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TALKING BRAZIL WITH FRANCISCO BATISTA



Following up on issue #90 in November 2021, Francisco Batista returns with vital information on Brazil.

Energy

As we approach the end of the rainy season, we can now make an accurate assessment of the energy system in Brazil and state that the rationing risk for 2022 is greatly reduced or even non-existent. Following the worst drought ever in Brazil (Oct/20 - Sep/21), when rainfall was around 50% of the average, the current rainy season (Nov/21 - Mar/22) brought rainfall levels close to average. Despite the improvement in rainfall, the Brazilian ISO kept thermal plants operating during the entire rainy season. It started with 20GW+ (in Sep/21) being reduced to 6GW+ as of today. Thermals were vital to help reservoirs recover, especially those in the Southeast region (responsible for over 70% of the country's capacity) that had hit the lowest record level of 16.2% in Sep/21 and are now over 62% (in average terms). This recovery allowed spot prices to plummet to the minimum regulatory value of $12/MWh, however, the enormous cost of the thermal dispatch (still underway) is piling up and is already being transferred to consumers through increasing the *Grid Fee*. It is expected this cost will keep pressuring the overall cost of electricity (energy + grid fee) in Brazil for the next 2 yrs.

Macroeconomics

Inflation in BR, just like most everywhere, is out of control. The Brazilian central bank increased interest rate from 2.0% to 11.75% in less than one year. This rate hike does not appear to be curtailing inflation so more increases are expected that will very likely put the country's GDP in negative territory for 2022. One of the consequences of the interest rate hike is it has created the biggest real interest rate in the world (6.5%), which in turn brought a lot of short-term influx to the country, especially in what is called *Carry-Trade* operation. This massive inflow of resources has directly impacted the exchange rate, making it plummet from R$ 5.74 (Dec/21) to R$ 4.78 today.

Commodities

As prices are still high (some are at record levels) the commodity output in Brazil is increasing as much as logistically possible. The overall cost of electricity has been consistently reduced since the beginning of the drought (May/21) which will more than offset the revenue loss caused by US currency depreciation.

Elections

The country will hold general elections in October and November (runoff) of this year. It is expected that seating president (Jair Bolsonaro) reaches the runoff with former president Lula, which has regained his political rights after the Supreme Court cancelled all of his convictions based on the forum his cases were judged. Polls indicate Lula has an edge over Bolsonaro in the runoff, but it is still too early to make a prediction. There is no clear understanding of the impact of each contender in the economy after 2023.

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NHQ Still on the Road to Progress



Pictured above is an employee conducting a test in the NHQ lab.

New He Qiao Shareholding Company (NHQ) is currently running furnaces at 80% of theoretical capacity and have enough kWh to operate the plant. However, like most other global high energy consuming industries, NHQ has been forced to absorb kWh price increases. Although the kWh price bumps in Vietnam are not as dramatic as many others in the SiC industry, a 33% year-over-year increase is a difficult pill to swallow. In addition, during peak hours, kWh pricing can be as high as 8 cents per kWh.

When comparing NHQ's kWh pricing to the Chinese provinces of Gansu, Qinghai, and Ningxia, NHQ is currently on a level playing field. That was not the case during 2020 and 2021 and eventually Vietnam's price will edge higher again due to the national grid operating at a loss.

In issues #90 and #91 of ***SiC & More,*** it was reported that the improvements to transformer group No. 2 had been postponed and would hopefully be completed during 1H 2022. However, due to a combination of hurdles, completion of this project could be delayed until year-end. On a more positive note, NHQ has ordered another transformer.

The price of NHQ's anthracite, one of two essential raw materials to produce SiC, has increased by 85% compared to one year ago. This sort of increase isn't unusual as virtually every global SiC furnace plant that is using either anthracite or green pet coke have suffered from 60-125% price increases, depending on region and sulfur content. When you combine the carbon source price issue with the kWh, one can quickly see why end-use market pricing for SiC has doubled in price in many cases.

When asked about shipping, management responded, "Shipping has improved a bit in Asia areas. EU and U.S. are still consuming more transit time, normally two months."

NHQ still plans to produce 40,000 metric tons of SiC during 2022 with 50% being metallurgical grade and 50% refractory grain.

