

COP21's climate technofix: spinning carbon into gold and the myth of 'negative emissions'

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Skyline in Decatur, Illinois, Photo: commons.wikimedia.org/wiki/File:Decatur_IL_industrial_skyline.jpg

by Rachel Smolker, The Ecologist

Paris has been awash with hype about 'CO₂ recycling' and 'carbon neutral' or even 'carbon negative' technologies based on burning millions of trees, writes Rachel Smolker. But the alchemical notion that waste carbon can be spun into corporate gold is hitting serious reality checks. It's time to ditch the fantasies and progress the real solutions: like caring for land, soils, forests and grasslands.

When the IPCC (International Panel on Climate Change) published their most recent fifth assessment report, something surprising and deeply disturbing was lurking in the small print in [chapter three](#) on 'mitigation'.

The IPCC revealed that to achieve even a recognizably normal future climate the models they reviewed relied on not only drastically reducing emissions in the future, but also on widespread use of some advanced technology that can remove some of the CO₂ that is already in the atmosphere.

In fact, most (101 of 116 models they reviewed to achieve 430-480 PPM stabilization) incorporated some sort of 'negative emissions' technological fix ([Fuss et al., 2014](#)).

The terminology of 'negative emissions' has now entered the jargon in climate negotiations currently underway in Paris. Yet such a technology is currently nonexistent. The only approach to sucking CO₂ out of the atmosphere mentioned by the IPCC as "*near term available*" is bioenergy with carbon capture and storage, commonly referred to as BECCS - Bio-Energy with Carbon Capture and Sequestration.

BECCS involves producing biomass in massive amounts and either refining it into liquid biofuels (ethanol etc.) or burning it for electricity and heat, while also capturing the resulting CO₂ emissions and burying them underground.

IPCC acknowledges that there are risks and uncertainties associated with large scale BECCS. But, while IPCC has remained scientifically rigorous in their assessments of the state of our climate (chapter one of the report), when it comes to assessing 'mitigation' options (chapter three), scientific rigor appears to have fallen by the wayside in favor of economic wishful thinking.

The reality of BECCS

The fact is that no matter how costly or difficult it may be economically and no matter how difficult to make the models 'work' to lay out a path to climate stabilization, embracing fantasy technofixes is a losing strategy. We already know that for both technical and economic reasons, BECCS can never achieve 'negative emissions'.

In fact, in a new report on BECCS, by Biofuelwatch refers to reliance on BECCS to clean up our climate mess as being roughly as dependable as counting on a visit from carbon sucking extraterrestrials from another planet.

There are currently only a handful of operating commercial BECCS facility in existence, based at ethanol refineries, the most notable being the Archer Daniels Midland project in Decatur Illinois. These capture CO₂ from fermentation, which is cheaper and easier than capturing CO₂ from other processes because fermentation results in a relatively pure CO₂ stream.

The Decatur project is a proof of concept project for underground storage of CO₂. However, its developers never claimed to provide 'negative emissions' nor even to be 'carbon neutral'. A few others sell the captured fermentation CO₂ for industrial applications including soft drinks and enhanced oil recovery (see below).

Meanwhile, burning wood for industrial and commercial scale electricity and heat is the bioenergy process that is scaling up most rapidly, with co-firing of wood pellets in coal power plants. Industry and governments continue to claim that burning wood for electricity is renewable and 'carbon neutral'.

Hence they subsidize it alongside wind and solar, even though the CO₂ emissions are generally much higher even than for coal per unit of energy generated. The notion that those emissions will be offset by regrowth of the trees and crops that are used has been refuted over and over again, yet still is not reflected in policies. Yet, if the process is not 'carbon neutral' in the first place, it can never be rendered 'negative' by carbon capture.

We also know full well by now that the demand for 'biomass' and the associated land, water, fertilizers use etc. would be hugely destructive on a variety of fronts beyond greenhouse gas emissions – affecting food production, water, human rights and biodiversity. This is clear already at the current scale of bioenergy production.

BECCS and 'clean coal'

BECCS is the bioenergy twin of 'clean coal', the carbon capture (CCS) technology that has been touted for years by the coal industry. So how has that worked out?

Carbon capture from fossil fuel processes, as from bioenergy, is expensive and energy intensive. Most attempts – almost all involving coal and natural gas, have encountered a multitude of technical problems and massive cost overruns. They have failed to operate efficiently if at all.

FutureGen, a demonstration 'clean coal' plant, was intended to be a US showcase example of CCS technology. Somewhere around 200 million dollars of public funding were spent prior to cancellation in 2013. It was canceled in part because private investors wouldn't chip in. They didn't consider it viable, presumably because the technical and economic challenges were simply too great.

Another CCS 'clean coal' project is in progress in Kemper, Mississippi. The facility will use lignite coal strip mined from an adjacent area of around 48 square miles. Costs were initially estimated at \$1.8 billion but have so far ballooned to an astounding \$6.17 billion.

Even then, the facility is required only to 'try' to capture CO₂. If they fail, they won't be held responsible. If they succeed, they have contracted to sell the CO₂ for enhanced oil recovery. The project is nevertheless still presented as 'good for the climate'.

Last year SaskPower's billion dollar Boundary Dam project, capturing CO₂ from a coal plant came online amid massive hype and proclamations of success. However, recent release of internal documents

"have not only shed light on the technical and financial problems with the plant but the political deception that has gone with it ... A little over a year later, the hype about the purported environmental benefits and affordability of the Boundary Dam CCS plant have gone up in a puff of green smoke."

