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Acknowledgments: Mindi Schneider does the design and production work for Commodity Frontiers. Special thanks to Marjolijn Dijkman for our logo and cover design, and for invaluable design advice. Thanks to Andrew Creamer for managing the journal in the Brown Digital Repository. Thanks to all of the contributors to this issue for sharing their work and insights.

Cover image: Maurice #3 by Pamela Tulizo, 2022.

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Editorial Introduction

Commodity Frontiers 6, Fall 2023

'Renewable' Energy Frontiers

Mindi Schneider

"What does renewable energy mean to you?"

When Maarten Vanden Eynde asked this of Pamela Tulizo in the Issue's opening article, she responded that in Goma (North Kivu, Democratic Republic of the Congo),

"We don't talk about it."

As their conversation unfolds in the article, it becomes clear why the average person in Goma doesn't talk about renewable energy. For one thing, renewable energy is a taboo and politically sensitive topic thought best left to the authorities. For another, connections between the minerals people mine in the region and the solar panels, batteries, and electronic devices the same people use every day are invisibilized. Extracted minerals leave the DRC, are transformed elsewhere, and return in the form of marketable products that bear no sign of the place from which they came. Links between Goma's extracted minerals and electric cars one of the darlings of the renewable energy transition — are even further removed. Although people working in mines in Goma might use solar panels and mobile phones, they are not driving Teslas.

Ms. Tulizo's photo on the cover of the Issue offers a portal into a parallel universe where the people whose work fuels the production of things like Teslas get to enjoy the fruits of their labor. The photo features Béatrice Mwamba, a woman who works in Goma washing minerals. As Ms. Tulizo says in the article,

[S]he deserves to be in this car. Because if she doesn't exist, this car doesn't exist.

Like Ms. Mwamba, the people and places that underwrite, animate, express, and contest renewable energy frontiers are at the heart of this Issue. They belong at the heart of any renewable energy conversation.

From a technical point of view, renewable energy is energy from "natural" sources that can be constantly replenished; things like wind, sun, waves. Without a doubt, these are important fossil fuel alternatives. But when commodity frontier dynamics are the entry point for analyzing energy and energy transitions, the notion of renewability comes into question. To define an energy transition in technical terms without addressing the people who could make a transition possible, or the root causes of climate change, environmental degradation, and global inequality leaves a foundational question unanswered: in addition to energy, what else is being renewed in today's renewable energy frontiers?

Several pieces in the Issue look at how renewable energy reproduces — or renews extractive, colonial, exploitative relations. The first three articles are grounded in the Democratic Republic of the Congo and the mining of **cobalt**, a mineral marked as key for the renewable energy transition. Following Maarten Vanden Eynde's conversation with Pamela Tulizo (pp. 1-9), Felipe Paiva reviews Siddarth Kara's book, Cobalt Red: How the Blood of the Congo Powers Our Lives (pp. 10-14). Although the book centers on people working in mines in the DRC, Paiva argues that rather than acknowledging their lives, histories, and agency, "the true commodity of Kara's Cobalt Red is the suffering of others, with cobalt as the background" (p. 13).

Rounding out the DRC section, Robrecht Declercq's piece advances the notion of a *double commodity frontier* through a historical study of copper-cobalt mining in Katanga (pp. 15-23). His concept highlights a methodological issue in the study of commodity frontiers generally: while single commodities are useful entry points for description and analysis, they never exist in isolation from other commodities and processes of commodification.

Examining **wind** farms in Jordan, Kendra Kintzi's contribution looks at what she calls "renewable energy investment frontiers" as processes of enclosure (pp. 24-31). She shows how "frontiers of global decarbonization finance" are devaluing rural land, labor, livelihoods, and lifeways in the present, while forestalling options for the future.

Next, in a conversation about her book, An Elusive Common: Land, Politics, and Agrarian Rurality in a Moroccan Oasis, Karen Rignall discusses the injustices of who must pay for energy transitions, as well as continuities between current **solar** energy projects and colonial juridical systems (pp. 32-37). On the question of a "just energy transition" in rural southeastern Morocco, she says:

If we transition just in carbon replacement and reinforce the same systems of inequality, we're not decarbonizing anything, aside from the ethical and political dimensions involved (p. 35).

Ethical and political dimensions of "renewable" energy are the focus of Hendro Sangkoyo's piece on community resistance to **geothermal** development in Indonesia (pp. 38-48). A collection of six interviews with community activists from across the archipelago, the article illustrates the heavy social, environmental, and political costs of geothermal energy development for local communities.

Turning to Brazil, Thomas D. Rogers details the arrival of the sugarcane frontier in the country's

1970s **ethanol** production boom (pp. 49-53). He argues that labor and land tenure transformations during this time became the standard in Brazil's subsequent agribusiness-focused economy.

Industry is also central in Charlotte Marcil's article on the role of "big oil" in renewable energy (pp. 54-61). Through a study of annual reports from Shell, British Petroleum, and Chevron, she shows that while the oil majors loudly tout their commitment to "green" and "renewable" energy, actual spending in these areas is dwarfed by companies' fossil fuel expenditures. What's more, the technologies that they count as "renewable" are questionably so, even in technical terms.

The Issue concludes with a think piece on preindustrial renewable energy by environmental historian, Brian Lander (pp. 62-65). He argues that although premodern energy regimes were largely "renewable" and "sustainable"—limiting the production, consumption, and circulation of things—they were not without environmental and social problems. In modern times, then, a simple "return" to fossil-free energy will not resolve deeper issues.

Each contribution, in its way, asks and answers the question of what, exactly, is being renewed with renewable energy frontiers, particularly in the Global South¹. Collectively, co-renewals examined in the pages of this Issue include: colonial relations and discourses; labor exploitation; rural devaluation (economically and otherwise); global and local inequalities; political repression; corporate, state, and transnational power; ecological transformations; and environmental degradation. In the Issue's title, we refer to "renewable" energy frontiers to flag that the term means different things to different people, in different times, and in different geographic and social locations.

So what, dear reader, does renewable energy mean to you?

¹Renewable energy frontier dynamics are variable. See the recent report from the Brown University Climate and Development Lab, <u>Against the Wind: A Map of the Anti-Offshore Wind Network in the Eastern United States.</u>

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Cite this article:

Schneider, M. (2023). "Renewable' Energy Frontiers: Editorial Introduction" *Commodity Frontiers* 6: i-iii. doi: 10.26300/6f68-zy94.

Commodity Frontiers is an open-access journal edited by the CFI Editorial Board, Mindi Schneider, senior editor. Read it online at the <u>Brown University Digital Repository</u>, or our website, <u>commodityfrontiers.com</u>.

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Fictional Frontiers: On the Fallacies and Fantasies Surrounding Renewable Energy. A conversation with Pamela Tulizo

Maarten Vanden Eynde

Keywords: renewable energy, natural resources, conflict minerals, artistic freedom, contemporary photography, digital manipulation, Goma, DR. Congo, future fantasies

Abstract: Renewable energy seems to be both inextricably and indiscriminately linked to the so-called 'green energy transition,' which is put forward as one of the necessary transitions to avoid further climate breakdown. Little attention is given to the extraction processes of the raw materials needed to produce and store renewable energy, or to the social disruption and inequality they bear and engender. Artist, documentary photographer, and journalist Pamela Tulizo is living and working in Goma, in North Kivu, Democratic Republic of the Congo, one of the most mediated conflictual and unresolved energy frontiers. In her work, she incessantly and without limitations renegotiates the iconography of black African woman throughout history, by restaging and (digitally) manipulating their representation in popular culture and media outlets. She includes raw materials and historical objects in the mix of her poignant alterations of the perceived reality of African women. In 2021, she opened Tulizo Elle Space, a cultural center that empowers women through art, while they metamorphose from merely carrying the burdens of the past into invincible Amazons of the future. This article is a conversation between Maarten Vanden Eynde and Pamela Tulizo about the urgency of shifting narratives related to the mysterious concept of renewable energy and the power of art to confront the present and imagine a different future.



Pamela Tulizo, Matrice #3, 2022.

Maarten Vanden Eynde (MVE): I know you're very busy with your new project, 'Regard Croisé', as part of the residency at ICC/Institute of Colonial Culture, so thank you for taking the time for this conversation. In order to put my fingers immediately into the socket: What does renewable energy mean to you?

Pamela Tulizo (PT): I want to answer like a Lambda person (an average person, Ed.), like someone who lives in Goma, who has been in contact with or in the presence of miners forever but knows nothing about renewable energies. Personally, I know maybe some things, but I speak for all the people who live in the North of the country now, and who know that there are mining activities going on. It's not a question that we will ask someone in the street, nor a question that we introduce at school, or that we will introduce in debates. So it's almost like something really taboo and very fragile for us. We can't discuss it. We don't talk about it. At least for ordinary people, we don't talk about it. It's a question that concerns the authorities, that concerns the traditional chief, and that's all. But for a regular person, Lambda, Lambda, it's not a question we are familiar with. So we don't know what it is exactly. What is certain, is that we live with solar panels, we live with them because there is a problem with the electricity in Goma. So we use solar panels, we use phones, we use computers, and indeed, there are cars that have batteries and all that. So yes, we use it, but we don't know where it comes from. Yet, at the same time, it comes from Goma!

MVE: It's the same thing as in Manono, DRC, where people didn't know lithium, and if they did, they didn't know what it was used for. The world's largest reserve of lithium ore was discovered in the old tin mine of Manono, and when I went there in 2019, in the framework of the On-Trade-Off collective research project, it was so shocking to experience and sad at the same time, because most people have a phone with a lithium battery, but they don't know that it's coming from the stones that surround them.

PT: It's also a bit annoying and revolting because we have to pay a lot of money for the end products while the lithium ore is so omnipresent. It's just there!

MVE: That is something I wanted to touch upon with you as well: the simultaneous presence of mobile phones, computers, solar panels, and other electronic devices, and the raw materials that are needed to produce them. Everything is there at the same time, except for the production and transformation process. That is taken out, hidden, or invisibilized. Do you think it is done consciously? Is it done on purpose to be able to remove raw materials without saying what they are used for, in order to sell the finished products without making a link with the raw materials that are used for its production?

PT: It is done on purpose, yes, to avoid any awareness raising within the local population. What is certain is that the majority of the people of Manono, Masisi, Rutshuru, or even the entire North Kivu region, don't know what all these minerals are used for. I think the only things we are aware of, related to their future use, are gold and maybe diamonds, but other raw materials that need further processing or transformation, we don't know about. This is weird because we are not only the supplier but also the end consumer at the same time. And we consume a lot, particularly the most extravagant models, more than in Europe. We are perhaps the number one consumer of the newest iPhones and MacBooks. So I think it is done on purpose to avoid not only the awareness of the local population but also to avoid a form of redemption by industries and companies, for example.

This brings me to the responsibility of the authorities, of the decision-makers, of the leaders, because they, I'm sure, know. The people who sign the contracts, the people who sign the agreements, they know what's going on. They know that a particular company will exploit a particular material to make a particular device. I'm sure that's clear for them. What's sad is that the government and the authorities do not feel responsible for transmitting this kind of information to the local population, who is going underground, going into the mud, every day, to get the minerals out while taking many risks. I think it is also to avoid people raising the prices. If one kilo is 1000 francs (1,5 Euro, Ed.), and if I know that it will make

multiple iPhones of 1200 euros each, I would raise the price. So, there is a whole mechanism to make it so that there is hidden data to avoid awareness. So yes, it is done on purpose.

