



Unlocking Energy Storage Opportunities Amid Tariffs & Antimony Shortages

Norbert Maleschitz – EVP/COO East Penn Manufacturing

AGENDA

1 East Penn Corporate Overview

2 Megatrends

3 Opportunities

4 Headwinds

5 Key Strategies to Stay Ahead

Company Overview

Founded in 1946

by DeLight Breidegam Jr. and
DeLight Breidegam Sr.

Largest **single-site** and
largest **privately-held** lead
battery company

10,400+
employees
globally

Markets Served –
Transportation,
Motive Power and
Reserve Power

**On-site
Recycling** –
Recycled over
30,000
batteries a day

OUR DIVISIONS



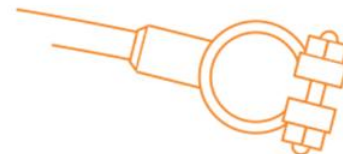
Transportation



Motive Power



Reserve Power



Wire & Cable

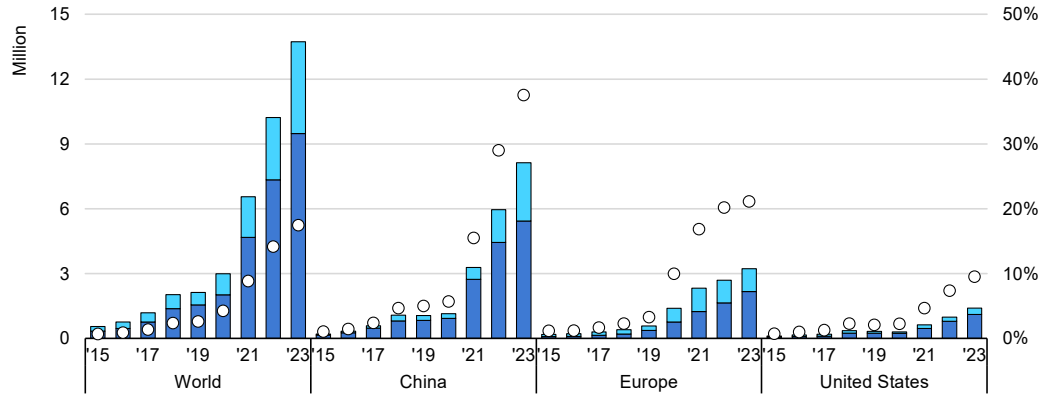
OUR COMPANIES



ELECTRIFICATION OF TRANSPORTATION

2

Electric car registrations and sales share in selected countries and regions, 2015-2023

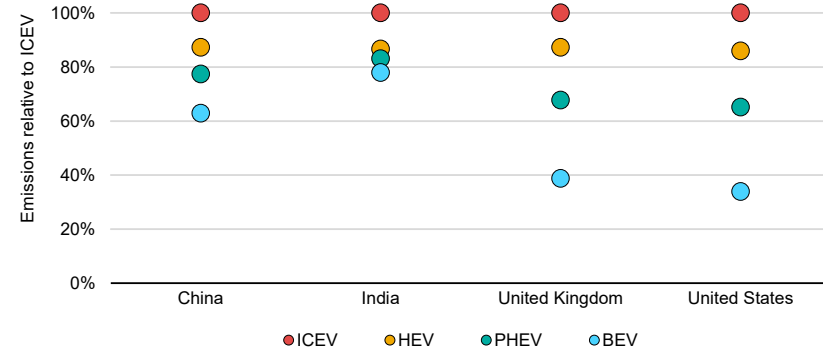


Source: IEA

EVs are Cleaner than ICE

EV Sales are Still on the Rise

Lifecycle emissions of a medium-sized car by powertrain relative to a gasoline internal combustion engine car by region in the Stated Policies Scenario, 2023



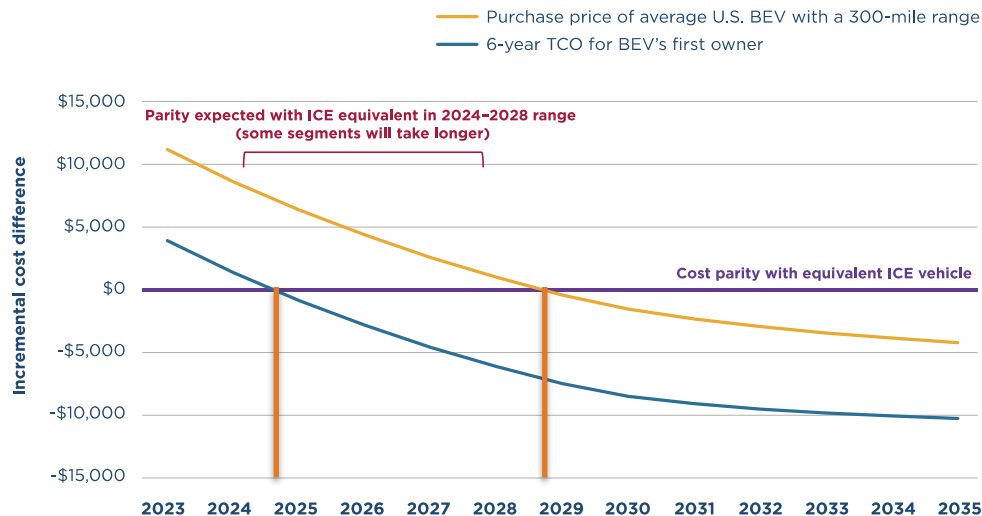
Source: IEA

IEA. CC BY 4.0.

