

Power Dynamics: Shaping the future of the data centric era and the role of AI

Amir Attarha

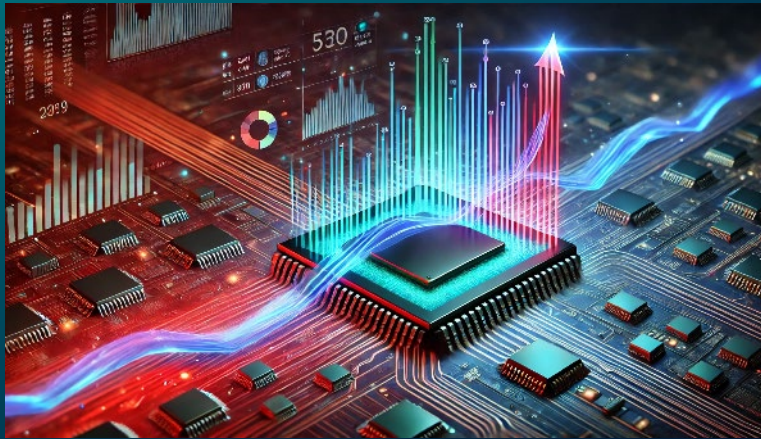
Senior Product Manager -- HAV Division

Siemens EDA

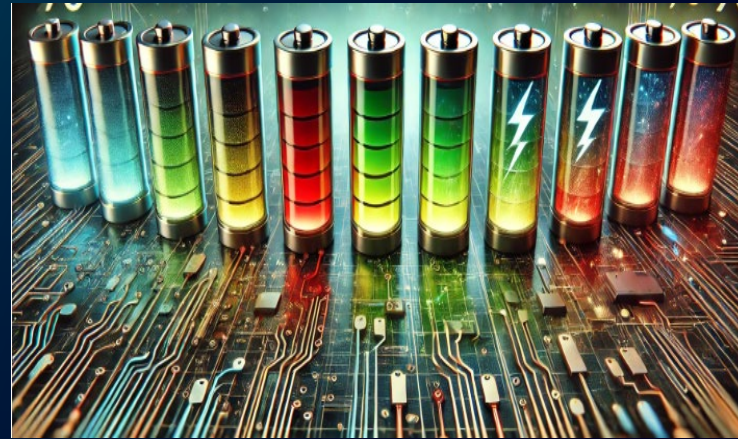
DVCON 2026



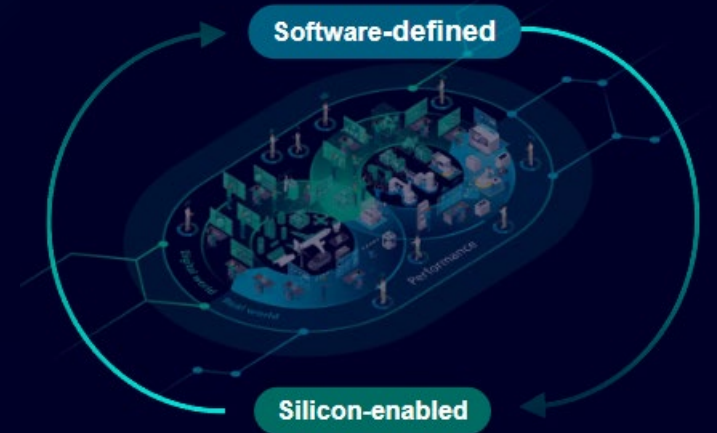
Agenda: The impact of power in a SW-defined world



