WELCOME TO

COPPE UFRJ

Instituto Alberto Luiz Coimbra de
Pós-Graduação e Pesquisa de Engenharia

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About COPPE

The Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering of the Federal University of Rio de Janeiro – Coppe – is one of the leading centers for education and research in Engineering in Latin America. Founded in 1963 by engineer Alberto Luiz Coimbra, it was a milestone for the establishment of graduate courses in Brazil.

We stand by three pillars: academic excellence, innovation and contributing to society, which have led us as we set national and international standards for education and research in Engineering. Our 13 graduate programs for master's and doctoral degrees have been awarded grades 6 and 7 by Capes (the highest possible grades in this system), leading Coppe to become one of the most important centers for education and research in the world.

With a broader perspective on Engineering, we at Coppe believe that multiple types of knowledge can work together for solving current and future demands of society, and, as such, we offer our students the opportunity to experience matters that call for cutting-edge knowledge.

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> **"Coppe is determined to promote an environment that encourages innovation and technological development with the aim of connecting multiple actors, including the private sector, to our technological capabilities for innovation."**
>
> Suzana Kahn,
> Director of COPPE

Our Numbers

2,387
Students in Master's and Doctoral programs
(as of March, 2023)

346
Full, Courtesy and Visiting Professors

155
Postdocs

18,377
Theses and Dissertations
(from 1963 to 2022)

600
Master's and Doctoral graduates per year

700
Laboratory researchers

Our Hallmarks

The Brazilian engineering institution with the highest number of maximum grades awarded by Capes

Biggest Latin American laboratory complex in Engineering, with more than 100 high-level facilities

Partnerships with the top universities in the world

All fields in Engineering brought together in one campus

Programs with a multidisciplinary approach for developing integrated solutions in strategic fields

By stimulating entrepreneurship and innovation, we promote the right conditions for converting research into business

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Executive Director of the Coppetec Foundation

Our Programs

We offer **13 GRADUATE PROGRAMS** for master's and doctoral degrees in Engineering. Capes has awarded 10 out of all our programs with its maximum grades, comparable to the leading international institutions.
The Engineering Programs at COPPE are the following: Biomedical Engineering, Electrical Engineering, Nuclear Engineering, Chemical Engineering, Civil Engineering, Production Engineering, Mechanical Engineering, Nanotechnology Engineering, Marine Engineering, Metallurgical and Materials Engineering, Systems and Computer Engineering, Transport Engineering and Energy Planning Program.

As the leading Latin American center for education and research in Engineering, our programs are fully adapted and integrated to develop strategic solutions for society.
MAIN LINES OF RESEARCH: Oil and Gas, Subsea Engineering, Ocean Technologies, Renewable Energy, Biofuels, Climate Change, Water Resources, Robotics and Automation, Health Engineering, Digital Transformation, Telecommunications, Hydrogen, Biopharmaceuticals, Polymers, Transport and Mobility, Green Chemistry, Biobased building materials, Nanotechnology and advanced materials, Smart Cities, Decarbonization and Artificial Intelligence.

