

Frontier Climate: A Bugreport

The Institute for Technology In the Public Interest

Contents

- Frontier Climate: a bug report
 - Context
 - What is Frontier?
 - Why this bugreport?
 - Areas of evidence
 - Knowledge gap reversals
 - A power grabbing partnership
 - A CRaaS fata morgana market
 - Dark kitchens and digital wallets for climate change?
 - Creative accounting narratives
 - The conflation of Big Tech and Big Oil
 - Planetary prototyping
 - The capture of other futures
 - Colophon
 - Contact

Frontier Climate: a bug report

This bugreport is a collective action against Frontier Climate¹. Frontier Climate is a consortium of Big Tech companies which was established to manage advanced market commitments (AMC) for carbon removal². We call for businesses, institutions, communities, science labs and consumers to de-invest their money, time, energy and trust from this enterprise.

Instead of payment systems for carbon removal, we call for an immediate halt to the logistics of racial capitalism that make fossil fuel extraction unavoidable. We urge to work towards the abolition of the computational infrastructuring of the Big Tech Complex, and towards the establishment of mutual-aid proposals for infrastructuring otherwise.

1. <https://frontierclimate.com>

2. Permanent carbon removal, previously known as “negative emissions”, refers to both the imaginary and the technoscience of a range of processes that seek to eliminate carbon from the atmosphere. It is a techno-economic model based on a violent mix of speculative accounting, and questionable geo-engineering practices. The experimental, speculative and techno-solutionist promise of permanent carbon removal is one in which the underground becomes the site of negative accumulation and the space of spatialised storage of carbon, following the axis of vertical models of extraction. See for example <https://www.greenpeace.org/international/story/54079/great-carbon-capture-scam/> For a history of Carbon removal, see <https://priceofoil.org/content/uploads/2021/06/Timeline-of-Carbon-Capture.png> and <https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.671>

Context

In 2021, the Intergovernmental Panel on Climate Change (IPCC) warned that exceeding 2°C of planetary warming would have catastrophic impacts. To keep the planet stable, they argued, global warming needs to be kept at 1.5°C.³ Because the world is currently on track to surpass those limits, the reduction of carbon emissions alone will not suffice. The IPCC therefore proposed that the removal of carbon currently present in the atmosphere would be required.

The circulation of the IPCC 2021 report at COP26 brought renewed attention to Carbon Dioxide Removal (CDR). In the context of the intensification of state reliance on technology during COVID-19, CDR quickly garnered EU support and led to a surge of financial activity by both political and corporate climate actors. Their actions were not aimed at reducing fossil fuel emissions; instead they directed their efforts towards investing and building infrastructures for the removal of carbon. In April 2022 the IPCC released explicit support for “the deployment of carbon dioxide removals” and within two months Frontier Climate was launched.⁴

The anticipatory technosolutions proposed by Frontier are explicitly not focused on reducing emissions from fossil fuels or halting new carbon extraction. Instead, they are being used as justification for corporations and governments to balance emissions in their carbon budgets while continuing to increase

3. In the Paris agreement, only six years ago, 1.5° was set as a maximum temperature rise.

4. <https://www.mckinsey.com/capabilities/sustainability/our-insights/sustainability-blog/now-the-ipcc-has-recognized-that-carbon-removals-are-critical-to-addressing-climate-change-its-time-to-act>

fossil fuel use and carbon extraction ⁵ . This solutionist take continues business-as-usual by means of techno-fixes.

Concretely this has resulted in:

- The increased circulation of greenwashing narratives such as: net-zero, carbon removal, carbon neutrality, carbon positivity
- An investment market for carbon removal. In addition, because Oil and gas companies are the largest owners of carbon removal infrastructure they can invest in carbon removal as a way to increase their revenue. This gives investors the opportunity to symbolically de-invest from oil and gas markets, and reinvest in CDR
- The building of a number of new large scale carbon removal infrastructural experiments
- New regulations and policies in the US, European Union (EU), UK, Switzerland (amongst others) around certification, validation and carbon removal
- An increase of investments in oil, gas, big tech and metal mining companies that are involved in carbon removal technologies and infrastructures
- The emergence of a number of Big Tech-led initiatives to manage these processes via computational infrastructures: Microsoft Climate, Stripe Climate, Amazon Sustainability, Google Sustainability, Meta Sustainability, as well as coalitions or consortia such as Frontier Climate
- Making carbon removal and climate action "platform-ready", expanding and speeding up the financialisation of life

5. see for instance the promise of new carbon removal for balancing the emissions from new expansion of coal and gas extraction in the UK

What is Frontier?

