

The background of the slide is a complex digital visualization. It features a dark blue space filled with numerous small, glowing yellow and green triangles that form a grid-like pattern, suggesting a data network or a digital landscape. In the lower right foreground, there is a 3D rendering of a globe showing the Earth's continents and oceans. A lush green tree with dense foliage is growing out of the top of the globe. The overall aesthetic is high-tech and futuristic, with a focus on digital connectivity and environmental sustainability.

SEMICON Europa – ITF WORLD

The Journey to Sustainable Design

Karna Nisewaner

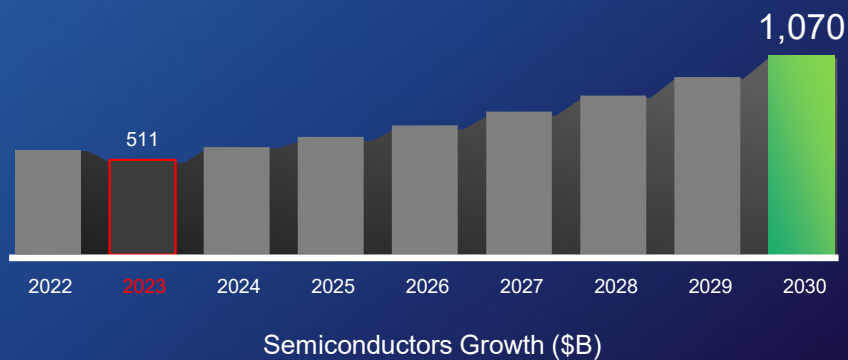
General Counsel and Corporate Secretary
Cadence Design Systems, Inc
November 14, 2023

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Semiconductor Growth Could be Constrained by Available Power

