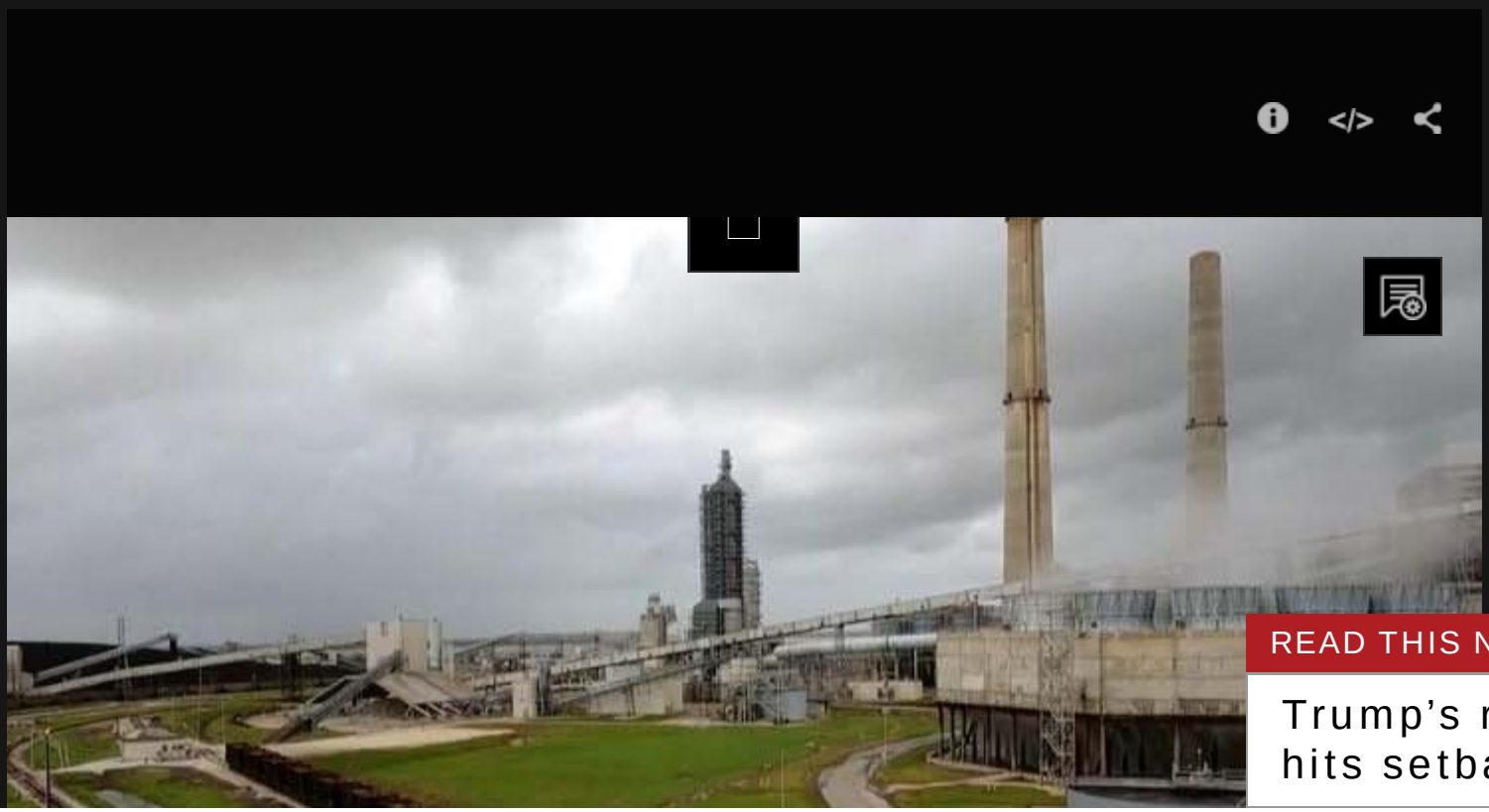
PBS NEWSHOUR

TOPICS > SCIENCE > THE LEADING EDGE

Could carbon capturing make ‘clean coal’ a reality?

June 14, 2017 at 6:25 PM EDT



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country and the obstacles stopping them from collecting more.

JUDY WOODRUFF: The future of coal is very much at the center of debate right now when it comes to the politics and business of energy.