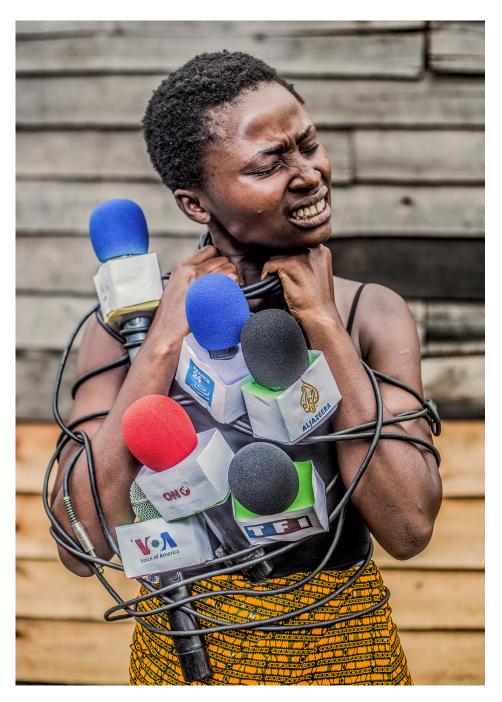
MVE: To me, you are living dead center on an energy frontier, with constant international pressure to extract sought-after minerals like gold, diamonds, and the 3T's: Tin (cassiterite), tungsten (wolframite), and tantalum (coltan). But also, geologically, there is a lot of activity with the Nyiragongo volcano erupting regularly. Do you experience it as living on an energy frontier, or is that mainly external projection from foreign governments and media outlets?

PT: Not at all. We are aware of why (it is perceived as an energy frontier, Ed.) because, for the past 25 years, we have been in full-scale conflict. We are in a territorial conflict, we are in a civil war, and we are in political instability. If we look at DRC as a whole and see where there is an intense concentration of a wide variety of raw materials, Kivu in the North jumps out, and that is where there is political instability. Everyone knows. If you talk to people in Goma, they will tell you: as long as we have this abundance of raw materials, we will never be at peace. And today people don't find them very interesting, like oh wow, it's a very rich region and all that. There are two major reasons to say that if we could, we would remove them from the map. That is, if we could get rid of all the minerals, we would do it. So, on the one hand, we have this wealth that is there, so we should live well, like a rich region, but that is not the case. Kivu is among the poorest regions, even within DRC. On the other hand, the mining industry is a source of conflict. So, in any case, it is not an advantage for us. If the government made attractive contracts to ensure the population benefits from this wealth, it could be interesting. But we don't take advantage of it, we rather pay with our lives for it. First of all, in the mines themselves, which are very dangerous, and secondly in the military conflicts that are a result of the presence of valuable raw materials. Because how does it work?

For example, here, where we are right now, we know that there is something valuable. People come and do tests, and now we are sure, but there is also the local population living there. How to create and exploit an extraction site? Of course, the population must leave. And how do we get rid of the population? We create instability. This way, people get out, and we are at peace to have what we want. And the population knows that this is why. Because when there is nothing left, the armed groups disappear, and people can return. So, for us, it's a curse. It's not an incredible thing for which I, personally, can be proud and say, we have this in Goma, and we have that. I know that in the rankings, we are first this, first that, or most this and most that, but I have never been first. And for me, it is like an injustice that has always been there. I admit that this is a problem that I cannot solve. But as an artist, and a journalist, I have a part of the responsibility to do something. To answer, to make it short, for us, if we could get rid of it, it would be a very good thing. Because we would be calm. Like in Kisangani, like in Kinshasa. They are calm because they have nothing. We have all of that here, and it makes us never calm. And it also makes that, from the point of view of the exterior, it's all that is here. Because there is so much focus on these minerals, and the related conflicts, but nothing else.

MVE: And you are trying to change this with your own work, which is like a staging or a creation of an alternative reality, where things are made visible that were not visible before. And at the same time, you help other women through your cultural center, to focus on other things than mining or conflict and help them to find a different path in life while focusing on other (cultural) riches that are also present in Goma. And in order to do that you need to break free from this triangular gridlock that always seems to be present when the NGOs, MONUSCO (The United Nations Organization Stabilization Mission in the Democratic Republic of the Congo), and the mining companies arrive. They always appear to work together.

PT: Exactly! It's the three musketeers, as we say in our country. I am looking for an escape. A shift that I am trying to make to allow the outside world to talk about Goma for



Pamela Tulizo, Double identité, 2019.

something else. Because when we talk about Goma, it revolves around minerals and conflict. So we're all about that. And I know it's not much, maybe, what I've done, but at least someone is doing it. It's about being able to raise awareness among people and raise awareness among the government, in relation to this injustice. Hence the initiative I took to start the Festival of Photography, to allow people to see something else in Goma.

Because we, personally, are not interested in what is under the ground. It brings nothing good, so we are not interested. I try to create other things, like the Women's Centre (Tulizo Elle Space, Ed.), to allow people to see beyond what the media shows and what we can read in the newspaper.

MVE: You use art as an alternative force to show a different reality. Do you think we can

say that art is a different kind of renewable energy, something that we can share, that we can show to someone else, that we can use to educate others? It's something that goes beyond generations, which is also an energy, but a different energy, which is perhaps really renewable?

PT: Yes, we can say that. It's exactly that! Especially for us, people from Goma, art is perhaps all that is left. Art is a renewable energy that we can share with everyone, which is ecological at the same time and which allows us to be connected with each other. Through art, we can transmit things from generation to generation, like who is there, who forges us, who educates us, who makes us strong, because that's what we use to denounce things, to express ourselves. I can say that, personally, it's all I have. If I want to express myself, if I want to say something to someone, it's what I use. Because what is essential is that art is a peaceful

weapon we use. When I was a journalist, for instance, I couldn't say those things. When I was a journalist, I was limited. I wasn't free.

MVE: You couldn't manipulate the photos either, because you had to show exactly what was there.

PT: I was very limited at first. We talk about the freedom of the press, but it doesn't exist. I can't just wake up and say, okay, there is this injustice with regard to the mining industry. I would be in prison after that. But with art, it's like I can be free. I can exploit this idea that people or authorities have when they say that artists are crazy. "It's just crazy, leave it there, it's ok," they say, "it's not a big deal. He's going to do contemporary things." When we talk about contemporary art, we have the impression that it's nice, it's glamorous, it's okay. So I won't be taken that seriously. But the message has been passed, the message is



Pamela Tulizo, Double identité, 2019.

coming, and the outside world is waiting. The outside world sees, and the local population sees. At one point or another, the goal is to reach people, and I manage to do that. That's what's important. And art is all we have to do that. When we talk about journalism, it's a bit of an investigation, it's a bit of telling the truth. Yes, to hurt, to expose things that shouldn't be invisible.

MVE: When you manipulate the image, it's a bit like lying, but you lie to tell the truth more clearly in the end.

PT: Exactly. And I accepted this because there is this moment of trickery or change, which is accepted, which is seen as art, as creativity. And in the end, the image hits you. It's the truth that is visible in a mirror. That's why I chose art photography because I wanted to be free. To say what I think, in my own way, without feeling in danger. Because it's like that in Goma, everything can happen. There are kidnappings, there are deaths, there are prisons, there are no rights, there is nothing. So, I found a way to protect myself. And photography for me was the ideal way because it's a still image. I wanted to make films at first, but that was still too exposed because it speaks, it says. So I wanted to make films that don't move, that don't speak. And that's why I went into directing and staging, to have as many details you can have as in a film, but condensed in one photo.

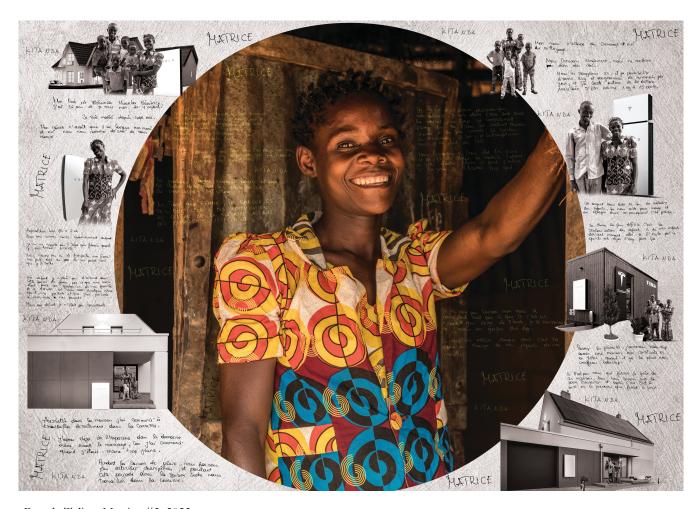
MVE: Let's circle back to Manono. It's a very conflicted place as well, related to the minerals that are in the ground. And at the same time, the lithium ore is still not being extracted there. It is more related to speculation and manipulation of the prices in the London Metal Exchange, the world centre for industrial metals pricing. You were there recently, in Manono, as an artist and photographer. Was it similar to other mining sites you visited, or was it very different? And how was it for you, to work there as an artist?

PT: I think it's different on some points, but there are two common denominators. The conditions of work are the same. There is no protection. It's horrible. People are exposed, just like in North Kivu, to all possible dangers, physical, psychological, and biological as well as chemical. But it was a little bit calmer compared to when I went to a site in North Kivu. Why? Because there is no presence of armed groups. I could work quietly. I also had a different experience when I arrived in Manono because I was there with thousands of women. The majority of people working there, especially in artisanal mining sites where they wash the minerals, are women. I was with my husband, but as long as the woman knew it was me asking the questions and making the work, it was okay. They were very open to me because I was a woman as well. For once, being a woman working in my favor! We had so many discussions, and I was even invited to their homes. To have access to all the information they gave me, was incredible for me.

There is one particular woman, Béatrice Mwamba, who became the main model in the series I made about Manono, who is so incredible. Soo strong! When you look in her eyes, she is happy. But when she washes the minerals finds them and sells them, where do they go? What she has in her hands will be shipped away and eventually come back, and she has to buy it again... It's like a triangular journey. It comes out of the Congo, goes there, and then it goes there, and then it comes back. When I told her about it, she was surprised. All the women said: "We should be rich then, I don't even have a smartphone, I have a small phone." I was sad at the same time and rebelled at the same time. Because for me, it isn't right that these women work in these conditions, that they live in these conditions.

MVE: It made me think of your future project about Congolese Queens, and how, throughout history, they played a crucial role in the resistance movements in colonial times. The women you photographed in Manono are also queens, super strong women in a more contemporary context.

