



# Memory and Storage, Current Status and Future Projections

**Jim Handy**

**OBJECTIVE ANALYSIS**



# Outline

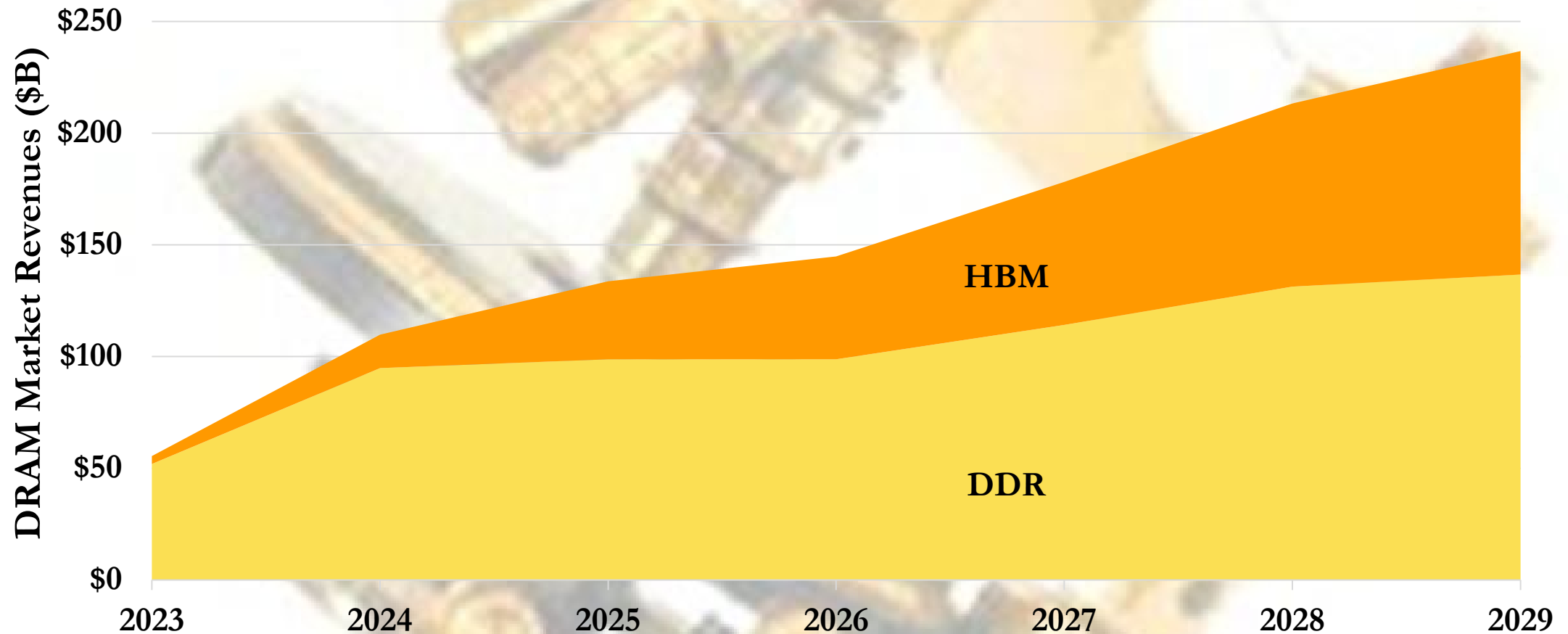
- DRAM & HBM
- NAND flash & SSDs
- AI
- CXL
- Chiplets
- Global Issues



