



MINI-DISTILLERIES AS TECHNOLOGICAL DEVELOPMENT FACTOR FOR BIOETHANOL PRODUCTION IN COLOMBIA.

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Being the knowledge a good that can be traded nowadays, it could be said that universities and research institutes (in and outside companies) become factories, which produce by batches.

Once generated, the knowledge is offered to costumers. Notwithstanding the huge investment, it will produce only one product, and that is the big difference against a conventional factory where several units need to be produced for long terms. This is the role of the project to be described.

The Colombian National Government, through the law (692/2001), decreed the use of oxygenated compounds such as ethanol –denominated fuel alcohol- in counties over 500k inhabitants. Mines and Energy Ministry in conjunction with the Environmental and Development Ministry, established that fuel should incorporate at least 10% v/v of oxygenated compounds in those cities since September 2005.

Subsequently, in July 2007, the decree 2629 which aims to promote the use of bio-fuels, established that from January 2012, new vehicles and any other new equipment which requires gasoline must be able to use a minimum of 80% of basic gasoline and 20% of fuel alcohol (flex-fuel engines 20%, E20). In the same way, diesel engines should be able to use either diesel or diesel-biodiesel mixtures –B20–.

CONPES document 3510 from March 2008, based on Agriculture Ministry surveys, says that the total cost of producing ethanol in Colombia is twice as high as the ethanol produced in Brazil, which is the cheapest around the world. From the costs, raw material represents 2.3 times the Brazilian cost, and production and maintenance costs are about 6 times them.

Due to these facts, it has been necessary to develop technology that allows an international competitiveness for the Colombian fuel alcohol for both sectors, the raw material production and the processing of it in order to reduce operational and maintenance costs.

In 2005, 5 fuel alcohol plants were built up in Colombia, using Praj technology, from India, that is based on taking advantage of their dual characteristics. The fermentation stage is a continuous process with recirculation of

molasses and yeast. Dehydration uses a European technology based on molecular sieves.

Other technologies have been proposed for building other plants. Some of them are Dedini technology from Brazil, which replaces the milling by diffusion during the extraction stage, given a higher rate of sugar extracted. Chematur, Australian process based on high solid concentration fermentation and low molasses production (1:3 L/L). The dehydration system is molecular sieves.

Having this framework, this mini-distilleries or mini-plant Bio-ethanol project has been developed which initially aims to produce fuel alcohol from sugar cane, with a capacity of 5k lpd and secondly it aimed to show that there is a national technology for designing, building up and operating bio-ethanol plants into the country.

The development was carried out by disaggregating the technology, considering the multiple stages of a Bio-ethanol plant. Industrias Químicas FIQ, was responsible for carrying out fermentation, distillation and dehydration stages. Fermentation. Batch process. This stage was divided and for the first section were used a columna platos perforados, and for further stages the columns used were filled by third generation package. Dehydration. An extractive distillation system was used, based on previous studies developed by Universidad Nacional de Colombia, supported by COLCIENCIAS.

This is the way this research project has been developed, given the option to obtain dehydrated ethanol with concentrations between 99,5 and 99,9 % V/V. This process uses Etilenglicol as dehydrated agent, which is further regenerated in a second stage that allows it to be re used.

This technology allows building higher plants with higher capacity, reducing production and maintenance costs, which ultimately are the cause of non-competitiveness of the anhydrous ethanol produced in the country.

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