

DOCKETED	
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UCDAVIS

Institute of Transportation Studies

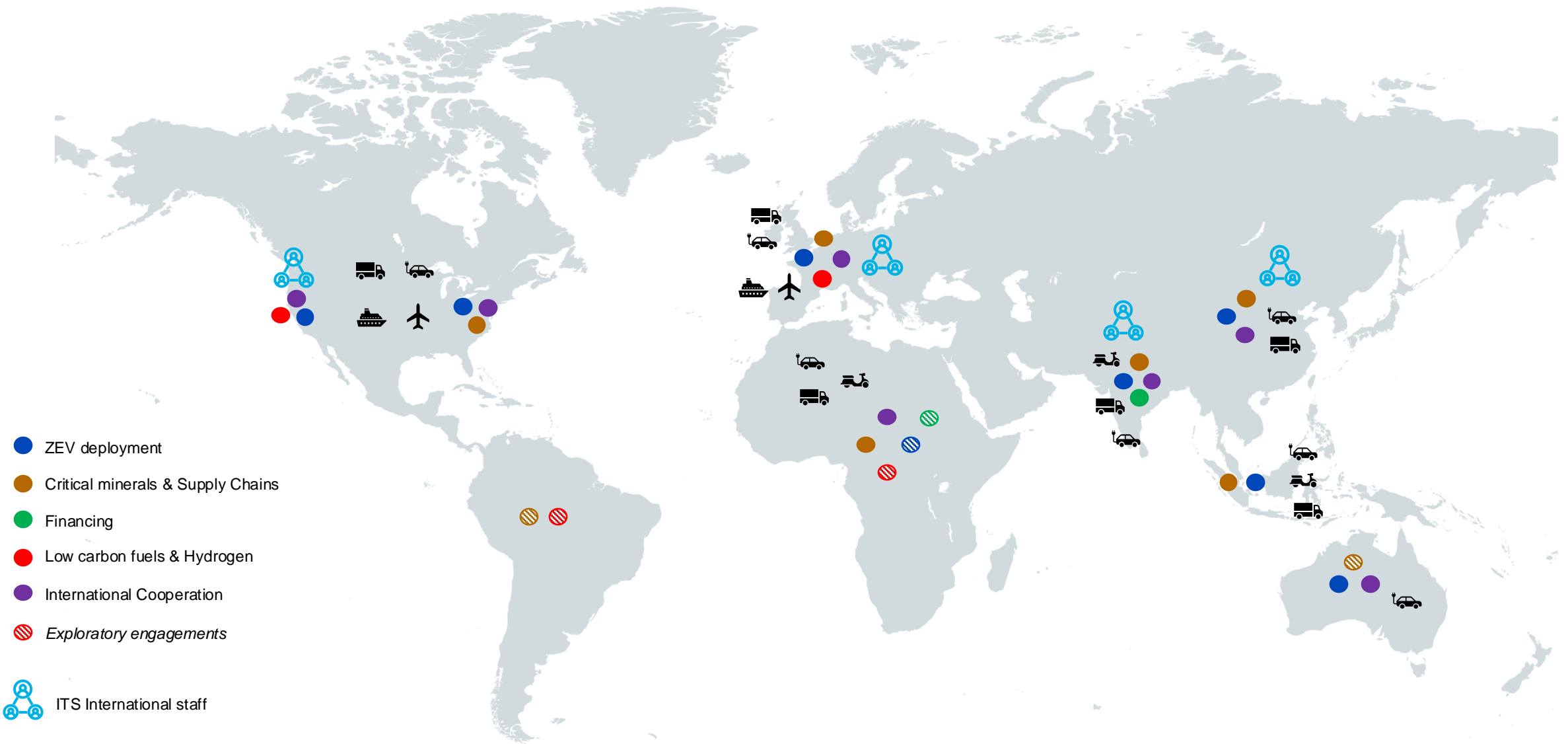
LVC Informational Workshop California Energy Commission