ELECTRIFICATION OF TRANSPORTATION

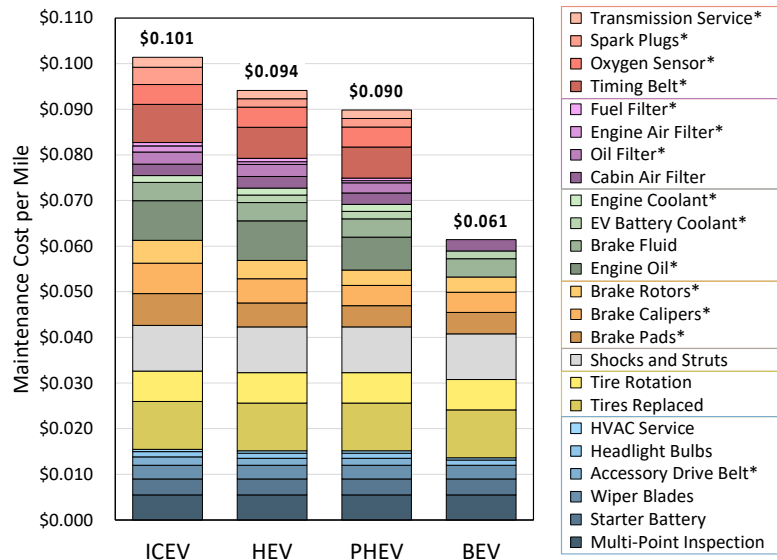
Cost of EVs is Coming Down

Figure 2 Incremental cost difference for purchasing and owning a BEV in the United States versus an equivalent combustion engine vehicle



Source: ANL

Scheduled LDV Maintenance Costs



Source: ANL

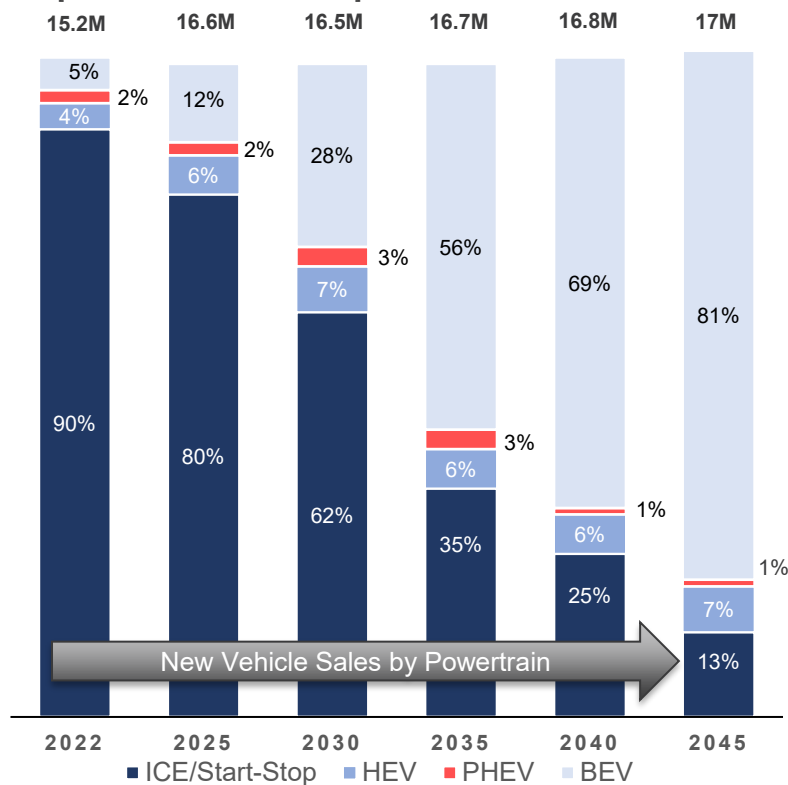
Charging Infrastructure is Still a Challenge

GROWTH RATE VEHICLE FORECAST THROUGH 2045

2

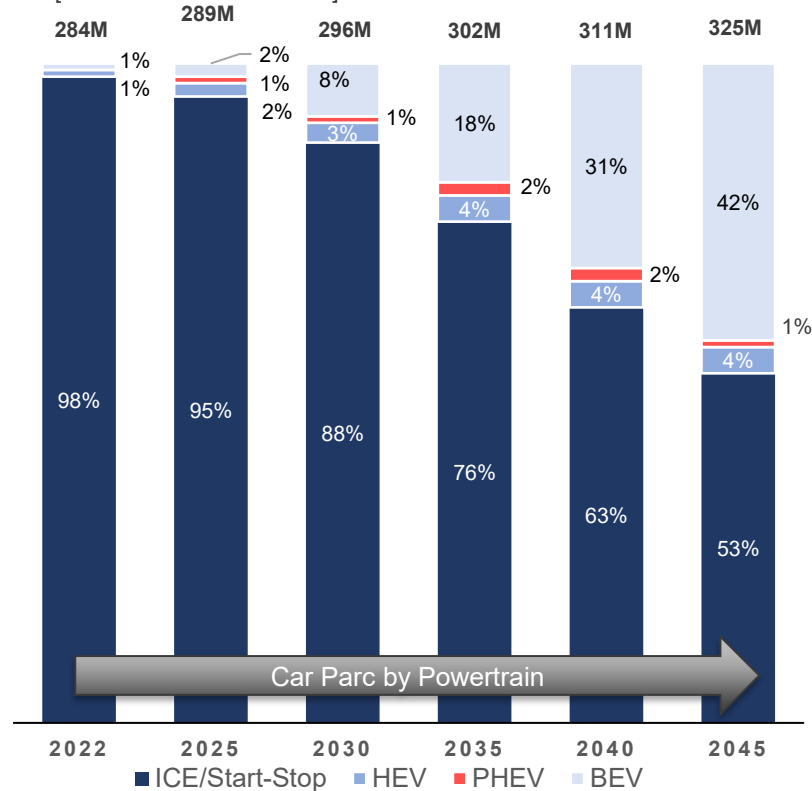
2022-2045F U.S. Percent of New Car Sales by Powertrain

[Percent of Total New Sales]



2022-2045F BEV Parc Penetration in the U.S.

