

When electronics inflation threatens margins

Defending supplier profitability through the 2026-28 repricing cycle

November 2026

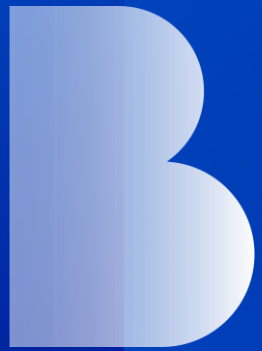
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Agenda

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1. Why this reaches you

The 2026–28 electronics repricing is a margin event, not a purchasing event

Double-digit product-cost inflation is colliding with fixed customer pricing, annual cost-down commitments and a trade regime in flux.

How the next four quarters of supplier contracts, customer negotiations and program specifications are handled will determine margin, guidance credibility and competitive position through 2028.



Why this reaches you: the case study inside prices this cycle on a product you will recognize and guidance that will decide your 2027: how much of the inflation is real, how much your organization can engineer it out, and how much must be recovered in customer pricing. Knowing that split before your customers do is the difference between margin defended and margin donated.



2. Electronics material cost and impact outlook

Auto material cost outlook

Executive summary

2A

Market context & drivers

7

- **Cost and supply pressure has broadened across electronics** with memory, PCB / laminate and MLCCs now all repricing while copper trades at record highs
- **Risk differs materially by category** with continuity pressure concentrated in memory and high-spec electronics, while metals and resins skew more toward cost exposure
- **Four forces are reshaping the outlook** as AI / data-center demand, uneven capacity response, upstream input pressure and external disruption interact across markets

2B

Market outlook

10

- **Memory remains the clearest continuity and pricing hotspot** as suppliers are guiding to tighter supply in 2027-28 than in 2026 and 4Q26 contract prices rise further
- **Advanced SoC / compute pressure remains node-specific** with 3 nm now a third of TSMC wafer revenue, 2 nm ramping and further price increases signaled for 2027
- **PCB / laminate pressure has spread from high-performance to standard grades** as the glass-fabric shortage drives repeated FR-4 laminate increases, with relief not before 2H 2027
- **Copper has set new records as mine disruptions meet electrification and data-center demand;** the timing of 2027 relief is contested
- **Passives have moved from selective to broad-based increases** with across-the-board MLCC hikes and extended lead times, while mature-node silicon repricing extends into 2027

2C

Automotive implications & industry response

44

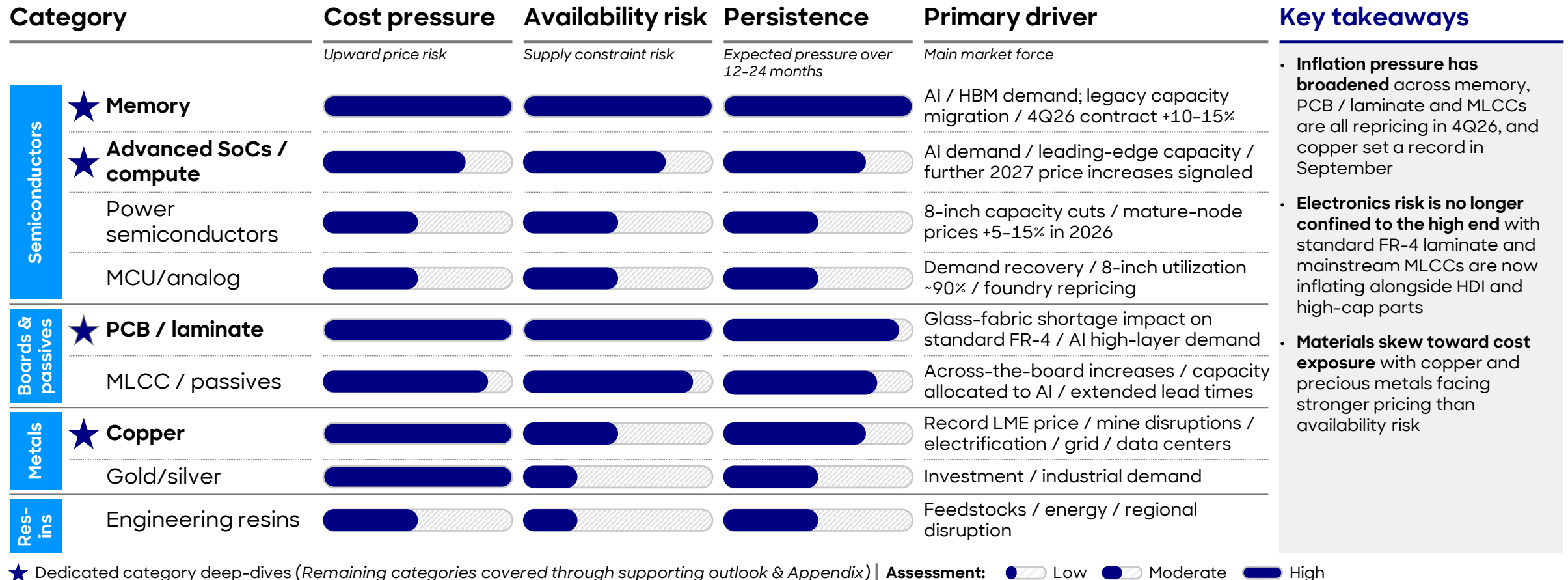
- **BOM composition determines the actual cost impact** with the illustrative IVI controller ~25% material inflation in 2026 and a further ~12-15% in 2027, with memory driving more than half while larger cost-down requires qualification, redesign and ultimately platform-level changes
- **Near-term mitigation is meaningful but partial** as sourcing and commercial levers can provide faster relief, but larger cost-down requires qualification, redesign and ultimately platform-level changes
- **Operating models influence how much inflation reaches vehicle cost** with global players combining capacity, sourcing and design levers while leading CN-based NEV players can move faster through greater integration, localization and sourcing flexibility



2A. Market context & drivers

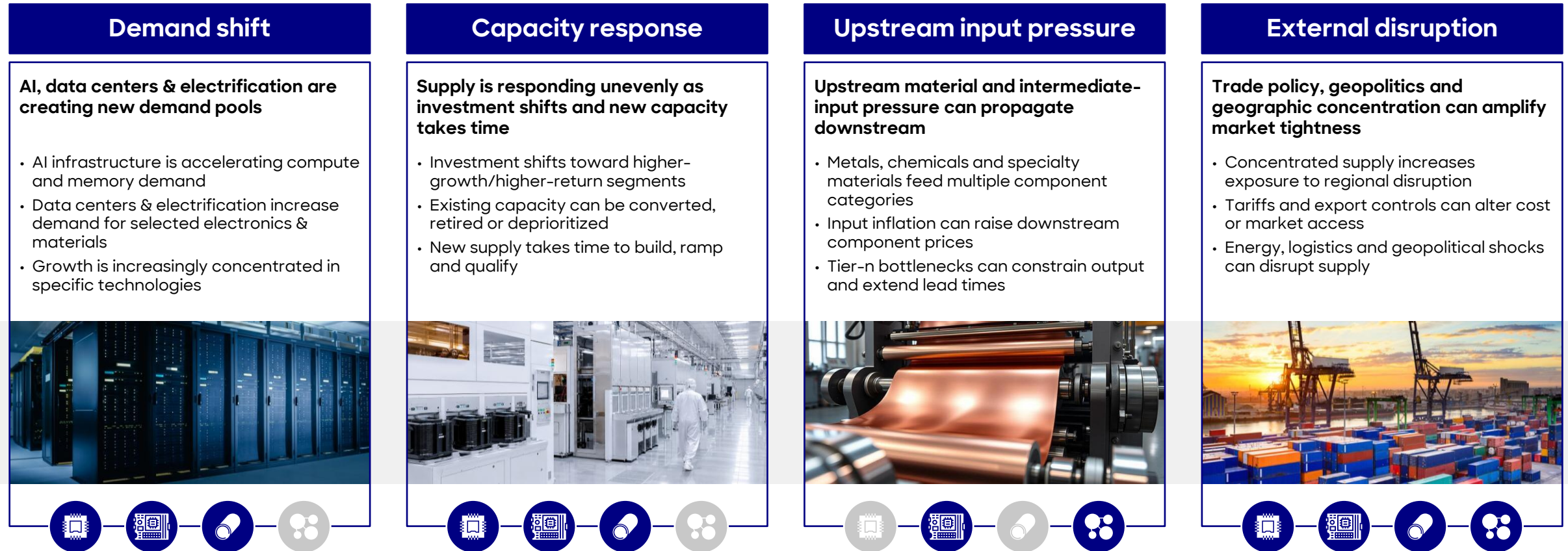
Cost and supply pressure has broadened with memory, PCB / laminate and MLCCs are all repricing, and copper is at record highs

Cross-category outlook overview



Four primary forces are reshaping cost and availability across automotive-relevant materials and components

Key market drivers¹⁾



Relative relevance: ● Primary ● Secondary |  Semiconductors  Boards & passives  Metals  Resins

1) Primary market-level drivers; company-specific FX, contracting and hedging effects not shown



2B. Market outlook

Market outlook will focus on the categories where cost pressure, availability risk and persistence appear most meaningful

Overview of markets covered and priority topics

Semiconductors

- ★ **Memory**
- ★ **Advanced SoCs / compute**
 - Power semiconductors
 - MCU / analog

Boards & passives

- ★ **PCB / laminate**
 - MLCC / passives

Metals

- ★ **Copper**
 - Gold / silver

Resins

- Engineering resins

Priority market review sequence



What each market review covers

Current pricing and availability	Key demand and supply drivers	12-24 month outlook	Automotive relevance
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★ Priority market reviews | Remaining categories covered in supporting outlook & appendix



2B.1 Memory

Memory is entering a tighter market environment as demand rises and supply increasingly diverges by generation

Memory market outlook summary

1 Memory

2 Advanced SoCs / compute

3 PCB / laminate

4 Copper

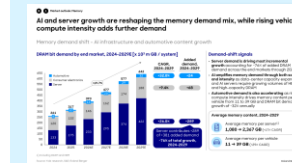
5 Additional market outlooks

- **DRAM pricing and availability remain under pressure** as the market enters a sharp upcycle and suppliers signal continued tightness through 2028
- **AI and server growth are reshaping the demand mix** with servers driving most incremental DRAM demand while automotive memory requirements also continue to rise
- **Supplier focus is shifting toward newer DRAM generations and HBM** as higher-growth technologies attract greater investment relative to legacy DDR4
- **The forward outlook differs increasingly by generation** with legacy DRAM facing the greatest continuity risk while newer generations receive greater supply support
- **Automotive remains particularly exposed to legacy-memory constraints** as long product cycles and qualification requirements slow substitution even as newer-generation capacity expands

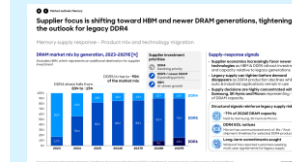
Supporting deep-dives



Market outlook



Demand shift



Supply response



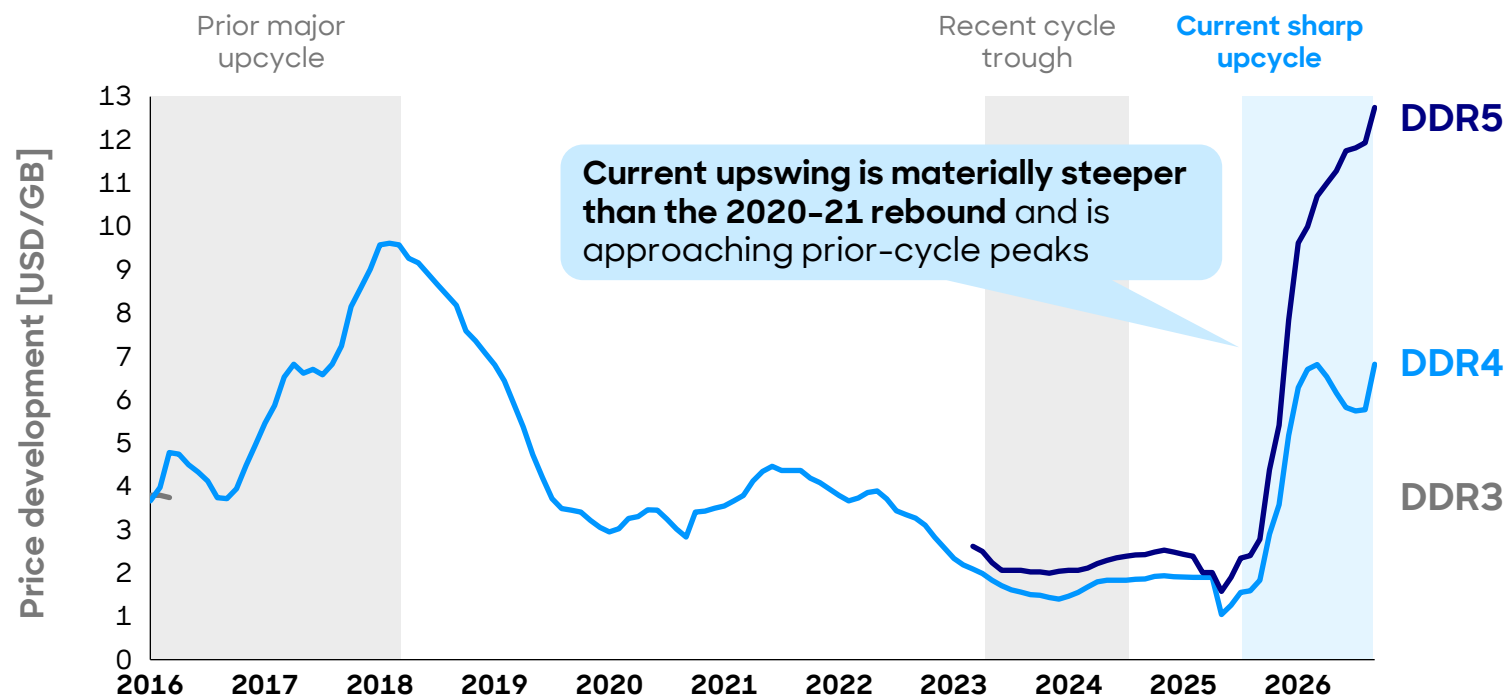
Forward outlook

DRAM has entered a sharp upcycle and suppliers now guide to tightness through 2028, memory remains cyclical, but the timing of the downturn is not in sight

Current memory market – DRAM pricing and availability

DRAM spot-price development [USD per GB]

USD/GB spot price for base-quality eTT DRAM – Spot prices are directional indicators of market conditions and may differ from automotive contract pricing



Current market signals

- **The current upcycle is materially stronger than the prior recovery** with prices rising faster than in 2020-21
- **Price pressure spans both legacy and newer generations** as DDR4 and DDR5 rise sharply into 2026
- **Market pressure is likely to persist** as suppliers signal tight conditions and limited incremental supply into next several years



“We expect memory and storage supply-demand conditions to be much tighter in calendar 2027 and 2028 than they were in 2026 ... we do not have line of sight to when supply and demand will return to balance.”