NHQ continues to be a major supplier to the likes of Japan, Korea, India, and EU. The ability to sell both metallurgical and refractory grade SiC products, and in diverse regions of the world, gives NHQ a broad and diverse customer base, something all SiC producers must do in order to survive.



Pictured above is an NHQ furnace under power

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> Cont from previous page



Pictured above is one of NHQ's finished goods warehouses with SiC packaged in super sacks and ready to ship to customers.

SiC & More asked NHQ management about the obstacles to a successful year. Management responded, "High increase in raw material prices. Second, environmental protection regulations. We adopted China's established model, added sealing cover to furnace and implemented desulfurization system and all the procedures to be completed by August this year. Our priority would be to match up to the lates local environmental protection regulations in 2022."

In most experts' opinions, NHQ owners and managers have managed to follow an efficiently constructed business plan. From the start, NHQ exceeded the expectations of many of the world's SiC experts going from a furnace plant that was initially designed to produce 12,000 m/t from Phase 1 in 2012 to a furnace plant that was producing 50,000 m/t in 2019. When all the upgrades are completed, NHQ will be one of the largest furnace plants in the world producing metallurgical grade SiC as well as value added products for the refractory industries. All of this being achieved in less than 10 years is a testament to NHQ's vision.

It appears as if NHQ is becoming synonymous with progress.

> Cont from page 1

Both candidates are talking increases in public spending (and therefore in the tax deficit), but according to recent news, Lula seems to be more aggressive than Bolsonaro in doing it. A looser fiscal policy in Brazil means high inflation, high interest rates and a devalued currency which is very favorable for exporters and very unfavorable for domestic consumption.

COVID

After a rough start the country has increased vaccination during 2nd half of 2021. The vast culture of vaccination and the very efficient public health system in Brazil have led the country to be among the most vaccinated in the world (75% fully vaccinated), making Covid and deaths cases drop to very low levels. Mask mandates are off, and life has returned to normalcy. Unless something very unexpected happens with new Covid variants it seems that the worst is behind and its impact in Brazil will become irrelevant very soon.

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Metals Industry Update

FORD

The Ford Flat Rock Michigan assembly plant has been idled due to a shortage of semiconductor chips. This is the facility that builds the popular Ford Mustang. The Flat Rock plant was also slowed during May 2021 for the same reason.

U.S. Vehicle Sales

Vehicle sales in the U.S fell by 4.6% in March representing a 13.3 million units seasonally adjusted annualized rate. Q1 results reflect 14.1 million units.

Electric Cars

The Tesla model Y leads global plug-in EV sales with the Tesla Model 3 running in third place.

Pacific Steel Group

This California-based rebar fabricator is expected to invest $350 million into building a new micro-mill in Mohave, California. Start-up is expected in early 2025 and should employ about 400 people.

Durable Goods

The Commerce Department reported that durable goods fell by 2.2% in February 2022, which represents an about-face from the 1.6% increase in January.

U.S. Gross Domestic Product

The final revision to Q4 GDP showed that the economy increased at an annual rate of 6.9%.

Iron Ore

Spot prices for iron ore have ranged from $146 to $158 in recent weeks. Many steelmakers are rushing to Australia to replace iron ore imports from Ukraine and Russia.

Global Raw Steel Production

Raw steel production dropped to 142.7 million metric tons during February, which was a 9.8% decrease from January in addition to a 5.7% decrease compared to February 2021. Compared to 2021, China is 10% lower through the month of February 2022.

NUCOR

Nucor announced that a new rebar micro-mill will be built in Lexington, N.C. and have an annual capacity of 430,000 tons. The facility is expected to represent a $350 million investment.

FORD

During mid-March 2022, Ford announced that the company would produce seven new EV's for the European market by 2024 and will expand its collaboration with Volkswagen.

