in Squamish British Columbia there’s a company that wants to stop climate change by sucking carbon dioxide out of the atmosphere.

One of our plants does the work of 40 million trees.

We have the lowest capital cost of energy cost of any of the co2 capture from atmosphere solutions.

we’re starting to enter commercial market.

it’s called carbon engineering and it uses a combination of giant fans and complex chemical processes to remove co2 from the air and a procedure known as direct air capture  
we have such a huge problem with co2 already in the atmosphere. but if we have a mechanism to collect it at large scale it will give us so much more flexibility in addressing climate change and will start to address all of those emissions that occurred yesterday the day before all the way back into the Industrial Age

the company is backed by Bill Gates as well as the oil giants Chevron bhp and  
Oxy dental. it’s received more funding than any other direct air capture company and it just announced plans to partner with Oxy dental to build its first commercial plant. but not everyone is excited.

partnering with an oil company is absolutely a step in the wrong direction

p they’re not stopping the fossil fuel industry you’re actually promoting it

so, we’ve got a bunch of equipment around us here that collectively process atmospheric air and pull the carbon dioxide out

basically, carbon Engineering’s process involves using large fans to pull in atmospheric air through a device called a contactor. after that it’s just chemistry. the air gets sent through a honeycomb structure upon which a liquid solution of chemicals is constantly raining down on. some of the co2 molecules in the air stick to that liquid and the resulting solution is processed in a few more chemical steps to form calcium carbonate pellets. which are heated at very high temperatures to release pure carbon dioxide. which can then be stored underground or used to create products like fuels. all the chemicals in the process are recycled. so, the cycle can repeat. carbon Engineering’s pilot plan is currently powered by a mix of natural gas and clean electricity. and the co2 generated from combustion is captured. eventually though the company plans to run fully on renewable electricity. while previously direct air capture was thought to be too expensive to be a viable option. carbon engineering published research last June that тrevealed its process would cost between ninety-four and two hundred thirty-two dollars per ton of co2 captured. a steep decrease from the industry’s prior estimate of $600 per ton.

this led to тrenewed interest in the tech especially after the Intergovernmental Panel on Climate Change or the IPCC released its special report on global warming last October. which stated that some form of carbon dioxide removal would be necessary to keep global warming below 1.5 degrees Celsius. and thereby avoid the worst effects of climate change.

we were actually assessing a lot of different pathways to reach 1.5 degrees C. but none of them could actually reach the temperature target without removing co2 from the atmosphere each year that we wait we actually making ourselves more dependent on carbon removal.

direct air capture is one of only a handful of technologies that can permanently take carbon dioxide out of the atmosphere. another is called bioenergy with carbon capture and storage. basically, this involves burning biomass like trees and storing the carbon dioxide emissions underground. this is currently done in five facilities worldwide. problem is it takes a lot of land to grow all that biomass. and just like direct air capture it’s difficult to finance these projects. then there are dozens of companies working in the carbon capture space more broadly. while these companies don’t have the potential to remove co2 that’s already in the air. they can capture it at the source and recycle it or bury it. for example, shale operates a carbon capture project called quest. that has sequestered a total of 4 million tons of co2 from one of its plants in Alberta. and many oil companies do recycle the carbon dioxide they produce to help them extract more oil from the ground. but one of the simplest ways to remove carbon dioxide from the atmosphere is actually just to plant more trees. then there are also a number of other more advanced agricultural and land use techniques that could help capture and store co2 in soil and vegetation. given the urgency of climate change many say we need to do it all.

we need more renewables, we need more direct data capture, we need more carbon capture and storage we need more nature-based solutions, we need more informed policy developments, because the challenge of climate change means at the time for picking winners is gone. this is about taking an all-of-the-above approach because the challenge is so great.

Bill Gates is an investor in carbon engineering and as of this year so our three major oil companies Chevron bhp and Occidental. which helped the company raise 68 million dollars in its most recent funding rounds. in May Carbon engineering announced that it’s working with Occidental to design its first commercial plant. which will capture about half a Megaton of co2 per year. to be used in enhanced oil recovery operations in the Permian Basin in Texas. basically, this means that the captured carbon dioxide will be injected underground in order to extract more oil from petroleum wells.

well this is a common use case for carbon capture technologies some definitely see it as counterintuitive for a company that aims to address the climate crisis.

the oil companies love this because they actually can then take the co2 and then increase their oil production which means we’ll burn more oil for transportation and other uses. and that will result in even more air pollution and global warming.

it seems like a crazy idea the oil is true but the at Patras this is not businesses usually on the street they would never do it by for the regulatory force coming from California. so, they’re gonna be paying us much more per time and they will pay normally for co2 and the only reason that works is gonna make fuels that truly are carbon neutral.

California requires a 20% reduction in the carbon intensity of the state’s transportation fuels. by driving the market for cleaner fuels and using captured carbon dioxide for oil recovery is cleaner than the way the process is otherwise performed

estimates are that by 2040 still 50 percent of the energy that is going to  
 be needed is going to come from oil and gas. so, it’s really important for us to think about our current portfolio as well as future portfolios and the overall carbon intensity or footprint of them.

carbon engineering is also using its captured co2 to produce synthetic fuel which it hopes can hit the market in as soon as five years. so long as the price of solar hydrogen drops as this is also needed to create the fuel.

so compared with the conventional fuels that we use today and transportation these fuels emit 70 or even 90 percent less carbon. so it’s a big step in the right direction and then with further technology innovation we can get even closer to zero. so even closer to fully carbon neutral fuels.

private sector partnerships with oil and gas companies will allow Carbon engineering to bring its tech to market. but some energy experts are worried that it will create perverse incentives. ultimately making it harder to wean the world off of fossil fuels.

partnering with an oil company is absolutely a step in the wrong direction and there’s no way to soft-pedal that story. if you say you’re part of the solution and that your technology won’t be a shill a cover a front to fig leaf for fossil fuels then you can’t partner with that same industry. you either need to be part of the effort to grow the green energy economy without perpetuating the dirty energy one that must be gotten rid of and right now sadly carbon engineering is on the wrong side of that equation.

problem is without public investment or more stringent carbon pricing initiatives there’s just no monetary incentive for carbon engineering to permanently bury carbon underground. without creating a product like crude oil or synthetic fuel

governments are not funding this technology right now they’re not funding removal of co2 from the atmosphere. so, do those critics they want us to wait or do they want to bring our technology to the market using the mechanisms that are available. why wouldn’t we do that.