Whatever you may think about those questions, the U.S. still uses a lot of coal. About 30 percent of our energy, of our electricity is generated by it.

For some, the Holy Grail is new technology that captures some of coal’s worst problems with greenhouse gases.

Miles O’Brien reports on the largest facility trying to do so.

It’s part of our weekly series on the Leading Edge of science and technology.

MILES O’BRIEN: At the W.A. Parish power plant southwest of Houston, they are piling up coal, getting ready for another long, hot, aggressively air-conditioned summer.

One of the largest fossil fuel power plants in the country, Parish can generate about one-fifth of the city’s electricity using coal- and gas-fired turbines. And it is leading the nation down a promising, yet problematic path.

Here, they are trying to make clean coal more than a political slogan.

Mauricio Gutierrez is CEO of NRG, owner of the plant.

MAURICIO GUTIERREZ, President and CEO, NRG: We built the world’s largest carbon capture system on an existing coal-fired power plant. It is the first commercial scale facility of this kind in the United States.

MILES O’BRIEN: They are capturing and storing carbon dioxide, the greenhouse gas that is the main driver of global warming. This is prompting some unexpected support from members of the Trump administration.

Listen to Energy Secretary Rick Perry at the ceremonial opening in April.

RICK PERRY, U.S. Secretary of Energy: I think the solutions to many of the challenges that we have in the world today are displayed behind me.

MILES O’BRIEN: The same Rick Perry who wrote a book calling climate scientists members of a secular carbon cult who manipulate data and climate science a contrived, phony mess, but not here.

RICK PERRY: It shows we don’t have to pit the environment on one side weighing and the economy on the other side. We can and we will be good stewards of both.

MILES O’BRIEN: The steward of this project for NRG is David Greeson, the vice president of development.

DAVID GREESON, Vice President of Development, NRG: We’re interested in doing more carbon capture as a part of our overall sustainable energy future plan, and so we’re going to see how this one

works.

MILES O’BRIEN: They call the billion-dollar carbon capture and storage system Petra Nova. NRG built it in partnership with the Japanese oil company JX Nippon using a $190 million grant from the Department of Energy doled out during the Obama administration.

DAVID GREESON: So we’re capturing about 200 tons of CO2 per hour. On an annual basis, that’s about 1.6 million tons per year. That’s the equivalent of 350,000 cars being taken off the road.

MILES O’BRIEN: While it may be the world’s largest carbon capture facility, it is still only removing about 10 percent of the CO2 created by the four coal-fired generators here. The only obstacle to capturing more is money.

DAVID GREESON: We’re just now reaching the point where this technology is mature enough to be considered for rollout to the broad coal-fired fleet in the United States and around the world.

MILES O’BRIEN: Here’s how it works. Flue gas, with carbon dioxide in it, flows through a duct to the carbon capture facility. One vessel contains amine, an ammonia-based chemical in liquid form. It naturally binds with carbon dioxide.

With the carbon now in solution, the liquid goes to another vessel, where it is heated up. As that happens, the process is reversed and the CO2 pops out as a gas. It is captured, and, after it is compressed, ready for underground storage.

MICHAEL WEBBER, University of Texas at Austin: I think Petra Nova is a shining example of what technology offers, and so, as an engineer, I’m very enthusiastic about it. I think it’s very exciting.

MILES O’BRIEN: Michael Webber is deputy director of the Energy Institute at the University of Texas at Austin. He says the energy sector is watching this project very closely.

MICHAEL WEBBER: We’re getting a lot of scrutiny because people want to know if carbon capture and sequestration will work. And there are examples around the nation, around the world where it hasn’t really quite come together the way people want. It’s really expensive and hard to do, so you wouldn’t do it unless you had to, or it’s in your economic favor to do so.

MILES O’BRIEN: And a coincidence of geography has made that possible here. The CO2 from the Petra Nova facility is sent 80 miles to the southwest, to the West Ranch oil field. Here, the gas is as good as gold, black gold, Texas tea.

JILL FISK, Senior Vice President, Hilcorp: That was the hope, if you marry up a partnership between a CO2 emitter where they can capture the CO2 and reduce their CO2 emissions, but then that CO2 can be used to increase oil production. That’s really a win-win.

