AMID ALL THE BAD NEWS that has been deluging the Brazilian economy since the beginning of 2015, the sugar-energy sector is looking forward to April with enthusiasm. April is the official start of the harvest of sugar for ethanol in the Center-South of the country, and with resumption of investment, the outlook is for continuing favorable conditions for sales, and thus continuing economic and financial recovery, which began in 2015.

According to a study for the Center for Advanced Studies in Applied Economics (CEPEA) by Agricultural School Luiz de Queiróz of São Paulo University, 2016 will see a shortage in world sugar production, but in Brazil conditions are favorable for a good harvest. With the price of sugar recovering, ethanol now encouraged by the end of government price controls on diesel and gasoline last year, reintroduction of the Contribution on Intervention in the Economic Domain (Cide) tax on gasoline and diesel, and the amount of ethanol added to gasoline increased to 27%, leading industry analysts are looking forward to the sugar crop with optimism.

After four years of difficulties that swept away at least 40 sugar mills and put another 79 into judicial
recovery, according to Elizabeth Farina, president of the Cane Sugar Industry Union (UNICA), the sector is now introducing technological advances that should promote efficiency, productivity, and product diversification.

Currently sugar mills and ethanol plants are also producing electricity from sugarcane bagasse, and in the not too distant future biorefineries will be producing products ranging from second-generation ethanol to fine chemicals, in response to Brazilian commitments to reduce carbon emissions. “Of course there are many challenges for developing new technologies, but we believe this is how the industry can start growing again,” says Artur Yabe, sector manager of the Department of Biofuels of the National Bank for Economic and Social Development (BNDES).

“Business risks are intrinsic to capitalism. Political and institutional risks are more difficult to deal with.”

Elizabeth Farina

According to Roberto Rodrigues, former Minister of Agriculture and coordinator of the Agribusiness Center of the São Paulo School of Economics of the Getulio Vargas Foundation (EESP), the future of the sugar sector will depend on technological advances and that will require funding to revitalize company investment.

**Brazil’s ethanol production is approaching 30 billion liters**

(Harvest 2014/2015; products and major producing states and regions)

<table>
<thead>
<tr>
<th>State/Region</th>
<th>Sugarcane (Millions of metric tons)</th>
<th>Sugar (Millions of metric tons)</th>
<th>Anhydrous ethanol (Billions of liters)</th>
<th>Hydrous ethanol (Billions of liters)</th>
<th>Ethanol total (Billions of liters)</th>
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</thead>
<tbody>
<tr>
<td>Alagoas</td>
<td>23.1</td>
<td>1.9</td>
<td>0.4</td>
<td>0.2</td>
<td>0.6</td>
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<tr>
<td>Goiás</td>
<td>66.3</td>
<td>2.0</td>
<td>1.3</td>
<td>2.9</td>
<td>4.2</td>
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<tr>
<td>Mato Grosso</td>
<td>13.0</td>
<td>0.4</td>
<td>0.5</td>
<td>0.7</td>
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<tr>
<td>Mato Grosso do Sul</td>
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<td>0.6</td>
<td>1.8</td>
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<tr>
<td>Minas Gerais</td>
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<td>3.3</td>
<td>1.2</td>
<td>1.5</td>
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<tr>
<td>Paraná</td>
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<td>2.9</td>
<td>0.5</td>
<td>1.1</td>
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<tr>
<td>Pernambuco</td>
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<td>0.2</td>
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<td>São Paulo</td>
<td>337.8</td>
<td>21.9</td>
<td>6.5</td>
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<td>Northeast Region</td>
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<td>1.3</td>
<td>0.9</td>
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<tr>
<td>Brazil</td>
<td>632.1</td>
<td>35.6</td>
<td>12.1</td>
<td>16.3</td>
<td>29.4</td>
</tr>
</tbody>
</table>

Source: UNICA.
2016 will see a shortage in world sugar production but in Brazil conditions are favorable for a good harvest.