Semiconductors

\$1 Trillion



Source: IBS Market Forecast, June 2023

Projected Datacenter Electricity Demand

Power Gap

2.3%

Global Electricity Generation

Source: Enerdata, 2022

Cadence Climate Action Efforts from In-House to Supply Chain

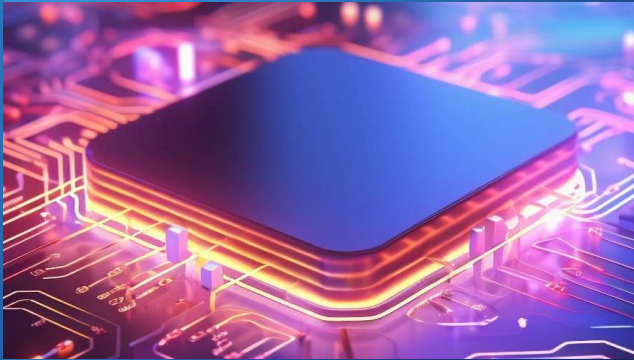


Supply Chain Sustainability Impact Requires Collaboration



Our Tools Enable Design of More Sustainable Products

Digital Design



Up to **30%** total power savings at the chip level

AI-Driven Chip Design



Up to **35%** further savings in total power from AI

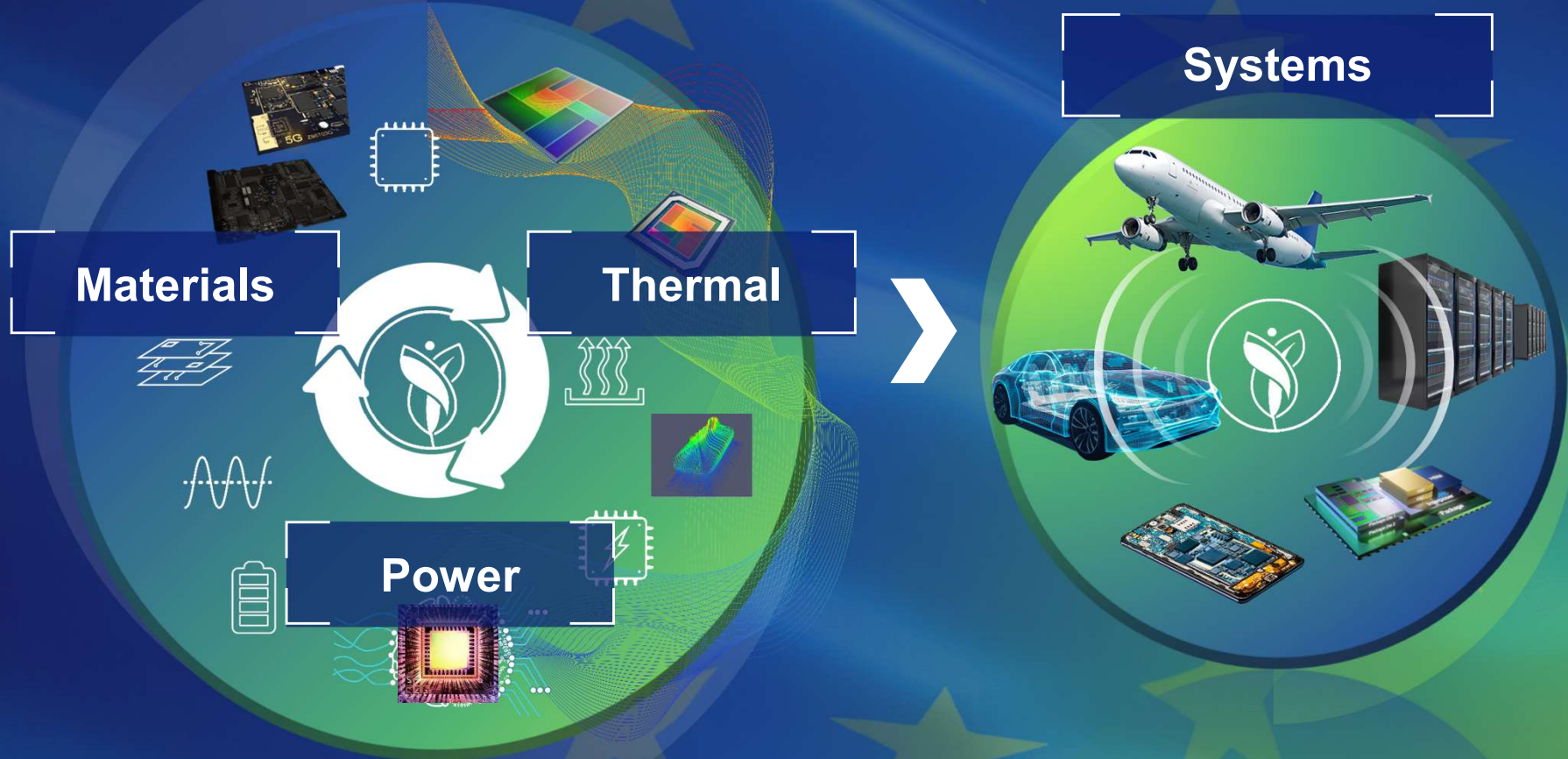
Emulation Capacity



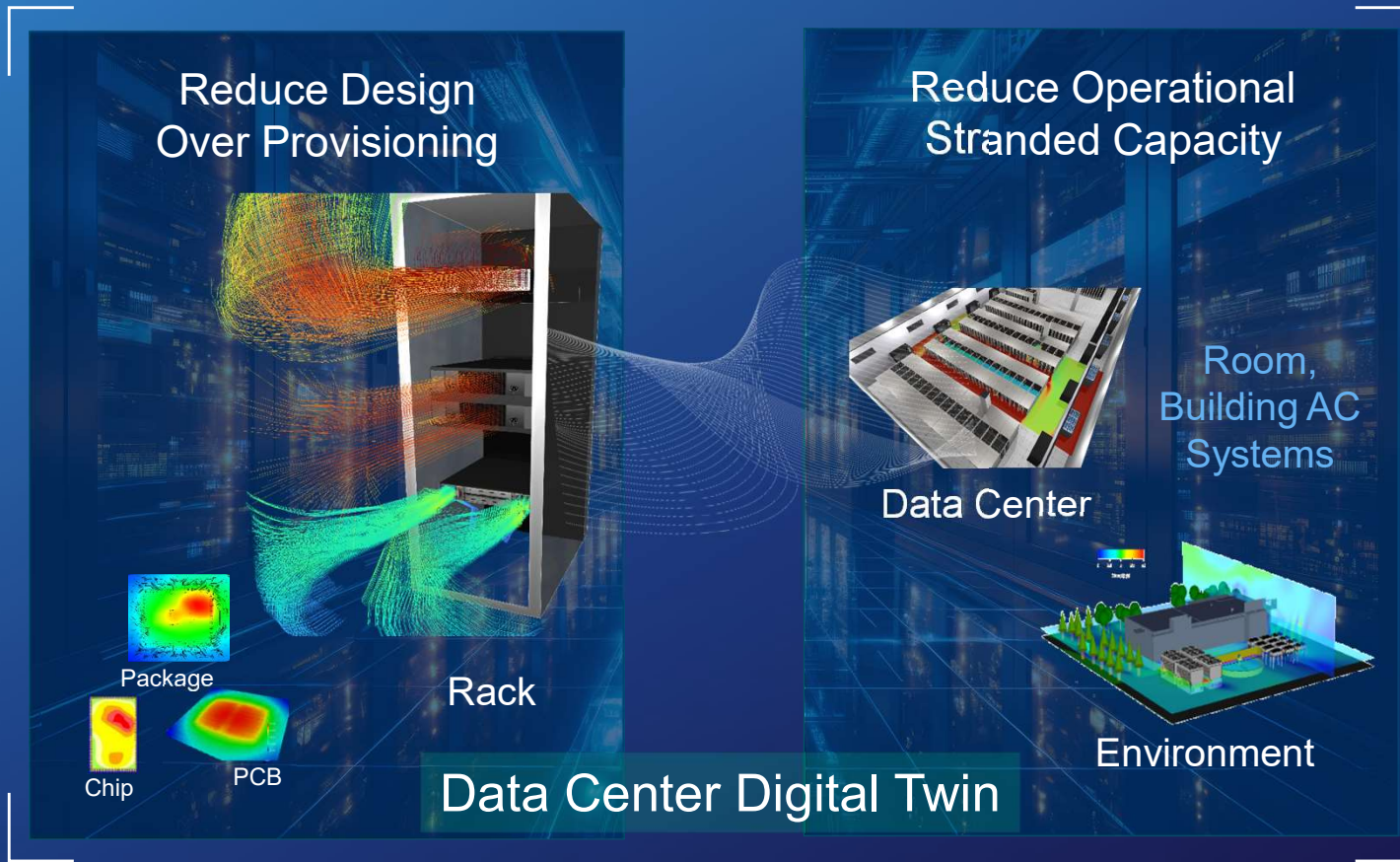
Over **40%** improvement in watts/million gates between architecture generations