Top 10 steel-producing countries in February 2022

China produced an estimated 75.0 Mt in February 2022, down 10.0% in February 2021. India produced 10.1 Mt, up 7.6%. Japan produced 7.3 Mt, down 2.3%. The United States produced 6.4 Mt, up 1.4%. Russia is estimated to have produced 5.8 Mt, down 1.4%. South Korea produced 5.2 Mt, down 6.0%. Germany produced 3.2 Mt, up 3.8%. Turkey produced 3.0 Mt, down 3.3%. Brazil produced 2.7 Mt, down 6.9%. Iran is estimated to have produced 2.5 Mt, up 3.7%. (*Worldsteel Association*)

Silicon Carbide Minutia

► SiC was discovered by George Acheson in March 1891 while attempting to produce synthetic diamonds.
► Initial selling price was $900 per pound.
► In September 1891 Carborundum Company was created.
► In 1893 production was 500 pounds per day. During 1894 the plant was moved from Monongahela to Niagara Falls.
► In 1895 Carborundum was operating five furnaces producing six tons per day.
► By 1910 Carborundum was producing 5,000 tpy.
► By 1962 Carborundum was considered the largest producer in the world with output of 125,000 tons per year.
► In 2022 global producers are forecasted to produce 1,217,000 tons of SiC.

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CURIMBABA GROUP UPDATE



Pictured above is the final layer of raw material being loaded on a Sublime furnace using a sophisticated rotating loading conveyor.

Due to the history and diverse nature of the Curimbaba Group, it is always interesting and inspiring to visit with Managing Director Leonardo Curimbaba.

For review, the Curimbaba family involvement in producing fused minerals dates to 1961 with its initial bauxite mining and processing venture. Over its 60-year history, the Curimbaba Group has proven, that due to judicious ownership and acute business management, one can not only survive difficult times but grow and even prosper. The Curimbaba name has become synonymous with bauxite, aluminum oxide, proppant, and silicon carbide amongst other fused minerals and value-added products.

In issue #91 of ***SiC & More*** we reported on the status of Curimbaba's Sublime SiC plant in South Africa. At that time, conversations were taking place regarding the restart of Sublime's #1 transformer group. According to Leonardo at that time, "We are discussing this matter with the local electricity supplier, once we need their allowance to purchase more energy." Fast forward to the last week of March 2022 and Leonardo informed ***SiC & More***, "Yes. Our intention is to have it running in 3 months. We are finishing some repairs and awaiting some critical parts from abroad."

According to Leonardo, Sublime will have enough energy allocated from ESKOM to enable #1 transformer group to run at 60% capacity while running #3 at capacity. As mentioned in issue #91, with global SiC supply struggling to keep pace with demand, and the supply situation in China seemingly tentative, tonnage from a furnace plant that has been generally underutilized virtually since day-one is vitally important to the industry.

According to Leonardo, ESKOM has not implemented the 20.5% energy tariff that had been the subject of much controversy. Nevertheless, although ESKOM appreciates the importance of high energy consuming industries to the economy, the cost of kWh continues to increase. Leonardo added, "Electricity prices in South Africa have been high and increasing for a long time. I'd say we face double digit increases every year."

Unlike the U.S. and many countries in the EU, Sublime has access to labor. The labor market is strong and finding employees for Sublime has not been a major issue. However, like most other global producers, energy availability is a problem as are logistical constraints.



Pictured above is a large SiC furnace being cracked after being taken off-power and cooled at the Curimbaba Group's Sublime SiC plant in South Africa.

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CURIMBABA GROUP UPDATE– Continued



Above is the graphite core being completed before the final raw material is loaded on the furnace and put under power.

One cannot interview Leonardo without discussing the aluminum oxide business. As one of the global powers when it comes to bauxite and Al2O3, the Curimbaba Group's ELFUSA division is thriving in Brazil. ***SiC & More*** asked Leonardo about the state of Brazilian energy, "Energy cost in the spot market is down for several months. Although most of the electro intensive companies like ELFUSA, has its power demand based in a long-term contract. Therefore, we are protected for any price fluctuation. Just to give you an idea the price in the spot market dropped 10-fold in the last eight months."

Although owning a bauxite mine is a comparative if not competitive advantage in the Al2O3 business, the cost of diesel to extract and move bauxite has escalated. Like energy or labor, this cost must be passed downstream.

The Al2O3 furnaces run at near-capacity and selling the finished products have not been an issue. On the other hand, although ELFUSA holds a distinct advantage over Chinese Al2O3 producers due to the 7.5% tariff on BFA crude in the U.S., ELFUSA is faced with extraordinary freight costs and ocean carrier issues for the Brazil to U.S. shipping lane.