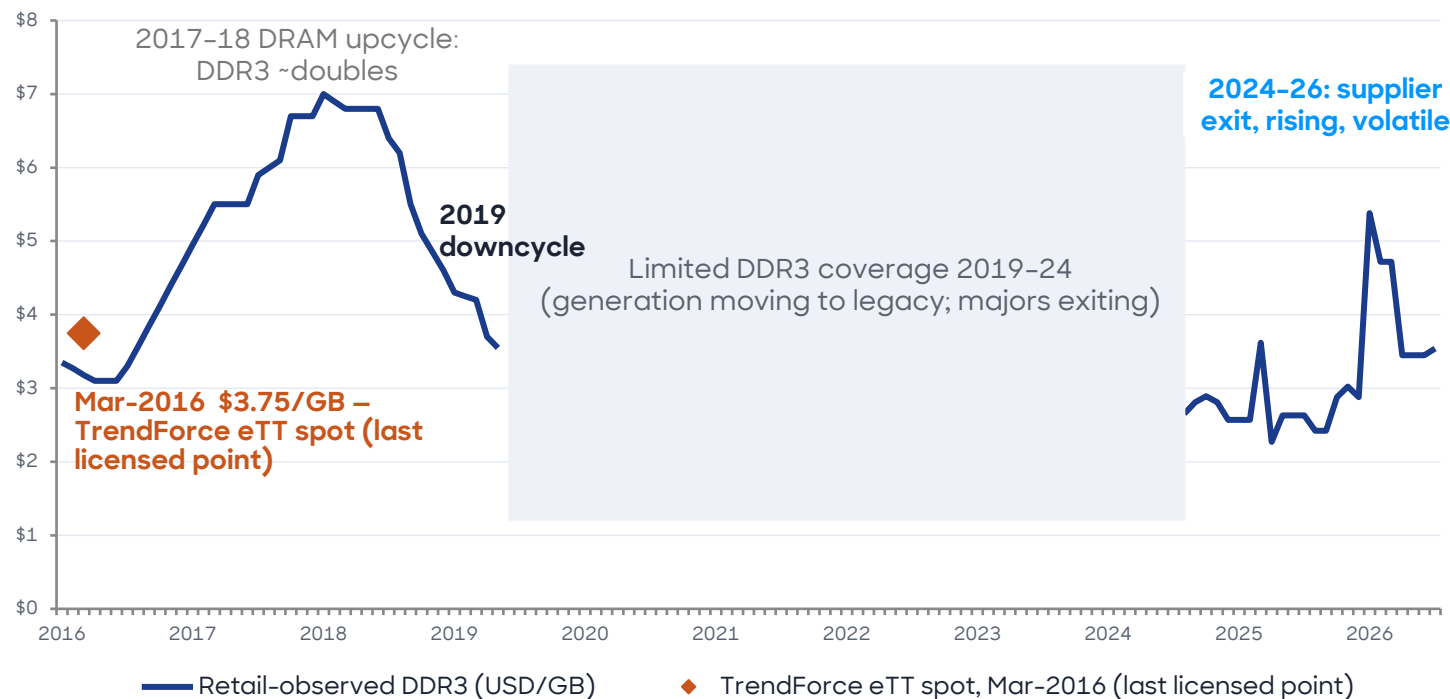
– Sanjay Mehrotra, CEO Micron, FQ4 2026 prepared remarks (market outlook), 30 Sep 2026



DDR3 pricing has turned from a demand cycle into a supplier-exit story, flat-to-down through 2019–23, rising and volatile since 2024 as the majors withdraw

Current memory market – DDR3 pricing and availability

Retail-observed DDR3 module price, USD/GB (3-month median of monthly lowest-listed prices, fixed basket); TrendForce eTT spot anchor shown for Q1-2016



Additional observations

Data basis

TrendForce eTT spot through Q1-2016. From Q2-2016 the series is retail-observed USD/GB (lowest listed DDR3 modules, fixed basket) – it tracks spot direction with a short lag and is used for trend and inflection points. Not a settlement-grade reference.

What is presented

The 2017–18 upcycle roughly doubled DDR3; the 2019 downcycle gave most of it back. Since 2024, with Samsung, SK hynix and Micron withdrawing capacity toward DDR4/DDR5 and HBM, DDR3 has risen and become markedly more volatile as supply concentrates with Nanya, Winbond and Chinese/Taiwanese makers.

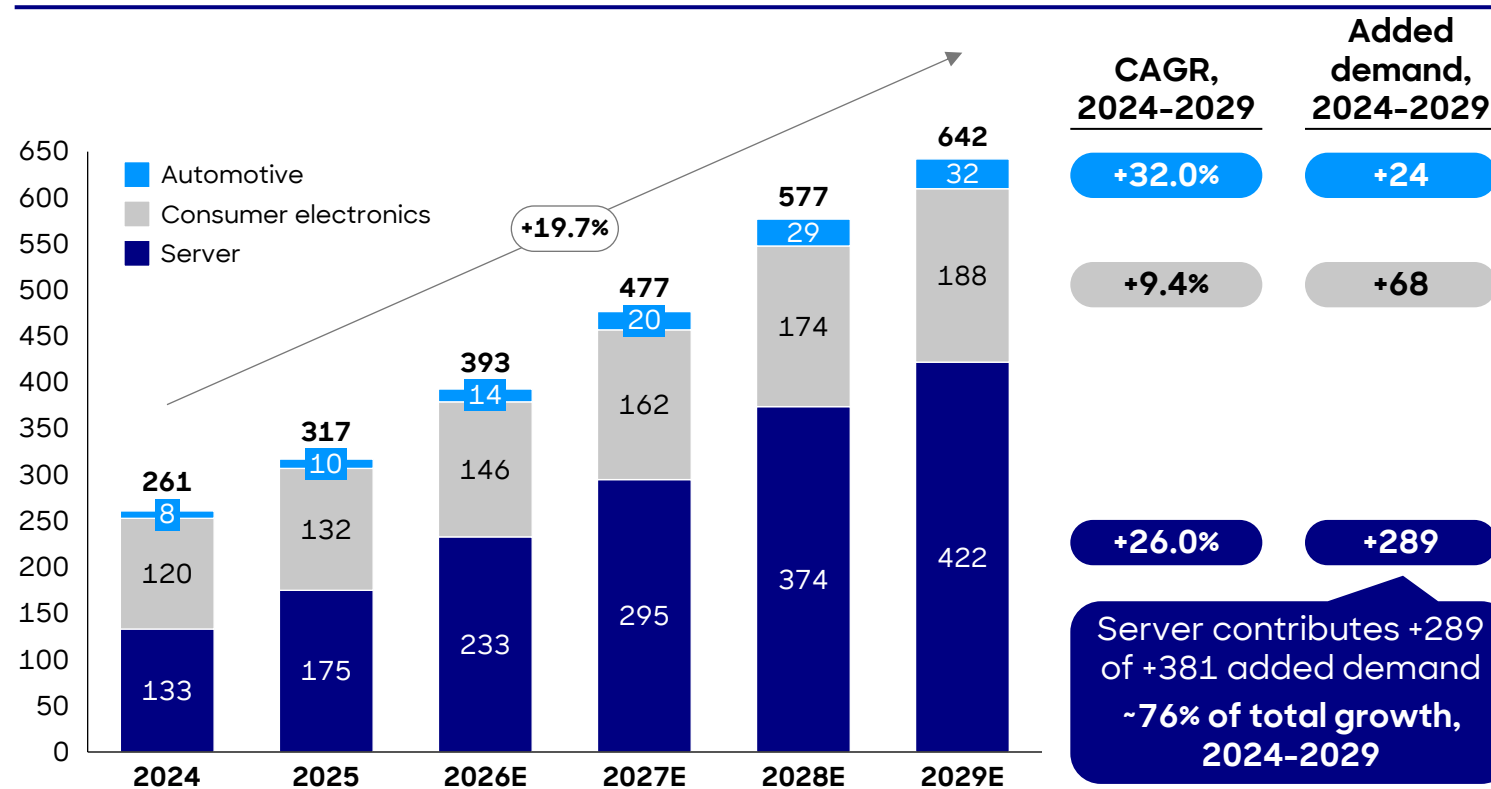
What is not presented

Branded, automotive-qualified DDR3 on contract moves later and less than spot or retail. The relevant references are the contract price history against the generation-matched contract assessment, and the EOL / last-time-buy timelines of the qualified sources.

AI and server growth are reshaping the memory demand mix, while rising vehicle compute intensity adds further demand

Memory demand shift – AI infrastructure and automotive content growth

DRAM bit demand by end market, 2024-2029E [x 103 m GB / system]



Demand shift signals

- **Server demand is driving most incremental growth** accounting for ~76% of added DRAM demand across the end markets through 2029
- **AI amplifies memory demand through both scale and intensity** as data-center capacity expands and AI servers require growing volumes of HBM and high-capacity DRAM
- **Automotive demand is also accelerating** as rising compute intensity drives memory content per vehicle from 11 to 39 GB and DRAM bit demand growth of ~32% annually

Average memory content, 2024-2029



Average memory per server¹⁾
1,080 → 2,367 GB (+17% CAGR)



Average memory per vehicle
11 → 39 GB (+29% CAGR)

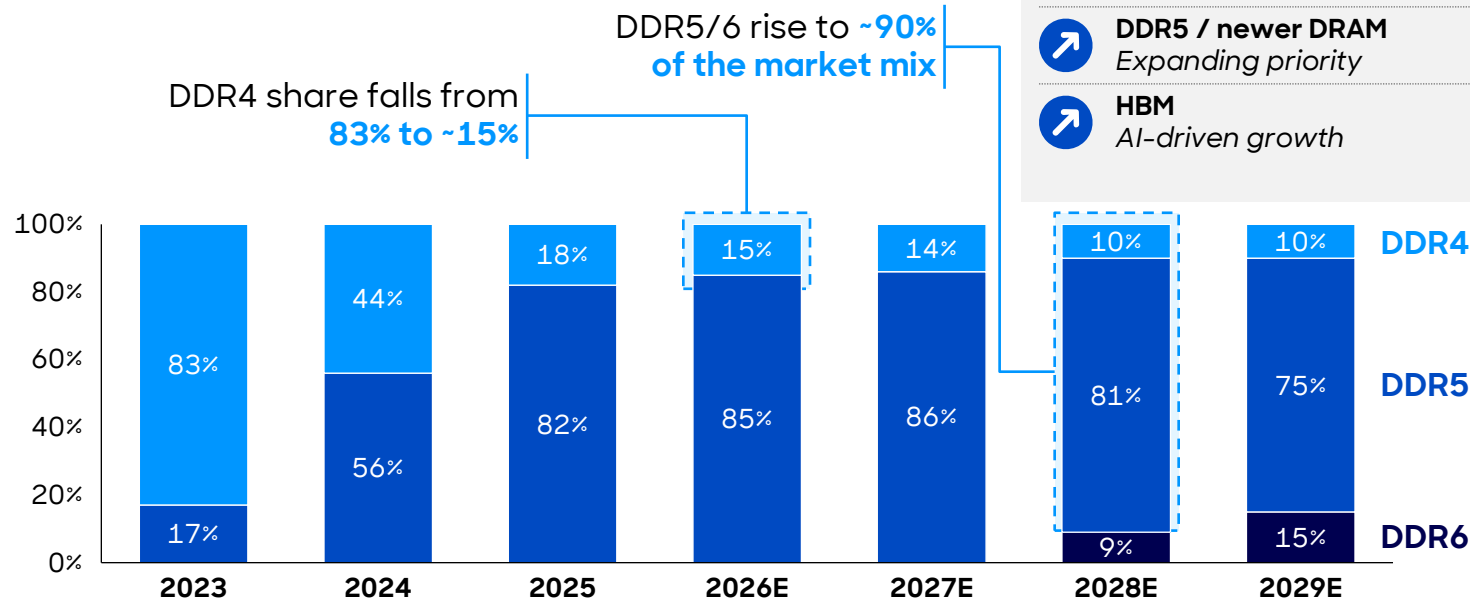
1) Including DRAM and HBM

Supplier focus is shifting toward HBM and newer DRAM generations, tightening the outlook for legacy DDR4

Memory supply response – Product mix and technology migration

DRAM market mix by generation, 2023-2029E [%]

Excludes HBM, which represents an additional destination for supplier investment



Supplier investment priorities

- DDR4**
Declining priority
- DDR5 / newer DRAM**
Expanding priority
- HBM**
AI-driven growth

Supply response signals

- **Supplier economics increasingly favor newer technologies** as HBM & DDR5 attract investment and capacity relative to legacy generations
- **Legacy supply can tighten before demand disappears** as DDR4 production declines while auto & industrial applications remain in use
- **Supply decisions are highly concentrated with Samsung, SK Hynix and Micron** representing ~79% of DRAM capacity

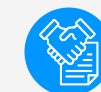
Structural signals reinforce legacy supply risk



~79% of 2026E DRAM capacity
held by Samsung, SK Hynix & Micron



DDR4 EOL notices
Micron has communicated end-of-life / final-shipment timelines for selected DDR4 products



Long-term commitments sought
Winbond has reported customers seeking multi-year agreements for legacy supply

