

**Required Report:** Required - Public Distribution **Date:** May 10, 2023

**Report Number:** RH2023-0002

**Report Name:** Sugar Annual

**Country:** Zimbabwe

Post: Pretoria

**Report Category:** Sugar

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## **Report Highlights:**

Post forecasts Zimbabwe's sugar cane production will increase by 1 percent to 3.5 million metric tons (MT) in marketing year (MY) 2023/24 based on a return to normal weather conditions, the availability of sufficient irrigation water, and an increase in planted area. Post forecasts sugar production will increase by 3 percent to 410,000 MT in MY 2023/24, based on an increase in the quantity of sugar delivered to mills, improved sugar cane quality (sucrose content), and consistent milling efficiencies (sugar recovery rate). Zimbabwe is expected to fully utilize its allocation of 12,910 MT for the U.S. sugar tariff rate quota in both the 2022/23 and 2023/24 MYs.

# **Background**

Sugar cane in Zimbabwe is grown under canal irrigation in the lowveld area of Triangle and Hippo Valley, in the Chiredzi District of Masvingo Province, as shown in **Figure 1**. Lowveld is the name given to areas that lie at an elevation of between 500-2,000 feet (150-600 meters) above sea level. About 80 percent of Zimbabwe's sugar cane crop is produced by two large estates: Triangle Sugar Estate and Hippo Valley Estate. Private producers, including large- and small-scale farmers, produce the remaining 20 percent of the country's sugar cane crop. Private growers include all of the individual farmers who are not part of the Triangle and Hippo Valley Estates.

There are two sugar mills in Zimbabwe: Hippo Valley Estates Ltd and Triangle Sugar Estates Ltd. The two mills have a combined sugar production capacity of about 640,000 MT and installed milling capacity of 4.8 million MT of sugar cane per year. Tongaat Hulett owns 100 percent of the Triangle Sugar mill and 50.5 percent of the Hippo Valley mill. The remaining 49.5 percent of the Hippo Valley mill shares are publicly owned through the Zimbabwe Stock Exchange. The Hippo Valley Estates mill only produces raw sugar, while Triangle Sugar Estate mill produces raw sugar and about 20 percent of the total refined sugar in Zimbabwe.

Zimbabwe has two sugar refineries: <u>Triangle Sugar Refinery</u> and <u>Star Africa Sugar Refinery Ltd</u>, an independent sugar refinery based in Harare. Star Africa produces about 80 percent of the total refined sugar in Zimbabwe, including bottler-grade white sugar (premium refined sugar that has been graded). The Star Africa refinery has the capacity to produce 200,000 MT of refined sugar annually, while the Triangle refinery can produce 140,000 MT of refined per year.

The Zimbabwe Sugar Association is the highest decision-making authority on issues regarding sugar cane growers and sugar millers, including sugar cane pricing and policy advocacy. In addition, the Zimbabwe Sugar Association Experiment Station (ZSAES) conducts research on sugar cane varieties, pests, and diseases and is funded by sugar sales.

Due to diverse interests and regular disagreements, there are at least 10 associations representing private growers, as shown in **Figure 2**. The Zimbabwe Sugar Sales Company (ZSSC) was founded by growers and is the main organization that exports and sells sugar domestically on behalf of the industry to the Star Africa and Triangle sugar mills for further processing.

Zimbabwe currently has 19 varieties of sugar cane approved for planting in the country. While the industry seeks to limit any single variety to less than 40 percent of planted area to minimize and diversify risks, the N14 variety currently accounts for about 60 percent of total production. One of the new varieties, ZN10, has been gaining popularity with farmers because of its high sucrose content. Although the industry had agreed to limit the production of ZN10 to 10 percent of planted area due to its fine particles that can flood mill diffusers, this variety is estimated to account for at least 30 percent of total sugar cane production in the country. About 450 to 500 hectares is dedicated to the production of seed cane, and the industry replants about 12 percent of sugar cane area annually.

