



The Department of energy technologies and renewable energy sources

The Department of “Energy Technologies and Renewable Energy Sources” carries out research and innovation activities in the field of renewable technologies, such as solar systems with advanced storage systems, photovoltaics, bioenergy, biorefinery, and biofuels; and in the field of energy efficiency and energy end-use technologies, smart cities, energy communities, smart grids, smart sector integration technology; sustainable mobility and transport, carbon capture and utilisation for sustainable fossil energy; hydrogen production, distribution, storage and end-use technologies; electrochemical energy storage for mobile and stationary applications; robotics, ICT and enabling digitisation technologies.

THE STRATEGIC GOALS

- Contribute to energy transition by diversifying energy sources and reducing emissions from and dependence on fossil sources; to decarbonisation by improving and accelerating the use of renewables, and optimising and rationalising energy use and consumption.
- Contribute to increasing the competitiveness of the Italian industry by reducing energy costs and improving the productivity and profitability of energy generation with innovative technologies, processes, products, and services.

The Department has a presence in the main national, European, and world fora. Its activities are prioritized taking into consideration the energy directives of the European Commission, the vision of the SET (Strategic Energy Technology) Plan, of the EERA (European Energy Research Alliance); of the Horizon Europe programme, of Mission Innovation, of the National Energy and Climate Plan 2030, of the National Recovery and Resilience Plan (PNRR), and of the Programme Agreement on research for the national electrical system between ENEA and the Italian Ministry of Ecological Transition. The Department coordinates the National Energy Technology Cluster.

SUPPORT ACTIVITIES FOR THE BUSINESS SECTOR

The Department develops, implements, and transfers technology, methods, materials, processes, and products; carries out the advanced engineering, development, and testing of prototype plants; provides advanced technical services, knowledge, and technology transfer for the development of a sustainable national energy system.



The organization chart

The Director
Giorgio Graditi

500 researchers and engineers structured into six divisions,
one strategic technical support unit, three technical units
and two management and administration units

Techno-scientific area deputy director
Giambattista Guidi

Management and administration area deputy director
Piero Massari

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Our mission

“ENEA is a non-profit public body committed to developing research and innovation technology, and to providing advanced services to businesses, public administration, and citizens, in the fields of energy, environment and sustainable economic development”.

Act 28 December 2015, no. 22

ENEA’s mission is to contribute to increasing the competitiveness of Italy and promoting its sustainable development through research, technology development, and by supporting public administration, businesses, especially SME’s, and citizens.

ENEA is structured into four departments, that carry out research, technology development and advanced services; has 13 research centres in Italy with approximately 2,300 employees, including researchers, technicians, and administration staff.

ENEA has over 50 years’ experience in research and innovation in the fields of energy, new technology, the environment, and sustainable economic development.



ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES,
ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT



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we research innovation



energy technologies

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Renewable sources and smart grids

The Department carries out research, development, engineering and implementation of materials, processes and products for prototype systems in the fields of renewables (solar thermal, photovoltaics, and biomass), smart grid and integrated energy network.

Activities are aimed at developing low and medium-temperature solar thermal technologies, components and systems for high-temperature concentrating solar power plants, thermal energy storage with several media (molten salt mixtures, phase-change materials and low-cost solid materials, etc.), innovative devices and components for photovoltaic power generation, technologies and components for smart and integrated energy networks, techniques and strategies for the management, advanced control and optimization of complex grids and systems, biological processes for the conversion of biomass into energy, and liquid or gaseous fuels.

The Department is also committed to developing projects aimed at energy saving, consumption optimization and improving end users' performance, as well as providing advanced services for grids and to users.

ICT and smart cities and smart communities

The Department develops energy technologies and methods through the implementation of ICT, for the industrial system, public institutions, and citizens. Activities include the design and management of smart buildings and districts, of energy community support platforms, the development of infrastructure for smart cities, including urban networks (such as public lighting, electricity, water and gas), mobility systems, information systems (Smart City Platform), risk prediction and management systems (safety & security, natural disaster risk analysis for critical infrastructures), smart homes, assisted living systems, and the development of energy awareness and interaction with energy grids.