[Percent of Total Car Parc]

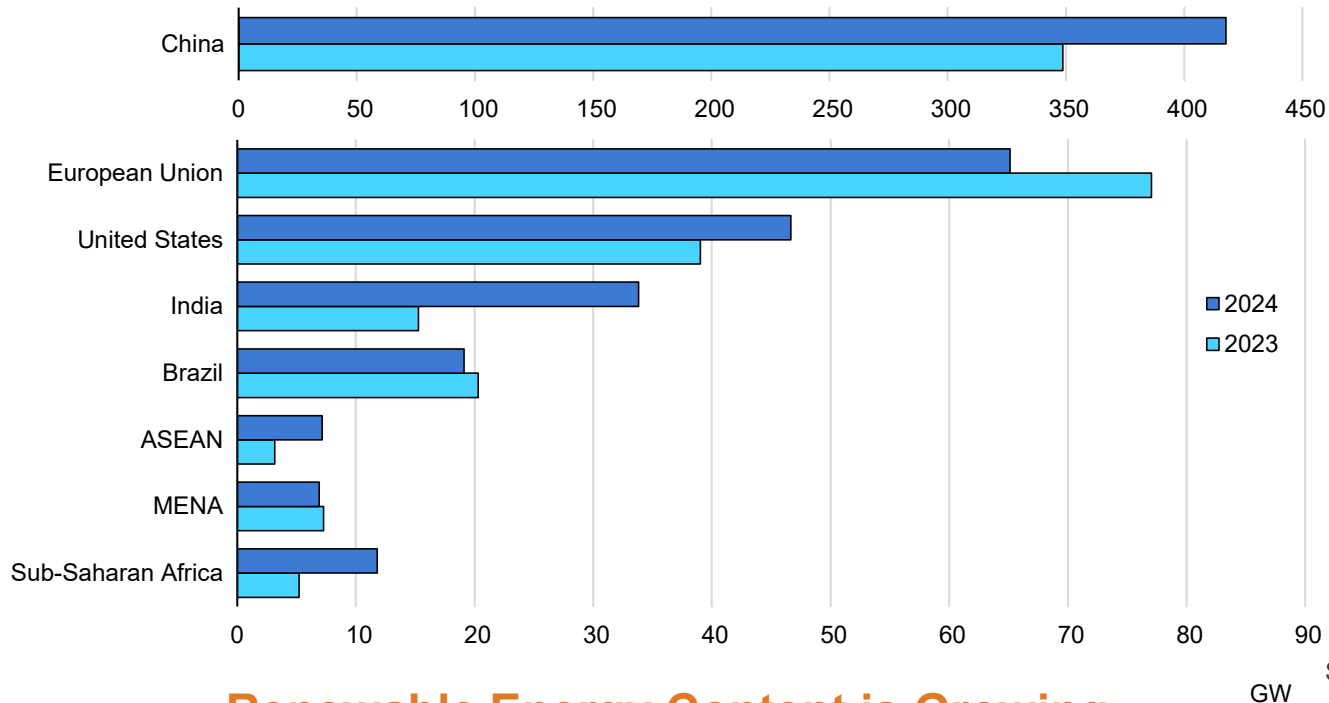


Source: AASA / AutoCare

RENEWABLE ENERGY - GLOBAL

2

Renewable electricity net capacity additions by country/region, 2023-2024

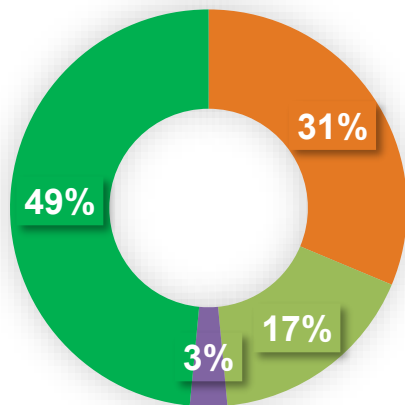


Renewable Energy Content is Growing

IEA. CC BY 4.0.

