Intergovernmental Climate Report Leaves Hopes Hanging on Fantasy Technology

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This year, the Intergovernmental Panel on Climate Change (IPCC) has confirmed for us, once again, that the planet is warming, even more and even faster than panel members thought. In fact, it is getting even warmer even faster than they thought the last time they admitted to having underestimated the problem. We humans are in deep trouble, and finding a way out of this mess – one that will ensure a decent future for us – is becoming increasingly difficult, if not nearly impossible.

That difficult task is what the latest installment from IPCC, the Working Group 3 report on mitigation is intended to address. This past weekend, the "summary for policymakers" was released after the mad rush of government negotiations over the scientists' text took place in Berlin last week.

This is the fifth assessment report, and differed from the previous reports by also including some (contentious) discussion of ethical considerations. Notably, this report acknowledges that economic growth is the fundamental driver of emissions. It also offers economic analysis showing that taking necessary steps to protect the climate would require an annual economic growth opportunity loss of a mere 0.06%. As Joe Romm noted: "that's "relative to annualized consumption growth in the baseline that is between 1.6 percent and 3 percent per year." So we're talking annual growth of, say 2.24 percent rather than 2.30 percent to save billions and billions of people from needless suffering for decades if not centuries."

That's great, but the big question is: What investments are recommended, and would they actually work? What became clear from leaked earlier drafts was a troubling prominence of false solutions and unicorns included among the strategies for mitigation.

The report considered 900 stabilization scenarios, aiming to achieve anywhere from 430-720 ppm (parts per million of CO2) by 2100. What they concluded is that to achieve (maybe) even the alarmingly high 450-550 ppm – the level thought to hold some chance for limiting warming to 2 degrees above pre-industrial levels – would at this point require not only reducing emissions, but also using some technology to actually remove CO2 from the atmosphere.

It seems that IPCC is at a loss to provide realistic pathways even to achieving 450 or 550 ppm, which is pretty alarming in itself, but also, it seems unrealistic to assume in any case that we are in control of earth systems such that we can pick a ppm target and just go there. We are already experiencing unanticipated, underestimated and uncontrollable feedbacks that make the discussions of targets and ppm modeling seem a bit obsolete. Nonetheless, this is the framework for the report.

IPCC is telling us that we will need not only to reduce the ongoing flow of emissions, but also to find a way to pull CO2 out of the atmosphere. The working group cochair Ottmar Edenhofer, a German economist, stated at the press briefing that many scenarios "strongly depend on the ability to remove large amounts of carbon dioxide from the atmosphere."

How are we to supposedly remove CO2 from the atmosphere? The only techniques on offer are bioenergy with carbon capture and sequestration, also called BECCS, and afforestation.

The problem with this conclusion, and the reason the media picked up on it even prior to the final report release is that BECCS is almost entirely unproven; we already have a strong basis for assuming it will not actually work to remove CO2, and it is extremely risky and costly. IPCC acknowledges this, even as they deem it essential.

The media, starting with *The Guardian*, picked up on this even in advance of the final negotiations, referring to BECCS as "the dangerous spawn of two bad ideas," and in another article referring to it as the "plan to worsen global warming."

The BBC headlined “UN dilemma over ‘Cinderella’ Technology.” And the *UK Daily Mail* asked: “Could we SUCK UP climate change? Referring to the great potential for carbon storage in Britain due to many abandoned coal mines and gas wells.

Here is what the final summary report actually states: “Mitigation scenarios reaching about 450 ppm CO2eq (carbon dioxide equivalent) in 2100 typically involve temporary overshoot of atmospheric concentrations as do many scenarios reaching about 500-550 ppm CO2eq in 2100. Depending on the level of the overshoot, overshoot scenarios typically rely on the availability and widespread deployment of BECCS and afforestation in the second half of the century. The availability and scale of these and other Carbon Dioxide Removal (CDR) technologies and methods are uncertain, and CDR technologies and methods are, to varying degrees associated with challenges and risks (see Section SPM 4.2, high confidence). CDR is also prevalent in many scenarios without overshoot to compensate for residual emissions from sectors where mitigation is more expensive. There is only limited evidence on the potential for large-scale deployment of BECCS, large-scale afforestation and other CDR technologies and methods.”

Biofuelwatch (the organization for which I serve as codirector) authored a report on BECCS in 2012, and so we have some familiarity with the nature of the “uncertainties” and the degree to which evidence on the potential is “limited.”

There is near-zero real-world experience with BECCS beyond a handful of attempts and a surprising number of canceled projects.

BECCS is not only “risky,” but already we have very good reasons to assume it will fail. For one thing, the entire logic behind BECCS rests on false assumptions. One false assumption is that bioenergy (and so far that appears to include all manner of processes, from corn ethanol refineries to coal plants retrofitted to burn trees in place of coal for electricity) is “carbon neutral.” The idea is that adding CCS to a carbon neutral process, will render it “carbon negative.” That simplistic thinking assumes that carbon absorbed out of the atmosphere by plants as they grow will be captured and buried, and then when more plants grow, they will absorb yet more carbon, a net “removal.” But, much is left out of that story.