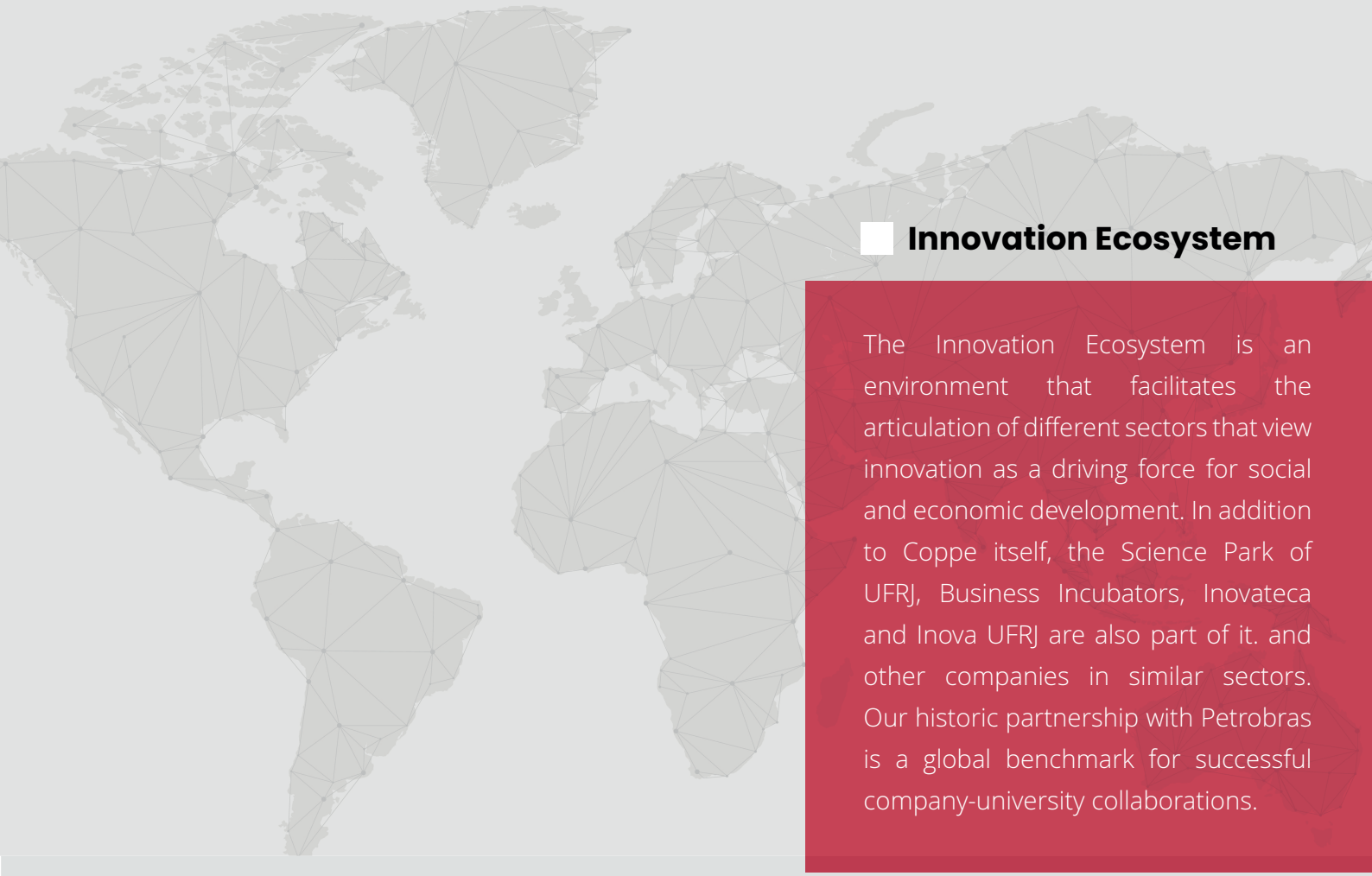
POSTDOCTORAL DEGREE

For consolidating and bringing the knowledge of doctoral graduates up to date, we at Coppe offer postdoctoral internships in our 13 programs, which last for 36 months and can be extended for up to two years.
Finding solutions to reduce carbon emissions is a collective effort that implies having an impact in many different areas. The course on Low Carbon promotes this much-needed multidisciplinarity and knowledge diversity, accentuating both the potential and obstacles for some low-carbon technologies to become a reality.

