REGENERATION:
Environment, Art, Culture

Pasek, Anne. "Unalienating Carbon: Affect and Labour in Artisanal Carbon Removal Work." *Regeneration: Environment, Art, Culture* 1, no. 3 (2025): pp. 1–21.
DOI: https://doi.org/10.16995/regeneration.16556

Open Library of Humanities

Unalienating Carbon: Affect and Labour in Artisanal Carbon Removal Work

Anne Pasek, Department of Cultural Studies/Trent School of the Environment, Trent University, CA, annepasek@trentu.ca

Carbon is rapidly undergoing a joint technological and cultural transformation. With the prolific rise of carbon dioxide removal in the climate pathways and net zero commitments that contour wider energy transitions, carbon emissions are increasingly positioned not just as future actions to be avoided, but as an already existing material sink newly opened to technical intervention and marketization. While climate models contemplate industrial-scale carbon removal technologies by the end of the century, carbon removal is currently characterized by small-scale, agricultural work: regenerative farming and biochar production. This article focuses on these forms of artisanal carbon removal, analyzing how its workers develop a unique experience of what is otherwise an invisible object of social anxiety: for them, carbon is an object of their labour, transformed through work into newly sensory and reparative forms. The narratives and affects of small-scale carbon removal work, accordingly, present a significant departure from the usual frames of climate and energy politics, offering rare possibilities for hope, regeneration, and relational capacities for direct and tangible action. Drawing on documentary media about and by regenerative agriculture and biochar practitioners, this article explores how such unalienated affects may culminate in new orientations for climate communication and politics.

Five years ago, outside of Ithaca, NY, I was served a cup of "carbon-negative tea." The drink itself was a gesture of hospitality, offered to anyone curious enough to make the trip up to the Finger Lakes for a workshop. I've since entirely forgotten what it tasted like; the real delight lay in watching it get made. A demonstrator first boiled a kettle over a small, top-lit wood stove, specially designed to channel heat and air upwards. After the kettle was poured, and with a flourish, the stove's burning contents were upended into a pot of water, leaving black, glassy charcoal floating in the dissipating steam. Poking at the burnt remains, the demonstrator editorialized,

> It's counterintuitive; most people have no idea it's possible. *What do you mean carbon negative? You can't be better than carbon neutral!* Well, about 50% of the carbon that started in the wood is still in these. And if we don't burn this, it will last, whatever, 500–8,000 years or more.[1]

We were looking at biochar, a kind of charcoal that is almost entirely composed of carbon atoms. It is formed by burning biomass at high heat and with low oxygen—a process called pyrolysis, which locks carbon atoms into highly durable bonds. As the demonstrator's loose range of dates suggest, there are uncertainties in exactly how long these carbon atoms will remain stuck together, but there is general agreement that it does achieve a long-term shift within the carbon cycle. Instead of circulating rapidly between the atmosphere, oceans, and biotic life on the planet (like the wood feedstock of the fire), the carbon in the char will stay inertly bound to itself for centuries. And so, although some carbon was released back into the atmosphere via combustion, the overall effect was that of sequestration. Fewer carbon atoms were now destined to be bound to oxygen, making CO_2. By virtue of our tea, there are now less greenhouse gases warming the planet.

It was, on the scale of the climate, obviously a very small difference—not one that really matters to the global thermostat. To the demonstrator, however, it was a promise: not only can climate change be reversed, this work can be done, in part, by anyone. With some effort and low-tech equipment, we could all perform a bit of climate repair. We watched the char bob on the water, glimmering. It was carbon we could see and touch. It was carbon we could remove, rather than merely avoid.

The moment was remarkable to me for two reasons. Firstly, as a scholar of the cultural and technological politics of climate change, I am used to encountering carbon as something of an abstraction: a tenuous referent in a slew of quantitative equivalencies: carbon taxes, budgets, footprints, and more. These can aid in policy decisions, but don't really deliver a concrete object around which social movements

can rally. Carbon is in fossil fuels, greenhouse gases, and plastics—but also all forms of life, and a considerable portion of our geology. As such, it's hard to narrativize or feel much towards something that is seemingly in everything, everywhere.[2] And yet, in biochar, we encounter it plainly. I found it unexpectedly poignant to finally meet my object of study face-to-face, as it were. So did our demonstrator. "The carbon," he kept emphasizing, "is right here."

Secondly, the experience was also remarkable in all the ways that it seemed to prefigure, in highly artisanal terms, the technical work currently contemplated—but not yet realized—in growing numbers of climate action scenarios. To ensure a fair chance at blunting the catastrophe of global warming, most models contemplate massive amounts of carbon dioxide removal by the end of the century, culminating in something at the scale of the oil industry (only running in reverse). There are a range of technical pathways for this work, from purpose-built industrial plants that can capture CO_2 from the air to the creation and burial of bio-oil. The best formula for achieving this goal cheaply and with minimal impacts on land and energy supplies is yet to be determined—in start up offices, a thousand speculative flowers currently bloom. To succeed in making a meaningful difference on climate trajectories, at least one will need to scale up ambitiously and quickly.

At the moment, however, the vast majority of carbon removal work that is currently being practiced takes shape through much more modest means and scales, and mostly on farms. In addition to biochar, there is also the potential to increase the quantity of carbon held in agricultural fields: through a combination of practices including cover cropping, no-till, and multi-paddock grazing, the mass of organic carbon held in the soil can be increased, with benefits for both the climate and the farmer. These techniques are fairly marginal within present agricultural trends and—to be clear—their mass adoption would still be insufficient to reach the scales eventually required by net zero plans.[3] Nevertheless, they characterize carbon removal's present, even as most eyes look to its future.

There is thus a divide in investments (both financial and political) that move through carbon removal efforts, pointing in different directions. On the one hand, there are policy makers, climate scientists, and corporations keen to move the abstractions of global climate math into practice. Most humanistic and social scientific work on carbon removal has focused on these actors, their imaginaries of planetary intervention, and the social implications thereof.[4] On the other hand, there are those currently doing carbon removal work, in largely agricultural settings, who have vastly different experiences and perceptions of both carbon and the climate. Scholarly interest in this latter group has not been commensurate to that of the former; where they are studied, it is primarily

within the sociology of farming or as potential climate policy levers, rather than as the banner holders of a comparable social vision for carbon's future.[5]

This article is an attempt to ponder some of the consequences of this gap in scholarly attention, as well as what may come to pass in the near future if carbon removal proceeds down its industrial path, rendering its artisanal antecedents irrelevant. I want to ask: what has been specifically gained in the effort to hold carbon in hand, visible to the eye and manipulated through labour, that might be lost in a shift to much larger—and so less accessibly grasped—forms of sequestration? And what lessons might these communities have to offer to wider questions of climate and energy politics that continue to confound the matter of carbon mitigation?

