Lifting the Energy Veil

A plea for data and science

Philip Levis
Computer Systems Lab
Stanford University
Amdahl’s Law Extended

• Costs bound benefits
• Corollary: optimize the big cost
• Death of a thousand cuts?

80%  20%
Well-Lit CPUs

In practice, a 3-5% improvement is achievable.
Contrast: Displays

In practice, a 20% improvement is achievable.
The issue is that people don’t realize all of the options in the design space. You can turn sleep current arbitrarily low.

Bill Dally, Chief Scientist, NVIDIA

You could have lower power RAM, but engineering it is expensive and the market would not pay for the investment.

Krisztian Flautner, Director of Advanced Research, ARM

I think you will find that a part designed to run at 50MHz and above with 64K of SRAM will always draw more power in sleep mode.

Paul Kimelman, chief architect of ARM Cortex M3
Data is Truth

• Separate artifact from essence
  – (addressing either is commendable)
• “Interesting” is a bad word
• Open, public data sets