National and International Partnerships

As leaders in education and research in Engineering at both national and international levels, we have projects in cooperation with the most prominent and well-recognized scientific and technological institutions across all continents. An example is Tsinghua University, in China, which is strongly involved in Climate Change, new energy sources, decarbonization, biofuels and biofertilizers, which resulted in the creation of the China-Brazil Center for Climate Change and Energy Technology

Coppe is the industrial sector's first choice of partnership for developing various projects. With our intensive contribution to the process of technology development for the oil industry, we led Brazil to a leading position in deep-water oil exploration and production. In this field, we hold partnerships with market leaders and other companies in similar sectors. Our historic partnership with Petrobras is a global benchmark for successful company-university collaborations.



Innovation Ecosystem

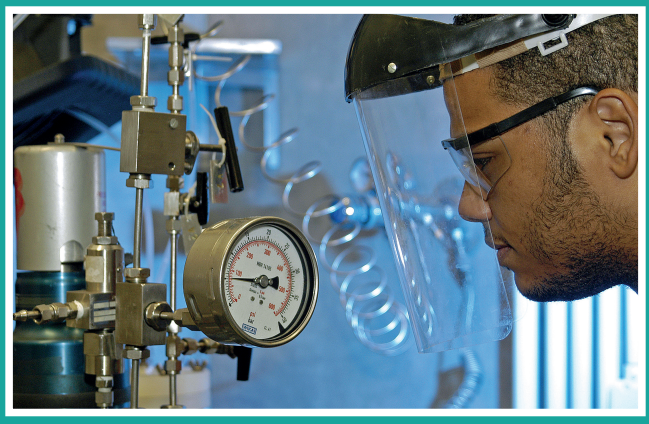
The Innovation Ecosystem is an environment that facilitates the articulation of different sectors that view innovation as a driving force for social and economic development. In addition to Coppe itself, the Science Park of UFRJ, Business Incubators, Inovateca and Inova UFRJ are also part of it. and other companies in similar sectors. Our historic partnership with Petrobras is a global benchmark for successful company-university collaborations.

Contribution to Society

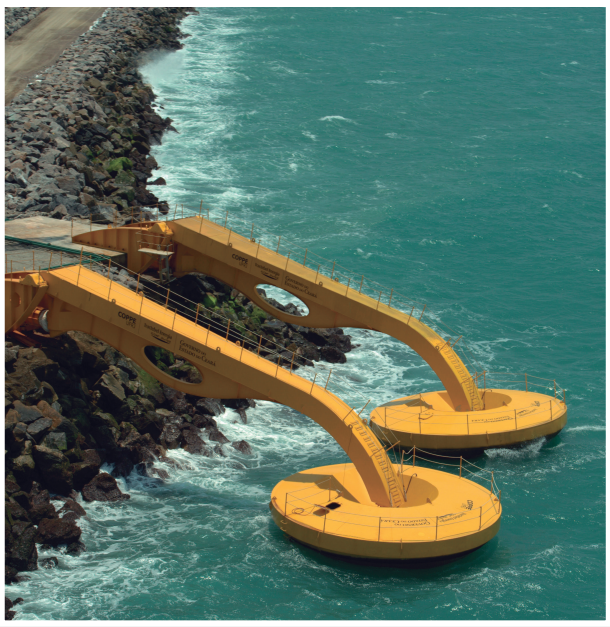
We at Coppe are in sync with future tendencies. We were pioneers in bringing universities and society together, converting knowledge into wealth and development for Brazil.

Our 13 programs are fully integrated, bringing industrial, social and environmental contributions in various areas: Oil and Gas, Subsea Engineering, Ocean Technologies, Renewable Energy, Biofuels, Climate Change, Water Resources, Robotics and Automation, Health Engineering, Digital Transformation, Telecommunications, Hydrogen, Biopharmaceuticals, Polymers, Transport and Mobility, Green Chemistry, Biobased building materials, Nanotechnology and advanced materials, Smart Cities, Decarbonization and Artificial Intelligence.