Dr Aditya Ramji

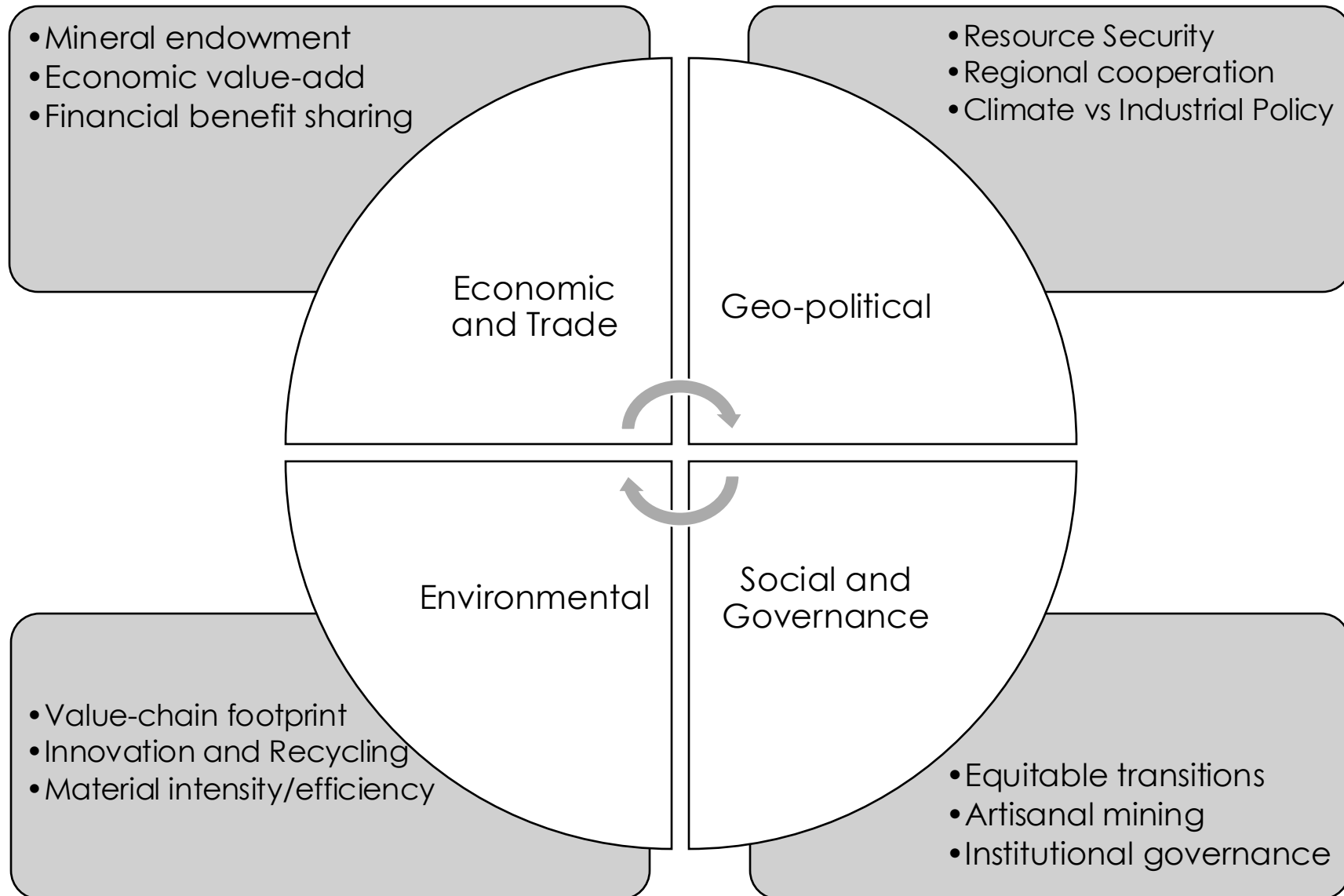
19 February 2025



Premier global research institution on clean transportation

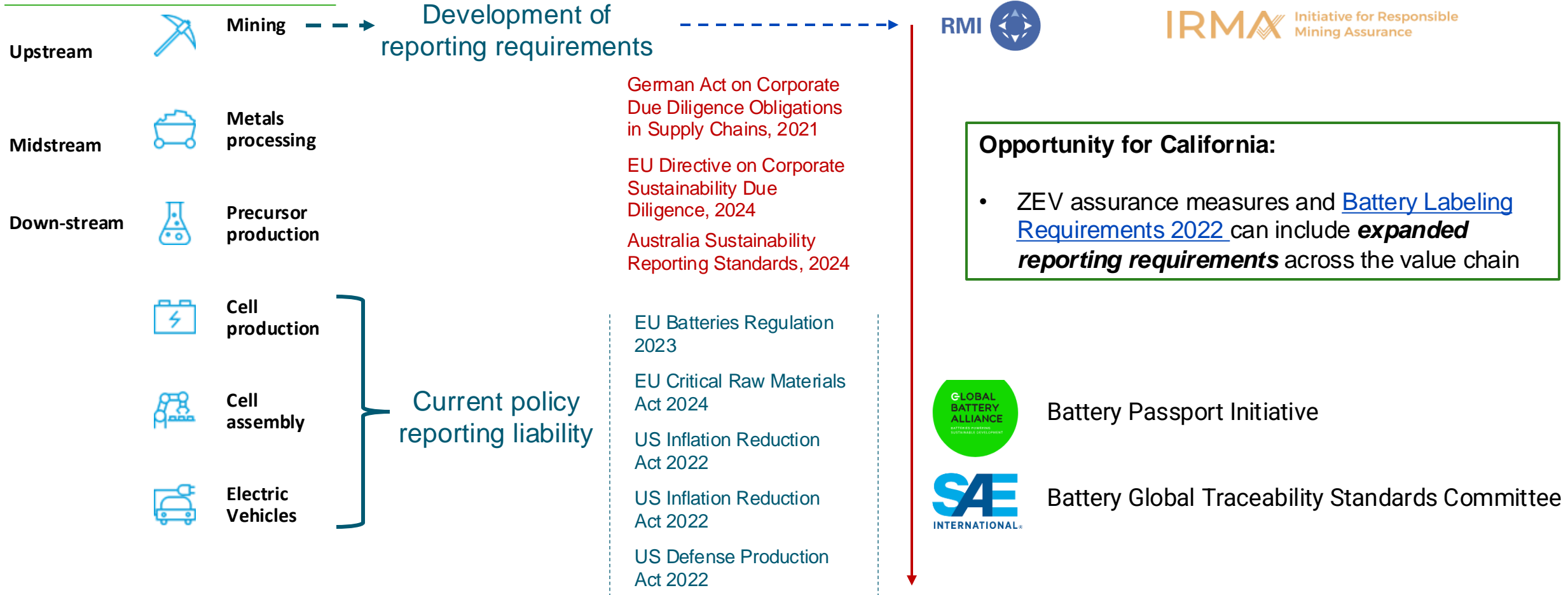


Track and Trace: Assessing supply risks



Track and Trace: Key Global Developments

EV Value Chain



- Various countries are considering battery passport regulations
- ESG reporting is become mainstream: 40% of 2024 Lithium ore to come from industries with higher ESG standards

Battery Passport Initiative: Global Battery Alliance



GHG emissions



Circular Design



Biodiversity Loss



Environmental & Human Rights



Child Labor



Forced Labor



Indigenous Peoples' Rights

BATTERY INFORMATION

MATERIALS PROVENANCE

ESG PERFORMANCE

CLUSTERS