Answers can be found at the intersections of affect and work. Carbon removal in biochar and regenerative agriculture communities is effortful and impactful: through their labour, practitioners affect tangible changes in the landscapes and materials they work with, and are themselves affected by their capacities to intervene in the climate system. As such, they gain a distinct relation to what is otherwise an invisible object of social anxiety and financialization: for them, carbon is an object mediated by their labour, generating newly sensory and reparative forms of experience and of feeling. This presents a significant departure from the usual frames of climate and energy politics, offering emotional dividends through heightened individual capacities for material action. Labour and affect thus plays a central role in shifting perceptions on the carbon cycle.

In this article I analyze these themes through a study of documentary media produced about and by both communities, in which practitioners perform and communicate about their labour. This allows for a broad range of reflections that center insights on the tangible and emotional character of artisanal carbon removal work. To better focus on these self-accounts, I emphasize small-scale and self-published media productions rather than feature-length documentaries or books written by external authors. A close reading of worker accounts demonstrates how aesthetic, ethics, and labour are mutually enmeshed, revealing underexplored forms of sensemaking and affectivity that can enrich the climate movement's wider strategic analysis. Work, as I aim to demonstrate, could be put to work—both for instrumental and constitutive ends.

This methodological approach, however, also demands caution. Some subjects are more readily captured by, or capable of self-documenting themselves in, the forms of DIY media that this study centers than others. Moreover, because of imperial histories of land tenure, technical education, and access to capital, these subjects and the communities of practice in which they are embedded, are almost entirely Western,

white, and landholding, which doubtlessly colours their relation to labour and the climate.[6] Gendered questions around the specificity and dignity of manual work are a further analytic concern in a workforce that is predominantly, but not exclusively, male. I thus aim to proceed here with a great deal of curiosity about the ways that work comes to matter in these accounts, without presuming that they represent a singular or normative resolution to the many cultural and environmental questions that they intersect.

Starting with regenerative agriculture, and then moving to biochar, I discuss how affect surfaces in worker accounts as both an epistemic and tactical resource, culminating in new theories of climate politics and value formation within these communities of practice. I then turn to examine the commodification process, and the complex ways in which the sensory and affective worlds of carbon removal work are abstracted within emerging markets. Finally, I conclude with a brief discussion of the theoretical and strategic questions these accounts raise for climate politics and the energy and environmental humanities. However, before elaborating these facets of my argument, I first detail several theoretical discussions of affect and energy that guide my approach.

Affecting Energy and Energizing Affect

Affect and energy are two essential components of climate politics. They are also, confoundingly, polysemous. It's not always clear where either term is supposed to begin or end—and the meaning of one often bleeds into the other. As I describe below, this semantic haziness may indicate new directions for parsing both the material and more-than-material character of climate repair.

Affect in social theory is most commonly approached as a prelinguistic and/or embodied feeling (sometimes taken to be contiguous with emotion in general). This orientation is highly germane to the work of climate communications, poetics, and politics.[7] Yet affect also has other lineages. The concept of "affective infrastructures" has recently inspired considerable investigation, both in encounters with fossil fuel systems, as well as the social reproduction of activist formations—and so as a means by which structural forces are experienced and contested.[8] This understanding of affect often exceeds questions of emotion, borrowing instead from Spinozist definitions of affect as the capacity to both affect the world and be affected by it.[9] Affect, here, is understood more as a question of responsive capacity and relational structures than discrete psychological states. In this sense, the concept can also play a key if often underexamined role in accounts of the gaps between everyday experiences and larger social ideologies, especially in the way these experiences are textured through one's

affective capacities (or their lack).[10] This can be a very useful way to explore the scalar challenges of climate futures and social histories.[11] When we talk of affect, therefore, we speak of potentially quite heterogeneous feelings, potentials, and vulnerabilities, all of which matter to the work of climate mobilization and all of which are to some degree interrelated.

Energy might at first appear to be a much more straightforward concept: global warming is caused by the role of fossil fuels within global energy systems. Energy transitions are thus a primary site of struggle for climate politics. Yet exactly where energy systems begin or end is fraught. As scholars in the energy humanities have emphasized, energy has profoundly cultural effects and influences, contouring the structures of social connection, belonging, and expectation, such that energy transitions are never just a question of fuel substitution.[12] Paradoxically, in physics, energy is fundamentally a unit of equivalence. Like carbon, energy is used to measure highly varied forms of mechanical and thermal work, making them abstractly commensurable. As such, it provides a technocratic means to organize and optimize work and, so too, to imbue it with moral weight. Discussions of energy are thus often coterminous with broader debates around social flourishing, personal work ethics, and the role and dignity of labour.[13] To speak of energy is thus to speak of capacities for work that are at once highly interchangeable and inertially specific.

Affect and energy, then, both cover highly varied terrains. For my purposes, I am particularly interested in the way these often overlap: the ability to perform work is to a large degree coterminous with the ability to affect and be affected. Put differently, the capacity to effect change is affective in a double sense: both in the self-making of the worker and the affective world made through the products and relations of work.

To navigate these slippages between affect, energy, and work we would do well to return to the labour theory of value. Centered around Marx's writings and many generations of interpreters, this account takes the worker as the fulcrum of value creation—both as a resource exploited by capital to create surplus value, but also in the somewhat more existential means by which the relationship (or 'metabolism') between the human and non-human world are mediated.[14] A Spinozist affect theory can be easily read into such accounts. Says Marx of the worker and his work (and here echoing earlier liberal theories of property rights), "through this movement he acts upon external nature and changes it, and in this way he simultaneously changes his own nature, and subjects the play of its forces to his own sovereign power."[15] Though this phrasing rings of a domineering humanism, it nevertheless speaks to a kind of relational encounter. Through work, something of the creative and cognitive character of the worker is mixed with their materials ("crystalized"[16] or made to act as an "agent

of fermentation").[17] Both materials and worker are transformed through the process; it is a condition of mutual affectivity. This is in part why the exchange of goods requires some degree of alienation—there is something of the worker that remains in the products of labour that must be severed in its movement into the market.

Alienation is an interesting and somewhat elusive term within the labour theory of value. To Marx, it describes the process of estrangement germane to the commodity form. Through the mediations of money and markets, the labour and labourer are made invisible to the consumer/society at large, such that commodities appear to act through their own power.[18] This sense of alienation builds from longer, often theological, accounts of the concept, which speak to the distance between man and God or of Hegelian dialectics.[19] Shades of these more metaphysical notions creep into Marx's account of how, through exchange, a commodity's "sensuous characteristics are extinguished... they are merely congealed qualities of homogenous human labour in the abstract."[20] There is thus a link to be made between the particular and tangible experiences of labour, the labourer's subjectivity, and the abstractions of the market. To labour is to know, change, and comingle oneself with the world. To sell one's labour and its products is to lose part of that affectivity. The stakes of the sensory are thus at once epistemological and ethical.

