b]	6.2.7 EU declaration of conformity	Article 20(1)
NOTE 1 all information on label is accessible to the public NOTE 2 for further information on data points see Clause 6		
[a] Detailed timeline can be found in 6.3.7. [b] Subject to the general principles set out in Regulation (EC) No 765/2008, Article 30.		

Challenges Identified (So Far)

BATTERY PASSPORT

- Labels, Compliance, Certifications
- General Battery & Manufacturer Information
- Battery Carbon Footprint
- Supply Chain Due Diligence
- Battery Materials and Composition
- Circularity & Resource Efficiency
- Performance & Durability

Trust

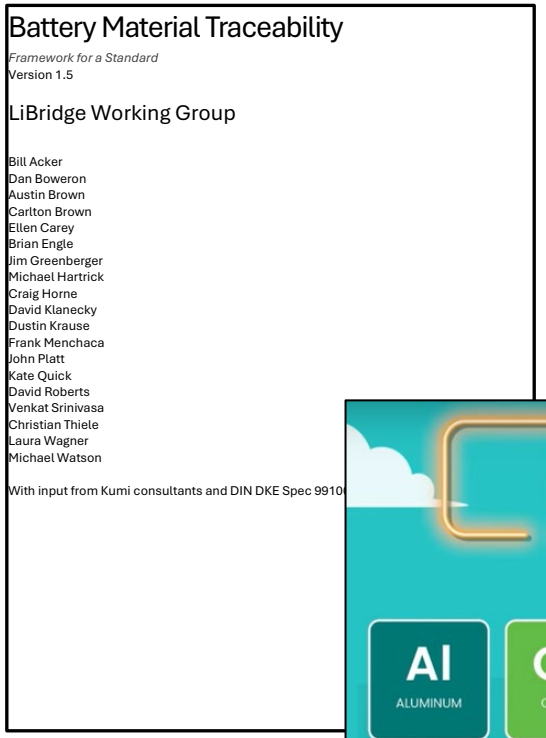
How to solve for US needs?

SAE International and LiBridge

Assembled a working group to write a framework that focuses on key data points for traceability:

1. Battery capacity
2. Date of Service
3. Identification and proportions of critical minerals with a focus on “the electric eighteen.”
4. Producer information, especially identifying FEOC
5. Battery components (e.g. cells)

✓ Objective is to hand this off to an SAE committee for standardization.


