

As Colorado's wildfire threat grows, Douglas County turns to biochar as 'next level' mitigation tool

New \$8 million biochar facility in Sedalia will process waste from forest thinning, other material



A rendering shows a biochar facility that Douglas County plans to build and launch this year in Sedalia. Biochar is a carbon-rich, charcoal-like substance that is produced by heating organic waste materials — like wood chips, manure and plant residues — in a low-oxygen environment. Biochar can be used as a soil amendment to help grow new plants. It has the added benefit of being a wildfire mitigation tool, consuming woody biomass from the forest that can act as fuel for a fire. (Rendering provided by Douglas County)

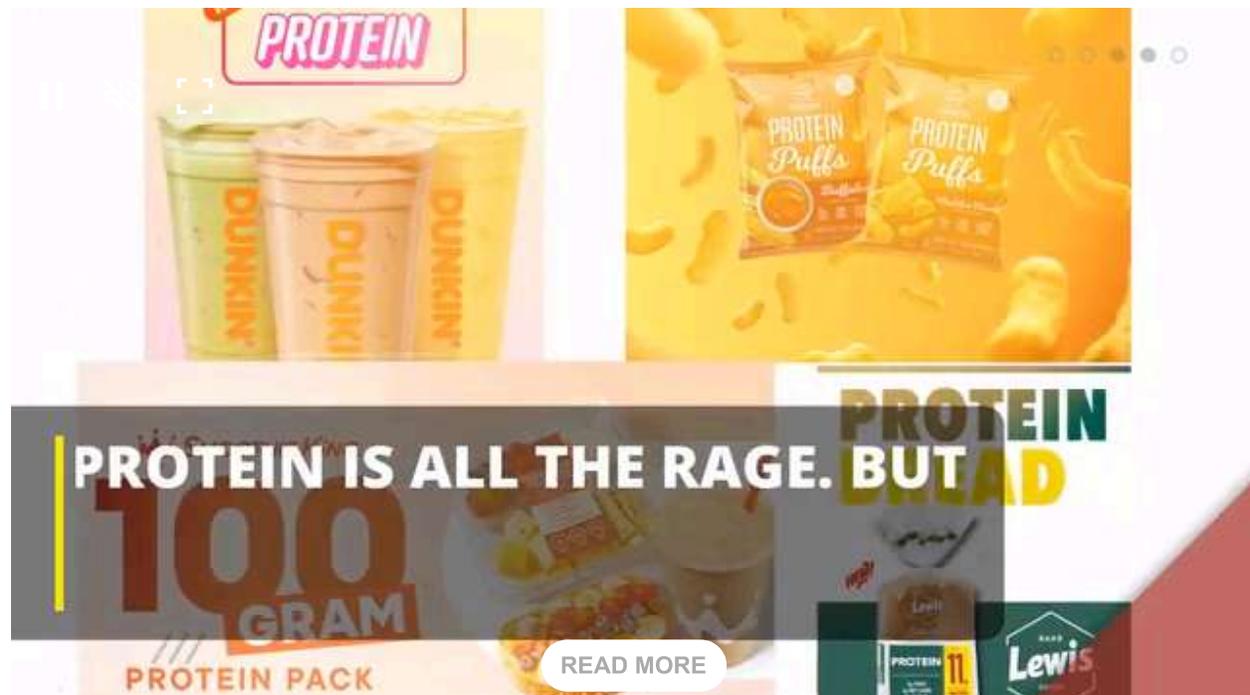


The 10,000 tons of downed trees and woody waste that Douglas County's planned biochar facility will process in a year will mean 10,000 fewer tons of fuel lying in wait to feed Colorado's next cataclysmic wildfire.

That's a big selling point for Dylan Williams, the wildfire mitigation and resilience coordinator for Douglas County. He sees biochar — a carbon-rich, charcoal-like material produced with intense heat and little oxygen — as the “next level of wildfire mitigation.”

