



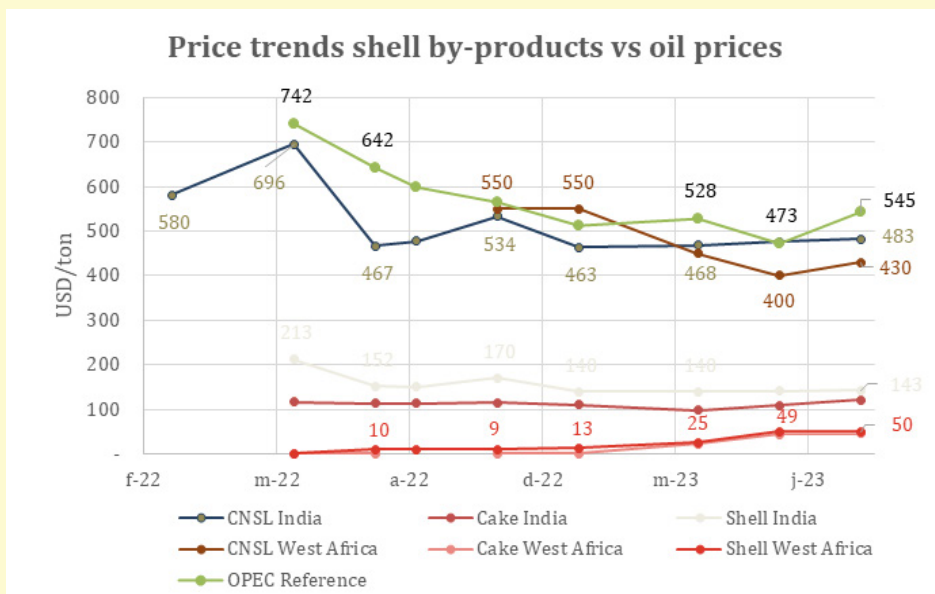
Julia Artigas Sancho
Nitidae

CLOSING THE CASHEW LOOP: THE TIME HAS COME FOR THE CASHEW SHELL

Mr Joseph Yeung, MD of MIM Cashew & Agricultural Products (Ghana), used to say that when it comes to cashew processing, there is a whole story starting from the shelling. As the nut is separated into shell (73% of the weight) and kernel (27%), we should be speaking of two differentiated products, as both are to be processed into finished goods. Indeed, up to now, the cashew industry has only focused on kernel processing. But what about the shell? There is very little knowledge, especially amongst African cashew processors on shell processing. While shell has been considered a waste stream, difficult to handle and to add value, only Asian competitors have developed a shell value chain. To date, factories with Indian capital established in Africa are almost the only ones that have installed Cashew Nuts Shell Liquid (CNSL) extraction facilities. They know that CNSL is highly valuable, and they are not afraid to handle this extraction process in parallel. Far is the time when some feared that processing shells at the factory would damage the hygiene and quality certifications for the edible produce – indeed, both activities can be managed at the venue site with proper building separation.

The reality nowadays is that cashew shells are experiencing a sudden demand in West Africa. Several European buyers have emerged, and this gave rise to the shell price, especially in Côte d'Ivoire who holds important stocks of unprocessed shells. A quick look at the Indian and Vietnamese market though, shows that the value from the shells is still way higher in Asia. Cashew shell is currently sold at more than 140 USD/ton in India, while the highest prices in Côte d'Ivoire are around 50 USD. However, CNSL FOB Abidjan is only 15% cheaper than CNSL sold internally in India. This suggests higher profit margins for CNSL processors in Africa than in India. In addition, sales of de-oiled shell cake are also possible to the export market, at very interesting rates. It can also be concluded that cashew (kernel) processors get a much smaller benefit from selling their shells based in West Africa than in Asia – though current sale prices still mean 8 to 10% of the procurement cost of raw nuts, which is very good news for the processor.

It is a good moment to invest in cashew shell extraction in West Africa. Feedstock prices are relatively low, and by-products (CNSL and shell cake) do get a fair value. Extraction and refining equipment means no rocket science in the African context, as CNSL processing only needs 5 steps, with shell milling being the highest precision stage. There is extensive knowledge in Africa on vegetable oil extraction through screw presses so knowledge and technical assistance can be readily provided. The first cashew only-shell processing factories are now being set up in Côte d'Ivoire, featuring new private actors attracted only by the shell by-products business. A new link in the cashew value chain is thus emerging, driven by the high nut volumes processed and not fully converted.