Industry trend



Power challenges



Power analysis
In SW-defined world

Semiconductor industry at-a-glance



1960

1980

2000

2020

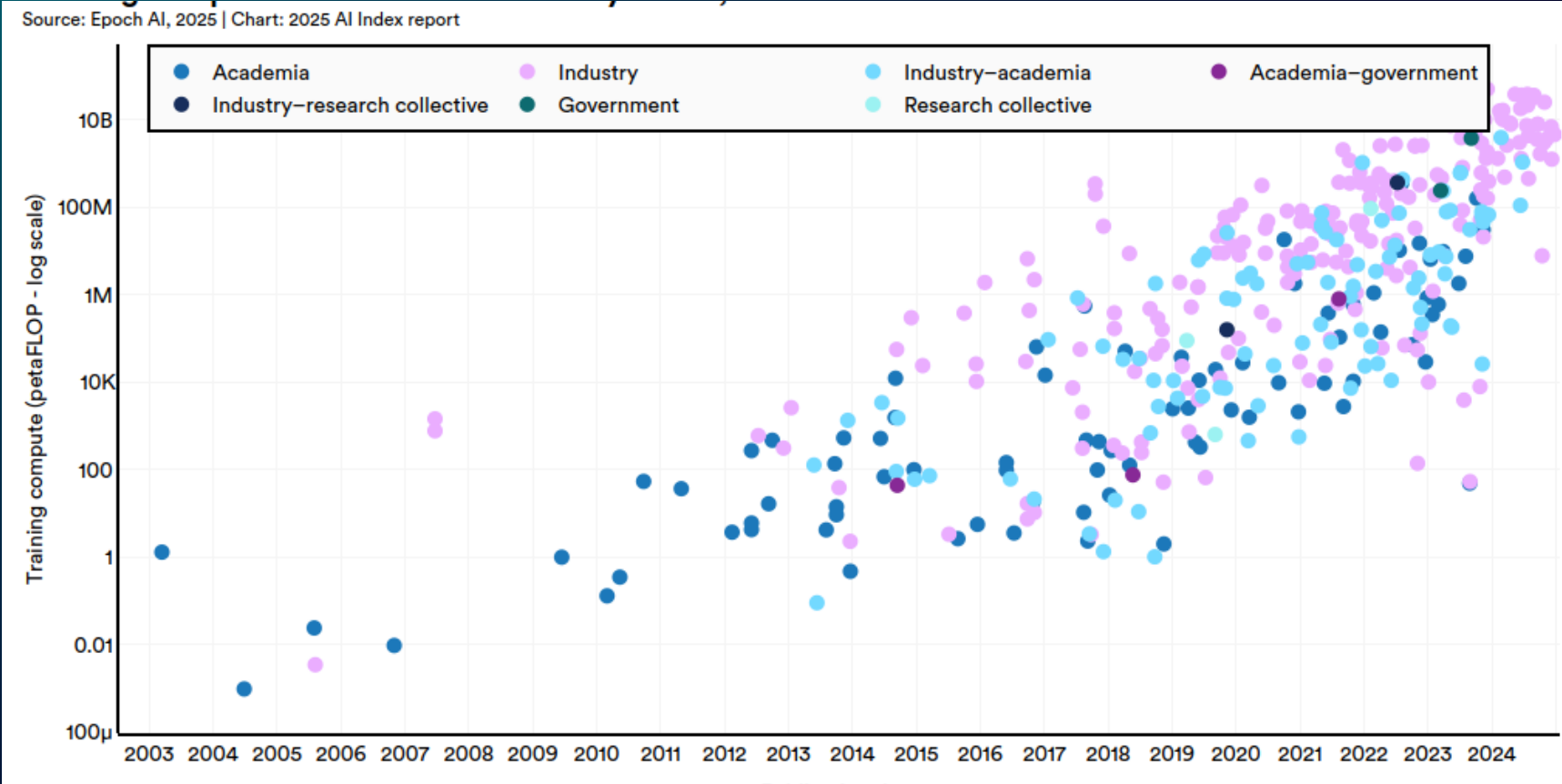
Data centric era is synonymous with AI

Massive computation

High bandwidth memories

Cutting edge communication

Maximum parallel processing (no idle phase)



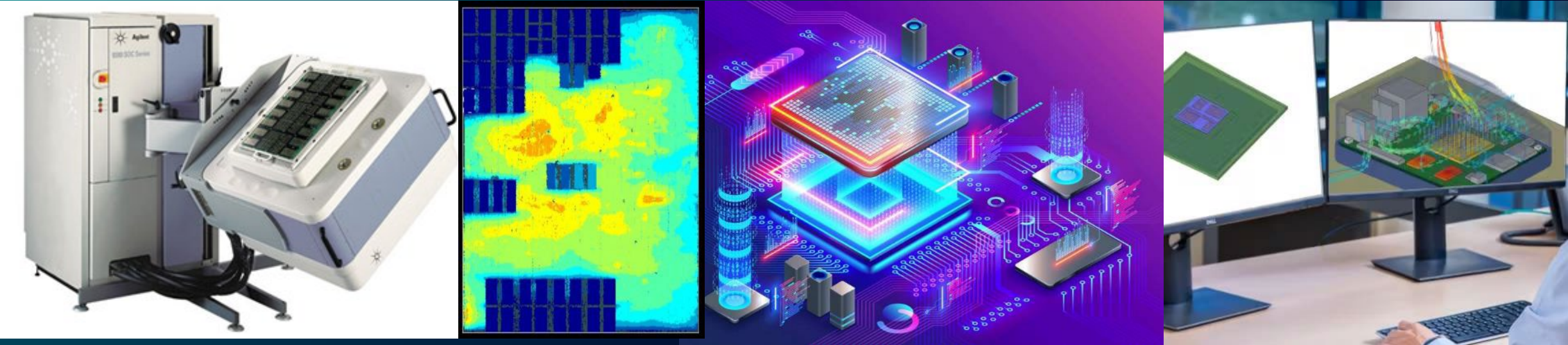
The magnitude of AI energy consumption is astounding