The \$8 million [biochar plant in Sedalia](#), which will begin construction soon, is being billed as the first county-owned facility of its type in the country.

The process of making biochar releases little in the way of harmful emissions, experts say, making it a desirable method to process organic matter that land managers see as increasingly important to remove from the forest as the climate warms and becomes drier.



The material that's produced brings another upside: Biochar can be added to farm fields, golf courses or home gardens, where it improves aeration and water retention in soil. It also stores carbon that might otherwise get released as planet-warming carbon dioxide through burning — or as methane, another greenhouse gas, if it were left to break down in a landfill.



Biochar products are displayed in a box on Tuesday, June 13, 2017, at Biochar Now in Berthoud. The company takes waste wood such as beetle-killed pine trees and pallets and heats it in special kilns to make the biochar, which can be used to make soil more productive, clean water and reduce odors. (Photo by Jenny Sparks/Loveland Reporter-Herald).

“By converting woody debris and forest byproducts into biochar, we’re reducing wildfire risk, supporting responsible forest management, and creating a valuable resource that can improve soil health and support long-term environmental resilience,” Douglas County Commissioner Abe Laydon said last week.

The county has been moving quickly to get the plant up and running, said Nash Leef, a partner in Carbon Dynamics. Leef’s company works with local governments to stand up biochar operations and has been collaborating with Douglas County for about a year to prepare the plant’s debut, expected this fall.

“The technology to produce biochar at scale is nascent,” he said. “There are so many communities watching Douglas County to see if it will work for them.”

One set of interested eyes comes from Aurora. The county and Colorado’s third-largest city hammered out an agreement in December that [pledges \\$100,000](#) from Aurora toward the development of the biochar facility.

Aurora Water spokeswoman Shonnie Cline said most of the city’s drinking water originates from forested areas west of the city, “where forest thinning and fuels-reduction projects are essential to reducing wildfire risk.”

But properly disposing of that potential wildfire fuel can be as difficult as removing it in the first place.

“From an operational standpoint, one of the greatest challenges associated with forest health work is managing the woody material generated through thinning projects,” Cline said. “Today, that material is often trucked to landfills, chipped onsite or burned in piles, which can be costly and generate higher emissions.”

Daniel Roberts, the assistant director of Douglas County’s public works department, said the plant’s future home off of U.S. 85 is just downhill from the Pike and San Isabel national forests, where wildfire danger lurks large.

Where trucks today haul tons of downed logs and leafy understory to distant landfills and other receiving sites in the state, Douglas County’s new facility could reduce those miles — and costs — substantially, he said.

But the new plant won’t just be for the big guys.

At an open house last week in Castle Rock, several dozen people turned out to learn about Douglas County’s biochar ambitions. A.J. Opp, the lead plant healthcare technician with Knothead Tree and Lawn, was in the audience.

His company, he said, would much rather turn the organic waste it generates into a useful product rather than just chucking it.

“I like it mostly because of the reusability of the product that I’m trying to get rid of,” Opp said, holding a sample bag at the open house. “This is instantly usable carbon.”

Biochar market is growing

Biochar as a material is not novel. It has been produced by humans for more than 2,000 years, [originating in the Amazon basin](#) of South America.

But churning out the material at an industrial scale is what’s newer, said R. Scott Summers, a professor of environmental engineering at the University of Colorado Boulder.

While Douglas County’s facility will be a municipally run biochar operation, there are private biochar plants in the state. Most notable are [Biochar Now](#) in Berthoud and [Colorado Biochar Resources](#) in Pueblo. Both companies got their start in 2011.

Summers has been experimenting with biochar production for more than two decades, using different methods, equipment and feedstock — the term for the input material that is to be turned into biochar.

He likes the equipment that Douglas County will be using — a \$1.6 million [Biomass Energy Technologies Pyrolysis Rotary Drum](#) that decomposes organic waste at temperatures as high as 1,800 degrees Fahrenheit. The machine weighs in at five tons and is 36 feet in length.