Capacity. Rodrigues believes that the most appropriate way to capitalize the sector is to raise the Cide tax from R$0.10 per liter of gasoline and diesel to R$0.30 to R$0.35.

The controls on fuel prices in 2011–14, say Rodrigues and most other experts on sugar energy, were primarily responsible for the disinvestment in sugar mills and ethanol plants, along with the drop in international sugar prices, and the problems of state-owned oil company Petrobras, which is grappling with the largest debt in its history and unable to make the investments necessary to exploit deep sea oil.

For economist Adriano Pires, director of the Brazilian Infrastructure Center, what determined the ethanol supply crisis in the late 1980s and throughout the 1990s was declining oil prices and the resulting general lack of interest in ethanol as a fuel.

Consultant Roberto Villa, a former director of Petrobras, said the lack of ethanol in the market for several years in the 1990s was usually associated with good international prices for sugar itself.

Investing in technology to grow more

The current crisis, exacerbated by severe drought in 2013 and 2014, bottomed out last year partly because of favorable hydrology. Also, changes in economic policy ended the price controls on gasoline and diesel, allowing Petrobras to restore its profit margin, which favored the recovery of the sugar-energy sector. However, the plunge in international oil prices, from US$111 a barrel in June 2014 to about US$35 currently, has slowed gasoline and diesel re-pricing.

The government has moved to make ethanol more competitive and raise demand for it by reintroducing the Cide tax on gasoline and diesel, realigning fossil fuel prices, and
raising the ethanol content of gasoline from 25% to 27%.

Given Brazil’s commitments to the 21st UN Conference on Climate Change to reduce emissions 37% by 2025 and 43% by 2030, the sugar-energy sector sees a new path opening for use of biomass for energy. With oil prices expected to stay low for some time, Rodrigues believes that this is the time for an injection of income so the sugar-energy sector can leave crisis behind. He believes raising the Cide tax on gasoline and diesel would allow sugar mills to widen the profit margins on ethanol sales. Nevertheless, he says, many sugar mills in difficulties will not be able to survive; he expects a new round of consolidation like that experienced in the early years of this decade.

Rodrigues has identified “a silent technological effort” among sugar-energy producers to achieve greater efficiency, productivity, and added value. The initiatives are both agricultural and industrial. For instance, now in an advanced stage of development is planting pre-sprouted seedlings instead of the traditional pieces of sugar cane. In Ribeirão Preto in São Paulo, the Sugarcane Center of the Agronomic Institute of Campinas (IAC) has found way to cultivate seedlings in nurseries, which substantially reduces the amount of cane required for traditional planting, and thus increases crop productivity and the amount available for sale. The cost of using seedlings, Rodrigues says, is almost the same as traditional planting, which should favor its rapid dissemination.

Mechanized harvesting is another advance that makes agricultural labor more productive and reduces the need to burn the straw, a practice that is gradually being eliminated.

Rodrigues also highlights the advance of transgenic sugarcane and “energy-cane,” a variety that is richer in fiber than sucrose and is thus more suitable for producing ethanol, chemicals, and electricity than sugar. In addition to the “green plastic” produced by petrochemical giant Braskem, yeasts and

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Sustainability is central
UNICA’s Farina considers sustainability to be central to advancing the sugar-energy sector. She believes Brazil’s international commitments to reduce carbon emissions make it imperative to give biofuels a larger share in the country’s energy matrix.

“The biggest challenge of this international agreement is to put in place public policies consistent with those agreed targets. The struggle now is to define those policies,” Farina said. One related problem is what she calls the “tax gap.” Farina argues that the tax gap between renewable energy and fossil fuel should be calculated by pricing in “the positive externalities of renewable energy and the negative externality of fossil fuels.” Currently subsidies to fossil fuels are still “huge,” she says—an estimated US$3 trillion, according to the International Monetary Fund.