# DRAM

# The DRAM Market Needs HBM

HBM Market Bolsters Slow DDR Growth





# Will HBM Rescue the DRAM Market?

## New report from Objective Analysis

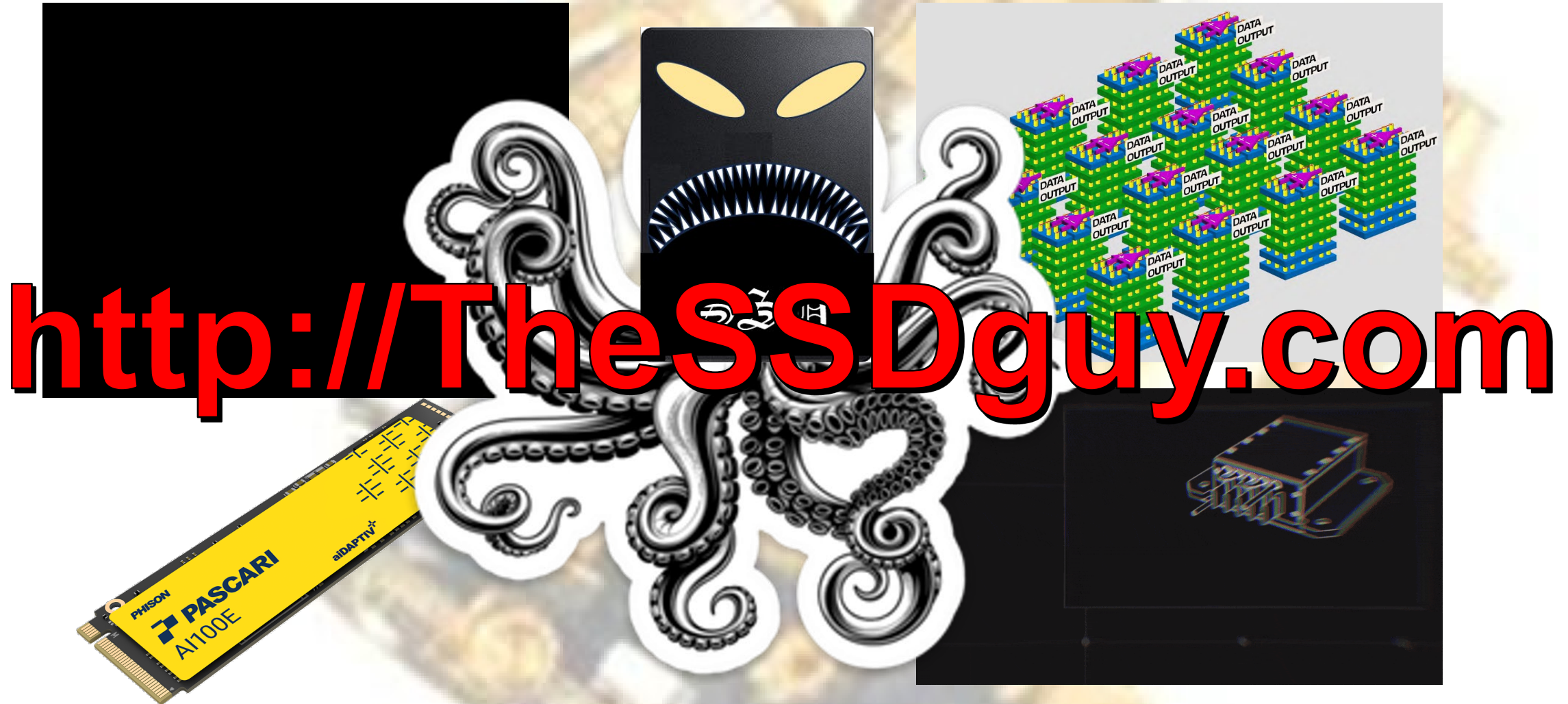
- Covers all perspectives
  - What is HBM and why it's so costly
  - Supply Chain – who buys it and why
  - Price dynamics: HBM vs. DRAM
  - Forecast (Revenues, units, ASP)
- Coming soon for immediate download:

[Objective-Analysis.com/reports](https://Objective-Analysis.com/reports)