DRAM supply dynamics are increasingly diverging by technology, with legacy products facing the greatest continuity risk through 2028

Memory forward outlook – ~12-24 month pricing and availability

Memory technology outlook, 2026H2-2027

	Legacy DRAM DDR3/DDR4	Current-gen DRAM DDR5	AI/high-bandwidth memory HBM
Demand outlook 	 Persistent legacy demand	 Growing	 Rapid growth
Supply constraint 	 Declining supplier priority	 Investment expanding	 Capacity expanding rapidly
12-24 mth. availability risk 	 Most constrained	 Tight, gradually improving	 Tight despite expansion
Price pressure 	 Elevated / volatile	 Elevated	 Elevated
Automotive exposure 	 High today	 Increasing	 Mostly indirect today

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **DRAM tightness is likely to persist through 2028** as AI and server demand continue to absorb near-term supply additions
- **New capacity will provide uneven relief** as investment remains concentrated in HBM and newer DRAM generations while fab ramps take time
- **Legacy availability remains the key continuity risk** as DDR4 supply declines faster than automotive and industrial demand can migrate

What this means for automotive



Legacy-qualified products remain most exposed
as capacity additions in newer generations do not directly replace DDR3/4 supply



Qualification requirements slow substitution
so broader market relief may not translate immediately to individual automotive components



2B.2 Advanced SoCs / compute

Advanced SoCs face selective near-term pressure as AI demand reshapes leading-edge capacity economics

Advanced SoCs / compute market outlook summary

1 Memory

2 Advanced SoCs / compute

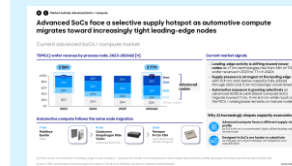
3 PCB / laminate

4 Copper

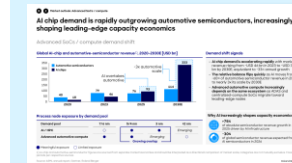
5 Additional market outlooks

- **Advanced SoCs face selective supply pressure** as automotive compute migrates toward increasingly tight leading-edge nodes
- **AI chip demand is reshaping the market** growing far faster than automotive semiconductors and increasingly influencing leading-edge capacity economics
- **Advanced-node supply is expanding rapidly** with ≤ 7 nm capacity growing through 2028 and investment shifting toward newer technologies
- **The outlook remains node-specific** with 3 nm the key near-term hotspot as expanding 3 nm and ≤ 2 nm capacity gradually improves supply
- **Automotive remains selectively exposed** requiring earlier supply planning while cost relief may lag capacity improvement

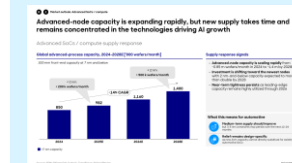
Supporting deep-dives



Market outlook



Demand shift



Supply response

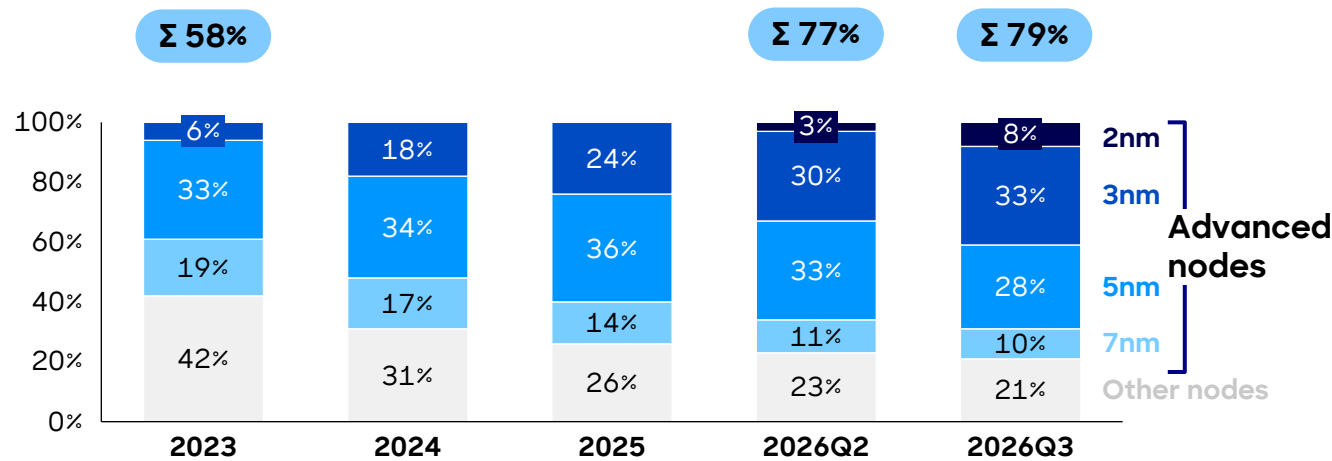


Forward outlook

Advanced SoCs face a selective supply hotspot as leading-edge nodes reach ~80% of TSMC wafer revenue and 2 nm begins to ramp

Current advanced SoCs / compute market

TSMC¹⁾ wafer revenue by process node, 2023-2026Q2 [%]



Current market signals

- **Leading-edge activity keeps shifting toward advanced nodes** as ≤7 nm rises from 58% of TSMC wafer revenue in 2023 to 79% in 3Q26, with 2 nm already 8% in its first quarters of volume
- **Supply pressure is strongest at the leading edge**, AI demand still exceeds supply, further wafer-price increases are reported for 2027
- **Automotive exposure is growing selectively** as advanced ADAS and centralized-compute SoCs migrate toward 7 nm, 4 nm and 3 nm while much of the MCU / analog base remains on mature nodes

Automotive compute follows the same node migration

7 nm
Mobileye
EyeQ6
ADAS



4 nm
Qualcomm
Snapdragon Ride
Vision
Advanced ADAS/AD



3 nm
Renesas
R-Car X5H
Centralized multi-domain compute



Why AI increasingly shapes capacity economics



Advanced compute faces a different supply-risk profile
as SoCs rely on a concentrated, highly utilized leading-edge foundry base



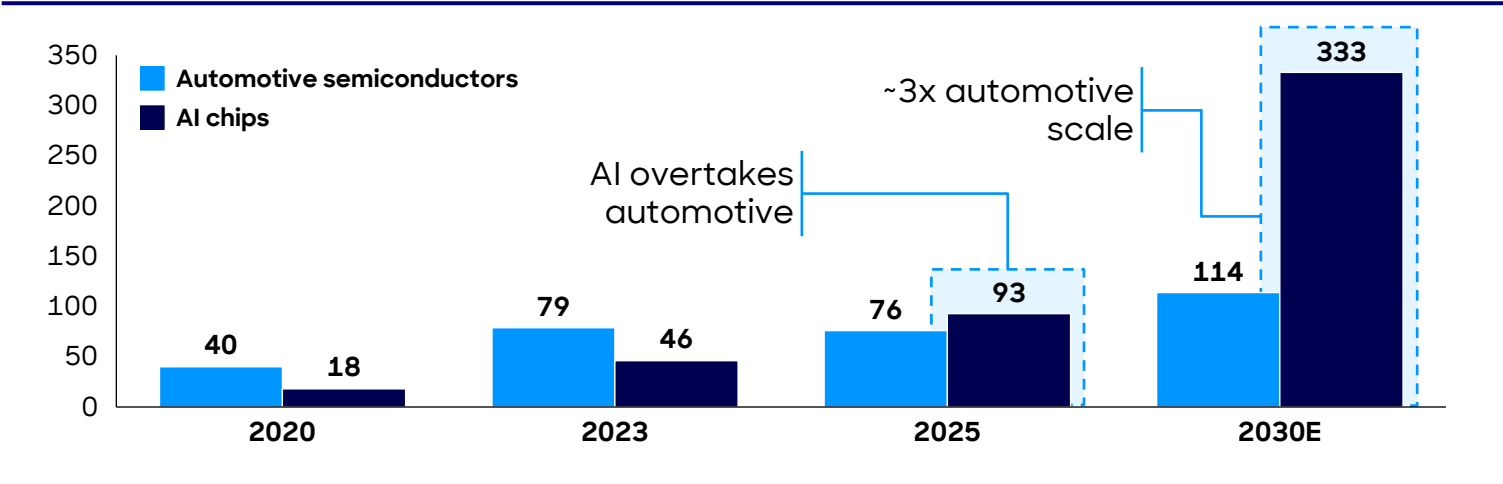
Designed-in SoCs are harder to substitute
as changes can require redesign, SW adaptation and requalification

1) TSMC shown as an indicator of leading-edge foundry evolution – revenue mix should not be interpreted as total market demand share. 2026Q2 / Q3 are the latest quarterly snapshots (reported Jul and 15 Oct 2026)

AI chip demand is rapidly outgrowing automotive semiconductors, increasingly shaping leading-edge capacity economics

Advanced SoCs / compute demand shift

Global AI-chip and automotive-semiconductor revenue¹⁾, 2020-2030E [USD bn]



Demand shift signals

- **AI chip demand is accelerating rapidly** with market revenue rising from ~USD 46 bn in 2023 to ~USD 333 bn by 2030E, equivalent to ~33% annual growth
- **The relative balance flips quickly** as AI moves from ~60% of automotive semiconductor revenue in 2023 to nearly 3x its scale by 2030E
- **Advanced automotive compute increasingly depends on the same ecosystem** as ADAS and centralized-compute SoCs migrate toward leading-edge nodes

Process node exposure by demand pool

Demand pool	7/6 nm	5/4 nm	3 nm	≤2 nm
AI / HPC	<div></div>	<div></div>	<div></div>	Emerging
Advanced automotive compute	<div></div>	<div></div>	<div>Emerging</div>	<div></div>

● Meaningful exposure ○ Limited exposure

Why AI increasingly shapes capacity economics

- >75%** of absolute semiconductor revenue growth in 2025 driven by AI infrastructure
- ~30%** of global semiconductor revenue expected from AI semiconductors in 2026

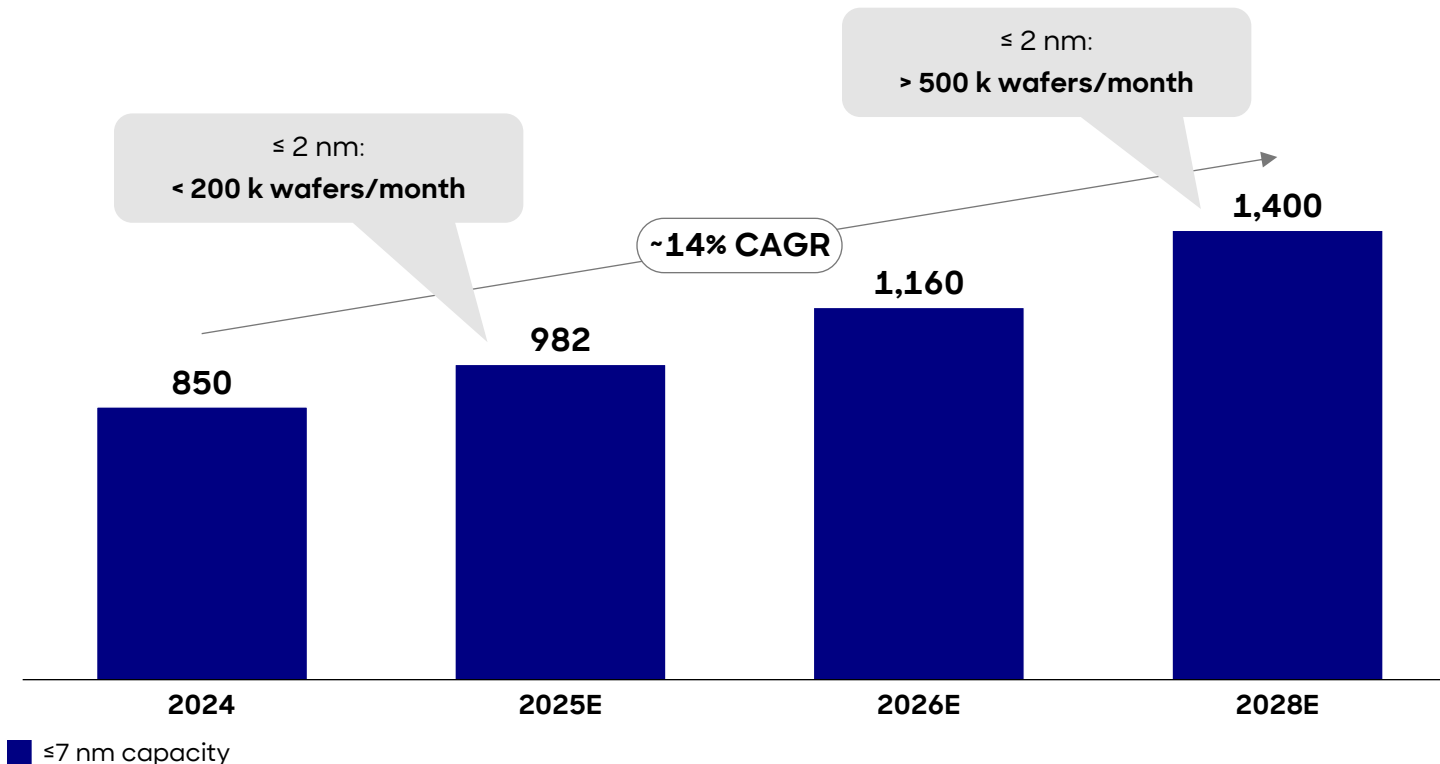
1) AI-chip and automotive-semiconductor figures are sourced from separate market taxonomies and should be interpreted as a directional comparison of market scale; categories are not mutually exclusive. Forecast periods per respective sources

Advanced-node capacity is expanding rapidly, but new supply takes time and remains concentrated in the technologies driving AI growth

Advanced SoCs / compute supply response

Global advanced-process capacity, 2024-2028E ['000 wafers/month]

300 mm front-end capacity at 7 nm and below



Supply response signals

- **Advanced-node capacity is scaling rapidly** from ~0.85 m wafers/month in 2024 to ~1.4 m by 2028E
- **Investment is shifting toward the newest nodes** with 2 nm-and-below capacity expected to more than double by 2028
- **Near-term tightness persists** as leading-edge capacity remains highly utilized through 2026