Battery Material Traceability

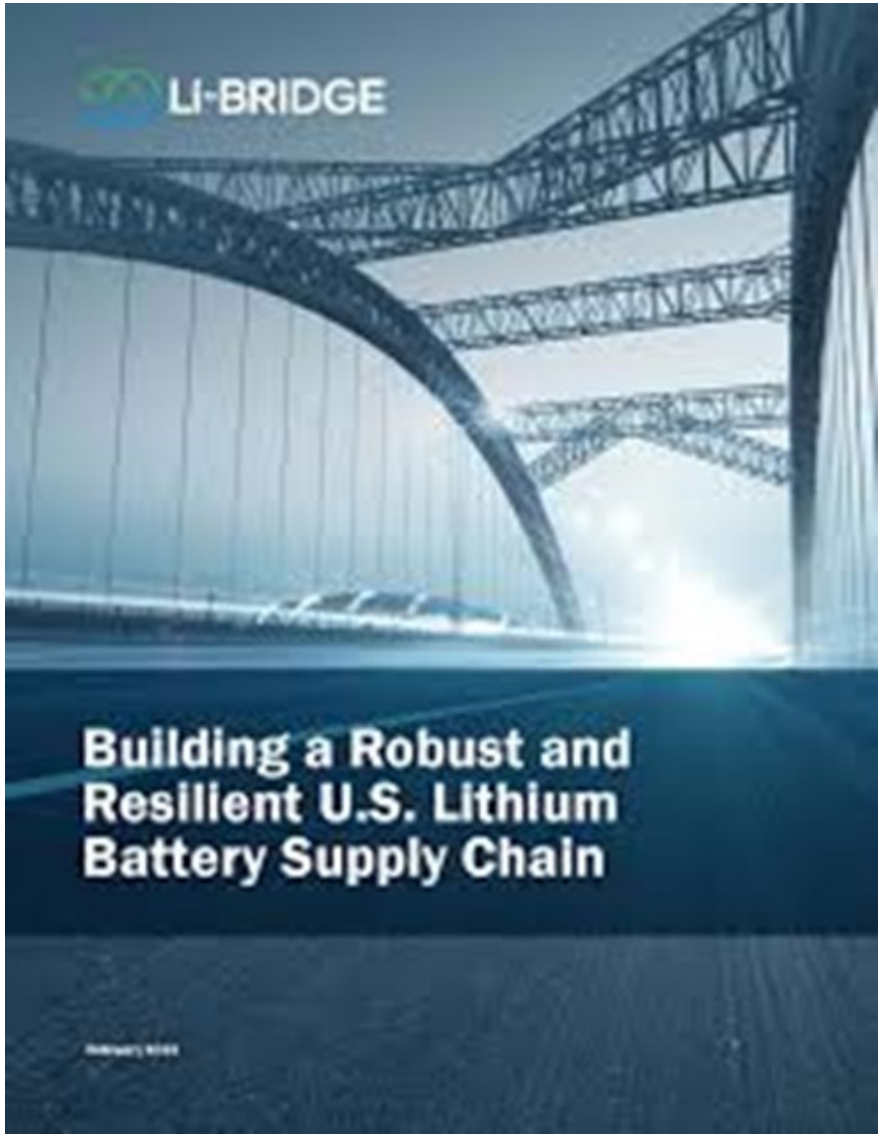
Framework for a Standard
Version 1.5

LiBridge Working Group

Bill Acker
Dan Boweron
Austin Brown
Carlton Brown
Ellen Carey
Brian Engle
Jim Greenberger
Michael Hartrick
Craig Horne
David Klanecky
Dustin Krause
Frank Menchaca
John Platt
Kate Quick
David Roberts
Venkat Srinivasa
Christian Thiele
Laura Wagner
Michael Watson

With input from Kumi consultants and DIN DKE Spec 9910

LiBridge process & progress



LiBridge

A public-private alliance committed to accelerating the development of a robust and secure domestic supply chain for lithium-based batteries

Argonne National Laboratory

Leads coordination of Li-Bridge by serving as the facilitator between private industry and the Federal Consortium for Advanced Batteries

Met in August 2024 with 75+ companies

Purpose was to understand the landscape of traceability

Key Takeaways

Landscape is fragmented. Some companies complying with the EU Digital Product Passport (DPP). Some not engaged in traceability. No consistent practice or reporting. Supply chain is disorganized and inefficient.

>100 SAE EV, Hybrid, and Fuel Cell Vehicle Published Documents

Fuel Cell Fueling: J2600, J2601, J2601/1. J2601/2, J2601/3,J2601/4, J2601/5, J2719, J2719/1, J2799, J1766, J2578, J2579

Fuel Cell Testing: J2615, J2616, J2617, J3219

Fuel Cell Systems: J2579, J2594, J3089

EV Battery Recycling/Secondary Use: J2984, J2974, J3071, J2997

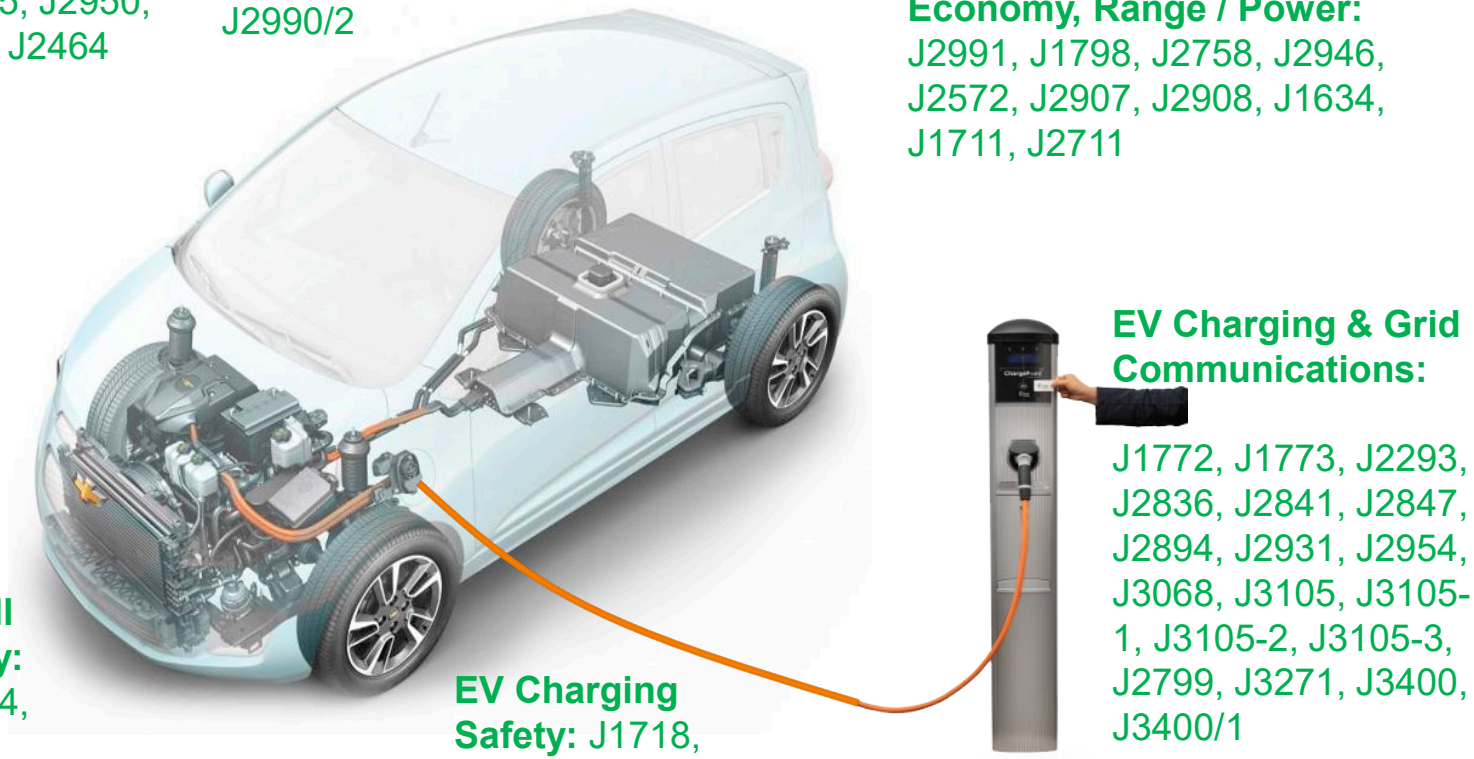
Energy Transfer Systems: J2293, J2293/1, J3072