The technologies we develop here at Coppe can and must guide both public policies, so that using these technologies is made possible, and policies for the private sector as well, thus allowing for these new technologies to be absorbed by the market. This is made possible through the Coppetec Foundation, which is the bridge that makes the accumulated knowledge at Coppe available for economic, technological, and social development and that manages contracts and agreements with companies, governments and non-governmental organization.

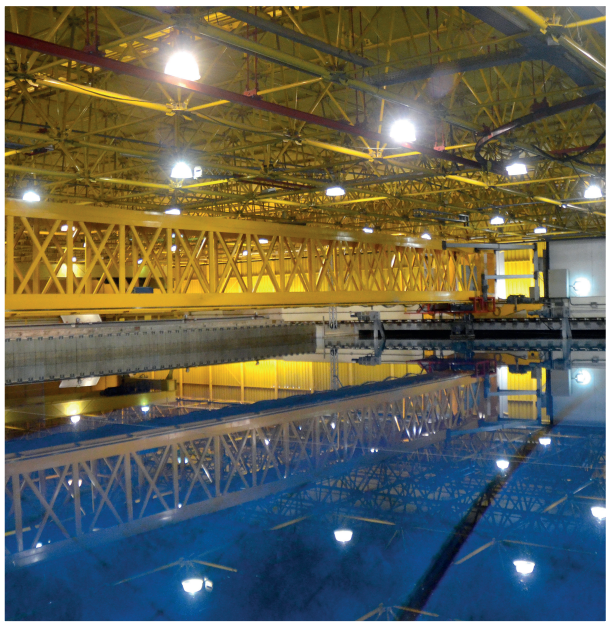


> **“COPPE goes from classical engineering to health engineering, to technology information, to energy transition, to climate change...**
> **There are several areas in which Coppe operates, always making relevant industrial and social contributions.”**
>
> Suzana Kahn,
> Director of COPPE




MagLev
Cobra


COPPE/POLI/CT/UFRJ



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Multidisciplinary Approach in Engineering for Strategic Solution Development

Health Engineering

One of the specialties that drive the research and development of new technologies the most is what we call Health Engineering and which essentially consists of applying knowledge in engineering, throughout its multiple fields, in order to, in association with the Biomedical and Social Sciences and Economics, in and outside UFRJ, improve human and animal health in its broadest sense.

Employing such knowledge and principles makes it possible to carry out projects and to bring about solutions for the development and implementation, for instance, of cutting-edge technologies, electronic systems, software, new materials, miniaturization and optical devices, which will be applied towards issues such as the continuous increase in healthcare costs, the quality and safety of medical and hospital procedures, population ageing care, and hospital and laboratory management, among other important aspects.
The creation of an ecosystem for innovation in the Health field is based on the concept of business ecosystems and on the influence they have had on innovation development around the world.

Essentially geared towards human needs, an ecosystem with such characteristics relies on the complementation of skills combined with excellence in research, access to RD&I infrastructure, public resources for development, as well as with the market and with an innovative mindset for creating value and for the solution of complicated challenges. Some aspects that complement this picture are the training of highly specialized human resources and the employment rates and income generation in our country.