Not to be left out, ***SiC & More*** asked Leonardo for a status report on Electro Abrasives in Buffalo, NY. Electro is unique in that the company is the only North American producer of water classified black silicon carbide powders and micro grits. Electro also produces macro grits of both black and green SiC for numerous value-added end-use markets. According to Leonardo, "On June 1st, Electro Abrasives will be incorporated by US Electrofused Minerals (USEM) and from that point on, USEM will be responsible to deal with fused oxides and carbides (black SiC, green SiC, and boron carbide) in the North American market"

During early Q3, all of us at ***SiC & More*** look forward to writing about the successful restart of Sublime's #1 transformer group.

SemiQ Announces Launch of its 1200V 80mΩ Silicon Carbide MOSFET Modules

LAKE FOREST, Calif. (PRWEB) April 04, 2022 (Press release)

SemiQ, Inc. is proud to announce the release of its second-generation Silicon Carbide 1200V 80mΩ Power MOSFET modules developed in the industry-standard SOT-227 packages.

GCMS080B120S1-E1 1200V 80mohm MOSFET with 1200V 10A Parallel Diode

GCMX080B120S1-E1 1200V 80mohm MOSFET without Parallel Diode

These 1200V Silicon Carbide MOSFET Modules are the latest extension to our SiC MOSFET product portfolio.

SemiQ's SiC MOSFETs 10bring high efficiency to high-performance applications including electric vehicles, power supplies and data centers, and are specifically designed and tested to operate reliably in extreme environments. Compared to legacy Silicon IGBTs, SemiQ's MOSFETs switch faster with lower losses, enabling system-level benefits through reduced size, weight and cooling requirements.

Michael Robinson, President and General Manager at SemiQ said "The SOT-227 package is one of the best fully Isolated Power Semiconductors Packages around. Combined with our SiC MOSFETs and SiC Diodes, these products are perfect for increasing efficiency in your Fast Charging and Inverters systems."

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Pet Coke & Anthracite Pricing Showing Some Swagger

According to Roget's Thesaurus, "transitory" is synonymous with "fleeting", "momentary", "short-lived", "temporary", amongst several other descriptors.

If you are a consumer of either pet coke or anthracite you are feeling the pain of real inflation. No, not the transitory type that is popular with whatever party is defending their economic policies, but the kind that can almost ruin your business and infuriate your customers.

If you want a little controversy in your life, tell a consumer of anthracite, "Not to worry, this is of brief duration".

In Vietnam, the price of anthracite has increased by 85% from April 2021 to April 2022.

If you are buying low sulfur pet coke in the EU, you might have paid the equivalent of US $106 m/t in April 2021 while in January of 2022 that number would have been $195. However, in April 2022 the price of pet coke is over $270. Try to explain that to your customer while also absorbing and rationalizing the extraordinary increases in kWh rates.

How about China? In China the current price of anthracite in the Gansu province is the equivalent of US $495 m/t whereas one year ago the price was $267 m/t. If you are purchasing pet coke in China, if you can find it, the price was US $254 m/t in April 2021 and it is now $360 m/t.

How long will this pricing last? According to a processor that is familiar with this market, "I suspect the price of both anthracite and pet coke will increase over the short- term but it won't stay there. I think it will take a recession to bring prices back to a reasonable levels, but I don't think we will see anything close to the prices we saw during 2020 and early 2021. This is the sort of commodity pricing environment that sets new ceiling and basement levels."

Brown Fused Aluminum Oxide

We closed issue #91 of ***SiC & More*** with the following statement: As far as BFA pricing is concerned, there are many variables in play that could affect the price going forward. As it stands today, virtually every BFA end-use market will see price increases well into Q3. If the spigots do get turned on during March, and supply is readily available, many are convinced that transportation issue will continue to linger." Besides that forecast, a processor said, "I expect pricing to increase during Q2 and Q3 and hopefully stabilize during Q4. After all, it's my job to plan for the worst and hope for the best."