The Frontier narrative is constructed around the supposed need for Carbon Removal (scientists would call it CDR) as the core solution for Climate Change. Carbon Removal is different from carbon capture, in the sense that it is promising permanent storage of carbon (for 1000 years or more). To do so involves many yet untested technologies, risky interventions that have yet to scale (or not).

Frontier Climate is an enterprise solely owned by Stripe ⁶, a multinational company developing online payments infrastructure, financial services and software as a service (SaaS). Legally, it is set up as a Limited Liability Company for profit social interest company, and its founding members are Meta, Alphabet, Shopify, and McKinsey. Together they constructed a platform for gathering more than 10 billion dollars, a sum aimed at accelerating the testing and scaling of Carbon Removal. Instead of calling for donations, they use the construction of advance market commitment (AMC) which allows partners and members to invest in start-up companies that pledge to remove amounts of carbon at an agreed price in the future. As a way to call in donations from their customers, Stripe also created an Application Programming Interface (API) for their business clients.

Why this bugreport?

We are a group of researchers, activists, artists, technologists concerned with business-as-usual attitudes towards climate

6. https://en.wikipedia.org/wiki/Stripe,_Inc.

change as a technofix. We are writing this bugreport⁷ as a collective action directed against Frontier Climate's AMC for carbon removal. It is urgent to collectively signal 'bugs' in the operations of enterprises such as Frontier Climate, to address them collectively and in a transdisciplinary manner. To call attention to their workings and implications, and join forces and report widely on the violent bugs of global computational infrastructures that monetise climate change as the most profitable of damages. Of course, Frontier's bugs are not an error.

This report is published out of concern with:

1. The use of the narrative of carbon removal to create new financial mechanisms and market expansion for both big tech and big oil. (→ [The conflation of Big Tech and Big Oil](#))
2. The normalisation and financialisation of carbon removal as justification for further 'frontiers' of fossil-fueled accumulation. (→ [Planetary prototyping, Knowledge gap reversals](#))
3. The move of big tech initiatives to gain leverage on the management of planetary resources and climate governance. (→ [A power grabbing partnership](#))
4. The use of the global climate crisis to generate over 10 billion US dollars in donations, absent transparency or oversight. (→ [Dark kitchens and digital wallets for climate change?, A CRaaS Fata Morgana market](#))
5. The deployment of an overarching financial infrastructure to funnel research and capital away from addressing core drivers of this crisis, erasing the socioecological impacts of fossil fuel extraction through the narrative hegemony of

7. On bugreporting as a method:
[<https://titipi.org/wiki/index.php/Bugreporting_how-to>](https://titipi.org/wiki/index.php/Bugreporting_how-to)

infra-solutionism. (→ [Dark kitchens and digital wallets for climate change?](#))

6. The extension, instrumentalisation, and intimate impacts of computational infrastructures from smart phones to vast sensor networks of carbon measurement, not least through the massive implementation of an online payment infrastructure. (→ [Dark kitchens and digital wallets for climate change?](#))
7. The manufacture of dependence for collective survival on systems of computation, financing, and management that are fundamentally colonial, extractive, and opposed to the flourishing of life. (→ [Creative accounting narratives](#), [Dark kitchens and digital wallets for climate change?](#))
8. The capture of other sociotechnical futures by the imaginative monopoly of carbon removal, repackaged according to the size and manners of US-Silicon Valley cosmovisions. (→ [Capturing other futures](#))

Disclaimer: This bugreport is not meant to fix Frontier. It is a provocation for critical discussions and further research into the damaging and limiting agenda proposed by Frontier. It is also not fixed on Frontier. It proposes bugreporting-as-a-method for reporting on dynamics where large scale consortiums are using their power and resources across geo-political contexts to co-opt and exploit genuine concerns, as a strategy to divert resources away from any resistances and struggles. Here we report on the diversion from climate struggles and calls to end fossil fuel but this is also a pattern that we observe in other contexts of resistance and struggle.