“At that scale, that’s the standard that is used,” Summers said.



A large pile of beetle kill timber, a log unloader and a shredder sit with the mountains in the background Tuesday, June 13, 2017, at Biochar Now in Berthoud. (Photo by Jenny Sparks/Loveland Reporter-Herald)

Leef, with Carbon Dynamics, says organic waste is typically chipped down to 2-inch diameter wood chips and fed into the drum. After being exposed to a high temperature, the material is cooled and quenched with water. The limited oxygen involved in the process means little in the way of emissions is released, namely carbon dioxide.

“The vast majority of those carbon compounds are forced to bond with other carbon compounds (rather than oxygen),” Leef said.

According to a [Colorado State University fact sheet](#) on biochar, the pyrolysis process “chemically and physically alters the composition of the biomass to produce a highly porous, stable form of organic matter.”

Biochar has multiple applications and uses, including yielding byproducts like bio-oil, syngas, wood vinegar, and thermal or electric power during its transformation. CSU also notes that biochar reduces greenhouse gas emissions by storing carbon and helps with water and nutrient cycling in agriculture.

Leef likens today’s biochar industry to where composting was 50 years ago — a quirky concept that will take time to gain widespread acceptance. But according to a December report from [business analytics firm SkyQuest Technology](#), the sector is poised to take off.

The firm estimated the 2024 value of the biochar industry at nearly \$230 million, jumping to \$258 million last year. By 2033, the sector is projected to reach a value of \$652 million.

Sales of biochar, Leef said, could provide “an economic light at the end of the tunnel” for municipal leaders trying to make the numbers work.

Douglas County doesn't see future biochar sales as a profit center — other than to set the project on a self-sustainable course. It expects the facility to reach the break-even point in just under a decade.

"The goal is to have more acreage treated and take the profit (from biochar sales) and put that into the mitigation program," said Williams, the county's wildfire mitigation expert.

Daniels, from Douglas County's public works department, figures the plant can generate \$2 million to \$2.2 million annually from sales of biochar, while keeping annual operating costs at around \$1.5 million a year.

Summers, the CU professor, had some questions about those numbers.

"If they're dependent on that economic model, they really need to make sure the market is there," he said.

That's the job of Jared Tanaka, an environmental inspections supervisor for Douglas County. While homeowners will likely be able to get biochar from the county for free, Tanaka is working on developing a wholesale side to the operation.

That might include marketing biochar as a soil blender for horticultural and agricultural businesses, as well as for golf courses.

'This is better' than a landfill

As for ensuring there's adequate feedstock for the biochar plant into the future, Williams said that's not a concern.

The genesis of the idea of placing a facility in Douglas County, he said, came a couple of years ago during discussions with U.S. Forest Service personnel who were looking for a better way to dispose of forest waste.

Last month, the Forest Service [launched the Rampart Fuel Break project](#), which will involve crews removing trees and other woody waste from the Pike National Forest along Rampart Range Road to [create fuel breaks and reduce the chance of devastating wildfires](#).

Leef, the consultant, called the biomass that will be culled by the Forest Service over the next few years "ideal feedstock." Free of barbed wire and nails, it provides the steady quality that works best in creating biochar.

"These units work best when you have a feedstock that is consistent and dry," he said.

The facility itself will be being structured to have as little impact as possible on residents in Sedalia, Roberts said, including the construction of noise walls.

"Delivery of biomass and operation of the grinder and chipper will only be done during the day to minimize noise impacts," he said. "Design of lighting will be done to minimize impacts while still providing needed illumination for security and safety."

Forest Service trucks will arrive by appointment only so as not to overwhelm the neighborhood.

"We don't want 50 trucks a day coming into this facility," Roberts said.

Opp, with Knothead Tree and Lawn, said the new biochar plant will make his work feel more worthwhile and sustainable.

"I don't want to see the wood chips we produce go straight to the landfill and do absolutely nothing for the environment," he said. "This is better."

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