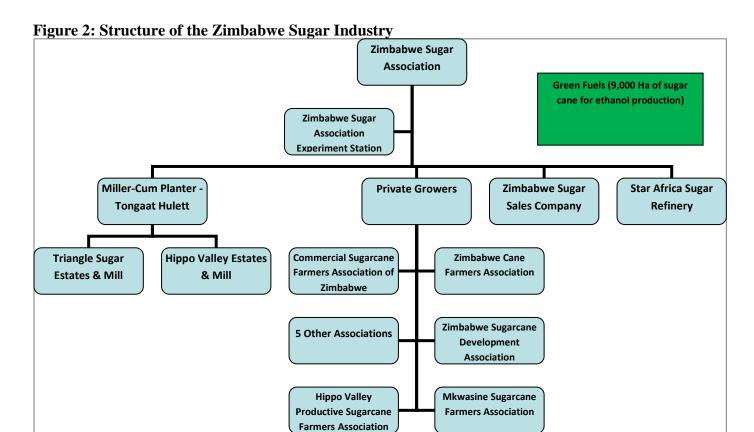
The main diseases of concern in Zimbabwe include smut, ration stunting disease (RSD), leaf scald, brown rust, orange rust, and sugar cane yellow leaf. The main pests of concern include eldana moths, sugar cane yellow aphids, and black maize beetles. Viral diseases in crops are not closely monitored or

controlled. As part of the industry's biosecurity and risk-mitigating strategy, the ZSAES routinely scouts for pests and diseases in all sugar cane farms, including subsistence farms that produce chewing sugar cane.

Figure 1: Location of the Sugar Cane Growing Areas and Mills in Zimbabwe



Source: Tongaat Hulett



Source: Zimbabwe Sugar Association Experiment Station

MT = metric tons

MY = marketing year (April-March for sugar cane and May-April for sugar)

### **Production**

Post forecast that area under sugar cane production in Zimbabwe will increase by 1 percent to 54,350 hectares (ha) in MY 2023/24 up from 54,000 ha in MY 2022/23. This is based on new land being made available for production under Project Kilimanjaro, an initiative by the Zimbabwean government, Tongaat Hulett and private banks that aims to bring an additional 200 new farmers and 4,000 ha under sugar cane production in the short term. New land for cane production will require water conveyance to be extended to ensure sufficient supply for irrigation, since the majority of Zimbabwe's sugar cane relies on irrigation. There is no commercial sugar beet production in Zimbabwe.

Post forecasts that sugar cane production in Zimbabwe will increase by 1 percent to 3.5 million MT in the MY 2023/24 MY, up from 3.45 million MT in MY 2022/23 MY, based normal weather conditions, availability of sufficient irrigation water, softening input prices, and increase in area planted. Production in MY 2022/23 is revised downwards to 3.45 million MT as some areas were affected by yellow sugarcane aphid, which is known to cause losses to yield and sugar content at harvest. Additionally, farmers were unable to apply optimal amounts of fertilizer and chemicals due to increasing input costs. Heavy intermittent rains led to water-logged fields compromising cane yield and caused delays in harvest, which affects sugar content in the cane.

Dam levels in 2023 are slightly lower than they were in 2022, due to mediocre rainfall as shown in **Table 1**. However, industry sources expect that there will be sufficient irrigation water for the MY 2023/24 sugar cane crop. The Tugwi-Mukosi and Mutirikwi dams supply about 72 percent of total sugar cane area, followed by Manjireni (24 percent) and Manyuchi (4 percent).

