

## The Bioenergy Program and Society

The Bioenergy Program is meant to support the development of specialised entities that have an interest in the use and exploitation of bioenergy, and to assist them in the production of energy crops (topinambur, rapeseed, jatropha, sunflower, poplar, etcetera) to obtain biofuels, conduct quality controls and put them on the market. The synergy of the projects constituting the Program represents an advantage to both privately owned and Estate-run institutions, which can thus get qualified advice on any of the Program-related topics or participate in the Program by integrating their needs into the objectives of certain specific projects and consequently benefit from very specific technological definitions, which have been thoroughly studied and validated on the basis of real experience.



## Structure of the Bioenergy Program

The Program is structured as follows:

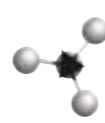
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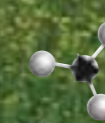
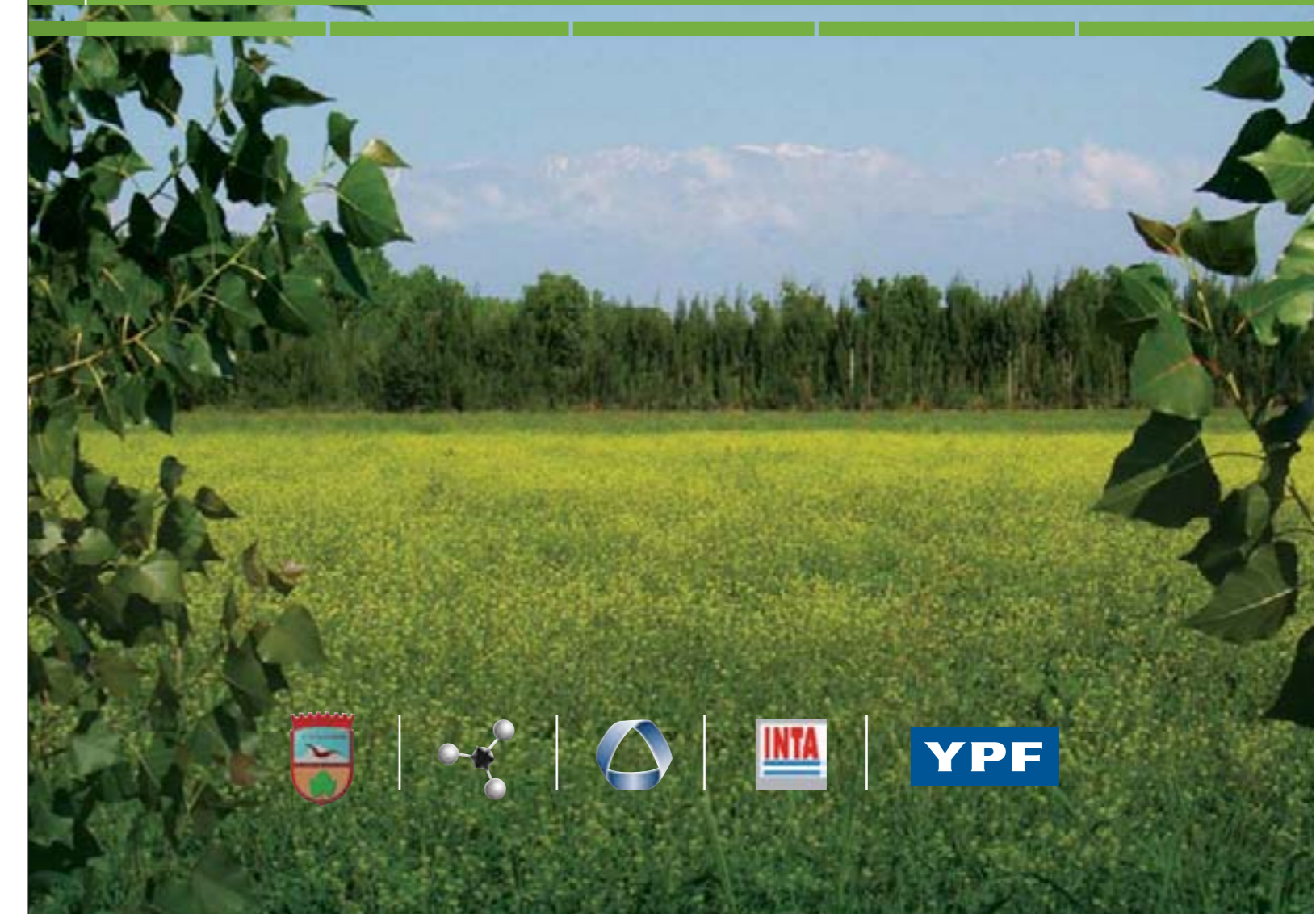
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## Bioenergy Program 2007/2010

