

WORKSHOP AI AND ENERGY

Fondazione Bruno Kessler Via Sommarive 18, Povo – Trento (Italy) Conference Room "Luigi Stringa"

FRIDAY, FEBRUARY 28, 2025

Artificial Intelligence systems, especially systems based on Large Language Models and generative systems with systemic impact, such as ChatGPT will direct new models of development, the creation of new families of services, push, already do, the production and use of hardware different from what is available today on our computing systems. This will happen if their deployment is economically, energetically and environmentally sustainable.

The topic of AI and energy is being increasingly debated in this period. It is not easy to understand whether the introduction of AI will have as a critical point of concern energy sustainability in a model that already sees a growing trend in data center energy requirements also due to the increasing volume of data generated (example from IoT systems) but not only. There are many factors to consider, from hardware production (more and/or different?) to the implementation of new services and consequent ability of AI systems to penetrate the market.

This workshop compares different perspectives, to understand whether the energy consumption of AI systems can become a critical issue, considering that there are other items of global power consumption far more impactful in quantitative terms. The question is whether it is appropriate to think already now about more efficient AI models and architectures, what theoretical guidelines, national and European policies, and concrete actions are being put in place.

Workshop structure

Target of the workshop are researchers and expert in AI sector. The workshop will be organized in three main sessions:

"General Overview" session: world consumption in various sectors and sources of supply. What energy sources are used, how much is consumed, and how sustainable is it? How much does ICT/AI contribute to the overall context? What opportunities are there for rationalization/management?

"Research and Innovation" session: AI system consumption and energy efficiency strategies. What are the factors that need to be evaluated? How is the consumption of an AI model calculated? What strategies are being studied and researched?

"In operation" session: concrete needs and actions by service and infrastructure providers. How do companies/entities implementing and using ICT assets act to develop LLM-based services from an energy perspective (needs estimation and infrastructure design)?



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Opening

9:00 – 9:30 **Paolo Traverso** (FBK, Strategic Planning) **Stefano Micocci** (FBK, Strategic Planning)

"General Overview" session: world consumption in various sectors and sources of supply (Chair: Giuliano Muzio, FBK Chief Corporate Relationship Officer)

- 9:30 10:20 **Nicola Armaroli** (Research Director at CNR-ISOF Istituto per la sintesi organica e la fotoreattività) "The present and future of energy supply: perspectives and challenges"
- 10:20 11:00 **Luigi Crema** (Director Center Sustainable Energy, FBK) "Global challenges of the Energy sector to meet the Net Zero Carbon at 2050"
- 11.00 -11:30 Coffee Break

"Research and Innovation" session: AI system consumption and energy efficiency strategies (Chair: Leonardo Gasparini, Head of the IRIS unit, FBK Center for Sensors & Devices)

- 11:30 -12:20 **Patricia Lago** (Director of the Digital Sustainability Center at Vrije Universiteit Amsterdam) "AI Beyond the Hype: a software engineering perspective"
- 12:20 -13:00 Allegra De Filippo (Researcher at Univ. of Bologna) "Monitoring Carbon Footprint for Energy Efficient AI: a case study on Recommender Systems"
- 13:00 -14:30 Lunch Break

"In operation" session: concrete needs and actions by service and infrastructure providers (Chair: Fabio Pianesi, FBK Distinguished Fellow)

- 14:30 -15:10 **Gabriella Scipione** (Head of the data management HPC of CINECA) "AI Factories: the convergence between HPC and AI"
- 15:10-15:50 **Roberto Loro** (Director Technology & Innovation Dedagroup S.p.A. and Intacture/Trentino DataMine) "Intacture: Pioneering Sustainable AI from the (Under)Ground Up"
- 15:50 -16:30 Elisabetta Farella (Head of the Energy Efficient Embedded Digital Architectures research unit, FBK) "AI in Tiny Devices - An Energy Efficiency Challenge"

Closing