Either the actor undertaking expelling – a third person or a cashew kernel processor -, shell processing in Africa means added competitiveness to the cashew sector, a more attractive and diversified business, and a renewal of the image of the whole African cashew industry. Cashew processors now have the opportunity to switch their shells from a threat to an opportunity in their SWOT table. And the paths to give value to it are numerous as we will explain later on.

But first, let us focus on the **reasons for the worldwide growing interest in cashew shell**. CNSL market rates have always been linked to crude oil prices, as it is a cheaper substitute to mineral phenol –from it, a diversity of resins, varnishes, epoxy compounds and glues can be manufactured. As oil prices fluctuate (see the OPEC oil line in the graph), so does CNSL in both domestic – India is a self-consumer of its CNSL – and international markets. In 2021, oil prices incurred in a quick rise. As a result, CNSL then sold at less than 300 USD per MT is traded at more than 400 USD since early 2022, and that means a huge profit difference to any CNSL producer.

But since 2022 there have been two underlying additional trends: the rise of concern on the climate crisis and, in a smaller measure, the Russian-Ukrainian war. Both situations have triggered the development of conducive policies to speed-up the switch to diversified energy providers and low-emission energy sources. Biomass in its solid form, and biofuels (liquid forms of biomass) have experienced a rising demand since. The main markets are the United States, the European Union, India, and Brazil. The two latter rely almost only on domestically produced biomass, but the position of the Indian government marks a clear ambition to make the most of biofuels. In May 2022, India – the third largest consumer of crude oil in the world - approved amendments to the national biofuel policy to reduce India's dependency on oil imports to meet its energy demands. This has had important impacts on demand for biofuels, mainly substituting mineral coke or heavy oil in heating appliances. A number of biomass combustion devices has become widespread in many small to big industrial sites in India. Some energy services companies help in the switch from mineral fuels to biomass. In many cases, they recommend the use of cashew shell cake on its own or blended with other dry biomass feedstocks. These developments have come to reinforce the link between

the shell price with the oil price.

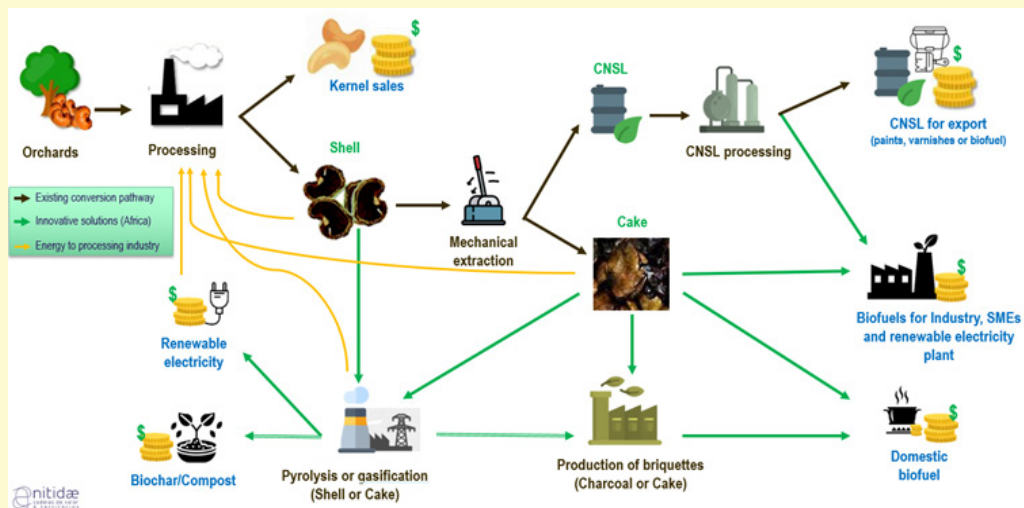
At the same time, on the Atlantic side, the European Union and the United States have set higher ambitions for renewable fuel use goals and reinforced the requirements to guarantee the renewability of imported biomass fuel. The new legislation and increasing biorefining capacities allow the use of a diversified mix of natural energy sources. Ahead of palm or soya oil to biodiesel, there is an increasing use of non-edible vegetal sources or waste materials to be transformed into fuel. Only in the European Union, the use of the so-called renewable diesel has increased by 900 million litres in 2021-2022, while the US more than doubled the renewable diesel demand (+2,000 additional million litres in the same period). Both the EU and the US make the most of the 40% expansion in consumption of renewable fuel. And believe me, there is some CNSL in all these blends. Even the wooden part of the shell, i.e. the shell cake has joined the biomass mix for industrial and household heating, as it is a 100% renewable feedstock and can be guaranteed exempted from deforestation. The share of district heat increased globally from 11% to 14%, while modern bioenergy made the largest contribution to the increase in renewable heat consumption, owing essentially to rebounding activity in the industry. This explains the steady demand for either shell and cake to be exported, and the small price difference between FOB shell and cake (see graph).