PT: Yes, actually, I've already done that in a series called Heroine dans l'hombre (Heroine in the Shadow, Ed.), where I made portraits of contemporary women in Goma, working as



Pamela Tulizo, Matrice #3, 2022.

salespersons in the streets, carrying around their portable shop on their heads. In Manono, I did the same with women and the tools they use for digging and washing the soil. The main model, Béatrice Mwamba, is so incredibly strong, and she works in such inhumane conditions, immersed in the mud, coming up to here (pointing at her neck, Ed.), from morning to evening, from Monday to Saturday, every day, with all the possible risks. And what is crazy is that she knows what will happen next. She started washing minerals when she was 10 years old. And until today, at age 26 with 4 children, she does this work. She knows that at some point or another, she will fall ill. And then, in the long run, she will lose her uterus as a result of working under such horrible conditions. It will get damaged, and they will remove her uterus. And although she knows what is going to happen, she doesn't give up, it's not that she is not going to work, it's not that

she is going to complain. She does what she has to do. I spent the whole day with her, in her workplace, in her environment, and another day at home. When you see, for example, a smart or intelligent house and the house in which she lives, there is no link. It has nothing to do with it, nothing! I think these women deserve better, they deserve more. They deserve to live in an intelligent house as well.

MVE: Exactly, that's why you also put her in a Tesla.

PT: Yes, because she deserves to be in this car. Because if she doesn't exist, this car doesn't exist either. I don't see Elon Musk going to Manono diving in the mud, washing the ore, or going underground to look for the ore. If this person does not exist, all these companies will close down. The phones will cease to exist. So, in a way, they are the rightful owners. But we

have to be pragmatic. I don't control their lives or the situation they're in, which is annoying in the end. There are very few exceptions where the living standard improved for the workers as well. There is a goldmine, for instance, in Durba (in Haut-Uélé, DRC, Ed.) where the gold flows in the streets after it rains. I swear, my husband was there and came back with incredible pictures! When workers revolted, they were given things, but most of the time, it's just promises, like in colonial times. So, at the end of the day, after all that, I tell myself, colonization is never over. Theft still exists, but now in a different form.

There are so many interests related to this, from China to the United States and Europe, that I don't know if it will ever change. Once, when I was on my way somewhere in Central Congo, I heard on the radio, that there was a gentleman who was presenting a plan for the transformation of the economy, which included the introduction of production businesses in

Congo. This would allow us to address the problems of unemployment and profitability. The wealth, or at least a renegotiated percentage, would stay in Congo. I don't know...deep inside, I knew it was just a bluff. It's just words like that to soften people, to allow people to move on. There are a lot of people who have made millions in this story, including Congolese people and Congolese authorities, who make a lot of money.

MVE: This fantasy world, this parallel universe, which you are able to create through your art, is that then the only place where all rights are respected? Is it the only place or space where we can imagine a world where there is no social injustice, a world where you are free to say what you think, to show your way of seeing things from your point of view, without prejudice, without discrimination, without fear? Is the only solution then to all become artists?



Pamela Tulizo, Matrice #3, 2022.

PT: Hahaha, It would be so weird if everyone was an artist. Imagine that! It would be a world where everyone is in another world, where everyone doesn't care about propaganda. Everyone lives freely, and it would be nice. It would be a world of peace. But on the other hand, it would be too bizarre. I saw a film once where all people are very gentle. Everything is fine, and everyone is in the process of flying. It would be too weird. No, I prefer this disorder. It's better like that. It would be too... no. It would be too chaotic, that's for sure.

MVE: Thank you, Pamela, for your time and straight-from-the-heart conversation about these complex issues related to renewable energy. It seems to me that if people can't find a way to make energy without human suffering and inbuilt inequality, we should not renew it, regardless of what kind of raw materials are used to produce it in the first place. I wish you all the best with your future projects, and I hope that one day, your imaginary world becomes reality.



Pamela Tulizo is a documentary photographer based in the east of DR Congo in Goma, and founder of TES (Tulizo Elle Space). After initially studying journalism, Pamela graduated from the Market Photo Workshop School of Photography in Johannesburg, South Africa, in 2019. Her work focuses primarily on expressions of female identity. In her series entitled *Double Identity*, which comprises 13 self-portraits, the photographer embodies an African woman torn between her own sense of self and the role attributed to her by a globalized society. She is a contributor to Agence France-Presse and was artist in residence in 2020 in Wiels, Brussels, Belgium. The same year she won the Dior Photography & Visual Arts Award for Young Talents 2020. Recent exhibitions include: *Toxicity*, 7th Lubumbashi Biennale, D.R. Congo (2022) and *Charging Myths*, Framer Framed, Amsterdam, The Netherlands (2022).



Maarten Vanden Eynde is a visual artist and co-founder of the artist-run initiative Enough Room for Space. His practice is embedded in long-term research projects that focus on numerous subjects of social and political relevance such as post-industrialism, capitalism and ecology. Since 2020 he is a PhD candidate at the UiB / University of Bergen in Norway studying material traces that could represent human presence on Earth in the far future.

*All photos provided by the author.

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Cite this article:

Vanden Eynde, M. (2023). "Fictional Frontiers: On the Fallacies and Fantasies Surrounding Renewable Energy. A conversation with Pamela Tulizo." *Commodity Frontiers* 6: 1-9. doi: 10.26300/2vx0-nh93.

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Suffering as Commodity:

A Review of Siddharth Kara's Cobalt Red

Felipe Paiva

"O inferno é assim – um espaço branco sem fronteiras no tempo"

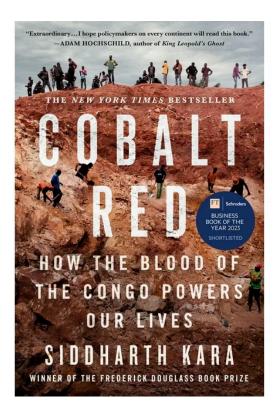
[Such is Hell - a blank space without time frontiers]

Lúcio Cardoso, Crônica da casa assassinada [Chronicle of the Murdered House], 1959

And how many people have been there and come back alive to tell us their stories? From the biblical John to Dante, the underground world of suffering has been presented in various forms, as in the contradiction of poetry: to beautifully talk about pain. At some point, however, a new hell appeared, surrounded by a warm and lush nature that eventually made humanity itself disappear.

This was the colonial world, set between despair and madness: "I had stepped into the gloomy circle of some Inferno" (Conrad, 1996, p. 31). And inside the colonial world one could find a particularly hideous last circle, which produced a long-lasting stereotype of a place of sorrow inhabited by passive victims. The more one entered into its hinterland, the more terrifying the landscape became. This place, huge for its history but always diminished by the racism of well-known metaphors on gloom and darkness, is the African continent. And the last man who came back alive from there was Siddharth Kara, the author of *Cobalt Red: How the Blood of the Congo Powers our Live*, published in 2023.

According to the book's description, Kara is an "author, researcher, screenwriter, and activist on modern Slavery." He is also "a British Academy Global Professor, an associate professor of human trafficking and modern slavery at Nottingham University, and a senior fellow at the Harvard School of Public Health," having written three



other books on modern slavery, one of which won the Frederick Douglass Book Prize.

Instead of describing each chapter, as usual, this review will discuss the book along two main themes: the reified view of the African population and the serious scientific problems that can be found in this work.

ara's book aims to offer a realistic portrait of the terrible conditions found in the cobalt mines in the Democratic Republic of Congo (DRC), where the largest cobalt deposits in the world are located. The book's main goal is to show the hideous labor conditions in so-called "artisanal and small-scale mining" (ASM), forms of mining that operate under big international corporations, a number of intermediaries, and the public and private military

forces of Congo. The unhealthy conditions to which workers are exposed lead us to believe that "artisanal" is merely an euphemism for the most obscene precarization of labor. In Kara's estimates, artisanal miners are responsible for 26 percent of the global supply of tantalum, 25 percent of tin and gold, 20 percent of diamonds, 80 percent of sapphires, and 30 percent of cobalt (Kara, 2023, p. 140. 141)¹. International companies use this last ore to build more durable batteries, with which we charge our cell phones, computers, electric cars, and other devices powered by lithium.

Instead of proceeding to a rigorous analysis of the data, connecting it to workers' lives, Kara seeks to stir emotions in the reader based on the purest forms of sensationalism, disguised as a sentimental form of protest. Right at the beginning of the introduction he tells us that he saw "a body in the dirt. It is a child, lying motionless within a storm of dust and despair." Under the watch of soldiers who oversaw the mines, Kara gets closer to see what was left of the kid: "I can see his face now, locked in a terminal expression of dread" (Kara, 2023, p. 48). The scene is striking, especially if it comes from someone whose self-proclaimed mission is to denounce child labor. The beginning of the book reveals the narrative construction used throughout, with an instrumentalization of the suffering of others.

More importantly, Kara tells us that this was the image he brought with himself from his voyages to Congo, "the heart of Africa reduced to the bloodstained corpse of a child, Who died solely because He was digging for cobalt" (Kara, 2023, p.55). The scene is obviously shocking and no one with a minimum of empathy would defend child labor, especially in these conditions. The main problem is that the author deliberately decided to reduce (in his own words) the African reality to this. Another heart of darkness, another portrait of hell.

Those who study Africa will certainly ask: this again?

The many references and allusions to Conrad's work, the many phrases and words that are well

known by any Africanist, are exhaustively repeated. Perhaps the intention was to develop some sort of erudite paraphrasing, but the final result is commonplace.

If in Conrad – and in other authors who used the metaphors of darkness to describe the African continent – this came with some irony regarding the practices of European enterprises, in Kara these images are nothing more than a stereotype of a population whose existence is reduced to suffering and passivity. In this way, he turns the broad history of Africa into a linear tale of suffering and exploitation: from slavery to colonialism; from colonialism to the extraction of cobalt, without any mediation.

This is especially evident when Kara decides to show his skills as a fiction writer. After narrating the story of a person supposedly named Elodie, whose existence is nothing but tears of sadness, he states that she,

was the latest entry in an ancient chronicle of torment that stretched back generations in the heart of Africa. I could imagine Elodie's greatgreat-great-grandmother losing a hand to the Force Publique after her great-great-greatgrandfather failed to meet his rubber quota that day. Perhaps their children suffered slavery on a palm tree plantation leased by the Belgians to the Lever brothers. Perhaps the next generation endured forced labor at a copper mine in Katanga [...], and perhaps Elodie's grandparents were butchered for diamonds in the Kasai during Africa's Great War. This succession of torment hypothetical though it may be, could also not be more real. It is the tragic inheritance of all who enter the world in the Congo (Kara, 2023, p. 2906).

We can instead think of Elodie's ancestors as Yaka warriors, holding their spears and pushing back the Belgians with blood, sweat, and tears. Or as loyal subjects of *Kwet aPe*, pushing their sovereign to practice *Tongatonga* rites as an anticolonial strategy. Maybe one of her family lines was of *chokwes* who migrated from Angola, why not? I can see a young peasant putting his hoe aside to listen to the fiery words of Patrice Lumumba, with his heart now

¹ Numbering in this piece refers to the position of text in the Kindle version of the book.

full of hope. In sum, when the only references you have about Africa are commonplace, the only things you'll be able to imagine will be a bunch of alienated depictions, a collection of colonial trinkets. No agency for the African people, no resistance.

I will not persist here, since Sarah Katz-Lavigne and Espérant Mwishamali Lukobo have written an excellent review focusing exclusively on these issues². I would, however, like to add one thing to their brilliant review: Kara's view repeats colonial stereotypes not only in the way he writes and builds his narrative, but also in his absolute ignorance of African history. It is not just a matter of form, but also of content.

sing everything that he must have learned during his undergraduate and graduate years, Kara tells us that the problems of Congo started when the Portuguese navigator Diogo Cão arrived there in 1482. Since then, things have gone very bad. Everything happening in Congo today (Kara speaks specifically of Katanga) "is the result of an unrelenting sequence of events that began at that place and time" (Kara, 2023, p. 1661). On this, he deliberately confuses – or does not know – some basic differences: 1) the ancient kingdom of Congo; 2) the country that is known today as the Democratic Republic of Congo (DRC); and 3) the ethnic-linguistic speakers of Niger-Congo languages.