What this means for automotive



Medium-term supply should improve
but 3-5 nm constraints may persist over the next 12-24 months



Relief remains design-specific
as new 2nm capacity cannot directly substitute for existing automotive SoCs

Leading-edge tightness extends into 2027 with 3 nm the near-term hotspot and further price increases incoming for 2027

Advanced SoCs / compute outlook, next 12-24 months

Leading-edge process-node outlook, 2026H2-2027

	5/4 nm Current advanced compute base	3 nm Near-term migration hotspot	≤ 2 nm Next-generation capacity build
Demand outlook 	 High	 Highest	 Moderate / Rising
Supply constraint 	 Capacity expanding	 Tight despite rapid expansion	 Early-ramp limited
12-24 mth. availability risk 	 Tight, but gradually improving	 Most constrained	 Ramp-limited
Price pressure 	 Elevated	 Elevated / highest pressure	 Premium at ramp
Automotive exposure 	 High today	 Increasing	 Emerging

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **Leading-edge tightness extends into 2027** as AI GPUs and custom ASICs sustain demand for 5/4 nm and below
- **3 nm is the near-term hotspot** as AI/HPC migrates from 4 nm before broader 2 nm adoption
- **Further price increases are signaled for 2027** with mature-node foundries raising prices 5-15% in 2026 with a third round planned into 2027
- **Leading-edge increases are reported** and TSMC raised 2026-28 capex plans

What this means for automotive



Foundry-driven claims will cite 2027 increases
ask for the supplier's own foundry notice before accepting the rate



Cost relief may lag supply improvement
as pricing remains elevated even while new leading-edge capacity ramps



2B.3 PCB / laminate

PCB / laminate pressure has spread from high-complexity boards to standard FR-4 as the glass-fabric shortage reaches every grade

PCB / laminate market outlook summary

1 Memory

2 Advanced semiconductors

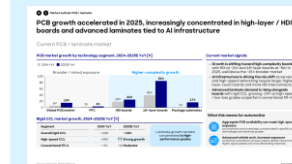
3 PCB/laminate

4 Copper

5 Additional market outlooks

- **Growth is shifting toward high-complexity boards** with HDI and 18+ layer PCB outpacing the broader market but laminate inflation now reaches all grades
- **AI is driving both volume and content growth** as newer server architectures require more HDI, higher layer counts and increasingly low-loss materials
- **High-end supply is expanding, but upstream inputs remain the bottleneck** as T-glass ramp timing and premium-foil yields limit effective output
- **Relief will remain uneven through 2027** with glass fabric gates every grade, HDI improves gradually and standard FR-4 reprices through 1H27 with relief in 2H27
- **Automotive remains substantially exposed** as ECU-class FR-4 boards see laminate inflation while ADAS / centralized compute adds HDI and low-loss requirements

Supporting deep-dives



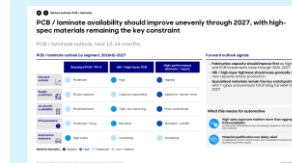
Market outlook



Demand shift



Supply response

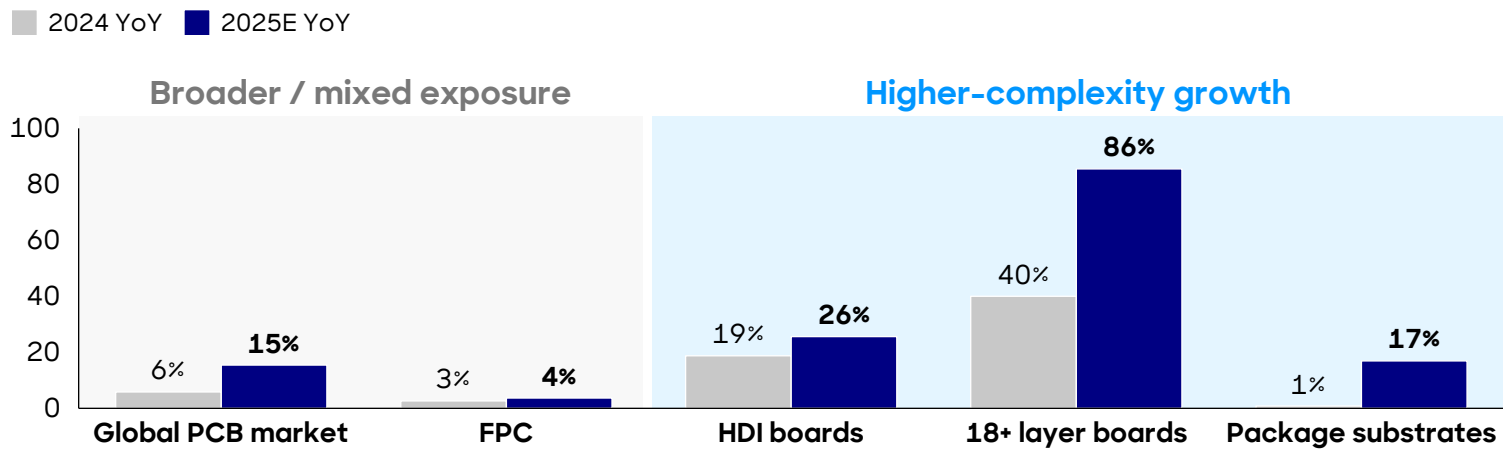


Forward outlook

PCB growth accelerated in 2025 at the high-layer / HDI end; in 2026 laminate inflation has spread from AI-grade materials to standard FR-4

Current PCB / laminate market

PCB market growth by technology segment, 2024-2025E YoY [%]



Current market signals

- **Growth is shifting toward high-complexity boards** with HDI at ~26% and 18+ layer boards at ~86% in 2025, well above the ~15% broader market
- **Glass fabric is now the binding constraint** with electronic glass-cloth prices >2x since late 2025
- **Thin cloth (2116 and thinner) is on allocation**, new capacity not before mid-2027
- **Standard laminate is no longer insulated**, Kingboard has issued multiple CCL / prepreg increases in 2026 (latest 13 Oct)

Rigid CCL market growth, 2024-2025E YoY [%]

Segment	2024 YoY	2025E YoY	2026 YTD (Oct)
Overall rigid CCL	~+18%	~+24%	Broad, repeated increases
High-speed CCL	~+50%	↑↑ Strong growth	Allocation; T-glass gated
Conventional FR-4	~+3%	→ Moderate	>5 increases; realized ~+50-75% YoY

2026 YTD reflects supplier price notices and Korea CCL import prices; not a transaction index. Conventional FR-4 2025E 'Moderate' superseded in 2026.

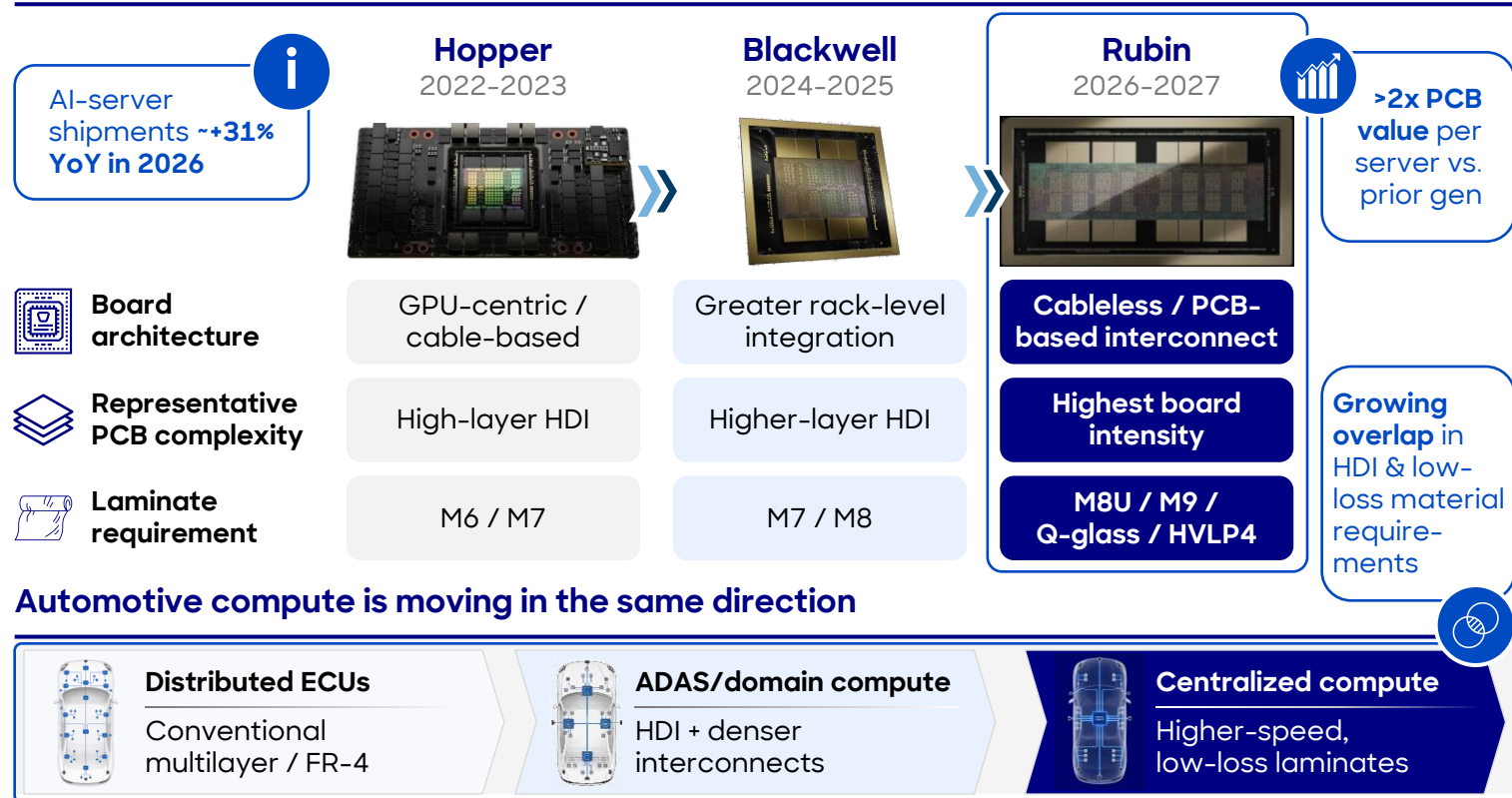
What this means for automotive

-  **Standard multilayer boards are now in inflation scope**
ECU-class FR-4 boards see laminate inflation even without HDI or low-loss content
-  **Advanced vehicle arch. increase exposure**
as ADAS & centralized compute require denser interconnects, higher signal speeds and more demanding materials

AI server architectures are increasing PCB content and complexity, pulling demand toward high-layer HDI and low-loss laminates

PCB / laminate demand shift

AI server generations drive a step-change in PCB complexity and material intensity¹⁾



Demand shift signals

- **AI demand is growing on two fronts** as server volumes rise and PCB content per system increases
- **Interconnects are shifting onto the board** driving greater HDI use and higher layer counts
- **Material requirements are moving higher** as faster signaling increases demand for low-loss laminates and advanced copper foil

What this means for automotive

- **Automotive compute is moving along the same technology path** as ADAS & centralized architectures require denser, higher-speed boards
- **Overlap with AI-driven material demand is increasing** particularly for HDI & low-loss laminate requirements

1) Architecture, PCB complexity and laminate specifications shown are representative of selected AI-server designs; actual configurations vary by system and board

High-performance PCB-material supply is expanding, but specialized inputs remain the limiting factor for near-term relief

PCB / laminate supply response

Supply response across the high-performance PCB / laminate stack

Material	Constraint today	Supply response	Relief outlook
Low-Dk/ T-glass cloth Critical for low-loss laminates	~90% T-glass share held by Nittobo - Major new capacity not expected before mid-'27	Capacity expansion underway, but supply remains concentrated	Tight/slower relief Mid-2027+
HVLP copper foil Enables low-loss, high-speed signal performance	Higher-spec conversion reduces yield ~50%	Premium output expanding, but lower yields constrain effective supply	Gradual relief 2026-2027
High-speed rigid CCL Converts specialty inputs into advanced laminate	Korea import prices +74.5% YoY - Advance ordering >5x typical monthly usage ¹⁾	EMC, TUC and peers ramping output	Tight / input-dependent through 2027
HDI/18+ layer PCB capacity Required for dense high-layer adv. electronics	Higher layer counts reduce yield and narrow the qualified supplier pool	High-end PCB investment and capacity ramping	Improving, input-dependent 2026H2+

Supply response signals

- **High-end PCB investment is accelerating** with >20 Chinese PCB makers announcing expansion plans in 2026H1
- **Downstream capacity is ramping** as PCB and CCL suppliers add high-performance output
- **Upstream relief remains slower** as specialty glass ramp timing and premium-foil yields constrain effective supply

Why relief remains uneven



Downstream cap. can expand faster than inputs as CCL and PCB ramps still depend on specialized glass and copper foil



~87% of CCL cost tied to glass cloth, copper foil & resin



High-spec capacity is not fully fungible as material specifications, yields and qualification narrow the usable supply pool

1) Korea CCL import-price data and advance-order example shown as directional evidence of market tightness

PCB / laminate availability should improve unevenly through 2027, with glass fabric the constraint across all grades, not only high-spec materials

PCB / laminate outlook, next 12-24 months

PCB / laminate outlook by segment, 2026H2-2027

	Standard PCB / FR-4	HDI / high-layer PCB	High-performance laminate / inputs
Demand outlook 	Moderate	High	Highest
Supply constraint 	Fab capacity broad, but glass-fabric gated	Capacity expanding	Selective / slower ramp
12-24 mth. availability risk 	Tight on thin-cloth laminate grades; quota	Tight, but improving	Most constrained
Price pressure 	Elevated / rising – laminate repricing through 1H27	Elevated	Elevated / volatile
Automotive exposure 	High today	Increasing	Increasing