MILES O’BRIEN: Jill Fisk is a senior vice president for Hilcorp, the current operator of this oil field, which first opened in the 1930s. At its peak in the ’70s, it produced 50,000 barrels of oil a day. Today, it’s down to less than 300 barrels a day. Normally, it would be time to cap the wells here.

But, instead, they’re drilling new ones, getting ready to pump a lot more oil by injecting carbon dioxide deep underground. Liquid CO2 has been used to liberate the most stubborn oil for about 40 years.

JILL FISK: Essentially, what’s happening is the oil is stuck to rock, if you can imagine that. The CO2 is injected, it dissolves into that oil that’s stuck to the rock, loosens up the oil, lightens it up, which — so it can then flow toward a producer and produce additional oil.

At West Ranch, we’re expecting to recover an additional 60 million barrels of oil that would otherwise be left in the ground and be unrecoverable without a project of this type.

MILES O’BRIEN: Right now, with oil prices so low, Petra Nova is breaking even, but, over the next decade, they expect to make a tidy profit capturing and burying carbon dioxide.

But doesn’t this just transfer greenhouse gas emissions from a power plant smokestack to automobile tailpipes?

JILL FISK: So, I think that demand for oil is either going to be met by foreign oil that the United States has to purchase or by our own production that we’re able to supply. So this project is breathing new life into a field in the U.S. to help supply that demand for oil.

MILES O’BRIEN: But how can we be certain buried CO2 will stay underground? Scientists from the University of Texas are running tests at 22 monitoring wells at West Ranch, getting baseline data so they will know later if the injected CO2 triggers some unintended consequences, like earthquakes or the release of deep dwelling salt water, minerals, or chemicals.

At this test site in Austin, they are finding new ways to monitor the buried CO2.

SUE HOVORKA, University of Texas at Austin: You ready to start?

MILES O’BRIEN: They pump the gas into groundwater to simulate leaks. They use a sensor that

measures light. It is coated with a polymer that thins when it reacts with CO2. If there’s any trouble, the sensor detects more light, and an alarm is transmitted automatically.

Geologist Sue Hovorka leads this effort.

SUE HOVORKA: We need to get good enough to provide value to the atmosphere, and we need to avoid unacceptable consequences.

MILES O’BRIEN: Hovorka analyzes deep rock core samples stored in a cavernous warehouse at the Bureau of Economic Geology in Austin. She says there are ample places to bury carbon dioxide produced by all types of fossil fuel power plants, not just coal burners. That would be a monumental step toward addressing climate change.

SUE HOVORKA: If consumers want to use coal and want to reduce the carbon from that, the system to do that is ready to go. They have to pay for it. It’s not outrageous. It’s totally possible, but it’s not free.

MILES O’BRIEN: Up until now, clean coal has been nothing more than a marketing myth. It could become a reality at no small cost, but at a small fraction of the toll if the industry does nothing to stop global warming.

In Richmond, Texas, I’m Miles O’Brien for the PBS NewsHour.

JUDY WOODRUFF: And as Miles just said, costs are just one of the questions about whether this model could be replicated more widely.

And Miles joins me now from Boston.

So, Miles, tell us more about why — and so this is the first plant of its kind. What are the challenges in trying to replicate this somewhere else and getting the same results?

MILES O’BRIEN: Well, Judy, the secret sauce of this one, according to the innovators behind it, is, they reduced the cost of creating the carbon capture.

When I say cost, the cost in power. Normally, what the assumption is, that it reduces the output of any given power plant by as much as 30 percent in order to run the carbon capture system.

What they did in this case was they decided not to use the actual turbines which light the lights that I’m using right now, but rather a separate co-generation plant air, a smaller power plant on site that can

be run much more efficiently.

And they say that they — it's costing them about 15 percent of the power-generating capacity of that plant. So that's a big hurdle that they have gotten over. Now, 15 percent is still a big number, and unless you have some commodity or the CO2 has some value, the business model doesn't add up just yet.

JUDY WOODRUFF: And you were telling us, Miles, there are also some physical challenges as well.

MILES O'BRIEN: Well, being 80 miles near an old oil field that could use that CO2 to capture and recover a lot of stubborn oil from the ground makes it all work.

The question is, could a fossil fuel plant of any kind that's a long way away from an oil field, could it avail itself of this kind of transaction? And CO2 can be pumped in pipelines for an indefinite amount of distance, as long as you recompress every now and then, sort of have a booster system in.