ChatGPT's daily power usage is nearly equal to 180,000 U.S. households

Google AI service is estimated to consume electricity as much as Ireland



Power impacts: packaging cost and complexity



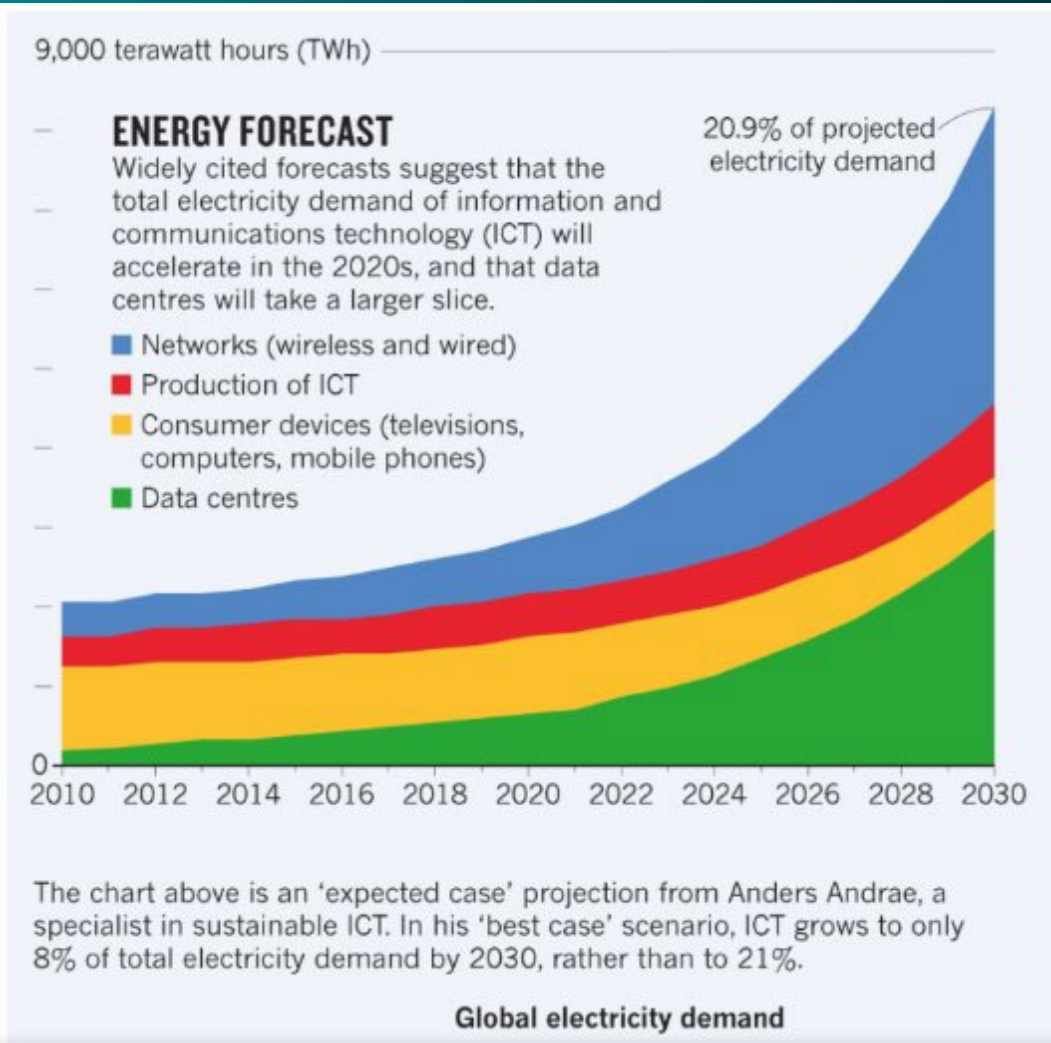
DFT

thermal

package

cooling

Power impacts: from micro to macro



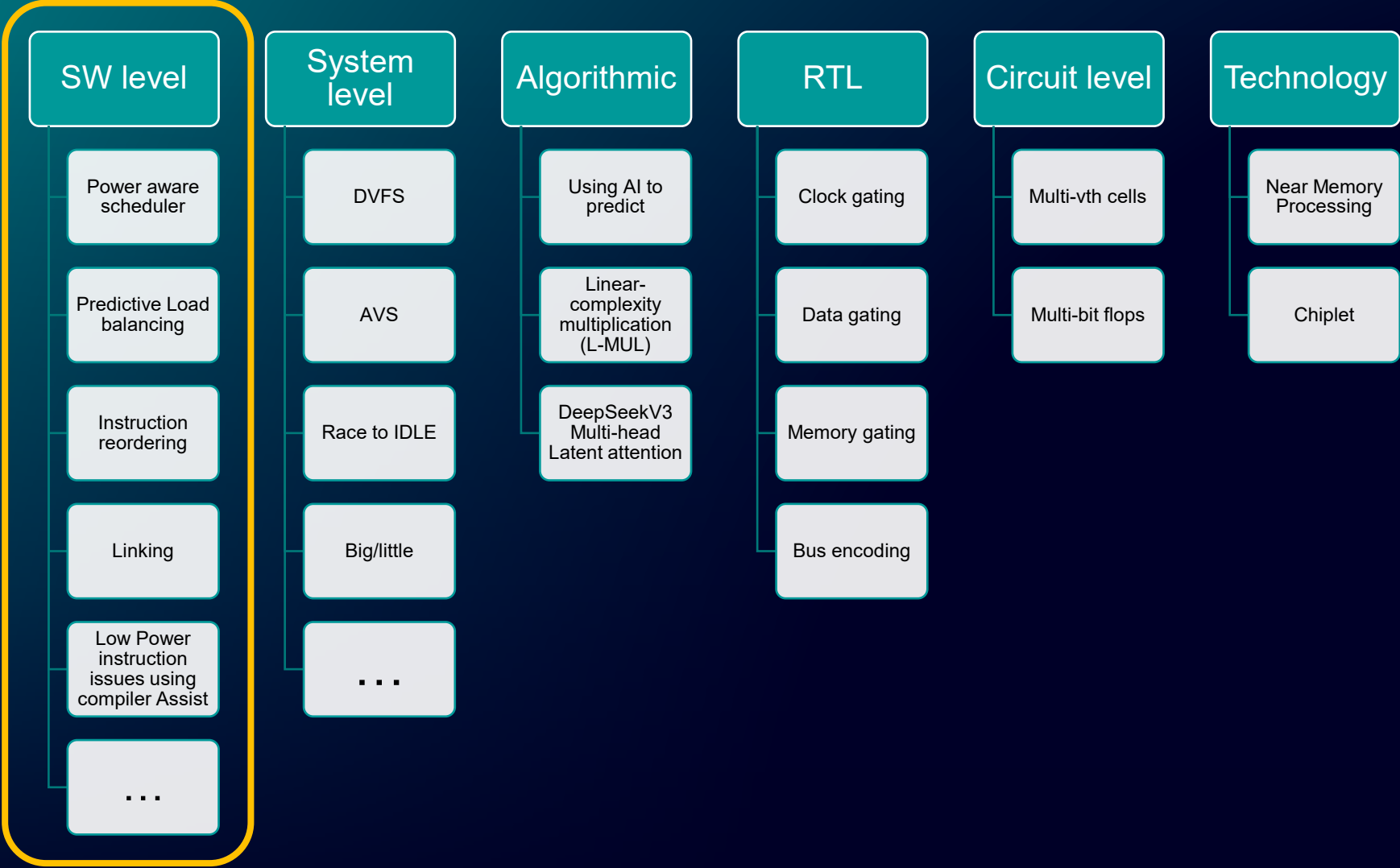
Data Centers could consume 20% of total electricity by 2030