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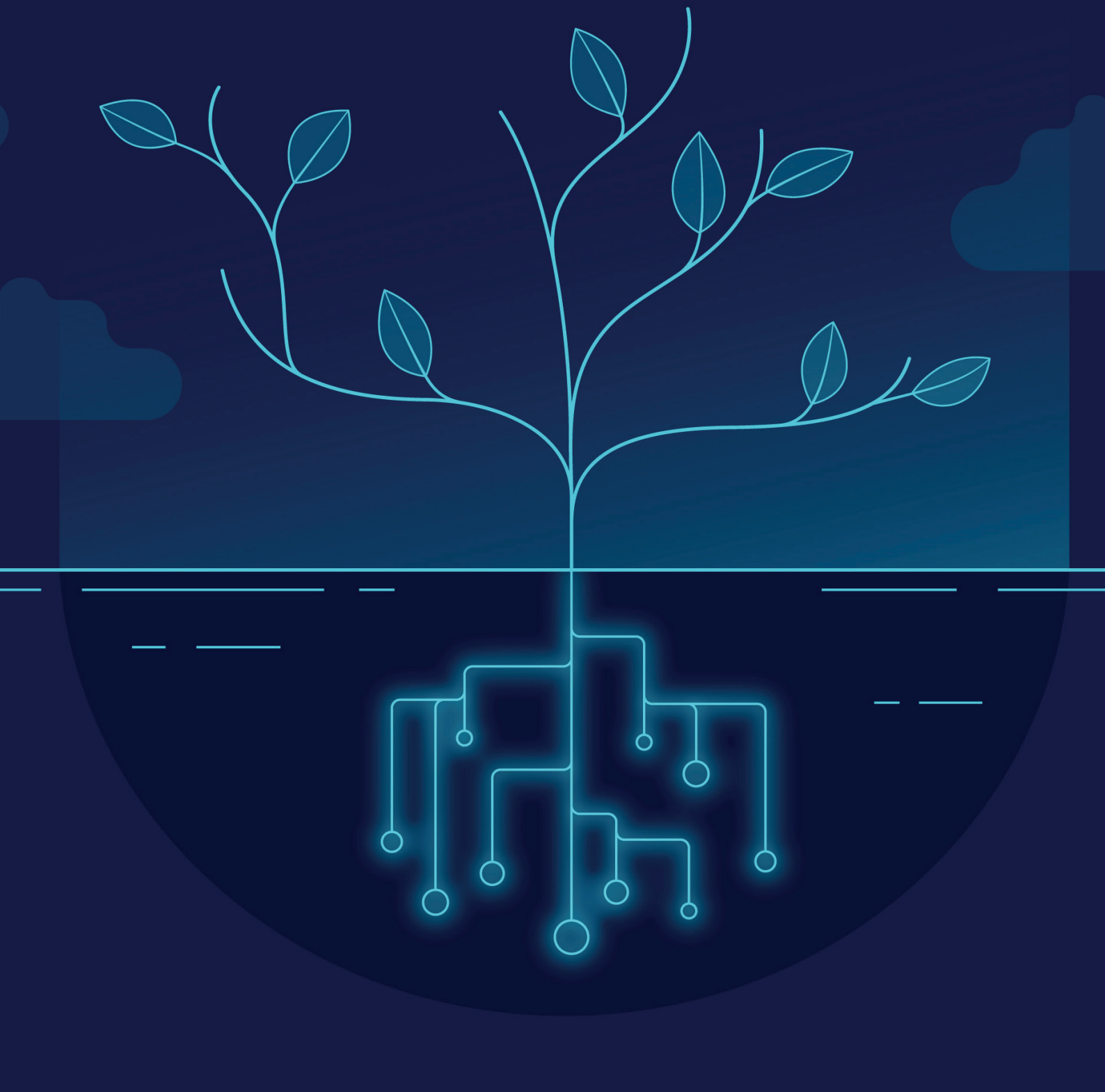

Low-Carbon Technology Solutions

The world is currently in an ongoing period of energy transition and systemic efforts to mitigate the environmental impacts of human activities. This causes large companies in the energy generation, civil construction, and industrial sectors to reposition themselves and to reallocate their investments in Research, Development and Innovation.

With one of the largest Brazilian laboratory complexes in Engineering, Coppe has numerous skills for this purpose. Our many laboratories act together in the search for more sustainable technological solutions through the Online Center for Low-Carbon Technology Solutions.

The mission of our Center is to produce theoretical and practical knowledge on new technological routes for energy generation and their integration, industrial processes and less carbon-intensive construction materials. It will also train professionals for this new branch.