EV, Hybrid, Fuel Cell Vehicle Safety: J1766, J2344, J2910, J2578, 3108, J3108/1, J3235, J2950, J3325, J2929, J2464

Battery Testing: J1798, J1798/1, 1798/2, J2288, J2289, J2380, J2758, J3220, J3277, J3277/1

EV, Hybrid, Fuel Cell Vehicle Terminology: J1715, J1715/2 J2574, J2760

EV, Hybrid, Fuel Cell Vehicle Crash Safety: J3040, J1766, J2990, J2990/2



EV Charging Safety: J1718, J2953/1, J2953/3

EV, Hybrid, Fuel Cell Vehicle Economy, Range / Power: J2991, J1798, J2758, J2946, J2572, J2907, J2908, J1634, J1711, J2711

EV Charging & Grid Communications: J1772, J1773, J2293, J2836, J2841, J2847, J2894, J2931, J2954, J3068, J3105, J3105-1, J3105-2, J3105-3, J2799, J3271, J3400, J3400/1

https://standardsworks.sae.org/standards-committees/hybrid-ev-committee
https://standardsworks.sae.org/standards-committees/fuel-cell-standards-committee
ttps://standardsworks.sae.org/standards-committees/vehicle-battery-standards-steering-committee

Vehicle Battery Standards Steering Committee

750+ Committee Membership Individual Participants

171 Represented Employers (OEM's, Suppliers, Government, and Academia)

32 Subcommittees

40 Published Documents

SAE Vehicle Battery Standards Steering Committee

BSSC COMMITTEES: Q1 2025

BC1 Battery Safety Standards Committee
BC2 Battery Standards Testing Committee
BC3 Battery Standards Label & Tape Committee
BC4 Battery Transportation Committee
BC5 Battery Size Standardization Committee
BC6 Starter Battery Committee
BC7 Truck Battery Systems Committee
BC8 Battery Standards Fuel Economy & Range Committee
BC9 Battery Standards Advanced Battery Concepts Committee
BC10 Battery Standards Recycling Committee-
BC11 Battery Global Traceability Committee
BC12 Battery Test Equipment Committee
BC13 Battery Terminology Committee
BC14 Battery Materials Testing Committee
BC15 Secondary Battery Use Committee
BC16 Start-Stop Battery Committee
BC17 Battery Diagnostics
BC18 Battery Field Discharge and Disconnect Committee
BC19 Battery Systems Connection Committee
BC20 Battery Management Systems
BC 21 Battery Thermal Management Committee
BC22 Bus Battery System Committee
BC23 Battery Systems Adhesives-Sealants-Heat Transfer Materials
BC24 Battery Sensors Committee
BC25 Construction Agricultural and Off Road Rechargeable ESS Committee
BC26 Micro mobility Battery Standards Committee
BC27 Truck Battery Systems
BC29 Battery Swapping Committee
BC30 Battery Pack Venting Committee
BC31 Insurance
BC32 Vehicle Platform Power Management Committ

First Responders Task Force

To Join a Committee:

Brian Engle: Brian.engle@amphenol-sensors.com

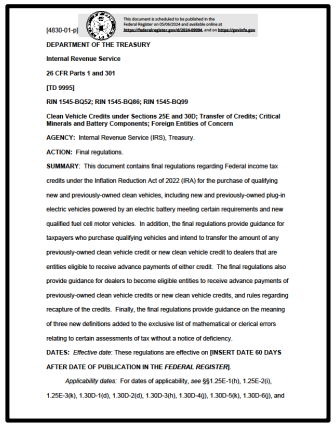
Alyssia Bostrom: alyssia.bostrom@dolav-usa.com