of companies

QUANTITATIVE ISSUE:

of reports

GHG (PMA)

primary data share

GHG (HMA)

primary data share

QUALITATIVE ISSUES

of reports

ESG Score

n/a rate (%)

DATA PROOFS

(A) external

(B) standard

(C) self-reported

(D) validated (*)

of verified reports

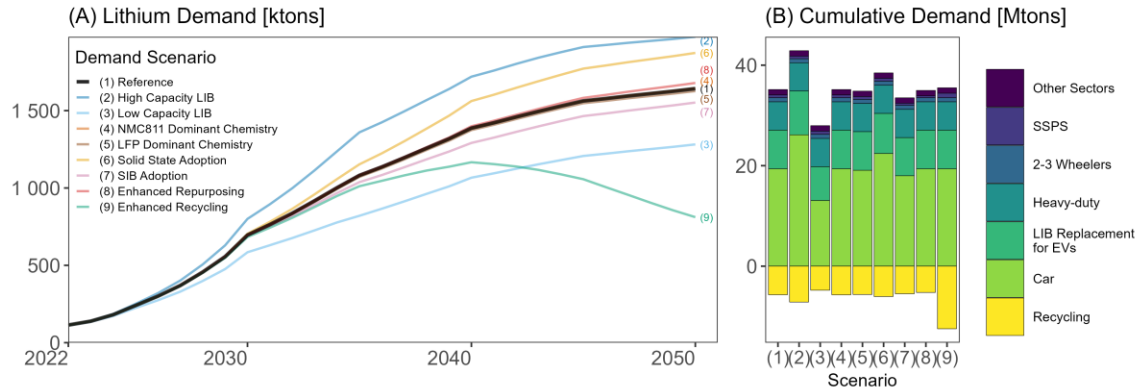
MINING	REFINING	MATERIALS	CELL	BATTERY	OVERALL
3	3	6	1	1	14
(01) GREENHOUSE GAS					
2	2	4	2	2	12
17	7	59	17	1	102
0%	0%	67%	100%	100%	57%
18	7	52	9	0,41	86
0%	0%	62%	100%	100%	49%
(02-07) OVERALL					
4	4	12	2	2	24
withheld	withheld	withheld	withheld	withheld	secured
19%	19%	12%	0%	0%	12%
0%	0%	0%	0%	0%	0%
0%	0%	6%	13%	13%	5%
100%	100%	94%	14%	14%	81%
0%	0%	0%	73%	73%	14%
0	0	8	2	2	12

U.S. Case Study: Track and trace by 2027....