An inexperienced reader will have the impression that Diogo Cão arrived in the DRC, and there established a terrible relationship of exploitation that linearly culminated with the horrible situation of the Congolese population today. The problem is that the ancient kingdom of Congo spanned areas that include present-day DRC and Angola. Both the *Padrões* (statues) that marked the arrival of Portuguese ships, and Soyo where Diogo Cão arrived are located on the Angolan side of the frontier. Moreover, if we consider the Katanga as a reference, this region was the basis of the kingdoms of Luba and Lunda, and later the kingdom of Kazembe (Vansina, 1966, p.70, 156). In fact, when arriving at Soyo, a vassal of the

kingdom of Congo, Cão found a centralized and organized state willing to negotiate with the Portuguese. It was not a coincidence that their sovereign adopted Christian rites, probably considering this a possible strategy to deal with these new people.

A well-known primary source of that time describes their meeting in the following terms:

vindo Diogo Cam com este requerimento de conversão de hum Principe senhor de tão grande povo (Monumenta Missionária Africana, 1951, p. 41). [coming to this request for conversation with Diogo Cam was a princely lord of a great people].

It is striking that Portuguese sources of the fifteenth century describe an African people in better terms than Kara today. There is an obvious ideological game in the document, but it still shows how Kara not only offers an imprecise and anachronistic depiction, but is also a few centuries late.

Thus the comparison between the DRC today and the ancient kingdom of Congo is only a historical falsification. Kara does indeed use the letter "K" to refer to the kingdom of Congo. The difference, however, is not only semantic, but also geographic, and an inexperienced reader will think that this is the same place. In the place the DRC is located today, there were other political entities besides the aforementioned kingdoms, states with different sizes and levels of centralization, as well as peoples organized along segmentary lines. The pre-colonial DRC was a kaleidoscope of various colors, fascinating characters, speakers of different languages, who although largely coming from the Niger-Congo family language, did not necessarily understand each other. Similarly, each region had different levels of contact and interaction with Europeans. The power that Europeans had significantly changed over time and space. There was nothing comparable to the omnipotence presented in Cobalt Red.

² Sarah Katz-Lavigne; Espérant Mwishamali Lukobo, "Cobalt Red: a regressive, deeply flawed account of Congo's mining industry". *Open Democracy*. https://www.opendemocracy.net/en/beyond-trafficking-and-slavery/cobalt-red-siddharth-karademocratic-republic-congo-book-review/

In terms of historiographic narrative, therefore, Kara proceeds as a writer typical of the nineteenth century. According to him, "of all the hazards one encounters in the Congo, perhaps the most dangerous one is history." With this he states that the history of Congo (the kingdom and the country known today as DRC) started only after the arrival of European explorers. Let's continue a little bit more with his words:

There was a fleeting moment of hope at the dawn of independence in 1960 when the fate of the Congo could have been so different... but hope was destroyed before it ever had a chance. History made sure of it. More than any king, slave trader, warlord, or kleptocrat, history reigns supreme in the Congo, darkening the land like a gathering storm, the moment before the first bolt rips the sky (Kara, 2023, p. 145).

After one more original metaphor involving darkness, we get a fatalist view of history. Worse, history is the villain. History, obviously, not imperialism. Unless Clio (muse of history in Greek mythology) has become a great shareholder in late capitalism.

Kara treats the arrival of Cão as an invasion, equating him to Columbus. His effort to erase any African agency is such that he once again falsifies history. The relationship between the sovereigns of Congo and Europeans were much more complex. It involved a lot of negotiation, collaboration, contracts, commodities; but it was definitely not an invasion in the American style. Kara himself seems to be aware of this, since he argues that "throughout the entire period of the Atlantic slave trade, Europeans remained largely restricted to the coasts of Africa and had virtually no Knowledge of the interior" (Kara, 2023, p.1680, 1681). Thus the question remains: what kind of invasion was this, that it remained restricted to the coast and under the surveillance of local sovereigns? History is not a cruel, inescapable destiny, it is a science that deals with heterogeneous processes and complex connections between peoples and individuals; to reduce history to that makes the narrative itself contradictory. Perhaps the author did this to make the book more accessible to a broader audience. If that was the case, he is underestimating the critical skills of his readers.

His narrative becomes even more anachronic when the author states, "from the moment Diego Cão introduced Europeans to the Kongo in 1482, the heart of Africa was made colony to the world" (Kara, 2023, 1874). As if the invasion of Congo was not enough, its submission was not only to Europeans, but to the entire planet. Did "third world" countries benefit from the capitalist exploitation of Congo in the twentieth century? It seems he is equating "the West" to "the world," in which case, this is another example of how colonialism is reproduced in his discourse.

Kara vaguely discusses how western neocolonialism blocked emancipatory alternatives in Congo, explicitly citing Patrice Lumumba as an example. This is one of the few moments of sobriety. Except for this passage, there are no references to structural questions in Cobalt Red. Words like "capitalism" or "imperialism" do not appear a single time in the book while there are around 30 references to China and even North Korea shows up at least once. The author's reticence to discuss the real motor behind Congolese exploitation leads him to develop a narrative that is not only imprecise, but also very biased. The theme is too important to be explored in such a simplistic fashion. The ways in which capitalist extractivism advances using "environmental" motifs deserve a serious and solid discussion. Otherwise, as a famous Brazilian martyr once said, ecology will be merely gardening. In the end, the true commodity of Kara's Cobalt Red is the suffering of the others, with cobalt as the background.

Kara ends his book citing Patrice Lumumba, an icon of African liberation and the struggle and solidarity of oppressed peoples. I would like to repeat Lumumba's words in conclusion: "Africa will have a history and it will be a history of dignity" (Lumumba, 1968, p. 140). Dignity is what is lacking in Kara's narrative. I am aware that this review may seem harsh, but after the martyrdom of many like Lumumba, we need to honor his view, memory, and inspiration. No compromise with colonial discourses, no complicity with the lack of historical rigor. African suffering is not a commodity.

Acknowledgement

The author wishes to thank Leonardo Marques for his help in translating the original text. He claims responsibility for all content.



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Cite this article:

Paiva, F. (2023). "Suffering as Commodity: A Review of Siddharth Kara's, Cobalt Red." *Commodity Frontiers* 6: 10-14. doi: 10.26300/th19-hw29.

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Global Energy Transition and Mineral Frontiers:

The History of Cobalt Mining in the DRC (1920-today)

Robrecht Declercq

Keywords: cobalt, energy transition, mining, DRC, scarcity

Abstract: This article focuses on the history of cobalt production in Katanga, DRC, the main source of this critical metal in the world. In doing so, it offers a historical appraisal of the central role of cobalt, a scarce and concentrated mineral, in the current energy transition. Initially developed as a by-product of copper, cobalt production has gained a prominent position in the area. This article advances the notion of a double commodity frontier in Katanga, focusing on the (dis)entanglements of copper-cobalt mining. A double commodity frontier implies that there is a process in which two natural resources are commodified in the same place at roughly the same time, a process that is determined by geology and nature but also by economic choice. It operates a neo-material perspective, focusing on the by-product: cobalt. The energy-intensive separation cobalt from copper changed the nature of commodity frontier development. A first cobalt boom after World War II reinforced capital-intensive processes and experiments of social engineering on the copperbelt. Ultimately cobalt created its own geopolitical, economic and social realities.

his contribution focuses on the history of cobalt production in Katanga, the southern part of the Democratic Republic of Congo (DRC), which is today as well as in the past the main source for cobalt in the world. Cobalt is essential for the global energy transition of today: the effort to replace carbon-intensive forms of energy production with renewable ones. Today, the fabrication of lithium-ion batteries consumes over half of the total world cobalt production. Cobaltcontaining batteries are mainly used to replace fossil-burning cars with electrical vehicles, and therefore crucial to low-carbon energy systems and mobility. The criticality of cobalt presents however a conundrum. According to recent estimates, current reserves of the metals needed for the energy transition, such as copper, lithium, nickel and cobalt, are insufficient for the projected mass deployment of the new, carbon-low technologies (windmills, batteries, electricity grid...) in the scenario of staying below the 1,5° global warming

threshold¹. The situation is particularly dire for cobalt. Cobalt production peaked towards a record 210,000 tons in 2022, but the rising demand for clean energy technology will in all likelihood create supply bottlenecks in the near future (Zeng et al., 2022).

Unlike other global systems of metal production, cobalt is both scarce and highly concentrated, and found in the presence of other minerals. Katanga in the DRC accounts for over 60 % of cobalt production. This creates intense local social and environmental tensions, as well as geopolitical anxieties. Furthermore, almost 20 % of all cobalt is mined by artisanal mining, often in unhealthy conditions, or involving child labour (Kara, 2023). Access to cobalt is a strategic concern for states and tech industries across the world. This article offers a historical appraisal of how the current energy transition reverberates in the cobalt mining frontier of Katanga, focusing on the social and ecological consequences it

^{1 &}quot;The new commodity superpowers", https://www.ft.com/content/0d2fba79-940f-4a28-8f4f-68f1e755200f.

produced. It builds on my own historical research on the global copper mining industry and adds very recent contributions. I employ a neo-material perspective, focusing on the realities and relations produced by the physical properties of cobalt, without falling into trap of determinism (Lecain, 2017), but by untangling cobalt from copper-centered historical narratives. The article takes into account cobalt's physical properties, in particular the fact that it is scarce, concentrated and found in presence of other, more abundant metals like copper.

Geologically a by-product of copper, this article questions how cobalt production in Katanga has unleashed political and socioeconomic dynamics of its own. As the production and importance of cobalt increased, Katanga transformed into what could be called a double commodity frontier. While commodity frontiers are variable in terms of place and commodity, and change over time (Beckert et al., 2021, p. 37), a double commodity frontier implies that there is a process in which two natural resources are commodified in the same place at roughly the same time, a process determined by geology and nature. The notion of a double commodity frontier may be useful to reflect upon mono-commodities perspectives that are usually deployed in commodity history (Specht, 2019). It is certainly not impossible to think of multiple, physically entangled commodities that are being produced on the same plot of land or in a mine, that may serve completely different markets or require either different or complementary processing capacities and skills on site. Think of the silver, lead and copper, minerals that are lumped together in the same mine of Cerro de Pasco, Peru. In the 1920s, the Hudson Bay Company pressured the Inuit in certain polar regions of Canada to hunt for new species, like whales and different furbearing animals, instead of only polar foxes (Declercq, 2023).