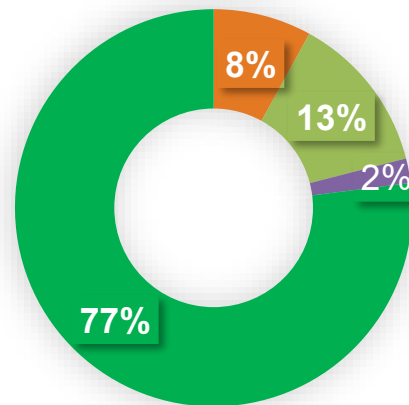
USA ELECTRICITY ADDITION

35,800 MW Addition 2023



■ Natural Gas ■ Coal ■ Wind ■ Nuclear
■ Hydro ■ Solar ■ Other

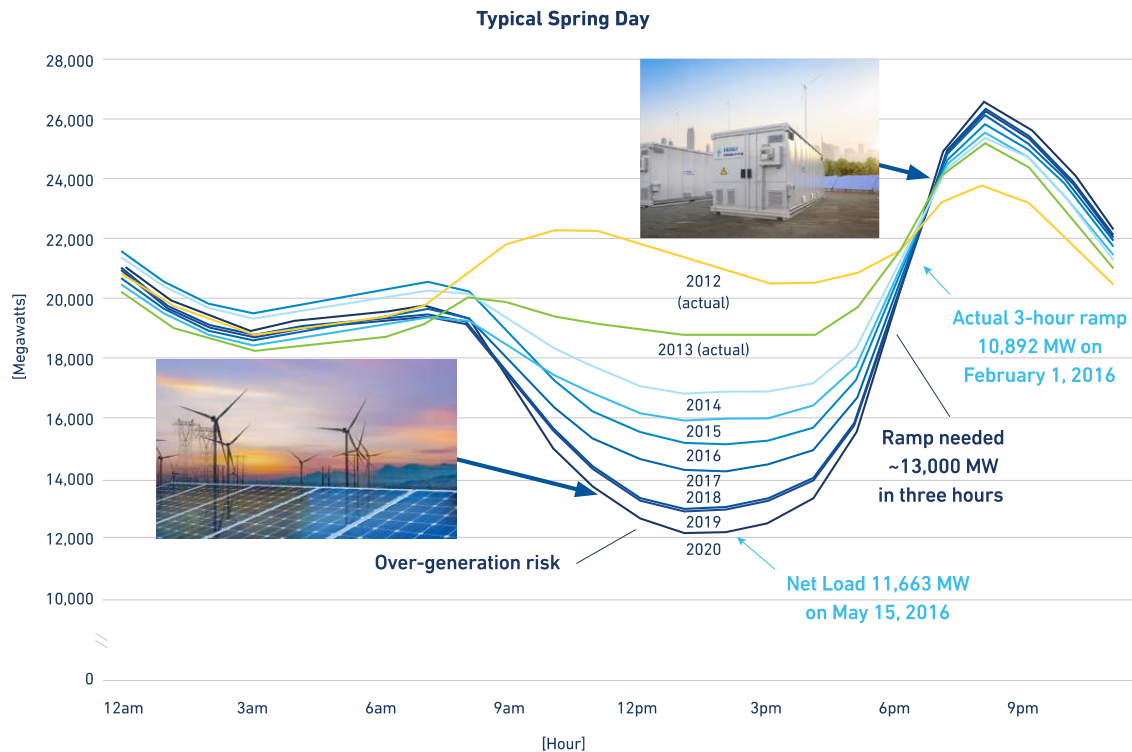
45,300 MW Addition Projection 2024



■ Natural Gas ■ Coal ■ Wind
■ Nuclear ■ Hydro ■ Solar
■ Other

Source: American Public Power Association

DEMAND AND SUPPLY ISSUE OF RENEWABLES – DUCK CURVE



Renewable Energy Generation is Destabilizing the Grid

ENERGY STORAGE OPPORTUNITIES

Technical and economical assessment* of current battery technologies for various ESS applications

Type	Application		Lithium-based 3 Li 5.9	Lead-based 82 Pb 207.2	Sodium-ion 11 Na 23.0	Sodium-sulfur 11 Na 23.0	Nickel-based 28 Ni 58.7	Vanad.-based 23 V 50.9	Zinc-based 30 Zn 65.4
Front-of-the-Meter 	Generation support & bulk storage	Firm capacity	Green	Light Green	Yellow	Yellow	Yellow	Light Green	Yellow
		Demand response	Green	Light Green	Yellow	Yellow	Yellow	Light Green	Light Green
		Arbitrage	Green	Light Green	Yellow	Yellow	Yellow	Green	Yellow
	Transmission & Distribution	Upgrade deferral	Green	Green	Light Green	Light Green	Yellow	Green	Light Green
		Frequency regulation	Green	Yellow	Yellow	Green	Light Green	Green	Light Green
	Ancillary services	Spinning reserve	Green	Yellow	Yellow	Green	Light Green	Red	Red
		Non-spinning reserve	Green	Light Green	Yellow	Green	Light Green	Green	Light Green
		Black start	Light Green	Green	Light Green	Light Green	Yellow	Light Green	Yellow
Behind-the-Meter 	Residential	Bill management	Light Green	Green	Yellow	Yellow	Red	Red	
		Back-up / micro-grid	Green	Green	Light Green	Light Green	Light Green	Yellow	Yellow
	C&I	Bill management	Light Green	Light Green	Yellow	Yellow	Yellow	Yellow	Yellow
		Back-up / micro-grid	Green	Green	Light Green	Light Green	Light Green	Light Green	Light Green

Sources: European Commission, desk research, KPMG analyses

(*) See details in core report



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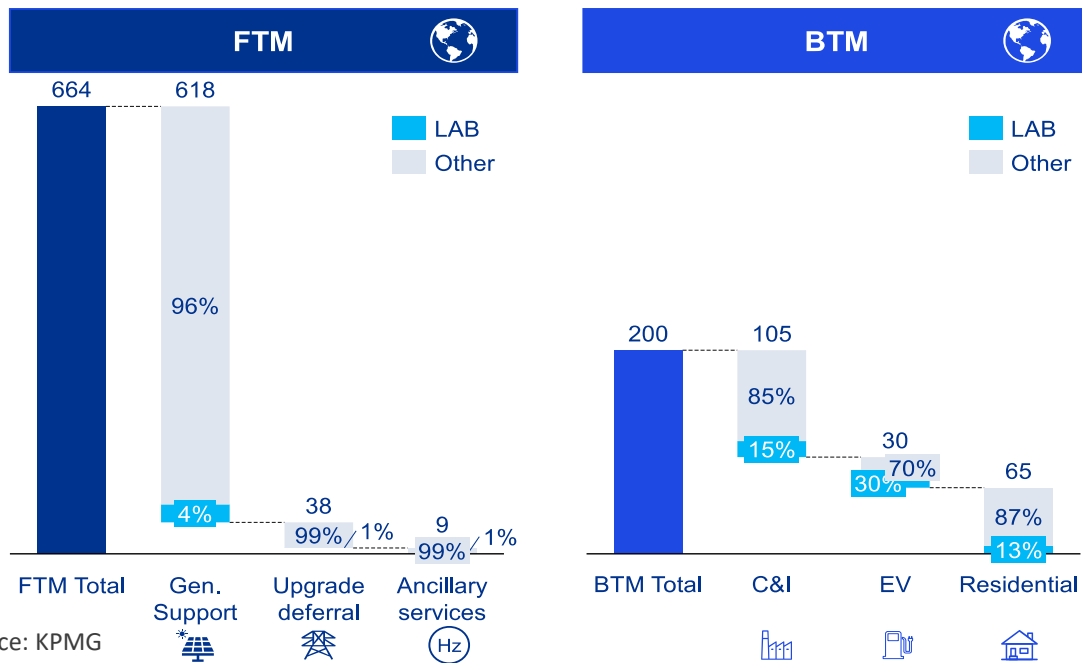
Legend: Unsuitable ■ ■ ■ ■ Suitable for the application