Table 1: Levels of Dams Supplying Irrigation Water to the Sugar Industry

	Full	% Full on							
Dam Name	Volume (Cubic Meters)	March 31, 2017	March 29, 2018	April 2, 2019	April 2, 2020	March 23, 2021	April 22, 2022	Feb 13, 2023	
Tugwi Mukosi	1,802,600	69	74	59	42	104	100	91	
Mutirikwi	1,378,080	36	50	52	40	96	100	97	
Manjirenji	274,170	95	94	83	71	96	80	53	
Manyuchi	30,600	103	107	77	51	102	100	84	

Source: Zimbabwe National Water Authority

**Table 2** provides statistics on Zimbabwe's sugar cane production and yields from MY 2014/15 to MY 2023/24. While average yields are estimated at 78.9 MT/Ha in the 2023/24 MY, the variation in yields in the country ranges widely from 4 MT/Ha for poorly performing farms to about 200 MT/Ha for well managed sugar estates.

**Table 2: Zimbabwe Sugar Cane Production and Yields** 

Marketing Year	Area Planted (Ha)	Area Harvested (Ha)	Cane Crushed (MT)	Yield (MT/ha)
2014/15	44,749	43,121	3,856,000	89.4
2015/16	44,952	43,094	3,348,000	77.7
2016/17	45,339	43,500	3,483,000	80.1
2017/18	45,245	41,000	3,101,000	75.6
2018/19	47,055	45,000	3,582,994	79.6
2019/20	48,937	46,000	3,562,000	77.4
2020/21	53,000	47,000	3,543,771	75.4
2021/22	54,000	47,000	3,450,000	73.4
2022/23*	54,000	43,022	3,452,873	75.0
2023/24**	54,350	44,371	3,499,586	78.9

<sup>\*</sup>Post Estimate \*\*Post Forecast

Sources: Zimbabwe Cane Farmers Association and Post Forecasts

Table 3: Production, Supply, and Distribution (PSD) Table for Sugar Cane

Sugar Cane for Centrifugal	2021/	2022	2022/2023 2023/202			2024	
Market Year Begins	Apr 2	2021	Apr 2022		Apr	Apr 2024	
Zimbabwe	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post	
Area Planted (1000 HA)	54	54	55	54	0	54	
Area Harvested (1000 HA)	47	47	49	43	0	44	
Production (1000 MT)	3518	3450	3669	3453	0	3500	
Total Supply (1000 MT)	3518	3450	3669	3453	0	3500	
Utilization for Sugar (1000 MT)	3450	3382	3600	3384	0	3431	
Utilizatn for Alcohol (1000 MT)	68	68	69	69	0	69	
Total Utilization (1000 MT)	3518	3450	3669	3453	0	3500	
(1000 HA) ,(1000 MT)	<u> </u>			I			

(1000 HA),(1000 MH)

## Sugar:

#### **Production**

Post forecast that sugar production in Zimbabwe will increase by 3 percent to 410,000 MT in MY 2023/24, up from 396,683 MT in MY 2022/23. This is based on an increase in the quantity of sugar delivered to mills, improved sugar cane quality (sucrose content), and constant sugar mill efficiencies (sugar recovery rate). Sugar recovery/extraction rate refers to the amount of sugar obtained from a metric ton of sugar cane, expressed as a percentage.

Zimbabwe's sugar production in MY 2022/23 was revised down to 396,683 MT based on updated lower-than-expected quantities of sugar cane delivered to the mills, poor sugar cane quality, and lower mill efficiencies. Quality of cane deliveries was affected by yellow sugarcane aphid and intermittent heavy rainfall. These affected the sugar content available for extraction.

**Figure 3** shows that for MY 2023/24 and MY 2022/23 sugar production is still below the 10-year industry average and has not returned to the peak production of 452,972 MT achieved in the MY 2018/19.

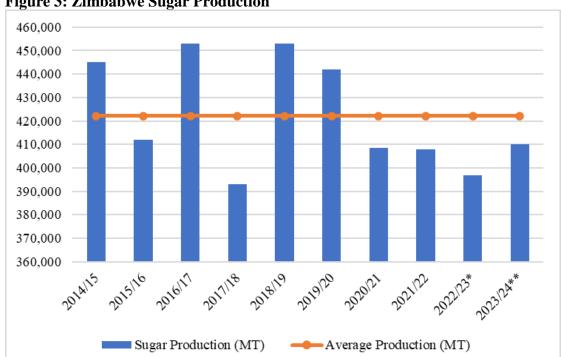


Figure 3: Zimbabwe Sugar Production

\*Post Estimate \*\*Post Forecast

Sources: Zimbabwe Cane Farmers Association and Post Forecasts

**Table 4** below shows that the sugar-to-cane ratio is forecasted increase slightly to 11.7 percent in the MY 2023/24, based on an anticipated increase in milling efficiency.