* Results may vary

Holistic Systems Analysis for Sustainable Design



Minimize Datacenter Over Provisioning and Stranded Capacity



Can reduce stranded capacity from typical 30% down to 10%

CFD on GPU for Accelerated and Sustainable Throughput

9X

Throughput or \$ Savings
GPU vs CPU

17X

Less Energy
GPU vs CPU

GPU Acceleration: A Tipping Point for High-fidelity CFD



NVIDIA
A100 HGX

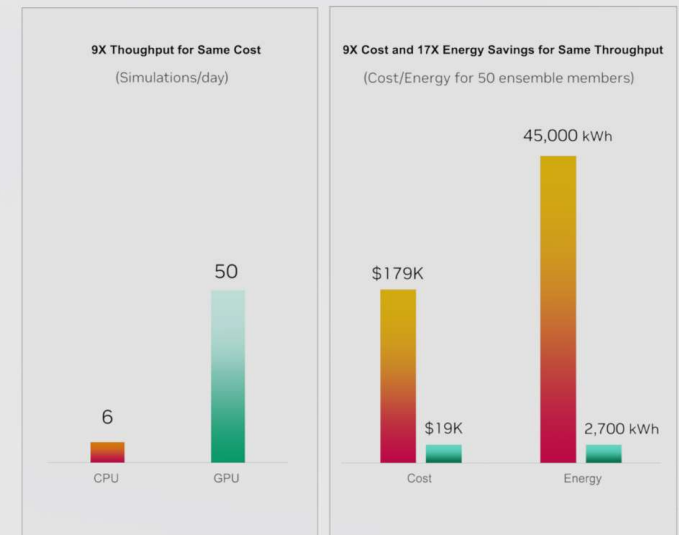
GPU acceleration is transforming high-fidelity CFD

9x throughput for the **SAME cost** of CPU*

9x lower cost and **17x less energy** for the **SAME throughput** of CPU*

NVIDIA's mature SDKs have been critical in supporting this transformation
Impacting designs in aerospace, automotive, and many other industries

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*Basis: CFD reacting compressible charLES solver on 50M cell grid running for 50ms per case.
Hardware: CPU: c6a.32xlarge AMD Epyc Gen2, GPU p4d.24xlarge 8 x NVIDIA A100 GPU

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Jensen Huang, CEO, NVIDIA, GTC Keynote – “Application Acceleration”

System Design and Sustainability Industry Collaborations

Automotive Efficiency and Performance



Hyperscale Datacenter Liquid Cooling Study



Sustainable Stadium Operations



Cadence Opportunities Around Sustainability



**AI-driven Low Power
Chip, PCB, and
System Design Tools**

This image shows a close-up of a circuit board with a microchip, overlaid with a glowing blue and green digital pattern, representing AI-driven design tools.



**Chip to System
Simulation to Reduce
Thermal Generation
and Cooling Energy**

This image shows a 3D wireframe model of a car, overlaid with a colorful thermal simulation mesh, representing simulation tools for reducing thermal generation and cooling energy.



**Digital Twins to
Reduce Data Center
Over Provisioning and
Stranded Capacity**

This image shows a server rack in a data center, overlaid with a green digital grid pattern, representing digital twins for reducing data center over provisioning and stranded capacity.

Optimize power consumption to reduce carbon footprint

Cadence is Building the Future of Sustainable System Design



**Low Power
Design**



**Thermal
Efficiency**



**Energy
Optimization**



The Cadence logo is centered on a blue gradient background. It features the word "cadence" in a white, lowercase, sans-serif font. A small red rectangular bar is positioned above the letter "a". A registered trademark symbol (®) is located to the upper right of the letter "e".

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