# **NAND Flash & SSDs**

# New NAND/SSD Directions



<http://TheSSDguy.com>



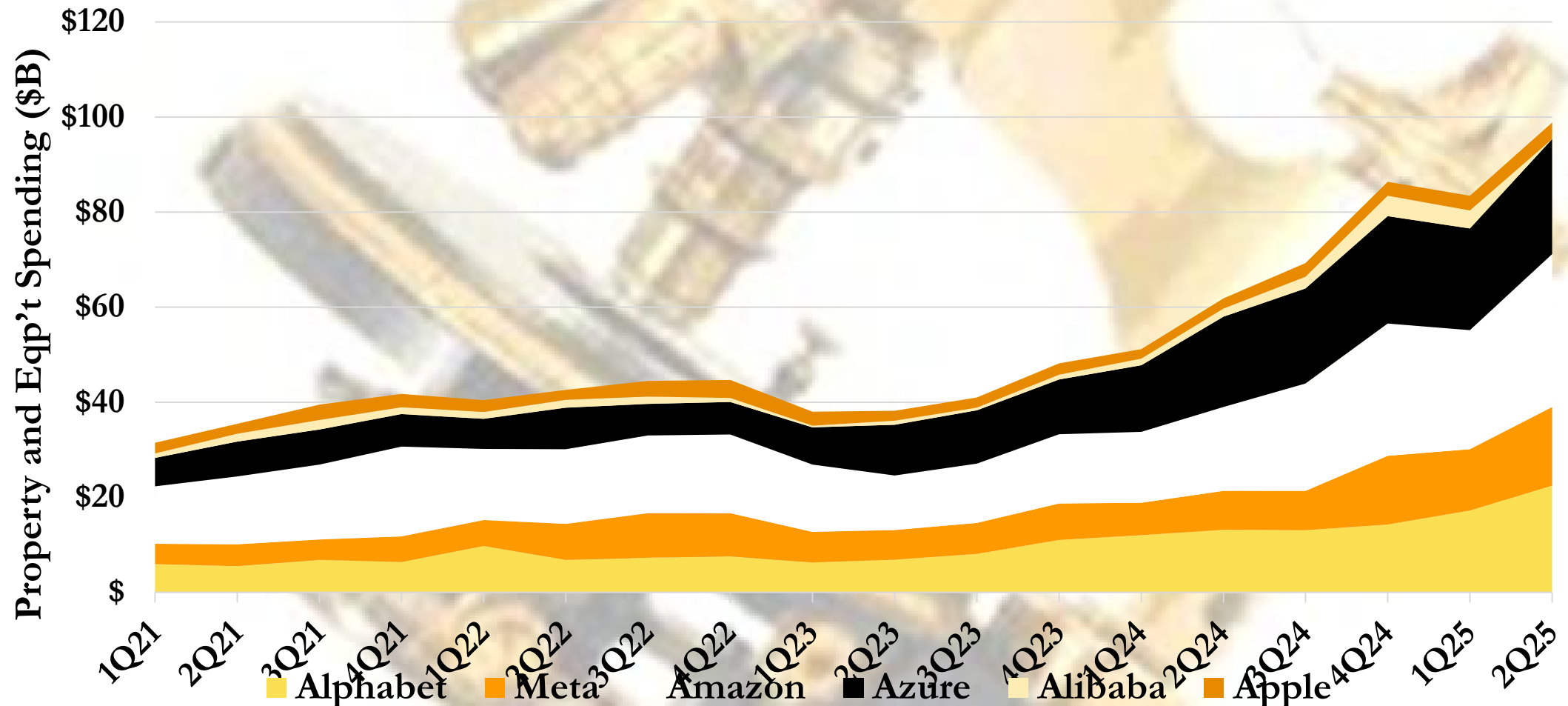