Please use this report to fuel conversations and direct actions.

Areas of evidence

The following areas of evidence articulate the concerns listed above. They have been written collectively, hence their polyphonic tone. We understand them as beginnings for developing further interventions.

Knowledge gap reversals

Frontier invites readers, users, interested researchers, potential clients and/or stakeholders to "Explore a database of 100+ knowledge gaps across the field of durable carbon removal."⁸ The database is actually an advanced spreadsheet, and for its pretentious interface, it contains in fact surprisingly little entries, categorised in five areas or types of gaps, ranging from "fundamental science" to "potentials for novel carbon removal pathways". A move in which Frontier is also proposing to build and control an epistemic infrastructure.

A gap is a negative volumetric entity, a lack of occupation, or rather: something which gets to be considered empty by the tools in use, despite what could have been there, or what is there that does not count. A knowledge gap is hence a sapience void.

By positioning the knowledge around CDR as in need of being filled, Frontier ignores the long history of Carbon removal, but also tunes out all current historical intelligence around planetary survival, ecosystem care, practices of survival and of (partial) repair. The rendering of these knowledges into gaps while a full industry is being invented "from scratch" is epistemicidal. There is no such thing as a void (especially if you are accepting the

8. <https://gaps.frontierclimate.com/>

enormous agencies of intangible matters such as air or ground, and inventing a machinery to value their density!) nor a "from scratch", but a continuation of erasures, dispossession and depletion on the one hand, and a continuation of accumulations, densification and super-impositions on the other.

As we have learned from the thick legacies of colonialism, exploration does very rarely imply the distribution of care and reparation. To explore a database addressed at a group of such diversity (readers hand in hand with users? interested researchers shoulder to shoulder with potential clients and/or stakeholders?) clearly sets it up as either a challenging operation, or a scam circulating in plain sight.

Why does this project try so hard to attract research? How did it get to understand itself as an optimal place to compile knowledge and fill gaps? Why does it need to self-legitimize as a para-agency for scientific research? Perhaps scientists contribute because of lack of national funding, or job prospects and in some places the explicit withdrawal of funding for climate research. Or maybe because they believe in Frontier having a positive impact. The negative infrastructure of defunding climate research expands the ways in which Big Tech and Big Oil are influencing the scientific research agenda, an agenda on which they already have a significant impact.

The slick infrastructure of the Gaps Database of course aligns with contemporary Cloud aesthetic norms and its performative attitude (providing an impression of ultimate flexibility, but actually stating what can and can't be done). It proposes to capture the unknown into an all too familiar efficient interface, serving up small glittery bits of ready-made pseudo-science. Pseudo-science is used here not as the powerful grassroots para-academic or disobedient

research procedures, but in the sense of not-to-be-discussed, not-to-be-peer-reviewed, not rigorous enough, and not subjected to thick discussion nor proactive dissent. The outrageous arrogance of proposing an indexing of gaps to be addressed through the framework of Frontier includes the too benign invitation to 'propose gaps' while staying unspecific about how they will be addressed. The Gaps Database is a not entirely unhelpful distraction.

A power grabbing partnership

Frontier Climate is a for-profit limited liability entity solely owned by Stripe. It was founded together with a group of powerful, US-based actors: Alphabet (tech company), Meta (tech company) and McKinsey Sustainability (global consultancy). This initial partnership was later joined by JP Morgan (banking), H&M (retail), workday (management of human and financial capital) and Autodesk (3D engineering software). Between them, these actors have an explicit invested interest in streamlining finance, narration, infrastructure building, tech-labor, computational infrastructure and software production.

While Stripe is busy setting up an infrastructure to become the main supplier for digital payments, McKinsey is serving big tech making green transition stories for corporate actors and nation states. The consultancy firm set up its sustainability branch for building the narration towards net zero and posing carbon removal as the only option in climate change. Workday signed a multiyear sponsorship deal with the McLaren motor racing team as an official partner. Alphabet's copious income coming from ad schemes is largely built on advert campaigns by Big Tech companies for carbon removal and net zero technologies. Oil and gas industries are one of the biggest purchasers of adverts that

are designed to look like Google search engine results (for example for the words "NetZero" and "Carbon Removal"). Meta also receives large amounts of advertising income from these industries.⁹

We could add many more contradictions to this list, but the point is clear. The power grab that this consortium represents is immense. It positions Big Tech and friends as the central player for addressing climate change, bringing them in a unique position to bargain.