Source: KPMG

MARKET OPPORTUNITIES FOR LEAD BATTERIES

Hypotheses taken for lead batteries market share by 2035 – Global view

Lead battery repartition in 2035 – FTM & BTM [GWh]



Source: KPMG



FTM = 25 GWh

BTM = 34 GWh



FTM = 5 GWh

BTM = 7 GWh



Total = 1.5 times
East Penn Mfg.

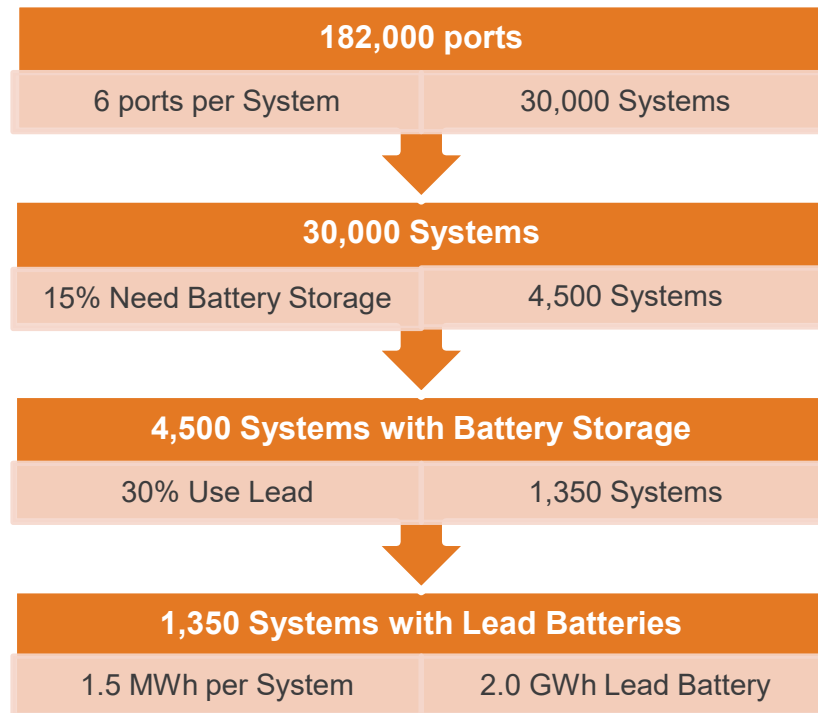
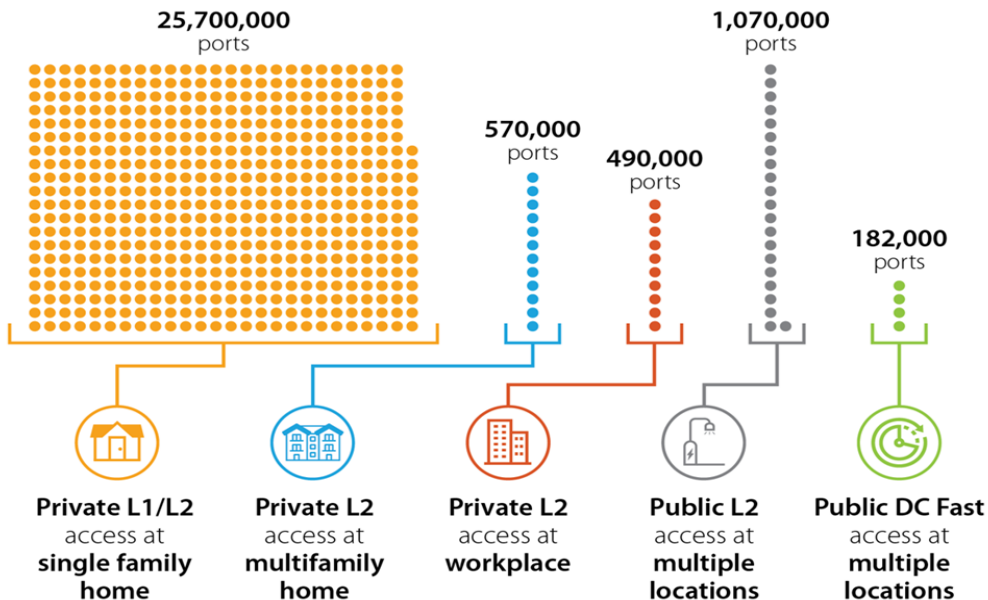


BTM = 18%
East Penn Mfg.