With the BxC digital platform, we integrate universities and the production sector for solving challenges and funding the development of decarbonization technologies. This platform uses the entire laboratory infrastructure at Coppe: over 60 thousand m² and human resources comprising over 300 professors, 700 researchers, 300 postdoctoral researchers, and more than two thousand master's and doctoral researchers in training.

Coppe AI
Artificial Intelligence Solutions

In line with social transformations due to the evolution of Artificial Intelligence technologies, we at Coppe decided to concentrate our expertise in the new Coppe AI Center. This initiative has the purpose of offering solid theoretical training to students in Machine Learning (ML) and developing skills for solving practical problems involving machine learning.

Therefore, collaboration between engineers from different subjects is necessary as the multidisciplinary nature of ML/AI requires a collaborative approach. Due to its multidisciplinary nature and excellence in Engineering, Coppe is an ideal place for comprehensive courses in ML/AI.

We offer a diverse range of necessary skills and knowledge: Applied Mathematics, for understanding the fundamental concepts of ML and data science; Basic Computer Science, such as programming languages, data structures and database management; Management of large data sets and familiarity with SQL (Structured Query Language) databases; Incorporation of Large Language Models (LLMs) in learning; and Problem-based learning.

Our Digital Hub comprises research laboratories in digital technologies, concentrating research groups with extensive experience in modeling and simulation, process automation, systems engineering and data sciences, artificial intelligence and visualization, and how we can use them for the Oil and Gas sector.

Oil & Gas

From the decade when COPPE was created onwards, we have been strongly engaged in training human resources and developing research for the exploration and exploitation of oil and gas.

Since we formalized our first collaboration agreement with Petrobras in 1977, we have operated in several areas of interest in O&G, especially offshore activities. With this cooperation, we have actively participated in developing the technology with which Brazil achieved a leading position in offshore oil production.

Researchers from almost all our graduate programs focus on advanced studies, ranging from designing and testing equipment and materials for deep waters to developing techniques that improve oil exploration and exploitation and make it more efficient and safe.

The research groups that carry out these studies work with riser resistance and corrosion, subsea robotics, marine geophysics (seismic), platform integrity, oil wells, and decommissioning of production structures, among many others. Our expertise in Oil & Gas also includes petroleum products, petroleum refining, and fuel analysis.

In addition to meeting current demands, our researchers have delved into studies involving future demands as well, by working with digital transformation in the oil industry, with techniques for unmanned platforms and studies for carbon storage. Furthermore, our research groups have been developing and constantly improving techniques for exploring Oil and Gas conscientiously, respecting the environment and minimizing possible impacts. A significant part of this accumulated knowledge has come into play here at Coppe, due to the need to achieve the energy transition and decarbonize the oil industry's activities.

