



HYPERION RESEARCH

Sustainability: No Longer a “Nice-to-Have”

ISC

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Upcoming and Future Systems

Power considerations of future systems are becoming more important to user sites

- **As the high end of the HPC space continues to plan and deploy larger systems, the power envelopes of those systems increases significantly**
 - GPUs draw more power than CPUs
 - CPUs and GPUs are increasing in power requirements
 - More racks are being installed
- **Frontier, as an example, anticipated to be a 20MW system, while Aurora has been discussed approaching 60MW**
- **Countries with tighter restrictions on power are looking at different approaches to leadership-class HPC systems**
 - LUMI – feeding back power to the local city
 - More power-efficient processors

Rising Power Envelopes of Chips

Chips getting hotter and drawing more power

- **New NVIDIA Hopper architecture GPUs have increased power envelopes north of 500 watts, the highest end topping out at 750 watts**
- **CPUs from Intel and AMD both top 200 watts at the high end of their respective CPU lines**
- **What does this boil down to?**
 - A rising need for liquid cooling in dense systems
 - A growth of power-efficient processor alternatives
 - Arm, RISC-V, ASICs, etc.
 - The European Processor Initiative highlights potential power efficiency as key pillar of development
 - Geographic-centric considerations for future systems
 - Cost of power
 - Access to power
 - Power consumption impacting local communities

The Carbon Offset of AI

Is the juice worth the squeeze?

- **Despite the growing power envelopes of major HPC systems, they continue to be built**
 - Not only is it about the power in, but also the carbon out
 - How can renewable energy sources help this?
- **The focus becomes an analysis of the trade off between running the system (and the power associated with that) and the impact of the work**
 - How can AI models be trained more efficiently to reduce their carbon impact on the globe?
 - Is the Green500 (or benchmarks like it) going to become a new critical component to system ranking and design?
- **There is a growing difficulty of monitoring the issue of carbon footprint with more systems moving fully or partially to cloud**

Addressing Carbon Outputs

US DOE announces MPC4Mfg to help optimize energy output of manufacturing organizations

- **Earlier this month, the US Department of Energy released a solicitation, HPC4Mfg for projects in the manufacturing sector:**
 - The goal: to use HPC to reduce the carbon footprint and improve efficiency of operations
 - The DOE allocated \$3 million USD towards these projects
 - Funds awarded will support compute cycles on national lab systems
- **“The advanced modeling, simulation, and data analysis capabilities of these supercomputers will help manufacturers identify the most effective ways to improve performance, increase energy efficiency, and cut emissions across the industrial sector”¹**

For more information about the HPC4Mfg: <https://hpc4energyinnovation.llnl.gov/>

Who Can Improve Sustainability?

Efficient business practices = less power waste

- **Business Analysts**
 - What is the optimized frequency of running applications to provide business value and save cost/power?
- **HPC Architects**
 - Resource optimization
 - Containerization
- **Site Planners**
 - Thorough evaluation of the impacts to the power supply infrastructure and local communities
 - Proper assessment of impact to adjacent ecosystems of the excess heat and noise produced by HPCs
- **Executives**
 - Plan to recycle components of HPCs at the end of life
 - Sensible identification of workloads that require HPCs

Continue the conversation



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Our ISC22 Briefing Agenda

All registered attendees will receive the slide deck

- **Market Update and Forecasts**
- **Some Perspectives on European HPC**
- **Sustainability: No Longer a "Nice to Have"**
- **HPC and AI Talent Challenges**
- **Exascale Update**
- **Cloud Update**
- **Quantum Update**
- **AI Update**
- **Update on Storage & Interconnects**
- **Conclusions and Wrap-up**