ELECTRIC VEHICLE CHARGING

2030 National EV Charging Network Size

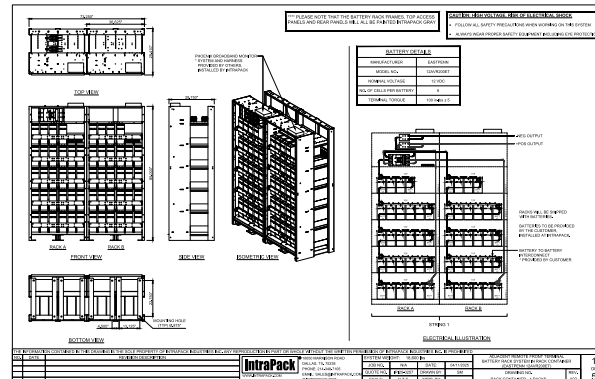
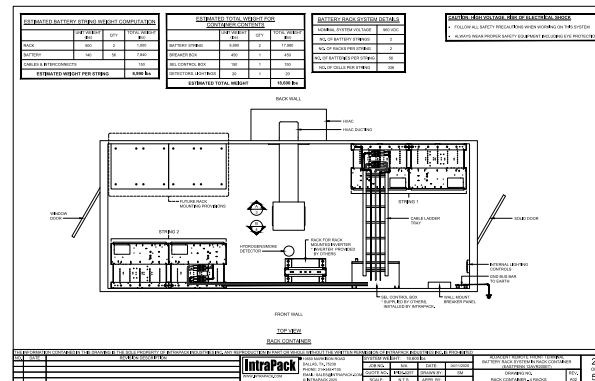
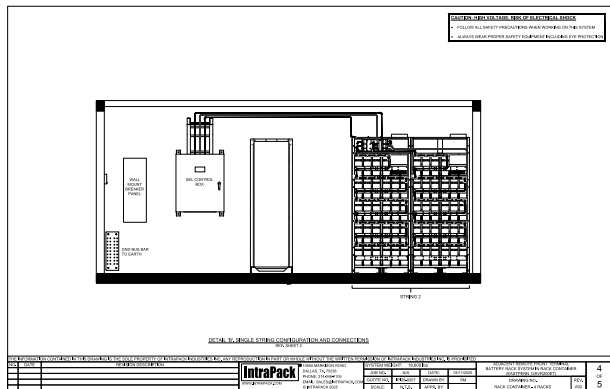
Each • represents 50,000 charging ports
Estimated Number of EV Charging Ports Needed to Support 33 Million EVs (Total of 28 Million Ports)



Source: DOE – VTO - NREL



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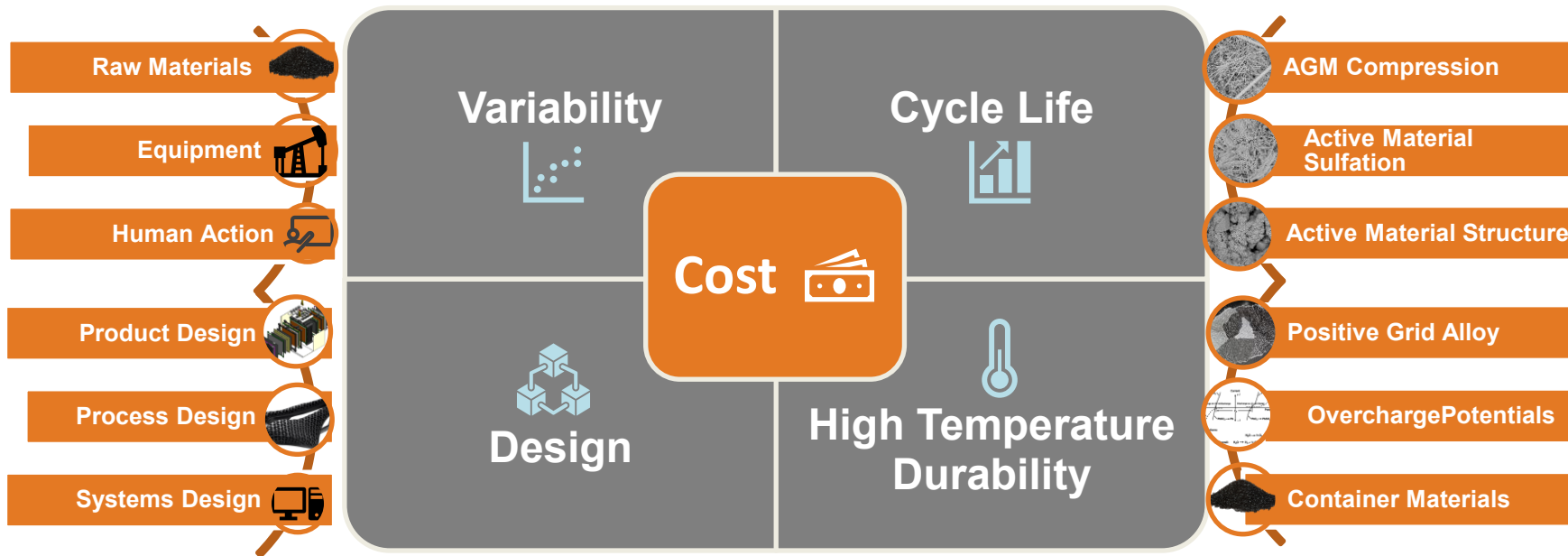