But, again, that's going to be a significant cost. It is not an insurmountable thing technologically, and it could be done. We already have significant CO2 pipelines in the oil sector. You could extend it out, if you were determined to do this.

JUDY WOODRUFF: And, just quickly, you were also saying other practical limits.

MILES O'BRIEN: Well, yes.

It's — the limits on this are — there are some concerns, for example, about putting CO2 in seismically active places, for example. You wouldn't want to put buried CO2 underneath San Francisco, for example.

But, having said all that, when you consider all the places that it can be stored, the experts tell me, we have enough storage capacity underneath the continental United States to last about 900 years of CO2 production.

So, it's just a question of societal priorities and whether we want to pay a little more for power to get the carbon dioxide out.

JUDY WOODRUFF: Miles O'Brien, thanks very much.

MILES O'BRIEN: You're welcome, Judy.

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51 Comments PBS NewsHour

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Lawrence Wasserman • 22 days ago

Miles -- As a scientist, I see a couple of problems with your article. First, and most obvious, is that if it takes 15% of the power output of the plant to extract and sequester 10% of the CO2, then it's going to take 150% of the power output to extract all the CO2. There is obviously a problem here.

Second, you never said anything about how much it would cost to sequester all the CO2

(both physical plant and continuing operating costs) compared to just closing the plant and replacing it with solar and/or wind power.
Otherwise, an interesting article.

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Valentino > Lawrence Wasserman • 21 days ago

I understand why you interpreted it this way, based on what was said in the report. However, that's not what is meant. What they mean is the more complex claim, that sequestering some proportion of the CO2 produced by the plant requires 15% of the energy produced, times the proportion of the CO2 production sequestered. So, they're using 15% of the electricity production from the 10% of production that they are sequestering, or 1.5% of the current total plant electricity production. This was very unclear.

Also, It's not stated whether that's rated against minimum base load, maximum output on the daily cycle, or some type of average of output. More importantly, nothing is said about how well the specialized use of cogen, which is what they claim moves them from 30% to 15%, can be scaled past application to 10% of the plant emissions. If you can only get the cogen benefits on the first 10% of sequestration, and you want to get to 70% sequestration, then only one seventh is paid for at 15% and the rest at 30% of plant power output -- not much of an improvement over the state of the art otherwise. A figure like 70% is a relevant goal, because it makes the coal

plant emit a net amount of CO2 for energy produced that approximates that of a natural gas plant with similar generation characteristics.

Finally, please note that you can't replace the output of a plant like this with solar or wind power,

see more

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Robert Nagle > Valentino • 21 days ago

Mark Z. Jacobsen and others at Stanford have modelled exactly how you can have a 100% Wind/Water/Solar grid for 50 states without intermittency issues. The plan envisions an 80% transition by 2030 and 100% by 2050. Here's the press release http://news.stanford.edu/20... and the PDF of the study (warning-- it's long!) http://web.stanford.edu/gro... (PDF).

1 | Share ›

Valentino > Robert Nagle • 20 days ago

Hi Robert, thanks for the reply. We're not likely to convince each other here, but I will say that I think that the word "exactly" is not used in an applicable way in your comment. The Jacobsen et al analysis leaves out plenty of detail that sets electrical engineers to howling. I suggest that you try the argument on someone who works in the power industry for a living, and has to actually make and maintain the plants and equipment that generate and distribute grid power, and listen carefully to what they have to say.

Here's a quick rebuttal to the Jacobsen paper, in case you don't have personal access to some power engineers:
http://www.greens.org/s-r/6...

The basic point is that you can't model grid energy matters without modeling each element through all time, at the relevant time scales for the features of the element. Coal and nat gas cogen plants are load-following, and so you can model them through their daily cycles and assess their match to relatively smoothly changing demand curves, absent only the very rare event of an unscheduled plant shutdown. PV solar and wind turbines are nothing like this; they regularly vary

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Robert Nagle > Valentino • 20 days ago

Thanks for your reply and the link. By the way, the link appears to address

Jacobson's 2011 papers, not really the 2015 one. I think in 2011 Jacobson was still aiming for 100% renewable by 2030, which the 2015 paper is no longer aiming for. The 2015 does not specifically address variability; I think it's just trying to talk about total power output. (You can see other papers from the Stanford group about reliability and variability here: http://web.stanford.edu/gro...)

