TECHNOLOGICAL DEVELOPMENT

Research and Development (R&D) is a **key element for Eni's transformation** into an integrated energy company for a low-carbon future. The availability and development of cutting-edge technological expertise at the service of innovation and sustainability and the continuous commitment expanding the areas of application of the energy solutions identified are the common denominator of the activities. Research projects cover every aspect of the production chain, with the aim of reducing risks and increasing efficiency, consolidating technological leadership and generally achieving greater quality, efficiency and sustainability in products, plants and processes. R&D becomes, therefore, the driver to create value, with the aim of minimizing the time to market needed for research to result in the development of technologies and their implementation on an industrial scale.

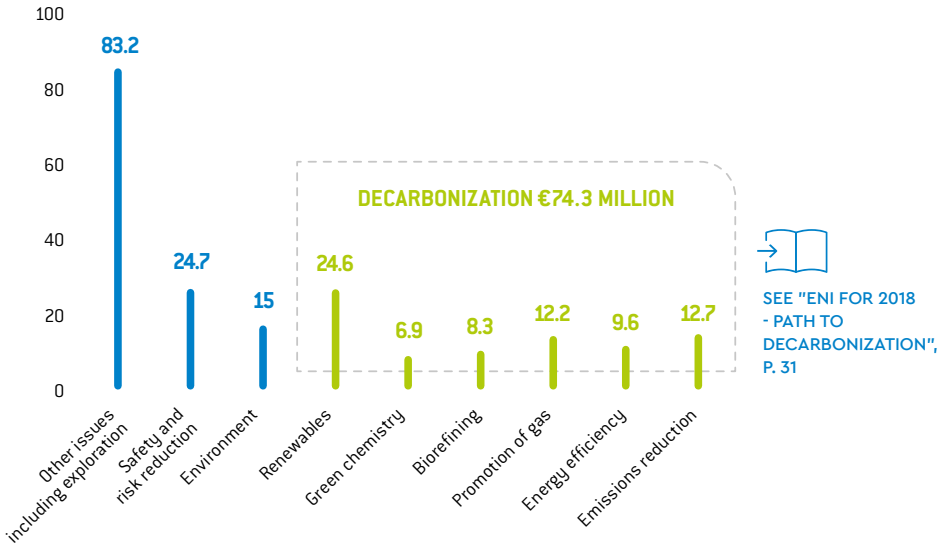
€900 MILLION
PLANNED INVESTMENTS FOR THE 2019-2022 PERIOD

€197 MILLION
TOTAL EXPENDITURE IN R&D IN 2018

7,280
EXISTING PATENTS

13
FIRST PATENT FILINGS ON RENEWABLE SOURCES

R&D expenditure in 2018
(€ million)



SEE "ENI FOR 2018 - PATH TO DECARBONIZATION", P. 31

The R&D objectives are set out in the following strategic guidelines:

SEE "ENI FOR 2018 - PERFORMANCE", PP. 5-6

- → develop key technologies for **asset development**, ensuring the highest level of efficiency, safety and minimum environmental impact, reducing CAPEX, OPEX and time to market activities;
- → **reduce, capture, transform or store CO_2, promote natural gas** by integrating it with renewable energy and developing innovative energy technologies;
- → **reduce the use of raw materials, including through recycling**, transforming waste into products with value added, with a view to development based on the principles of the circular economy.

TANGIBLE VALUE GENERATED BY R&D AND DISSEMINATION OF TECHNICAL KNOW-HOW

€921 MILLION
ECONOMIC BENEFITS FROM THE APPLICATION OF PROPRIETARY TECHNOLOGIES

Eni measures the value generated by applying innovative technologies developed both in-house and with third parties. In 2018, the estimated tangible value generated, i.e. the economic benefits associated with the application of innovative product/process technologies, was €921 million, slightly higher than in 2017, mainly due to the contribution of proprietary software and technologies. Moreover, to enhance internal skills, Eni is committed to spreading technical knowledge across all the functions and also through the Knowledge Management System (#KMS), focusing on two aspects: the quality of shared content and the integration of business lines on technical problem-solving issues.

DIGITALIZATION

The **digital transformation** launched by Eni represents a profound change involving the whole of Company and is based on a process of innovation for the reorganization of operational flows and the redefinition of organizational models. In order for the transformation to be carried out organically, a structured **change management** process is necessary to renew the Company culture and change the traditional approach to work, identifying more flexible and agile paths and adequate tools to involve people rationally and emotionally. Digital transformation is an opportunity for everyone: it allows us to operate with greater safety (see p. 31), provides new ways of working, enhances knowledge, makes us faster, more efficient, more flexible, and more sustainable towards the environment and stakeholders and more competitive within the reference market.

DIGITAL TRANSFORMATION: MAIN RESULTS OF THE YEAR

DIGITAL BUSINESS UNIT	Creation of the Digital Unit to implement the digital transformation at Eni.
DATA SCIENTIST	Recruitment of people with digital skills, also thanks to the relationship with academia.
DIGITAL COMPETENCE CENTER	Creation of the Center to strengthen the systems and methodologies for the inclusion, training and development of new professional roles and to upskill the traditional one.
DIGITAL TRANSFORMATION CENTER	Distance learning online environment for e-skill development and enhancement.
SIX-LEGGED HACKATHON	Launch of Eni's first internal Hackathon for the development of digital innovation ideas.
DIGITIZATION OF THE VIGGIANO OIL CENTER	The first phase of digitization of the plant in Italy has been completed. Eight months of work by multidisciplinary teams made up of data scientists, plant personnel and site personnel using the agile working method. CoVA is Eni's first digitized plant.
DIGITAL TWIN	Reproduction of a "virtual twin": a plant for drilling and HSE operational simulations. The digital twin also enables innovative operational training to be delivered.
CALL FOR INNOVATION	Launch of the first call for innovation for Italian start-ups relating to the digitization of: health and safety projects for Eni people; enhancement of service areas; manuals and integration with digital twins.

THE NEW SUPERCALCOLATOR NAMED HPC4 QUADRUPLES THE CALCULATION POWER OF GREEN DATA CENTER MAKING IT THE MOST POWERFUL IN THE WORLD AT INDUSTRIAL LEVEL.

FOCUS ON

A SUPERCOMPUTER IN THE GREEN DATA CENTER

In January 2018, at the Green Data Center in Ferrera Erbognone, Eni launched the new mainframe called HPC4, quadrupling the power of the entire infrastructure and making it the most powerful in the world at an industrial level.

PROJECT GOALS: accelerate the time-to-market of Eni's projects and optimize field management strategies for all production assets.

RESULTS: Thanks to HPC4 (which has a computing power of 18.6 PetaFLOPS), in May 2018, Eni set a record in the numerical modelling of Oil & Gas fields: in just 15 hours the mainframe performed 100,000 simulations of high-resolution field models, taking into account geological uncertainties.

To perceive the amount of computing capacity achieved by Eni, suffice it to think that HPC3* and HPC4 together reach a peak of 22.4 quintillion operations per second. Thanks to these technological capabilities, Eni can tap the potential of big data acquired through its operational activities.

MORE DETAILS ON ENI.COM

* Supercomputing system already in operation, which is associated with the new HPC4 mainframe.