HotCarbon ’25 Program

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

Day 1 – Thursday, July 10, 2025

9:00–9:15
Welcome & Opening Remarks

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.

10:00–10:15
Coffee Break

10:15–11:00
Session 1: Data Center Sustainability & Thermal Management

- Data Centers Carbon Emissions at Crossroads: An Empirical Study
  Diptyaroop Maji (University of Massachusetts, Amherst); Walid Hanafy, Li Wu, David Irwin, Prashant Shenoy (University of Massachusetts Amherst); Ramesh Sitaraman (UMass Amherst & Akamai Tech)
- A Thermal-aware Workload Scheduler for High-performance LLM Inference in Cooling-regulated Datacenters
  Rui Lu, Dan Wang (The Hong Kong Polytechnic University)

11:00–12:20
Session 2: Hardware & Manufacturing Impact

- Wafer-Scale Systems: A Carbon Perspective
  Alicia Golden, Mariam Elgamal (Harvard University); Abdulrahman Mahmoud (MBZUAI); Gage Hills (Harvard University); Carole-Jean Wu (FAIR at Meta); Gu-Yeon Wei, David Brooks (Harvard University)
- When Servers Meet Species: A Fab-to-Grave Lens on Computing's Biodiversity Impact
  Tianyao Shi, Ritbik Kumar, Inez Hua, Yi Ding (Purdue University)
- Dirty Bits in Low-Earth Orbit: The Carbon Footprint of Launching Computers
  Robin Ohs, Gregory F. Stock, Andreas Schmidt, Juan A. Fraire, Holger Hermanns (Saarland University)

- Re-Evaluating Storage Carbon Emissions In Machine Learning Workloads
  Dorota Kopczyk, Abhishek Chandra (University of Minnesota - Twin Cities)

12:20 – 13:45
Lunch

> Taking place in parallel
> **Graduate Student Forum**, organized by Jennifer Switzer (UC San Diego)

14:00 – 15:00
Session 3: Edge Computing & Distributed Systems

- From Component to System: Rethinking Edge Computing Design Through a Carbon-Aware Lens
  Xuesi Chen (Cornell Tech); Ariel Goldner (Columbia University); Eren Yildiz (Georgia Institute of Technology); Ilan Mandel (Cornell Tech); Tingyu Cheng, Josiah Hester (Georgia Institute of Technology); Udit Gupta (Cornell Tech)
- Towards Decentralized and Sustainable Foundation Model Training with the Edge
  Leyang Xue (The University of Edinburgh); Meghana Madhyastha, Randal Burns (Johns Hopkins University); Myungjin Lee (Cisco Research); Mahesh Marina (The University of Edinburgh)
- Towards Performance and Energy Aware Kubernetes Scheduler
  Han Dong (Hamilton College); Parul Singh (Red Hat Inc.); Yara Awad (Boston University); Felix George (IBM Research - India); Krishnasuri Narayanam (IBM Research); Sanjay Arora (Red Hat Inc); Jonathan Appavoo (Boston University)

15:00 – 15:30
Coffee Break

15:30 – 16:50
Session 4: LLM Efficiency & Carbon Impact

- LLMCO2: Advancing Accurate Carbon Footprint Prediction for LLM Inferences
  Zhenxiao Fu, Fan Chen (Indiana University Bloomington); Shan Zhou, Haitong Li (Purdue University); Lei Jiang (Indiana University Bloomington)
- Energy Efficient or Exhaustive? Benchmarking Power Consumption of LLM Inference Engines
  Chenxu Niu (Texas Tech University); Wei Zhang (Lawrence Berkeley National Laboratory); Yongjian Zhao, Yong Chen (Texas Tech University)
- Is Chiplet the Key to Greener AI Accelerators? A Quantitative Benchmarking of Real Chiplet Architectures
  Yuhan Sun, Jiacong Sun, Xiaoling Yi, Marian Verhelst (KU Leuven)
- The Utilization Fallacy and the Real Drivers of Carbon-Efficient Inference Serving
  Prasoon Sinha, Dimitrios Liakopoulos, Ruihao Li, Neeraja J. Yadwadkar (University of Texas at Austin)

Day 2 – Friday, July 11, 2025

9:00 – 9:05
Welcome & Opening Remarks

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.

10:00 – 10:15
Coffee Break

10:15 – 11:15
Session 5: Infrastructure & Long-term Sustainability

- Carbon Topography Representation: Improving Impacts of Data Center Lifecycle
  Olivier Weppe (Univ. Rennes, INSA Rennes, CNRS,IETR - UMR 6164 F-35000 Rennes); David Bekri (HES-SO Fribourg); Thibaut Marty (Univ. Rennes, INSA Rennes, CNRS,IETR - UMR 6164 F-35000 Rennes); Loïc Guibert (HES-SO Fribourg); Louise Aubet (Resilio); Jean-Christophe Prévotet, Maxime Pelcat (Univ. Rennes, INSA Rennes, CNRS,IETR - UMR 6164 F-35000 Rennes); Sebastien Rumley (HES-SO Fribourg)
- Uncertainty-aware Day-ahead Datacenter Workload Planning with Load-following Small Modular Reactors
  Yijie Yang, Dan Wang (The Hong Kong Polytechnic University); Jian Shi (University of Houston); Chenye Wu (The Chinese University of Hong Kong - Shenzhen); Zhu Han (University of Houston)
- Not All Water Consumption Is Equal: A Water Stress Weighted Metric for Sustainable Computing
  Yanran Wu, Inez Hua, Yi Ding (Purdue University)

11:15 – 12:15
Interactive Posters & Discussion Session

12:15 – 13:00
Lunch

13:00 – 14:00
Session 6: Causal Modeling & Resource Optimization

- Causal Machine Learning Approaches for Modelling Data Center Heat Recovery: A Physical Testbed Study

David Zapata Gonzalez, Marcel Meyer, Oliver Müller (Paderborn University)

- Noise-aware Client Selection for Carbon-efficient Federated Learning via Gradient Norm Thresholding
  Patrick Wilhelm, Inese Yilmaz, Odej Kao (Technical University Berlin)
- User Tolerance as a Factor in Sustainable Website Design
  Grace Everts, Arthi Padmanabhan (Harvey Mudd College)

2:00 – 2:25
Coffee Break

2:25 – 3:10
Open Discussion: Can Cloud Computing Escape the Jevons Paradox

Prateek Sharma (Indiana University)

3:10 – 3:20
Closing Remarks