The learnings from these figures are 1. Current high mineral oil prices provide room for interesting benefits for shell derivatives, and mainly CNSL sales; 2. The demand for low-emission biofuels is bound to grow steadily, spurred by the renewable energies conducting policies. The IEA¹ forecasts a global growth of 20% in biofuel demand over 2022-2027. And 3. When it comes to shell derivatives, India is not a direct competitor as it is a net consumer, and rather seeks supply from Vietnam and other neighbouring countries.

So, where should African countries stand here? In fact, most African economies have also set targets for renewable fuels, as it is paramount to become less dependent on oil imports. Most ECOWAS countries have set increasing targets on use of biofuels until 2030, reaching 5% in Burkina Faso and Côte d'Ivoire, 5.4% in Mali, 10% in Benin and 20% in Ghana. Here again, the increasing cashew processed volumes in these countries and the relatively high prices of conventional fuels provide a good scenario for domestic sales of CNSL: Currently, these fuels are sold at 1,100 to 1,200 USD/ton in West and East African cashew producing countries. The shell oil can be sold at half the price of the kerosene (also called petroleum) or heavy fuel oil, instead of being sold for export. So, there is no need to subsidize the sector, it is all about awareness and technical readiness. Here, national cashew unions and bodies such as the African Cashew Alliance (ACA) and the IGCC could play a prominent role in reaching out to the different stakeholders to harness the whole potential for their countries. There are some examples of the use of CNSL for fuel in Africa: in Ouagadougou (Burkina Faso) and Nacala (Mozambique), respective companies in the metallurgy sector have successfully switched to CNSL fuel.

And this is not all: the de-oiled cake is a huge opportunity to substitute wood-based fuels in productive settings. Imagine bread baked with 100% renewable fuel, or your favourite edible oil refined in your country thanks to the heat supply from the shell cake. Cement, textile, and tile industries have also shown interest to switch to shell-based renewable fuels. Finally, in the case of big stocks of shells, it would be possible to install a renewable power plant converting the shells or the cake into electricity, with charcoal as a by-product, with the potential to provide green charcoal briquettes or biochar for soil amendment. There are market-ready solutions for almost every scale of production.

There is a huge opportunity of closing the cashew loop, with the cashew sector becoming more and more attractive to national stakeholders as it becomes a source of wealth and green jobs. For the cashew (kernel + shell) processors, there is the potential of achieving higher environmental certifications such as Carbon neutral[®], Cradle[®], Positive energy, etc. who help differentiate their product and give additional value to the sustainability efforts of the company. Not to forget that, to support investment in these new areas, there are multiple opportunities to harness carbon finance...



Julia Artigas Sancho

A specialist in Chemical process and Renewable energies, passionate about circular economy, Julia works since 2016 in support to the African food processing industry. The development and popularization of innovative processes, along with virtuous agri-waste conversion systems are her expertise fields of expertise. On behalf of flourishing sectors like cashew, shea, mango or cassava, she participates to the conception and demonstration of Efficient processing equipment, Management systems of solid and liquid waste streams, or Environmental impact Reduction strategies. This, focusing on a maximum appropriation by a large stakeholder range. After the foundation of the consultancy firm Füntent Installations et conseil, she joined Nitidae in 2019 as Energy and process project officer. Amongst others, Julia has co-signed the ACA-commissioned Study on Waste management in cashew processing in eight African countries, and more recently given support to the CBA on the definition of a model conversion unit for cashew shells in Burkina Faso.