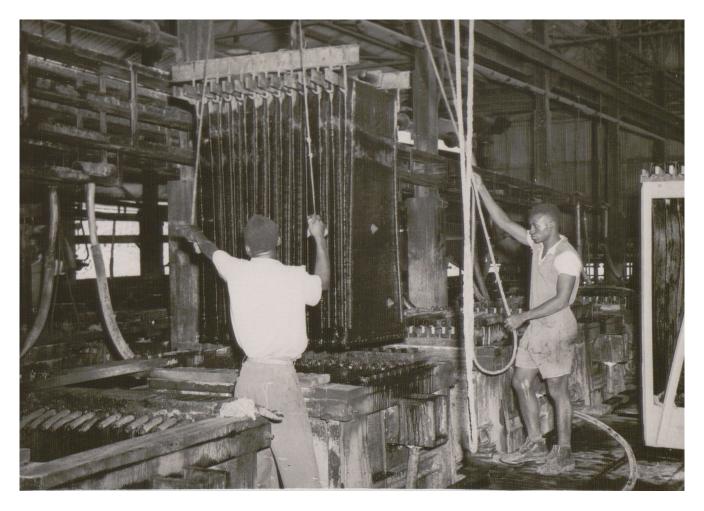
For now, I am inclined to argue that *double* commodity frontiers go along with a process of intensification, necessarily relying on similar or

at least complementary labour and environmental arrangements, simply because they depend on the same workforce and natural environment. But double commodity frontiers can also serve a tool to better understand different dynamics, outcomes and temporalities – in particular booms and busts - of frontier expansion. This seems to hold for coppercobalt. The former is abundant, can be produced in different areas of the world and in much larger quantities, whereas the latter is scarce and has become strategically much more important. More than copper, the relative scarcity of cobalt has been the subject of geopolitical calculus (Eckes, 1979, p. 202). I operate the lens of a double commodity frontier, in which the cobalt and copper frontier were mutually constitutive. This is more than a rhetorical device. By analytically disentangling cobalt from copper, through a neo-material perspective, certain social, political and economic developments in Katanga can be put in sharper relief. I identify two stages of the cobalt boom that fortified certain developments, a first cobalt boom (1945-1980) when the metal was in high demand by the emerging military-industrial complex in the US. This stage chimed with heavy capital investments and processes of social engineering on the copperbelt, whereas a second cobalt boom (1997-today) triggered by the sustainable energy transition, was marked by privatization and artisanal mining.

From By-product to a Double Frontier (1924-1960)?

obalt was a mineral of relatively modest importance until the twentieth century, mostly used as a blue dye in the ceramic and glass industry. It was mainly sourced from Scandinavia and Saxony (Germany). In the 16th century, German miners, who were unable to refine the substance, attributed their failings to the working of goblins, in German "Kobold(e)". In the beginning of the 20th century, demand rose as metallurgists created new alloys that involved the qualities,

² Hagley Museum, American Institute for Iron and Steel, Box 21, Excerpt "Cobalt", *Metallurgia. The British Journal of Metals*, Vol 59, 1959, no. 352.



Cobalt Workers in Shituru (Likasi), undated. Source: State Archives in Belgium 2, UMHK 2nd series, n. 5, note documentaire Février 1950. Image published with the permission of State Archives in Belgium.

particularly heat resistance, of cobalt. The main result was Stellites, an alloy of cobalt-chromium-tungsten to be used for high-speed cutting³.

Under its geological circumstances, cobalt is not only rare but also found in the presence of other minerals, mostly copper and nickel. Therefore, the main commodity frontiers of cobalt were historically situated in the copperbelt in Northern Rhodesia (Zambia) and Katanga. In 1885, the mineral-rich region of Katanga was forcefully integrated in Leopold II's Congo Free State which paved the way for its massive exploitation. In 1906, Union Minière du Haut Katanga (UMHK) acquired

the largest concessions, mostly for copper mining. The production of cobalt started later, in 1924, in the vicinity of Jadotville (Likasi). The area immediately became the main global supplier of cobalt (Cobalt Monograph, 1960). In 1933 production of cobalt started elsewhere too. Cobalt minerals were found in Katanga's neighboring area of Northern Rhodesia (Zambia) and in Morocco, in the region of Bou Azzer near the Atlas mountains. The mine in Morocco is the only mine where cobalt is in fact the main product.

During the Second World War, cobalt acquired a new status as a critical raw material. The military-industrial complex in particular craved

³ Hagley Museum, American Institute for Iron and Steel, Box 21, "Glen C. Ware "Cobalt", *mineral facts and problems*, 1965 edition".

for cobalt. Cobalt was a vital metal of the nascent "high speed age", making projectiles and rockets more heat resistant. In the second half of the 20th century, geologists were already acutely aware of cobalt's relative scarcity. In 1950 the US National Production Authority had ordered a 70 % cutback for domestic industries, earmarking imports of cobalt to the requirements of the military⁴. The size of the cobalt market expanded rapidly, but remained relatively small. From 5,000 metric tons in 1945, production tripled to 15,000 in 1960.

Against this background, UMHK saw cobalt as a way to diversify its dependence on copper. Cobalt was in strong demand, and, due to its scarcity, made a high price on the market. Cobalt was therefore part and parcel of the postwar colonial-industrial development of the copperbelt. Cobalt production and refining particularly centered on the city and hinterland of Kolwezi, the new westernmost "group" of the UMHK concession. This area was given priority by in postwar development plans, attracting white settlers and black labour migration. Here, new mines were opened as well as new electrometallurgical facilities for the production of low-graded copper and cobalt. The Musonoi and Kamoto mines, both near Kolwezi, were the largest copper-cobalt mines exploited in the Congo. In 1957, UMHK established the Cobalt Information Center (CIC), which united the main cobalt producers for studying the use of cobalt and intensely promoted the use of cobalt in a wider set of applications.

The *double commodity frontier* of copper and cobalt in Katanga ventured into a new industrial, capital and energy-intensive terrain, partly because these minerals were so intrinsically linked and difficult to disentangle. The separation of cobalt from copper (and other impurities), required huge amounts of energy and went along with complicated chemical processes⁵. The new postwar metallurgical installations, installed in Likasi and

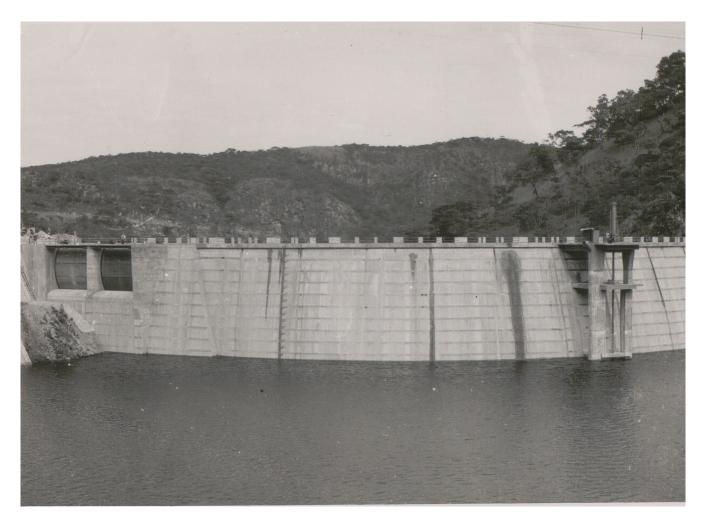
later Kolwezi, needed more energy, resources and workers, resources that were in short supply. Therefore, the double frontier embodied late colonial ambitions of social engineering and technological experimentation.

The copper-cobalt boom depended upon energy. The huge energy requirements of treating copper-cobalt led to a dam-building frenzy in order to scale-up hydro-electricity production. After 1945 hydro-electricity was the main energy structure for colonial powers that aimed for development and modernization (Isaacman, 2004; Tischler, 2013). In Katanga, the double expansion of cobalt-copper production led to three new damming projects, in addition to the first dam that was finished in 1930. The largest one, Le Marinel, was finished in 1956 and could produce 1,430 million kWh of electricity, or as much as the three other dams combined.

However, climatic conditions interfered with this energy system. Long dry seasons and insufficient rain during the rainy seasons repeatedly threatened production. UMHK briefly experimented with artificial rain in the early 1950s in order to improve the potential of hydro-electricity (Declercq & Money, 2023). The double frontier also needed new workers, who were 'recruited' from even more distant places, particularly Ruanda-Urundi, from where workers were flown in (Trieu de Terdonck et al., 1957). They were being prepared and disciplined to work in the underground mines and metallurgical factories. It were the heydays of the politics of what was euphemistically called stabilization, through which social discipline was enforced in the mining cités. The aim of stabilization, which was initiated in 1928, was to tie skilled workers to the mines, instead of relying on temporary migration. In doing so, UMHK extended a paternalistic policy of benefits from 'the cradle to the grave' but also created a highly disciplined, policed work environment in the rapidly expanding mining camps (De Meulder, 1996).

⁴ Hagley Museum, American Institute for Iron and Steel, Box 21, *Department of the Interior, information service*. February 14, 1956.

⁵ State Archives in Belgium 2, Umicore, no 203, UMHK annual report 1952.



The Zilo reservoir, 24.12.1952, one of the hydro-electrical installations UMHK built to provide energy to the copper-cobalt industry. Source: State Archives in Belgium 2, UMHK 2nd series, n. 5, note documentaire Janvier 1954. Published with permission of the State Archives in Belgium.

The disentanglement of copper and cobalt, relying on intensive technologies, capital inputs and social engineering, therefore symbolized a new colonial imaginary of industrial and urban modernity. In line with modernization theory, many believed that the development of the mining industry, particularly in the postwar years, would lead, similar as in the West, to sustained economic development and improved living standards. It was the main area in Africa where urbanization, wage-earning and industrialization took place. While the development of formal mining is often juxtaposed against that of (contemporary) informal mining, research on the copperbelt has shown that workers faced precarious

conditions at best, even during the boom periods marked by working class formation and company paternalism (Larmer, 2017). Black workers could be rewarded with promotion, but in fact only a limited number of them attained higher positions. In 1955, of the 21,350 workers, 41% were in the lowest salary category, which mostly involved payment in kind (food, housing) and a limited moneyed renumeration (allowance) (Waterschoot, 1985, p. 24).

Boom-Bust-Boom (1970-today)

ecolonization initially little affected the double commodity frontier of copper and cobalt, and the all-powerful position of UMHK. Early 1960, UMHK opened a new cobalt refinery plant in Kolwezi, the Luilu plant, in order to maintain the postwar cobalt boom. UMHK actively lent its support to the independence of Katanga between 1960-63. From a geopolitical point of view, however, the need to control cobalt was greater than for copper. When, during the nationalization of UMHK in 1967, production was temporarily suspended, this caused anxiety, particularly in the US. The US Bureau of Mines noted that "the World could ill afford to lose half of its cobalt supply, but loss of less than 10 percent of its copper although from one of the major producing countries is not that critical" (Reno, 1968, p. 384).

Gécamines, the Congolese-Zaïrese state-led mining company, largely operated along the same lines as its predecessor (UMHK) as far as mining development is concerned. It advanced an expansion program for the production of copper and cobalt, that would insure an industrial future of the country. Investment programs focused on a drastic expansion of both copper and cobalt. Cobalt production jumped from 9,700 metric tons in 1967 to 15,800 tons in 1973. Gécamines enjoyed a dominant position and little competition (World Bank, 1973). Western companies hoped to find an alternative by opening a new commodity frontier: that of deep-sea mining. Already in the 1970s, the experimental technology of harvesting polymetallic nodules from the ocean floor was taken into consideration as a politically safe alternative (Sparenberg, 2019).