Dante Rahdar: dante.rahdar@sae.org

US Battery Traceability Needs

Addressing Needs:

- Compliance with provisions of 45X (Producer Incentive)
- FEOC sourcing restrictions (China, Russia, North Korea)
- CBP and tariffs
- HR 8187 Critical Material Transparency and Reporting in Advanced Clean Energy (TRACE) – Introduced- no action
- Identification of critical minerals for recycling
- ***Modeling supply chain gaps and informing policy***



[4830-01-p]

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Parts 1 and 301

[TD 9995]

RIN 1545-BQ52; RIN 1545-BQ86; RIN 1545-BQ99

Clean Vehicle Credits under Sections 25E and 30D; Transfer of Credits; Critical Minerals and Battery Components; Foreign Entities of Concern

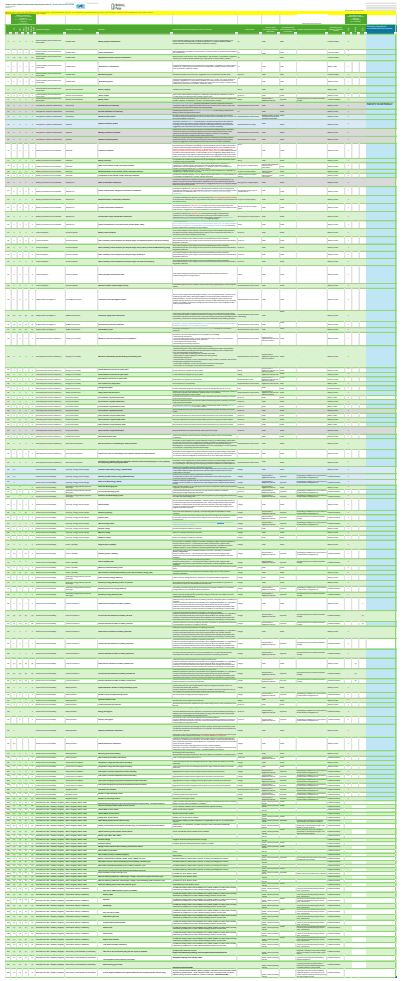
AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Final regulations.

SUMMARY: This document contains final regulations regarding Federal income tax credits under the Inflation Reduction Act of 2022 (IRA) for the purchase of qualifying new and previously-owned clean vehicles, including new and previously-owned plug-in electric vehicles powered by an electric battery meeting certain requirements and new qualified fuel cell motor vehicles. In addition, the final regulations provide guidance for taxpayers who purchase qualifying vehicles and intend to transfer the amount of any previously-owned clean vehicle credit or new clean vehicle credit to dealers that are entities eligible to receive advance payments of either credit. The final regulations also provide guidance for dealers to become eligible entities to receive advance payments of previously-owned clean vehicle credits or new clean vehicle credits, and rules regarding recapture of the credits. Finally, the final regulations provide guidance on the meaning of three new definitions added to the exclusive list of mathematical or clerical errors relating to certain assessments of tax without a notice of deficiency.

DATES: *Effective date:* These regulations are effective on **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

Applicability dates: For dates of applicability, see §§1.25E-1(h), 1.25E-2(i), 1.25E-3(k), 1.30D-1(d), 1.30D-2(d), 1.30D-3(h), 1.30D-4(j), 1.30D-5(k), 1.30D-6(j), and



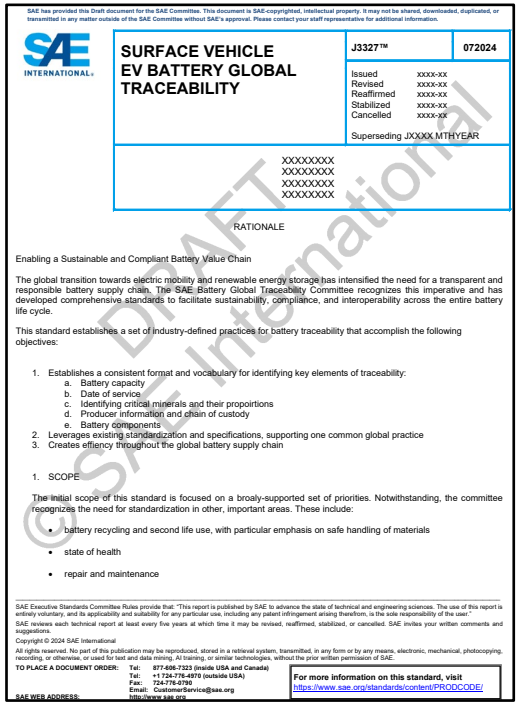
Goals for Standards Team:

- Serves industry's needs for efficiency and consistency and integrity
- Supports growth of U.S. battery manufacturing and recycling
- Enables companies to take advantage of available incentives in the U.S.
- Allows US to take a leadership position with EU in traceability (2/1/27)
- Lowers the cost of US providers to comply with EU battery regulations
- Can be completed in <12 months
- Syncs with DoE Supply Chain Database

Reporting/verification needs to be inexpensive, but accurate, trustworthy

Battery Traceability – SAE J3327

Enabling a Sustainable and Compliant Battery Value Chain



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SURFACE VEHICLE
EV BATTERY GLOBAL TRACEABILITY

J3327™ 072024

Issued xxxx-xx
Revised xxxx-xx
Reaffirmed xxxx-xx
Stabilized xxxx-xx
Cancelled xxxx-xx

Superseding JXXXX MTHYEAR

XXXXXXXX
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RATIONALE

Enabling a Sustainable and Compliant Battery Value Chain

The global transition towards electric mobility and renewable energy storage has intensified the need for a transparent and responsible battery supply chain. The SAE Battery Global Traceability Committee recognizes this imperative and has developed comprehensive standards to facilitate sustainability, compliance, and interoperability across the entire battery life cycle.

This standard establishes a set of industry-defined practices for battery traceability that accomplish the following objectives:

1. Establishes a consistent format and vocabulary for identifying key elements of traceability:
   a. Battery capacity
   b. Date of service
   c. Identifying critical minerals and their propoirtions
   d. Producer information and chain of custody
   e. Battery components
2. Leverages existing standardization and specifications, supporting one common global practice
3. Creates efficency throughout the global battery supply chain

1. SCOPE

The initial scope of this standard is focused on a broaly-supported set of priorities. Notwithstanding, the committee recognizes the need for standardization in other, important areas. These include:

- battery recycling and second life use, with particular emphasis on safe handling of materials
- state of health
- repair and maintenance

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For more information on this standard, visit
https://www.sae.org/standards/content/PRODCODE/

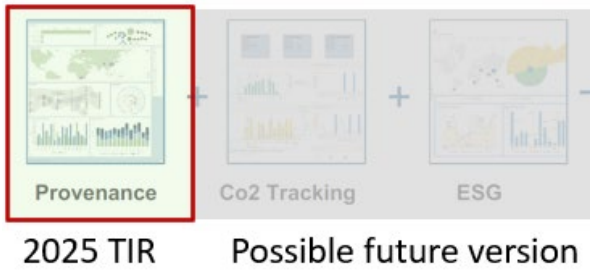
1. SCOPE

The initial scope of this standard is focused on a broad-supported set of priorities. Notwithstanding, the committee recognizes the need for standardization in other, important areas. These include:

- battery recycling and second life use, with particular emphasis on safe handling of materials
- state of health
- repair and maintenance

Suppliers need Standard Practice for identifying, documenting, and reporting provenance of materials

- Complementary to EU Passport and similar provenance requirements
- Focus on cell contents (Anode, Cathode, etc)
- Carbon footprint and ESG not planned for J3327 TIR Initial release



- ***Voluntary Standards ilo Compulsory Regulation***

SAE J3327 SURFACE VEHICLE
EV BATTERY GLOBAL TRACEABILITY COMMITTEE

How it works:

- Convenes suppliers, OEMs, traceability experts, standardization experts (66 members, 42 voting members)
- Leverages and harmonizes existing sources
  - Available U.S. incentives
  - Traceability data for the EU Battery Passport
  - SAE AS9100
  - ISO 22095, chain of custody models
    - E,g. mass balance models
  - ISO 23664, traceability of rare earth materials from mine to separated products
  - ASTM F49 digital communications within the supply chain