As we enter Q2 it's becoming obvious that the processor mentioned above was hoping for the best. As it stands today, some of the most recent parcels that departed China are about $50-$70 ton higher than the January 2022 price range of $880-905 delivered to NOLA. Considering you could have purchased about all the BFA you wanted 12-18 months ago for $600-615 net ton delivered to NOLA that is quite the sticker shock.

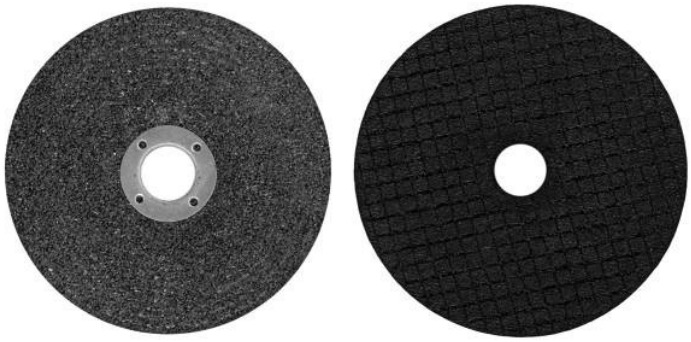
Depending on your source, it is believed that China supplies the refractory and abrasive markets of the world with about 85% of the required BFA. There are a few other options for BFA consumers including The Curimbaba Group, which is a major player out of Brazil. When interviewed for issue #91, Leonardo Curimbaba said, "Regarding Al2O3, I'd like to say that ELFUSA is operating at full capacity. The main problem faced right now is related to the logistic to export ELFUSA's products overseas. Freight is extremely high and it's really difficult to get room in the vessels."

Although ELFUSA continues to run their furnaces at capacity, shipping vessel availability is still an issue as is the cost of freight. When asked whether the ongoing tariff on Chinese BFA in the U.S. continued to create opportunities for ELFUSA, Leonardo was perfectly candid when he said, "Yes. But the problem we face are the huge freight cost from Brazil to the U.S."

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DIGGING THROUGH THE ARCHIVES



Grinding wheel. Stock photo

This is the twelfth segment from the dusty but irreplaceable *SiC & More* archives. The initial segments were dedicated to abrasive-related topics and, due to popular demand, we continue to move forward with sections related to refractories. All twelve of the segments have been taken from a paper that was discovered in a file several years ago but does not bear the name of the author. Continued from issue #91:

Another large user of silicon carbide refractories is the zinc melting and refining industry. The zinc ore is reduced and the metal comes off in the vapor state. The vapor must be condensed out of contact with air so as to prevent its being oxidized to zinc oxide. The operation is carried on in the large vertical silicon carbide retorts. Briquettes of ore mixed with reducing agent are introduced into the retort which is heated from the outside. The reduced metal vapor coming off is carried to a condenser built up of silicon carbide shapes.

In the subsequent refining process in which zinc is very high purity is produced, a column of silicon carbide trays is employed to separate, by fractional distillation, the impurities from the zinc.

The silicon carbide refractory retorts is used in the primary ore reduction process and the silicon carbide refining tray units are both large assemblies often thirty feet high. They must remain tight against zinc vapor leakage during operation.

Steel mills use silicon carbide skid rails in furnaces because the high resistance to abrasion at the temperature involved gives these rails a longer life than any of the metal alloys or water cooled metal pipes that they replace. The elimination of the water cooling is an advantage since it obviates the formation of these rails. The life of the silicon carbide skids greatly exceeds that of uncooled alloy steel skids effecting considerable monetary saving.

Silicon carbide refractories find many other large-scale and specialized uses in metallurgical and chemical industries in applications, which require high thermal conductivity or high resistance to abrasion, corrosion or thermal shock.

In issue #93 we will complete the refractory section with a short text on *Refractory Cements*.

> Continued from previous page

We checked in with a trader to get yet another opinion of what to expect for Q2 and beyond. “China’s domestic market is weak. With raw steel production running 10-15% below 2021 and the high cost of energy, many of the smelters have not restarted since the end of the Olympic Blue Sky policy. For prices to drop, more furnaces need to be brought on-line. In my opinion, there is no doubt that the end-use market price trend will be up for the entire calendar year and even into the first quarter of 2023”.