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Blue Economy

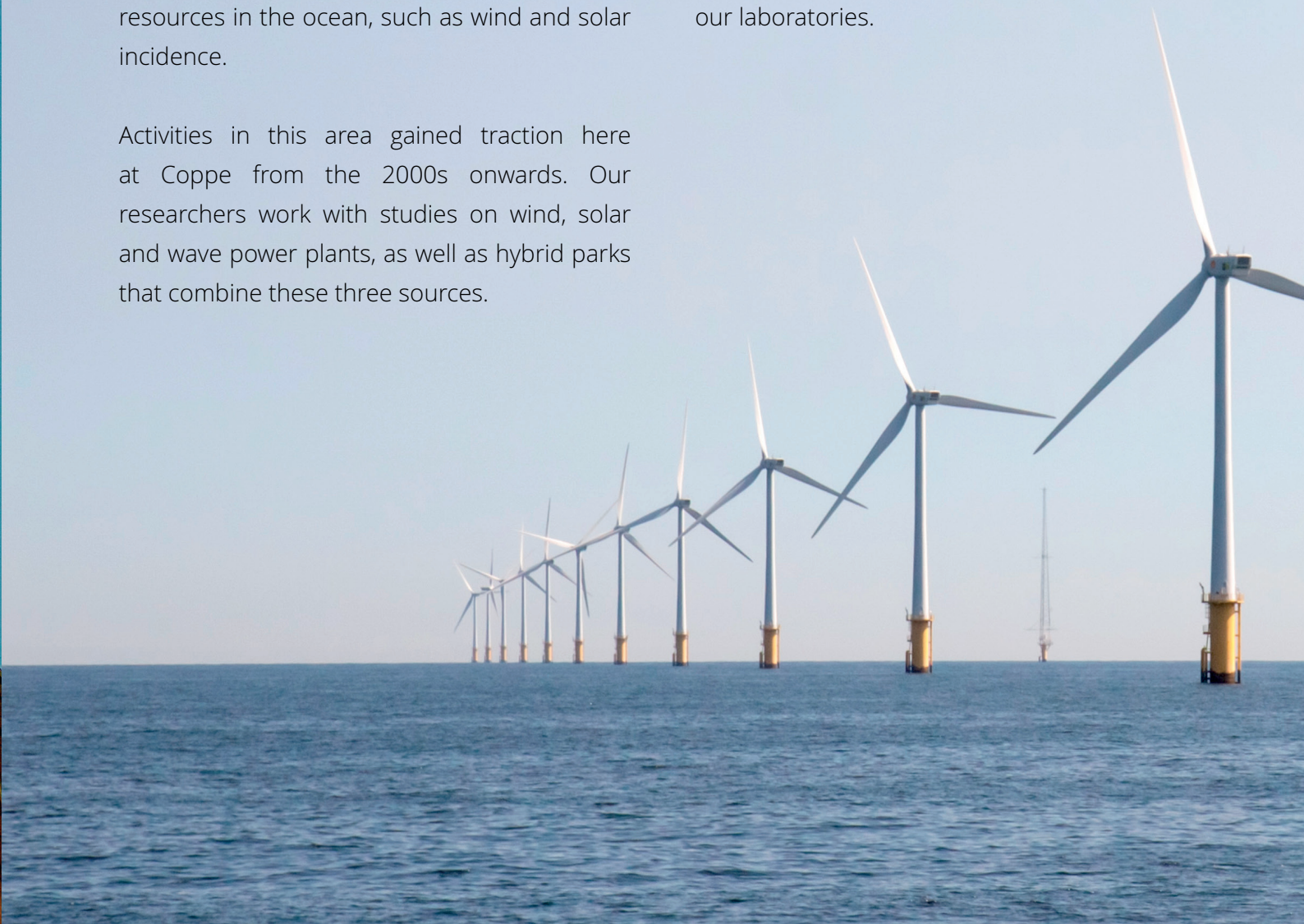
The oceans are among humanity's most important natural resources, being fundamental to Earth's climate. This immense resource requires an integrating approach that allows its use by different economy sectors, such as the fishing industry, maritime transport, shipbuilding and port systems, exploration and production of oil and gas, renewable energies, biotechnology, and robotics.

The Blue Economy plays an important role in integrating economic development and growth with the protection of marine resources. Renewable ocean sources include those resources directly related to seawater, such as waves, tides, ocean currents, thermal and salinity gradients, and other freely occurring resources in the ocean, such as wind and solar incidence.

Activities in this area gained traction here at Coppe from the 2000s onwards. Our researchers work with studies on wind, solar and wave power plants, as well as hybrid parks that combine these three sources.

Another object of study of our research group is the installation of structures for these power systems on platforms to be decommissioned. The energy we generate with these sources can be both used on platforms operating far from the shore and in the production of green hydrogen.

The expertise we have developed is critical for generating clean energy from the ocean and for companies interested in knowing the oceanographic features of the sea region, for instance, in which they would like to install their wind power structures. Ocean current dynamics, temperature, salinity, chlorophyll, and organic matter are some real-time data that we can transmit via satellite and analyze in our laboratories.



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