

CTRM for Sugar

Managing Sugar's Complexity



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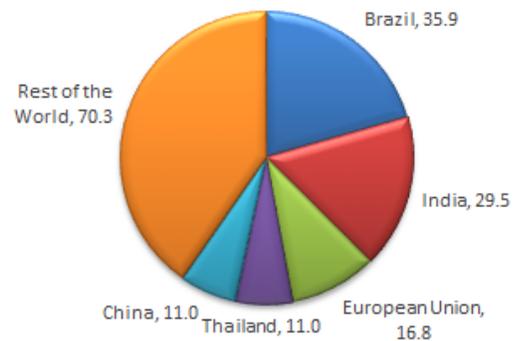
**Commodity
Technology
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CTRM Market Research, Analysis and Insights

INTRODUCTION

Sugar is produced in more than 120 countries and global production is now more than 174 Million tons a year. Approximately 70% of this is produced from sugar cane, largely grown in tropical countries, and the remaining 30% is produced from sugar beet, a root crop grown mostly in northern temperate zones. The primary use and market for sugar is the food industry, as sugar is used as a sweetener, preservative, texture modifier, fermentation substrate, flavoring and coloring agent, bulking agent and to add decoration to food items, such as cakes.

World Sugar Production 2014/15
(Mil. Metric Tonnes)



This paper looks at this important commodity in terms of its supply chain, markets, price formation and most importantly, unique functional requirements in a CTRM solution. While there are many CTRM software solutions on the market, there are many fewer that can truly handle the unique aspects of sugar trading. The paper identifies the unique characteristics of sugar trading and sugar trading that needs to be included in a sugar-focused CTRM solution.

SUGAR CANE

Sugar cane is essentially a giant grass that grows up to 3 meters in height in tropical and semitropical regions. It needs rainfall and sunlight to grow and the majority of the sugar cane production is not irrigated, relying solely on rainfall. Harvesting the sugar cane is performed either manually or mechanically, and in both cases the cane is cut close to the ground and the leaves removed. The plant re-grows each year from the original root, but requires replacement after an average 7-year period.

The harvested sugar cane is transported as quickly as possible to the sugar mill to maximize the extraction of the sugar. The sugar mill is typically located close by the sugar cane growing area in order to avoid delays, reduce transport costs and related environmental impacts.

At the mill, the cane will be crushed and the juices will be collected. The cane juice will then be cleaned using slaked lime, and then reduced to syrup via boiling off of excess water. Finally, the syrup is crystallized through additional boiling allowing sugar crystals to grow. Once the sugar is in a crystalline state, any excess liquids are spun out in centrifuges and the crystals are dried with hot air. Once dried, the crystalline sugar is placed in storage, awaiting shipping.

The remaining cane fiber material is often used to generate energy (co-generation) required for the processing plant.

Usually, these local mills produce raw sugar that requires refining to a pure form; however, in some cases the sugar mills have been modified to enable production of direct consumption sugars.

Raw sugar is shipped in bulk ocean-going vessels from the sugar mill directly to port-based refineries, which will remove any remaining impurities and color from the raw sugar. Once refined, the sugar can then be tailored to meet the customers' requirements. A full portfolio of sugars is produced in crystal, liquid and syrup form.

SUGAR BEET

White beet sugar is made from the beets in a single process rather than the two steps required for cane sugar. The beets are harvested in the autumn and early winter and transported to the factory by large trucks. Beet is a rotational crop requiring almost 4 times the land area of an equivalent sugar cane crop. The beets have to be thoroughly washed and separated from mud, stones, leaves and other debris and waste before being processed.

The clean beet is then sliced into thin chips to increase the surface area of the beet for enhanced sugar extraction. These chips are placed in a diffuser with hot water for around an hour. Afterwards, the exhausted beet slices are run through screw presses to extract as much of the juice as possible. The pressed beet is then turned into pellets, which are used as a constituent of animal feed.

