

Tim Tan, a self-described “IT guy gone wrong”, has spent the better part of his professional life developing new products and, from there, new businesses. So, when he stumbled on kenaf a few years ago, the 58-year-old did not just find the answer he was looking for in his quest for an affordable and eco-friendly building material; having spent some three decades in the building materials industry, Tan saw in kenaf the chance to close the loop on building materials.

A major crop in Africa and Asia, the use of kenaf fibre has, over the years, diversified from its historical role as a cordage crop (to produce string, rope, twine and sackcloth) to thermal insulation and soundproofing solutions in construction and in the manufacturing of medium-density fibreboard for the furniture industry. The automobile industry has also been using kenaf fibres to replace synthetics in car interiors such as door panels, dashboard coverings, seat backs and cushions, to name a few.

Kenaf plant is a cousin to okra, cotton and the hibiscus, and every part of it can be used. “The best use of the leaves and shoots is for animal feed. It is highly nutritious, with about 30% crude protein. Waste components of the plant can be upcycled as plant-based animal feed, and any other waste can be turned into compost to replace chemical fertilisers,” Tan says.

It was the fibres of the plant, however, that most intrigued Tan. In a kenaf stalk, there are two fibres — the inner and the outer, or the core and bast respectively. From his initial research on the plant, Tan found that, like hemp, which is a widely used biomass building material, the kenaf core could be used to make fibre-based bricks, or kenafcrete, which is ideal for building affordable houses.

Tan built a business anchored on the circular economy model — where all resources are reused or upcycled into more valuable products and nothing is wasted. Affordable Abodes, which he started with a partner in 2015, sought to reduce the carbon footprint of the production and transportation of building materials while creating more jobs locally.

The idea was to encourage paddy farmers, affected by climate change, to farm kenaf, thus increasing their income, as well as employ local youths in the manufacture of kenaf fibre building materials. “Apart from offering the chance to put a roof over the heads of the poor, we saw this as a way to train people and lift them out of poverty and bad social situations,” says Tan.

Cradle-to-cradle homes with kenaf

Tim Tan, who started Affordable Abodes to build affordable homes for the underprivileged, is furthering his research into expanding the use of kenaf as a building material. The day may come, he believes, when entire houses can be constructed from this plant.

Everything was done from scratch. Following research and testing in the backyard of his partner’s house in Muar, Tan came up with a brick-like material that is 90% composed of kenaf core. To bind the fibres, Tan used an industrial waste lime product — upcycling it to produce a binder, thus replacing cement. “We then went to a kenaf farm in Pahang to set up a small factory to produce the raw materials and then brought them to Muar to cast into kenafcrete blocks.” With these, they built a small 700 sq ft house.

“I saw this as a fantastic solution for rural developments,” he says, adding that the next couple of years were spent on further testing and securing approval and accreditation from SIRIM. Its products also have the Construction Industry Development Board’s Industrialised Building System certification.

“In terms of sustainability and the circular econo-

my, I have not come across anything as close [to these concepts] as what we do with kenaf. Throughout my career in the cement industry, we looked at environmentally sustainable cement, one that was not heavily dependent on burning limestone,” he says, pointing out that cement, concrete and steel produce about 30% of global greenhouse gas emissions.

“Kenaf fits in well with our goal to find a good-quality building material that lasts and is safe for the occupants because it’s not just a matter of putting together a shelter for the poor. In the end, if we don’t use the right materials, they end up spending more money repairing the house. Income is wasted, so we’d rather do something once and make sure it’s right from the beginning. Although they are poor, they deserve everything that we deserve,” he says, adding that a house made from kenaf can be delivered on a RM65,000 budget.

Tan has spent the past year developing new kenaf bast fibre technology for more building applications.



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Further innovation in kenaf building materials

In 2018, the enterprise made a foray into prefabricated kenaf panels instead of blocks. Each of the 3m by 0.6m panels is load bearing — able to bear a load of five tonnes. “So, it’s technically possible to build a 2½-storey low-rise development with kenaf core panels,” he says, adding that, so far, Affordable Abodes has supplied kenaf products for 14 dwellings.

In the run-up to 2020, the company was all set to roll out its products when the Covid-19 pandemic hit, putting the brakes on new projects. “The pandemic set us back quite harshly because nothing is really moving in the low-cost sector,” says Tan.

