Local competitiveness in EV, Pack, and Cell Manufacturing

Going beyond scale and subsidies

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OEMs must first and foremost chart a path to profitability

SUV example	*($, thousands)*	*Advantage vs ICE*
BEV selling price	**45.0**	
Dealer related fees	6.0	≈
Powertrain	14.0	− −
Other materials	12.0	≈
Assembly	2.0	+
Overhead	4.0	≈
D&A	2.0	≈ −
R&D	2.0	≈ −
Other SG&A	3.5	≈
Advertising	1.0	≈
Freight & Warranty	1.5	≈
Total costs	**48.0**	
Op income	(3)	

Needed cost reductions include:
$3k to breakeven
$7-8k to match ICE profitability

Main levers to reduce total delivery costs:

1. Incremental "design to cost" (10%+ savings potential)
2. "Transformative design" (5-10%)
3. De-contenting (up to 5%)

Source: BCG analysis

The customer and supplier need to be considered within the solution path

Cars have become "too expensive"

New vehicle average transaction price over time

$50k
in December 2024

Versus $47k in 2021 and $37k in 2018

Suppliers getting squeezed

EBIT margins

Avg. **6%**
since 2021 (lower post-COVID)

Versus 8% average for OEMs (higher post-COVID)

Production costs set to rise

Additional labor cost per vehicle by 2028

+$800 to +$1000

As an outcome of 2023 UAW negotiations

Source: Cox Auto 2024 December report, BCG analysis

Tariffs do not change the fundamental long-term advantages of China-made EVs

	BYD Seal U	BYD Seal U	VW ID.4
MSRP ($k €)	22,000	42,000	44,000
Est. profit margin (%)	6%	30% pre-2024 tariffs	Negative

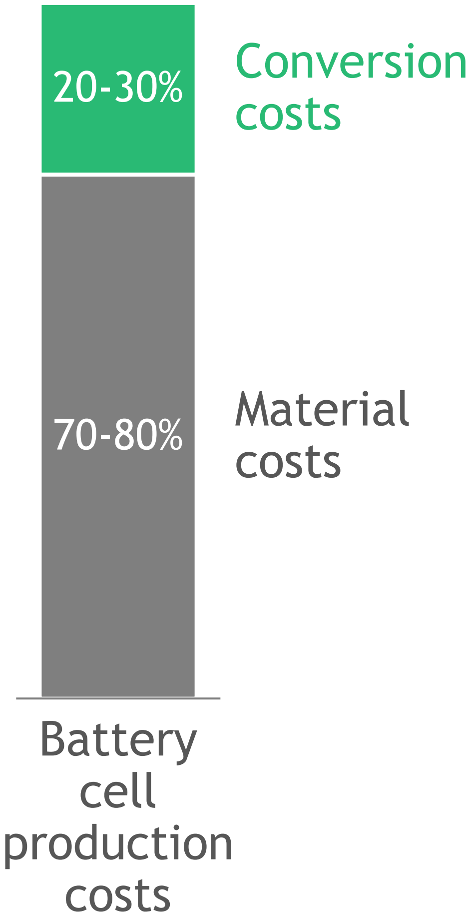
Margins for int'l sales drive are major source of cash