**Table 4: Zimbabwe Sugar Production and Mill Sugar Recovery Rates** 

Marketing Year	Cane crushed (MT)	Sugar Production (MT)	Sugar/Cane Ratio (Percentage)
2014/15	3,856,000	445,000	11.5%
2015/16	3,348,000	412,000	12.3%
2016/17	3,483,000	453,000	13.0%
2017/18	3,101,000	393,000	12.7%
2018/19	3,582,994	452,972	12.6%
2019/20	3,562,000	442,000	12.4%
2020/21	3,543,771	408,518	11.5%
2021/22	3,450,000	408,000	11.8%
2022/23*	3,452,873	396,683	11.5%
2023/24**	3,499,586	410,000	11.7%

<sup>\*</sup>Post Estimate \*\*Post Forecast

Sources: Zimbabwe Cane Farmers Association and Post Forecasts

### Consumption

Post forecast that for MY 2023/24 sugar consumption in Zimbabwe will increase by 1 percent to 283,810 MT, up from 280,000 MT in MY 2022/23. This is based on population growth, increased imports of sugar volumes in MY 2022/23, and increased income especially for government employees who received a salary increase in 2023. However, record-high food price inflation limits the upside of consumption growth.

The two main categories of sugar consumers in Zimbabwe are manufacturers (beverages, confectioners, bakers, and pharmaceuticals) and private households. White sugar makes up about 30 percent of domestic sugar consumption, while brown sugar accounts for the remaining 70 percent. Independent sugar refinery Star Africa has significantly improved its processing capacity in terms of the quality and volume of refined sugar that it produces, including bottler-grade sugar (premium refined sugar that has been graded).

Zimbabwe's per capita consumption of sugar is approximately 24 kilograms (kg) per year, which is higher than the average per capita consumption in Africa of 17.2 kg/year, as well as global sugar per capita consumption of 23 kg/year. However, there are opportunities for further growth as some neighboring countries such as South Africa have per capita consumption of 45 kg/year. The growth in Zimbabwe's per capita consumption is highly constrained by the limits on consumers' disposable income and lower demand from the struggling manufacturing sector. So far in 2023, the average domestic retail price of white and brown sugar in Zimbabwe is about \$1.10/kg, down from \$1.38/kg in 2022/23. The industry currently sees minimal impact from the use of alternative sweeteners by some beverage producers, as the quantities utilized are still low.

### **Trade:**

# **Exports**

Post forecasts that Zimbabwe's sugar exports will decrease by 3 percent to 25,000 MT in the 2023/24 MY, down from 25,692 MT in MY 2022/23, based on continued decline in exports to the region and restrictive trade policies in Kenya, which was often the largest market for raw sugar exports prior to MY 2021/22. For Post's forecast and estimates, refined sugar has been converted to raw value using a factor of 1.07.

Exports to Kenya have decreased drastically since MY 2021/22 as that country drastically decreased its duty-free import quota for countries in the Common Market for Eastern and Southern Africa (COMESA) from 300,000 MT to 210,163 MT. Volumes outside of the quota are subject to a 100 percent tariff rate. As a result, Zimbabwe has not exported raw sugar to Kenya since March of 2021.