These affective dynamics impact the worker beyond the monetary relations and factory settings initially centred in the labour theory of value. This is recognized, in part, within labour struggles for greater dignity and self-direction at work, including Luddite rebellions and forms of socialist humanism that frame demands in terms of the (perhaps nostalgic) return to artisanal production rather than the sole advancement of higher wages.[21] Affective alienation also has new salience within post-industrial and service economies. David Graeber's concept of "bullshit jobs" highlights the psychological damage of work that workers themselves perceive to be particularly pointless—damaging specifically because it frustrates workers' capacities to meaningfully affect the world around them.[22] Again, this translates well into the terms of an expansive affect theory: alienation is an external constraint placed on one's capacities to affect and be affected by one's milieu. Or, as Rahel Jaeggi succinctly puts it, "alienation is a relation of relationlessness."[23]

Alienation may also provide a broader framework for understanding something of the emotional and political gaps that vex climate politics and its relations to the energetic work of everyday life. While many scholars have examined the social consequences of alienation between industrialized subjects and nonhuman nature,[24] similar feelings of relationlessness obtain between concerned individuals and the wider climate system. We are all, through conditions largely beyond our control,

part of processes that produce carbon emissions. The provenance and character of these emissions are largely imperceptible, while their momentum exceeds individual capacities for sensation or intervention. As such, publics generally relate to climate data as an external abstraction.[25] Like the commodity form, carbon appears, if not as a fetish, then as an acutely alienated relation.

It is striking that artisanal carbon removal moves in precisely the opposite direction. By following worker accounts of these experiences, we can unearth new forms of affective subjectification and action that could serve to reenergize climate politics.

Unalienating Soil Carbon

"Remember, carbon is what it's all about. We're a carbon-based planet and this is it in living colour right here, right now."[26] With these words, soil scientist Tom Hunt lays out a plug of soil, about a foot deep, pulled from an Albertan pasture. He is there to study experiments in regenerative agriculture.[27] The farmers' whose fields he is assessing have made a transition from conventional grazing, in which cattle roam freely on large pastures, to Adaptive Multi-Paddock (AMP) management, characterized by the rapid rotation of dense groups of livestock across small parcels of land. By increasing the periods of rest and renewal afforded to grass species, and by avoiding monocultures and pesticides on the pasture, the plant and microbial lives of the soils are enhanced, which in turn sequesters carbon in the ground. This requires active work on the part of the rancher, who must regularly rotate livestock through paddocks and eschew extensive petrochemical controls. But, as a result, the fields abound with organic matter that performs climate work.

Hunt spills the soil out into his hand. It's dark and moist, contrasting sharply with the pink of his skin and the green of the grasslands. The sensation provokes comment: "Feel that, it's just—pleasurable. It's silky. And that is the carbon in there, the organic matter." He passes the soil to Tim Hoven, the farmer who owns and works the pasture he's studying, who thumbs it appreciatively. They've gathered together with a film crew to witness this soil carbon assessment—one of many the scientists will make in Hoven's land to quantify rates of carbon sequestration. Hunt next works a soil sampling probe, digging and laying out a cross-section of earth. The excavated soil indexes both the subterranean reach of native grasses (roots burrowing some 30 inches deep) and a timeline of soil carbon accrual. Hoven later remarks, "It was amazing to see that soil laid out on the grass, and see, you know, a ten-thousand-year history, and how my decisions today are affecting that."[28] Scientists later validate this thought: studies in the region found between 0.75–2.5 more tonnes of soil carbon formation per hectare per year in AMP pastures.[29] Hoven is making a difference.

The scene represents a dynamic common to soil carbon work: a blending of quantitative inquiry with the sensory knowledge of agricultural workers. Kearnes and Rickards describe these "hybrid epistemological strategies," both calculative and aesthetic, as farmers and scientists jointly develop new paradigms of soil carbon management.[30] Conjoined with this project is a shifting land ethic—one that outwardly repositions farmers as climate champions.[31] This is variably approached as an ethical project of care, as seen in many feminist and eco-critical accounts of soil ecologies,[32] or as a techno-pastoral fix, like in the Carbon Farming Foundation's reference to such farmers as "the heroes of net zero."[33]

Within farmer accounts, however, these climate narratives are often secondary to more personal experiences of ecological and financial renewal. Stories of farmers' journeys to regenerative agriculture frequently begin in crisis—drought, hail, mounting debts, or family loss—which prompts a turn to soil health as a means of reducing petrochemical inputs (and therefore costs) in their practices. These accounts are highly emotionally charged—adversity, loss, stubbornness, and salvation are frequent themes—though thrift, more than environmentalism, is most often the instigating concern.[34] Gabe Brown, a farmer and regenerative agriculture spokesman, gives a quick gloss when sharing, "When my wife and I went through the four years of crop failure, I'm sure I was not a pleasant man to be around in that it was extremely high stress. But my wife and I will tell you it was the best thing that could have ever happened to us because—what it was—it forced us to start looking at the soil."[35]

This turn to the soil requires a different rhythm of work, and more active problem solving on the farm. Livestock rotation rates and breed characteristics, as well as cover crops and foraging species, must be negotiated through the particular microclimates of each farm, often through processes of iterative experimentation. In doing so, and contrary to the formulaic application of fertilizers and monocrops in conventional agriculture, farmers find themselves attuned to a landscape that can both resist and respond to their interventions. Sensorially, this is experienced in both the rates of crop production, pollinator diversity, and the return of charismatic wild animals to the land.[36] Peter Byck and Carbon Nation, the film crew documenting the Hoven farm study, emphasize this visually through rich panning close-up shots of flowering grasses, insects, birds, and cattle flanks, often in slow motion. Cross sections of soil, showing darkly coloured earth and expansive networks of roots, are a further visual idiom that repeats across representations of the practice. To the farmer and the viewer both, regenerative work produces new landscapes.

Farmer accounts discuss this through both a sensorial enjoyment of the land as well as a pleasure in their ability to better know and restore it through their labour.

This is tied to both professional identities and an expanded feeling of personal capacity in relation to the soil. Ben Mead, a farmer in the UK, notes that, "instead of being down that conventional road where you're having to work with chemicals—I mean life is more interesting now because you've actually got to be a farmer, you've got to work with it man!"[37] Martin Howard, similarly, explains that, "I am at the moment completely experimental... [It makes me feel] excited. Because I can feel the vigor of this regrowth."[38] Affect theory helps attune us to these kinds of comments as more than merely a feel-good quote. There is instead an investment in working on and with agricultural ecologies, that in turn works on and with the farmer, shifting their attention and bearing material and emotional effects: a de-alienation.