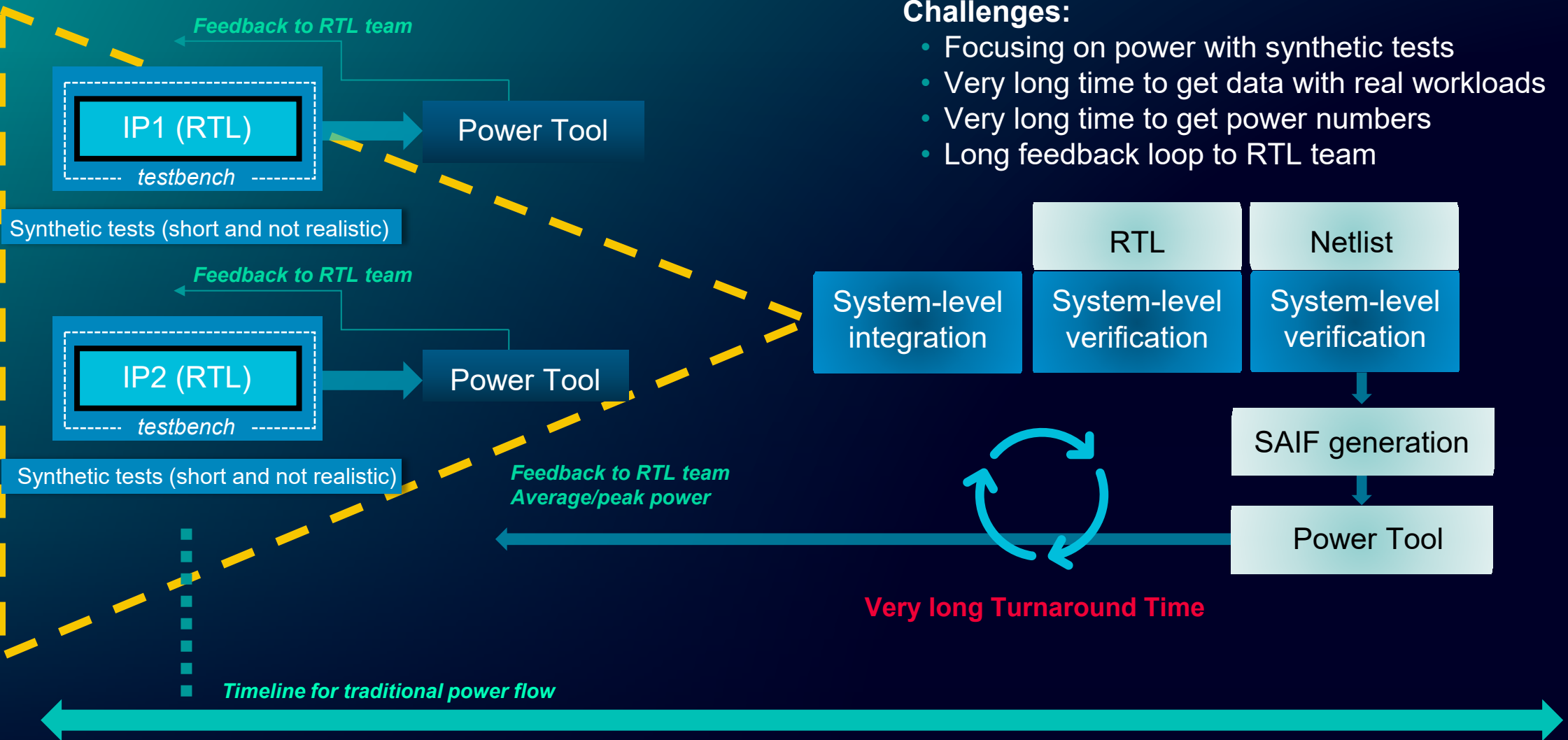
Power analysis and reduction

From system to circuit

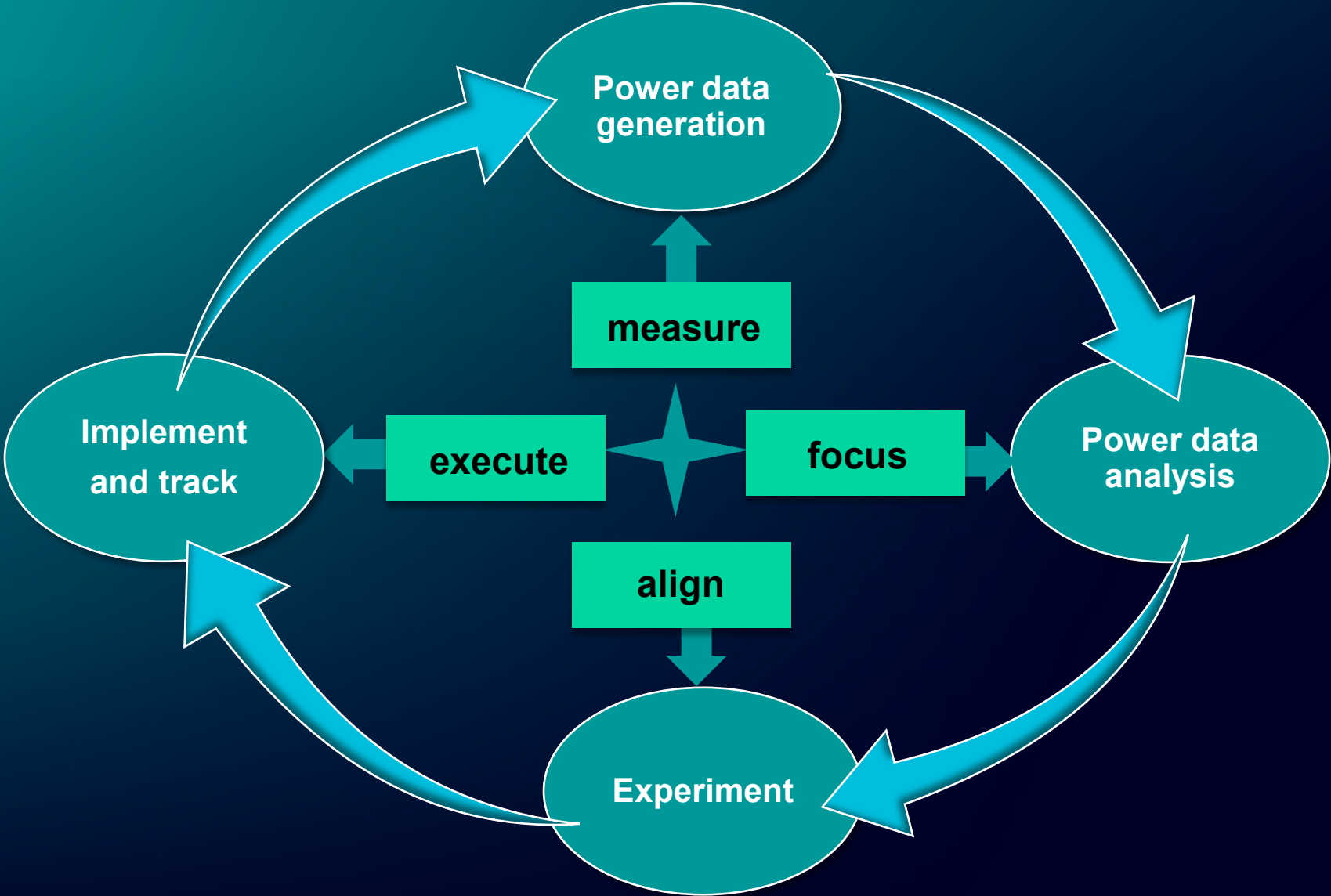
Dynamic power reduction



Traditional power flow



Shift left vision of power analysis



Early in the design cycle

Power data generate with real workloads

Generating actionable power metrics

Achieving high accuracy

Compelling solution for design teams

Design

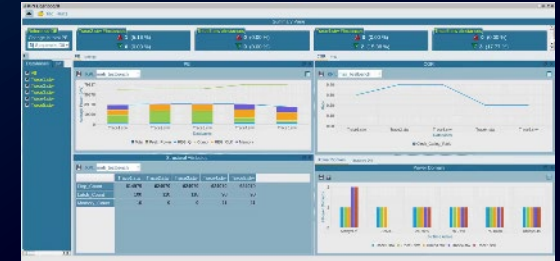
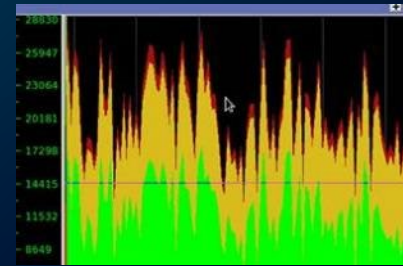
Liberty