**Table 5: Raw Sugar Exports** 

	Zimbabw	e Export Statist	ics					
Commodity: Raw Sugar, HS170111, HS170112, HS170113, HS170114 May - April								
World	T	98,769	86,617	19,992	18,887			
United States Consumption	T	13,804	19,378	13,087	17,751			
Botswana	T	43	5,865	1,901	1,136			
Kenya	T	62,349	60,630	-	-			
Namibia	T	-	-	4,944	-			
EU 27 External Trade (Brexit)	T	19,909	-	-	-			
South Africa	T	2,664	744	-	-			
Zambia	Т	_	_	60	_			

Source: Trade Data Monitor

**Table 6: Refined Sugar Exports** 

Zimbabwe Export Statistics Commodity: Refined Sugar, HS170191, HS170199 May - April								
Reporter Unit 2019/20 2020/21 2021/22 2022/23 <sup>3</sup>								
World	T 16,309 13,698 8,725 6,8							
Kenya	T	11,280	12,680	3,344	6,805			
Botswana	T	1	0	0	0			
Namibia	T	3,073	0	5,345	0			
Peru	T	0	0	0	0			
South Africa	T	1,955	1,019	36	0			

Source: Trade Data Monitor

\*Export data through February 2023

*Note:* Refined sugar volumes in this table have been converted to raw value using a factor of 1.07.

<sup>\*</sup>Export data through March 2023

## **Imports**

Post forecasts that sugar imports will decline by 46 percent to 10,000 MT in MY 2023/24 from 18,388 MT in MY 2022/23. This is based on a re-imposed import tariff which will drive down the demand for imported sugar. From May-November 2022, the Zimbabwean government removed import duties for various products to increase supply in the market and control for hyperinflation. Zimbabwe uses the U.S. dollar, so exporters entered the market to earn in dollar terms, even if it was below their cost of production. This caused a spike in sugar imports for MY 2022/23, but with the tariff reimposed for MY 2023/34, Post expects a return to more typical import volumes. Imports by Zimbabwe in MY 2022/23 came mostly from South Africa. Additionally, due to increases in imports (and transshipments), fortified vitamin A sugar was found in the market. Prior to MY 2021/22 Zimbabwean sugar imports were minimal as shown in **Tables 7 and 8**, due to the adequate raw sugar supply in the domestic market. Sugar imports in MY2022/23 are mainly from other countries in the Southern African Development Community (SADC).

**Table 7: Raw Sugar Imports** 

Table 7. Kaw Bugai	Imports								
Zimbabwe Import Statistics									
Commodity: Raw Sugar, HS170111, HS170112, HS170113, HS170114									
	May – April								
<b>Partner Country</b>	Partner Country Unit 2019/20 2020/21 2021/22 2022/23*								
World	World T 36 913 1,697 3,38								
South Africa	T	36	695	180	2,931				
Zambia	T	0	0	1,514	420				
Botswana	T	0	218	0	37				
India	T	0	0	3	0				

Source: Trade Data Monitor

**Table 8: Refined Sugar Imports** 

Zimbabwe Import Statistics Commodity: Refined Sugar, HS170191, HS170199									
May - April									
Partner country Unit 2019/20 2020/21 2021/22 2022/23*									
World	T	55	1,835	2,902	14,311				
Namibia	T	-	-	1,019	7,184				
India	T	1	-	-	4,179				
South Africa	T	54	1,835	295	2,558				
Thailand	T	-	-	-	321				
Botswana	T	-	-	-	68				
Serbia	T	-	-	11	-				
EU 27 External Trade (Brexit)	EU 27 External Trade (Brexit) T								
Zambia	T	-	-	1,577	-				

Source: Trade Data Monitor

*Note:* Refined sugar volumes in this table have been converted to raw value using a factor of 1.07.

<sup>\*</sup>Export data through February 2023

<sup>\*</sup>Export data through February 2023

# **Closing Stocks**

Post forecasts that closing stocks will increase significantly to 406,000 MT in MY 2023/24, up from 295,000 MT in MY 2022/23, based on the increase in sugar production and a decrease in exports in 2022/23 and 2023/24. All the sugar produced in each marketing year is considered sold at the end of the season in order for the industry to share the revenue between growers and millers per the agreed "division of proceeds" formulas used by the milling companies and industry. Ownership of closing stocks is usually held by wholesalers, retailers, refineries, and to a limited extent, the Zimbabwe Sugar Sales Company Dose a cost challenge to the industry, as growers and millers have to pay for the storage of such sugar.

