SHADES OF GREEN (V)

10/09/2019(https://panamazonsynodwatch.info/2019/09/10/) 1:57 pm

No Comments(https://panamazonsynodwatch.info/articles/commented-news/shades-of-green-v/#respond)

Evaristo De Miranda

Sustainable Agriculture in Brazil

CHAPTER 4 - RENEWABLE AGRO-ENERGY

THE LIQUID BIOFUELS PRODUCTION: ETHANOL

The main biofuel in Brazil is ethanol, produced from sugarcane. lts use in automobile engines began in the 1920s. The bi-fuel car is the best symbol of ethanol's success: of the 1.98 million light vehicles licensed in 2016 in Brazil, 88% were flexfuel.

Sugarcane is one of the main crops of Brazil's economy. In addition to producing ethanol and generating electricity with bagasse, sugarcane maintains the country as the world's largest sugar producer and exporter. The country accounts for 48% of the international sugar trade.

For the 2015/2016 crop, 10.8 million hectares were planted, producing 666.8 million tons of sugarcane, transformed into 33.8 million tons of sugar and 302,000 m^3 of ethanol and anhydrous alcohol[1].[2]

The sugar/ethanol ratio fluctuates year by year, around 5%, depending on the international prices of each product. In rounded-off numbers, half of the production is for sugar and half for ethanol.

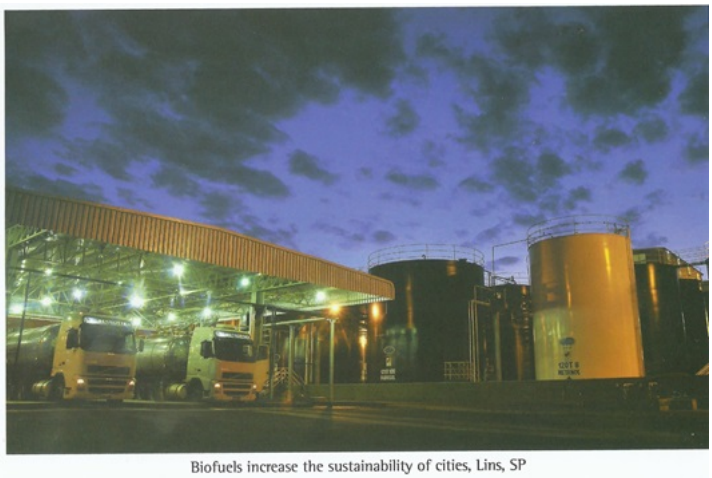
The production of ethanol guaranteed 5.3% of the Brazilian energy matrix in 2016. It served a circulating fleet of 25 million vehicles powered by ethanol or biofuels (58.4% of the total fleet). And anhydrous alcohol is added to the fuel of another 13.5 million gasoline-powered vehicles, in proportions ranging from 18% to 25%. The bagasse of sugarcane accounts for 11.7% more of bioelectricity in the energy matrix.

Brazilian ethanol, produced from sugar cane, has clearly documented economic and environmental advantages over ethanol produced from other sources such as beet, sorghum and corn (North America's option). The energy balance of Brazilian ethanol – that is, the ratio between the fossil energy used to produce it and the energy contained in the fuel produced – is highly positive. There are nine renewable energy units for each unit of fossil energy used in its production. According to the World Watch Institute, this ratio is about four times that of ethanol produced on the European continent and almost five times that of ethanol produced from corn. Brazilian ethanol from sugarcane reduces carbon emissions by about 90% compared with using gasoline[3]; in addition, it also reduces exhaust pollutants from engines.

The increasing consumption of ethanol and anhydrous alcohol creates a permanent need to expand production in Brazil. If 50% of the national fleet uses ethanol in 2020, the production of sugarcane should be around 1.2 billion tons. And the total would reach 1.5 billion tons if 80% of the fleet uses ethanol.

This will mean increasing sugarcane production by 150%, without increasing the planted area at the same rate. Innovative second generation ethanol extraction technologies, using stocks and bagasse, will change this picture positively. Two second-generation ethanol production plants using sugarcane residues and bagasse are already operating in Brazil[4].

Ethanol and anhydrous alcohol are renewable fuels, very efficient as carbon dioxcide emission reducers. All the carbon emitted during combustion is taken out of the atmosphere during the annual renewal of plantings and crops. These two fuels replace the use of gasoline completely or partially. Also, there is no emission of nitrogen oxide or sulfur, and the emission of fine particulates and other pollutants is lower. Ethanol plays an important role in improving the air quality in large Brazilian cities, with benefits for the health of the population and the environment[5] – another example of agriculture exporting sustainability to large urban areas.



Biofuels increase the sustainability of cities, Lins, SP

THE LIQUID BIOFUELS PRODUCTION: BIODIESEL

The same vegetable oil used in salads or in the production of margarines can be used for fuel in buses, trucks and tractors throughout the country. Since 2008, all diesel fuel sold in Brazil is required to have biodiesel in the mixture. Today, the ratio of biodiesel to mineral diesel is 10% and the outlook is for this to increase to 12% by 2020. According to ABIOVE, the change in the mixture from 8% to 10% requires more than 3.5 million tons of soybeans for 700 thousand tons of oil. This processing results in 2.8 million tons of protein bran, destined for the domestic and foreign markets. In addition to the environmental and human health benefits,

B10 contributes to developing the biodiesel industry, to feeding people and animals, and to generating employment and income in Brazil[6].