To meet Brazil’s commitments to reduce carbon emissions, the Ministry of Mines and Energy (MME) has set a goal of producing 50 billion liters of ethanol a year, almost double 2014/2015 production. Farina notes that one favorable measure in 2015 was the increase in the share of ethanol in gasoline, making fossil fuel cleaner and increasing the price and competitiveness of ethanol. Last year consumption of ethanol went up by 37.5%.

Farina said that the recovery of the sugar-energy sector will eventually attract more investment, but warns that recovery will not be fast until Brazil escapes the political and institutional crisis responsible for depressing business
confidence in all sectors. “Everyone is waiting to see what will happen. Business risks are intrinsic to capitalism. Political and institutional risks are more difficult to deal with,” she said.

Innovation and BNDES
Farina also highlighted advances in production of electric power by the sugar-energy industry. All 380 active sugar mills are now self-sufficient in electricity, and 177 supply power to the grid, lighting up 11 million homes—16.4% of Brazilian households.

BNDES and the Financier of Studies and Projects (Finep) are the two main government agencies that support industrial development. Artur Yabe of BNDES says that the conditions that favored ethanol in 2015 are expected to continue in 2016, reinforced by a favorable market for sugar and contributing to continued improvement of the financial health of companies in the sector.

Yabe says “the sector’s profit is key.” The worst of all worlds, he thinks, would be a scenario of low prices combined with currently expensive credit. But in his opinion, “The resumption of investment will come sooner than we expect, first by expansion of installed capacity and then by construction of new plants.”

Yabe said in this sector BNDES, in partnership with Finep, has in recent years been concentrating on stimulating technological advances in both sugar farming and industry. The Program of Support for Technological Innovation in the Sugar-Energy and Sugar-Chemical Sectors (PAISS) disbursed more than R$1.5 billion in 2013–15. Yabe said
In addition to the “green plastic” produced by petrochemical giant Braskem, yeasts and enzymes from sugarcane have been bred to replace petrochemicals as raw materials for fine chemicals.

that energy sugarcane could produce as much as 200 tons per hectare; crops of current varieties are just below 100 tons.

In the area of transgenic sugarcane, most of the work is being done by the Center for Sugarcane Technology (CTC). The CTC, created in 1969 as a nonprofit research institution, has been transformed into a corporation controlled by sugar-energy companies. BNDES underwrote R$300 million in CTC bonds to finance acquisition of state-of-the-art genetic technology equipment. CTC will launch its first variety of transgenic sugarcane in 2017.

In the industrial area BNDES has concentrated its support on encouraging new technologies for second-generation ethanol plants and biorefineries, which Yabe considers the future of the industry. For cellulosic ethanol, Yabe points out that already three industrial plants are operating in the country, two on a commercial scale, Granbio and Raizen, and one a CTC prototype. As for biorefineries, two plants, Paraiso Bioenergy and the Bunge group, are up and running.

Mirian Bacchi, a Cepea specialist in ethanol, believes that new technologies will be the main way to reduce production costs and make the sugar-energy sector more competitive, but in the short and medium technological advances will not occur on a large scale, because of either financial limitations or lack of a clearly defined national fuel policy.

Sugar and equipment
The favorable outlook for ethanol and sugar does not yet excite machinery and
equipment suppliers. “The outlook for the sugar-energy sector is the same as for other crops: the harvest is good, profitability is good, but sales of machines and equipment do not grow,” explains Pedro Estevão Bastos, president of the Brazilian Chamber of Machinery and Agricultural Implements of the Brazilian Association of Machinery and Equipment (Abimaq).

Bastos believes the problem is that entrepreneurs lack confidence in the sector and in the direction of Brazil’s economy—the same problem that afflicts companies throughout the economy. According to Abimaq, in 2015 sales of machines and equipment dropped by 27%.

Building new markets is an arduous task that takes time. The devaluation of the Brazilian currency, which has made Brazilian industry more competitive and brings in more revenue per unit sold, is not yet reflected in heightened exports, which amount to only about 20% of total production. Selling little, the sector can invest little—and in Bastos’s opinion, last year the government eliminated the incentives for innovation.

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