Pressure / exposure: ● Highest ● High ● Moderate ● Low / indirect

Forward outlook signals

- **Fabrication capacity should improve first** as high-end PCB investments ramp through 2026-2027
- **HDI / high-layer tightness should ease gradually** as new capacity enters production
- **Glass fabric is the watchpoint across all grades** as T-glass and standard E-glass cloth capacity additions are not expected before mid / 2H 2027

What this means for automotive



Standard FR-4 is now a cost issue for every ECU
With laminate-driven claims on conventional boards are real; demand the CCL cost breakout rather than refusing



Material qualification can delay relief
as additional market capacity does not immediately translate into qualified automotive supply



2B.4 Copper

Copper remains primarily a cost and volatility exposure as structural demand growth meets a slow upstream supply response

Copper market outlook summary

1 Memory

2 Advanced semiconductors

3 PCB/laminate

4 Copper

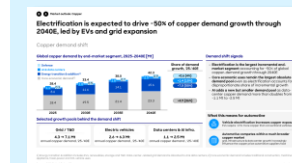
5 Additional market outlooks

- **Copper prices have set new records** as mine disruptions compound concentrate tightness, despite a broadly balanced refined market
- **Electrification is becoming the largest source of incremental demand** accounting for ~50% of copper demand growth through 2040E, led by EVs & grid
- **Near-term supply response remains constrained** as concentrate availability limits refined growth in 2026, the size of 2027 relief is contested
- **Price pressure and volatility are likely to persist** even as physical availability improves, given structural demand growth and recurring mine, inventory and regional-flow disruptions
- **Automotive remains primarily exposed through cost rather than broad shortages** as vehicle electrification increases copper intensity while larger infrastructure demand pools influence market pricing

Supporting deep-dives



Market outlook



Demand shift



Supply response

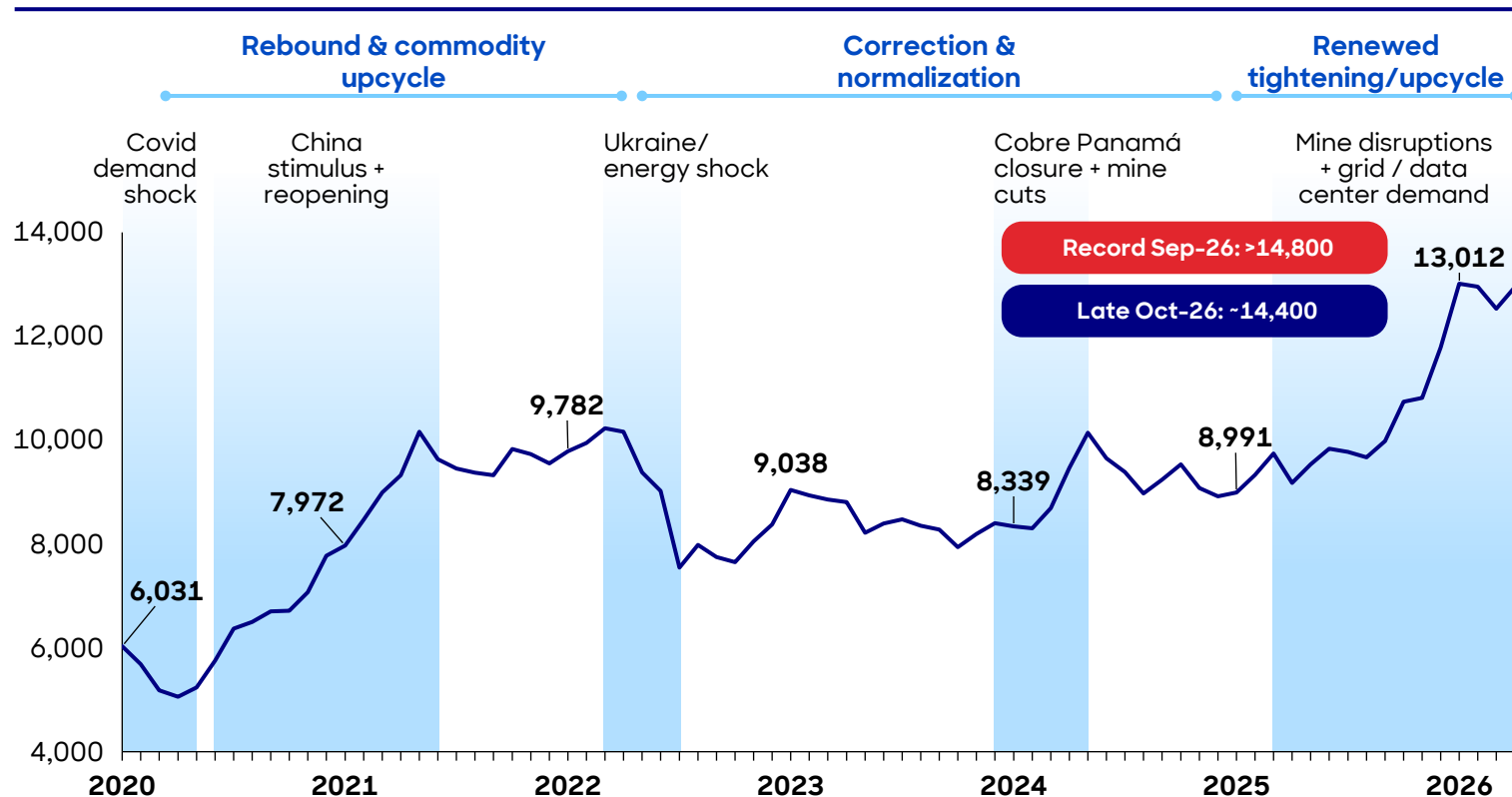


Forward outlook

Copper prices remain elevated amid slow mine growth and concentrate tightness, despite a broadly balanced refined market

Current copper market

Monthly LME copper price, 2020-2026 [USD/t]



Current market signals

- **Copper has set new records with LME above 14,800 USD/t** in September 2026, ~14,400 in late October, ~10% above the charted mid-year level
- **Mine supply remains the limiting upstream factor** with 2026 growth revised down to ~1.6% as major producing regions face disruptions and slower ramp-ups
- **Concentrate availability remains tight** constraining refined output even as smelting capacity continues to expand

Why price pressure persists



Mine supply responds slowly

as new projects require long development cycles and existing mines face declining grades & operational disruption



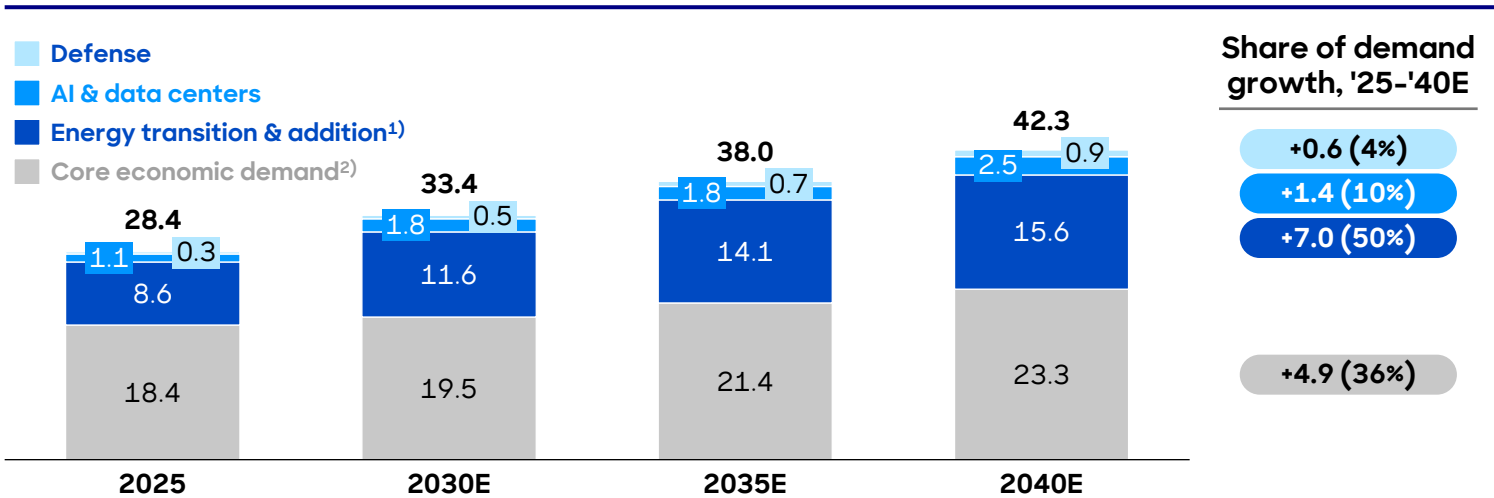
Refined balance can mask physical tightness

as concentrate scarcity, regional inventories and metal flows influence spot pricing

Electrification is expected to drive ~50% of copper demand growth through 2040E, led by EVs and grid expansion

Copper demand shift

Global copper demand by end-market segment, 2025-2040E [Mt]



Demand shift signals

- **Electrification is the largest incremental end-market segment** accounting for ~50% of global copper-demand growth through 2040E
- **Core economic uses remain the largest absolute demand pool** even as electrification accounts for a disproportionate share of incremental growth
- **AI adds a new but smaller demand pool** as data-center copper demand more than doubles from ~1.1 Mt to ~2.5 Mt

Selected growth pools behind the demand shift

<p>Grid / T&D³⁾</p> <p>4.3 → 7.1 Mt</p> <p>annual copper demand, '25-'40E</p>	<p>Electric vehicles</p> <p>2.6 → 6.3 Mt</p> <p>annual copper demand, '25-'40E</p>	<p>Data centers & AI infra.</p> <p>1.1 → 2.5 Mt</p> <p>annual copper demand, '25-'40E</p>
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What this means for automotive

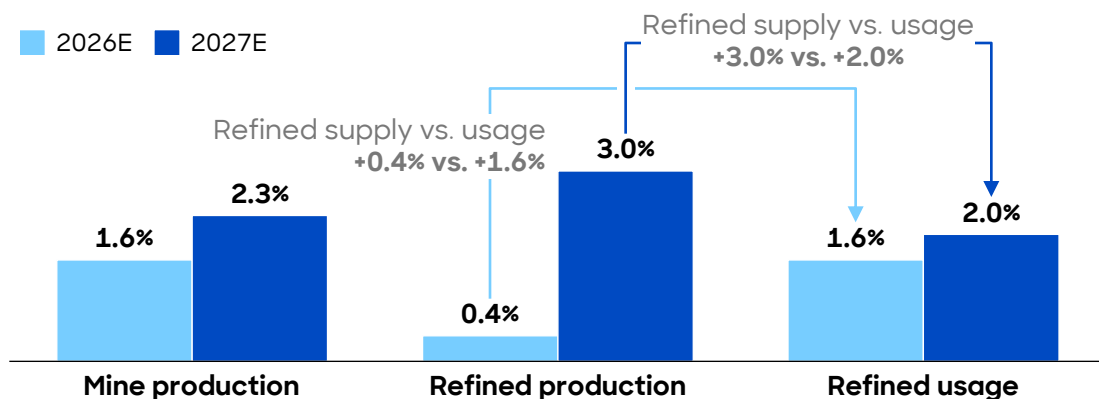
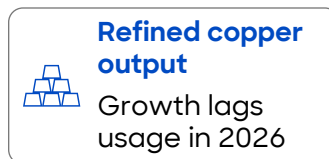
- Vehicle electrification increases copper exposure**
EVs require ~2.9x more copper than conventional vehicles
- Automotive competes within a much broader copper market**
grid, infrastructure & data center growth increasingly influence the copper price automotive suppliers face

1) Energy transition & addition includes EVs, renewables, storage and T&D. Data-center-related grid demand is allocated to AI & data centers; 2) Core economic demand includes traditional construction, machinery, appliance, fossil-power and ICE-vehicle uses; 3) T&D = Transmission and distribution

Refined copper supply remains constrained in 2026 as concentrate availability lags, relief expected in 2027 but forecasters disagree on its size

Copper supply response

Copper supply and demand growth YoY, 2026E-2027E [%]



Refined market balance¹⁾

2026E	+96 kt <i>Thin cushion</i>
2027E	+377 kt <i>Greater relief</i>

Improves in 2027 as mine recovery & secondary supply build

What is constraining near-term supply?