CCS has been held up as the promise behind 'clean coal' for decades. Yet a few weeks ago, after 22 years of lobbying for so-called 'clean coal' and failing to produce a single speck of it, the American Coalition for Clean Coal Electricity announced that they will scale back their lobbying efforts.

In 'Carbon capture: Miracle machine or white elephant', the Financial Times noted *"Few technologies have had so much money thrown at them for so many years by so many governments and companies, with such feeble results."*

Was it ever anything more than a useful fiction?

Even above and beyond the problems already mentioned, necessary infrastructure, such as pipelines, to handle captured CO₂ and transport it to storage sites are not always conveniently available.

Underground storage of CO₂ is also questionable. Leaks are pretty much inevitable. A slow leak would release the CO₂ back into the atmosphere, while catastrophic leaks from, say, an earthquake, could be lethal to surrounding populations as CO₂ is deadly when concentrated.

Where carbon capture has been implemented (primarily in natural gas refinery operations), the costs are offset in part by selling the CO₂ for 'enhanced oil recovery', that is: pumping compressed CO₂ into depleted oil wells which forces more oil to the surface. But this is neither considered 'sequestration' nor is it climate friendly. Quite the reverse.

Still, governments continue to dole out the cash for CCS projects. Doing so is viewed, politically, as 'taking action' to reduce emissions. Energy companies on the other hand, have not invested significantly into BECCS or CCS. Governments, that is, we the taxpayers, are instead footing the bill for this endless nonsense.

None of this bodes well for a miraculous, rapid and effective scaling up of BECCS as climate savior. Just recently, DRAX, one of UK's largest power companies, announced that they were abandoning their 'White Rose' BECCS project.

That project, sometimes billed as 'carbon negative', was to involve construction of a sizeable new coal plant (the first new plant in UK since 1972). DRAX was slated to receive millions in government subsidies for mixing wood pellets with coal and, in theory at least, capturing and burying some proportion of the CO₂ emissions.

Now, as the Paris climate negotiations are just beginning, the UK announced they will altogether drop their promised 'pioneering' funding competition for CCS.

Now what? Ah yes: 'CO₂ recycling'

The idea that we can somehow remove CO₂ from the atmosphere is highly appealing. But so far it is simply not possible, and BECCS, even if it existed and was affordable, could not achieve that.

Nevertheless, polluting industries, with their slick PR machinery and near infinite budgets, stand prepared to hype whatever will allow them to maintain business as usual: whether it is clean coal, carbon neutral bioenergy, or negative emissions. These are the lies and false promises upon which we are expected to hang our hopes.

In reality, they are pointless babble, smoke and mirrors designed to distract a public that is finally coming to recognize the causes and magnitude of the climate crisis but which still remains naively vulnerable to false hopes for a magical technofix.

As the Paris climate negotiations are under way, we bear witness the latest fad: 'CO₂ recycling'. Instead of putting serious attention to addressing the roots of the problem, we are encouraged to embrace an entrepreneurial and stylishly clever mindset that CO₂ is no longer a 'problem' but should instead be viewed as a valuable commodity!

Why not make stuff from CO₂ and sell it? We can profit from our own pollution!

Recently, 'XPrize' announced a collaboration with the American energy company, NRG and the oil sands innovation alliance (Cosia) to provide a \$20 million bounty for development of a technology capable of making something of value from CO₂ removed from the atmosphere.

But, recall the famous 3R's of waste management? Reduce, Reuse and Recycle. We learned that reuse and recycle only slightly postpone the approach into landfills: a blink of the eye in the lifetime of a plastic.

As it turns out, reduce is really the key, it alone addresses the root of the problem. The same is likely to be true for CO₂. The only seeming reason to make CO₂ products dependent on the perpetuation of an unsustainable and polluting industry (to generate the CO₂) is to keep the polluting industry alive.

A fairy tale with no happy ending

This idea of CO₂ recycling brings to mind the famous fairy tale of Rumpelstiltskin. In that story, the princess is commanded to spin straw into gold. A magical imp offers to assist her with this impossible task, but only if she promises to hand over her firstborn child to him. When her child is born, the imp offers that if she can only guess his name, she can keep her child. Happily, she succeeds.

Now we have the fossil fuel industry, XPrize backers representing some of the most atrociously polluting industries, and even some well intentioned people who genuinely, if naively, wish for a technofix to 'solve the climate problem' demanding that we spin gold out of CO₂ emissions if we want our children to have a decent future.

But we don't actually have to play mind games with magicalimps. We know of tried and true solutions to remove CO₂ from the atmosphere. Those include a global transition away from industrial agriculture and towards agroecology, good soil practices and the restoration of native ecosystems, including the halting of deforestation.

Overall good stewardship of the land and nature would take us much farther towards healing the atmosphere, something that many, including organizations such as La Via Campesina (the peasant farmers), Global Forest Coalition, Indigenous Environmental Network and indigenous peoples around the world have long fought for.

Those real solutions will not generate 'renewable energy' or marketable products and therefore are not technically 'negative emissions'. They do not rely on shiny new technofixes or pretend to 'recycle' pollution. Importantly, they are not so amenable to monetization, corruption, or corporate monopolization.

Hence they are rarely given more than lip service, and when they are, it is in the context of bringing them into the market, and providing offsets for polluters as in the case with forests and 'reducing emissions from deforestation and degradation' (REDD) and 'Climate Smart Agriculture'.

What is needed more than ever is to see through the smoke and mirrors, stop providing massive funding for lifelines to the polluting industries and embrace the obvious and common sense solutions that are tried and true, and remain our best hope.