A CRaaS fata morgana market

Frontier describes its mission as building a new market for carbon removal for investors, researchers and entrepreneurs. This involves the scaling up and development of payment apps and carbon removal infrastructures across the planet to cover the potential future demand for carbon removal. Frontier promises to have the planetary reach and global financial infrastructure, and the geopolitical access to operate these building blocs.

Like delivering education over Zoom/Teams, health care over QR code apps, Microsoft Teams for border control, Google forms for signing statements or the digitization of payrolls or any other essential public service, the Frontier consortium takes the already-legitimized, recognizable role of a Big Tech consortia "as the one to provide the service"¹⁰. The same way that Microsoft, Google and AWS have positioned themselves as the only providers able to deliver services for education or health, Frontier places itself as the only one with the possibility to fill the research gaps, to fund,

9. <https://www.motherjones.com/environment/2022/01/fossil-fuel-firms-google-ads-snippets-sponsored-search-results-study/> + <https://influencemap.org/report/Climate-Change-and-Digital-Advertising-a40c8116160668aa2d865da2f5abe91b#1>

10. https://intellectdiscover.com/content/journals/10.1386/jem_00030_1,

and to scale up carbon removal. Like healthcare or education they describe they will sell climate change mitigation as a service (facilitated by API, dashboards and compute). Frontier's mission is Carbon-Removal-as-a-Service (CRaaS), however this mission is a mirage, a *fata morgana*! Just like heat-induced hallucinations or deformations of what is there, CRaaS¹¹ emerges in an overheated world view as a mirage that floats over the horizon of all that is at reach. We might speculate that Frontier is not the climate savior it claims to be, perhaps it cares as little about carbon removal as Zoom cares about education or Google about health care.

Why is this a mirage? Through their development of 'carbon removal technologies', Frontier has developed a computational payment system to buy and sell carbon removal in tonnes. We might assume that Frontier is proposing a future service in which businesses can buy carbon removal and then sell carbon removal to other businesses and buyers. However, the core aim of Frontier which we believe is to create a monopoly of financial infrastructures of digital wallets and future capital purchase capabilities. Frontier has already received many billions in donations since launching in 2022, and that large pool of money now exists somewhere or rather is being used to do something else. Analysing the purchase agreements and other contracts available on Github¹² has shown us that only a small percentage of the pool of money has been paid out as capital investment to carbon removal companies. 90% of the donations seem to be somewhere else. So the question is what is it being used for, is it being used to directly expand and support more software development.. and if so what is the money doing? Has Stripe used this pool of money in their recent payment company acquisitions?

11. CRaaS = Carbon Removal as a Service or Capitalism Removal as a Service

12. <https://github.com/frontierclimate/carbon-removal-source-materials/tree/main/Purchase%20Agreements>

During this time, they have purchased or taken over all its key payment infrastructures globally, including Paystack a Nigerian financial technology company, RunKit, Indie Hackers, Index, Touchtech, Kickoff, Totems, TaxJar, Bouncer, Recko, Payable and OpenChannel, quickly securing themselves a global financial infrastructure monopoly.¹³ Or has the pool of money been used to develop the new Stripe API dashboard (see above) to allow businesses to capture future payments, digital wallets needed for Carbon Removal trading? Wherever the money is and whatever its being used for, Carbon Removal is a mirage that floats in front of the expansion of software development for financial payments and the making of a transnational monopoly which is fully owned by Stripe.

Dark kitchens and digital wallets for climate change?

Is it possible to speak of a political ecology of carbon removal, which highlights the main interconnective tissue between stakeholders, marketing tactics, resources, environment, and methods for capital accumulation? If so, what are its main operations, areas, and shapes? In Frontier Climate's planning for a market beyond carbon offset credits, we can already see specific technical strategies and techniques of capture being put in place for this market-in-the-making. Not surprisingly, they align quite well with the wider and already-settled political economy of computational infrastructures as a whole, whether it is applied to food delivery or energy logistics.