Mine disruptions

Grasberg & Kamo a recovery remains gradual

Long project ramp cycles

New supply adds gradually, not immediately

Smelting capacity has grown faster than concentrate supply

Processing cap. has expanded faster than mine feed availability

Supply response signals

- **Mine supply growth remains modest in 2026** as major operations recover from 2025 disruptions, at roughly 1.6%
- **Concentrate availability is the key near-term bottleneck** limiting refined production growth to only roughly 0.4% despite added refining capacity
- **Supply relief improves in 2027** as mine recovery, higher concentrate availability and secondary production lift refined output growth to 3.0%

What this means for automotive



Continuity risk should ease into 2027

Improving refined availability reduces the probability of broad supply shortages



Price risk remains

A more balanced refined market does not eliminate exposure to mine disruptions, inventories and regional flows

1) Refined balance may vary with unreported inventory movements and unforeseen supply disruptions

Copper supply should improve into 2027, but the size of the relief is contested and structural demand keeps price pressure elevated

Copper outlook, 2026–longer term

Copper outlook by dimension, 2026H2–longer term

	2026 H2	2027	Beyond 2027 ¹⁾
Demand pressure 	 High	 High	 Structurally rising
Upstream supply tightness 	 High	 Improving	 Increasingly project-dependent
Refined availability risk 	 Tight / volatile	 More balanced	 At risk without new supply
Price pressure 	 Elevated / volatile	 Elevated, potentially moderating	 Upward bias / recurring volatility
Automotive cost exposure 	 High cost exposure	 High cost exposure	 Structurally higher exposure

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **2027 relief is a scenario, not a consensus**, ICSG sees a surplus building in 2027, while several bank forecasts still see a deficit
- **Demand remains structurally strong** as EVs, grid investment and data centers continue to expand copper consumption
- **Price volatility is likely to persist** as mine disruptions, inventories and regional flows can quickly tighten an otherwise balanced market

What this means for automotive



Cost exposure remains the primary risk

Copper is more likely to create recurring price and margin pressure than broad component-level shortages



Specification & sourcing choices can reduce exposure

Material efficiency, contractual mechanisms and sourcing strategy can help mitigate commodity-price risk

1) Beyond-2027 outlook reflects directional assessment based on projected demand growth, prospective supply additions and mine-development constraints



2B.5 Additional market outlooks

Additional markets show broadening pressure with mature-node silicon and MLCCs repricing, while precious metals and resins remain cost-led

Additional market outlooks summary

1 Memory

2 Advanced semiconductors

3 PCB/laminate

4 Copper

5 Additional market outlooks

Additional electronics outlooks

Power semiconductors



Mature-node silicon is repricing into 2027 while SiC remains comparatively well supplied

MCU / analog



Selective tightness is returning, but broad shortages remain unlikely

MLCC / passives



MLCC increases are across the board while broader passives face mainly cost pressure

Additional materials outlooks

Gold / silver



Elevated prices create cost pressure, not broad availability risk

Engineering resins



Polyamides remain the watchpoint while broader resin supply stays balanced

Power semiconductor pressure is increasingly technology-specific as mature-node silicon reprices into 2027 while SiC remains comparatively well supplied

Power semiconductors outlook, next 12-24 months

Power semiconductor outlook by dimension, 2026H2-2027

	Silicon power / PMICs <i>Mature-node manufacturing base</i>	SiC power devices <i>High-voltage EV growth platform</i>	GaN power devices <i>Emerging high-efficiency platform</i>
Demand pressure 	 AI power + broad industrial / auto demand	 EV / 800V adoption expanding	 AI infrastructure driving rapid growth
Supply constraint 	 8-inch capacity declining; utilization ~90%	 Capacity digestion underway	 Capacity scaling
12-24 mth. availability risk 	 Selectively tight	 Broadly adequate	 Qualification / supplier-limited
Price pressure 	 Rising with +5-15% in 2026, third round running into 2027	 Competitive / easing	 Premium at early adoption
Automotive cost exposure 	 High today	 Increasing	 Emerging today

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **Mature-node silicon is the near-term pressure point** as 8-inch foundry prices rose 5-15% between 1Q and 2Q26, a third round is running from 2H26 into 2027
- **SiC supply is comparatively well positioned** as EV adoption continues but recent capacity expansion shifts the market toward digestion and cost competition
- **GaN is emerging as the next growth platform** with AI infrastructure accelerating demand while automotive adoption remains at an earlier stage

What this means for automotive



Mature-node power devices warrant the closest near-term watch

Tightening 8-inch capacity raises selective cost and supply risk



Wide-bandgap pressure is more manageable

SiC supply is ample while GaN remains earlier-stage in automotive

MCU / analog demand is recovering, but broad shortages appear unlikely as selective mature-node constraints emerge into 2027

MCU / analog outlook, 2026-2027

MCU / analog outlook by dimension, 2026H2-2027

	2026H2	2027	Beyond 2027
Demand pressure 	 Recovery underway	 Auto / industrial demand strengthens	 SDV content growth
Supply constraint 	 Capacity still broadly available	 Mature-node utilization tightens	 Node / supplier dependent
12-24 mth. availability risk 	 Generally balanced	 Selective tightness	 Auto-qualified parts remain less fungible
Price pressure 	 Rising as 2026 foundry rounds of 5-15% feeding through	 Foundry repricing feeds through	 Structural mature-node support
Automotive cost exposure 	 High today	 High	 Content increasing

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **Automotive MCU / analog demand is recovering** as customer inventories normalize and vehicle semiconductor demand improves
- **Price increases are already in motion**, mature-node foundry prices +5-15% in 2026 with a third round into 2027
- **Broad shortages remain less likely than selective constraints** with automotive qualification and long product lifecycles limiting substitution for specific parts

What this means for automotive



Selective supply risk is returning

Mature-node and auto-qualified parts warrant closer monitoring



Qualification limits rapid substitution

MCU / analog redesigns can require meaningful validation effort

Passive-component pressure has moved from selective to broad-based, with across-the-board MLCC increases and extended lead times on high-capacitance parts

MLCC / passives outlook, next 12-24 months

MLCC / passives outlook by dimension, 2026H2-2027

	High-end / specialty MLCC <i>High-capacitance/high-temperature applications</i>	Mainstream MLCC <i>Broad consumer/auto-motive applications</i>	Other passives <i>Resistors, inductors, ferrite beads</i>
Demand pressure 	 AI / server demand accelerating	 Auto demand + spillover ordering	 Broad demand mixed
Supply constraint 	 Capacity concentrated / reallocated	 Supply flexibility narrowing	 Broad supplier base
12-24 mth. availability risk 	 Constrained with lead times of up to 40 weeks reported	 Tightening, extended lead times	 Generally available
Price pressure 	 Rising, further rounds reported; spot sharply higher	 Across-the-board increases (SEMCO +30% all products)	 Metal-cost pass-through
Automotive cost exposure 	 Increasing	 High today	 Broad BOM exposure

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **MLCC increases are now across the board**
- **Samsung Electro-Mechanics (SEMCO) +30% on all products from 1 Aug 2026**, Murata automotive-grade +15-35% (Apr 2026)
- **Lead times have stretched to 20-40 weeks** on high-capacitance, high-voltage and large-case (1206 / 1210) parts that are hardest to substitute
- **Broader passives face cost more than availability pressure** as metal prices feed into resistors, inductors and ferrites

What this means for automotive



Commodity-grade passive claims are now real
 supplier-wide notices mean these claims move from 'refuse' to 'structure', phase them and demand the notice



Passive-component cost pressure is broadening
 Metal inflation can raise BOM cost even where availability remains adequate

Gold and silver remain primarily cost exposures, with elevated prices unlikely to translate into broad automotive availability constraints

Gold / silver outlook, next 12-24 months

Gold / silver outlook by dimension, 2026H2-2027

	Gold <i>High-reliability electronics / plating</i>	Silver <i>Contacts, conductors / joining applications</i>
Demand pressure 	 Investment + electronics support	 AI, grid & auto offset PV weakness
Supply constraint 	 Mine supply relatively stable	 Market remains in structural deficit
12-24 mth. availability risk 	 Broadly available	 Physical market tighter, but no broad auto shortage
Price pressure 	 Elevated / macro-driven	 Elevated / volatile
Automotive cost exposure 	 Low volume, high value	 Broader industrial / electronics usage

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **Precious-metal prices remain elevated** with gold driven primarily by investment / macro factors and silver retaining greater industrial sensitivity
- **Industrial demand remains supportive but mixed** as AI, grid and automotive growth offset substitution and thrifting in price-sensitive applications
- **Availability risk remains secondary to cost** as manufacturers respond to high prices through material efficiency, thinner plating and substitution

What this means for automotive



Cost exposure outweighs continuity risk
High metal prices raise electronics and connector cost without implying broad shortages



Material efficiency can mitigate exposure
Selective plating, lower loadings and substitution can reduce precious-metal intensity

Engineering-resin availability remains broadly adequate, while polyamides face the greatest near-term cost and supply pressure

Engineering resins outlook, next 12-24 months

Engineering resins outlook by polymer family, 2026H2-2027

	PA6 / PA66 <i>High-temperature/ structural auto applications</i>	PBT / POM <i>Electrical connectors / precision components</i>	PC / ABS <i>Housings / interior & exterior applications</i>
Demand pressure 	 Auto demand still subdued	 Stable end-use demand	 Weak auto/consumer demand
Supply constraint 	 Feedstock + regional restructuring	 Supply broadly sufficient	 Ample capacity / imports
12-24 mth. availability risk 	 Selective regional tightness	 Generally balanced	 Broadly available
Price pressure 	 Feedstock-driven volatility	 Mostly stable	 Feedstock-sensitive
Automotive cost exposure 	 High today	 High in E/E components	 Broad vehicle applications

Pressure / exposure:  Highest  High  Moderate  Low / indirect

Forward outlook signals

- **Polyamides remain the primary watchpoint** as feedstock volatility and European capacity restructuring keep PA6 / PA66 costs elevated
- **Other engineering resins remain broadly balanced** with PBT, POM and PC supply generally sufficient amid muted demand
- **Cost pressure should remain more important than continuity risk** as petrochemical feedstocks and regional energy / logistics costs drive volatility

What this means for automotive



Broad resin shortages appear unlikely
Risk is concentrated in selected polyamide grades and regions



Feedstock volatility remains the key cost driver
Material choice and regional sourcing can materially affect exposure



2C. Automotive implications & industry response

We scenario modeled material inflation for a dual-board IVI controller to translate global input pressures into product-level material-cost exposure

SUPPLIER

Global Tier-1 manufacturer

- Global semiconductor and electronics sourcing
- Global including North American production footprint
- High-volume automotive program

PART

Dual-board IVI controller

- Main SoC / application processor
- DRAM + NAND storage
- Automotive-qualified PCB, passives and connectors

COST

Material cost Baseline index = 100

- Electronics dominate material cost
- ~25% illustrative 2026 inflation exposure¹⁾
- Memory drives >50% of modeled 2026 uplift

THE SUPPLIER IS FACING MULTIPLE SUPPLY CHAIN DISRUPTIONS:

Memory repricing & legacy supply tightness

PCB / laminate input pressure

Copper / plating inflation

Mature-node semiconductor constraints

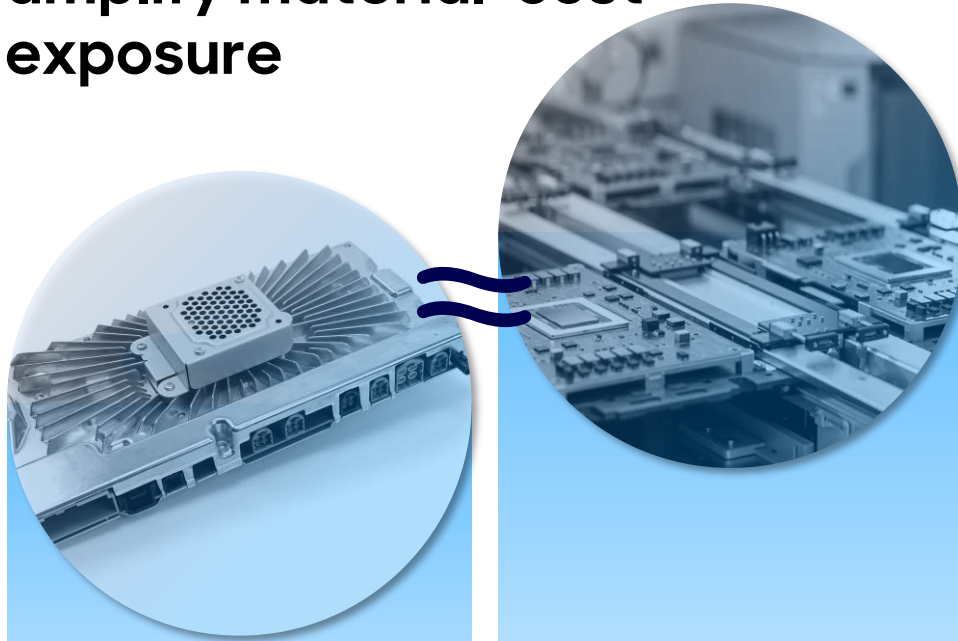
Broad MLCC / passive repricing

Trade, export-control & logistics disruption



1) Based on the illustrative IVI controller BOM and Roland Berger market-outlook assumptions; actual exposure varies by product architecture, specification, sourcing terms and supplier mix

IVI controllers illustrate how concentrated electronics content, global sourcing and qualification constraints can amplify material-cost exposure



REASONS FOR IVI CONTROLLER COMPLEXITY



Variety in **COMPONENTS & TECHNOLOGIES**

- SoCs / logic, DRAM / NAND, PCB / laminate, passives, connectors & plating
- Different technology cycles & supply-demand dynamics across components



Complex **QUALIFICATION & DESIGN DEPENDENCIES**

- Automotive-qualified components cannot always be substituted directly
- HW, SW and board design changes can require revalidation



Supply chain **SPANNING MULTIPLE REGIONS**

- Semiconductor, memory, PCB and passive supply concentrated across global electronics hubs
- Regional disruptions can propagate across multiple component tiers



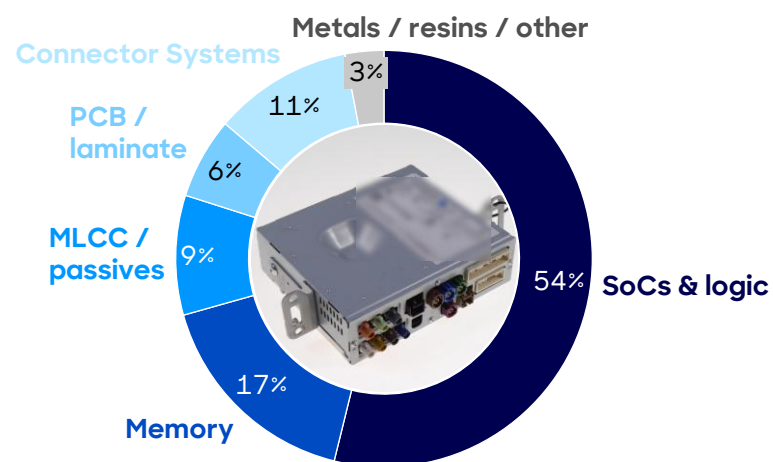
LONG PRODUCT LIFECYCLES & LEGACY EXPOSURE

- Automotive programs remain in production much longer than many underlying electronics technologies
- Component EOL/migration can create supply and repricing risk

Our inflation outlook model reflects sharply different category inflation impact on a should-costed IVI cBOM, led by memory spike in 2026

Base case inflation outlook by key IVI cBOM components to develop what-if scenarios

IVI controller cBOM¹ mix [% of material cost]