Increased affectivity also leads to shifting theories of value. To many regenerative farmers, this is a mode of work attuned to different metrics of success than maximizing profits on a yearly timescale. Mead contrasts this to mining, from which his family built their prior wealth. Regenerative agriculture "is the complete antithesis," because of the long-term investments in soil health and the lengthier and richer lives of foraging livestock—"you're not using them extractively."[39] To some, like Brown, there is also an opportunity to exit commodity markets, and to pursue direct sales driven by the distinct narrative and nutritional qualities of regenerative meat and produce. These boutique markets can command higher prices, while also allowing the longer-term sustainability of the farm to moderate the pursuit of the greatest possible short-term returns.[40] To others, potentially diminished returns are an acceptable trade-off for the different physical and moral character of work that regenerative agriculture affords. It is, to one pair of ranchers, a question of "quality of life" and the "opportunity to do great things and preserve some of this great land."[41]

Unalienating char

Biochar work also affords affective opportunities. As the account of carbon negative tea shows, this is in part because char is so demonstrative; it remediates carbon into an especially tangible form through the labour of the practitioner. This abounds in the teaching of biochar production. One example is found in a workshop led by Bob Wells, a Massachusetts biochar producer and farmer. The recording includes an hour-long lesson on the mechanics of the carbon cycle, taught through simple illustrations of carbon flows and sinks. However, one attendee, not quite following, asks whether pyrolysis risks depleting the world's oxygen supply. After a demure answer from Wells, another audience member—one seemingly with biochar experience—interjects. After asking Wells to hold up a piece of char, he presses: "He's got it right there in his hand. It used to be in the air, in the form of carbon dioxide. Got rid of all the oxygen. Held on to the carbon."[42]

Wells, indeed, holds on to the carbon quite often in his demonstrations. His hands are frequently dark with charcoal dust from holding, breaking, and gesticulating with biochar, just as his lips are sometimes marked from eating the material. He claims to always test each batch of char by tasting it. This provides a hook to open the workshop: while the camera pans across a footprint in a pile of biochar dust, he announces, "this is how we really mean to take a bite out of our carbon footprint." He then bites a pyrolyzed plank with an audible crunch.[43]

These sensory engagements with biochar are, in part, epistemic. Wells teaches his students how to identify high quality char through colour (all black, with no white ash or brown unburnt interior), sound (a clink with "almost metallic or glassy like brittleness"), and taste (or rather, the absence thereof; it removes flavour).[44] Sensory attunements also extend to would-be char. Wells notes of one of the burn piles lying around the farm, "Most people see it as a big pile of pine that needs to be gotten rid of. To me, it looks like carbon that needs to be sequestered."[45]

Wells is so avidly on the look for carbon to remove from the climate system, in large part, because the practice provides a way out of the practical and emotional impasse of petrocultures. In his lesson on the carbon cycle he frames the science of global warming as a problem we are frustratingly mostly not attempting to solve. "Can we turn it around? Can we just stop? Well, we can drive a Prius... we can not drive as much. That's not going to fix the problem; it's going to slow down how fast it gets bad."[46] With biochar, however, "we're doing the exact opposite of what the coal companies are doing. We're taking it out of the sky and putting it in the ground."[47]

The emotional stakes of this shift are, to Wells, quite significant. He frequently mentions the value of sharing the practice of biochar with children, who he feels are inundated with negative climate news. He discusses, in particular, a visit to his daughter's high school, who were, "thrilled. They could see hope in this... That's an important aspect of it in my preaching about biochar is that we can give ourselves, and especially our kids, hope that it's not all going to go bad, that at least we can work towards trying to balance these things out and make it better."[48]

Kathleen Draper, board chair of the International Biochar Initiative, is similarly attuned to the positive affects and demonstrable effects of biochar. She discusses this outright in a guide to the "biocharmed"—those newly enraptured by biochar's environmental promise—who, she argues, pass through five stages of falling in love: hopeful, exuberant, evangelistic, overwhelmed, and focused. Positioned as the mirror opposite to the five stages of grief (or, she wonders, perhaps a comparable passage through eco-anxiety), the biocharmed go on an emotional journey that eventually settles into sustained efforts to support and grow the carbon negative economy.[49]

Char's affects work on its proponents equally as they work on it, shaping them into a new kind of climate subject with unalienated pathways for direct action.

This taxonomy is also, one senses, a reflection on personal experience. Years before, Draper delivered a church sermon about the necessity of hope in environmental activism. First sketching a grim picture of the contemporary news landscape (with its financial incentives to focus almost exclusively on bad news) and the climate movement's emphasis on fighting fossil fuel pipelines (efforts which are "empowering" and "necessary," but ultimately insufficient in that they are "focused only on stopping something") she emphasizes the need to design, "new models for our future with the potential to render various parts of the existing fossil fuel economy obsolete."[50] Biochar, unsurprisingly, is one such trend for hope. After detailing its potential applications in agriculture, battery chemistry, and bioenergy, she returns to the strategic and emotional stakes of its promise:

> In order to successfully combat our inbred negativity bias, it's important to focus on the positive, to really dwell on the positive. Not to the extent that we are all sporting rose-colored glasses forevermore, but to the point where we do not lose hope. To the point where we set specific challenging goals for ourselves and our communities that begin the long process of restoring Mother Earth to the glory she deserves.[51]

There are seemingly endless places where the biocharmed can dig in. Back in the Ithaca biochar workshop, Draper opened the proceedings with a lengthy account of what biochar could do for the climate, and where it might find agricultural and material science applications: cow feed, lighter concretes, municipal waste management, syngas, disaster response, invasive species removal, and much more. It was a tour de force of positive potentials, waiting to be explored. Yet these expansive industrial visions were quickly paired with hands-on fieldwork. Organic farmers brought us out to crop rows, where they burned and buried char directly into mounds of soil with hand-held hoes. A hub of biochar entrepreneurs demonstrated products and processes nearby, including fireplace canisters made for urban users unable to light large outdoor pyres. Draper, in their midst, demonstrated an open-source kiln which anyone could replicate. The goal was to get char before our eyes and to move us towards producing it, in whatever capacity fit with our ambitions and abilities. The promise was in doing the work itself, in whatever direction that took us.

What's more, the work promised convivial connections, deepening relations with both carbon ecologies and social community. Biochar production and design, proponents attest, can be a mode of work with many affective rewards. Draper's colleagues write of their kiln design efforts that, "what made it light work … was the

magnificent pleasure it was to work directly with the fire... Friendships have been strengthened by the fire while sharing meals cooked on the [kiln]."[52] This experience calls for further enjoyable and collaborative efforts: "all are invited to participate in this movement to reappropriate the craft of fire and biochar making:" a practice and technology that is "supremely beautiful."[53]

This emphasis on the sensory and the relational often culminates in a theory of climate politics. Draper and her colleagues argue that biochar's emphasis on action and affect present a new path for activist mobilizations, correcting for the deficits of technocratic and consumer-oriented mitigation. They position politicians who approach global warming "counterproductively" through a focus on "abstract calculations of CO_2 that rarely help and don't address the climate damage that we already experience,"[54] against "each and every person using [biochar] techniques," who therefore gain "the ability to...[make] their own heartfelt contribution to mitigate the damage humans have caused to the planet."[55] This approach is both more motivating and actionable, for "at its very essence, climate farming cultivates hope and happiness, something that is sorely needed in this era of climate chaos."[56]