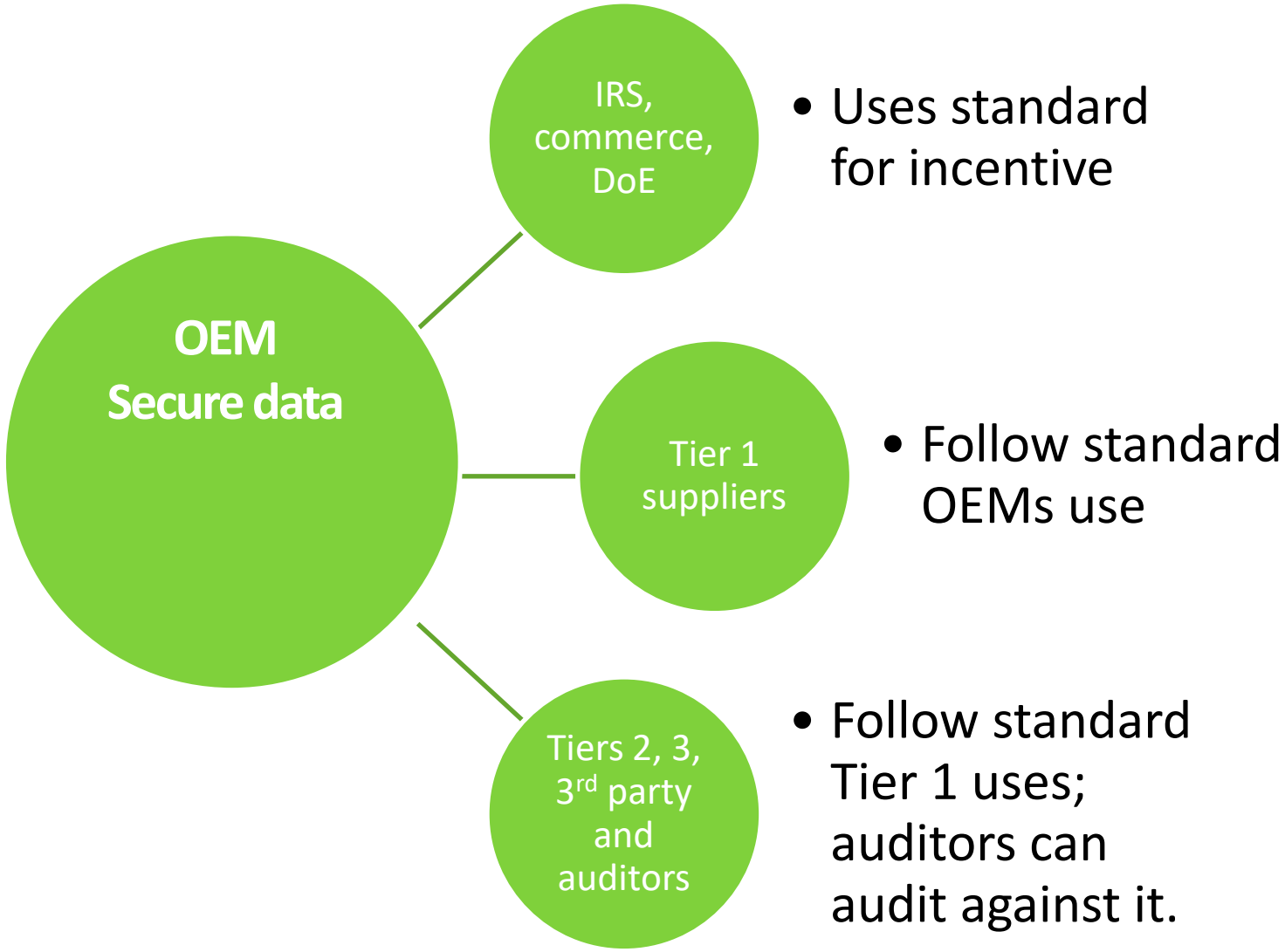
One common vocabulary, one way of identifying minerals, that protects competitive advantage and supports security.

How?

Once standard proliferates in the supply chain consistency and benchmarking promote efficiency.

Producer information can establish a chain of custody that can be audited for mistakes/inconsistencies.

First step in enabling the tracking of products and ingredients throughout the supply chain, allowing for quick identification of issues and efficient recalls, thus fostering trust and identifying anomalies that occur in counterfeits and adulterated products. SAE is responsible for AS9100 which calls for supplier verification via auditing/NADCAP accreditation.



Example: guidance on which critical minerals to track

a. The standard shall include disclosure of the critical minerals constituting the battery and their percentage of contribution to the battery. The standard shall focus on the minerals defined as critical by statute. Battery minerals highlighted.
    i. According to Section) 45X C (6 of the US tax code, they include: aluminum, antimony, arsenic, barite, beryllium, bismuth, cerium, cesium, chromium, cobalt, dysprosium, erbium, europium, fluorspar, gadolinium, gallium, germanium, graphite, hafnium, holmium, indium, iridium, lanthanum, lithium, lutetium, magnesium, manganese, neodymium, nickel, niobium, palladium, platinum, praseodymium, rhodium, rubidium, ruthenium, samarium, scandium, tantalum, tellurium, terbium, thulium, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium.
    ii. Copper (based on recent executive order)
    iii. Section 33 of the European Union's 2023 Battery Regulation cites the following as critical minerals: cobalt, lead, lithium and nickel.
b. Producer Information/Chain of custody. Leveraging article 3 of the EUBP, which identifies battery's producer(s) and chain of custody, the standard shall include location information and producer of the critical minerals.

c. Can be updated as list changes.

Expedited time frame

Typical time frame is 18-36 months

Goal is to create a standard that makes it possible to take advantage of incentives and comply with requirements through a common data scheme and nomenclature with recommended practice for OEMs and their suppliers. Also works for third party traceability companies and recyclers.

