

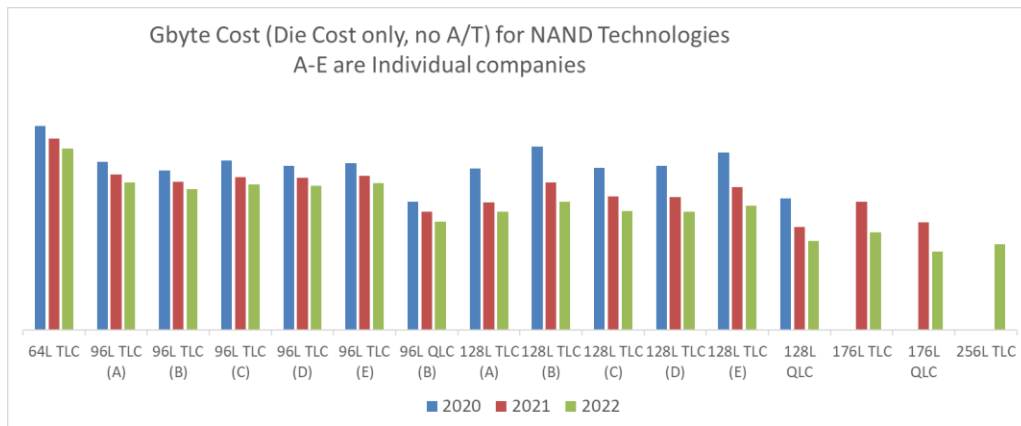
What are NAND costs today and over the next 10 years

In our FMS paper on NAND costs for all vendors and all technologies, we showed how NAND bit costs are being reduced as we go from 64L to 256L. We also showed that equipment companies and Fabs are improving efficiency much faster than we expected. We also showed that QLC will grow to over 50% of bits by 2025 and that this will lead to cost reduction.

As a result, NAND bit costs are on track to drop ~20% per year if we continue the increase in layers at this rate.

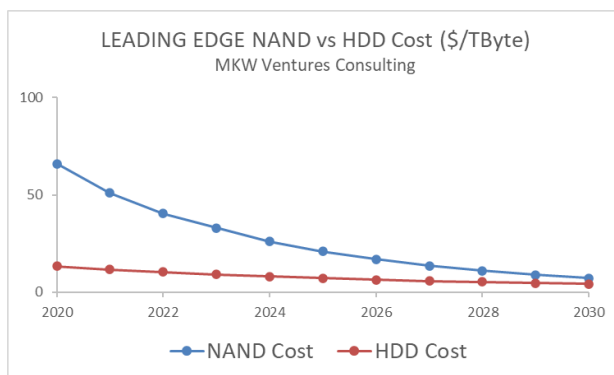
Details are at www.mkwventures.com with multiple reports

Some data



- 1) Each layer Increase brings significant cost reduction
- 2) Costs are significantly reduced each year for each existing technology (efficiency)
- 3) QLC is modeled at 22-23% cheaper than TLC

Overall, this leads to Gbyte cost reduction (these costs include package, assembly, test) over the next 10 years:



Another presentation at the same FMS session had costs for each company and technology as well. While the technical analysis of the processing and teardowns is excellent, the actual costs are obviously incorrect. If those costs were the actual costs, every NAND company would be running negative 10%

gross margin. Their margins are bad... but not that bad. Our costs line up with and are calibrated to what actual ASPs are and what actual margins are. All that gory details are available for discussion.

Mark Webb

www.mkwventures.com