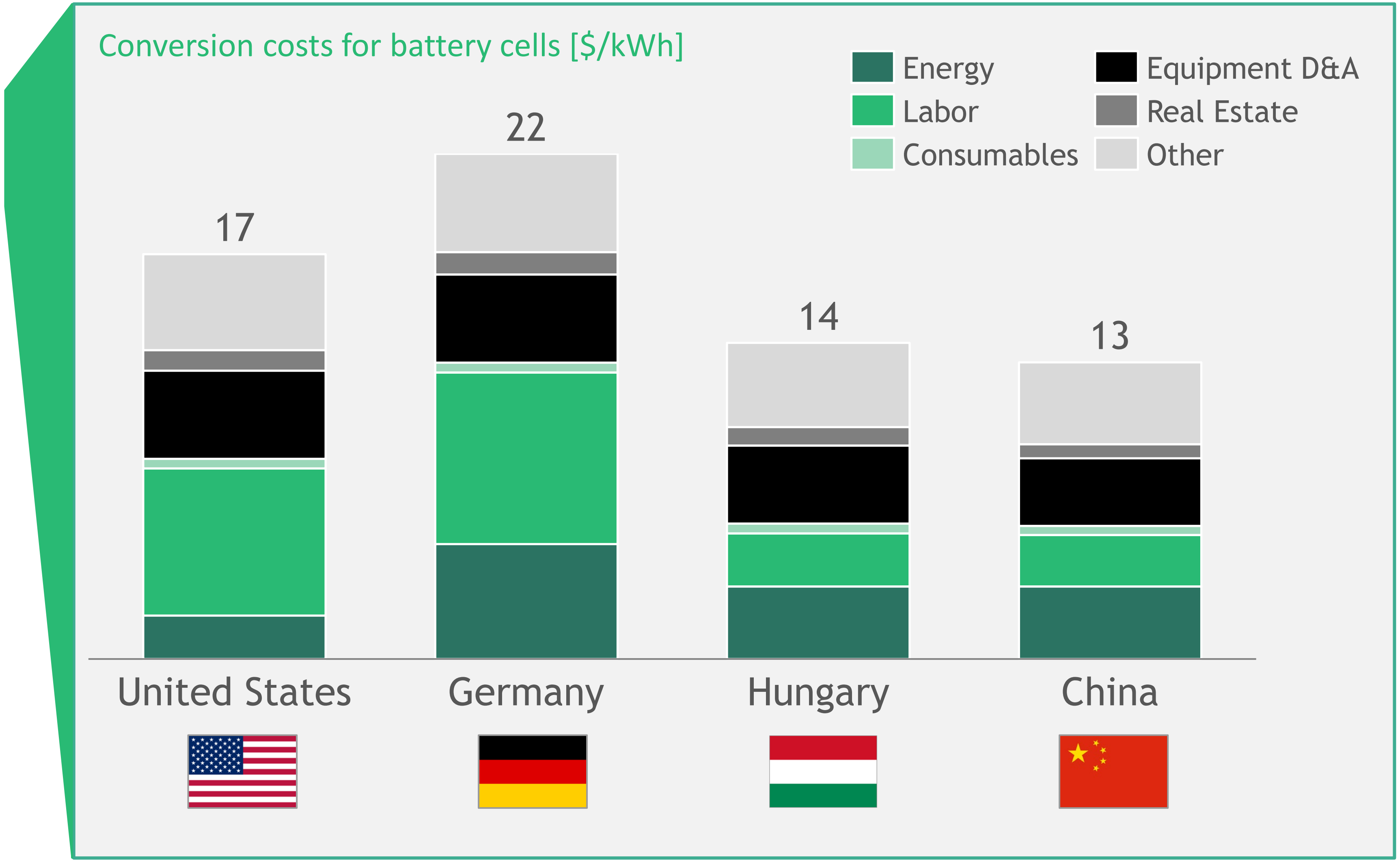
Implies over $12k in margin advantage pre-tariff

Note: EU tariff announced in 2024 of xx% on BYD; ranges by automakers and is subject to change   Source: Rhodium Group, BCG analysis

Cell-maker conversion costs can vary meaningfully by geography

But hidden savings (on materials, in quality) matter more for near-term competitiveness & landed cost advantage