UPF

Workload



Power trend analysis



Time-base CGE

Time-based FFE



Capturing power profile for entire workload



Capturing key power indicators at cluster or SoC level



Accurately finding peaks

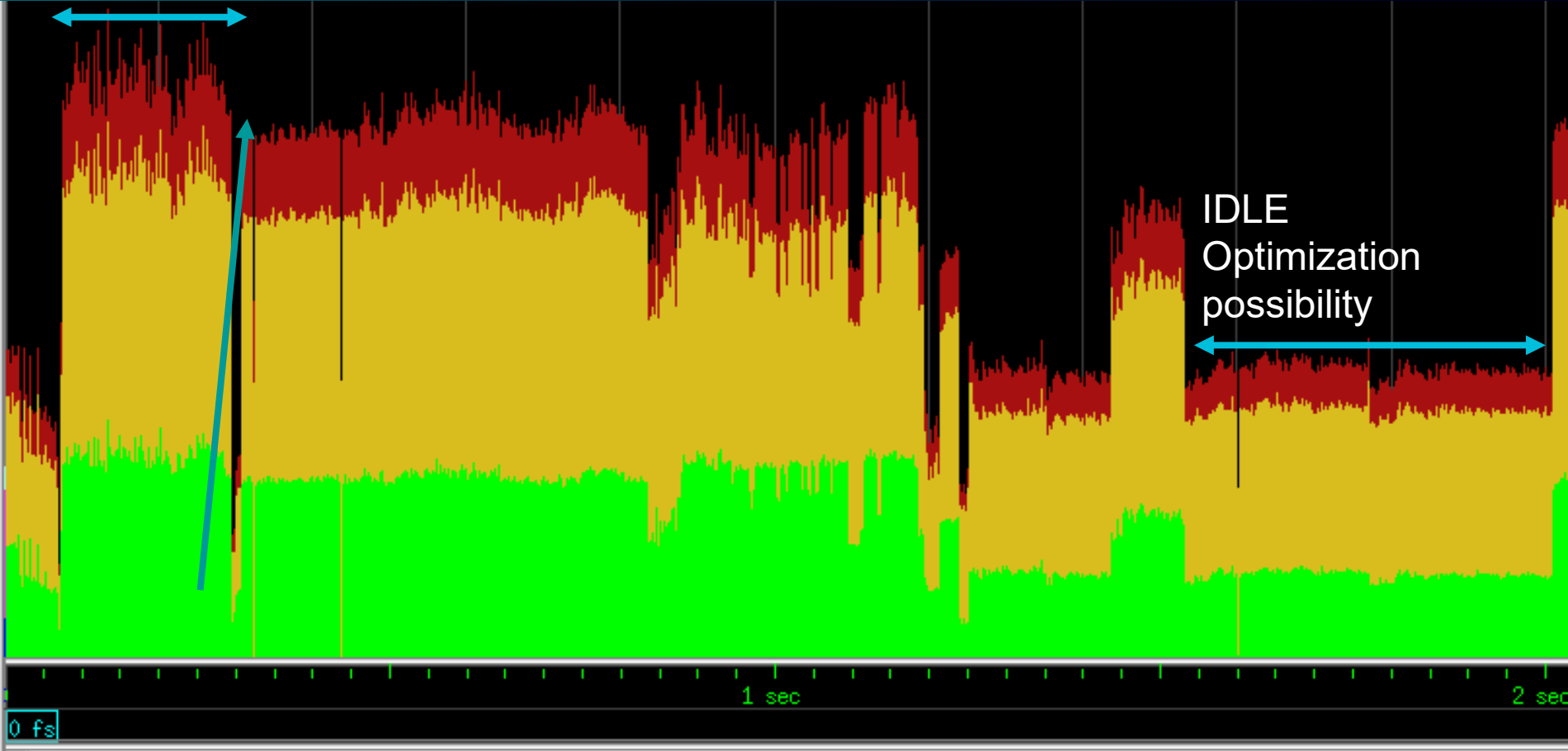
Generating power profile for Billions of cycles

Making key decisions based on real data

Power profile/heat map for realistic benchmarks allows focusing on right area

Hot zone
optimization possibility

Is this benchmark interesting for power analysis?



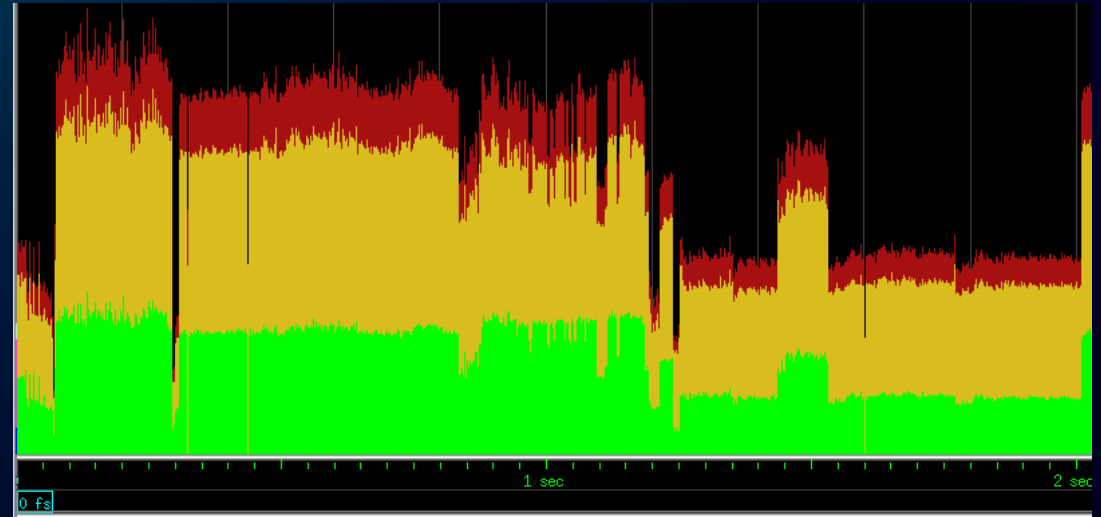
Cycle accurate power profile, CGE and FFE for entire duration of workload

Power profile for each instance

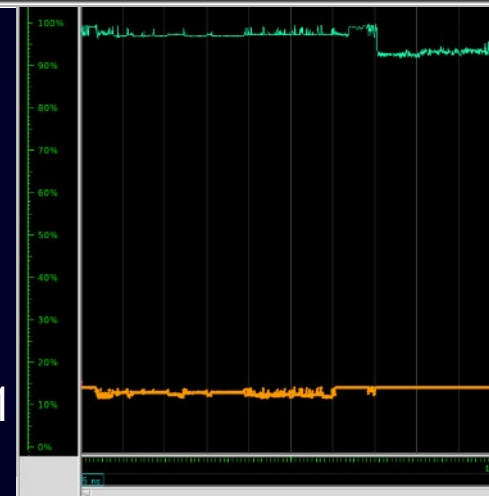
Power profile enables peaks and possible dynamic di/dt detection