In the late 1970s, political and economic instability revoked the idea of an industrial modernity achieved through the double development of copper-cobalt. Rebel insurgencies created a cobalt panic. International buyers feared that the USSR would capture the strategically important cobalt output of Katanga (Gulley, 2022). The price hike resulting from this cobalt crisis

(1979-1983) was followed by a subsequent drop in prices and hence production. Crisis, underinvestment and debts ultimately made the Gécamines fall apart. In the early 1990s, corruption and economic turmoil plagued cobalt production. Gécamines was unable to expand production as the large underground cobalt mine (Kamoto) collapsed due to underinvestment in maintenance and repair and multiple concessions were abandoned.

The second cobalt boom was born in a wave of privatization and the 'informalization' of mining labour. Starting from 1997 Western as well as Chinese mining companies took an interest in concessions, to support the emerging battery and electronics manufacturing sector. In 1997, artisanal mining was enabled by the new Kabila regime. Artisanal miners were permitted to enter abandoned concessions, which generated income by taxing them. Chinese traders and processors started buying ores from artisanal miners, the creuseurs (diggers). Today, ASM (artisanal and small-scale mining) accounts for largely 20% of cobalt production in the Congo. Companies acquired concessions, often in partnership with Gécamines, that account for the remaining 80% of production. While cobalt is still connected to copper ores, both trajectories become increasingly separated, with the sudden rise of cobalt production, from 56,000 ton in 2013 to 98,000 ton in 2020. (Gulley, 2022). Once again cobalt from Katanga has come to dominate the world market, with a share of 69 % in 2020 (Ritchie, 2023). Copper production is surging as well in the last decade, with the global market share of the DRC hovering around 15%. Yet, as copper is one of the minerals driving the clean energy transition, the copper-cobalt tandem seems back in place.

But the cobalt surge in particular seems to hold the area in its spell, and is in the center of attention. Reports and often virulent publications of recent making have linked ASM in the DRC to hazardous and unhealthy working conditions, as workers have to dig deep to retrieve cobalt containing samples. Estimates of artisanal miners involved in the cobalt production in the DRC, range between 44,000 and 200,000 (Ritchie, 2023).

Publications, like that of Kara's 'cobalt red', have exposed the dangerous conditions under which creuseurs work and the health risks they are exposed to (Kara, 2023). Although generally associated with cobalt, ASM production is important for copper too since diggers bring up cobalt ores containing copper. But cobalt production through ASM seems to be much larger in a relative sense. According to a report of the German bureau of mines in 2019, ASM produced 16,300 tons of copper and approximately 12,500 Cobalt. But since the quantities and concentrations of copper are generally much higher, cobalt artisanal mining is relatively more important. Only around 1 percent of the total copper production in Katanga is mined by creuseurs (Bundesanstalt für Geowissenschaften und Rohstoffe, 2019). ASM in the area has thus mostly been a rapid response to the drastic increase in demand for cobalt, with creuseurs focusing on ores that contain high degrees of cobalt.

Companies are increasingly under pressure to scrutinize and "clean up" their supply chains of cobalt. Some have criticized a one-side image of cobalt as the "modern blood diamond" or conflict mineral, or, more generally, equating ASM with modern slavery (Katz-Lavigne, 2023). Researchers on ASM in cobalt have warned against sensationalist narratives that focus uniquely on local suffering and victimization of the powerless artisanal miners. (Vogel, 2022, p. 8). What is often seen as illegal or informal mining may in local communities serve as an acceptable, much-needed even, form of work and source of income (Verbrugge & Mengoa, 2020).

Indeed, by neglecting local conditions and institutions, top-down processes of work formalization and supply chain regulations may have negative and adverse effects on the lives

and incomes of informal miners. Attempts in the early 2000s to formalize cobalt mining in the DRC, for instance, have added much to the insecurity of creuseurs because of penalization and repressive actions taken against them (Cuvelier, 2020, p. 1). Another series of initiatives to circumvent ASM is to diversify the flows of cobalt. Plans and discussions to yield cobalt from the ocean floor is back on the table, as is substitution of cobalt by developing different types of batteries. Regardless of what is the outcome, both the transplantation of production or its continued expansion may negatively affect the cobalt workers. In other words, 'doing something' about it, may clear the consciousness of Western consumers, but does not necessarily take into account the needs of miners.

In conclusion, the article aimed to focus on the history of cobalt production in the DRC, and narratively disentangle the history of cobalt from that of copper, by employing the concept of the double commodity frontier. The materiality of cobalt produced realities and dynamics of its own. Historically cobalt production started as a by-product of copper, and was supported by similar labour and environmental arrangements. The complicatedness of separating copper from cobalt intensified processes of labour stabilization and undergirded visions of an industrial modernity in the period between 1945 and 1980. Although copper-cobalt production expanded in tandem, cobalt from Katanga started to show diverging dynamics, tensions and temporalities especially since the 1960s. The cobalt panic of the late 1970s made this evidently clear. The cobalt boom of the last decades also created an important decalage in terms of the labour regime. ASM has expanded in the region has drastically expanded but is mostly associated with cobalt production rather than copper.

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*All photos provided by the author.

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Cite this article:

Declercq, R. (2023). "Global Energy Transition and Mineral Frontiers: The History of Cobalt Mining in the DRC (1920-today)." *Commodity Frontiers* 6: 15-23. doi: doi: doi.org/10.26300/4f6g-aw32.

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Desert Power:

Wind Farms and the New Frontiers of Renewable Energy Finance in Jordan

Kendra	Kintzi	

Keywords: wind power, renewable energy, land tenure, green grabbing, enclosure

Abstract: From the Jordan River Basin to the Gulf of Aqaba, the shape of energy production is changing. Drawing on sixteen months of ethnographic research on Jordan's energy transition, this article examines the spatial shift in energy production landscapes through the expansion of the global renewable energy investment frontier. Rural renewable energy development and urban deindustrialization shape broader transformations in the spatial reconfiguration of global power production, as conjoined processes of land devaluation and revaluation push the frontier of renewable energy investment deeper into the countrysides and rural ecosystems of the Global South. The case of Jordan's shifting energy frontier reveals new arteries of contestation, as rural lifeways and livelihoods are devalued to make space for national energy development and decarbonization goals. This transformation of rural deserts into new frontiers of global decarbonization finance shifts the kinds of labor and lifeways that can be sustained, and the kinds of futures that can be envisioned on these lands.

The Changing Shape of Global Energy Production

7 rom the Jordan River Basin to the Gulf of Aqaba, the shape of energy production is changing. The oldest electricity generation station east of the Jordan River is nestled along the rocky crevice of Ras al-Ain, the dense urban corridor that runs through the heart of the capital city, Amman. Built in the 1930s as the new capital was being constructed, the electricity station originally powered a single bakery and then expanded through the 1940s and 1950s to serve the burgeoning city's rapid urbanization, as successive waves of urban migrants and refugees carved a new life into the city's hillsides. Over the past decade, however, centralized power production shifted further and further afield from the urban industrial heart of the city, and the cavernous hull of the shuttered Ras al-Ain electricity hangar was transformed from a power production site into an urban art and design space. The project, led

by a local Ammani architecture and design firm, was hailed as a masterpiece of architectural heritage preservation, and won an Arab Architects Award in 2018 for its creative historical adaptation and use of striking geometric patterns to mirror the rectangular buildings and multi-family apartment complexes hewn into the vertical hillside.

In conjunction with this transformation of urban space, a significant piece of the country's industrial-scale electricity production shifted 180 kilometers south, to the wind-swept high desert plateaus of the Tafila Governorate. In this rural municipality, far from the urban center, towering wind turbines were erected in circular clusters along the spine of mountain ridges that jut upwards from the Jordan River Valley. Seven utility-scale wind farms stretch along this ridge, from Tafila southward towards Shobak and Ma'an. Collectively, these sites



The hangar of the oldest power generation station in downtown Amman, Jordan, which was decommissioned and transformed into an urban art and design space. Photo Source: Kendra Kintzi, 2021.

generate nearly five hundred megawatts of new renewable power that then travels the 180 kilometers back northwards to Amman along Jordan's central electricity transmission backbone.

Drawing on sixteen months of ethnographic research on Jordan's energy transition, this article examines the spatial shift in energy

production landscapes through the expansion of the global renewable energy investment frontier. Rural renewable energy development and urban deindustrialization shape broader transformations in the spatial reconfiguration of global power production, as conjoined processes of land devaluation and revaluation push the frontier of renewable energy investment deeper into the countrysides and

rural ecosystems of the Global South¹. Building on the work of Jennifer Baka (2017), I approach the renewable energy frontier as an uneven, contested site of enclosure, as lands that were once considered 'wastelands' are simultaneously devalued and revalued in particular ways (Vaishnava & Baka, 2022). As shifts in the technical and financial arrangements of power provisioning push energy production from urban industrial centers towards increasingly marginal desert lands, transnational investments in utility-scale power production reconfigure these landscapes into new frontiers of accumulation. Analyzing this enclosure – this twinned process of de/ revaluation - through the lens of the

commodity frontier helps link situated struggles over land and resources within a broader, evolving global context of shifting energy and financial flows.

Once considered the hinterlands of the Ottoman Empire, the sun-kissed hilltops of Tafila are being transformed into new fields of gold (Fairbairn 2020) for transnational energy investors. While this transformation brought previously 'unproductive' desert lands onto the balance sheets of transnational investors, these lands remain hinterlands in a political sense, as rural herders struggle to maintain usufruct rights and negotiate for the local redistribution of project profits and benefits. In the following



Utility-scale wind farms located on grazing lands in Jordan's Tafila Governorate. Photo Source: Kendra Kintzi, 2019.

¹ My use of the term 'Global South' is informed by Sud and Sánchez-Ancochea's (2022) discussion of the South as a "territorial, relational, structural and political construct [that] is fundamentally about the distribution of power in the global system."

section, I place this transformation of desert lands in the context Jordan's ambitious national-scale renewable energy transition program. I then situate this transformation historically, showing how the devaluation and revaluation of communal herding lands was shaped by imperial and colonial projects of making land into property. I conclude with a brief discussion of the implications of these spatial shifts in Jordan and beyond, posing a series of questions about the role of shifting renewable energy frontiers in transforming the global energy investment landscape.

The National Project of Generating a Renewable Powerhouse

ordan's renewable transition began with an aggressive national strategy that was launched over a decade ago, through the Renewable Energy and Energy Efficiency Law (Law No. 13) in 2012. This law provides the legal framework for the country to transition away from dependence on imported hydrocarbons, towards domestically generated renewable sources. Capitalizing on the country's high abundance of wind and solar potential, state planners and regulators worked together with transnational investors from Europe, East Asia, and the Gulf states to transform the varied topography into an inviting canvas for private investment through lucrative contracts for utility-scale renewable power generation. These utility-scale renewable power projects were financially structured to guarantee a return on investment through twenty-five-year power purchase agreements with the national transmission carrier. Jordan's energy transition is often hailed as an international success by investors, as renewable power production surged from 1% in 2014 to over 29% in 2022. In addition, the central government recently announced plans to continue increasing production to reach 50% renewable power and begin exporting excess power to neighboring countries in the next few years. This rapid transformation has not only radically remade the spaces of power production across the ridges and wadis of the East Bank; it also provides a model and framework for sister projects across the region and beyond.