The raw juice will usually contain about 14% sugar and it must be cleaned before it can be used for sugar production. Once cleaned through a process known as carbonatation, the liquid is processed in a multi-stage evaporator to reduce it to

a sugar syrup. Finally, that syrup is placed into a very large pan, typically holding 60 tons or more of sugar syrup, where the remaining water is boiled off until sugar crystals grow. The wet crystalline sugar is then spun in centrifuges to separate the liquid. The crystals are then fully dried with hot air prior to being packed and/or stored ready for shipping. The final sugar is white and ready for use, whether in the kitchen or by an industrial user, such as a soft drink manufacturer.

A byproduct of the beet refining process is beet molasses, which is usually turned into a cattle feed, or sent to a fermentation plant such as a distillery for alcohol production.

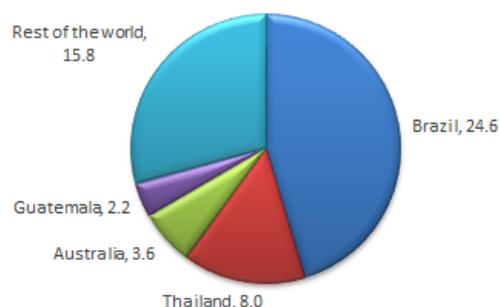
THE SOUTHERN HEMISPHERE IS DOMINATING EXPORTS

Brazil is currently the world's largest producer of white, also known as centrifugal or fully refined, sugar with annual production in 2014/15 of almost 36 million tonnes of sugar in 2014 accounting for slightly more than 20% of the total global production. Brazil's exports accounted for about 45% of the worldwide sugar exports last year. While much of the sugar cane grown in Brazil is used for refined sugar, a large portion of crop has been used for the production of ethanol to supply the Brazilian market for motor fuels and has made the country the largest user of ethanol in the world.

India, the world's second largest producer at 29.5 million tonnes, is also the world's largest consumer, leaving it outside of export and import rankings.

Thailand has become a significant exporter of raw sugar in recent years, with the country now ranking second only behind Brazil. With annual production in 2014 of 11 million tonnes, up from 9.7 million tonnes in 2010; and with flat domestic consumption during the same period at around 2.5 million tonnes, the country is a significant source of raw sugar for the rest of the world.

Global Sugar Exports 2014/15
(Million Metric Tonnes)



IMPORTS ARE HISTORICALLY INFLUENCED BY REGULATIONS

China is one of the top five producing countries in the world at 11 million tonnes in 2014 and its increasing population and growing middle class has led to increasing consumption. Since 2011 the country's sugar imports have more than doubled, growing from 2.1 million tonnes in that year to 4.8 million tonnes in 2014, making it the world's largest importer.

The US produces about 7.7 million tonnes per year, but faces a net consumption shortfall of 3.1 million tonnes, which is met through imports. These imports are mainly supplied from Mexico that aggressively competes for the US domestic market. Trade regulations and quota systems are severely impacting sugar flows between US and its adjacent countries Mexico, Canada and consequently prices.

Similarly, the European Union, though a significant producer and a region in which sugar consumption has declined in recent years, will typically import more sugar than it exports in any given year. In 2014 the EU countries exported 1.5 million tonnes, while importing some 3 million tonnes. The latter highly influenced by trade regulations, price regulations and export quotas set by the European Union.

The EU has announced the ending of sugar quotas in 2017 as well as the ending of the export limit and guaranteed prices offered to sugar beet growers. This is widely expected to have a significant impact on the players, supply chain and prices, as European prices should fall to general world market levels. As a result consolidation in the industry is expected as producers and marketers jostle for position.

Since the cost of production of White Sugar within the EU is relatively low (versus refined Raw Sugar), its production is expected to increase substantially after the EU market liberalization. With the ending of export limits, Europe's position as a net importer could change significantly.

SUGAR THE PHYSICAL MARKETS – RAW AND WHITE!

As previously noted, sugar is derived from either sugar cane or sugar beets. Given that sugar sourced from Beet requires a single stage of processing, beet sugar is always produced and traded in its “white” consumable form, as opposed to cane sugar, which is traded in either a raw form after milling, or a white form after refining. Since the refining step requires significant cost, white sugar is traded at a premium over raw sugar.