MENDOZA - ARGENTINA



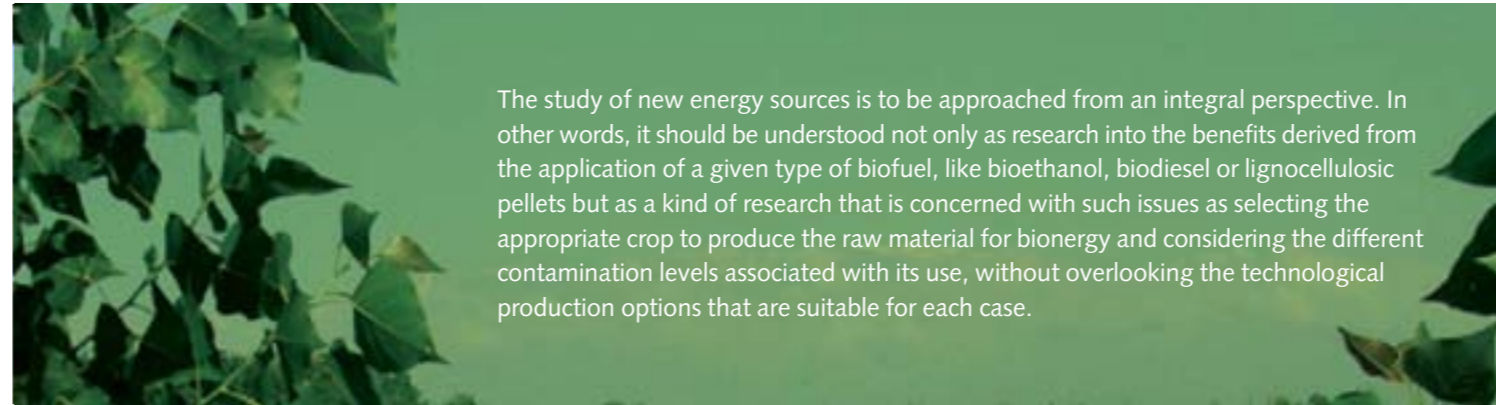
## The Bioenergy Program

The Bioenergy Program supported by the National University of Cuyo (UNCuyo) responds to the unquestionable need to gain expert knowledge in the field of biofuels. It is to address this issue that the program objectives have been strategically established to control the Biofuel Cycle from the growth of Energy Crops, to get the UNCuyo to produce its own supplies of biofuels by 2010, to have the quality of biofuels certified, to consolidate both research and researchers along their lines of study and to train human resources technically and scientifically in the subject of biofuels. In order to achieve these Strategic Objectives, institutions like the School of Agrarian Sciences, the School of Industry Applied Sciences, and the School of Engineering of the National University of Cuyo, together with Argentina's National Institute of Agricultural Technology (INTA) and YPF have been invited to take part in a Research and Development Program covering the full cycle of biofuels. This Program integrates 11 projects which

encompass the different steps of the biofuel cycle -from selecting basic raw materials (e.g. energy crops such as rapeseed and topinambur) to developing production techniques (e.g. to get bioethanol, biodiesel and lignocellulosic pellets) and analysing the contaminating emissions derived from the use of these forms of energy. Over its 4-year length, the Program is expected to reach the logical scientific and technical definition of biofuel cycles adapted to the regional reality of the province of Mendoza and the areas under its direct influence, to determine the schemes that might favour agricultural exploitation of marginal crops on the basis of the economic opportunities available, to define viable alternatives for the province of Mendoza so that a projection can be made in order to device the policies that should be carried out to safeguard people and protect the environment, to provide the knowledge necessary to contribute to the norms regulating the use of biofuels in terms of

environmental protection and the quality of fuel blends, to gain expert knowledge to assist agricultural producers and biofuel producers, and to learn about the impact that biofuels and the emissions derived from their combustion and blends can have on the environment and society.

## Approach of the Biofuel Study



The study of new energy sources is to be approached from an integral perspective. In other words, it should be understood not only as research into the benefits derived from the application of a given type of biofuel, like bioethanol, biodiesel or lignocellulosic pellets but as a kind of research that is concerned with such issues as selecting the appropriate crop to produce the raw material for bioenergy and considering the different contamination levels associated with its use, without overlooking the technological production options that are suitable for each case.

## The Cycle of Biofuels

On a first stage, the Bioenergy Program is concerned with the cycles of bioethanol, biodiesel and biomass of vegetable origin. In all of these cases, the cycle starts when a given species is planted to get the raw material which will be the basis of the biofuel. Both willows and poplars are suitable for producing the pellets, fire logs and chips that will be eventually used as fuels in household or industrial furnaces, while the organic matter remaining is compostable. Topinambur is a promising resource, because the sugars derived from this crop can be fermented to obtain bioethanol, while the organic matter remaining is compostable. Sunflower, jatropha and rapeseed yield an oil which can be transesterified (transesterification is the reaction of an oil

plus alcohol occurring in the presence of a catalyst) into biodiesel. Rapeseed represents a special case because it is a heavy nectar plant from which honeybees produce a light colored honey that is highly priced in international markets; its seeds can be pressed for oil and yield a by-product in the form of a high-protein flour which is used as animal feed. Finally, all biofuels are burnt. As combustion takes place, biofuels release CO<sub>2</sub> into the environment (carbon dioxide) at a rate that is lower than the amount fixed during the cultivating process. Then, where does the rate difference go to? This difference is incorporated into the land as compostable material or as manure, and constitutes the so-called environmental credit.