In a (near) future market, the research startup companies, who provide the carbon removal tonnes, are similar to the ghost kitchens arranged systematically and along urban territories

13. <https://research.contrary.com/reports/stripe>

around the logistical logic of Deliveroo or Ubereats, but now on a planetary scale. They are unknown to the future buyers of carbon removal, but rather activating a new frontier in the distribution of forces and financial imaginations of through an expanding the computational infrastructure of The Cloud. Somehow like "the dark kitchens for climate change", carbon removal suppliers are distributed along different territories and switched in and out as demand, labor and material conditions fluctuate. The carbon removal activity happens out of view, in deals made behind the dashboard. Shopify for example will sell the carbon removal via its "Planet App".

Most prominent at the moment is the integration of a "Counteract climate change" payment product that can be enabled within Stripe's API for e-commerce websites and mobile applications. Frontier Climate centers Stripe as a single solution for online payment, and given Stripe's position as an established provider of a software as a service model for financial services, the role of Stripe as a leading actor in this consortium begins to emerge.

Stripe's payments product APIs provide an existing, relatively 'seamless' capacity to manage the flows for committing resources to markets that are not yet established (carbon removal credits, carbon capture certificates, or whatever form this market's traded goods tradition will take). In doing so, Stripe, and by extension, Frontier Climate, can fold in the creation of an advanced market condition for carbon removal into their platformised payments system, paving the way for a massive market and infrastructural advantage in which Stripe and the Consortium will be in a dominant position as both a go-between for users/buyers and products/suppliers, as well as a large funder/investor of these technical fixes for the climate crises, present and to come.

Hence, the seemingly trivial function of a digital wallet, a centralised device for monetary operations involving banking entities, sellers and a *userised* client as a way to offer carbon removal options for future payments, becomes a package deal for a ready-made and platform-ready infrastructure in the Stripe climate payment function. Given this consortium's well established legacy in regards to their digital offerings, its renewed hegemony in this market of carbon removal in the making will very likely result in modes of operation that are oriented towards further extracting and monopolizing. It is purposefully expanding a computational infrastructure that supports the global operations of Frontier. In a loop of damage, this infrastructure is also among the major contributors to the problem it seeks to solve. The financialisation and subsuming of climate issues into corporate cloud infrastructures will represent yet another of this consortium's ongoing capture of so many domains of (ghosted) lives.

Creative accounting narratives

The narrative Frontier Climate builds around accounting needs to do a lot of heavy lifting. I.e. if the narrative they produce is able to be accounted for within its own logic, then it maintains an image of Frontier as a viable economic and material solution within the rampant climate crisis. However, as Frontier Climate operates according to a propositional logic, that means that as long as they are able to account for their own narrative premise, and maintain the logic of their own narrative, they are able to function by receiving large sums of money and holding onto them indefinitely.

Drawing the comparison with financing the development of vaccines, as Frontier does to explain the mechanism of AMC's¹⁴, is manipulative and inaccurate because it draws a direct equivalence between human life and earth life. At the same time, what is backgrounded is the way that Big Pharma profits from AMC's, by refusing to produce medicine for all at a fair price, unlike previously developed vaccines. The actual point of equivalence between vaccine production and Frontier's use of AMC is that they function to reproduce — and scale-up — the harms that they claim to be eliminating, by turning techniques for life preservation into yet another occasion for market exploitation.

Frontier insists on climate change as a budget issue, both in terms of carbon removal and of the money needed to address it at scale. It allows for gross simplification of the issues (social, economic, environmental effects) which are blended into a logic that builds a narrative around accounting that makes Frontier the one and only actor able to offer solutions to these distorted issues. Transparency and accountability issues are included within that logic as simple budget questions like everything else, so that in the end only a single budget needs to be addressed. Accountability has been reduced to accounting.

Frontier is also a specific legal construction that allows them to receive large sums of money under the guise of altruistic donation, yet they are not a registered charity and so can accumulate profit under the framework of business, and hold the profit under the logic of future innovation. The way that business-donation-innovation triangulate means that the accountability linked to each of the three constructions can be deferred

14. As a way to explain the mechanism, Frontier refers to the article "[Advance Market Commitments: Insights from Theory and Experience](#)" which explains how it was used to rig the vaccine market.

according to the other two (i.e. receive money as profit at the same time as donation).