Time-based CGE/FFE at SoC level and within 1% accuracy from power tools

Time-based CGE/FFE based on global/local clocks

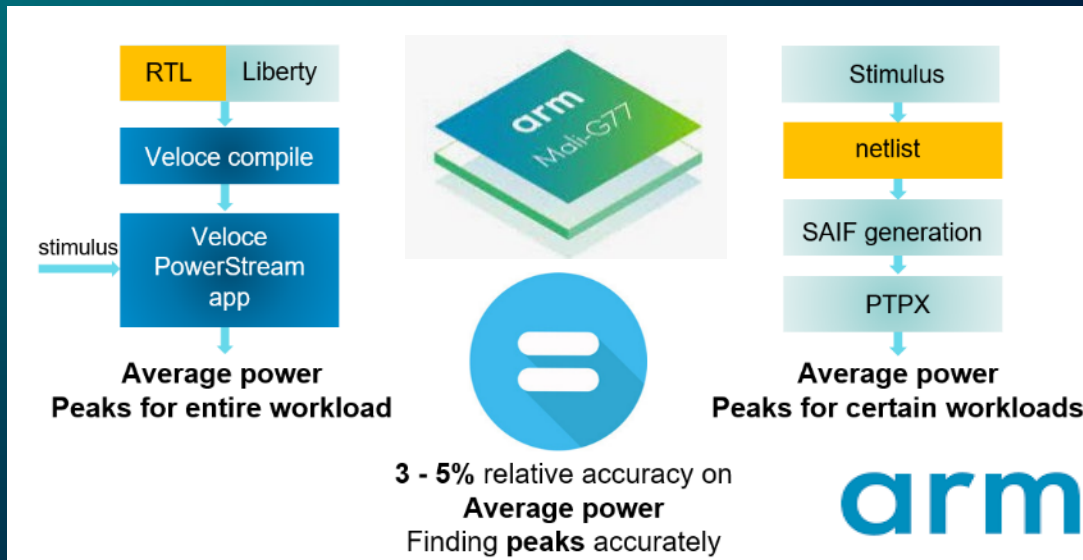


CGE instance3



CGE instance1

Accuracy is always a requirement



Veloce power app is a key instrument for below use cases:

- Finding peaks
- IR drop analysis → Leveraging power data for packaging guidance
- De-peaking

Emulation based power analysis address some of the challenges

- Faster TAT for activity generation & analysis
- Faster & accurate power calculation between emulator & power analysis

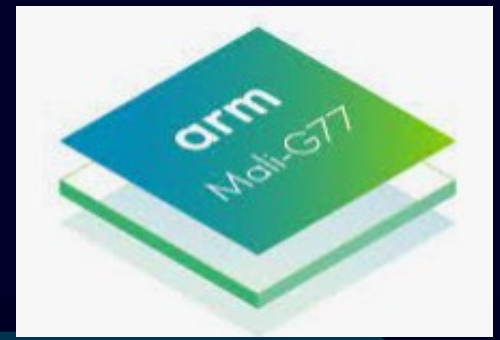
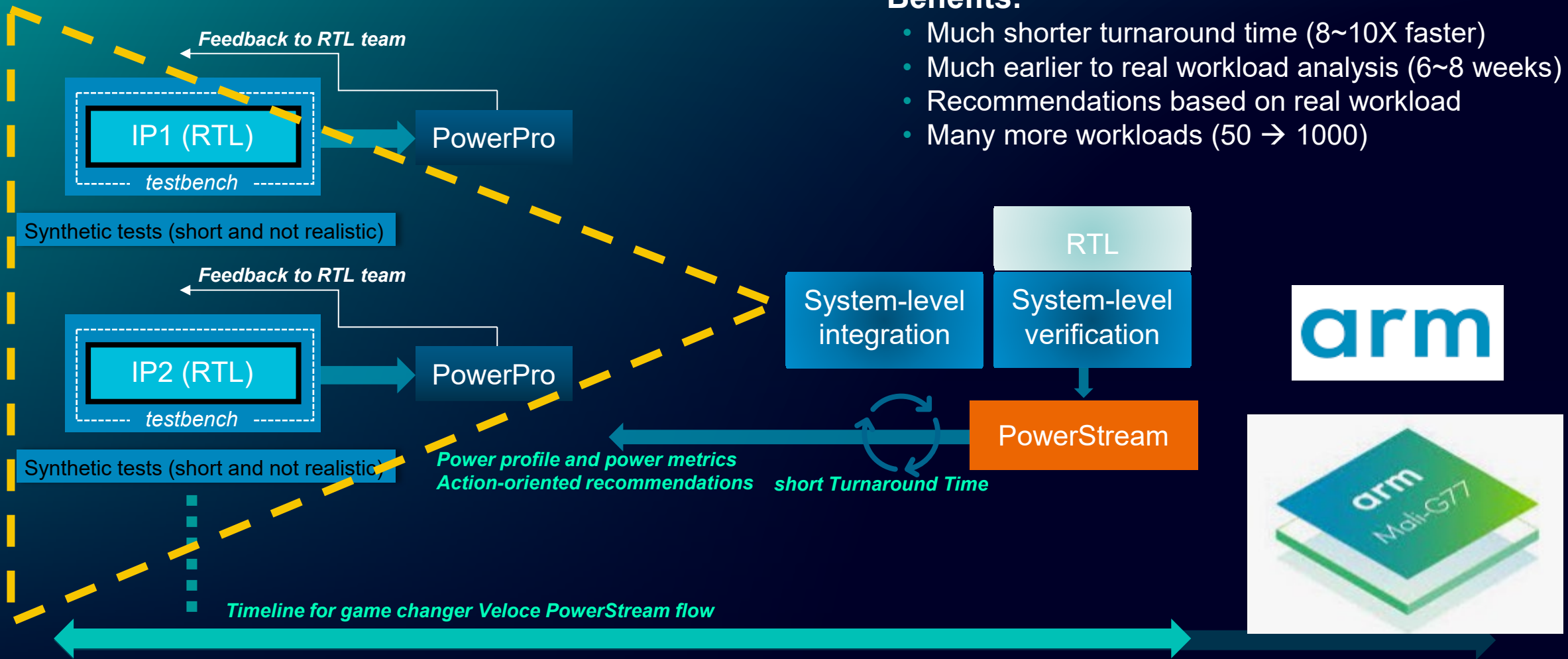