What’s more, with national borders closed, Tan, a Singapore national, has also been unable to return to Malaysia. But he has not been idle this past year. “We are currently developing new kenaf bast fibre technology for more building applications. So, it’s not just the kenaf core that we’re using to develop building materials.

“With the kenaf bast, we can also make fibre composites that can replace fibreglass. I had already known this was possible, but a couple of years ago, we did not have all the resources to carry out the research to develop this. I had in mind that once we had more funding and investment and were able to scale up, we could explore this. Now that I am locked down in Singapore, that’s what I am doing: focusing on the research.

“Now, we have the building solutions for the walls, but in future, I want to make roofing out of kenaf fibre composites, as well as make the doors, windows, frames and even furniture,” he says, adding that such solutions would replace timber and put a halt to deforestation.

“There are still many things that can be looked at. The floor slab, for example, is made of concrete and roofing is made of steel or clay tiles, which are also not very good for the environment and also uncomfortable. So, we’re trying to make kenaf fibre composite roofing, which is insulated, so the houses will be cooler,” he says, pointing out that the walls are already insulated, as kenaf fibre panels comprise more than 90% fibre.

Tan envisions that the day will come when 100% of a house can be built from kenaf. He concedes that glass windows cannot be replaced but, pointing to old kampung houses, he says louvered windows and shutters are more sustainable options in the long run. “They made more sense to keep the heat out. As it is, we consume too much energy because of glass. By having a well-insulated house against the heat, you won’t require as much energy to cool the house down,” he says, adding that building a sustainable house boils down to a combination of using the right materials and good design.

“From our research, a kenaf house can absorb the equivalent CO2 emission of one to two cars per year — that’s about three to four tonnes of CO2. The houses are also fully recyclable. Typically, brick houses last 30 to 40 years and we expect the kenaf houses to last at least 50 years. And at the end of the life of the house, the panels can be repaired or, if not, they can be dismantled and recycled. We can use the same raw materials to manufacture kenafcrete again,” he says, not discounting the possibility of eventually building cradle-to-cradle houses.

Moving beyond proof of concept

Although things have been slow because of the pandemic, Tan says the company is close to securing a deal to build a 100-bed nursing home in a mixed-use development in Juru, Penang. Although details of its participation in the development, which also includes low-cost housing blocks and a school for the underprivileged, have not been finalised, he reckons that it could be a combination of elements.

“We could provide the walls for low-rise structures because these will not need much structural reinforcement. In any case, our panels are structural grade, so that will save money and time. The building will be cooler as well because the panels are insulated and can absorb sound, which is important in a nursing home,” he says, adding that hopes are running high for the project to commence by the end of June or July.

Given the visibility of the project, Tan hopes that it will be the catalyst for more jobs in the future. He is grateful for partners, associates and prospective clients who appreciate what Affordable Abodes is doing.

The research he has undertaken and amassed over the years has also made Tan a staunch advocate of kenaf. Although the kenaf industry in Malaysia was established some 15 years ago, with the National Kenaf and Tobacco Board of Malaysia having allocated 2,000ha for smallholders to cultivate kenaf, it has not yielded the desired finished products.

“The initial intent of the industry was to supply to Proton and the automotive industry, but they’ve not come up with the right technology; I don’t know why that is. Instead, kenaf is used for mattress stuffing much like coconut fibre. But coconut fibre is really a waste product and here you’re growing a plant for fibre and using it like a waste product ... So, it’s a missed opportunity,” he laments.

So, how can kenaf potentially impact the building materials industry? “In a hectare, we can plant the crop 2½ times a year (four-month planting cycle). So, for that, we can produce enough biomass to build about 15 small (700 sq ft) houses. If Malaysia planted 1,200ha of kenaf, that’s a lot of biomass, which can build several thousand houses.”

Affordable Abodes’ goal, he adds, is to build 10,000 houses a year. “To do that, we need to build four factories. Our existing factory can produce only 800 to 1,000 houses a year,” he says, adding that he hopes to roll out the kenaf fibre building material technology across Malaysia and the region.

Gratified by the response and impact of the enterprise so far, Tan holds close to his heart the ethos that one does not do business with just one’s mind. “We have to put our hearts first to solve these problems and, with the help of God, we work together to accomplish those goals. That’s how we see this business in the long term.” —By Sreerema Banoo **E**

Back to basics

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able but that every wash leads to microfibrils polluting our rivers and seas. “They end up in the ocean and our food chain, so it’s important to raise awareness that what we wear can be harmful to us,” she says.