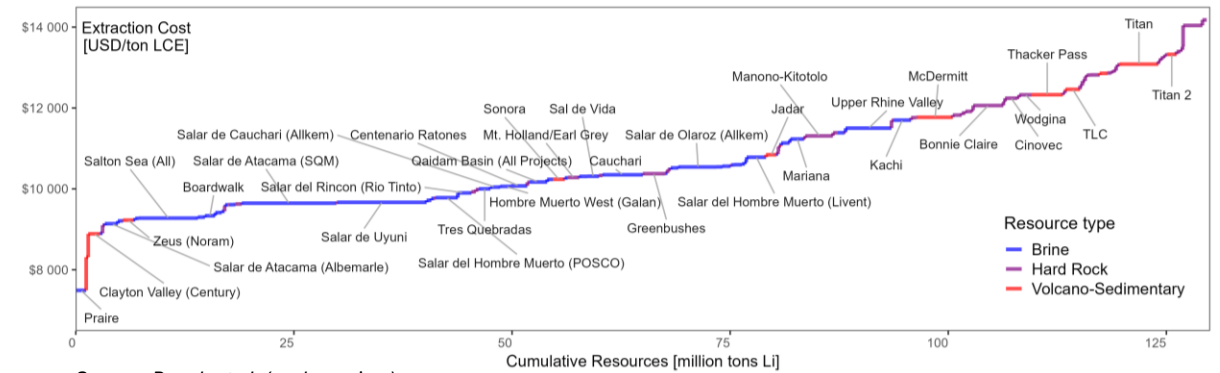
Mineral	China %	Major Sources	Import Prices (\$/mt)
Lithium (Li-HO / CO3)	4-5% (proc.)	Chile, Argentina	HO: \$23k (1.6X) CO3: \$11k (1X)
Nickel	86-90% (ore)	Ore: China Sulphates: EU, South Africa	Ore: \$4k (1.6X) Sulph: \$7k (1.6X)
Manganese	-	Ore: Gabon, S. Africa, Mexico Oxides: Africa, India, E. Asia	Ore: \$510 (1.6X) Oxides: \$1.2k (1.1X)
Cobalt	16% (ore) 3% (ox.)	Ore: Russia, Canada Oxides: EU, UK, Asia	Ore: \$88k (4.5X) Oxides: \$47k (1.8X)
Graphite	49% (nat.)	Natural: Mexico, Africa, Canada, Brazil	Natural: \$2k (1.8X)
Aluminium	1.6%	Canada, Brazil, Sweden, Colombia, Mexico	\$990 (1.9X)

- [Treasury](#), IRS & DOE: updated guidance on [30D](#) & [FEOC](#)
- **FEOC definition becomes more stringent:**
 - if HQ, inc. or relevant activities in a covered nation
 - if 25% or more of voting rights, board seats, or equity held by the govt.
 - if controlled by a FEOC through a license or contract with that FEOC
 - Battery components (2024); Critical minerals (2025)
- **Traced qualifying value add test**
 - Detailed supply chain tracing to estimate actual value-added % for extraction, processing, and recycling
 - Certain impracticable-to-trace battery materials exempted until 2027 including graphite and some electrode powders.
 - EV OEMs to show proof of track and trace mechanisms that will be implemented to meet this compliance by 2027
- These exemptions could change subject to new directives from USG
- **Proposed legislation:** Critical Material Transparency and Reporting of Advanced Clean Energy (Critical Material TRACE) Act

CALi: Market competitiveness is a Cost+ approach

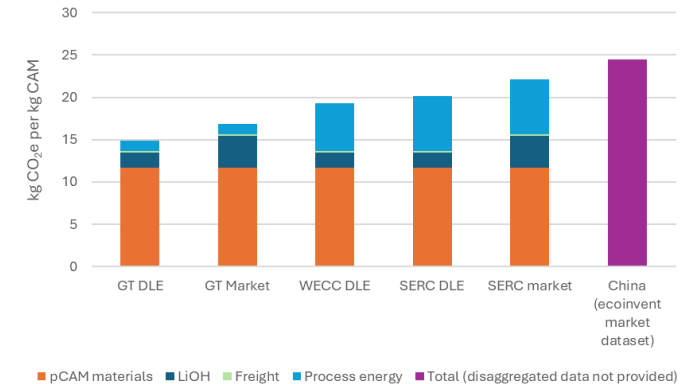


Source: Kendall et al. (under review)



Source: Busch et al. (under review)

- **Low emission extraction** will be an inherent advantage
- **Market opportunity in Europe** for low-carbon battery production and critical materials with low ESG risks
- **Export competitiveness** → Strategic port access + Clean Ports + low carbon production
- **Co-locating** processing, pCAM and recycling can create strategic opportunities, lower transportation costs, lower emissions
- Mexico has analogous resources in proximity to Salton Sea: **cross-border collaboration in “hub” development and achieving scale.**



Global warming potential (measured by kg CO₂e) of different CAM production scenarios, differentiated by emissions driver (materials, freight, and process energy).

Source: Slattery et al. (under review)



Thank you!

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