As in regenerative agriculture, biochar practitioners' emphasis on affect point to motivations and rewards that are more than financial. While Draper's talks often include reference to sustainable business concepts such as the triple bottom line or sustainable development goals, these concerns are also coterminous with the personal psychological need to take impactful climate actions, or the aesthetic lure of pyrolysis' beauty. Wells, similarly, emphasizes profit, but in an expanded sense: one that might not necessarily mean money, but increased environmental and food benefits instead—returns that need not pass through the commodity form.[57]

Carbon Commodities

As these accounts of biochar and regenerative farming suggest, artisanal carbon sequestration creates generative affects and effects. Through labour, these workers are able to produce shifts across the carbon cycle, with dividends for their farm ecologies, businesses, and emotional wellbeing. These unalienated encounters with carbon inspire new horizons to climate politics: approaches that would move away from technocratic or consumer efforts at mitigation to better embrace a polity of carbon workers—broadly and openly defined—who directly know and act on the carbon cycle through their labour.

Yet, for carbon removal to scale to climate-significant quantities, the products of this labour will likely have to pass through, and be mediated by, commodity markets. This is in part a consequence of the economic demands of industrialization—complex

and resource-intensive processes like direct air capture—that are necessary to achieve enduring gigatons of carbon drawdown. Yet it is also already evident in currently existing efforts to define and grow carbon removal marketplaces on the basis of artisanal carbon work, solely through the scaling potential of finance.

This tension is exemplified in Nori, a start-up that aims to verify and sell carbon removal certificates—currently all sourced from agricultural soils. Their aims are ambitious; their tagline jumps over the specifics of their suppliers' farmlands to instead address the general and planetary: "an API to reverse climate change."[58] Achieving this goal, they emphasize, requires homogenization. A 'bespoke' carbon removal market which sustains the specificity and virtues of the supplier, they argue, would be one with considerable middlemen costs and barriers to entry for small suppliers.[59] Instead, Nori operates through a first-in, first-out queue; buyers cannot know what farm or practices they are purchasing from until after their transaction is completed. The founder of Nori is quite specific, stating "we're trying to commoditize carbon dioxide. We're trying to move past these tangible parts of CO_2 removal."[60] To this end, he "want[s] to see people looking at it like, 'a ton is a ton, is a ton.' It doesn't matter where its stored, as long as it's stored in a mostly permanent fashion and removed from the atmosphere."[61]

Nori aims to achieve this homogeneity through data science. Farmers wishing to register on their platform must input extensive information about their farming histories and provide digital field boundaries so that verifiers can review satellite imagery of croplands. Verification takes the form of a 'desktop audit,' which is to say, entirely through computers. No one actually visits the field site to take samples of soil carbon on the land, or to admire its silky blackness.[62]

Such sensory worlds persist in only minimal traces on the Nori platform. Photos of generic croplands appear throughout the site, while farmers provide a short paragraph description of their practices for a profile that consumers can view after their purchase. Nori's vision for the platform intensifies this dynamic further. Its CEO predicts that "carbon removal in the future will be automatic, invisible, and in the background, like a prompt at the end of an Uber ride or gas pump transaction to buy carbon removal credits,"[63] such that "many people who ultimately take some action that results in buying [carbon removal] might not even be aware of it. This… is what will enable Nori and the world to make a real and significant impact on climate change."[64]

The pursuit of frictionless exchange continues on a further financial register. Nori distinguishes itself from other carbon marketplaces in large part due to its planned cryptocurrency token launch. While its initial years of operations have included only the sale of carbon removal certificates from farmlands, it ultimately aims to expand its offerings to multiple forms of carbon removal, mediated through a blockchain token

that will fluctuate in value while remaining exchangeable with one tonne of carbon dioxide removal. In this way Nori is poised to accelerate with the industrialization of carbon sequestration work while staying agnostic to its particular forms. The CEO, accordingly, insists that Nori is much more than a carbon credit salesmen, but instead a "carbon price discovery company," achieving through market action what state regulation has largely failed to deliver (a defensible price on carbon), and providing the means to standardize and drive competition across the varied forms of emergent carbon removal technologies rapidly entering the market.[65] Its success depends on omitting the affective worlds of the worker.

Conclusions

This future may come with both gains and losses for the climate movement. The need for scale is a matter of geophysics: to meaningfully reduce global warming, sequestration work must be advanced at industrial scales, and so almost certainly through commodification. Yet, in addition to the questions of political economy and climate justice that these technologies raise, industrialization—through the fragmentation and alienation of carbon removal work—may also foreclose the political and affective openings created by the artisanal modes of production it seeks to surpass. Given the social and environmental stakes, this may be an acceptable loss. A humanistic attachment to artisanal relations of production is not terribly defensible relative to the suffering of 3 or 4 degrees of warming. My aim in studying these practitioners has not been to argue for their importance above and beyond larger carbon removal futures—to advance an exclusively small-is-beautiful environmentalism—but rather to parse how current worker accounts suggest promising directions for climate politics in general. The value of these latent strategies may exceed that of the carbon math alone.

This article has advanced two central claims. Firstly, I've analyzed how affect is central to climate action—not only in terms of psychological motivations, but in the entanglements of feelings, sensations, and relationalities across the often-estranged materiality of carbon emissions. Secondly, I've suggested that some forms of carbon removal work achieve this goal, cultivating capacities to affect and be affected by the carbon cycle, and reducing feelings of alienation therein.

The climate movement, in reviewing the limitations of its current tactical portfolio (which depends predominantly on the trifecta of individual behavioural changes, political lobbying, and direct opposition to fossil energy projects), might therefore seek to include reparative labour as a fourth strategy. While current debates about just energy transitions and the Green New Deal position jobs as a means to demobilize potential opponents to climate action, carbon removal work can itself be constitutive of

climate subjects and sensations that could usefully energize the movement. Such work need not be waged in order to help build subjects' capacities to know and intervene in the carbon cycle, nor necessarily be agricultural in nature; further research on the affective character of more technologically-intensive and hobbyist carbon removal work may reveal productive parallels. In either case, the political gains of this labour should be evaluated separately from its quantitative potential to sequester CO_2e. The affective (and not only instrumental) character of climate work has political value.

Yet work's political promise also comes with its share of perils. As anti-work scholars demonstrate, a narrow focus on the moral dimensions of labour risk occluding personal and environmental freedoms that may also be constitutive of different political demands, be it leisure and/or liberation.[66] Such risks are all the more acute in agricultural work, where colonial legacies of dispossession and genocide lurk behind the land ethics and property rights that undergird much of artisanal carbon removal efforts. These questions haunt biochar production, which frequently positions itself as a revival of precolonial Indigenous science, yet involves very little engagement with present day Indigenous communities and land struggles[67] and has in some instances contributed to further dispossession via global carbon markets.[68] Finally, there is also a risk of workers privileging their own economic and aesthetic interests over those required by the broader coalition of climate justice concerns. As an example, Tim Hoven is one of many farmers who oppose a federal carbon tax—not only because of its economic implications for his operations, but because he doubts the severity of global warming.[69] His apprehension of the carbon cycle has limits, and these limits inhibit solidarity.