The Department also manages the Agency's high-performance computing infrastructure and data-transmission network; it develops modelling solutions, cloud computing and web-based applications, Big Data and Internet of Things based applications focused on a wide range of issues related to energy and industrial innovation.

Energy and industry decarbonization, energy storage systems, sustainable mobility

The Department develops chemical and electrochemical decarbonization technologies, from materials to processes and prototypes, for the production, conversion, storage, and use of energy. Besides, it carries out studies and develops more efficient low-impact vehicles, along with innovative support tools for the planning, management and operation of transport systems. It designs, realizes, and operates equipment and infrastructures to test innovative and advanced technology, with the support of models and computing codes for dynamic and non-dynamic simulations of components and processes. Finally, the Department develops optic components for a wide range of technology applications.

Solar thermal and smart network

The Division carries out research activities, development and qualification of solar thermal energy technologies, materials, processes and products for power generation, industrial processes heat production. It develops advanced systems for thermal storage to produce solar fuels and hydrogen from thermochemical processes. It investigates distributed power generation through multi-objective Artificial Intelligence techniques and develops methods and technologies for smart grids, and for integrated energy grids and microgrids. It provides advanced technical services to the companies in the sector.

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Photovoltaics and smart devices

The Division carries out activities of research and development, design and realization of materials, devices, processes, products, and demonstrators. It analyses and implements new technologies; it provides advanced technical services to companies and public administration in the areas of photovoltaic energy, agrivoltaics, and devices and sensors for multi-utilities. Its strategic goal is to develop innovative devices, components and systems for photovoltaic generation to foster the growth and competitiveness of the national industry, also through digital PV innovative approaches to achieve grid integration.

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Bioenergy, biorefinery and green chemistry

The Division works in bioenergy, biorefinery and green chemistry to produce heat, electricity, biofuels, liquid and gaseous biofuels, biomaterials, and semi-processed green chemicals. It carries out research aimed at recovering and recycling of residual manufacture by-products, vegetal and agro-industry biomass and waste. Research activities are focused on the development of new sustainable processes and technologies for the conversion into energy and/or fuels of such raw materials through chemical and enzymatic pre-treatments, chemical-catalytic and biotechnological processes. The Division has several pilot facilities as well as chemical, microbiological and molecular biology laboratories.

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Production, storage and consumption of energy

The Division carries out research, innovation and technology transfer for the decarbonization of the energy, residential, industrial, and transports sectors by developing technologies for hydrogen production, distribution, storage and usage and for the production of clean fuels, P2G technology, CCUS, heat pumps, innovative electrochemical storage systems for mobile and stationary applications. It investigates and develops technological solutions and models for sustainable mobility. It also realizes and operates experimental facilities for the demonstration and validation of advanced thermal cycles and fuel cell CHP systems.

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Smart energy

The Division works in the energy end use sector, in urban areas, on the integration of distributed systems for power production, distribution and transmission, on the interconnection of local systems and national energy grids. It bases its methodological approach on a holistic capacity to design systems that from their own innovative organization produce innovative services, using ICT as enabling technology for interconnecting grids and components, as well as meeting people's needs. Its fields of research include: energy communities, climate-neutral cities, 'smartization' and management of buildings and of distributed power generation systems, and local and smart energy communities.

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Development of systems for computing and ICT

The Division pursues ENEA's goals of research, technology innovation and the provision of advanced services in the energy sectors and for sustainable economic development, by implementing ICT, mainly for scientific high performance computing, high-capacity data networks, cloud computing, web-based applications, web applications for communication and training, remote working, and for the Agency's management software system. It also takes care of security and confidentiality of data and communications, while ensuring an effective management.

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