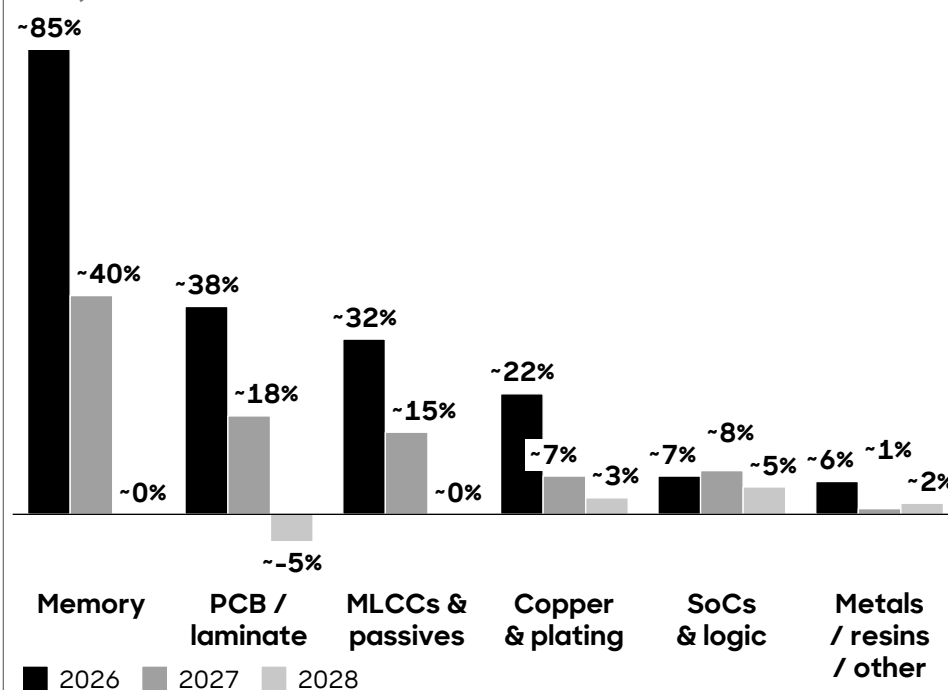


Representative high exposure components

SoCs & logic	Main SoC / application processor	~20%
Memory	DRAM (DDR 4/5)	~10-15%
PCB / laminate	Full mainboard (multilayer / HDI)	~5%

Base case category mat. cost inflation YoY, 2026-28 [%]

Figures reflect the base inflation case (market outlook as of Oct 2026), with low / high scenarios developed for sensitivity analysis



Key takeaways

- **cBOM exposure is concentrated in electronics** with SoCs & logic and memory representing the majority of material cost which bounds how much of a supplier's price a memory or laminate headline can legitimately touch
- **2026 inflation is highly uneven by category** with memory the clear outlier while PCB / laminate, passives and copper also face meaningful pressure
- **Category trajectories diverge thereafter** as memory stays elevated through 2028 with no base-case normalization, while SoCs & logic, laminate and passives keep repricing

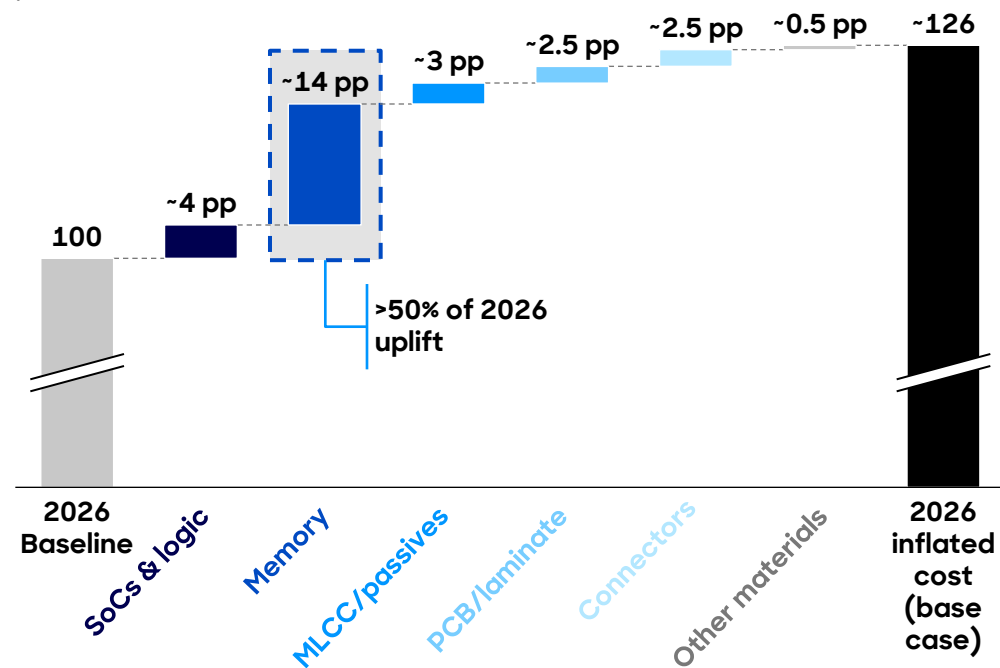
1) IVI controller cBOM based on representative dual-board IVI controller assembled in Vietnam/Thailand should cost, April 2026 base, and Roland Berger market-outlook assumptions; actual exposure varies by architecture, specification, sourcing terms and supplier mix

The IVI controller cBOM could face ~25% material-cost inflation in 2026 and a further ~12–15% in 2027, with memory driving more than half of the impact

IVI controller¹⁾ cBOM inflation outlook – Base case

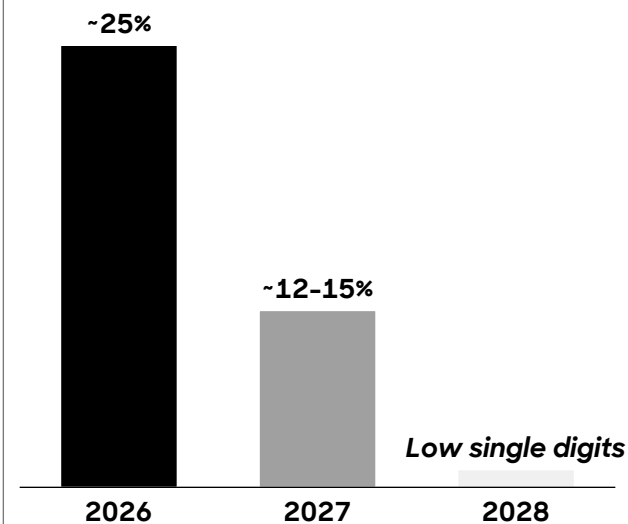
2026 material cost impact (base case, indexed=100)

Illustrative IVI example: magnitude varies materially by product architecture & cBOM mix



Base case weighted IVI cBOM material cost inflation YoY [%]

Base case scenario shown



Key takeaways

- Scenario definitions:**
 - Base** = most-likely path given announced capacity, supplier guidance and current pricing momentum
 - Low** = earlier capacity relief / demand destruction and softer supplier pass-through
 - High** = supply discipline holds, with allocation premiums and tariff/feedstock shocks compounding
- 2026 inflation is highly concentrated** with memory driving most impact representing only ~15–20% of material cost
- Residual pressure stays elevated through 2027** (~12–15%) as memory holds and SoCs & logic, laminate and passives keep repricing



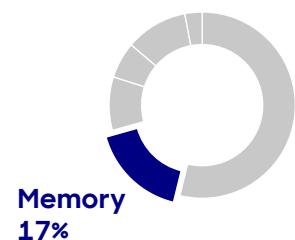
Next: priority mitigation levers by cost family

1) Illustrative IVI controller cBOM based on representative dual-board infotainment content and Roland Berger market-outlook assumptions; actual exposure varies by architecture, specification, sourcing terms and supplier mix

Memory: Protect 2026 exposure now while unlocking larger structural savings from 2027 onward

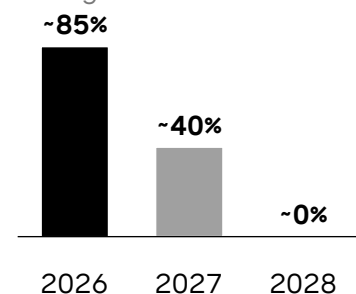
Illustrative IVI controller actions and value potential – Memory

Share of IVI cBOM



Inflation profile

Sharp spike, elevated through 2028



Top-5 priority actions

Commercial
Design

Secure capacity lock / LTA to 2028 with price-reopener & anti-reallocation clauses

Commercial
Design

Negotiate memory-specific OEM indexation; cap-and-collar, not full pass-through

Commercial
Design

Qualify second-source DRAM (same density, alternate supplier)¹

Commercial
Design

Right-size NAND via map compression / streamed map tiles

Commercial
Design

Pool memory demand across business lines (ADAS, IVI, connectivity) & standardize SKUs

Value mechanism / potential

Savings
Avoidance
Risk transfer

~5-10% of memory-family cost protected

Savings
Avoidance
Risk transfer

Margin protection/risk transfer

Savings
Avoidance
Risk transfer

~5-15% savings on applicable storage scope¹

Savings
Avoidance
Risk transfer

~15-30% savings on DRAM scope²

Savings
Avoidance
Risk transfer

~5-8%

Timing

0-6 months

0-6 months

12-18 months

6-12 months

0-6 months

Key gate / dependency

None: but competing with CSPs for the same fabs

None: commercial negotiation; requires index definition (DXI/contract price)

AEC-Q100 device qual + board-level DV + SI validation and capacity; OEM change approval

SW validation + OTA / map-provider alignment; no silicon requalification

None: cross-BU consolidation + commonization roadmap

Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

1) Second source must hold uncommitted capacity – now scarce (suppliers report customers seeking supply assurance beyond 2030); value condition-dependent

2) Value contingent on map / SW footprint leaving headroom below 128 GB

SoCs & logic: Cap persistent inflation now while reducing sole-source dependence over the platform cycle

Illustrative IVI controller actions and value potential – SoCs & logic

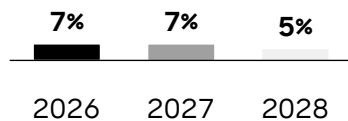
Share of IVI cBOM



SoCs & logic
54%

Inflation profile

Persistent, moderate
inflation through 2028



Top-5 priority actions

Value mechanism / potential

Timing

Key gate / dependency

Commercial Design	Negotiate multi-year pricing with foundry-increase cap / glidepath	Savings Avoidance Risk transfer	cap ~5-7% annual foundry-related increases	0-3 months	2027 foundry increases are being signaled this quarter; negotiate the cap before they flow through
Commercial Design	Qualify second-source SerDes on a competing link standard	Savings Avoidance Risk transfer	~10-20% of SerDes	12-24 months	AEC-Q100 + link-level interop + display/camera driver validation; OEM approval
Commercial Design	Introduce a mid-range SoC variant for lower trims (good-better-best)	Savings Avoidance Risk transfer	~5-12% of SoC	Platform cycle	AEC-Q100 + full SW port + OEM feature-set alignment; program-level decision
Commercial Design	Pool volumes across IVI variants & programs on the platform SoC	Savings Avoidance Risk transfer	~2-5%	0-6 months	None: commercial consolidation; strongest at annual pricing round
Commercial Design	Screen for last-time-buys on EOL-risk logic (older nodes retiring)	Savings Avoidance Risk transfer	Avoids spot premium ¹⁾	0-6 months	None: lifecycle monitoring; ties to allocation strategy

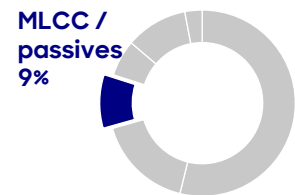
Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

1) Value realized only if EOL/shortage events occur; else carries inventory cost

MLCC / passives: Qualify alternatives where scarcity is real and phase or evidence-test increases elsewhere, outright rejection no longer holds

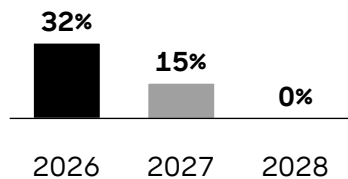
Illustrative IVI controller actions and value potential – MLCC / passives

Share of IVI cBOM



Inflation profile

Broad 2026 increases, 1Q27 round, then normalization



Top-5 priority actions

Value mechanism / potential

Timing

Key gate / dependency

Commercial Design	Qualify alternate MPNs on high-risk high-cap MLCC positions	Savings Avoidance Risk transfer	~5-12%	3-6 months	PPAP-level; screen candidates against live distributor stock before committing qualification hours
Commercial Design	Consolidate PMICs onto an integrated multi-rail part	Savings Avoidance Risk transfer	~5-15% of PMIC	Platform cycle	AEC-Q100 full + power-tree redesign + functional-safety re-analysis
Commercial Design	Evidence-test and phase increase notices on commodity grades against the supplier's own published adjustments	Savings Avoidance Risk transfer	~2-5% of commodity ¹⁾	0-3 months	Increases are now supplier-wide: negotiate timing, phasing and alternates, outright rejection rarely holds
Commercial Design	Lock franchise agreements with bonded buffer stock	Savings Avoidance Risk transfer	~2-5% + continuity	0-6 months	None: commercial; prioritize 47µF-class, high-voltage and 1206 / 1210 automotive grades (longest lead times)
Commercial Design	Consolidate passive purchasing across boards / programs	Savings Avoidance Risk transfer	~3-6% of applicable passive scope	0-6 months	None: volume leverage at franchise / supplier level

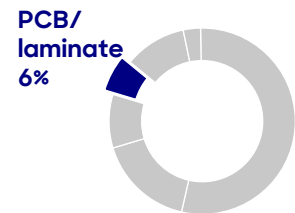
Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

1) Headroom narrowed in 2026 as commodity-grade increases became supplier-wide (SEMCO +30% on all products); value now lies in phasing, alternates and specification flexibility rather than rejection

PCB / laminate: Re-source high-cost positions now while using stack-up optimization and qualification to unlock structural savings

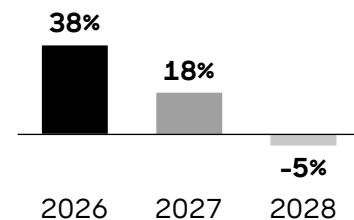
Illustrative IVI controller actions and value potential – PCB / laminate