Artisanal carbon removal workers, then, are not the unambiguous heroes of future climate action, whether through the vagaries of net zero accounting or the societal reconfigurations of climate repair. They are, however, illustrative of the importance and expansiveness of affect—broadly conceived—in the production of social meaning amid alienated conditions of energy production and climate change. These dynamics could be usefully studied by both activists and social theorists, pointing to the combined ways in which energy and affect come to matter in climate action. We might therefore seek ways to continue to hold carbon well in hand, even as its industrial applications scale up far beyond our everyday senses.

Notes

[1] Dale Hendricks, Carbon Farming and Biochar Workshop, May 20, 2017.

[2] Anne Pasek, "Carbon Vitalism: Life and the Body in Climate Denial," *Environmental Humanities* 13, no. 1 (May 1, 2021): 1–20, https://doi.org/10.1215/22011919-8867175.

[3] Holly Jean Buck, *After Geoengineering: Climate Tragedy, Repair, and Restoration* (London: Verso, 2019), 111.

[4] Kathryn Yusoff, "The Geoengine: Geoengineering and the Geopolitics of Planetary Modification," *Environment and Planning A* 45, no. 12 (December 1, 2013): 2799–2808; Tina Sikka, *Climate Technology, Gender, and Justice: The Standpoint of the Vulnerable* (Springer, 2018).

[5] Ken E Giller et al., "Regenerative Agriculture: An Agronomic Perspective," *Outlook on Agriculture* 50, no. 1 (March 1, 2021): 13–25, https://doi.org/10.1177/0030727021998063; Courtney White, "Why Regenerative Agriculture?," *The American Journal of Economics and Sociology* 79, no. 3 (2020): 799–812, https://doi.org/10.1111/ajes.12334. For exceptions, see Matthew Kearnes and Lauren Rickards, "Earthly Graves for Environmental Futures: Techno-Burial Practices," *Futures* 92 (September 1, 2017): 48–58, https://doi.org/10.1016/j.futures.2016.12.003; Buck, *After Geoengineering*.

[6] This question has been explored with more intention in recent, high-profile accounts of regenerative agriculture, including the film *Common Ground* (2023) and the book *Healing Grounds* (2022), perhaps in reaction to the lack of attention to race in earlier treatments of the subject by the same creators. This is less true of self-published media created within the regenerative agriculture and biochar communities, which may indicate the extent to which race matters to different degrees based on external vs. internal audiences. I thank Holly Jean Buck for this point.

[7] Renee Lertzman, "Tackling Apathy and Denial," Climate 2020, September 11, 2017, https://www.climate2020.org.uk/tackling-apathy-denial/; Glenn Albrecht, "'Solastalgia'. A New Concept in Health and Identity," *Philosophy Activism Nature*, no. 3 (November 10, 2020): 41–55, https://doi.org/10.3316/informit.897723015186456.

[8] Kai Bosworth, "What Is 'Affective Infrastructure'?," *Dialogues in Human Geography*, June 9, 2022, 20438206221107025, https://doi.org/10.1177/20438206221107025.

[9] Benedictus de Spinoza, *The collected works of Spinoza*, trans. E. M Curley, vol. 1 (Princeton: Princeton University Press, 1985).

[10] Kathleen Stewart, *Ordinary Affects* (Durham, NC: Duke University Press, 2007).

[11] Susan Ruddick, "Against a Fatal Confusion: Spinoza, Climate Crisis and the Weave of the World," *Intellectual History Review* 30, no. 3 (July 2, 2020): 505–21, https://doi.org/10.1080/17496977.2020.1732709; Anne Pasek, "Mediating Climate, Mediating Scale," *Humanities* 8, no. 4 (December 2019): 159, https://doi.org/10.3390/h8040159.

[12] Petrocultures Research Group, *After Oil* (Edmonton, AB: University of Alberta, 2016), https://afteroil.ca/wp-content/uploads/2022/04/After-Oil.pdf.

[13] Cara New Daggett, *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work* (Durham: Duke University Press, 2019), 87; Myles Lennon, "Decolonizing Energy: Black Lives Matter and Technoscientific Expertise amid Solar Transitions," *Energy Research & Social Science*, Exploring the Anthropology of Energy: Ethnography, Energy and Ethics, 30 (August 1, 2017): 18–27, https://doi.org/10.1016/j.erss.2017.06.002.

[14] Karl Marx, *Capital Volume 1*, trans. Ben Fowkes (New York: Penguin Classics, 1990), 133.

[15] Marx, 283.

[16] Marx, 128.

[17] Marx, 292.

[18] Marx, 165.

[19] Marcello Musto, "Revisiting Marx's Concept of Alienation," *Socialism and Democracy* 24, no. 3 (2010): 79–80, https://doi.org/10.1080/08854300.2010.544075.

[20] Marx, *Capital*, 128.

[21] For an account and critique of these traditions, see Chapter 2 of Kathi Weeks, *The Problem with Work: Feminism, Marxism, Antiwork Politics, and Postwork Imaginaries* (Durham, N.C: Duke University Press, 2011).

[22] David Graeber, *Bullshit Jobs: A Theory* (New York: Simon and Schuster, 2018), 84.

[23] Rahel Jaeggi, *Alienation* (Columbia University Press, 2014), 1.

[24] Simon Hailwood, *Alienation and Nature in Environmental Philosophy* (Cambridge University Press, 2015).

[25] Julie Doyle, *Mediating Climate Change* (Farnham, Surrey; Burlington, VT: Ashgate, 2011), 24.

