High-Quality Biochar boosts Agriculture, Cannabis and even Water Treatment

While high-quality at-scale production of biochar is new in Southeast Asia, there is massive potential in uses ranging from agriculture to – surprisingly – water treatment. Thai Carbon is looking to become a leader in biochar in Thailand and around the world.

Leveraging Best Practices for Efficiency

Thai Carbon managing director Kent Goeking looked at a multitude of ways of making biochar, the burned residue of agricultural or other waste that is used for carbon sequestration and fertiliser, after a Thai industrialist asked him for advice. While some firms valorise (burn) biomass in small-scale homemade reactors, they only make a few litres at a time. He looked around the world for technology that had already scaled up and found Biochar Now in the United States. “They're one of the most established companies,” Goeking explained. “The technology is a batch method rather than a continuous method. With the batch method, you produce a superior biochar product at scale.”

Goeking licensed the technology and set up a pilot. Although he tried feedstocks such as eucalyptus and cassava, bamboo proved to be the best. He has now set up a factory about an hour west of Bangkok, reached high quality levels and plans to expand to ten machines soon.

While Thai Carbon imported machines initially, Goeking found they can build much of the equipment locally and do not need to import costly components. Instead, Thai Carbon just imports controls for the system.

Making Biochar Better

What's special about biochar is that it comes out as a natural activated carbon, Goeking explained. Low-quality biochar only partially removes tars and residuals, so it has lower porosity and is not as effective. Thai Carbon’s technology produces clean, high-quality biochar.

Thai Carbon also produces it cleanly, Goeking said. The technology was developed in Colorado, which he said has some of the most restrictive EPA regulations in United States. “All the emitted gases come out as simple molecules that are within EPA emission rules.”

High performance comes at a higher cost, so it is crucial to find high-value applications. In Thailand, for instance, it works well for cannabis and other high-value crops such as horticulture.

Another use is water treatment. “A big problem in the US and elsewhere is lakes being choked with algae because of the fertilisers that flow in. They get algae blooms. The simplest solution is to take biochar, pack it into porous socks, allow water to flow through. They soak up phosphorus and other compounds. You will see the algae disappear.”

“I want large sales volumes,” Goeking said. Since small-time producers typically sell to the garden industry, “I don't have any real competitors in Thailand.” There is also no real biochar market in Thailand either, he said, so “I have to create the market.”

Demonstrating Effectiveness to Sell the Biochar

To increase awareness of biochar, Goeking has been speaking at conferences and arranging visits to Thai Carbon’s factory. “It's taken us a while to optimise the process so we have something we're proud to give out. We've got that now. We'll sell it commercially.”

“Our technique for marketing is that the material will sell itself,” Goeking said. “Our focus is to get the quality up. We're working to get test results validated. Marketing will be easier if I've got something that works in different fields, as an agriculture and a water treatment reference.”

Thai Carbon’s modular system is an advantage, as it can start small and add capacity. “The area I am looking at here is cassava. Much of the land is used for ethanol production, cassava flour and starches. I'm working with mills to do the processing of cassava waste. These

plants have high phosphorus and nitrate levels in their wastewater ponds. We're going to see if we can lower those rates. We can then take biochar to the farmer to put on his land, to get a higher yield, and claim a carbon credit."

Growing Revenue Globally

Goeking said he made his first sale in January 2024, to the cannabis industry, and has a goal to grow revenue and be profitable by the end of the year. "My kiln units produce about 3,000 tonnes a year. I could build another ten, another ten. The advantage of the batch method is that it doesn't all have to be located at the same spot. You want to locate your production as close to the feedstock supply as possible to minimise transportation. You could put them there for six months, and then move them back.

He also hopes to export biochar. "The major markets for biochar are the United States, Europe and Australia. Australia has a robust biochar industry because half of the world's organic agriculture comes from Australia. Thai Carbon could also be a secondary supplier to Biochar Now." Exporting is attractive because the price in the US of US$2,200 per tonne is twice as much as in Thailand and the price in Australia is even higher.

Another opportunity may be stranded biomass, such as in the palm oil industry. "When a tree reaches about 20 years old, they cut it down. We clear a spot in the plantation, set up our furnaces and bring in dead trunks. When we clean those out, we move up the road."

An additional revenue source could be sales of carbon credits. To apply for carbon credits, Goeking explained, "you have to have a complete supply chain that can be validated. Thai Carbon would need to show where the biomass came from, whether it was sustainably harvested, how it was transported, the carbon implications of conversion, how much CO2 was released, and validation that it went into the ground. "Carbon Dioxide Removal Certification companies send an auditor. They'll validate it and calculate your carbon credits."

Creating Impact

Goeking said his route to biochar was circuitous and serendipitous. "My PhD is in material science. I went from material science into management consulting and came to Southeast Asia. I left consulting and got into healthcare, which got me into biotech. Then I went to a startup. Through that connection I met this industrialist, and he asked me about bamboo biochar. I had never heard of biochar. When I started looking at it, I became excited with this material and the sustainability. It reconnected my management consulting and material science background." And he has taken that excitement to start a company in Thailand that could make major improvements in environmental sustainability.