Share of IVI cBOM



Inflation profile

High 2026 pressure, repricing through 1H27, relief 2H27



Top-5 priority actions

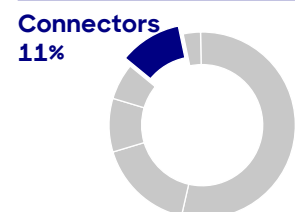
Commercial	Design	Value mechanism / potential	Timing	Key gate / dependency
Commercial	Identify / qualify second fab source per board with CCL-allocation check	Savings ~5-12% of PCB Avoidance Risk transfer	4-8 months	PPAP per board (two events); laminate allocation status verified before H1-27 builds
Commercial	Demand CCL cost breakout / indexation transparency in fab pricing	Savings Avoidance Risk transfer	0-6 months	None – contract structure; prevents blanket increases riding the CCL headline
Commercial	Optimize panel utilization / array design with the fab	Savings ~3-8% of PCB Avoidance Risk transfer	3-6 months	Fab engineering change + PPAP delta; near-zero design risk
Commercial	Optimize layer count / HDI routing at the next board revision	Savings ~5-12% of PCB Avoidance Risk transfer	12-18 months	Board respin + full DV + PPAP; couple to any planned revision, never standalone
Commercial	Secure laminate allocation / glass-fabric quota through the fab before 1H27 builds	Savings Avoidance Risk transfer	0-3 months	None – commercial; obtain the fab's laminate allocation status in writing per board

Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

Connectors: Separate metal-price exposure from supplier conversion cost now, then reduce plating intensity structurally

Illustrative IVI controller actions and value potential – Connectors

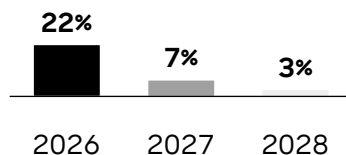
Share of IVI cBOM



Primarily connector / terminal metal content and associated plating

Inflation profile

Record copper in 2026; metal-cost pressure persists with recurring volatility



Top-5 priority actions

Value mechanism / potential

Timing

Key gate / dependency

Commercial	Install copper and plating-metal surcharge indexation on all copper-bearing positions (separate Cu / Ag / Au escalators, capped)	Savings Avoidance Risk transfer	Limits pass-through to actual indexed Ag/Au content	0-6 months	None – contract structure; splits metal pass-through from base-price negotiation
Design					
Commercial	Shift to selective plating – precious metal on the contact zone only	Savings Avoidance Risk transfer	~8-15% of applicable plating scope	3-6 months	PPAP + supplier process change; no board impact – the fastest design lever in the deck
Design					
Commercial	Dual-source high-value FAKRA / HSD connector positions	Savings Avoidance Risk transfer	~8-15% of applicable connector scope	6-12 months	PPAP + interface / performance validation + OEM approval
Design					
Commercial	Bundle the connector buy across your product lines	Savings Avoidance Risk transfer	~3-8% of applicable plating scope	0-6 months	None – corporate leverage with the same 3-4 connector houses
Design					
Commercial	Reduce plating thickness within the mating-cycle specification	Savings Avoidance Risk transfer	~5-10% of applicable plating scope	3-9 months	PPAP + durability validation (mating cycles, contact resistance over life)
Design					

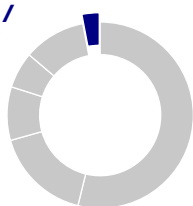
Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

Metals / resins / other: Challenge unsupported price increases now while pre-qualifying material alternatives and reducing mechanical content over time

Illustrative IVI controller actions and value potential – **Metals / resins / other**¹⁾

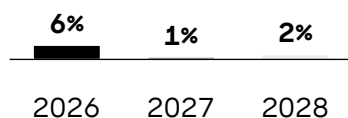
Share of IVI cBOM

Metals /
resins/
other
3%



Inflation profile

Limited aggregate inflation,
but position-specific
opportunities remain



Top-5 priority actions

Value mechanism / potential

Timing

Key gate / dependency

Commercial	Lock casting/stamping LTA with aluminum indexation; qualify near-shore second source	Savings Avoidance Risk transfer	~ 3-8% of mech	3-9 months	PPAP for second source; small absolute money, mainly for continuity, not savings
Design					
Commercial	Reject / renegotiate unsupported resin and mechanical price increases	Savings Avoidance Risk transfer	~ 3-8% of applicable resin scope ²⁾	0-3 months	Validate actual feedstock / supplier-cost movement
Design					
Commercial	Pre-qualify alternate engineering-resin grades / suppliers	Savings Avoidance Risk transfer	~ 4-10% of applicable resin scope ³⁾	3-6 months	Material-property equivalence + validation / OEM approval
Design					
Commercial	Rationalize fasteners, shields and low-value mechanical parts	Savings Avoidance Risk transfer	~ 3-8% of applicable HW scope	6-12 months	None to PPAP-delta; hygiene-level
Design					
Commercial	Right-size the heatsink via thermal redesign	Savings Avoidance Risk transfer	~ 5-12% of applicable mechanical scope	Platform / revision	Thermal / packaging validation
Design					

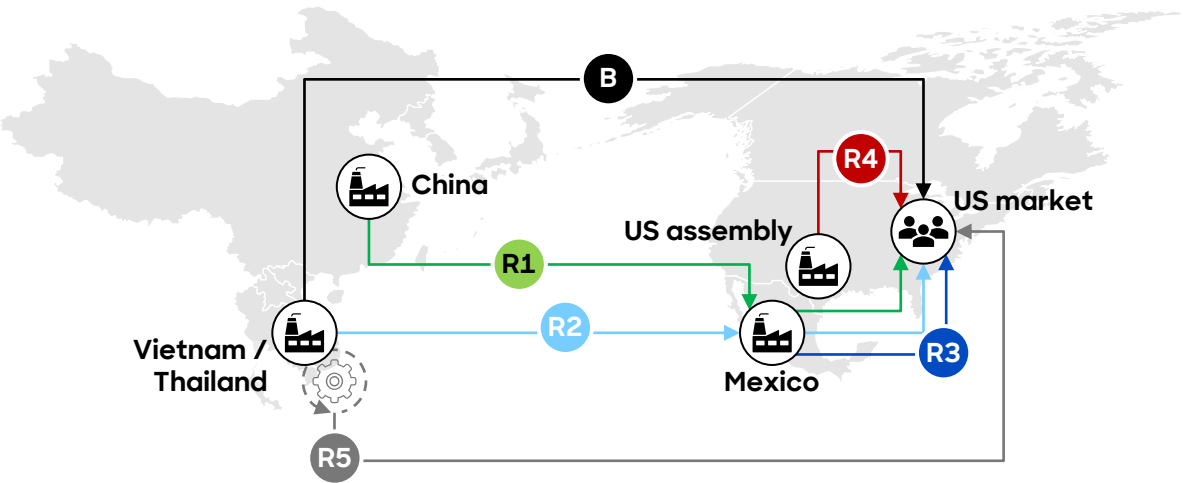
Savings = reduces underlying cost | **Avoidance** = prevents expected cost increase | **Risk transfer** = shifts cost exposure contractually

1) Engineering resins are explicitly included, with PA / PBT-type substitutions evaluated where specifications allow; 2) Holds while inventories stay high; re-spikes on feedstock geopolitics; 3) Value depends on an equivalent resin grade / supplier being technically suitable and approvable for the application

We also scenario modeled IVI controller US market landed cost across different feasible value chains

Illustrative IVI supply route scenarios to mainland USA

Illustrative route structures



- B** (Baseline) VN/TH → US
- R1** China → Mexico → US
- R2** Vietnam → Mexico → US
- R3** Mexico → US (fully assembly)
- R4** US → US (domestic assembly)
- R5** Stay & optimize (VN/TH + duty engineering)

Economics by route

Route	Landed-cost index ¹⁾	Δ vs. baseline	Scenario implication	Key dependency
B	100	-	Reference configuration	Electronics treatment holds; no §232 annex
R1	~88	-12 pts	Lower modeled cost, but materially higher execution/compliance risk	Only ~30% of content CN-addressable; higher origin / transshipment risk
R2	~90	-10 pts	Migration-phase configuration	Useful during migration; not intended as steady-state footprint
R3	~90	-10 pts	Leading MX configuration in the illustrative case	Cleanest Mexico route; Asian content remains largely non-USMCA
R4	~104	+4 pts	Leading route if §232 auto-parts annex applies	Classification outcome ²⁾
R5	~98	-2 pts	Low-CAPEX hurdle rate for relocation	First-sale + FTZ + origin engineering; months to execute, no PPAP / CAPEX

Note: Analysis assumes Tier-1 imports the IVI unit into the U.S.; if the OEM vehicle is assembled in Mexico, the relevant analysis shifts to OEM-level USMCA regional-value-content economics

1) Current VN/TH → US route = 100; lower index indicates lower modelled landed cost; 2) Classification remains the key swing factor: §232 auto-parts treatment would materially raise import-route costs and shift the leading configuration to R4

The outlook raises three questions for Auto Tier-1s around exposure, mitigation and competitive response

Key discussion points

1

Where are you most exposed?

Which market pressures matter most across your products, customers and sourcing footprint?

- Which categories represent the greatest **cost vs. continuity exposure**?
- Where is exposure concentrated by **product / platform / region**?
- Which risks are already reflected in current supplier agreements and pricing?

2

Where should you respond proactively?

Which pressures warrant action versus continued monitoring?

- **Supply assurance:** capacity commitments, alternate sourcing, strategic buffers
- **Design:** specification changes, qualification, material efficiency
- **Commercial:** indexation, pass-through, should-cost / negotiation
- **Supplier strategy:** deeper Tier-n engagement and regional diversification

3

How should you position against changing customer expectations?

Could different OEM operating models change what customers expect from you on cost-down?

- How exposed are you to **China-led cost benchmarks**?
- Where can you replicate elements of **localization, sourcing flexibility or faster redesign**?
- Where may you need to protect margin because input inflation cannot be engineered out?



Discussion should align on



Priority exposures

Which categories, products, regions and customers require the most attention?



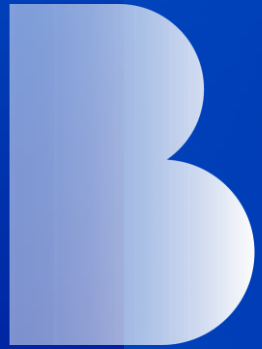
Response levers

Which actions and levers offer the greatest impact and are most feasible?



Areas requiring further fact base

What additional data, insights or scenarios are needed to decide?



3. "Power Hour" with Roland Berger experts

As a next step, we propose a “Power Hour”

Roland Berger "Power hour"

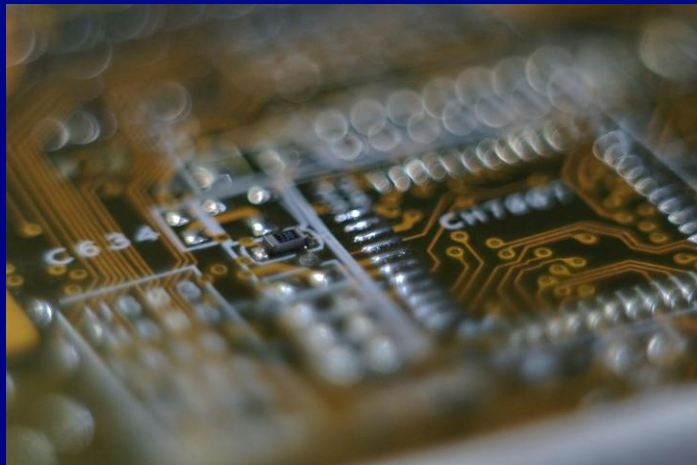
 Idea	45-60 min content impulse free of charge
 Content	Detailed review of electronics inflation current, future state, and impact on your portfolio with mitigation recommendation
 Participants	You/Your team and RB experts from the Supply Chain, Engineering and Strategy functions
 Format	Online/MS Teams – Minimal effort
 Success factor	Discussion – Get the most out of it for your specific situation



Simply scan the QR code to reach out for your Roland Berger “Power Hour”

Example of a typical Power Hour agenda

Electronics
Inflation
Management



A Welcome & joint introduction
5 min

B Detailed market outlook across electronics categories
25 min

C Deep dives into your product category level inflation impact and mitigation recommendations
25 min

D Optional: Additional insights
E.g., OEM claims management; tariff strategy

Pick one product and we will return its 2026–28 exposure under three scenarios, and the lever plan to fight it

A working-session offer scenario-modeled exposure and a mitigation plan on a product of your choosing

1. You choose the product

- One product family from your portfolio: e.g., a cockpit or domain controller, display unit, telematics module, camera or radar
- A BOM at whatever depth exists: costed, partial, or component list with volumes; we structure from there
- Your current landed route (build location → delivery market) for the duty overlay

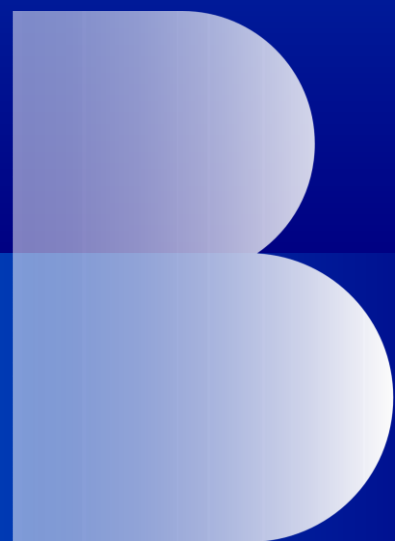
2. We model the exposure

- Low / Base / High inflation scenarios, 2026–28, on material and landed cost with the tariff and route overlay for your delivery market
- Category decomposition: where the impact concentrates and how much rides on memory alone

3. You receive the plan

- Top-5 mitigation actions for the product, with value ranges, timing and the specific qualification gate on each
- Savings classified honestly: real reduction vs. avoidance vs. risk transfer, what belongs in a savings total and what protects the P&L
- A sequencing view: what to execute this quarter, what to launch for 2027, what to hold for the next program

The mechanics: two to three weeks from BOM to briefing → your data stays local → findings in percentages and indices → a decision document, not a report



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