Kaman thinks the price of carbon just needs to be higher before direct air capture makes any sense.

there is a business model for direct air capture and it’s called a price on carbon. that price around the world is between ton in California to $5 a ton in China ton in Europe and those numbers are not enough to make direct air capture financially viable today. Whereas they’re more than enough to make clean energy options like solar wind energy storage energy efficiency all viable today.

unless we’re getting a decent carbon price, the business case for really storing and permanently is not there yet.

some countries are doing better. Norway has had a carbon tax since 1991 which is 50 dollars or more per ton for natural gas combustion. this is incentivized a number of carbon capture and storage projects. that have been operating there for decades. and Switzerland’s current rate is 99 dollars per ton. a price that is adjusted based on whether the country is hitting its emissions targets. u.s. federal tax regulations passed last year do provide a $50 per ton credit for capturing and sequestering co2 and a $35 per ton credit for using captured carbon dioxide and enhanced oil recovery. but experts say the u.s. is still falling short.

if you really want it to drive us emissions down at the kind of speed that people talk about these IPCC projections of emissions cuts, you need carbon prices a ton or higher.

it’s a tough position. if carbon engineering doesn’t go to market it may not get the resources to prove out its technology and catalyze policy change and investment but with its current partnerships carbon engineering is hitching its wagon to corporations with a fine Angell incentive to favor fossil fuels.

if you spend a certain amount of money on one technology like direct air capture that means it’s not being spent on another technology like renewable energy. for example, wind turbines or solar panels. they also remove carbon from the air because they prevent it from getting in the air in the first place.

but the IPCC says that wind and solar alone won’t be enough. and that we need some form of carbon dioxide removal. however, this doesn’t mean direct air capture itself is necessary we have other ways to bring carbon out of the air and they’re called trees. and trees are cheap and plentiful and they have lots and lots of co-benefits. and the more we invest in preserving our forests expanding our wetlands and making agriculture smarter and smarter we get all the benefits of direct air capture. at a fraction of the cost.

some climate stabilization models predict that if we invest in these land use measures and manage to achieve significant near-term emissions reductions. we can keep global warming below 1.5 degrees Celsius without technologies like direct air capture or bioenergy with carbon capture and storage. but carbon engineering says it’s tech would be much more effective than agricultural or forestry solutions. it plans to build plants that capture one mega ton of co2 per year. one of our plants does the work of 40 million trees so if we’re gonna plant trees instead of doing our plants we’d better get on with it and we better plant lots of them. so, you know we think we have a much more scalable solution because we’re gonna run out of land and time to grow trees.

a scaled-up plant could do the work of 40 million trees but only if the carbon were sequestered underground. not if it were used to extract oil or create fuels.

in the ideal world how would you best use that technology to make a dramatic impact on climate change. you know the short answer is you would set up plants worldwide capturing co2 straight from the atmosphere and burying it back where it came from underground. but that requires a lot of government money.

federal funding just isn’t there yet and while it may never be some dispute the notion that investment in one technology has to come at the expense of another.

so, a lot of times there is a confusion between carbon removal and conventional and mitigation supporting renewables like wind or solar. there is the misunderstanding that it’s an either/or. the problem though with ambitious climate targets is that we are late with mitigation we actually need both.

each year the world emits 40 billion tons of co2 at this rate it would 40 000 carbon engineering plants capturing one mega ton of co2 per year. to suck all the world’s annual emissions out of the air. but other direct air capture companies could lend a hands.

Swiss company Clime works opened the world’s first commercial direct air capture plant in Zuriit in 2016. It sells its captured carbon dioxide to greenhouses. but it costs $600 per ton of co2 removed. another company global thermostat runs what is currently the world’s largest commercial direct air capture plant in the world in Huntsville Alabama.

it claims it can eventually reach 50 dollars per ton by selling the co2 to soda companies. and Santa Cruz based company Prometheus recently received an a hundred fifty thousand dollars seed investment from Y Combinator. and also plans to use its captured co2 to make fuels. carbon engineering says in addition to its low cost. its advantage comes from its easy scalability.

when you look at our plant all of those pieces of equipment are available at scale in other industries. it makes it straightforward for us to scale to a very large size. so, if you believe that the co2 problem is very large scale then our solution lends itself best to that.

construction on the first commercial plant is set to begin in 2021 and carbon engineering estimates. it will become operable a few years after that hopefully helping to propel the public policy and funding that this tech needs to truly make a difference.

we’ve seen that again and again if you look at the fight over ozone destroying chemicals if you look at the fight over air pollution. what we find is that new pollution reducing technologies and able regulators to double down on stronger regulations.

the technology Keith says is ready.

this is not a technical problem this is a political problem. there are tons of technical solutions. the issue is political will to fight entrenched interests including some of the fossil fuel companies that are promoting lies to allow us to drive emissions down. if governments make decisions to force emissions down there are plenty of technical ways to drive them down  
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