The same issues continue to haunt the BFA industry; the cost of bauxite, environmental issues that stifle production, cost of energy, COVID, capacity utilization, and logistics issues and hurdles that affect product movement from the moment BFA leaves the Chinese smelter all the way to Rotterdam or NOLA.

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Silicon Carbide Pricing Frustrations

In issue #91 of ***SiC & More***, we reported about supply, demand, and pricing as well as a potential industry structure change that could be brought on by the cost of energy. ***SiC & More*** subscribers from the processing and end-use market sectors want to know more about what is driving the price of SiC. Several of the obvious reasons stem to the Beijing Olympics and Blue Sky policy, COVID, a broken supply chain, the price of FeSi, and the cost of freight, which have contributed to demand exceeding supply. However, the aforementioned points are the easy answer. If one digs deeper into the actual cost to produce a ton of SiC, you quickly see that the fundamentals have changed.

The costs identified in the following paragraphs are estimates prepared by ***SiC & More*** and should not be considered actual costs but rather approximations that give one an idea of the cost to produce crude SiC.

Since China produces the most SiC of any country, let's use them as our first example. Traditionally, Chinese furnace plants in the provinces of Gansu, Qinghai, and Ningxia have typically paid the equivalent of 4.5 cents per kWh. Since the summer of 2021, the price has been incrementally increasing to the point that the current rate is 8 cents per kWh. In China, energy alone has contributed another $245 net ton to the cost of producing SiC bringing the kWh line item to **$560.00** net ton.

When producing SiC you need a source of carbon and silica. Most of the furnace plants in China use anthracite. The cost of anthracite in China has been in the $455 net ton range for several months. This makes the cost of new mix for furnacing **$226.00** net ton, which also represents a substantial increase.

In other words, without labor, equipment, operating supplies, fuel, freight, environmental controls, etc., the cost to produce a net ton of SiC is already at **$786.00** net ton.

Using some generic numbers for the other cost inputs equates to about **$180.00** net ton putting an overall cost to produce a net ton at approximately **$966.00**. This cost does not include SG & A, profit, or transportation to a port. Once at port, there are loading fees, ocean freight, offloading, inland freight, processing, packaging, profit, etc.

Looking at producing SiC in the EU is even more interesting due to daily electricity pricing. Whereas kWh pricing might have been 4.5 cents in early 2021, the price during December 2021 and January 2022 hit 35 cents per kWh. In March, daily quotes reached an astonishing 59 cents per kWh. Using 7,000 kWh per ton of SiC, the January kWh rate meant **$2,450** net ton attributed to energy alone. The March rate equates to **$4,130** net ton.

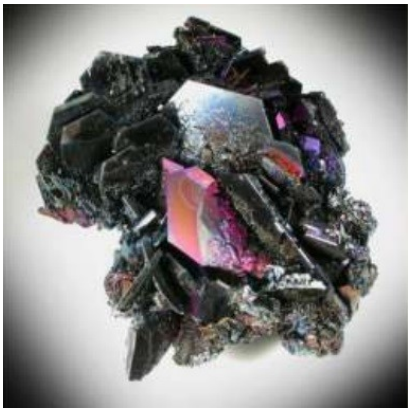
A reliable source informed ***SiC & More*** that during the first week of March, anthracite increased in price by $200 net ton. It is believed that most producers in the EU use petroleum coke and not anthracite, however, all carbon products are under price pressure. The estimate for the mix of pet coke and silica sand in the EU is **$264.00**. ***SiC & More*** was told by a EU producer that the price of pet coke had doubled in one year. Due to the extraordinary costs, doing the math on the total cost to produce one ton of SiC in the EU during Q1 2022 is an exercise in futility. Although the last nine months are not representative of historical costs, this is what some EU producers have been forced to rationalize. In other words, do they furnace and process SiC to service loyal customers or mothball the plant until common sense returns to kWh and raw material prices.

The question many processors and end-users pose is; "Is this temporary or is this permanent?" The answer to that is difficult, however, a trader told ***SiC & More***, "Generally, what goes up must come down. Many producers of commodities are suffering from bizarre costs and finding it almost impossible to operate their factories. When kWh prices are this high, operating at off-peak hours is the only avenue for survival. I cannot fathom this continuing into 2023 but I would have never imagined this is where we would be in 2022."