Raw sugar supply is very concentrated in Brazil and Thailand, but raw sugar refining is more dispersed, as is consumption of white sugar. Raw sugar trading has seen growth with the advent of refineries being built near the ports where sugar is imported and today a large portion of the global sugar trade is in raw, or unrefined cane sugar, it is however a somewhat consolidated and bulk orientated market.

The expansion of the white sugar trade has been tied to the emergence of the EU as a large exporter and the rise of sugar demand in the Arab world and Black Africa in the 1970s. For many years, the EU had a market share of 50% in white sugar,



but the growth of refining capacity at destination (in particular on the North African Continent and the Middle East) has helped re-direct some of the white sugar demand. Additionally, low quality white sugars have begun to displace high quality white sugars. Today refineries at destination represent 60% of global white sugar exports. Since white sugar directly flows to food industrials and end consumers, the white sugar market is much more fragmented than the raw sugar market. The ten largest importing countries representing less than 45% of white sugar demand, and almost endless number of specifications, logistic varieties and buyers.

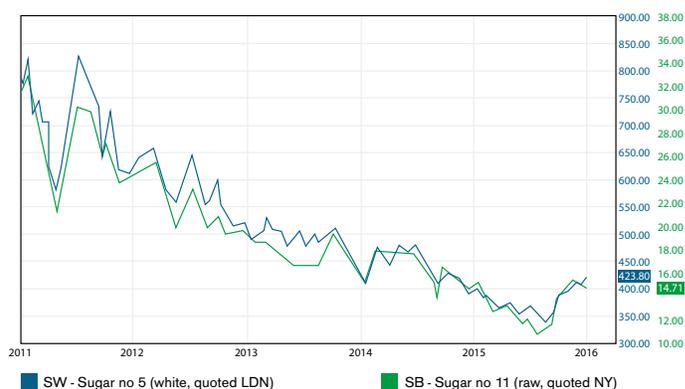
SUGAR TRADING FUTURES MARKETS

The futures contract for sugar is traded at the Intercontinental Exchange (ICE), Brazilian Mercantile and Futures Exchange (BF&M), Kansai Commodities Exchange (KEX), Multi Commodity Exchange (MCX), National Commodity Exchange Limited (NCEL), National Commodities and Derivatives Exchange (NCDEX) and Zhengzhou Commodity (CZCE) Exchange. Sugar options are also offered as several exchanges. The most important exchange is the New York Mercantile Exchange (NYMEX) and sugar prices at this exchange function as a benchmark for sugar prices.

At the NYMEX, sugar futures no. 11 for raw sugar are traded, on ICE sugar futures no. 16 represent raw sugar, while at NYSE Euronext it is sugar futures contract No. 407 representing either white beet, cane crystal or refined sugar. Finally, the Olsa de Mercadorias & Futuros, offers sugar futures contracts for cane crystal sugar.

Despite that, these different futures contracts are based on the origin of the product and the area in which they are being traded, but most contracts are denominated in USD. Originally, futures contracts were based on bulk shipments, but since white sugar is increasingly shipped and traded on a container basis, in 2015, ICE announced a new sugar futures contract for

containerized white sugar. This contract will start to be traded in the first quarter of 2016 with first maturity in August 2016.



SUGAR MARKET PRICES

The sugar commodity market liquidity and price level can be impacted by a number of factors. Historically, Sugar production is subsidized and tariffed by governments to secure local supply or to support farmers. Despite trade agreements and loosening regulations, today Sugar remains one of the most heavily subsidized commodities worldwide and changing government policies significantly impact price levels and sugar trade flows.

Since the impact of governments is so dominant, one could say that 'the real price of sugar' is actually unknown. One thing is clear, given its cost of production, and the recent developments from a supply and demand perspective, in a truly competitive trading environment, sugar prices might be significantly less.

In recent years, the supply side seems to have dominated price developments; world stocks and stocks to usage ratios have been historically high. There are, however a number of other factors significantly influencing Sugar price levels.

