VLSI RESEARCH INC

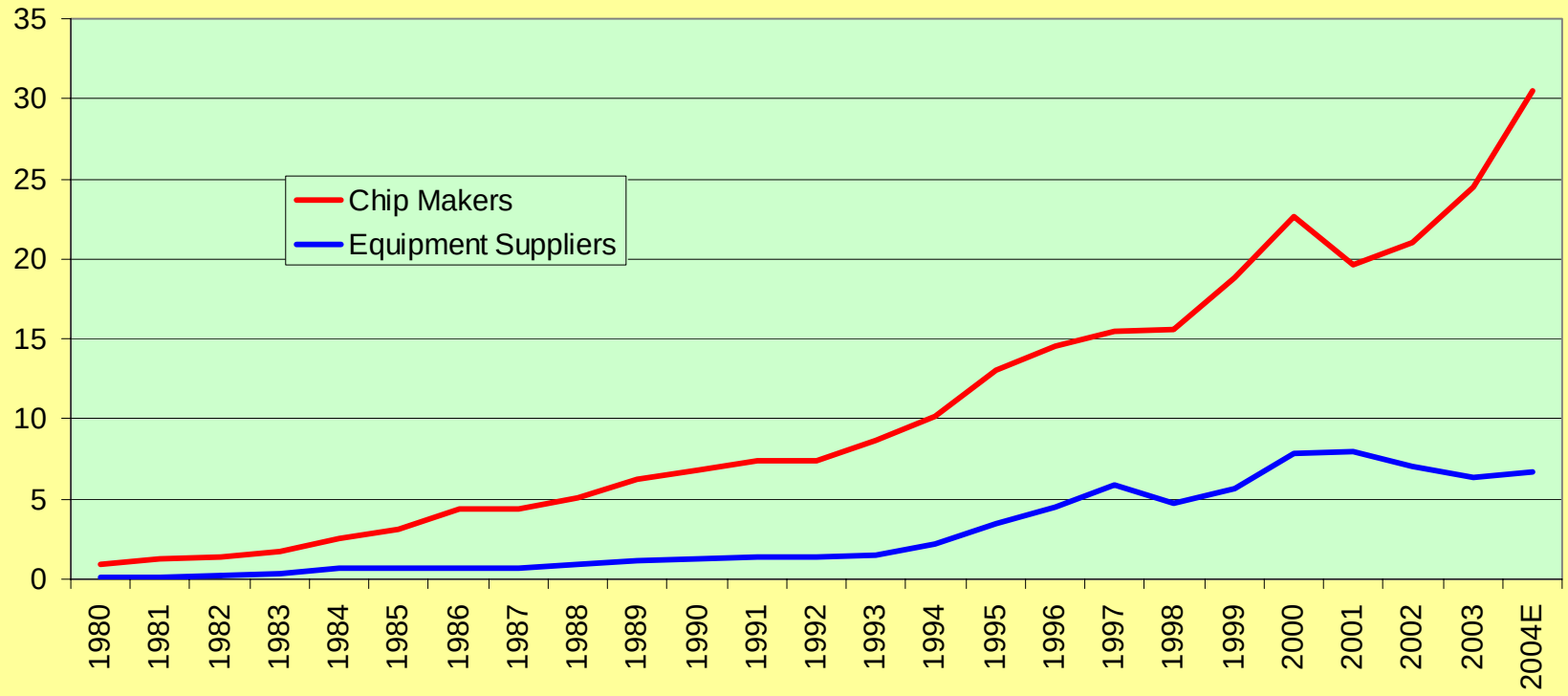
Where the Chip Making Industry Clicks to Find its Weather