Transforming Deserts into Fields of Renewable Gold

he wind farms of the Tafila Governorate stretch across the upland plateau that forms the eastern perimeter of the Jordan Rift Valley, rising above the salt flats of the Dead Sea. The rugged terrain of Tafila has long supported a variety of biodiverse ecosystems and transhumance practices, dating back to the Chalcolithic period. For much of the Ottoman era, this region was home to a variety of nomadic and semi-nomadic herding communities that ranged the mountain ridges and adapted their lifeways to the rocky terrain. Although many of the British colonial administrators of the Mandate period were quick to dismiss this region as a desert wasteland, the long-standing practices of the local herding communities attest to the rich diversity of human and non-human lifeways that can be sustained within this fragile upland desert ecology. Importantly, this region never gave rise to the sedentarized forms of agricultural production that mark the fecund black soil of the neighboring Jordan Valley. Across the Tafila Governorate, the combined lack of freshwater, the uneven topography of the mountain terrain, and the rocky, desiccated limestone soils proved resistant to the implementation of large-scale agriculture production. An important result of this history is that this particular countryside is not primarily agricultural; rather, social life has long been organized around transhumance movements across communal grazing lands. As these lands had not previously figured as a significant commodity frontier, the reconfiguration of this region into a frontier of renewable finance capital transformed the conditions of life amongst the herders.

The entrance of wind power changed the course of this history, transforming once marginal, non-agricultural desert landscapes into new frontiers of financial profit. Investments in the wind farms of Tafila channeled over \$800 million in new financial flows from the Gulf, Europe, and East Asia to refashion the soil into a generative terrain for capital accumulation. Recent scholarship on renewable energy frontiers has brought critical



Grazing lands, olive trees, and fruit trees nestled between the wind turbines. Photo Source: Kendra Kintzi, 2022.

focus to the neocolonial dimensions of energy investments in the region and more broadly across the Global South, as rural landscapes are transformed into powerhouses funneling capital flows back to the metropole (Hamouchene, 2016; Jenss & Schuetze, 2023). These critiques intersect with broader scholarship on emerging forms of global 'green grabbing,' as new flows of conservation and decarbonization finance generate new pressures on rural lands (Büscher & Fletcher, 2015; Fairhead et al., 2012; Stock & Birkenholtz, 2021). A key dimension of this process is the financialization of rural land (Besky, 2016; Fairbairn, 2020), as lands that were once considered marginal or unproductive become new potential sites of financial speculation and accumulation (Cantoni & Rignall, 2019; Knuth, 2017).

The De/Revaluation of Land in Historical Perspective

n the case of Jordan's desert mountain wind farms, land has historically played multiple roles that shifted with the entrance of the renewable energy frontier. In the Tafila Governorate, communal grazing land was devalued for its role as the material foundation of local pastoralists' subsistence livelihood practices, and then revalued for its potential role as a site of national renewable energy production and financial accumulation. The devaluation of land's communal role began in the late Ottoman period, as Ottoman administrators worked to increase agricultural cultivation to increase imperial tax revenue. This devaluation intensified under the British Mandate, as British colonial administrators

dissected communal (musha'a) lands and worked to inscribe British principles of private property onto the landscape. In the past two decades, the Jordanian state's aggressive privatization and austerity reforms have continued this process, dividing remaining communal and state lands into privatized parcels for the development of special economic zones and power production sites. This joint process of de/revaluing land is the conduit for the spatial shift in power production, from the urban industrial corridor of Ras Al-Ain to the rural hinterlands of the Tafila mountain ridges. This process also creates a potent site of political contestation. Rural herders watched as state officials divided their remaining communal lands and sold them to foreign investors and developers to build power plants and send electricity and capital northwards to Amman and beyond. None of the power and very little of the revenue generated from the wind farms stays locally in Tafila, creating new fault lines of resentment and contestation over the distribution of resources and profit derived from the desert hills. At the same time, the conversion of remaining communal grazing land into private wind farms further hollowed out the subsistence foundation for many local herders, adding mounting pressures to migrate north and abandon the rural landscapes of their ancestors.

Key Questions for Global Renewable Energy Frontiers

racing commodity frontiers helps us elucidate the evolving, mutually constitutive interplay between grounded sites of enclosure and the financial regimes they propagate (Beckert et al., 2021). The enclosure of Jordan's desert frontier in the service of renewable power generation plays a formative role in changing the global shape of energy, as desert countrysides are reconfigured to deprioritize subsistence lifeways and prioritize, in their place, the flow of capital and electric power outward, towards the capital city and the metropolitan centers of renewable investment finance. In this way, the case of Jordan's shifting energy frontier provides us with an empirical touchpoint for examining moments

of 'ontological encounter' (McMichael, 2022) in the configuration of broader global financial regimes. While the specific forms and natures of energy production in Jordan are shaped by historically rooted socioecological dynamics, this case provides an aperture for thinking through individual sites of energy transformation as constitutive elements in the formation of an evolving global commodity regime increasingly marked by decarbonization investment flows.

The case of Jordan's shifting energy frontier reveals new arteries of contestation, as rural lifeways and livelihoods are devalued to make space for national energy development and decarbonization goals. This process is interwoven with the parallel transformation of urban space, as Amman's urban corridors are devalued as sites of labor-intensive industrial production and revalued as sites of speculative real estate investment and lucrative urban redevelopment projects. As urban industrial powerhouses become museums, and as rural deserts become wind farms, these spatial shifts do more than simply change the shape of energy production: they change the kinds of labor and lifeways that can be sustained, and the kinds of futures that can be envisioned on these lands.

This case raises several key questions for parallel processes of renewable energy transition as they unfold around the world today. First, there is the question of the matter of energy. Unlike many other commodities, renewable energy is both a thing and a relation between things. It can be made, transported, and used; but it is also a constituent force in the making of other commodities and the provisioning of daily needs. Like a delicate fruit, it cannot be transported long distances without significant loss, and it must be used almost as soon as it is produced. How will these material qualities of energy as a commodity limit and shape the contours of the emerging renewable energy frontier? As we have seen, the affordances of renewable technologies enable the enclosure of increasingly marginal, nonagricultural landscapes, far from urban centers; yet there is a limit on the distances that can be opened up, again due to the technical



Transmission towers that evacuate power from the Tafila wind farms and transport it along the central electricity transmission corridor to Amman. Photo Source: Kendra Kintzi, 2022.

affordances and landscape dynamics of energy systems. How will these material conditions constrain the specific kinds of renewable frontiers that emerge?

Secondly, how will the enclosure of fragile desert socio-ecological landscapes change the forms of political resistance to global green grabbing? As desert frontiers are opened to new forms of renewable technology and finance, how will the reconfiguration of these spaces into frontiers shift the ways that local communities are able to use, interact with, and live on the land? What new interfaces will emerge for conflict and contestation over how land-based resources are extracted, used, and shared? As the emerging global renewable

energy frontier shifts the ways that people interact with land and through land, the commodity – in this case, energy – also circulates more broadly, creating new flows and frictions in the construction of the broader commodity regime. In the case of Jordan, the renewable energy frontier created a new template for renewable finance that now circulates globally. As we come up against the social, technological, and ecological limits of the energy frontier, how will the broader regime of decarbonization finance constrict and evolve? These questions invite further study and comparative inquiry into the unfolding global frontiers of renewable finance.

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Cite this article:

Kintzi, K. (2023). "Desert Power: Wind Farms and the New Frontiers of Renewable Energy Finance in Jordan." *Commodity Frontiers* 6: 24-31. doi: 10.26300/ws81-3a59.

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"These are Not Forgotten Places!"

A Conversation with Karen Rignall about Rural Conflict, Renewable Energy, and Building Deep Relationships in Southeastern Morocco

Hanne Cottyn and Stha Yeni

Keywords: energy transition, agrarian change, critical energy studies, Morocco, care

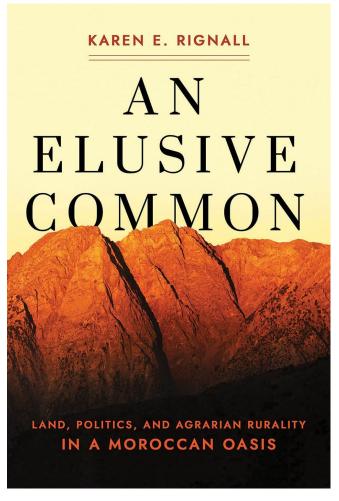
Abstract: Karen Rignall's recent book, <u>An Elusive Common: Land, Politics, and Agrarian Rurality in a Moroccan Oasis</u> (Cornell University Press, 2021), examines the dynamics of rural life and land in southeastern Morocco in the context of globalized capitalism. In conversation with *Commodity Frontiers*, Karen discusses the historical continuities, the local encounters, and the practical and conceptual challenges that have guided her from rural land conflicts to Morocco's contested energy transition.

Commodity Frontiers (CF): How did you come to study rural Morocco and how did this trajectory bring you to this book?

Karen Rignall (KR): It's my community development and activist interests, and a very strong personal attachment that motivates my research there. I returned to academia, having worked in nonprofit and immigrant rights activism in the US, specifically for and with Arab-Americans. I'm Arab-American of origin myself, and have spent a lot of time in Egypt, where my mother was born and raised. I went to Morocco initially in 1993 in search of a different kind of experience of the Middle East and have been going back since in various capacities.

The book is the culmination of 10 years of research and tells stories about people whose lives offer a window into ambivalent processes that make up the incredible dynamism and richness of rural life. It offered me a format to explore the many layers of how people are navigating global connections, political hierarchies, and the long durée of economic and political investments in southeastern Morocco. Through my work in community development, I really came to understand the limited comprehension development practice has of how people interact with the politics, resources, and social relations in the world around them. This informed some of my bigger, theoretical questions around how

people access land and what it means to live a rural life today.



CF: How has your interest in land issues brought you to the topic of renewable energy, and could you tell a bit more about the specific case you are studying in your current project?

KR: There is no energy, there is no extraction, and there is very little sun in the book. And yet the book is very much the foundation upon which my current work is based. I could not even come up with the conceptual frames I have now had I not actually spent a good year doing extensive interviews about collective lands and communal ownership, walking across the river, understanding what's at stake for people, and the long history of social relations. That enables me to see what is going on right now with these rural spaces. Although I was wrong about one important thing, initially, and that is understanding southeastern Morocco as intentionally marginalized because it was not contributing to the colonial economic project. Places like southeastern Morocco have traditionally been written off as hopeless for agriculture or other productive uses, where farming and rural life were always supposed to die off. There was this very famous formulation by the first French Resident General in 1912 of a Maroc utile et inutile (useful and useless Morocco): the idea that the Atlantic plains were more conducive to agricultural colonization and economic development motivated a bifurcated investment and state territorialization strategy.

So, the pre-Saharan oasis, the Sahara, the arid periphery, were marginalized. I have since learned that that is not the case. From even before colonization, European political and economic interests understood how these "peripheral" regions are crucial to the colonial project because of their metals and minerals. Extraction was very much a part of the colonial project and constitutes agrarian spaces in fundamentally important ways. I came to understand that over time. During the final interviews for my dissertation about land out in the steppes - a land that doesn't belong to private owners or is not part of a village - more and more people were drawing attention to the "Noor" solar energy installation in Ouarzazate. The solar power plant didn't seem to have anything to do with these very small-scale political protests, land confiscations, and land occupations I was documenting, and yet they were intricately related. Had I not spent that time understanding

the meaning and uses of land, I wouldn't have understood that how they acquire land for solar energy is very similar to how they have historically acquired land for extraction, and how there's an incredible new push on both fronts in the same spaces. That we can't think of one of these 3 terms - "renewable energy," "conventional extraction," and "agrarian change" - without taking the others into account. That's how I ended up with this new project.