# AI



# Hyperscaler CapEx Binge Continues

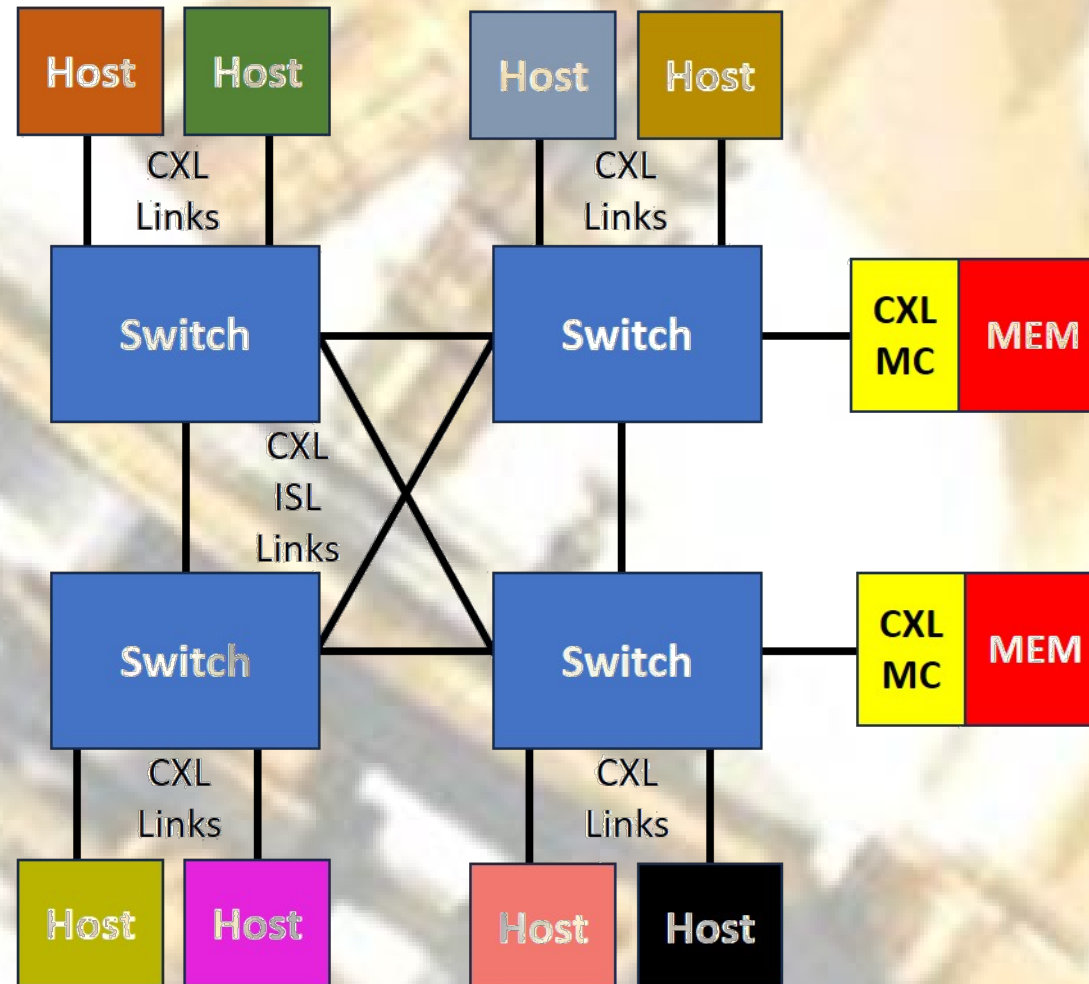
## Hyperscale Datacenter Capital Spending