Companies with accuracy requirements for early RTL power analysis

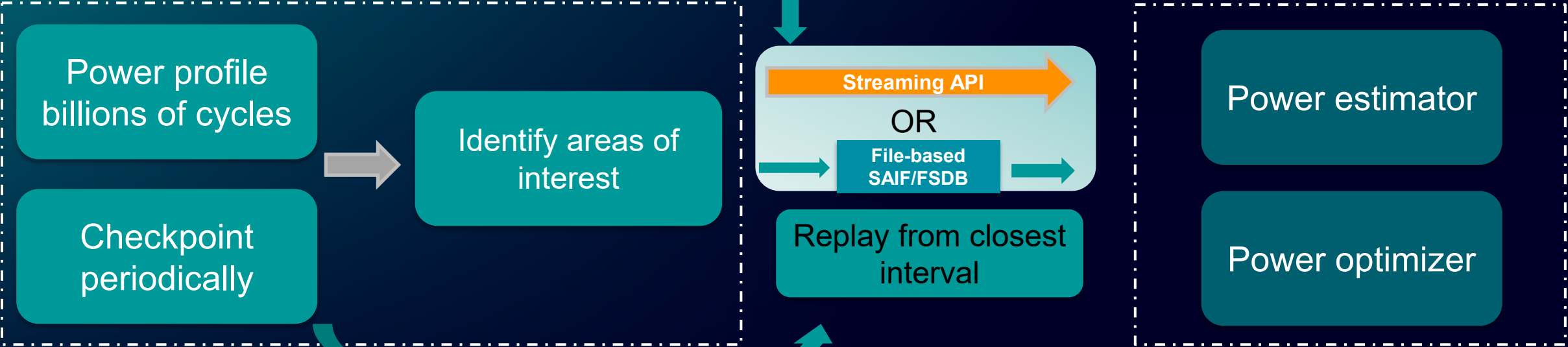
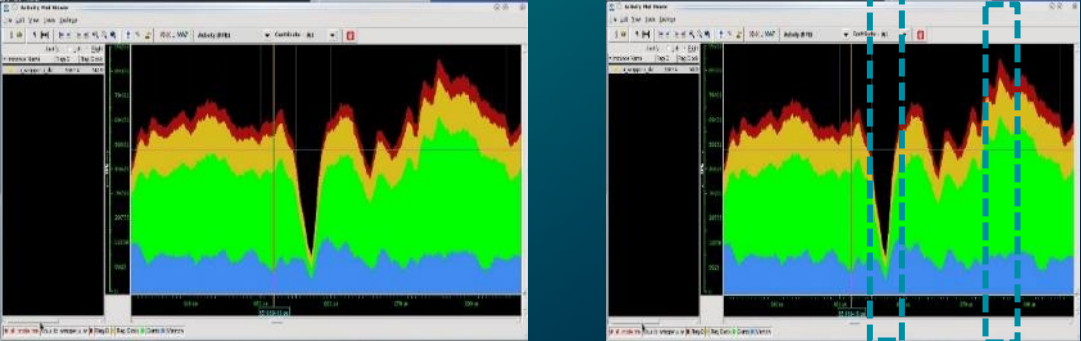
Veloce PowerStream is a game changer: SPEED disproportionately matters

Benefits:

- Much shorter turnaround time (8~10X faster)
- Much earlier to real workload analysis (6~8 weeks)
- Recommendations based on real workload
- Many more workloads (50 → 1000)



Power journey: billions of cycles to detailed power data on interesting areas



Veloce PowerPro differentiated solution

Delivers high performance for virtually unlimited capacity through design partitioning

Traditional file-based flow

VS

Streaming API based flow with Power Tools

Faster

Smaller disk space

Entire workload

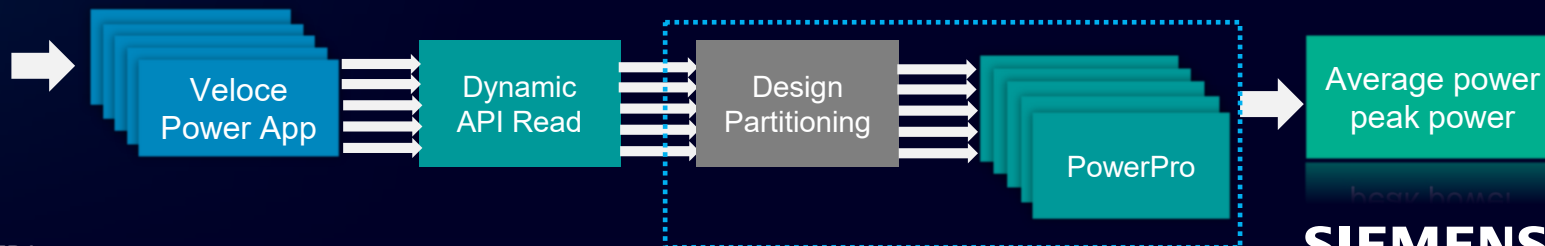
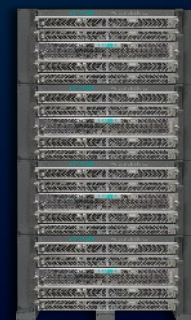
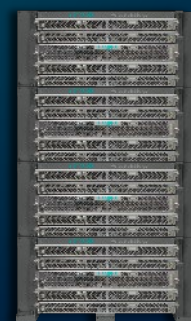
VS

