Some datacenter power and energy challenges in the AI era

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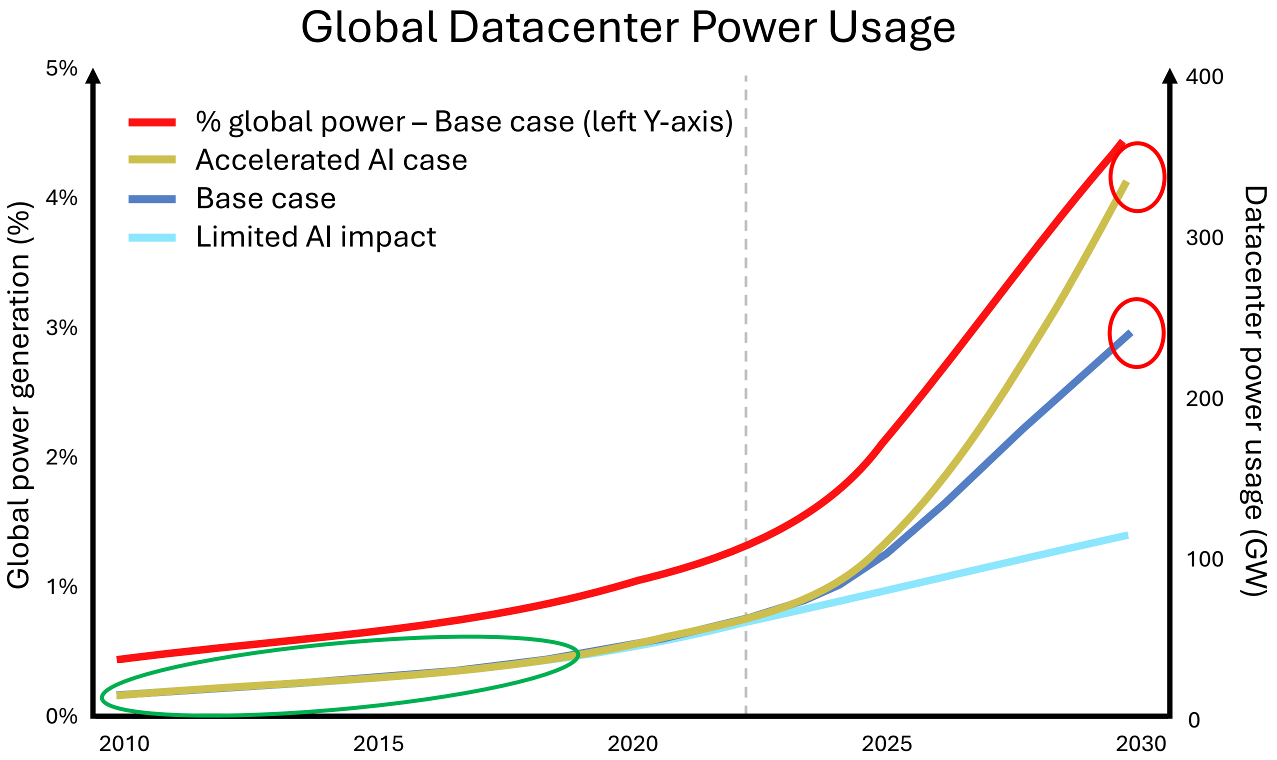
AI datacenter electricity demand



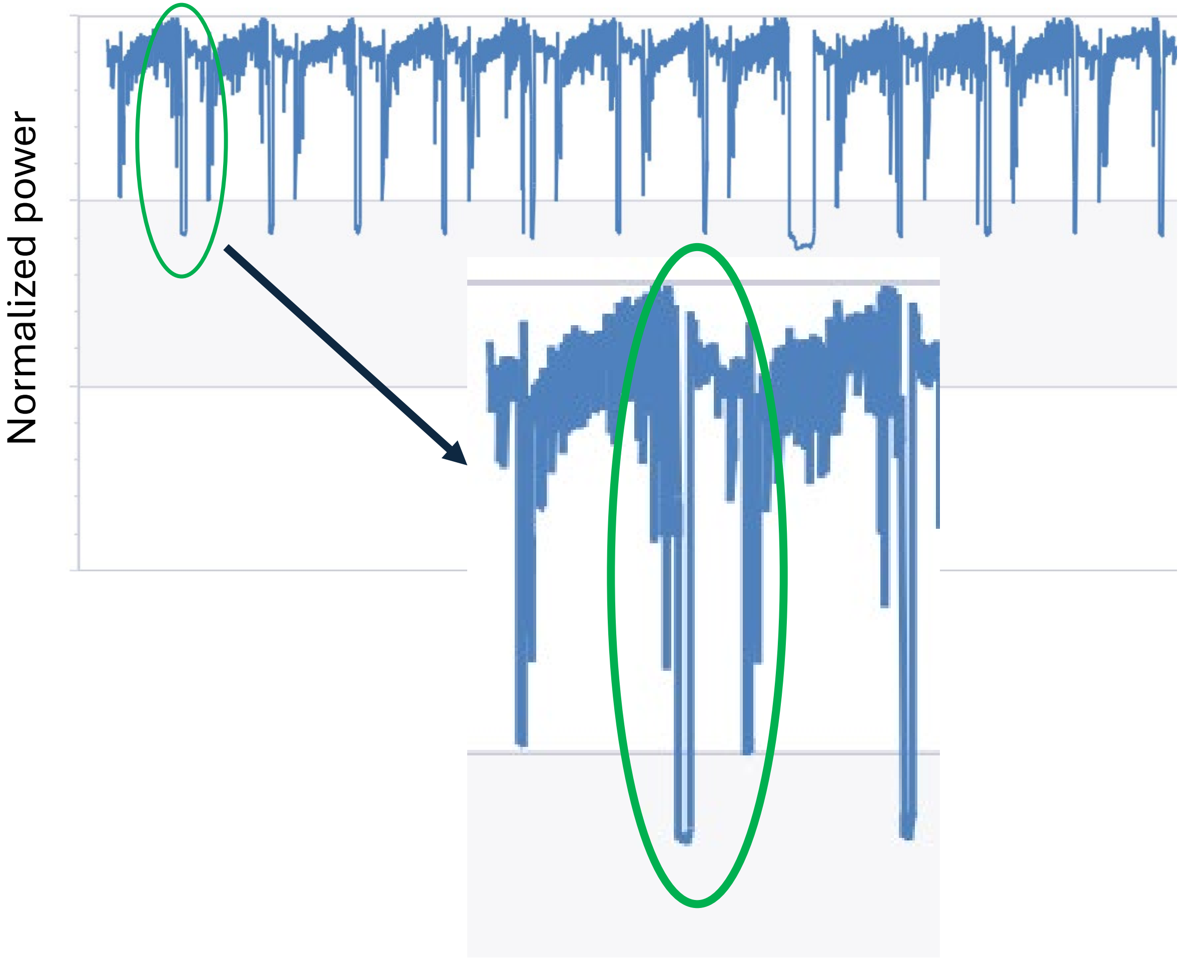
Base case suggests 171 GW in 2030 (3x today!)