The R&D Crisis

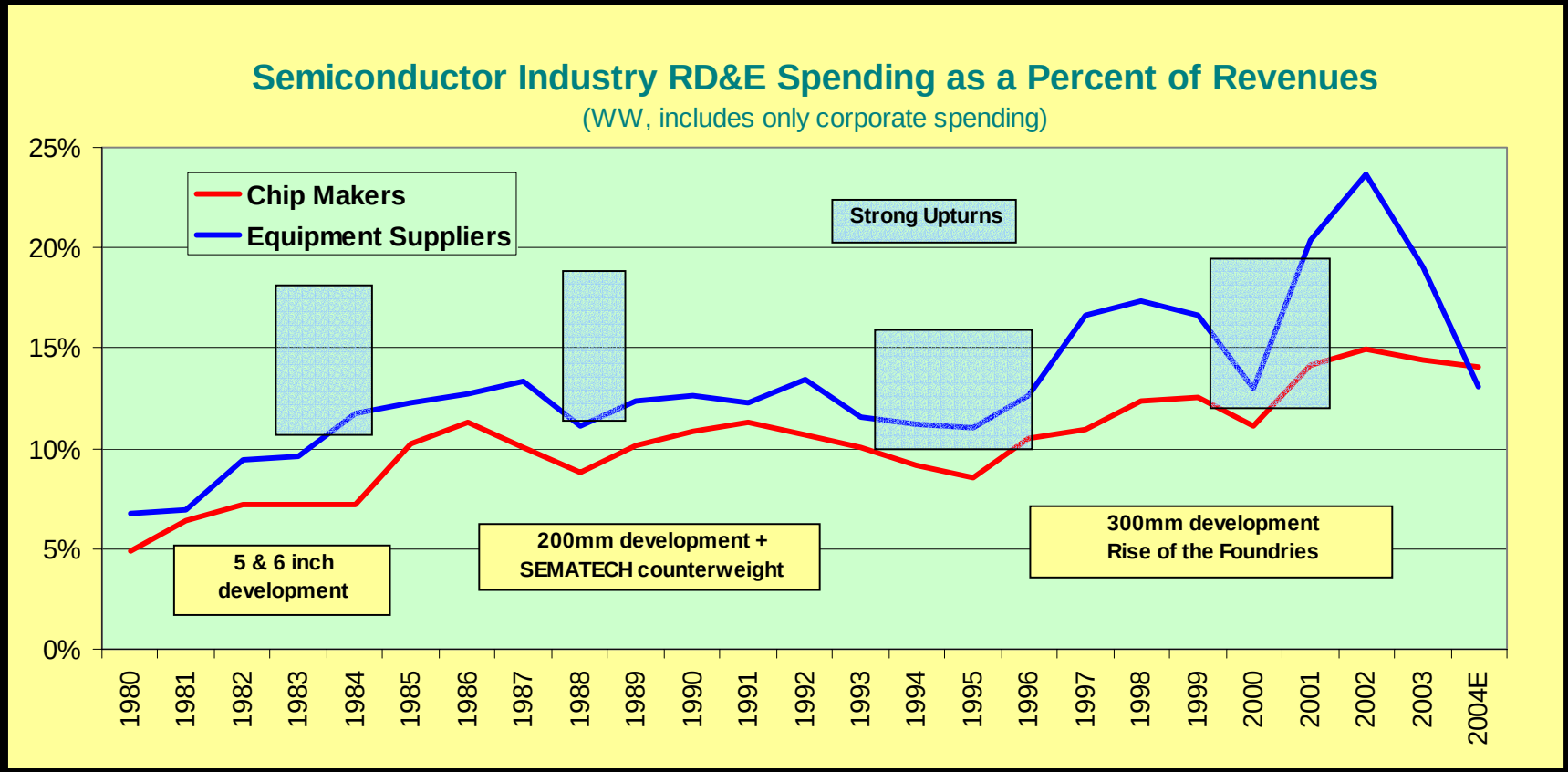
By G. Dan Hutcheson

Total WW Semiconductor Industry RD&E Spending

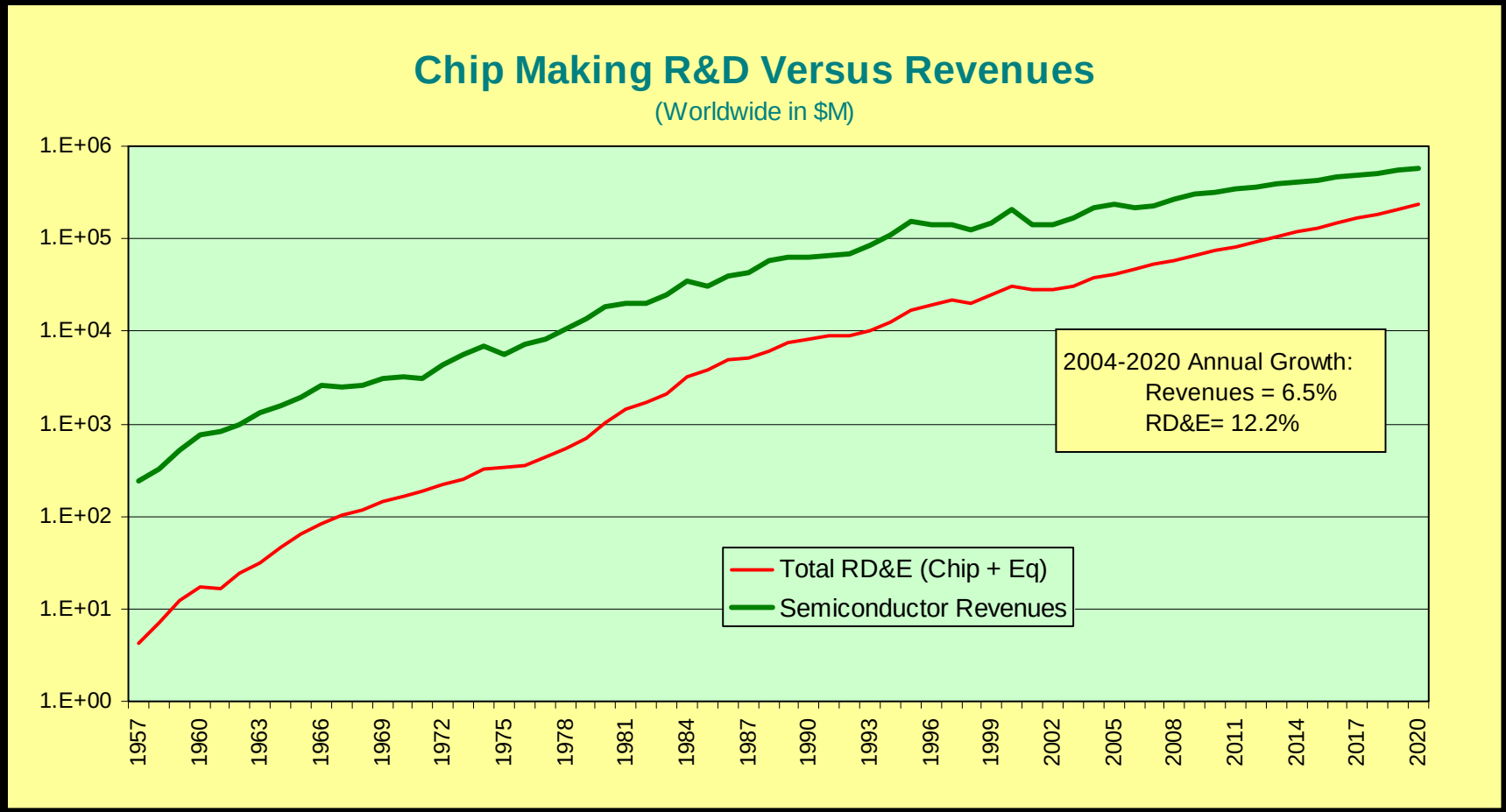
(in $B, includes only corporate spending)



Equipment makers will spend less on RD&E than chip makers for the first time in three decades.