Streaming API based flow with PowerPro

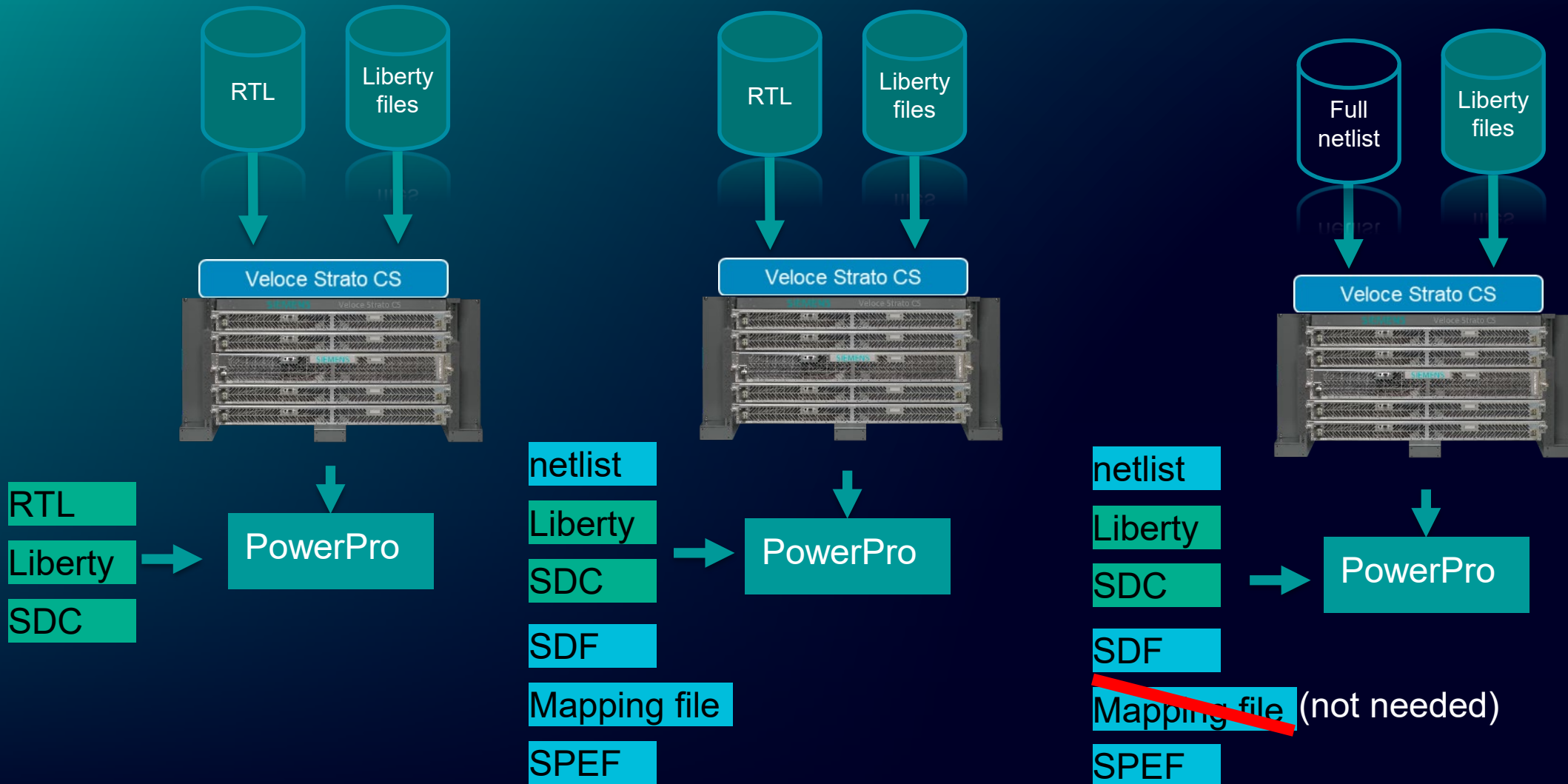
Faster

Virtually unlimited capacity

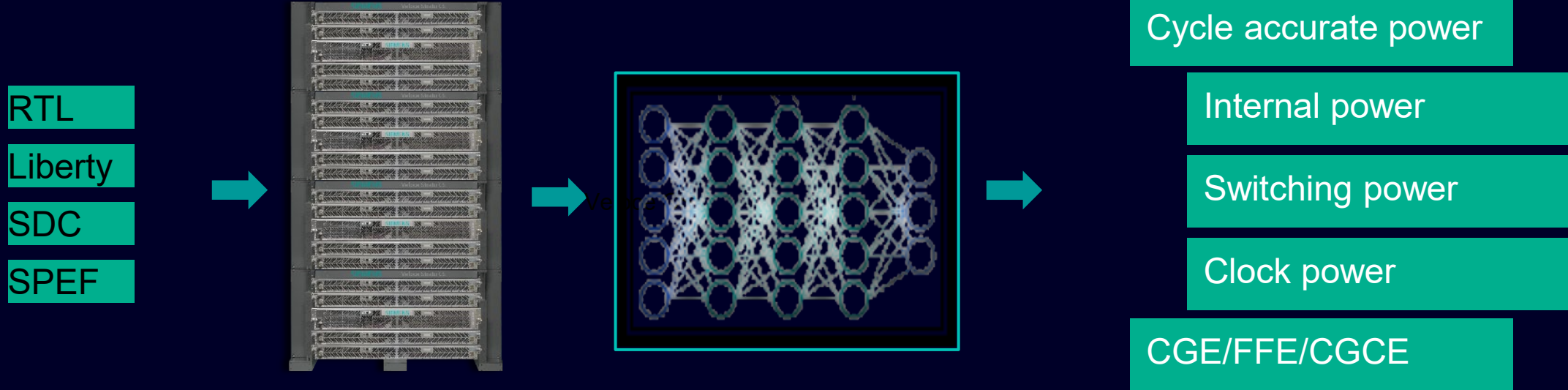
Entire workload



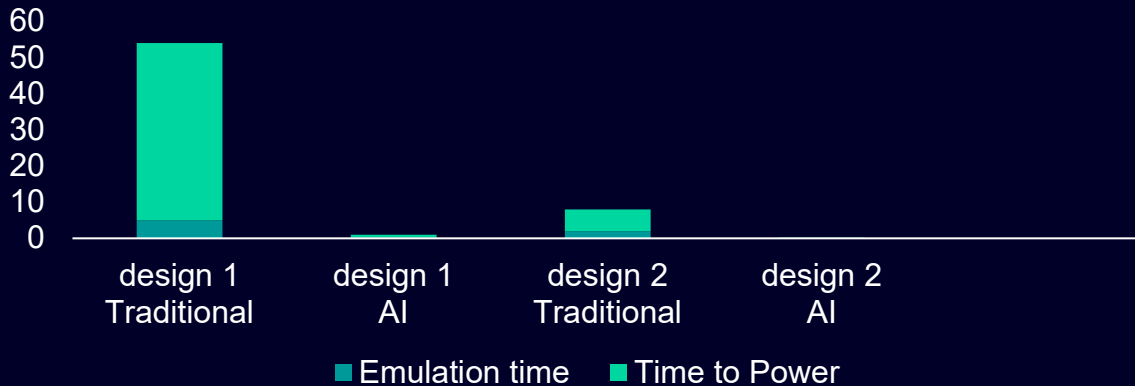
Velocite Power App + PowerPro provides versatility for different phases of the design cycle



Veloce is using AI to solve AI power challenges



Emulation Time and Time to power comparison with traditional flow



Emulation time reduction ~10x

Time to power reduction ~ 100X

Accuracy more than 95%

Training is needed once per RTL release

MUST: Early power analysis with real workloads!



Power analysis needs to be performed as early as possible with real workload



Highly configurable platforms will provide missing pieces to enable real workload analysis in early design cycle



Running 100s of benchmarks early in the design cycle is possible and essential!

Power impacts: What you can do...

Data centers could consume 20% of total electricity by 2030



....or we can reduce that with effective power management

Thank you

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