A lot of your issues can be addressed with more storage capacity and a better distribution grid, not to mention redundancy. You may be describing the current system accurately in some places, and perhaps a few edge cases. But I suspect that places like California and Washington already have dealt with the variability/baseload issue adequately by now.

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Valentino > Robert Nagle • 20 days ago

I have to say, Robert, it's so nice to have a pleasant conversation with someone, despite being in disagreement about something. There are no end of things to disagree about, but fundamentally, under it all, I really think that there is more agreement than people usually consider.

Thank you very much for pointing out my error in sourcing a reply link. It would, indeed, have been difficult for Ted Trainer to rebut the 2015 Jacobsen paper in his 2013 response. Apparently, I need to take a closer look at the 2015 paper...

I am worried, though, that I will find similar issues. Among the many strong constraints which can surprise the unwary, an electrical grid needs to generate nearly exactly the power that the load on the grid demands at all times, and this is not an easy feat. Big huge spinning machines driven by hot steam that drag the system into various complex types of correct behavior have been the go-to answer to this for generations, and while it would be great to see that need displaced by new technologies, it doesn't appear to be feasible in the present. This constraint means that

see more

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Robert Nagle > Valentino • 19 days ago

Hey, we're all learning about the limitations and practical realities of new energy sources. My only lament is that I can't be a 20 year old today in college to study these kinds of topics. When I was in school, I had little interest in such topics, but now these matters seem vitally important and interesting.

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Valentino > Robert Nagle • 19 days ago

I find that a lot, myself. I wasn't as interested in these detailed, complex, industrial questions when I was in school. Lately, I find myself looking into them on caprice. It's possible that the maturation of the internet has something to do with it.

There are going to be more good things to learn about new energy sources. I'm looking forward to learning bits and pieces as the technologies come along. I also think that the experts on these issues are generally conservative in their outlook, not meant in the political sense but in the sense related to rapid adaptation. That can be a very useful quality, but there will be times where we need to prod them on, and we also need to make sure that our desired social outcomes are expressed in dollars within the regulatory structure of the energy industry. Then we get into a whole other topic...

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fed-up-Redhead > Valentino • 19 days ago

Given the current "backward" thinking of our WH, we can only hope the research goes forward with a small measure of progress and eventually meets a WH more open to moving "forward".

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fed-up-Redhead > Valentino • 19 days ago

Valentino--forget my question above--you have answered it--and way beyond. Today has been a very good day for learning new things--from you and all the others. A Day without learning--is less than it should be. Today=good day.

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fed-up-Redhead > Valentino • 19 days ago

What do you think of the current R&D being done to improve storage capability? That

seems to be one of the biggest hurdles for expanding wind and solar--also technology for transmission from wind/solar "farms" to end users.

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Mike Livingston > Lawrence Wasserman • 22 days ago

Supply and demand will dictate the future of all energy sources and I believe that the solution is the deployment of a smart Grid system that accommodates all sources of supply and storage and utilizes them at the most efficient levels that modern technology has at the moment.

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Candid One > Lawrence Wasserman • 22 days ago

You degrade your attempted argument with your nonsense extrapolation of hypotheticals and accomplish nothing.

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hartvig > Candid One • 22 days ago

Pretty apparent you didn't understand his argument. Using MORE energy to remove harmful byproducts than it takes to produce them in the first place is a net negative, no matter what % of total emissions you are talking about capturing. It's like claiming a vehicle that gets 10 mpg but has a 20 gallon tank actually gets better gas milage than one that gets 15mpg but only has a 10 gallon tank since you can drive further on one tank of gas.

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Candid One > hartvig • 21 days ago

Understanding the argument without his content isn't a problem.

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fed-up-Redhead > hartvig • 19 days ago

For those who won't read a long posting--or always understand it--your example is simple enough for even orange haired persons. It also made me laugh.