Assuming the "accelerated AI" case, 242 GW!

Efficiency kept demand increasing slowly

Source: D. Patel, D. Nishball, and J. E. Ontiveros. "AI Datacenter Energy Dilemma – Race for AI Datacenter Space". March'24.
Image: Semianalysis

Software: Training

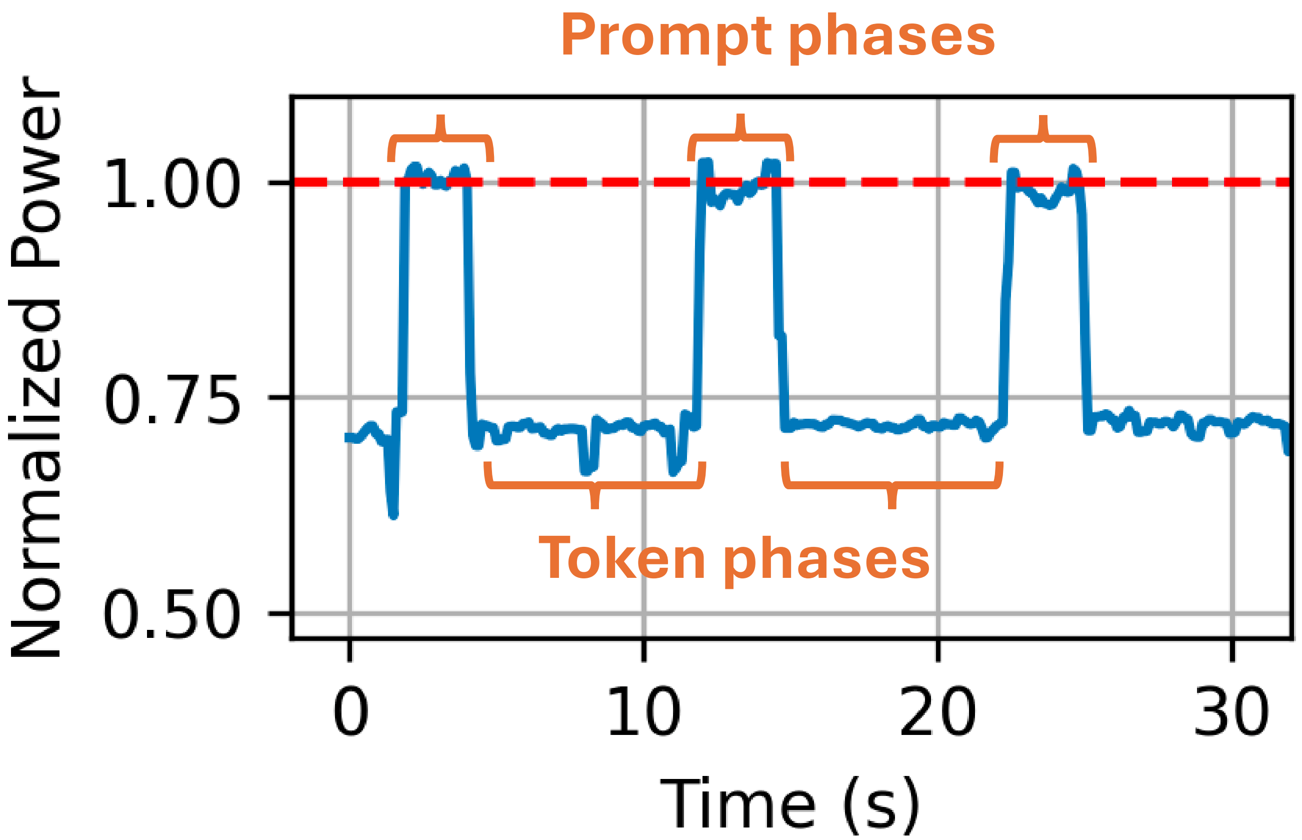


Batch job with high power utilization
Massive synchronous computation

Challenges:

- Power swings can de-stabilize the grid
- Decreasing effective utilization due to failures

Software: Inference



3x BLOOM-176B inference requests on 8 GPUs

Interactive service with lower utilization
Phases behave very differently

Challenges:

- Optimizing for such different behaviors
- Maximizing power oversubscription