

# HotCarbon '25 Program

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Thursday, July 10 & Friday, July 11, 2025 – Cambridge, MA

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## Day 1 – Thursday, July 10, 2025

**9:00–9:15**

**Welcome & Opening Remarks**

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**9:15–10:00**

**Keynote: The Interplay between AI and Electric Power Systems**

Le Xie (Harvard)

This presentation examines two primary dimensions of the evolving interplay between artificial intelligence (AI) and power systems. First, AI's increasing electricity demand poses both short-run operational and long-run planning challenges, making it necessary to reform and modernize the existing electric grid. Second, new AI capabilities present an unprecedented opportunity to enhance the efficiency, reliability, and adaptability of power systems, from real-time grid control to long-term expansion planning.

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**10:00–10:15**

**Coffee Break**

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**10:15–11:00**

**Session 1: Data Center Sustainability & Thermal Management**

- Data Centers Carbon Emissions at Crossroads: An Empirical Study
  - A Thermal-aware Workload Scheduler for High-performance LLM Inference in Cooling-regulated Datacenters
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**11:00–12:20**

**Session 2: Hardware & Manufacturing Impact**

- Wafer-Scale Systems: A Carbon Perspective
  - When Servers Meet Species: A Fab-to-Grave Lens on Computing's Biodiversity Impact
  - Dirty Bits in Low-Earth Orbit: The Carbon Footprint of Launching Computers
  - Re-Evaluating Storage Carbon Emissions In Machine Learning Workloads
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**12:20–13:45**

**Lunch**

Taking place in parallel

**Graduate Student Forum**, organized by Jennifer Switzer (UC San Diego)

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**14:00–15:00**

**Session 3: Edge Computing & Distributed Systems**

- From Component to System: Rethinking Edge Computing Design Through a Carbon-Aware Lens
- Towards Decentralized and Sustainable Foundation Model Training with the Edge
- Towards Performance and Energy Aware Kubernetes Scheduler

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**15:00–15:30**

**Coffee Break**

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**15:30–16:50**

**Session 4: LLM Efficiency & Carbon Impact**

- LLMCO2: Advancing Accurate Carbon Footprint Prediction for LLM Inferences
- Energy Efficient or Exhaustive? Benchmarking Power Consumption of LLM Inference Engines
- Is Chiplet the Key to Greener AI Accelerators? A Quantitative Benchmarking of Real Chiplet Architectures
- The Utilization Fallacy and the Real Drivers of Carbon-Efficient Inference Serving

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## Day 2 – Friday, July 11, 2025

**9:00–9:05**

**Welcome & Opening Remarks**

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**9:15–10:00**

**Keynote: Carbon Negative Datacenters Require a Marathon, Not a Sprint**

Daniel S. Berger (Microsoft)

Large cloud providers like Google and Microsoft promise significant carbon emission reductions over the next five years. Drawing on my experience prototyping and deploying sustainable cloud building blocks, this talk offers a practitioner's view on our progress and the challenges ahead. While we have key wins and learnings, achieving sustainable cloud computing requires a holistic strategy since no single aspect dominates a cloud's carbon emissions.

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**10:00–10:15**

**Coffee Break**

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**10:15–11:15**

**Session 5: Infrastructure & Long-term Sustainability**

- Carbon Topography Representation: Improving Impacts of Data Center Lifecycle
- Uncertainty-aware Day-ahead Datacenter Workload Planning with Load-following Small Modular Reactors
- Not All Water Consumption Is Equal: A Water Stress Weighted Metric for Sustainable Computing

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**11:15 – 12:15**

**Interactive Posters & Discussion Session**

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**12:15 – 13:00**

**Lunch**

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**13:00 – 14:00**

**Session 6: Causal Modeling & Resource Optimization**

- Causal Machine Learning Approaches for Modelling Data Center Heat Recovery: A Physical Testbed Study
  - Noise-aware Client Selection for Carbon-efficient Federated Learning via Gradient Norm Thresholding
  - User Tolerance as a Factor in Sustainable Website Design
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**2:00 – 2:25**

**Coffee Break**

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**2:25 – 3:10**

**Open Discussion: Can Cloud Computing Escape the Jevons Paradox**

Prateek Sharma (Indiana University)

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**3:10 – 3:20**

**Closing Remarks**

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