The full cycles of biofuels represent a series of additional benefits, which go beyond the environmental credit gained. In this respect, the use of biodiesel helps to eliminate the production of sulphur composites, to substantially reduce particulate and aromatic material emissions and consequently to improve the quality of air. By selecting and/or developing the right technology, by-products -which would be otherwise regarded as waste- acquire added-value.

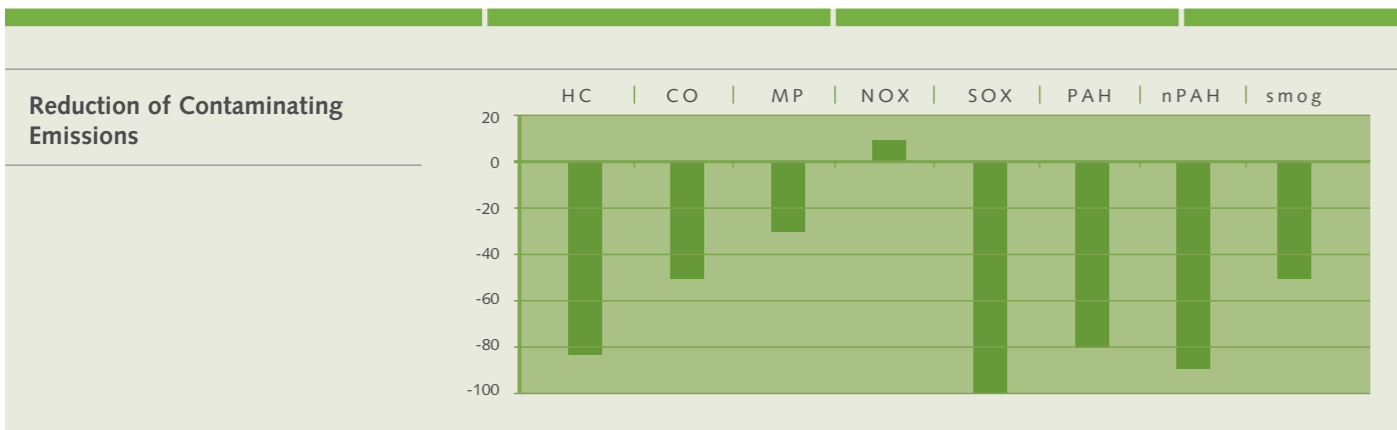
## Integrating and cross-sectional aspects of Research and Technological Development



Selecting energy crops is a relevant issue in terms of the economic opportunities, constraints and expectations that agricultural producers might have locally, in Mendoza, and on the basis of the profitability associated to the exploitation of these crops. Six research projects focus on this subject and study the cases of jatropha, sunflower, topinambur, salicaceae (willow and poplar), and two centre specifically on rapeseed (one is concerned with the productive aspects of this crop and the other with the integral features of exploitation). Two of the projects concentrate on the technology applied to produce bioethanol and biodiesel. Both discuss the need to design and build Pilot Plants where biofuel production-applied technology can be developed and which can eventually supply the National University of Cuyo with the all the biofuel it needs for its vehicles. A Certification-specialised Laboratory will control the quality of the biofuels produced locally and ensure that they conform to national and international standards.

It will also control automobile exhaust emissions, which will be related to the different sources of raw materials and production processes involved. This will help to optimise the value chain as well as the environmental impact associated with the use of biofuels. A Bench-scale Plant will help to study new alternative sources of raw materials to get biodiesel and, with the aid of a Certification Laboratory, it will be able to characterise the quality of the biodiesel or bioethanol that can be derived from the different sources. Finally, a research project focused on the Logistics and Traceability of biofuel production will assist in determining the most sensitive points of the production process and help to outline a work scheme which will ensure a cost-effective product.

Six research projects deal with the selection of energy crops.



### A PROGRAM LOOKING INTO THE FUTURE

The Bioenergy Program is concerned with the generation of knowledge in connection with the new sources of energy and focuses on how to develop and exploit them. It also centres on human resources and how to provide them with grade and post grade levels of training so that they can access a new field of study. Additionally, through the Program, it is possible to assist small and medium-sized producers and SMEs whose activities relate to biofuels, i.e. they range from selecting the energy crop to deciding on the type of technology to produce them. The Bioenergy Program constitutes a response to the future reality of the region.