** Any producer reading this article that takes exception to the data, we encourage you to contribute to an addendum. This information is meant to support the SiC industry and the more organizations that contribute, the more accurate and valuable the data.

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Kyryl Shapovalov Head of Foreign Trade Department of Zaporozhabrasive In Ukraine Speaks Out



Since the beginning of Russian invasion in Ukraine many enterprises had to stop their production fully or partly. Despite the hard time and conditions for business of today, Zaporozhabrasive (ZAC) continues it's production.

We understand that now the Ukrainian economy is in dire need of the support of such large enterprises as ours, and we know that consumers from Europe are waiting for our products.

Therefore, despite all the difficulties associated with hostilities, we have decided to resume our production and work as productively as possible under the current conditions. Our decision is facilitated by the controlled military situation in Zaporozhye.

Currently, ZAC produces both brown fused alumina and silicon carbide. So far, the volume of output of finished products is approximately 50% of the pre-war level. But our plans for the near future are to increase production and operate at full capacity. Now we are looking for all possible resources for this. We also solve difficult logistics issues.

ZAC continues to ship products from its warehouses. Deliveries of products to our consumers in certain regions of the Europe have already been established. We see and are working on ways to solve logistics problems in other areas. And we hope that in the very near future we will be able to deliver our products to all our consumers so that they can continue to fully conduct their business.

We are doing everything in our power to continue working, to meet the needs of our European customers, to remain a reliable supplier for our business partners, even in such difficult conditions.

We believe in Ukraine, in the revival of the national economy. And we hope for understanding and assistance from the public and representatives of European business

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40mΩ and 20mΩ modules in the SOT-227 are on the way.

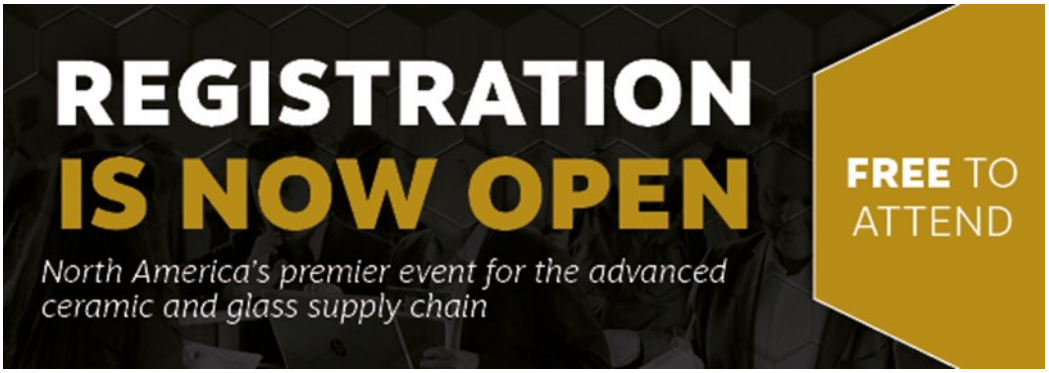
Samples are in stock at SemiQ and available through DigiKey, Mouser and Richardson Electronics. Please visit http://www.SemiQ.com for specifications and to request samples or volume pricing.

About SemiQ
SemiQ designs, develops and manufactures Silicon Carbide (SiC) Power Semiconductors as well as 150mm SiC epitaxial wafers. SiC Diodes and MOSFETs are available in both discrete and module form factors, as well as bare die and wafer form. SemiQ also offers power-conversion applications expertise which includes subsystem design and semi-custom modules. SemiQ serves the following end markets: Electric Vehicle Chargers and Charging Stations; Power Factor Correction (PFC); Output Rectification; Power Supplies including Server Farms; Solar Panel Inverters; Welding; Medical Equipment; and Motor Drives. SemiQ's manufacturing and engineering facilities are located in Lake Forest, California. The company is uniquely positioned with a fully redundant SiC supply chain.

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FREE TO ATTEND CONFERENCE AND EXHIBITION





Attendee registration for Ceramics Expo 2022 is now open.

North America's premier event for the advanced ceramic and glass supply chain is back, taking place **29-31 August at the Huntington Convention Center**

Silicon Carbide & More

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