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owl905 • 22 days ago

At a 10% recovery rate, it's a billion dollar non-starter. There's a better rate of return in simply banning the variants of coal over a certain emissions rate.
For damages: Natural gas is 50% of the emission rate of coal. Coal is simply noncompetitive from a damage perspective. And that isn't flattering natural gas either. But it is one the major reasons US emissions flattened and declined after the early aughts.
For cost: "The EIA’s findings suggest that natural gas–fired power plants are cheaper to build with overnight capital costs ranging from $676 to $2,095 per kilowatt (or kW),"
"Capital costs for coal-fired power plants range from $2,934 to $6,599 per kW, depending on the technology."
Coal is noncompetitive from a cost perspective. The business facts are the reasons the Coal-king Koch Brothers won environmental awards by shifting from coal to natural gas.
There is no such thing as 'clean coal' or 'clean natural gas'. And trying to sell a 10% reduction in emissions with a billion dollar refit is simply seeing how many people you can fool some of the time.
Footnote: new 'clean coal' pilot projects have more success with CSS but end up being poor in the price-performance game: "http://news.nationalgeograp..."
The real skeleton key is getting good CSS technology on new natural gas plants - the market is ripe for replacement based on the business case, but putting them up without CSS is a half century commitment to their emissions.

5 Share ›

JeanSC • 22 days ago

This might have some potential in certain niches, but carbon dioxide by itself isn't what makes coal a "dirty" fuel. It's the other elements in much coal, like heavy metals and also sulfur, which make it "dirty."
Decades ago, coal was indeed a "dirty" fuel because of the carbon soot which came out of the smokestacks and turned whitish buildings black. Many cities went through this phase.

4 Share ›

Candid One > JeanSC • 22 days ago

Recall all of those years of oilfield flares of burning waste gases glowing the night? Ah, the nostalgia of ignorance! Beacons of what?!

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owl905 > JeanSC • 22 days ago

You have the bullseye - there are niche places for coal plants - with scrubbers and carbon-capture. Mainstream technology is here, or near, that puts solar, wind, thermal, and even ocean-current, ripe for the competition.

2 | • Share ›

Knower > owl905 • 22 days ago

Name a niche.

1 | • Share ›

Mike Livingston > Knower • 22 days ago

Lame Dear Montana.

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fed-up-Redhead > owl905 • 19 days ago

Does that include Geo-thermal as well--California seems ripe for mixing a broad range of power production. With 40 million people combined with open land and the will to lead the pack toward green energy production, they could show the country a way into our future--in spite of Trump.

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owl905 > fed-up-Redhead • 19 days ago

Geo-thermal has a place, but it will probably remain a niche circumstance rather than a prime driver. This article charts it up:
"http://www.conserve-energy-..."

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DL > JeanSC • 21 days ago

Yep, don't forget the mercury in oceans due to coal.

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Diogenes60025 > DL • 21 days ago

No, most mercury pollution arises from other causes, including chloralkali production and dental fillings.

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MC Iowan > Diogenes60025 • 21 days ago

Dental fillings?? No dude. It comes from contamination / pollution by humans, and also naturally by tectonic activity and volcanic activity. There is not find well quantified data though so how much is natural vs. anthropogenic I don't know.

https://en.wikipedia.org/wi...

https://en.wikipedia.org/wi...

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DL > Diogenes60025 • 21 days ago

Citation needed.
Unless that's snark... lol

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Knower > JeanSC • 22 days ago

Slow down. They haven't been trained in heavy metal propaganda. Only CO2 propaganda.

Out here where I live the earth would be consumed by fire next year if CO2 was sequestered this year.
I love the smell of CO2 in the morning. It means my O will be very much available tomorrow.

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Candid One > Knower • 22 days ago

You make her point. Nice echo.

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fed-up-Redhead > Knower • 19 days ago

If the goals of the Paris Accord left something to be desired in terms of true pollution mitigation--what's your opinion of the Montreal version some years back?

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Robert Nagle • 22 days ago

Miles O'Brien is a great science reporter, but I think this sequestration project hasn't demonstrated viability. It also overlooks easier and cheaper solutions with renewables. It also holds out the mirage that CCS can solve the greenhouse house problem cheaply anytime soon. BTW, I'm not a fan of coal at all, but coal scrubbers (which are also expensive) can mitigate sulfur emissions significantly. Said Adrian Shelley of Public Citizen Texas, NRG’s W.A. Parish plant is the biggest polluter in Greater Houston, when it comes to contaminants like sulfur dioxide and soot, and toxics like mercury and arsenic. The billion dollars for the carbon capture system would have been better used to install “scrubbers” on the other three units of the power plant, which remove sulfur dioxide. https://www.houstonpublicme...