Table 9: Production, Supply, and Distribution (PSD) Table for Sugar

Sugar, Centrifugal	2021/2	2022	2022/	2023	2023/2	2024	
Market Year Begins	May	May 2021		May 2022		May 2023	
Zimbabwe	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post	
Beginning Stocks (1000 MT)	82	82	111	186	0	295	
Beet Sugar Production (1000 MT)	0	0	0	0	0	0	
Cane Sugar Production (1000 MT)	408	408	418	397	0	410	
<b>Total Sugar Production</b> (1000 MT)	408	408	418	397	0	410	
Raw Imports (1000 MT)	1	2	1	3	0	3	
Refined Imp.(Raw Val) (1000 MT)	1	3	1	15	0	7	
Total Imports (1000 MT)	2	5	2	18	0	10	
Total Supply (1000 MT)	492	495	531	601	0	715	
Raw Exports (1000 MT)	88	20	92	19	0	19	
Refined Exp.(Raw Val) (1000 MT)	13	9	13	7	0	6	
Total Exports (1000 MT)	101	29	105	26	0	25	
<b>Human Dom. Consumption</b> (1000 MT)	280	280	280	280	0	284	
Other Disappearance (1000 MT)	0	0	0	0	0	0	
Total Use (1000 MT)	280	280	280	280	0	284	
Ending Stocks (1000 MT)	111	186	146	295	0	406	
Total Distribution (1000 MT)	492	495	531	601	0	715	
(1000 MT)	I	I		I	I		

## **Trade Policy and Regulations:**

## U.S. Sugar TRQ

The United States allows duty-free access for Zimbabwe sugar exports under the TRQ program. The total TRQ allocation and re-allocations offered to Zimbabwe averages about 12,000 to 14,000 MT annually. Zimbabwe usually fully utilizes its sugar quota as prices in the U.S. market remain attractive compared to other countries. Post expects that Zimbabwe will fully utilize its allocated TRQ in MY's 2023/24 and 2022/23.

#### **Customs Duties**

In 2014, the Zimbabwe government instituted a 10 percent customs duty plus \$100/MT surtax on all sugar imports from countries outside of SADC and the Common Market for Eastern and Sothern Africa (COMESA) in a bid to protect the local industry from an influx of sugar imports from countries such as Brazil and India. In May 2022, the Zimbabwean government suspended custom duties on importation of basic commodities for a period of six months until November 2022, to avert serious shortages of basic commodities. This means that products could get into Zimbabwe duty free and increased availability of sugar in the market. This tariff was then re-instituted on November 16, 2022, at 10 percent customs duty plus \$100/MT surtax on all sugar imports from countries outside of SADC and COMESA.

### **Star Africa Corporation Limited**

On February 13, 2023, Star Africa Corporation Limited in Zimbabwe announced that it had decided to shut down its sugar refinery plant at its Goldstar Sugars Harare branch. This comes after the company engaged in a discussion with its raw sugar supplier, following significant raw sugar price increase and untenable trading conditions. A week later, on February 19, 2023, operations at the Goldstar Sugars Harare resumed following the successful resolution of the pricing of raw sugar.

### **Import Permits**

In 2014, the government confirmed that no raw sugar import permits would be issued for countries other than members of SADC and COMESA. However, this import permit restriction, does not apply to sugar imports intended to satisfy the requirements for bottler-grade sugar. Zimbabwe believes that there is an untapped market for sugar in African countries, and the prospective implementation of the African Continental Free Trade Area (AfCFTA) presents favorable market opportunities.