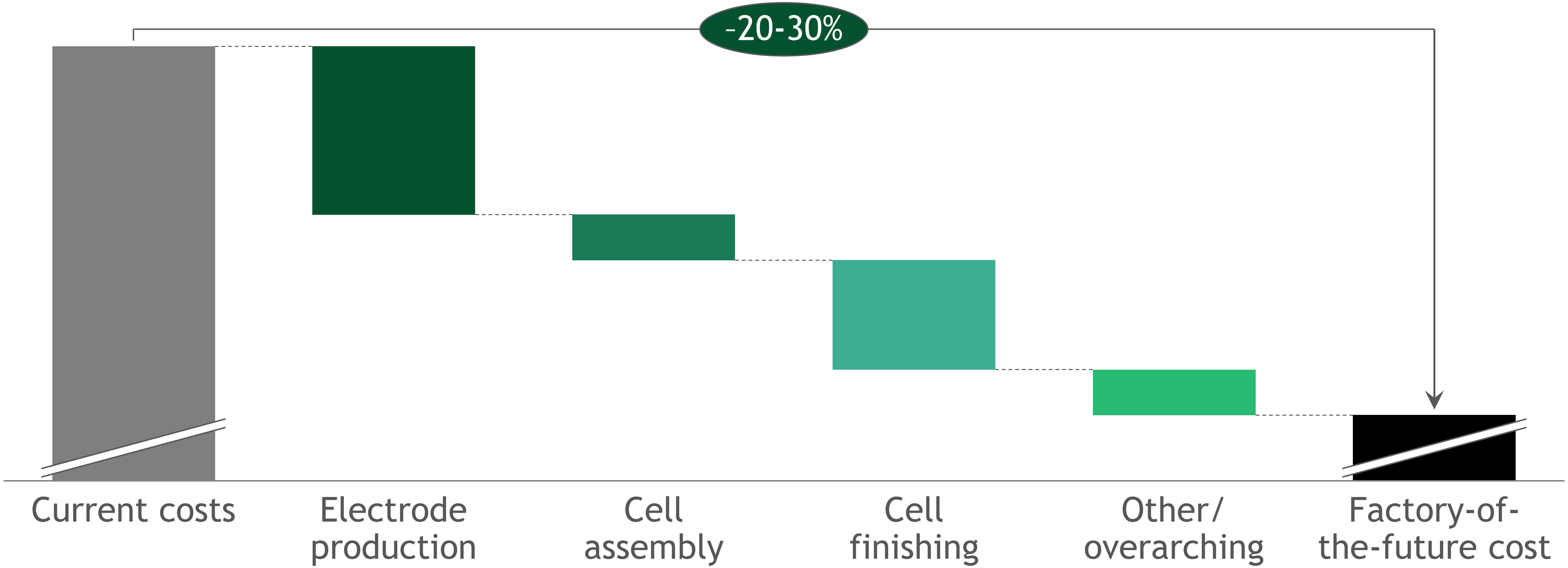




Note: Assumes same factory setup across different countries using equipment from Asian suppliers to produce NMC811 in pouch format, with stable operations and same level of efficiency and quality; 2024 cost baseline. D&A = depreciation and amortization. Source: BCG analysis ("Battery Cell Factory of the Future")

That said, there remain multiple opportunities to improve — and re-imagine

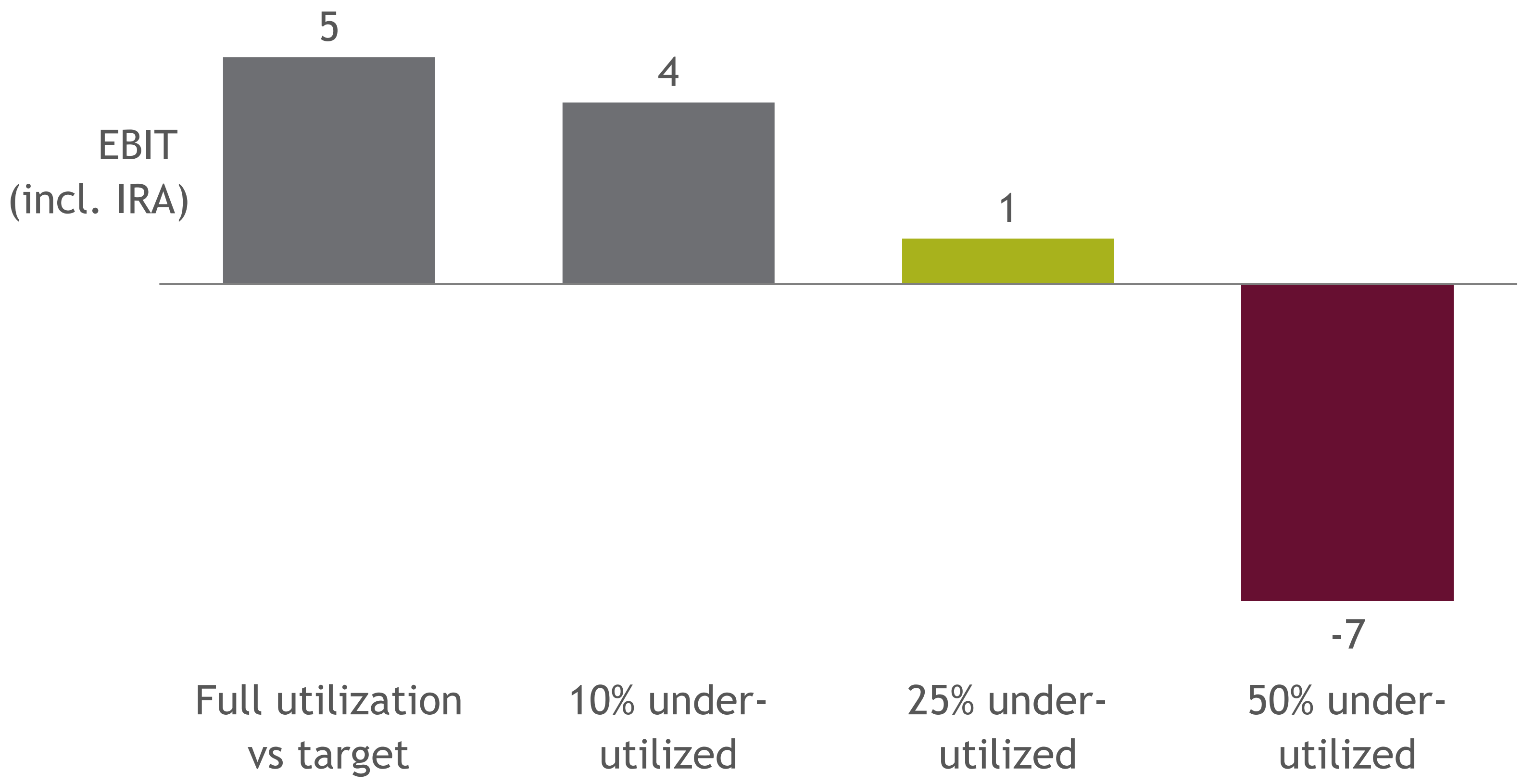
Impact of factory of the future on conversion costs for battery cells



Note: The analysis is based on a US factory producing NMC811 cells in the pouch format; 2024 cost baseline. Conversion costs = production costs minus material costs (excluding overhead and R&D). Source: BCG analysis ("Battery Cell Factory of the Future").