Virtually nobody still contends that corn ethanol is “carbon neutral.” Yet the premier BECCS project that is often referred to is an ADM corn ethanol refinery in Decatur Illinois. In fact, when emissions from indirect impacts are included in analyses, along with a complete assessment of the impacts from growing, harvesting, fertilizer and chemical use etc., most bioenergy processes actually cause more emissions even than the fossil fuels they are meant to replace. As for burning biomass (mostly wood) for electricity, there is a substantial literature – including peer-reviewed science, challenging the “carbon neutral” claim. It is well-established that counting just the emissions from smokestacks, burning wood releases around 50 percent more CO2 per unit of energy generation even than coal, along with many other pollutants. And it is simply incorrect to assume that this CO2 (as well as even further emissions resulting from harvest, transport and many indirect impacts) will be resequestered in new tree growth. If new trees do in fact grow, it may take decades. Further, we know already from the current scale of biofuel and biomass demand – just look at the current corn ethanol debacle – that it is driving loss of biodiversity, higher food prices, land grabs and other damages. Scaling up bioenergy to the extent that would be required to supposedly reduce global CO2 levels would be a disastrous backfire.

IPCC might have noted that the US EPA officials, charged with regulating CO2 emissions, found itself stymied with regard to how to account for emissions from bioenergy. Under pressure from industry, they decided to exempt biomass burning facilities from regulation for three years while they studied the problem. But that exemption was challenged in court, and the judge ruled there was no basis for it. In other words, CO2 from bioenergy should not be assumed “neutral” and therefore should not be exempted from regulation.

Most BECCS projects so far involve capturing CO2 streams from ethanol fermentation processes (because that is a relatively pure stream of CO2 that is cheaper and easier to capture). But then, the CO2 is not stored safely away, rather it is pumped into depleted oil wells to raise the pressure enough to force remaining oil out, a process called “enhanced oil recovery.” Oil industry analysts in fact estimate there is huge potential for accessing oil in this manner, and because it is profitable, it offsets some of the very substantial costs associated with CCS. This is hardly “carbon dioxide removal”! Furthermore, it is laying the groundwork in experience for using CCS applied to fossil fuels – i.e. so called “clean coal.” Capturing CO2 from coal plants remains more expensive and difficult due to the mix of gases, but the coal industry is hopeful that technology development will occur with BECCS.

The largely prohibitive costs have to do with the fact that capturing, compressing, transporting and storing CO2 all requires infrastructure and energy. It is assumed that adding CCS results in a “parasitic” energy load in the range of at least 30 percent of the facility capacity. In other words, 30 percent more biomass would be needed simply to power the CCS process itself.

Pumping and storing CO2 – from bio or fossil fuels – underground is downright foolhardy. We know full well that the earth’s crust is not static! There is the potential that CO2 deposits could increase seismicity (earthquakes). A catastrophic sudden release would be very dangerous given that CO2 is lethal at high concentrations. There is also much concern that the vast infrastructure of pipelines and trucking etc. that would be entailed in large scale deployment of CCS (with fossil or bio energy), would result in myriad small scale leaks. Valclav Smil calculated that to sequester just a fifth of current carbon dioxide emissions “. . . we would have to create an entirely new worldwide absorption-gathering-compression-transportation-storage industry, whose annual throughput would have to be about 70 percent larger than the annual volume now handled by the global crude oil industry, whose immense infrastructure of wells, pipelines, compressor stations and storages took generations to build.”

IPCC recognizes how risky and uncertain BECCS is, and yet they still deem it essential? We might have hoped they would offer a pathway with more likelihood of success, given all that is at stake.

IPCC also include natural gas, nuclear and large-scale bioenergy all as “low-carbon or zero-carbon” options. And, as with BECCS, they provide lip service to the risks and concerns around these, but they seem to minimize these very real risks when the scenarios they rely on incorporate those same mitigation strategies (to differing degrees) as though they were viable.

To their credit, IPCC has recognized that geoengineering is not an option and should not be considered “mitigation.” While there was pressure, especially from Russia, to include geoengineering, including solar radiation management (SRM) into the mix, this was met with welcome resistance. Carbon Dioxide Removal techniques, including BECCS, also are considered in the context of geoengineering debates. But they are tightly linked to practices in place already, so it is more difficult to place them squarely in the geoengineering camp, where they would be subjected to the Convention on Biological Diversity defacto moratorium. We already know the impacts of large-scale bioenergy, and they are not at all clean, green, sustainable, low-carbon or carbon negative. They make matters worse, not better. Under the influence of desperation, we risk making lethal blunders.

While IPCC painted a remarkably palatable economic analysis of the costs of mitigation, they fall pretty flat in providing realistic means for using that finance to successful ends. Perhaps the problem boils down to this: IPCC knows economic growth is the driver, but instead of suggesting that we dramatically ramp it down within a justice-based framework, they instead seek a means to keep the engines of growth revving, but using “alternative,” and so-called “zero- and low-carbon” sources of energy and materials. In so doing, they sidestep reality.

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