Brazil's production of biodiesel has been surprising: in 2008, 1.2 billion liters were produced; in 2010, the amount reached 2.4 billion liters and in 2015 the total was 3.9 billion liters, although in 2016 there was a slight reduction to 3.8 billion liters. All biodiesel production is consumed without surplus. There are 3 million toe. And with the right policies, agriculture still has the capacity to double the production of oils and other lubricants destined for biodiesel.

Vegetable oils and beef tallow are the the main sources of Brazilian biodiesel, Charqueada, SP

Currently, in terms of volume, the main renewable sources of biodiesel guaranteed by Brazilian agriculture and livestock raising are, approximately: soybeans (77%), beef tallow (20%), cotton (1.5%) and used frying oil (1.5%). Biodiesel from beef tallow is a bit cheaper than soybean oil. Each slaughtered bovine supplies, on average, 15 kg of usable tallow. The tallow next to the skin is not used. For several years there has been no inauguration of a slaughterhouse or cold-storage unit in Brazil without a biodiesel plant as part of it.

The energy utilization of animal agricultural residues is significant in the production of biodiesel. The annual

The energy utilization of animal agricultural residues is significant in the production of biodiesel. The annual Brazilian production of animal fats is around 1.95 million tons. Beef tallow, responsible for 20% of biodiesel produced in Brazil, replaces the use of fossil diesel – one more contribution to the reduction of CO2 emissions coming from Brazilian cattle ranching (not computed in the partial evaluation of methane emissions from cattle excrement, mentioned above).

The decomposition of one cattle carcass alone releases 1.2 tons of carbon dioxide, on average. Recycling avoids the rotting of carcasses and remains. Recycled animal fat is the source of energy that emits less greenhouse gases per megajoules of stored calories, according to European Community Directive 30/2009[7].

Thanks to biodiesel (and mainly to soybean oil), imports of fossil diesel have been falling, down 38% from 2014 through 2015. The total amount of imported diesel sold in Brazil fell from 19% in 2014 to 12% in 2015.

The use of biodiesel reduces the level of atmospheric pollutant emissions, due to the lower consumption of fossil diesel. Biodiesel plays a role analogous to that of ethanol in improving air quality in large cities, especially because of the significant reduction of sulfur and black smoke emissions by vehicles. Biodiesel is yet another example of how agriculture exports sustainability to cities.

Moreover, this form of biofuel does not require the use of additives and its combustion (without mixing) emits an average of 48% less carbon monoxide than petroleum diesel. Biodiesel emissions contain 47% less particulate matter, which is very harmful to the lungs. And, thanks to its combustion characteristics, it also generates 67% less hydrocarbons. As in sugarcane, all the carbon emitted during combustion is removed from the atmosphere in the annual renewal of plantings and crops. Considering the production chain as a whole, biodiesel reduces CO2 emissions by more than 75%.

From the book: Shades of Green – Sustainable Agriculture in Brazil (2018)

[1] The etanol (sold at gas stations) contains around 4% of water, while the anhydrous ethanol (mixed with gasoline) has practly no water content.
[2] CONAB. Acompanhamento da safra brasileira. Companhia Nacional de Abastecimento. *Observatório Agrícola*, v. 2 – Safra 2015/16 – n.3 – Terceiro levantamento, dez. 2015. Available at: <http://www.conab.gov.br/OlalaCMS/uploads/arquivos/15_12_17 _09_03_29_boletim_cana_portugues_- _3o_lev_ – _15-16.pdf>. Access in Oct. 2017.
[3] UNICA. União da Indústria de Cana de Açúcar. Available at: <http://www.unica.com.br/documentos/>. Access in Nov. 2017.
[4] RAIZEN. Tecnologia em energia renovável. Etanol de segunda geração. Available at: <https://www.raizen.com.br/energia-do-futuro-tecnologia-em-energia-renovavel/etanol-de-segunda-geracao >. Access in Sep. 2017.
[5] SALVO, Alberto *et al*. Reduced ultrafine particle levels in São Paulo's atmosphere during shifts from gasoline to ethanol use. *Nature Communications*, v. 8, article number: 77 (2017). Available at: <https://www.nature.com/articles/s41467-017-00041-5>. Access in Sep. 2017.
[6] ABIOVE. 2018 será impactado positivamente pelo B10; infraestrutura, logística e legislações na área de transportes rodoviários preocupam. Available at: <http://www.abiove.org.br/sitei-FlLES/Portugues/12122017-162722-12_12_2017 _ – _release_perpsectivas_2018.pdf>. Access in Dec. 2017.
[7] EUR-LEX. Diretiva 2009/30/CE do Parlamento Europeu e do Conselho de 23 de Abril de 2009 (…). Available at: http://eur-lex.europa.eu/legal-content/PT/TXT/?uri=CELEX%3A32009L0030 (https://eur-lex.europa.eu/legal-content/PT/TXT/?uri=CELEX%3A32009L0030). Acess in Jan. 2017.

Evaristo de Miranda

Is an agronomist and has a master's degree and a doctorate in ecology from the University of Montpellier (France). He is the author of 40 books and of hundreds of works published in Brazil and abroad. As a researcher at Embrapa (Brazilian Agricultural Research Corporation), he has already implemented and directed three national research centers. He is currently the General Manager of Embrapa Territorial.

(https://panamazonsynodwatch.info/feature/what-s (https://panamazonsynodwatch.info/feature/the-syr