



FAPESP BIOENERGY  
RESEARCH PROGRAM  
BIOEN





## ENERGY FOR THE FUTURE



The 42.4% of the Brazilian energy grid made up of clean, renewable energy in 2012 represents one of the highest percentages worldwide: the global average is 13%, and the percentage among countries comprising the Organization for Economic Development and Cooperation (OECD) is 8%. Indeed, bioenergy from sugarcane accounts for almost 15.4% of the Brazilian renewable energy supply through the use of ethanol and utilization of sugarcane bagasse in the generation of electric and thermal energy.

With 9.2 million hectares of sugarcane – the equivalent of 1% of the national territory and 14% of the planted agricultural and forest areas – Brazil is the world's top sugarcane producer, and productivity has grown 3.1% per hectare annually in the last few decades due to the incorporation of new technology. In 2012, the country produced 593 million tons of sugarcane, 23.5 million cubic meters of ethanol and 43.6 million tons of oil equivalent (MTOE) of biomass.

Ethanol is an important component of the energy that powers Brazilian vehicles. In 2012, 57% of the total fleet of automobiles and 92% of new vehicles sold in Brazil were equipped with flex motors. In the last five years, the average ethanol consumption was of 11.1 MTOE, and gasoline consumption reached MTOE.

Brazil's technological leadership in sugarcane ethanol should be credited to the investments in research and development (R&D) undertaken by institutes of higher learning and research, in addition to private companies that, over decades, have accumulated valuable knowledge involving sugarcane and its derivatives.



# PROGRAMA FAPESP DE PESQUISA EM BIOENERGIA (BIOEN)

The BIOEN Program seeks to expand R&D in bioenergy and investigate new alternative technologies to consolidate Brazilian leadership in bioenergy research and production.

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## MAIN OBJECTIVES

- Increasing the productivity of sugarcane through innovative research;
- Evaluating and seeking ways for bioenergy production to have socioeconomic and environmental impacts;
- Generating knowledge that guarantees Brazil's leadership in bioenergy production.

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BIOEN seeks to articulate public and private research and development by utilizing academic and corporate laboratories to generate and apply knowledge related to ethanol production in Brazil.



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## BIOEN: RESEARCH AREAS

- Biomass for bioenergy production;
  - Biofuel manufacturing;
  - Biorefineries and alcohol-chemicals;
  - Applications for ethanol in automotive engines, i.e., combustion engines;
  - Environmental and socioeconomic impacts, land use and intellectual property.
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## HOW TO PARTICIPATE

The BIOEN Program supports 426 projects through Research Grants and Fellowships in Brazil and abroad, 260 of which have been concluded. Among the projects underway, 21 are Thematic Projects, involving groups of researchers from several institutions engaged in bold projects. This intense research activity has the objective of informing biofuel production, mainly sugarcane ethanol, as well as investigating new production technologies.

Under the Research Grant rubric, the projects should be submitted to FAPESP as Thematic Projects or Regular Research Projects or under the Young Investigators in Emerging Center modalities. Under the Fellowships and Research Internships Abroad rubric, proposals should be associated with these three types of Grants, according to the Foundation's standards.

Thematic Projects are granted to teams of researchers lead by a principal investigator (PI) or, in some cases, co-PIs ([www.bv.fapesp.br/en/1/thematic-grants](http://www.bv.fapesp.br/en/1/thematic-grants)). The Regular Research Projects are generally granted to an individual researcher ([www.bv.fapesp.br/en/6/regular-line-of-funding](http://www.bv.fapesp.br/en/6/regular-line-of-funding)). The Young Investigators in Emerging Centers awards aim to create or establish a new research group lead by a promising scientist early in his or her career ([www.fapesp.br/en/yia](http://www.fapesp.br/en/yia)). The standards for the fellowships are available at [www.fapesp.br/en/fellowships](http://www.fapesp.br/en/fellowships), as are post-doctoral fellowship opportunities. Collaboration with research groups from other states and abroad are fostered largely through Thematic Projects.

The proposals are evaluated through FAPESP's routine mechanisms. The program's steering committee then recommends whether they should be included in the BIOEN Program, taking into consideration compliance with BIOEN's objectives.



FAPESP

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FUNDAÇÃO DE APOIO À PESQUISA  
ESTADO DE SÃO PAULO

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## ABOUT FAPESP

The São Paulo Research Foundation, FAPESP, is one of Brazil's leading research funding agencies. FAPESP was created in 1962 with the mission of supporting the advancement of knowledge, research infrastructure and application-focused research through fellowships to study in Brazil and abroad and research grants in all fields of knowledge.

FAPESP also funds research in areas that are considered strategic for Brazil and crucial to advancing science worldwide, through programs related to major themes such as global climate change (PFPMCG – [www.fapesp.br/en/rpgcc](http://www.fapesp.br/en/rpgcc)), bioenergy (BIOEN – [www.fapesp.br/en/bioen](http://www.fapesp.br/en/bioen)) and biodiversity (BIOTA-FAPESP – [www.fapesp.br/en/biota](http://www.fapesp.br/en/biota)).

All project proposals are evaluated on the basis of a peer review model (using ad hoc specialists) and scientific merit.

In the bioenergy area, FAPESP has made significant strides since the late 1990s, when it sponsored sequencing and analysis of the genes of sugar cane and their relation to productivity, plague resistance and disease and climate variations, under the auspices of the Sugarcane Genome Project, and research focused on technological development of ethanol production through acid and enzymatic hydrolysis on an industrial scale.

FAPESP also has the administrative and financial autonomy to manage resources equal to 1% of the tax income of São Paulo State, as guaranteed by the São Paulo State Constitution.



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