



The Great Rift Valley as it is visible near Eldoret, Kenya. Credit: Michael Shade, Wikipedia.

Kenya's "Great Carbon Valley" May Be Fertile Ground for Carbon Storage

By Mark Fogarty

Africa, which has produced quite a low percentage of the world's carbon emissions, is a relatively easy target to get to Net Zero and to provide an effective location for carbon removal.

The nascent field of carbon dioxide removal (CDR) is even more nascent in places like Kenya and its "Great Carbon Valley," according to Wil Burns, founding co-director of the Institute for Carbon Removal Law and Policy, in a recent session of its "Scrubbing the Skies" webinars.

"Many of the CDR processes that are receiving substantial attention now ultimately require sequestration of the carbon," Burns noted in introducing the session.

"There are a host of questions in this context," he noted, "in terms of cost, permanence and safety. My guests today are engaged in one such process for storage, which is often termed carbon mineralization."

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James Irungu Mwangi, founder of the Climate Action for Africa, said his primary interest is in climate action, the actions that will need to be taken to avert climate disaster. And the countries of the Global South may have some advantages here, he told the webinar.

"How do we move from thinking about the work of repairing our climate as a grudge purchase, a task, and move instead to say whoever made the mess should pay to clean it up, but whoever has the assets and resources to do it best should actually build an economy around that activity."

In Africa and in Kenya in particular, "the combination of a large and growing dynamic labor force, probably the world's largest in Africa by 2050, combined with the actual resource of land the continent has, it is the one

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place in the world where you have a large population coincident with a fairly large amount of underutilized land as well as a superabundance of renewable energy potential."

Africa and Kenya are really exciting in their potential for decarbonization, Mwangi said.



He pointed out that when people think about how Africa fits in to carbon removal, they think about the rain forests and the farmlands, and maybe the mangroves.

“But it turns out if you think about the critical enablers of large scale carbon removal, of scrubbing the skies using technology, well, what do you need?”

One is green energy that does not have a competing carbon use. “If you are using high-emission energy to pull CO₂ out of the air, you’re taking two steps forward and one step back,” he told the webinar.

“You’re actually looking for places where you have massive runway in terms of lots of renewable energy potential, but no decarbonizing use.” That points you to Africa, he said. “Emissions are still the lowest in the world, so there’s not much to decarbonize, and yet you’ve got energy and a lot of other enabling resources to drive this industry.”
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Mwangi asked this question: “Why does it matter?” and answered, “By unlocking the economics of energy system buildout, it could allow countries that haven’t been able to develop their actual advantages in renewable energy, to actually underwrite that, using this as a kind of buyer of last resort.”

The other panelist, Dr. Claire Nelson, co-founder and Chief Science Officer at Cella, wanted to discuss the potential for geologic carbon storage in the East African Rift.

She focused on Direct Air Capture (DAC) in its engineered forms, rather than natural ones, and carbon storage.

DAC “is an extremely energy-intensive process,” she said. “Kenya is unique in that 92 percent of its energy is renewable, and that’s projected to get to 100 percent in the next couple of years.”

About half of it is from geothermal energy, Dr. Nelson told the webinar. “Kenya is a global leader in geothermal energy, the eighth-largest geothermal industry in the world. Currently, the installed capacity of geothermal in Kenya is close to 900 megawatts of electricity and the estimated untapped potential is about 10,000 megawatts. To put that into perspective, Kenya has enough excess electric energy potential from geothermal alone to power a two hundred million ton per year DAC plant.”

And there is a lot of waste heat associated with geothermal energy production, she said. It is currently not being monetized to its maximum potential, making it a very attractive place for DAC companies that can monetize it.

Geologic storage is “a major bottleneck” to scaling these new technologies, she said. “DAC companies currently outnumber storage companies ten to one,” said Dr. Nelson.



Workers at Olkaria Geothermal Power Plant, Kenya. Credit: Lydur Skulason, Flickr.

“Very small amounts exist for pure carbon capture storage,” she said, with most going towards the oil industry.

Places with sedimentary storage capacity like the U.S., she said, are going to be used primarily for point of capture storage, making CDR storage capacity even smaller.

This is where Kenya comes in, especially the Kenya Rift, one of the largest volcanic provinces in the world.

Her company is developing carbon mineralization in basalt. “There’s tons and tons of basalt co-located with this renewable energy. There have been some preliminary assessments of capacity done by collaborators at the University of Nairobi and the University of Kenya assessing the storage capacity specifically for mineralization.”

Her firm is working on a new technology for carbon storage in basalt.

“We’re coming up with nozzle injection technologies to increase per well capacity, cut water demand, and therefore lower cost.”