- ✓ 8/24 LiBridge stakeholder meeting at Argonne National labs
- ✓ 11/24 Initial traceability framework completed
- ✓ 12/24 Re-formation of SAE J3327
- ✓ 1/25 SAE GIM / Call for experts
- ✓ 3/25 Initial Draft
- ✓ 4/25
- ✓ 5/25 Public comment
- ✓ 6/25 Ballot
- ❑ 7/25 Revision and voting
- ❑ 8/25 Finalization and publication

Battery SOH, RUL, Reporting & Diagnostics Challenge

Every Traction Battery will need to comply with the European Battery regulations, beginning to come into force in mid-2023.

Regulation (EU) No 2019/1020 requires certain data be made available

Remaining capacity	The dates of manufacturing of the battery and putting into service
Overall capacity fade	Energy throughput
Remaining power capability and power fade	Capacity throughput
Remaining round trip efficiency	Tracking of harmful events, such as the number of deep discharge events, time spent in extreme temperatures, time spent charging during extreme temperatures
Actual cooling demand	Number of full charge-discharge cycles
Evolution of self-discharging rates	
Ohmic resistance and/or electrochemical impedance	

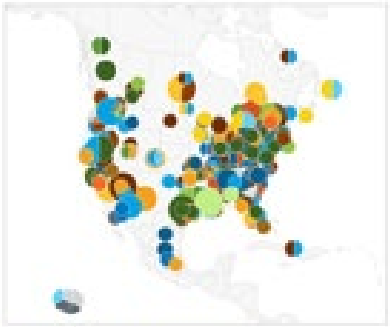
- SAE has developed Standards for SOC/SOH reporting
- Legacy OBD-2 format not required for EV's
  - Some EV's do not even have diagnostic connector
- Mandatory and Voluntary data / diagnostics reporting standard needed

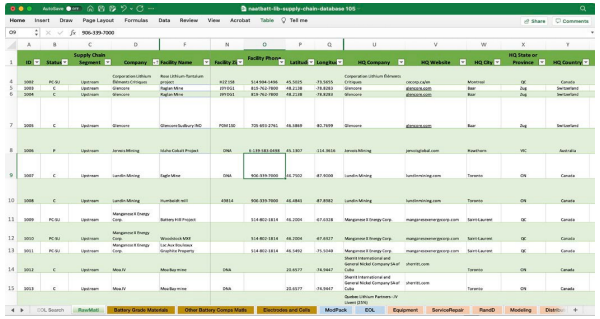
More work needed on State of Safety, Remaining Useful Life, reporting diagnostics and critical events

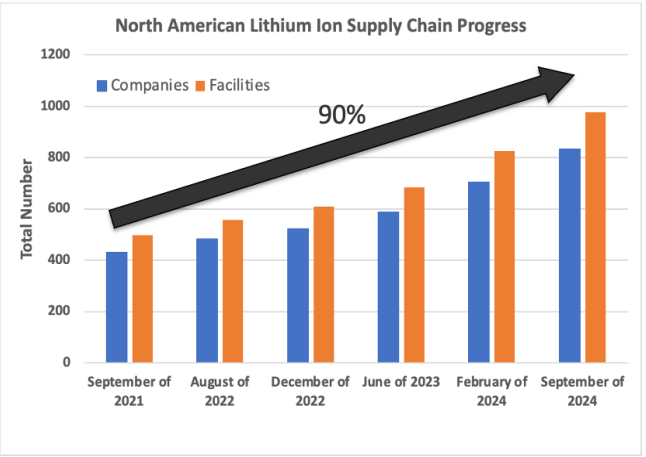
NAATBatt / DoE Battery Supply Chain – Modeling

- In April 2021, NAATBatt commissioned NREL to develop a database (DB) of companies that supply goods, equipment, and services to process, manufacture, or recycle high voltage lithium-ion materials, cells, battery packs, etc. in North America

- NREL released the first version of the DB on its website in September 2021 and since then every six months with updates to the DB and improvements to website.
  - More than 5000 **Excel** downloads of various versions
  - Released an easy to use and easy to search **online version** in February 2024
  - 2300 registrants to the version release in September 2024.
  - The Database shows almost **doubling** of companies & facilities between Sep 2021 to Sep 2024
  - A new update is expected to release Aug, 2025