EV Fast Charging Prototype East Penn Campus – Lyon Station, PA



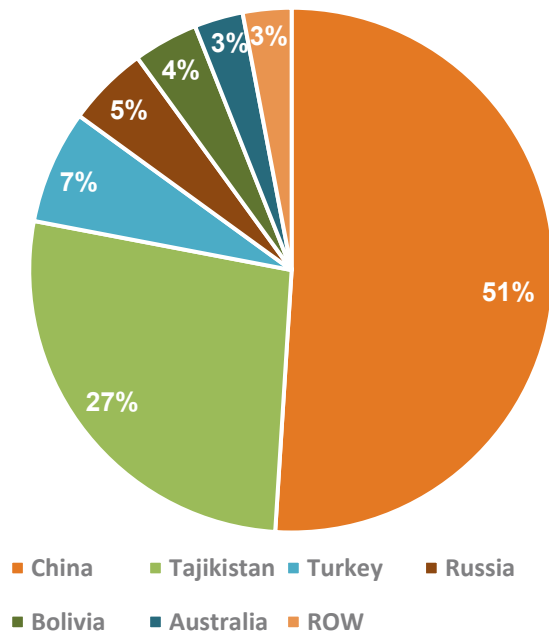
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TECHNICAL OPPORTUNITIES FOR LEAD BATTERIES

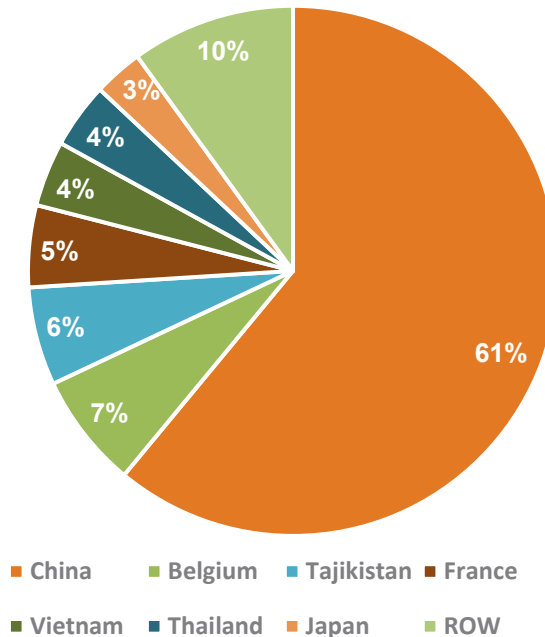


HEADWIND ANTIMONY SUPPLY

Global Mined Antimony Production 2023



Global Refined Antimony Production 2023



End Users

Flame Retardants

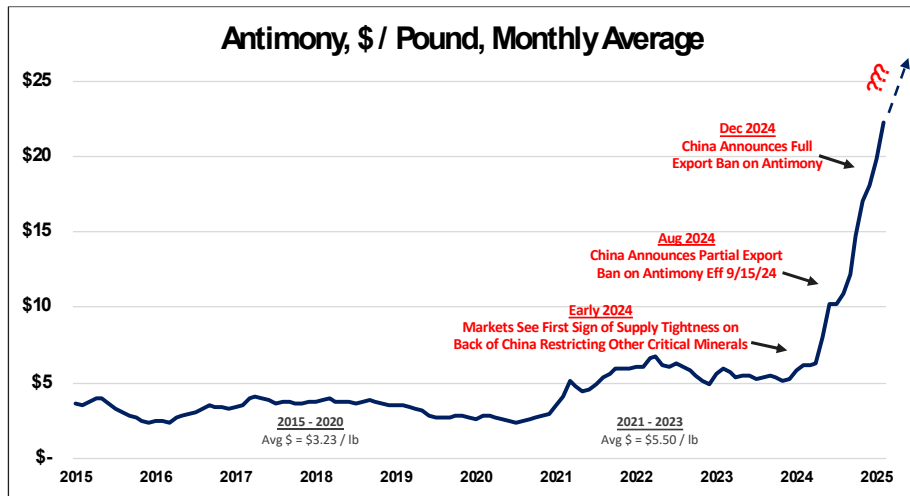
Batteries

Ceramics & Glass

Plastics

Ammunition

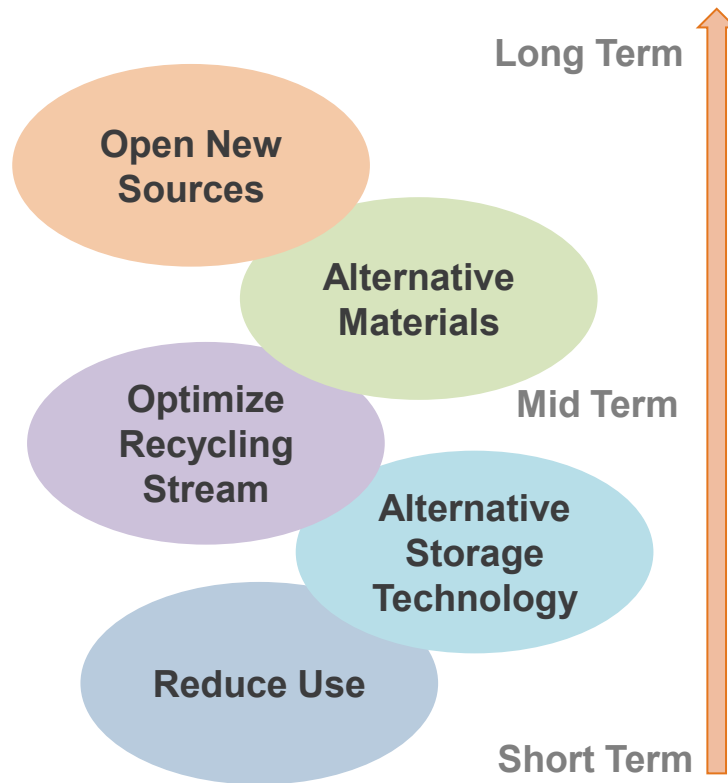
HEADWIND ANTIMONY SUPPLY



China bans export of critical minerals to US as trade tensions escalate

Reuters, August 2024

Mitigation Strategies



HEADWIND TARIFFS

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WP/19/9

Source: IMF

IMF Working Paper

Research Department

Macroeconomic Consequences of Tariffs¹

Prepared by Davide Furceri, Swarnali A. Hannan, Jonathan D. Ostry, and Andrew K. Rose²