A lot of this boils down to dollars and sense; Which cost projections seem the most realistic. (Maybe Paul Solman could have come along for the ride!?)

By the way, I live in Houston and once took a tour of the plant in college. Houston has a private energy market, and renewable energy is fairly cheap for consumers. We're soon at a point where we don't need this plant anymore.

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Candid One > Robert Nagle • 22 days ago

Spoiler alert!

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Miles O'Brien • 21 days ago

Apologies for confusing people with some numbers. The Petra Nova facility captures 90% of the CO2 in the flue gas that is pumped into the CCS system. While it is larger than others, it is still not big enough to capture all the CO2 produced by the four turbine 3500 megawatt coal plant. It is designed to remove 90% of the CO2 from 40% of the output of one of the turbines there - which equates to 10% of the entire coal complex. So, while it is commercial scale, it is still relatively small compared to the total output of the coal plant.

3 Share ›

Vinko Milić - The NewsHour Fan > Miles O'Brien • 21 days ago

Very interesting report. Of course, I'm watchin' every weeknight the NewsHour in northern Chile via YouTube or USTREAM. I remember the first experience as co-anchor with Judy. Very best of your part. Don't forget your bionic arm. A good idea. Or a new arm from a human donor? A good idea. Even on a #novapbs episode a theme about a limb implant is very interesting for those who loses their limbs. We want a report soon. Thank you. #PBSNEWS

2 • Share ›

fed-up-Redhead > Vinko Milić - The NewsHour Fan • 19 days ago

Vinko--did you change your name--news hour fan? Very good. I, too, am a frequent viewer of PBS and wish more folks would watch the huge variety of programming they offer. Nice to see your comments. Hello to Chile from someone in Nevada, USA!!!

• Share ›

Ned Johnson • 21 days ago

This approach to CO2 reduction is all well and good, but where is your coverage of an almost certainly superior approach being pioneered at George Washington University that turns power plants' CO2 emissions into carbon nanotubes that have high commercial value? While their work has focused thus far on natural gas plants, there are no compelling reasons why the same technique cannot be applied to coal-fired generators. This is a very important development that has been ongoing for years and published for at least one year. Read about it here: http://phys.org/news/2016-0...

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Scottsny • 21 days ago

As other posters have stated, I too respect the body of work of Miles O'Brien has produced for PBS. Unfortunately, in this case, he appears to be caught up in the glitter of a supposed new 'environmental technology' to promote an extremely misleading and, considering the current state of global warming, dangerous direction for implementing it.
It's nice to understand the details on how this technology works, but while trying to enlighten the audience on benefits (marginal CO2 removal), cost (very expensive, but how much??), and impact (unknown, and potentially dangerous consequences of underground storage) examples of practical use (minimal but also scary, in that it would potentially aid additional fossil fuel well-head excavation, with fracking-like consequences) there was ZERO comparisons to implementing alternative renewable energy projects.
After watching this piece it almost like renewable technology didn't exist. Without the comparison to alternative renewable technologies your story about a single 'energy-related' technology without mention

of the other ways ton reduce CO2 emission reeks from fossil-fuel advertising as opposed to being an objective science journalism.
As far as other the alternatives go, if you care about the future of this planet, renewable energy sources should be a no-brainer . The models for getting to zero CO2 emission are doable from both a technology and economic standpoint (check out the Jacobsen model, the state of CA energy plan, among others). Pieces that promote fossil-fuel extension like this one only confuse the direction that is needed in the times where action (10 years to 100% renewables) to deliver real breakthrough technologies is critically required.

2 • Share ›

fed-up-Redhead > Scottsny • 19 days ago

I live out west where we have lots of empty space and ample sunlight. These make it more straight forward for the use of both wind and solar. Transmission lines to carry power to populated areas is a concern, as it the ability to store generated power needed during peak hours of use. Many high density areas do not always have the land, the sunlight, or the storage capabilities needed to provide the power needs of millions of people. Tesla, among others are developing better batteries, for use in cars as well as systems that can provide storage for an electrical power plant large enough for our current needs. This technology has come a long way but there are still problems we haven't solved yet.