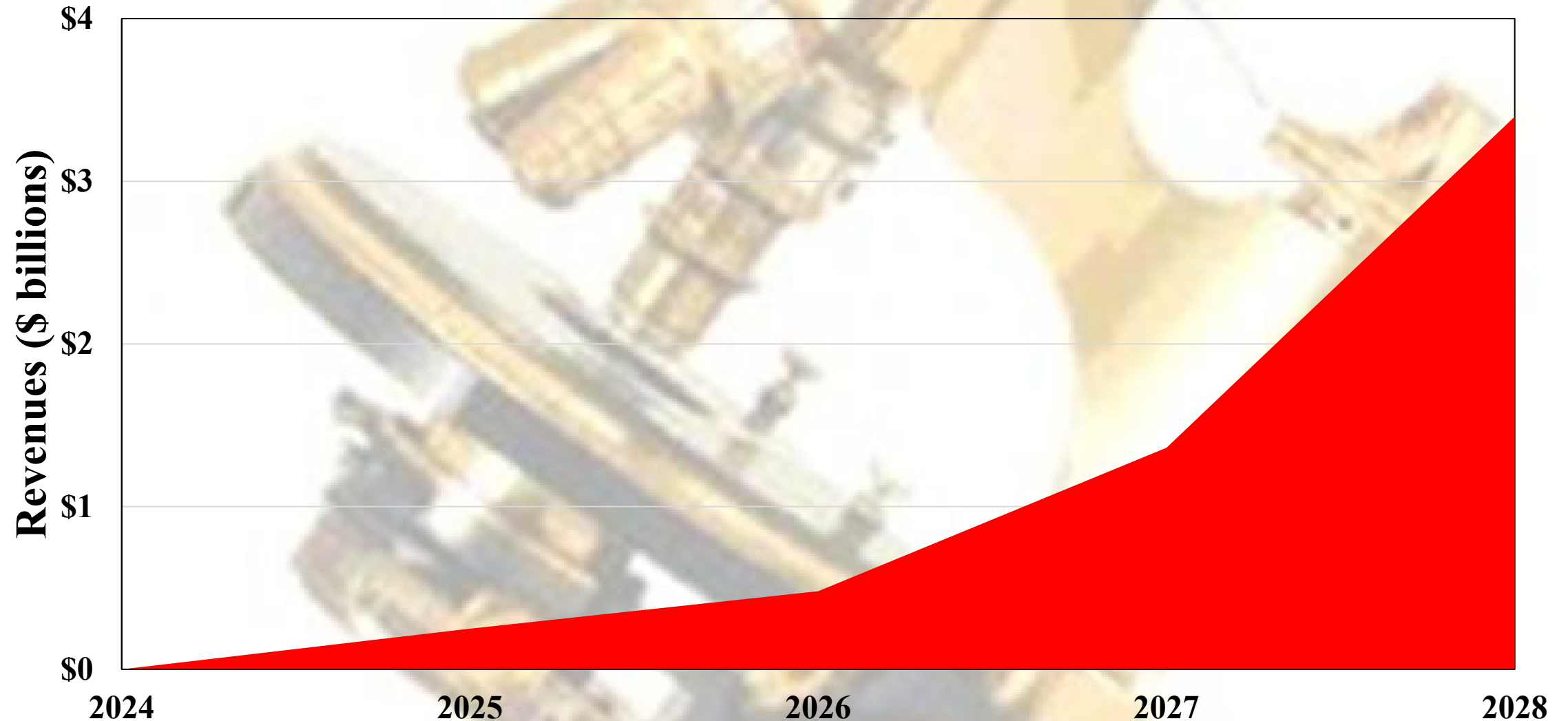


# CXL

# CXL Supports Memory Fabrics



# CXL Revenue Outlook





# CXL Looks for the Perfect Home

## Objective Analysis In-Depth Report

- Covers all perspectives
  - Where CXL is useful, and where it isn't
  - Demand drivers for CXL DRAM modules
  - Opportunities outside of DRAM
  - Forecast (Revenues, units, ASP)
- Available for immediate download:

