



Eni: story of a digital transformation based on skills

The company's digital transformation has reached a crucial milestone with the launch of its new HPC4 supercomputer, giving Eni the world's most powerful computing system in the industrial sector. The CEO, Claudio Descalzi, presented the new system during a meeting organised at Eni's Green Data Center with scientists and company representatives. The supercomputer system will be partially powered by a new photovoltaic plant installed at the centre, the first to become operational within "Progetto Italia".

Ferrera Erbognone (Pavia), 22 February 2018 – Eni has entered a crucial phase in its process of strategic digitalisation - with 150 projects cutting across all business areas and involving over 150 managers. It aims to achieve significant economic and operational benefits in the short and medium term. The company has been on a path of digital transformation for several decades, starting long before the rest of the industry began to talk about the issue. Over time it has managed to transform the need to process large amounts of data into a significant competitive advantage. While technological progress today offers opportunities that were unimaginable until recently, without the right people and skills it would be an unproductive tool albeit an extremely powerful one. Eni's digital transformation is therefore a success story of the integration of people, skills, technology and IT science. It is thanks to this mix that Eni has been able to achieve extraordinary results, such as, for example, the discovery of the Zohr field in Egypt, the largest ever made in the Mediterranean. This is what emerged today during the event "Imagine Energy. Stories of data, people and new horizons", held at Eni's Green Data Center (GDC) in Ferrera Erbognone, which was attended by Eni's CEO, Claudio Descalzi, the Chairman of the Italian National Research Council (CNR), Professor Massimo Inguscio, scientists and representatives of Eni.

Eni's CEO gave an outline of the company's digitalisation process, which began some thirty years ago and has recently reached a fundamental milestone with the introduction, at the

Green Data Center, of a new HPC4 supercomputer, making Eni's computer system the most powerful industrial system worldwide. Eni's digital transformation, which is specifically designed to involve all areas of the company's activities, has wide-ranging transversal objectives. They range from the improvement of the staff's health and safety to a further increase in the plants' level of reliability, operability and technical integrity, with knock-on benefits in terms of both safety and environmental impact; and from a strengthening of economic-operational performance to the development of new business models and the acceleration of decision-making processes, which will become increasingly data-driven. In the long term, this digital transformation is part of a broader process of evolution that will make Eni even more integrated in its processes, as well as increasingly capable of combining emerging digital competences with traditional technical skills, open to innovation, in collaboration with the most advanced technological start-ups, quicker in operational and work processes, and increasingly attractive to young talent.

Eni's first contact with the digital world was with the first powerful computers and proprietary software associated with the calculation and elaboration of enormous quantities of data: those related to exploration, as well as those simulating reservoir fluid dynamics. Subsequently, the company began developing proprietary algorithms in its exploration activities. Since 2000, Eni has rewritten its algorithms, engineering them according to an integrated hardware structure (CPU+GPU) that makes it possible to overcome sequential logic and to work with calculation clusters. In this way, every elaboration is broken down into separate "jobs" that are then recomposed, making it possible to work in parallel and more quickly.

Today, the addition of the HPC4 to Eni's supercomputing system provides the company with a computing infrastructure with a peak capacity of 22.4 Petaflops, or 22.4 million billion mathematical operations per second. But while power and technology, even in their most advanced forms, can provide fundamental competitive advantages, they are unproductive tools without human skills. In fact, Eni's computing infrastructure operates on the basis of a single highly advanced and complex proprietary algorithm ecosystem, created and developed over a decade, and based on the company's experience and know-how, in partnership with some of Italy's most important research institutes. Having a program created and developed internally means having complete control, flexibility and speed, as well as facilitating the continuous development of skills. Eni's supercomputers provide strategic support for the

company's digital transformation process across the entire value chain, from the exploration and development phases of oil and gas fields to the management of big data generated during operations by all of the Group's productive assets (upstream, refining and chemicals).

Eni's supercomputer system is located at its Green Data Center, the home of Eni's digital evolution. It is one of the first in Europe to be of this type and size, and one of the first worldwide in terms of energy efficiency. The GDC is home to a hybrid supercomputing infrastructure that uses half the energy of a traditional system while also reducing CO2 emissions. In particular, a significant breakthrough in terms of energy saving was achieved in 2017 with a PUE score (Power Usage Effectiveness) of 1.175, compared to a global average of 1.8 (EPA, US Environmental Protection Agency figures). Consequently, the quantity of CO2 released into the atmosphere saved in the three-year period 2014-2017 amounted to some 18,000 tons while the electricity saved in the same period was more than 50,000 MWh. To meet the energy requirements of the entire system, Eni has chosen low carbon content solutions and an air, rather than water, cooling system. The infrastructure is supplied by the Enipower thermoelectric power plant, located near the center, and includes a new 1 MW photovoltaic park. This new photovoltaic plant is the first to become operational as part of Eni's "Progetto Italia", which aims to generate energy from renewables at the company's industrial sites. The plant will generate energy that will be entirely consumed by the Green Data Center, meeting more than 15% of the HPC4's energy requirements.

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