A report titled “A New Textiles Economy: Redesigning Fashion’s Future” by the Ellen MacArthur Foundation and Circular Fibres Initiative found that, during textile use, trillions of plastic microfibrils are released through washing. Most of these ultimately end up in the ocean, contributing to ocean pollution. In recent years, plastic microfibrils from the washing of plastic-based textiles such as polyester, nylon and acrylic have been identified as a major contributor to this issue.

The report found that, annually, around half a million tonnes of plastic microfibrils — equivalent to more than 50 billion plastic bottles — resulting from the washing of textiles are estimated to be released into the ocean.

A balancing act

Chan sources Tencel from Austrian-based company Lenzing, which produces the lyocell fibres from sustainably farmed eucalyptus trees. “For every tree that is chopped is down, more trees are replanted to replace them. But the most interesting part of the production process, and what makes the material so sustainable, is that less water and energy and non-toxic chemicals are used to produce the fibres. A closed loop process is also used to produce the fibre,” she explains.

Working closely with Lenzing and the fabric mill in China, Chan is focused on ensuring that her products are sustainable. What’s more, she has also opted for digital printing instead of dyeing to reduce pollution and the impact on the environment.

“With STUF, it’s been a very different realm. With the womenswear brand, it was all about designing, keeping dead stock and there was so much fabric waste during the production process, especially with complicated design, whereas for STUF, there’s very minimal leftover fabric.

“As a fashion designer, you’re always thinking about creating complicated and cutting-edge designs but, at the same time, there is all that fabric waste. So, it’s a question of balancing the two.

“The Covid-19 pandemic has transformed my mindset. The focus is now on going back to basics; it’s not so much about fashion anymore but comfort and simplicity, and basic items like the T-shirt can be used in a variety of occasions. The pandemic made me realise that the world is changing, and what’s important is taking care of ourselves, protecting our skin and being comfortable.

“It’s all about our well-being, and the pandemic experience also pushed me to want to do more to help the environment and address pollution. Our T-shirts, made from a combination of Tencel and cotton, are biodegradable and compostable under home soil, industrial and marine conditions. “So, even in the worst case scenario, if it ends up in the landfill, it can be reverted back to nature in a few months.”

She does not discount the possibility of putting the material into a home compost bin. “It comes from trees, so it will return to nature,” she says of the cradle-to-cradle attribute of her products.

Raising awareness

From the outset, Chan chose to focus on streetwear because she wanted to influence and raise awareness among the younger generation about issues relating to sustainability and climate change.

“I felt that by getting together, we can do something positive for the environment, and such a mindset should be adopted from a young age. Although there are so many streetwear brands in Malaysia, this is something that is not seen in Malaysia. It’s new and I felt that the younger generation, especially, would get the hype.”

STUF’s T-shirts, available in two colours and two designs, are touted as the country’s first to adjust to the body’s temperature, thanks to Tencel. Other advantages include the fact that they are moisture-absorbent, highly breathable, highly durable with minimal static charge and ideal for those with sensitive skin.

They are marketed and sold online and at pop-up bazaars, and Chan says the feedback from customers has been positive. Most of the customers, she adds, are won over by the feel and comfort aspect of the material.

The pandemic, which put the brakes on the pop-up bazaars, has made marketing a challenge for Chan. “Most assume that it’s just an ordinary T-shirt, so it’s at these bazaars that I have the opportunity to explain about the material and the differences between Tencel and synthetic fabrics as well as other natural materials. So, although there are promotional materials on the website, what works best is when customers are able to use all their five senses to gauge the product,” she says.

As part of her sustainability ethos and eschewing of fast fashion, Chan, who runs the company solo and is its sole employee, plans to take it slow in growing the brand. “My focus is to go slow, unlike fast fashion, where there is a new product every month.”

Eventually, she plans to transform STUF into a lifestyle brand, offering bottoms, shirts and loungewear. “The T-shirt will always be the main focus of the brand. It is easy to match and it’s the most basic item in the wardrobe. It’s also suitable for many occasions, especially for staying in, which the pandemic has forced us to do.”

She plans to continue using Tencel for all her future products. “Even when I expand my product range with fabric blending, I’d still insist on using natural fibres.” —By Sreerema Banoo **E**