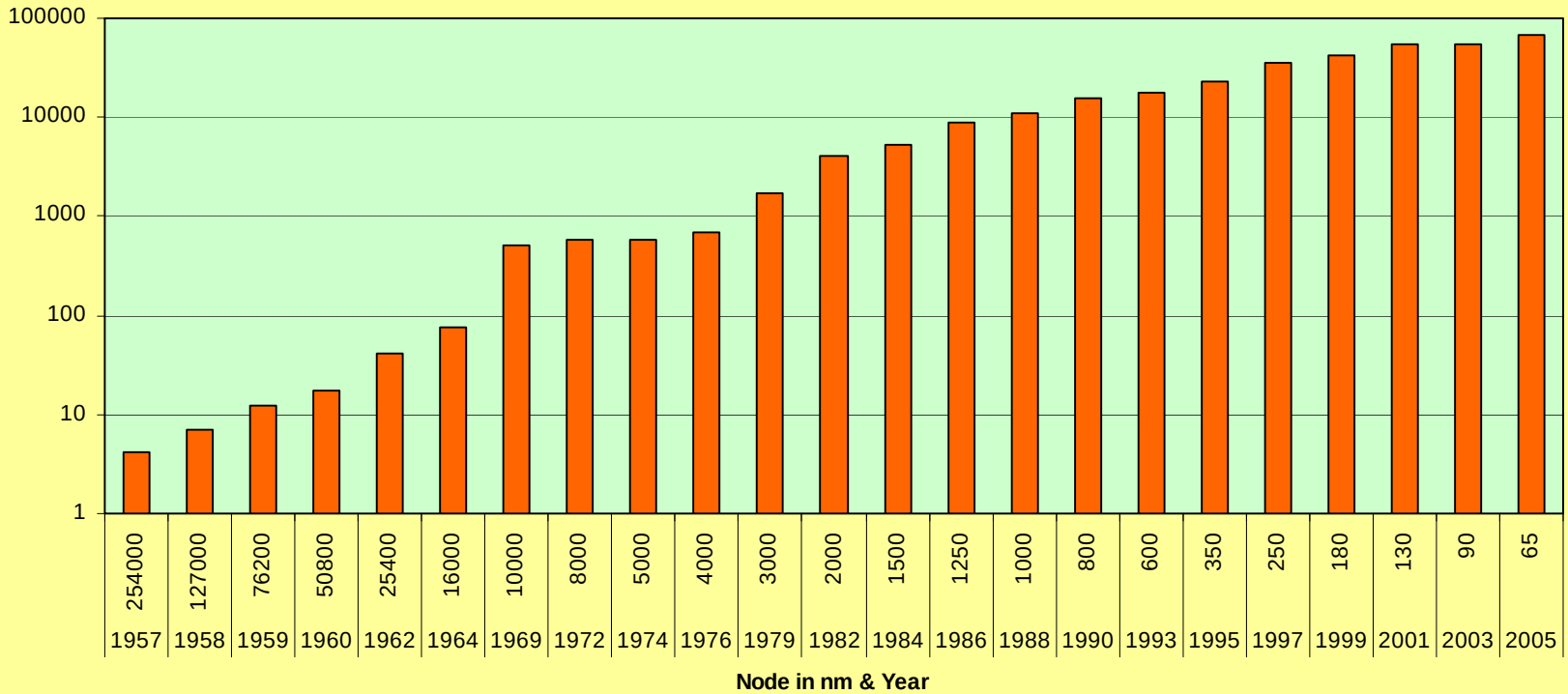
A flat equipment market is forcing equipment makers to cap R&D spending. ROI for equipment makers has become too low to justify the spending. This pushes R&D burden back on the chip makers.