[26] *The Luckiest Places on Earth*, Carbon Cowboys, 2020, https://www.youtube.com/watch?v=6yFsCTFrtUo.
[27] The term 'regenerative agriculture' lacks clear definition. As it gains public popularity (and commercial appeal) there are growing debates within agricultural social movements about the risks of this ambiguity and its ultimate sufficiency. I thank Evan Bowness for this point.
[28] *The Luckiest Places on Earth*.
[29] *The Luckiest Places on Earth*.
[30] Matthew Kearnes and Lauren Rickards, "Knowing Earth, Knowing Soil: Epistemological Work and the Political Aesthetics of Regenerative Agriculture," in *Thinking with Soils: Material Politics and Social Theory*, ed. Juan Francisco Salazar et al. (London: Bloomsbury Publishing, 2020), 71–88.
[31] Kearnes and Rickards.
[32] María Puig de la Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds* (Minneapolis; London: University of Minnesota Press, 2017).
[33] The Carbon Farming Foundation, "About Us," accessed August 18, 2022, https://carbonfarming.org.au/about/.
[34] See also The Fern's *Hot Farm* podcast series: https://thefern.org/podcast/part-1-change-is-hard/.
[35] *Soil Carbon Cowboys*, 2014, https://www.youtube.com/watch?v=MDoUDLbg8tg.
[36] *One Hundred Thousand Beating Hearts*, Carbon Cowboys, 2020, https://www.youtube.com/watch?v=qpvegapd1T4.
[37] *Time Will Tell*, Carbon Cowboys, 2020, https://www.youtube.com/watch?v=5LXIPmkPU_I.
[38] *Time Will Tell*.
[39] *Time Will Tell*.
[40] *Gabe Brown Discusses How Regenerative Agriculture Is a Solution to Global Challenges*, The Carbon Series (Boise, ID, 2021), https://www.youtube.com/watch?v=TLwsn8snsMc.
[41] *The Luckiest Places on Earth*.
[42] *Biochar Workshop Part 3: The Carbon Cycle*, 2014, https://www.youtube.com/watch?v=E0Lj_SsYpto.
[43] *Biochar Workshop Part 1: How to Make Biochar*, 2013, https://www.youtube.com/watch?v=svNg5w7WY0k.
[44] *Biochar Workshop Part 1: How to Make Biochar*.
[45] *Biochar Workshop Part 1: How to Make Biochar*.
[46] *Biochar Workshop Part 3: The Carbon Cycle*.
[47] *Biochar Workshop Part 3: The Carbon Cycle*.
[48] *Biochar Workshop Part 3: The Carbon Cycle*.
[49] Kathleen Draper, "5 Stages of Falling in Love with Biochar," *Finger Lakes Biochar* (blog), September 24, 2019, http://finger-lakesbiochar.com/5-stages-of-falling-in-love-with-biochar/.
[50] Kathleen Draper, "Trends for Hope" (Unitarian Universalist Church of Canandaigua, NY, April 24, 2013), https://www.youtube.com/watch?v=U-cA86RoN28.
[51] Draper.
[52] Hans-Peter Schmidt and Paul Taylor, "Kon-Tiki: The Democratization of Biochar Production," *The Biochar Journal* 39 (2014): 22, https://www.biochar-journal.org/en/ct/39-Kon-Tiki-the-democratization-of-biochar-production.
[53] Schmidt and Taylor, 23.
[54] Ute Scheub et al., *Terra Preta: How the World's Most Fertile Soil Can Help Reverse Climate Change and Reduce World Hunger* (Vancouver; Berkeley: Greystone Books, 2016), 200.
[55] Scheub et al., 202.
[56] Scheub et al., 68.
[57] *Biochar Workshop Part 1: How to Make Biochar*.
[58] "Nori: A Blockchain-Based Marketplace for Removing Carbon Dioxide from the Atmosphere" (Nori, February 18, 2019), 69, https://nori.com/resources/white-paper.
[59] Paul Gambill, "Nori Demo" (Reversapalooza, Seattle, April 26, 2018).
[60] Gambill.
[61] Paul Gambill, Christophe Jospe, and Ross Kenyon, "Paul Gambill, CEO of Nori," Reversing Climate Change, accessed March 24, 2019, https://nori.com/podcast/1-paul-gambill-ceo-of-nori.
[62] A further question here regards permanence. Once soil carbon reserves are created through these agricultural techniques they must be maintained indefinitely. Ploughing soils, or applying extensive synthetic pesticides and fertilizers, can undo sequestration gains. Nori currently only requires farmers on their platform to commit to ten-year maintenance terms.

[63] Paul Gambill, "Introduction to Reversapalooza" (Reversapalooza, Seattle, April 26, 2018).

[64] "Nori: A Blockchain-Based Marketplace," 69.

[65] *What Is Nori?*, 2022, https://www.youtube.com/watch?v=O42DqK3g4jY.

[66] Weeks, *The Problem with Work*; Daggett, *The Birth of Energy*.

[67] Klaus Hilbert and Jens Soentgen, "From the 'Terra Preta de Indio' to the 'Terra Preta Do Gringo': A History of Knowledge of the Amazonian Dark Earths," in *Ecosystem and Biodiversity of Amazonia*, ed. Heimo Juhani Mikkola (London: IntechOpen, 2021), 1–17, https://doi.org/10.5772/intechopen.93354.

[68] Melissa Leach, James Fairhead, and James Fraser, "Green Grabs and Biochar: Revaluing African Soils and Farming in the New Carbon Economy," *The Journal of Peasant Studies* 39, no. 2 (April 1, 2012): 285–307, https://doi.org/10.1080/03066150.2012.658042.

[69] Kyle Bakx, "Why Alberta Farmers Loathe the Carbon Tax," *CBC News*, January 23, 2017, sec. Business, https://www.cbc.ca/news/business/understanding-why-alberta-farmers-loathe-the-carbon-tax-1.3943040.

Acknowledgements

My thanks go out to the editors and fellow authors of this special issue for their invaluable comments in the early stages of drafting this article. I would like to further thank Holly Jean Buck for her feedback and Kees Schuller for their research assistance. This work was supported by the Canada Research Chairs Program (grant number 950-233016).

Competing Interests

The author declares that she has no competing interests.

References

Albrecht, Glenn. "'Solastalgia'. A New Concept in Health and Identity." *Philosophy Activism Nature*, no. 3 (November 10, 2020): 41–55. https://doi.org/10.3316/informit.897723015186456.

Bakx, Kyle. "Why Alberta Farmers Loathe the Carbon Tax." *CBC News*, January 23, 2017, sec. Business. https://www.cbc.ca/news/business/understanding-why-alberta-farmers-loathe-the-carbon-tax-1.3943040.

Biochar Workshop Part 1: How to Make Biochar, 2013. https://www.youtube.com/watch?v=svNg5w7WY0k.

Biochar Workshop Part 3: The Carbon Cycle, 2014. https://www.youtube.com/watch?v=E0Lj_SsYpto.

Bosworth, Kai. "What Is 'Affective Infrastructure'?" *Dialogues in Human Geography*, June 9, 2022, 20438206221107025. https://doi.org/10.1177/20438206221107025.

Buck, Holly Jean. *After Geoengineering: Climate Tragedy, Repair, and Restoration*. London: Verso, 2019.

Daggett, Cara New. *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work*. Durham: Duke University Press, 2019.

Doyle, Julie. *Mediating Climate Change*. Farnham, Surrey; Burlington, VT: Ashgate, 2011.

Draper, Kathleen. "5 Stages of Falling in Love with Biochar." *Finger Lakes Biochar* (blog), September 24, 2019. http://fingerlakesbiochar.com/5-stages-of-falling-in-love-with-biochar/.

———. "Trends for Hope." Unitarian Universalist Church of Canandaigua, NY, April 24, 2013. https://www.youtube.com/watch?v=U-cA86RoN28.