### **Domestic Retail Sugar Price Support**

Star Africa Corporation, an independent refinery, supplies the majority (at least 80 percent) of refined sugar in Zimbabwe. To maintain low retail prices for sugar in Zimbabwe, the government negotiates a fair price at which Star Africa buys raw sugar from the sugar mills. As a result, Star Africa is also required to obtain permission from the government to increase the wholesale and retail prices of refined sugar sold in Zimbabwe.

### **Ethanol Production**

Zimbabwe introduced mandatory blending of fuel with ethanol in 2011. Currently, minimum mandatory blending of vehicle fuels with ethanol is 20 percent, but the level varies depending on the domestic supply and availability of ethanol. Green Fuels had a monopoly in the production and supply of ethanol for fuel blending purposes. However, Triangle Sugar recently entered into a partnership with the National Oil Company of Zimbabwe, to produce and market ethanol for fuel-blending purposes. There are about 11 companies with licenses to blend ethanol into gasoline for retail sale at the pump.

Post estimates that total annual ethanol production in Zimbabwe ranges between 40 million to 120 million liters. The volume varies based on changes in sugar cane production, the quality of sugar cane, and factory efficiencies. Green Fuels has about 9,000 ha under cultivation for sugar cane for the sole purpose of ethanol production. The company has the capacity to produce about 120 million liters of ethanol annually. Fuel-grade ethanol produced by Triangle Sugar is a complementary product to sugar and is produced from molasses, a co-product of sugar production. This makes ethanol produced by Triangle Sugar cheaper than the ethanol produced by Green Fuels from fermentable sugar. Triangle Sugar's ethanol production is estimated to range from 20 to 50 million liters annually.

## **Cogeneration of Electricity**

The Hippo Valley and Triangle Sugar Mills generate sufficient electricity by burning bagasse to power their mills during peak production periods. They can also supply surplus electricity to the national grid. An electricity swap agreement was made with the Zimbabwe Power Company for the sugar mills to supply electricity to the national grid during the mills' peak production periods and to draw down some electricity from the national grid during off-peak periods. As a result, the net usage of electricity by the sugar mills is believed to be minimal.

#### **Vitamin A Fortification**

In 2017, the Zimbabwean government implemented a regulation for the mandatory fortification of household sugar with Vitamin A. This regulation was passed as part of the Zimbabwe National Food Fortification Strategy 2014-2018, which is aligned to the National Food and Nutrition Strategy for Zimbabwe that serves as a guideline to both policy and implementation levels to prevent micronutrient deficiencies. The strategy was developed to address the micronutrient deficiency burden in the country as revealed by the 2012 Zimbabwe Micronutrient Survey. According to the survey, 19 percent of children aged 6-59 months are vitamin A deficient, while 72 percent have iron deficiency, and 31 percent are anemic.

# Project Kilimanjaro

Project Kilimanjaro is an initiative by the Zimbabwean government, Tongaat Hulett and private banks that aims to assist up to 1,070 private farmers supplying cane to mills to increase productivity on their 22,822 ha by increasing yields to at least 100tons/ha by MY 2023/24. The project plans to develop 4,000 ha of virgin land into new sugar cane fields to benefit a further 200 new farmers on a full cost recovery basis, creating 2,000 new jobs. About R309 million (\$17.1 million) has been spent to date with 2,700

hectares of virgin land having been cleared, storage dams and water canals built, water pumps installed, and 455 hectares planted to cane.

### **Sources:**

Green Fuels – <a href="https://www.greenfuel.co.zw">https://www.greenfuel.co.zw</a>
Star Africa Corporation – <a href="http://www.starafricacorporation.com/">http://www.starafricacorporation.com/</a>
Tongaat Hulett – <a href="http://www.tongaat.co.za/">https://www.tongaat.co.za/</a>
Zimbabwe Sugar Association Experiment Station - <a href="https://www.zsaes.org.zw/">https://www.zsaes.org.zw/</a>
Zimbabwe National Water Authority – <a href="http://www.zinwa.co.zw">https://www.zinwa.co.zw</a>

### **Attachments:**

No Attachments