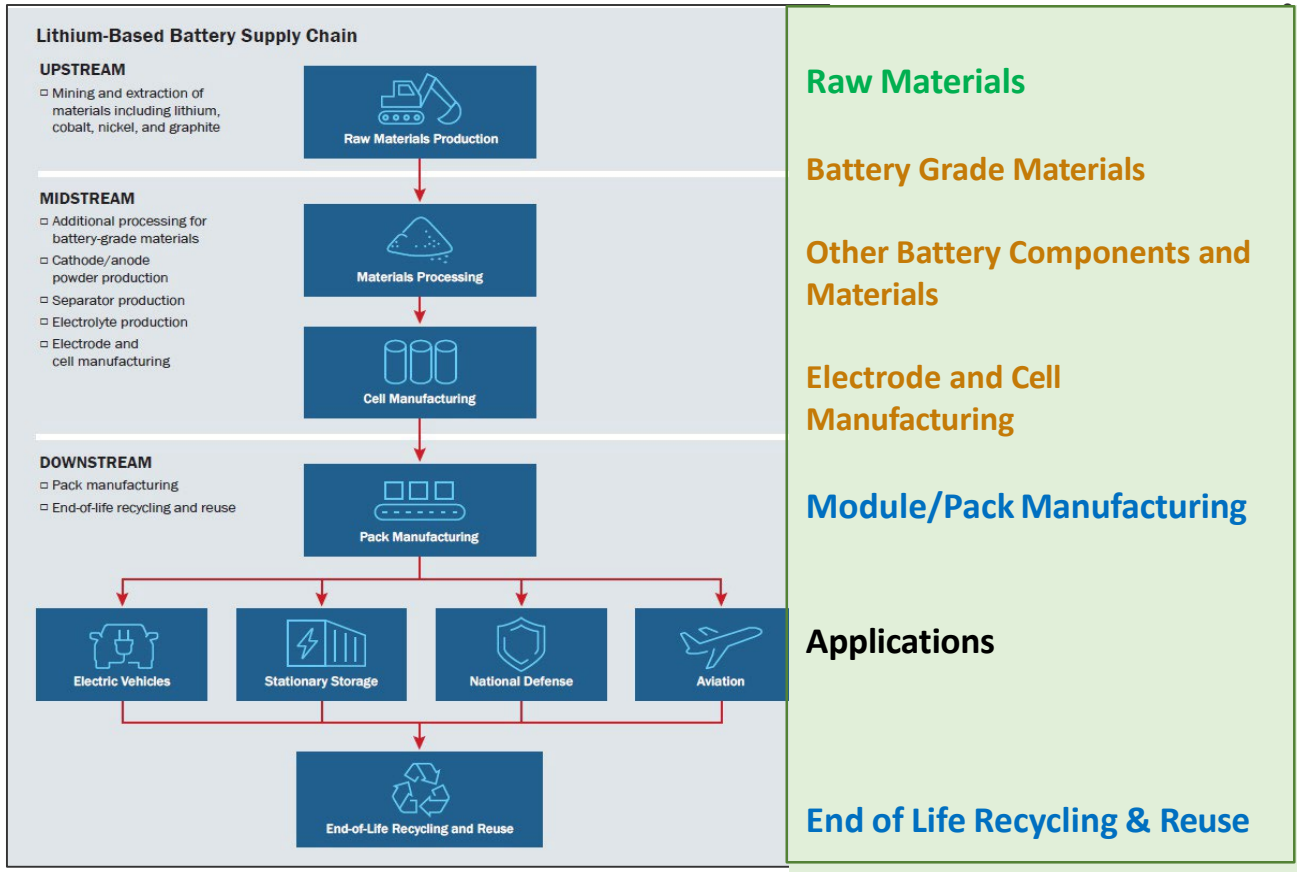




Battery Material Traceability

NAATBatt / DoE Battery Supply Chain Modeling

FCAB National Blueprint for Lithium Batteries 2021-2030



NAATBatt/NREL Database 2021

Raw Materials

Battery Grade Materials

Other Battery Components and Materials

Electrode and Cell Manufacturing

Module/Pack Manufacturing

Applications

End of Life Recycling & Reuse

Manufacturing Supply Chain

- Raw Materials Minin
- Battery Grade Materials
- Other Battery Components and Materials
- Electrode and Cell Manufacturing
- Module/Pack Manufacturing

EOL Supply Chain

Other Segment Supply Chains

- Equipment
- Service/Consulting
- R&D
- Modeling and Software
- Distributors

Battery Material Traceability

NAATBatt / DoE battery Supply Chain Modeling

The public-facing data will provide a foundation for compartmentalized data interface within DoE

- *Manufacturers provide traceability information under NDA with DoE*
- *DoE (VTO/NREL)-only: Fully mapped supply chain with critical information to:*
  - *Source of government audit information*
  - *Allows "macro view" of full supply chain*
  - *Identify gaps/critical weaknesses in supply chain*
  - ***Inform policy to support robust, vertically-integrated and adaptable industry***
    - ***Data evolves with diverse electrochemstries & markets***
    - ***Forward-looking: long-term view at growing industry at "the right pace"***
    - ***Apolitical, data-driven policymaking support***
    - ***Allows US to compete with "near peer" industrial supply chain modeling and policymaking***
    - ***Reduces exposure to "export controls" and supply chain disruption***

Thank You

SAE is supporting standards to provide for safe electrification. We invite partners to help craft standards that support healthy growth of the EV and battery industry

Brian A. Engle

Chairman, NAATBatt International

Chief Safety Officer, NAATBatt International
SAE Fellow

Chair, SAE Battery Standards Steering Committee
SAE International

Director, Business Development, Amphenol

+1 (248)978-5736

Brian.engle@amphenol-sensors.com