Gabe Brown Discusses How Regenerative Agriculture Is a Solution to Global Challenges. The Carbon Series. Boise, ID, 2021. https://www.youtube.com/watch?v=TLwsn8snsMc.

Gambill, Paul. "Introduction to Reversapalooza." Presented at the Reversapalooza, Seattle, April 26, 2018.

———. "Nori Demo." Presented at the Reversapalooza, Seattle, April 26, 2018.

Gambill, Paul, Christophe Jospe, and Ross Kenyon. "Paul Gambill, CEO of Nori." Reversing Climate Change. Accessed March 24, 2019. https://nori.com/podcast/1-paul-gambill-ceo-of-nori.

Giller, Ken E, Renske Hijbeek, Jens A Andersson, and James Sumberg. "Regenerative Agriculture: An Agronomic Perspective." *Outlook on Agriculture* 50, no. 1 (March 1, 2021): 13–25. https://doi.org/10.1177/0030727021998063.

Graeber, David. *Bullshit Jobs: A Theory*. New York: Simon and Schuster, 2018.

Hailwood, Simon. *Alienation and Nature in Environmental Philosophy*. Cambridge University Press, 2015.

Hendricks, Dale. Carbon Farming and Biochar Workshop, May 20, 2017.

Hilbert, Klaus, and Jens Soentgen. "From the 'Terra Preta de Indio' to the 'Terra Preta Do Gringo': A History of Knowledge of the Amazonian Dark Earths." In *Ecosystem and Biodiversity of Amazonia*, edited by Heimo Juhani Mikkola, 1–17. London: IntechOpen, 2021. https://doi.org/10.5772/intechopen.93354.

Jaeggi, Rahel. *Alienation*. Columbia University Press, 2014.

Kearnes, Matthew, and Lauren Rickards. "Earthly Graves for Environmental Futures: Techno-Burial Practices." *Futures* 92 (September 1, 2017): 48–58. https://doi.org/10.1016/j.futures.2016.12.003.

———. "Knowing Earth, Knowing Soil: Epistemological Work and the Political Aesthetics of Regenerative Agriculture." In *Thinking with Soils: Material Politics and Social Theory*, edited by Juan Francisco Salazar, Céline Granjou, Matthew Kearnes, Anna Krzywoszynska, and Manuel Tironi, 71–88. London: Bloomsbury Publishing, 2020.

Leach, Melissa, James Fairhead, and James Fraser. "Green Grabs and Biochar: Revaluing African Soils and Farming in the New Carbon Economy." *The Journal of Peasant Studies* 39, no. 2 (April 1, 2012): 285–307. https://doi.org/10.1080/03066150.2012.658042.

Lennon, Myles. "Decolonizing Energy: Black Lives Matter and Technoscientific Expertise amid Solar Transitions." *Energy Research & Social Science*, Exploring the Anthropology of Energy: Ethnography, Energy and Ethics, 30 (August 1, 2017): 18–27. https://doi.org/10.1016/j.erss.2017.06.002.

Lertzman, Renee. "Tackling Apathy and Denial." Climate 2020, September 11, 2017. https://www.climate2020.org.uk/tackling-apathy-denial/.

Marx, Karl. *Capital Volume 1*. Translated by Ben Fowkes. New York: Penguin Classics, 1990.

Musto, Marcello. "Revisiting Marx's Concept of Alienation." *Socialism and Democracy* 24, no. 3 (2010): 79–101. https://doi.org/10.1080/08854300.2010.544075.

"Nori: A Blockchain-Based Marketplace for Removing Carbon Dioxide from the Atmosphere." Nori, February 18, 2019. https://nori.com/resources/white-paper.

One Hundred Thousand Beating Hearts. Carbon Cowboys, 2020. https://www.youtube.com/watch?v=qpvegapd1T4.

Pasek, Anne. "Carbon Vitalism: Life and the Body in Climate Denial." *Environmental Humanities* 13, no. 1 (May 1, 2021): 1–20. https://doi.org/10.1215/22011919-8867175.

———. "Mediating Climate, Mediating Scale." *Humanities* 8, no. 4 (December 2019): 159. https://doi.org/10.3390/h8040159.

Petrocultures Research Group. *After Oil*. Edmonton, AB: University of Alberta, 2016. https://afteroil.ca/wp-content/uploads/2022/04/After-Oil.pdf.

Puig de la Bellacasa, María. *Matters of Care: Speculative Ethics in More than Human Worlds*. Minneapolis; London: University of Minnesota Press, 2017.

Ruddick, Susan. "Against a Fatal Confusion: Spinoza, Climate Crisis and the Weave of the World." *Intellectual History Review* 30, no. 3 (July 2, 2020): 505–21. https://doi.org/10.1080/17496977.2020.1732709.

Scheub, Ute, Haiko Pieplow, Hans-Peter Schmidt, Kathleen Draper, and Tim F. Flannery. *Terra Preta: How the World's Most Fertile Soil Can Help Reverse Climate Change and Reduce World Hunger*. Vancouver; Berkeley: Greystone Books, 2016.

Schmidt, Hans-Peter, and Paul Taylor. "Kon-Tiki: The Democratization of Biochar Production." *The Biochar Journal* 39 (2014): 14–24. https://www.biochar-journal.org/en/ct/39-Kon-Tiki-the-democratization-of-biochar-production.

Sikka, Tina. *Climate Technology, Gender, and Justice: The Standpoint of the Vulnerable*. Springer, 2018.

Soil Carbon Cowboys, 2014. https://www.youtube.com/watch?v=MDoUDLbg8tg.

Spinoza, Benedictus de. *The collected works of Spinoza*. Translated by E. M Curley. Vol. 1. Princeton: Princeton University Press, 1985.

Stewart, Kathleen. *Ordinary Affects*. Durham, NC: Duke University Press, 2007.

The Carbon Farming Foundation. "About Us." Accessed August 18, 2022. https://carbonfarming.org.au/about/.

The Luckiest Places on Earth. Carbon Cowboys, 2020. https://www.youtube.com/watch?v=6yFsCTFrtUo.

Time Will Tell. Carbon Cowboys, 2020. https://www.youtube.com/watch?v=5LXIPmkPU_I.

Weeks, Kathi. *The Problem with Work: Feminism, Marxism, Antiwork Politics, and Postwork Imaginaries*. Durham, N.C: Duke University Press, 2011.

What Is Nori?, 2022. https://www.youtube.com/watch?v=O42DqK3g4jY.

White, Courtney. "Why Regenerative Agriculture?" *The American Journal of Economics and Sociology* 79, no. 3 (2020): 799–812. https://doi.org/10.1111/ajes.12334.

Yusoff, Kathryn. "The Geoengine: Geoengineering and the Geopolitics of Planetary Modification." *Environment and Planning A* 45, no. 12 (December 1, 2013): 2799–2808.