First and foremost is the demand for ethanol, as biofuels become more appealing to buyers when the price of oil rises. As with all agriculture crops, weather forecasts, crop area and yield projects influence sugar prices. On the demand side, the growing population and increasing income levels in the Asia Pac region have increased the consumption and demand for sugar and that trend is expected to continue for the foreseeable future. Finally, increasing awareness of the health issues associated with too much sugar in the diet is having a negative impact on demand or growth of demand, in particular in the markets in the Northern Hemisphere.

Sugar is a complex commodity. It is traded at different geographical and functional markets and in these markets traders, merchandisers and consumers all value and use different specifications. Raw sugar is priced based on terminal markets, but in pricing and settlement, the purity of the non-refined sugar is a key price denominator. Purity of raw sugar can be measured with a spectrometer and is determined by the degree of polarization. The Polarization Premium is an important aspect of the raw sugar price. White sugar is traded at a premium over raw sugar and different types of white sugar have different premiums.



PHYSICAL SUGAR TRADING - THE COMMODITIES TRADED

As sugar is a processed commodity rather than a harvested commodity, sugar is traded in one of its processed forms. Trading and price formation requires references and standards and, over the years a set of quality standards were formed. Additional price formation complexity originates from the need of the global sugar consumption industries to set their own product specifications (e.g. Coca Cola spec) and the market increasingly moving from bulk to containerized logistics and trade.

- THE SUGAR COMMODITY COMPLEX**
- Raw Sugar
 - Refined Sugar
 - Refined Sugar - Fine Granulated
 - White Crystal Sugar
 - Crystal Muscavado
 - Demerara
 - Caster Icing
 - Premium Liquid Sugar
 - Fine Liquid Sugar Invert

When it comes to quality and specifications, the International Commission for Uniform Methods of Sugar Analysis is the provider of the ICUMSA standards and an ICUMSA rating is an international unit for expressing the purity of the sugar in solution, and is directly related to the color of the sugar.

/ White Refined Sugar - ICUMSA 45

A highly refined sugar product, Icumsa 45 is easily recognizable by its distinctive sparkling white color and pure sucrose taste. It is considered to be the world's leading consumer sugar that possesses a standard by which other types of sugar are measured against.

/ Sugar - ICUMSA 100

Icumsa 100 is refined sugar that has a lower grade and lower production cost than Icumsa 45. Having a light white color, this kind of sugar does not possess the visual appeal of sparkling white Icumsa 45, however, Icumsa 100 is still a food grade sugar that is safe for human consumption.

/ White Crystal Sugar - ICUMSA 150

Is recommended for most customers since it contains fewer chemicals, it is more readily available, and it is a lower cost replacement to the traditional white refined sugar, Icumsa 45. It is produced by crystallization process, with the absence of chemical refining.

/ VHP Sugar - ICUMSA 600-1200

The term VHP (Very High Polarity) is widely understood to mean that 99.4 percent (or expressed as a polarization of 99.4) of the total mass of the raw sugar is pure sucrose, and that only 0.6 percent or less is waste material. Such a relatively low contaminants level, cause this sugar to have a light brown in color. VHP remains in high demand, as it is much cheaper and easier to refine than standard raw sugars.

SUPPLY CHAIN PARTICIPANTS

The sugar market comprises a number of supply chain participants with the companies in each participating in some way in the trade flow and price formation. These include produces (plantations, famers), traders, millers refineries, distilleries, processors, marketers and buyers. Marketers and traders will most likely be involved in connecting geographical markets as supply chain participants and are expected to use futures markets to bridge exposure and time and for some, to gain some benefits in

a speculative trading mode. Producers and consumers of sugar will focus more on the physical side of the business, bridge the functional markets (raw/white), optimize their supply chain and are capital based whilst utilizing futures markets for hedging and price/margin risk management. These different types of Supply Chain Participants create the different needs and requirements for Commodity Trading and Risk Management (CTRM) software for the Sugar industry.

CTRM – EXAMPLES OF DEALING WITH THE COMPLEXITIES OF SUGAR

Commodity Trade and Risk Management solutions for sugar obviously need to be able to handle the general complexities of any particular commodity along with providing features such as usability, performance and integration. As indicated earlier, different market and supply chain participants have different business objectives and/or processes, and it is essential for these participants to be able to manage, trade and arbitrage on and between these markets. A Sugar CTRM should be able to support these different processes and objectives.