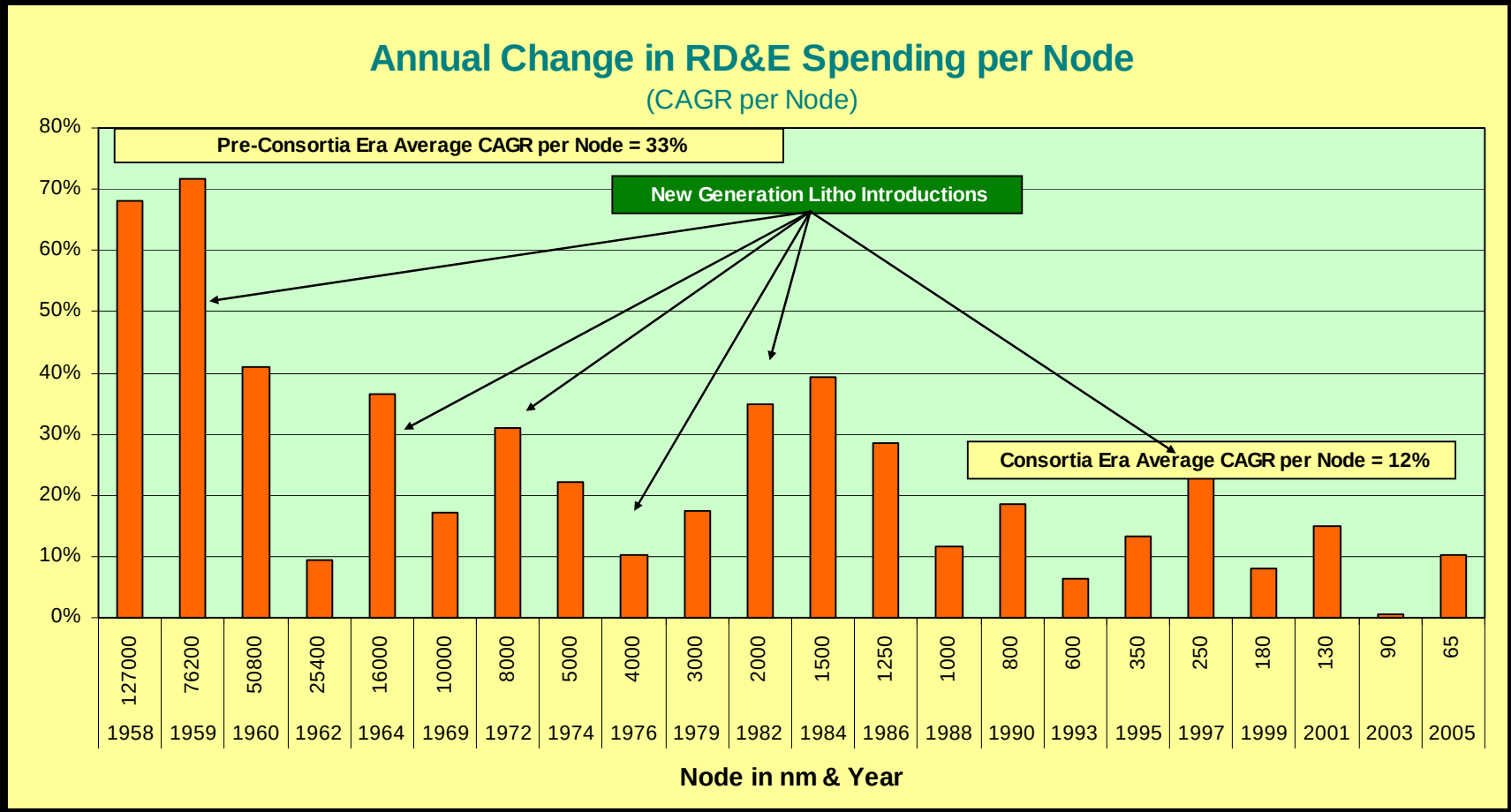


Chip sales have been growing at around 6% a year since 1995. But R&D is growing at a 12% CAGR. By 2020, RD&E spending rate would reach 40%. Clearly, this is unaffordable.

RD&E Spending per Node

(WW in $M. Includes both Chip and Equipment Spending)





The R&D Crisis

- If the R&D spending rate must slow, then
  - Either the clock rate of Moore's Law must slow.
  - Or the industry must become more efficient in R&D.

The R&D Crisis

- Slowing Moore's Law would mean:
  - A substantial reduction in the growth of both the semiconductors and electronics market.
  - Then we will have to slow RD&E spending growth more.
    - which will extend the clocking rate further.
    - and lower the market potential to an even lower level.
  - It is a downward spiral that no one would want to initiate.

Conclusions:

- As an industry, we have a choice. We can let R&D slow and see what happens OR…
  - Find new ways to make R&D more efficient. Doing this means learning to work together better.
  - Get prepared for the introduction of new lithography generations so that costs do not spike.
  - Figure out what is broken in the equipment model and fix it.
  - Find out what it is about SEMATECH that made it so good and then make it better

Thank you

This presentation is available as a white paper at:
https://www.vlsiresearch.com/public/600201_r&d_crisis.pdf