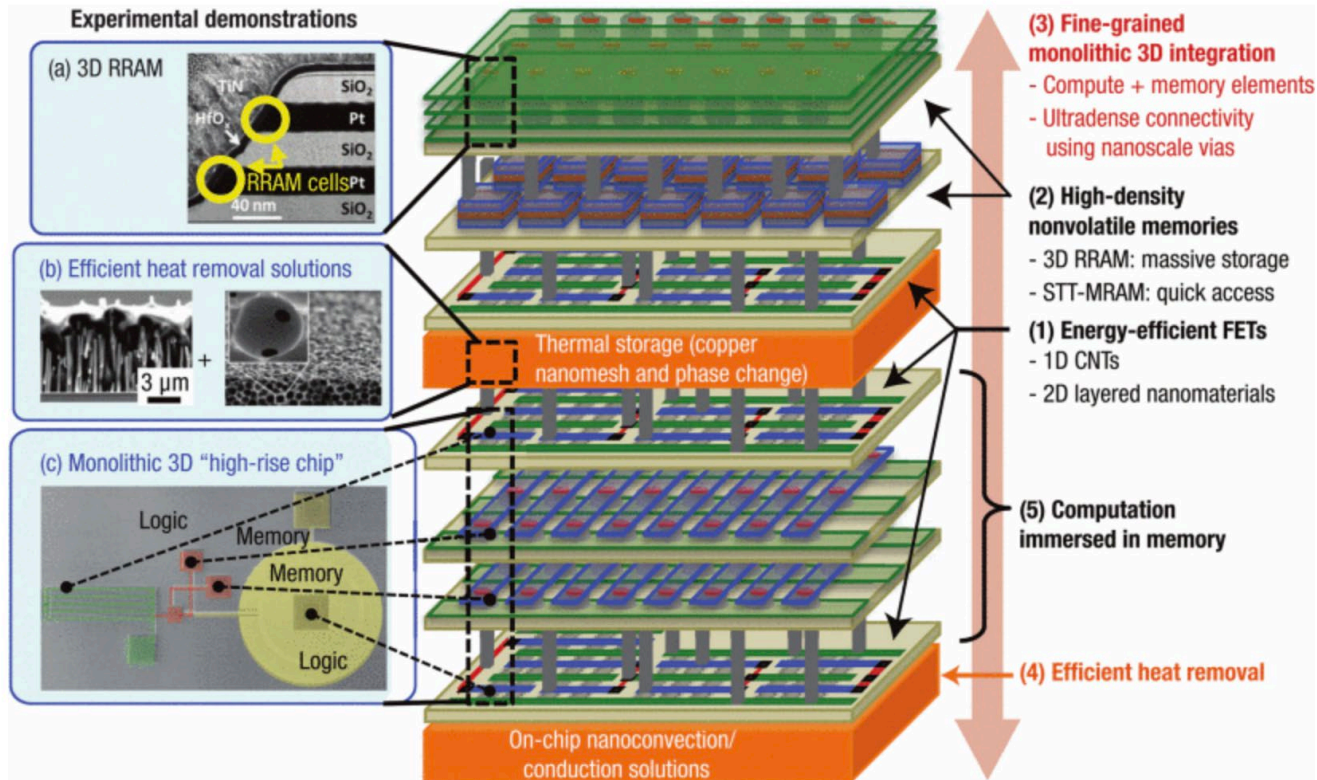
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# Chipllets



# Chipselets Support Heterogeneity



- Standard CMOS logic integrated with:
  - MRAM
  - ReRAM
  - FRAM
  - PCM
- Standard architecture or PIM
  - Processing in memory
- The possibilities are endless

Source: IEEE Heterogeneous Integration Roadmap:

<https://eps.ieee.org/technology/heterogeneous-integration-roadmap.html>



# Report: A Deep Look at New Memories



*Coughlin  
Associates*

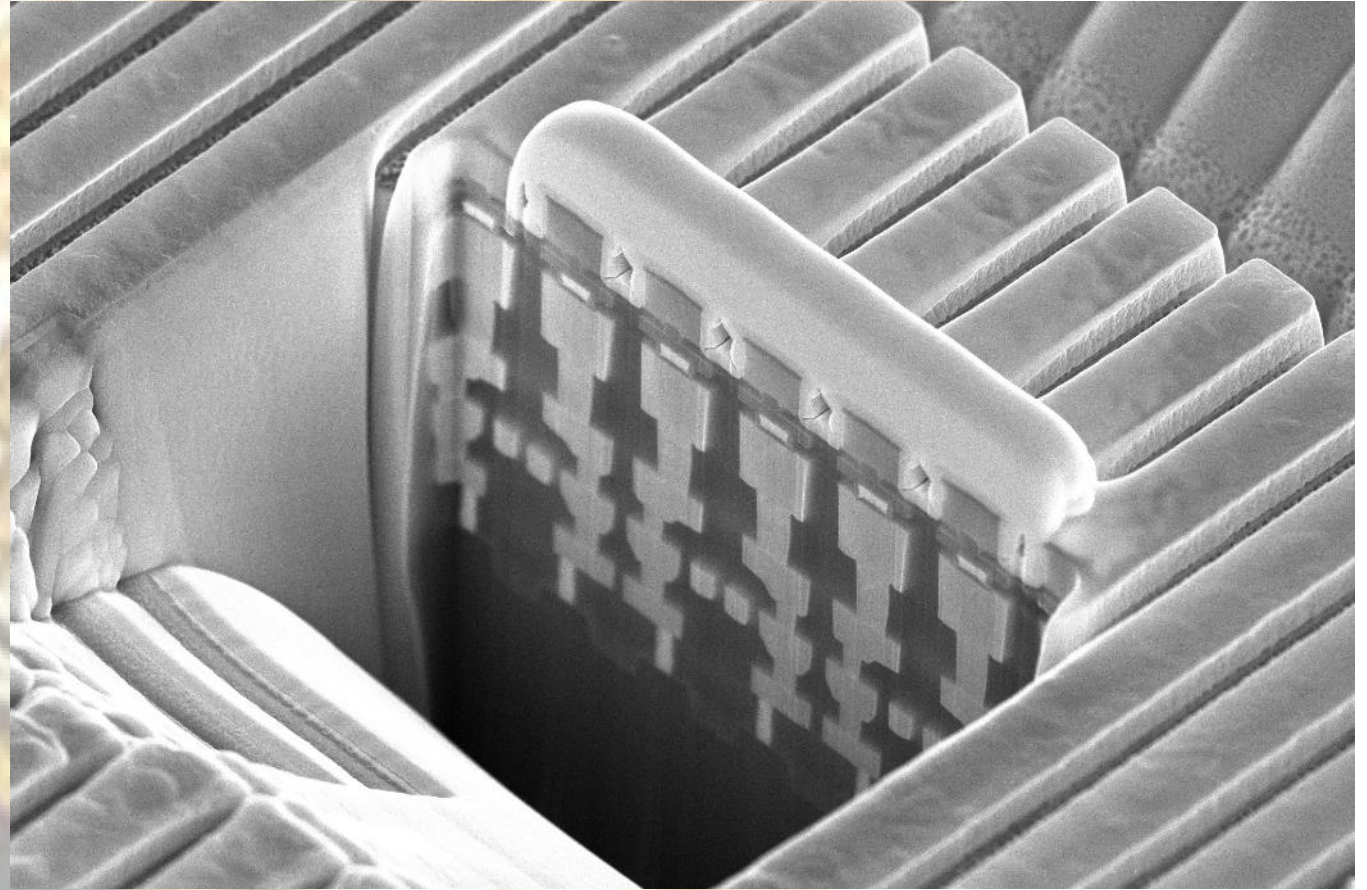



Photo courtesy of CEA Leti, 2023

**Now Available!** <https://Objective-Analysis.com/reports/#Emerging>  
<http://www.TomCoughlin.com/techpapers.htm>

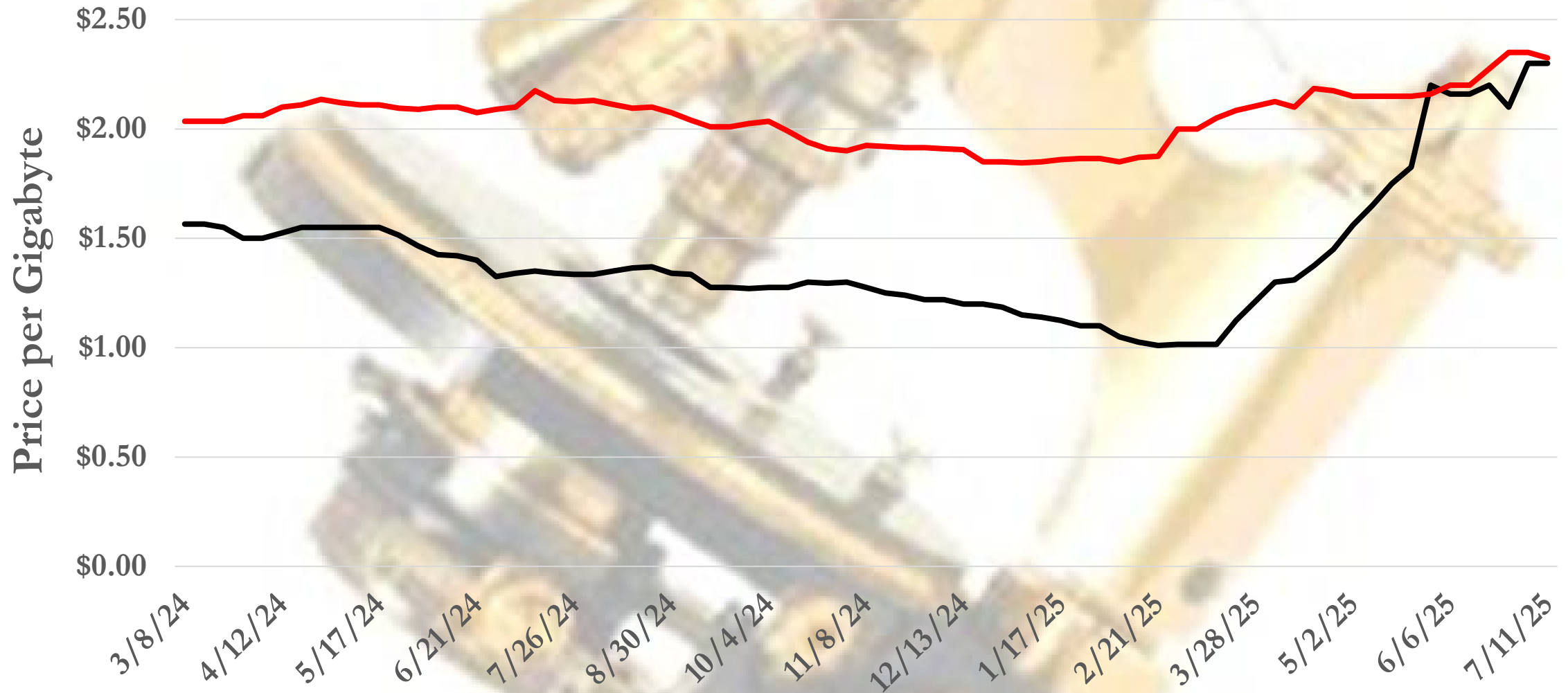
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# Global Issues

# CXMT Gaining Prominence

DDR4 vs. DDR5 Lowest Spot





# China's Memory Ambitions

## Objective Analysis In-Depth Report

- In-depth review of China's goals & plans
  - Why China? Why now?
  - Comparison to Japan, Korea, & Taiwan
  - Other industries China has penetrated
  - Outlook for China's successes & problems
- Available for immediate download:

[Objective-Analysis.com/reports](http://Objective-Analysis.com/reports)

# Summary

- DRAM market needs HBM to grow
- NAND & SSDs creating new applications
- AI spending appears ready to cool off
- CXL will be a large market, but not right away
- Chiplets will drive demand for new memories
- Trade War is starting to divide the market