• Share ›

Fredrika Wade • 22 days ago

There is no such thing as " CLEAN COAL " .
This is just " SPIN " from those who promote the use of coal.
All users of coal seek coal high in "ANTHRACITE" now referred to as "CLEAN COAL".

Many have succeeded in CO2 capture and storage, but to date the methods employed do not make it a feasible economic proposition.

Climate Change takes place every day, the Sun manages to warm the Earth to an average between 59oF to 61oF each day. Each day the day time temperature fluctuates from an average of 42oF to 78oF. We are talking approximate averages. i.e. 36oF increase in 12 hrs. approximately.

The Sun provides us all a massive amount of " CLEAN ENERGY" each day; slowly we are utilizing it. It is a "no brainer" to move on from COAL as a heating source.
Coal is " yesterdays man ". It took about 30yrs for the car to completely replace the horse and buggy and Coal is heading in the same direction.

Coal's future will have a limited use as Metallurgical Coal (high in Anthracite and low in impurities) in the making of Steel.

see more

2 • Share ›

Candid One > Fredrika Wade • 21 days ago

It's too late.

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fed-up-Redhead > Fredrika Wade • 19 days ago

I found your information not only interesting but something I haven't seen before. Where can I find more on this "branch" of the problem. What's your take on the methane being released by the melting of the permafrost?

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Candid One • 22 days ago

Although it would be politically unpalatable to sequester CO2 in populated areas, natural gas is being stored that way...amid many gotchas. That recurrent natural gas leakage from the SoCal Gas artificial underground storage reservoir in northwest Los Angeles is proof that it's easier to ask for forgiveness than for permission. It's not only problematic location amidst a large population, but it's also a few miles equidistant from the epicenters of the 6.6 1971 San Fernando EQ and the 6.7 1994 Northridge EQ. Heck, that methane is 28 times more effective than CO2 as a greenhouse gas, so sequestering CO2 under San Francisco might be comparative cinch! Just saying... :-)

BTW, FYI, re: fracking & CO2...gases are highly compressible. Liquids are comparably uncompressible. Pumping gases into subterranean petroleum reservoirs relies on gas-chemical interaction with the residual petroleum, not strongly on the gas pressure. Fracking uses pressurized liquids, fluids, to physically drive, displace, that residual petroleum toward extraction wells; that same pressure drives the less viscous injection fluids into rock fractures where the petroleum couldn't go and potentially changes fracture stability. Gas can go where fluids go but not with the same pressure levels and not effectively changing fracture stability.

Our automotive hydraulics (brake systems) rely on bleeding air out of the system whenever it gets in...a no-no. Air in the brake system yields spongy brake pedals that don't transfer pedal pressure as well as an airless system, so that the brake system doesn't brake safely. That's a pedestrian example of gas compressibility...not nearly as effective for transferring force as fluid. Just saying...

2 • Share ›

fed-up-Redhead > Candid One • 19 days ago

I can't believe the amount of excellent "new" information this article has brought forth. If miles O'Brien is smart, he should invite folks like you to critique his piece before airing it. Thanks for giving me so much more to think about--you are performing a great public service and I hope many people will read your comments.

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DL • 21 days ago

That's a massive amount of effort and expense for 10 percent of the pollution that "might" be useful, IF an oil drilling facility with fracking desires is nearby.

And regarding the earthquake question, it was made to sound that if used in non-earthquake prone areas it's fine, which hasn't been the case in the midwest (I think it was Oklahoma going from 2 earthquakes a year to over 200 with all signs pointing to fracking).

It's a huge amount of effort to maintain the whale oil and buggy whip concerns in light of the advances now in renewable energy sources.

1 • Share ›

gadfly • 21 days ago

A good report were it not, in the end, quite irresponsible!

O'Brien raises the question, "But doesn’t this just transfer greenhouse gas emissions from a power plant smokestack to automobile tailpipes?"

The answer he gets is an emphatic YES!

"JILL FISK: So, I think that demand for oil is either
going to be met by foreign oil that the United States has to purchase or by our own production that we’re able to supply."

Fisk admits we're just moving capturable CO2 from coal plants to non-capturable CO2 from cars. The only advantage is getting the oil domestically instead of from abroad.

Yet O'Brien ignores this acknowledgment that captured CO2 results in more CO2. His follow-up

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