Plant under-utilization needs to be an ecosystem-wide problem to (re)-solve

Impact of utilization on margin (battery cells) — *representative example*



A healthy supply chain makes for a healthy OEM

Financiers are increasingly playing a helpful role

e.g. setting the expectation of take-or-pay contracts (at least 50%) that stabilize the business case

Note: Full utilization is defined here as meeting target utilization (less planned downtime, scrap, etc), not nameplate capacity
Source: BCG analysis

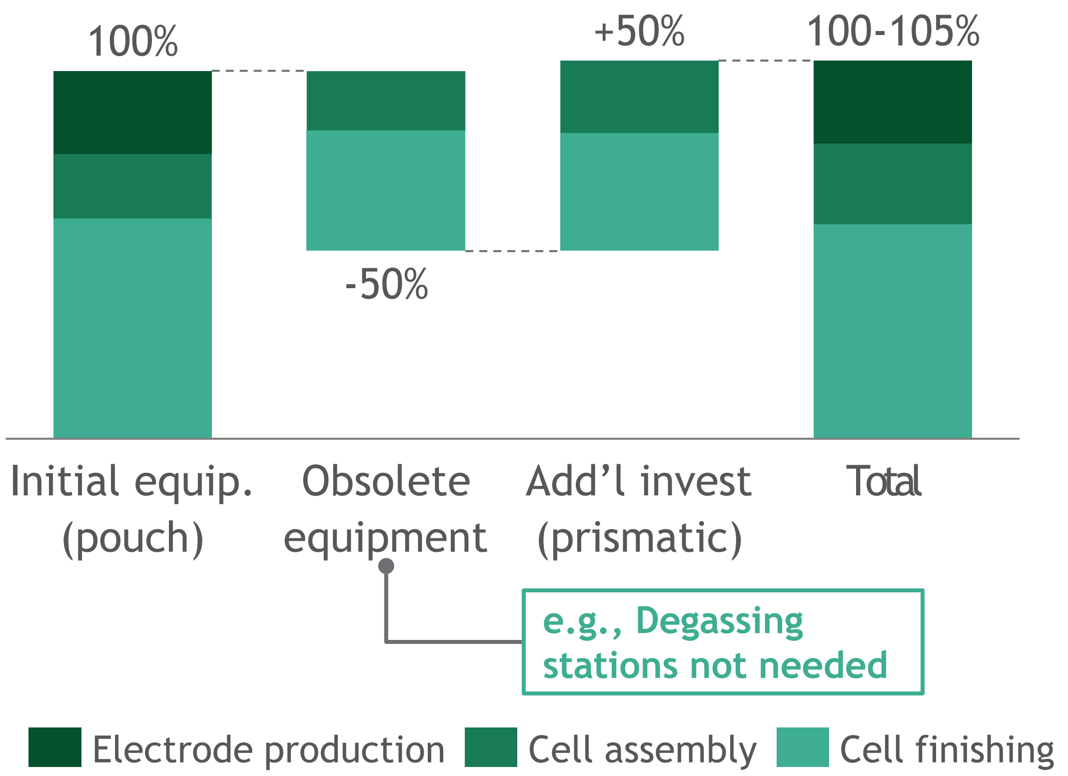
A change of heart can also be expensive; prepare for a future, not only the now

Which dimensions are agnostic to chemistry or format?

	Chemistry[1]	Format
Building	✓	✓
Process	✓	✗
Equipment	✓	✗
Tooling	✗	✗
Parameter setting	✗	✗

What is the capex cost of switching formats?

Pouch → Prismatic: Equipment CAPEX [$M/GWh]



Note: Baseline scenario: NMC811, pouch format, 43M cells/yr; CAPEX excl. water recycling & external electricity/gas line setup costs for both location; OPEX excl. tariffs & duties
Source: BCG

A winning recipe

Bridges, not walls: Re-think supply chain collaboration
Voice of customer, supplier contracting, etc

Float like a butterfly: operate with speed and incorporate flexibility, <u>expecting</u> that the landscape will change

Sting like a bee: Claim relevant control points
Or become unshackled from those that currently exist

Secure long-term alignment & support from policy-makers
Cut thru the noise, and make cleantech a winning issue

Question everything
No sacred cows, no stone unturned

Act with purpose and strong commitment
There is little/ no time to lose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