Sugar trading has a number of very specific aspects to it that should be functionally supported by a CTRM solution, for that CTRM solution to be effective.

/ Since there are multiple future markets for sugar, a CTRM solution for Physical Sugar needs to offer the flexibility to configure multiple trading books, each of them reflecting the hedging market to be used or a proxy of that hedging market.

/ Sugar is unique in the sense that it has two principal markets or products that can be converted to each other physically. Raw sugar can be processed and converted into white sugar and hence there is a differential known as the 'white premium' that can

value the conversion. The premium can change daily based on things like fuel costs and needs to be tracked. The white premium has to be handled by a CTRM used for sugar explicitly for the usage of pricing, but also to support rolling the premium.

- / Polarization is a quality measure. The clearer the sugar crystals, the less it costs to convert raw sugar into white sugar and therefore polarization (a quality measured using laboratory testing) is expressed in the contract and pricing terms. This quality aspect is specific to sugar and also need to be tracked by the CTRM for pricing, and settlement purposes, but it is also used to determine cost accruals and is utilized in valuation calculations to gain an accurate picture of Profit and Loss.
- / Over time, a number of product properties have emerged that also need to be 'understood' by the CTRM and these are specific to sugar. Examples are the Coca Cola specification and the ICUM-SA classifications. All of these product properties need to be captured and held in the CTRM solution. For refineries and millers, customized and changing specifications need to be supported as well, including but not limited to a wide range of product forms and packaging alternatives.
- / Many trades in sugar are traded at "prices to be fixed". This creates a need for insight in to the position to be obtained in the future. This requires position screens to show the 'to be price fixed' positions as well as overall position for each distinguished hedging market, it also requires an efficient invoicing process, as 'too be fixed' contracts are usually time consuming to settle;
- / Deposit Payment Terms - Commonly, white sugar traders will utilize deposit payment terms to minimize counterparty credit issues. The latter is also

required to be able to serve smaller counterparties in smaller quantities efficiently, broadly eliminating counterparty risk. Complex deposit terms combined with complex pricing structures, both incepted at deal capture, and controlled over the time of the contract, might create inefficiencies and risks when badly managed. A sugar solution should address this complexity from all (deal capture and a counterparty credit \ risk, settlement) perspectives.

- / Break bulk and bulk logistics – In sugar trading, managing logistics is made more complex by the fact that while white sugar is usually containerized, raw sugar can be traded in bulk. This means that a CTRM system for sugar must be able to handle both types of movement efficiently. For white sugar, containers will need to be tracked; deliveries may be made up of single or multiple containers whose movements need to be managed. On the other hand, bulk raw sugar requires a number of different items to be handled including loading times and vessel size, for example. Many CTRM solutions can cater for one or the other type of logistics but not both.
- / The sugar market is very dynamic and the sugar trade continuously adapts to a growing and changing market, eliminating inefficiencies as perceived by its participants. For example, reflecting the need for smaller size trades, more efficient and less bulky supply chains containerized trade of white sugar emerged. The new ICE containerized sugar futures will be available as of Q1 2016. Additionally, the ending of EU quotas, export limits and guaranteed prices, will almost certainly result in some market dynamic changes that will have an impact on your CTRM requirements. A Sugar CTRM should be able to cope with changing trading practices and environments as such.

These examples are just a few of the specific functional requirements for sugar trading that may not be supported in a generic CTRM solution, or may require some significant workarounds. As general guidance, anyone looking to procure a CTRM solution for its sugar trading or sugar procurement business should ensure that the short-listed CTRM solutions are able to handle such specifics, along with all of the other expected functions and features of a good and usable solution. Experience shows that when considering the sugar-specific functional criteria outlined above, the number of potential CTRM solutions is narrowed considerably.

AGIBLOCKS – A TRUE SUGAR SOLUTION

Agiboo's AGIBLOCKS CTRM solution, like many others, is a multi company, multi-commodity software application. It is a complete "out of the box" solution, available on premise and in the cloud. Built on modern technology, it provides functionality for trading physical commodities and their terminal market instruments. It supports contract management, logistics fulfillment, forex and hedging, and it has tools for real-time risk analysis and risk management. It supports both trading management and financial management from the same source of data and within the same application. Its modular structure allows users to implement an end-to-end solution or to select individual functions to implement only the functions that are needed.

