Academic Research | Italy

Scaling scientific discoveries sustainably

ENEA

In Italy, researchers at ENEA are working with international peers to make new discoveries in energy and environmental sustainability. To enable researchers to run larger simulations and analyze bigger datasets, the organization boosts its supercomputing power by 350% with a brand-new cluster built on Lenovo ThinkSystem SD650 V3 nodes powered by 5th Gen Intel® Xeon® Scalable processors with Lenovo Neptune® Liquid Cooling. **That's the power of Lenovo with Intel Inside®.**

1 Customer background

Who is ENEA?

In Italy, the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) is a public research body driving innovation in energy, the environment, and sustainable economic development. Founded in the 1960s, ENEA supports enterprises and government bodies through advanced laboratories, technology transfer, and strategic research. ENEA is the institutional and technical scientific point of reference of the Italian Ministry of the Environment and Energy Security.

The organization’s key focus areas include renewable energy, nuclear fusion, energy efficiency, and the transition to a circular economy. To enable researchers working at sites across Italy to perform their work, ENEA operates CRESCO—a shared high-performance computing (HPC) infrastructure.

2 The challenge

The CRESCO supercomputer supports a large and diverse group of research activities. As demand for increasingly complex research workloads continued to grow—including AI, advanced numerical simulations, climate modeling, and fusion energy research—ENEA needed significantly greater HPC capacity to support its expanding scientific community.

At the same time, the organization wanted to ensure that increasing compute performance did not come at the expense of higher energy consumption. ENEA therefore sought an HPC platform capable of delivering the performance required for next-generation scientific research while aligning with its sustainability ambitions.

“We wanted to allow our teams to run demanding new workloads, including technologies such as AI. When we evaluated HPC solutions, **energy efficiency was just as important to us as raw performance**; we wanted to ensure that the new platform would align with our **sustainability ambitions**.”

Dr. Giovanni Ponti PhD

Head of Division for Development of Computer Science Systems and ICT, ENEA

3 The solution

Ramping up HPC performance

To expand CRESCO while keeping energy consumption under control, ENEA selected Lenovo to deliver a new generation of high-performance, liquid-cooled HPC infrastructure. Using 758 Lenovo ThinkSystem SD650 V3 nodes powered by 5th Gen Intel® Xeon® Scalable processors and Lenovo Neptune® Liquid Cooling, the organization gains extreme HPC performance within a dense and efficient data center footprint. The 5th Gen Intel® Xeon® Scalable processors deliver trusted performance and exceptional efficiency.

“We carried out a thorough public tender, assessing potential vendors against a balanced set of criteria including performance, cost, and energy efficiency,” explains Dr. Ponti. “Lenovo’s all-Intel solution stood out with its high performance benchmarks and other key areas we were evaluating.”

Hardware

Lenovo ThinkSystem SD650 V3 Neptune DWC Server
5th Gen Intel® Xeon® Scalable processors
Lenovo Neptune® Liquid Cooling

3 The solution

Harnessing the advantages of water cooling

Direct liquid cooling contributed significantly to ENEA's sustainability goals. By removing up to 98% of heat directly from the processors, Lenovo Neptune Liquid Cooling enables ENEA to increase compute performance while significantly reducing the energy required for data center cooling. This allows researchers to run demanding scientific workloads without the thermal limitations and energy overhead associated with traditional air-cooled systems.

Installed by trusted local Lenovo business partner Ricca IT, the new HPC platform was manufactured at Lenovo's European production facility. Alongside the energy-efficiency benefits of Lenovo Neptune Liquid Cooling, building and shipping the system within Europe helped reduce transport-related emissions and further align the deployment with ENEA's sustainability ambitions.

"The Lenovo HPC solution is a total win-win for us in terms of performance and energy efficiency," confirms Dr. Ponti.

“Increasing our computing power while reducing energy consumption is a crucial and complex challenge. Our new Lenovo HPC infrastructure gives us the power to accommodate everything from **advanced numerical simulations to big data analytics and AI**, while significantly improving **energy efficiency in the data center**.”

Dr. Giovanni Ponti PhD

Head of Division for Development of Computer Science Systems and ICT, ENEA

4 The results

Through its collaboration with Lenovo, ENEA has boosted the compute capacity of its CRESCO HPC platform from 2 PFLOPS to 9 PFLOPS—a 350% increase that enables researchers to run larger simulations, analyze more complex datasets, and complete scientific experiments faster, accelerating research across disciplines ranging from fusion energy and climate modeling to AI and bioinformatics.

The new platform, CRESCO8, supports a broad range of research disciplines and is almost always at 100% utilization, as researchers clamor to take advantage of the huge increase in compute performance to accelerate their work.

- 350% increase in HPC performance
- 100% utilization rate
- 5x faster runtime for fusion codes

[1] Data provided by ENEA

4 The results

“Since we went live with the new cluster, our researchers have seen significant improvements in runtimes for their workloads,” says Dr. Ponti. “For example, fusion codes are now running five times faster than before. This allows our teams to perform higher volumes of more complex research.”

> “CRESCO8 will offer all ENEA researchers and research partners the benefits of a next-generation HPC cluster—helping us to respond to the evolving needs of the scientific community, and advance scientific research and innovation in Italy.”

Dr. Giovanni Ponti PhD

Head of Division for Development of Computer Science Systems and ICT, ENEA

Why Lenovo and Intel?

ENEA found the combination of 5th Gen Intel® Xeon® Scalable processors, Lenovo ThinkSystem servers, and Lenovo Neptune Liquid Cooling delivered the optimal balance of price, performance, and energy efficiency.

“We compared CPU benchmarks across a wide range of software tools used by the research community, and the 5th Gen Intel® Xeon® Scalable processors consistently came out on top,” says Dr. Ponti.

He concludes: “As a public institution, we put vendors through a rigorous selection process. Lenovo and Intel emerged from that process as our top choice because of their innovative direct-water cooled solution and superior price/performance ratio.”

How can research organizations accelerate breakthroughs?

With extreme HPC performance powered by 5th Gen Intel® Xeon® Scalable processors and ultra-efficient Lenovo Neptune Liquid Cooling, ENEA is advancing scientific research and innovation in Italy.

Explore Lenovo HPC Solutions

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