The conflation of Big Tech and Big Oil

Frontier is part of the narrative of carbon removal which creates new financial mechanisms and market expansion for both Big Tech and Big Oil. As Greenpeace explains in *Oil in the Cloud*, the interdependency between Big Tech and Big Oil runs deep. "Despite the biggest cloud companies' commitments to address climate change, Microsoft, Google, and Amazon all have connections to some of the world's dirtiest oil companies for the explicit purpose of getting more oil and gas out of the ground and onto the market faster and cheaper."¹⁵ First of all, it is good to remember that many Carbon Removal techniques reuse technologies, infrastructures and technologies initially developed for and by Big Oil. The injection of carbonated water into almost depleted oilwells for example, is a technique to continue extracting fossil fuels, which can now be branded as Net-Zero Oil!

We wonder how Alphabet motivates its engagement with the Frontier Removal plans. Was this based on the same urgencies that brought them to offer their cloud solutions to Total ¹⁶ , Schlumberger ¹⁷ and Aramco?¹⁸ Is Prospection-as-a-Service their next frontier to continue and intensify oil and gas extraction?

With smooth continuity, in a capitalism needing to greenwash and diversify, the same services that can be used as a way out of Oil economies are rapidly being converted into a re-investment into

15. <https://www.greenpeace.org/usa/reports/oil-in-the-cloud/>

16. <https://totalenergies.com/media/news/press-releases/total-develop-artificial-intelligence-solutions-google-cloud>

17. <https://cloud.google.com/blog/topics/inside-google-cloud/schlumberger-chooses-gcp-to-deliver-new-oil-and-gas-technology-platform>

18. <https://www.aramco.com/en/magazine/elements/2022/digital-innovation>

Tech. In this sense, Google Cloud diversifies its business by entering into the Saudi Market in the days leading up to COP28 and has recently committed to support the Saudi government's vision 2030¹⁹, that aims to transform the Saudi economy towards tech and services, limiting their dependency on the oil market. It goes without saying that this is mainly a question of caring for economic flourishing and despite the claims of Google Cloud²⁰ not a matter of environmental responsibility.

Planetary prototyping

Frontier proposes interconnected forms of prototyping across financial, scientific and software processes and test-beds them at the scale of an entire planet, using extreme language as if it was a mundane conversation. In other words, it proposes technologies that are basically drilling the f*ck out of volcano formations to lock something 'bad' in them, and then wait to see if it's okay. The consortium normalises techno-solutionism and innovation as the only way out. Innovation, when nested in the fantasy of planetary prototyping, replicates the very old rational colonial logics of *the pioneers*, the inhabitants of the ever-reinvented last frontier. It reproduces an imagination which approves that a 'new' planet B can be beta-tested and then just pop up from a lab; namely Frontier's lab. The prototyping is not only the prototyping of carbon removal through the injection of capital but also the prototyping of scaling up carbon removal and receiving carbon removal in return for investment which companies can sell in newly invented carbon removal markets. Frontier gains these donations through prototyping a software payment system that deals with the future. A software-enabled planetary prototyping payment system ready to be accessible through mobile phones,

19. <https://www.arabnews.com/node/2409331/business-economy>

20. <https://cloud.google.com/blog/topics/sustainability/cop28-how-google-cloud-is-bringing-ai-to-accelerate-climate-action>

supported by cloud computational infrastructure. However its dependency on large-scale computation, which allows Frontier to gather funds, it by design increases fossil fuel use, and resource extraction extending planetary damage and contributing to climate crisis, requiring further investments in carbon removal.