Authorized for distribution by Jonathan D. Ostry

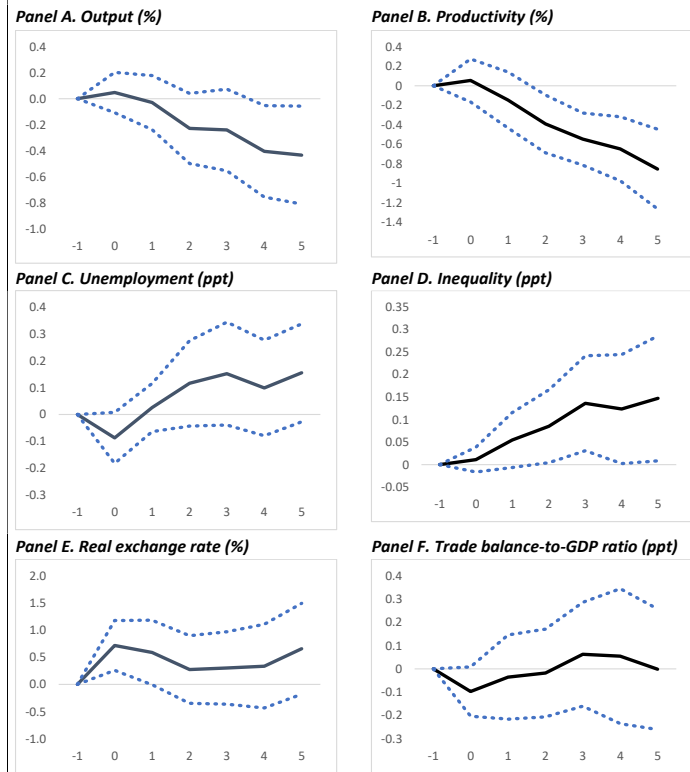
January 2019

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Abstract

We study the macroeconomic consequences of tariffs. We estimate impulse response functions from local projections using a panel of annual data that spans 151 countries over 1963–2014. We find that tariff increases lead, in the medium term, to economically and statistically significant declines in domestic output and productivity. Tariff increases also result in more unemployment, higher inequality, and real exchange rate appreciation, but only small effects on the trade balance. The effects on output and productivity tend to be magnified when tariffs rise during expansions, for advanced economies, and when tariffs go up, not down. Our results are robust to a large number of perturbations to our methodology, and we complement our analysis with industry-level data.

Figure 1. The Effect of Tariffs



Note: The solid line indicates the response of output (real exchange rate, trade balance, labor productivity).

HEADWIND TARIFFS

Headlines from the WSJ – Feb & Mar 2025

U.S. Tariff Rates Are Surging to Their Highest in Decades

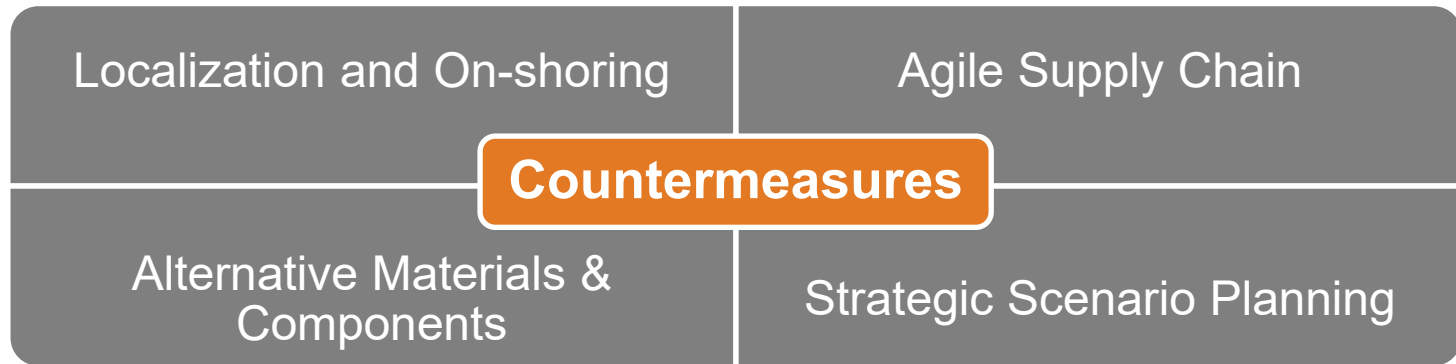
Trump Plans Another 10% Tariff on Products From China

The U.S. president cites the country's role in the fentanyl trade

Tariff Wars Are Often Short. Their Legacies Aren't.

How Uncertainty From Trump's Tariffs Is Rippling Through the Economy

Levies on Mexico and Canada mark new era of protectionism



KEY STRATEGIES TO STAY AHEAD

Innovation

in a collaborative environment along the supply chain

Diversify Material Sources

alternative materials and securing diverse suppliers will be crucial

Focus on Sustainability

recyclable, and sustainable materials are a key differentiator

Invest in R&D

improving existing technologies but also identifying novel approaches

Scenario based Strategies

agile and responsive supply chains to handle sudden shifts and disruptions

THANK YOU