While AGIBLOCKS is a strong contender across many commodities, including Coffee, Cocoa, Grains, Oilseeds, and Dairy, it is extremely strong in terms of meeting the specific requirements of the sugar markets. This is evidenced by the number of reputable customers that have implemented and are using AGIBLOCKS, to support their day-to-day sugar trading and/or merchandising businesses.

Wim Depla at Hottlet Sugar Trading, pointed to this issue specifically saying, "Finding a suitable commodity trade and risk management solution for sugar is not that easy as might look

on the surface. There are only few software solution providers specialized in sugar trade. Sugar has its specifics which all need to be incorporated in one single approach. Missing a crucial functionality would make a solution unusable. The People at AGIBOO immediately understood our requirements and needs, because of their specialization in sugar trade solutions."

AGIBLOCKS provides all of the specific and generic functionalities discussed above that are relevant to sugar and probably should be on any shortlist of CTRM software for companies involved in sugar markets that have a CTRM software need.



Start	Dashboard	Settings	Advanced		
Counterparties	Purchase contracts	Sales contracts	Positions	Futures	Forex contracts
Price confirmations	Reservations	Deliveries	Transports	Relations	Inventory
Invoices	Internal companies	Mark to market	Market data	Options	Unrealized P&L
Realized P&L	Past realized P&L	Reports		Dashboard	

ABOUT AGIBOO

Agiboo BV headquartered in The Netherlands is a provider of commodity trade and risk management solutions with a focus on agricultural and soft commodities and in specific on Cocoa, Coffee, Sugar, Dairy and Grains. The flagship product Agiblocks has been adopted in the commodity trade and risk management industry since 2011.

The commodity trade and risk management software AGIBLOCKS incorporates detailed understanding of the specific business and information technology requirements to successfully deploy commodity trading and risk management. AGIBLOCKS is positioned as a 'next generation' CTRM solution for commodity purchasers and traders.

Agiboo has its roots in the commodity trade and is one of the organizations driving commodity knowledge through the industry. People at Agiboo have their background in or did projects for organizations such as: Daarnhouwer, Nedcoffee, Continaf, Neumann, Louis Dreyfus, Glencore, Nutreco, Niderra, Hottlet Sugar, Tereos Commodities, RCMA Sugar, Cargill, Viterra etc. Products of Agiboo BV have been deployed in more than 15 commodity industry companies, where additional services have been delivered to more than 25 commodity industry organizations.

Senior staff at Agiboo has been exposed to senior management roles in trade, procurement, finance and information management. For its development and delivery processes Agiboo employs senior staff with each individually > 20 years experience in software development and delivery. Besides in-house consultants and developers Agiboo has long standing relations with external software development and implementation consulting companies.

AGIBLOCKS has been developed in one of the latest (2014) available software architectures and is designed to be accessible through any browser on any computer or tablet. Due to its design and its technology AGIBLOCKS offers a unique and intuitive user experience and is very scalable in its implementation. Together this facilitates easy implementations and a low total cost of ownership.

Key differentiators of AGIBLOCKS are the configurability, accessibility and specific functionality it offers for the Sugar, Cocoa, Coffee, Dairy and other softs- and agri- commodity industries.

AGIBLOCKS can be deployed on a single server on site or made available in the cloud and is offered on perpetual license or on subscription basis. These alternatives make AGIBLOCKS an attractive alternative for any existing CTRM in almost any situation.

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AGIBOO

ABOUT

Commodity Technology Advisory LLC

Commodity Technology Advisory is the leading analyst organization covering the ETRM and CTRM markets. We provide the invaluable insights into the issues and trends affecting the users and providers of the technologies that are crucial for success in the constantly evolving global commodities markets.

Patrick Reames and Gary Vasey head our team, whose combined 60-plus years in the energy and commodities markets, provides depth of understanding of the market and its issues that is unmatched and unrivaled by any analyst group.

For more information, please visit:

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