Let's take for instance the story of Cella, a start-up from which Stripe pre-purchases 333,000 dollars worth of carbon removal tonnes. Funded by Stripe donations, Cella begins to inject CO₂ into the voids of a basalt mass located in the Kenyan rift, a 'Carbon Valley' to come. In this story, the injection destabilizes the underground and makes new giant cracks emerge that rip through peoples houses. In response, Frontier funds another start-up called Aperture which they fund to drill these cracks, to inject them with more CO₂, and conduct large scale experiments on them. This is what is called in-situ carbon mineralisation. In Cella's own words:

"Carbon mineralization involved the formation of solid carbonate minerals through reaction of captured atmospheric CO₂ with rocks rich in calcium or magnesium. We inject CO₂ *deep into volcano rock formations* underground (like basalt), where CO₂ reacts with water and minerals within the rocks and turns into stone. Our novel in-situ mineralization technology *enhances these natural geologic* process by *speeding up chemical reactions* with subsurface minerals *to permanently lock away* atmospheric CO₂ and *mitigate the worst impacts of climate change*."

The imagination of a planetary laboratory is, unfortunately, not a new fantasy. What is new is maybe the scale afforded by Big Tech deludes us into thinking that effectively removing extreme planetary damage is possible.

The capture of other futures

Frontier promises the capture, removal, and enclosure of carbon. But which resources for alternate futures are also captured by the very apparatus of Frontier? Beyond the ostensible target of carbon removal, what else is removed? How, in other words, does the future promised by Frontier depend on the permanent closure of a plurality of futures, including the (techno)political imagination necessary to make these other futures possible? How does the capture of these futures affect communities on a local scale, even though Frontier's services function on the level of an institution or company?

The solutionist and market-oriented approach that Frontier offers has, already, a huge effect on the possibility of a plurality of post-carbon practices in immediate temporalities. The examples set by corporations affect the ways in which the public understands their role in contributing to climate solutions. This turns Frontier into a cultural device which participates in determining what gets to be imagined, and what not.

In the face of climate chaos, local communities are attending to a variety of ways to organise and resist. Caring for the closures that are needed by delinking and forging new solidarities, energy realities, and food practices. Collectivities from the bare bone of existence.

What are the effects of Frontier's proposal on public institutions and collective life? As Ruth Wilson Gilmore says "We already know that the revolution won't be funded". Institutions involved in health, housing, migration or education in the EU and elsewhere are under state, regulatory and public pressure to reduce carbon emissions through evidenced and validated

methods.²¹ As Frontier offers carbon removal as a service, schools, hospitals and universities, can sign up a percentage of their future income to fund Frontier--instead of funding a community farm, a forest or pedagogy projects. Adjusting to their regional sustainability directives, they might trust Frontier to meet their 2030 goals and the demands of the banks to prove their resilience. Further increasing the public money which is Microsoft Teams or Zoom for their everyday organizing. Frontier will quickly become the answer for the market they unwillingly committed to create. Their donations to support Frontier's growing software planetary financial infrastructure, will divert support away from other grounded approaches that might build community and collective attempts at ending fossil fuels and dealing with carbon emissions and in the mean time shift the burden elsewhere.

We don't need more software infrastructures.

We need to find ways to infrastructure and institute otherwise.

We need to end fossil fuel emissions now.

Colophon

Frontier: a bugreport was prepared by The Institute for Technology in the Public Interest (Helen V Pritchard, Jara Rocha, Femke Snelting)²² and collaboratively drawn up with Cassandra Troyan, Elodie Mugrefya, Eric Snodgrass, Martino Morandi, Therese Keogh, Aggeliki Diakrousi, Fred Carter and Livia Cahn. Thank you Joan LLort, Guillemette Legrand, Harun Morrisson and Donald Bertulfo for your comments. Typeface: BBB Poppins,²³ PDF laid out with

21. <https://www.mckinsey.com/capabilities/sustainability/our-insights/how-the-european-union-could-achieve-net-zero-emissions-at-net-zero-cost>

22. <https://titipi.org>

23. BBB Poppins: <https://typotheque.genderfluid.space/poppins.html>

wiki-2-pdf²⁴ and released under the CC4r (copyleft with a difference, 2024).²⁵ Financially supported by CHANSE through the project *SoLiXG: The Social Life of XG*.²⁶ and Generalitat de Catalunya through the project *CLaaS, Climatized Life as a Service*.

Contact

You can reach us at: titipi@titipi.org

24. About wiki-2-pdf: <https://titipi.org/wiki/index.php/Wiki-to-pdf>

25. Collective Conditions for Re-Use: <https://constantvzw.org/wefts/cc4r.en.html>

26. <https://chanse.org/solixg/>