CF: Your research distinguishes longue durée continuities across mining, agriculture, and energy, as you also highlight in a brilliant piece recently <u>published with TNI.</u> What are these continuities, and do you also discern new dynamics and ruptures in the rural transformations and contestation that shape new energy mega-infrastructure projects?

KR: Morocco's Solar Plan and Mining Plan are on a similar time schedule, have the same graphics, and describe extraction as fundamental to Morocco's economic growth as well as to the renewable energy transition. These are processes that are happening at the same time. Yet, I don't think I would have come to this comparison as quickly if not for some very explicit comparisons made by Moroccans themselves. In an interview with a local government official about the Noor solar plant, he stated the situation was indeed hard, but that it was not like the Bouazar cobalt mine where protests were going on. To me, that was the first indication that these protests are going on at the same time, they're using the same terms, and they're evoking some of the same claims and themes. I then turned to the critical energy studies literature and the just transition literature. I am certainly not the only person to have encountered continuities in the injustices of who must pay for this transition. The concept of sacrifice zones has been around for a while, as has work on commodity frontiers. Yet we don't necessarily need another case to prove how unjust contemporary capitalism is. We do obviously always need to document these cases. But the fundamental question is about the underlying structural and political processes that are enabling these projects to take shape in the way they are.

I am also interested in the continuities in the colonial juridical systems that are largely still in

place. I am trying to understand how the underlying logic of extraction that emerges during the colonial period becomes relevant again. Those laws were by and large constructed to expropriate land and subsurface resources, and those exact same laws are used to acquire resources necessary for renewable energy.

What has been bothering me in some of the critical approaches is an essentializing of people's attachment to the land. A lot of the critiques of Morocco's renewable energy program state that even though the land isn't worth much, we need to consider people's primordial attachment to the *tamazirt*, the homeland. Fine, but that's very paternalistic. It is also a way of sidestepping the essential questions about ownership and sovereignty, and the fundamental commitments of extractivist capitalism. The question, as people in Morocco ask, is: Who owns the sun? Why are they able to buy land at 10 dirham (or 1 US dollar) a

hectare and then reap the profits for eternity? Who owns that energy? That's much more important than the fact that the land means a lot to people. The land means a lot to people because it was fundamental to their sovereignty, social identity, and socio-ecological system. Those are the continuities I'm interested in.

I have never found the question of "how new is this" to be all that interesting. Colonialism has always been extractive. We're clearly in a new moment for capitalism as an ecological project, but those questions of temporalizing are not essential to me. The question is practical, about what claims people can make when they are able to democratize their knowledge and claim knowledge as a tool. It is about looking into those laws and finding ways to change them or use them.



Transmission infrastructure in Midelt province, Morocco, 2021. Photo source: Karen Rignall.

CF: What does "just transition" mean in rural southeastern Morocco, and how does your project relate to this concept?

KR: First of all, if we transition just in carbon replacement and reinforce the same systems of inequality, we're not decarbonizing anything, aside from the ethical and political dimensions involved. It's important to keep saying that. I hope this continues to inspire social movements at all levels, but it is not a very actionable conclusion. So, secondly, how does this inequity play out for actual people and places? Why is it that folks in Ouarzazate are sacrificing land, water, and power to fill swimming pools and air conditioning units for tourists in Marrakesh? These fundamental inequities are perhaps a little less theoretical, a little less global social movement-oriented, but also super important. Thirdly, I feel very committed to unpacking "just transition" as a concept from the vantage point of the folks who I developed the project with. For them, energy transition is part of larger political and personal projects, and everything is not about the Noor plant. It's about historical conflicts around land. It's about resource access. It's about how this project reinscribes the particular brand of Moroccan authoritarianism. I am interested in the ways people use that longue durée, how people think in their own temporal and spatial scales, what their political aspirations are, and how they can mobilize just around transition. Because people we have worked with in Morocco don't use that term, and it's not important to them. They are very much involved in some of the same themes, though, but we want to avoid that kind of activist paternalism in which you only get credit if you're using these global languages of resistance. We are very much committed to making this project rooted in southeastern Morocco and not having it migrate to Rabat or Casablanca to become this international NGO conduit for global climate change money.

CF: Through a place-based approach and extensive field work, your research places the rural at the center of our analysis, resonating with the commodity frontiers initiative's approach. How does this approach and methodology contribute to our analysis of global energy transition processes?

KR: In my case, a place-based approach makes sense as my expertise and my blessing are that I

have these connections, and a pretty good understanding of the resource and political dynamics in this rural space. It also allows to challenge discourses that frame Morocco – or Eastern Kentucky, which experiences comparable discourses - as forgotten places that have been marginalized forever, that are dissolving. These are not forgotten places! These are the centers of people's worlds. And they are, in fact, the center of our capitalist world, too, because of the resources that were exported there yielded incredible wealth.

To me, what this adds to our discussion about energy, transition and just transitions is that you can't assume false consciousness about people's aspirations. We do really need to engage with whatever mega-project it is *in relation to* histories of resource use. We need to understand that people not only have agency, but they *also* have their own interpretive frameworks, and sophisticated ones. In this project, we are trying to figure out how to animate these ethics with actual, on-the-ground relationships.

It's very important for me to do engaged work. Yet I am not prescriptive about the way to do field work. My initial field work was super traditional, doing the participant observation and the interviews. It was those relationships and conversations with people involved in human rights and civil society activism in the area, whom I met by force of luck, that enabled me to create partnerships where I can support their projects, interests, and aspirations. That work is hard, but it's also necessary, not just because of all of the politics in creating collaborative, egalitarian, justice-oriented relationships, but also because of having to figure out how this works over the longer term, when we live very far away, have a million committee meetings to go to, and kids, and so many multiple levels of crises, globally as well as personally. As an anthropologist, I will always have something to write about, even if the project involves complete failure. This is all data for me. I can accompany them without having to shape the work according to what my scholarly or professional needs are.

But often, in the places where we want to do the work, capacity is limited. For instance, how do we hire the right people for a project when local contacts have day jobs, do their activism on the side, and all the sort of practical logistics. My partners have a such a critical social science eve in their everyday interactions, but that knowledge is embodied and expressed in different ways, so how to transform it into material for an article, and much more importantly, into concrete tools? And how to manage expectations, as we're not some EU-funded development project that comes in with a big apparatus? It's rather about doing deep relationship building. That takes time to build, and it's messy. Initially, it may not be equal or remotely reciprocal - it will never be equal, as we know, in that you're not giving a lot back. But an authentic and politically committed relationship means that you can explore those opportunities over time. The truly engaged work is hard, and often the impacts come in very intangible ways further down the line.

CF: What are some of the specific methodologies you apply and what is their potential role in energy transition research?

KR: A really important piece of this work is a sort of liberatory mapping. I was quite inspired by the Environmental Justice Atlas, and the initiative of Soraya El Kahlaoui, who is developing an amazing counter mapping app. I'm interested in the many ways this can be done. It doesn't only need to be done with people comfortable with GIS, who are producing their own maps, or with people who are going into a community and developing maps de novo. A lot can be done with the existing maps, even those produced by the cadastral authorities. In this project, we're particularly interested in collective lands in the area where an even bigger, renewable energy plant is being developed. Most of these collective lands have been surveyed or delimited, so there are maps. Often the people who use, own, and manage those lands know these maps are available but they don't really know how to access them, what to use them for, or how to think about them. I don't mean that in a in a dismissive way. I mean that in the way this can open doors to new kinds of claims that they may not know about, because these laws are very arcane and complex. In the case of some of the international finance institution donors, people don't know that there are mechanisms, which however problematic they are - they can potentially use. Part of what mapping can do is to

demystify certain forms of data or discourse and enable people to use them.

Right now, we are focused on a legal translation project. We are taking an inventory of laws around conventional extraction, starting from the country reports of the Natural Resources, Energy and Governance Institute around transparency and extraction. We are bringing in a pedagogical expert who will translate that inventory into key points to democratize knowledge about the legal framework for extraction. To just summarize those laws, even in bullet point form, is just not useful. Instead, we're asking questions, or taking people's questions, and answering them through reference to the legal and procedural framework. For instance, if there is a granite quarry in your commune, and you think they didn't get the permit correctly, you need to know how permits are issued, which this legal translation project is going to help you with. Even though this tool is not going to stop or transform the renewable energy plants, it does create a space for people to make claims around the resources that matter to them, including in the context of renewable energy mega-projects.

CF: Is there anything you want to add?

KR: Commodity frontiers can be deeply disturbing and sad spaces. This work can feel very overwhelming. But I've also got an incredible joy from seeing people's commitments and willingness to collaborate, and patience when things go wrong. I think it's rare in critical energy studies or extraction studies to ever hear the word "joy" or "care." I have been so heartened and influenced by the critical work that comes out about mutual care, and from David Graeber and the anarchist tradition. I want us to think about that as the starting point for our work. That sense of care and connection should be the source of joy. We need to hold each other up when doing this work.

CF: That's a very powerful point to end our conversation. Thanks you so much, and good luck (and lots of joy) with the project!

Further reading

Rignall, K. (2021). An Elusive Common. Land, Politics, and Agrarian Rurality in a Moroccan Oasis. Cornell University Press. https://www.cornellpress.cornell.edu/book/9781501756139/an-elusive-common/. Rignall, K. (2022, July 22). What can an old mine tell us about a just energy transition? *TNI Longreads*. https://longreads.tni.org/mining-energy-transition-renewable-morocco.



Karen Rignall is an associate professor in Community and Leadership Development, a multidisciplinary department - formerly Rural Sociology - at the University of Kentucky, US. She is trained as a cultural anthropologist, and has a long trajectory in nonprofit and activism. Karen specializes in rural community development in the Middle East and North Africa, more specifically in Morocco. Her book *An Elusive Common: Land, Politics, and Agrarian Rurality in a Moroccan Oasis* (Cornell University Press, 2021), co-winner of the 2022 Nikki Keddie Book Prize of the Middle East Studies Association, examines the dynamics of rural life and land in southeastern Morocco in the context of globalized capitalism. Her recent research focuses on natural resources governance, grassroots organization,

and conflict in the context of Morocco's energy transition. She is also doing a comparable project in the central Appalachian region of the US, an extractive zone that is currently witnessing an economic and energy transition.

*All photos provided by the author.

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Cite this article:

Cottyn, H. and Yeni, S. (2023). "These are Not Forgotten Places! A Conversation with Karen Rignall about Rural Conflict, Renewable Energy, and Building Deep Relationships in Southeastern Morocco." *Commodity Frontiers* 6: 32-37. doi: 10.26300/3c05-xw05.

Commodity Frontiers is an open-access journal edited by the CFI Editorial Board, Mindi Schneider, senior editor. Read it online at the <u>Brown University Digital Repository</u>, or our website, <u>commodityfrontiers.com</u>.

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Community Resistance to Geothermal Development in Indonesia:

Interviews with Community Activists

Hendro Sangkoyo

Keywords: geothermal, energy, water, resistance, environmental justice, criminalization

Abstract: The Indonesian government is heavily promoting geothermal energy as a "green" energy source and a critical part of the country's transition to lower-carbon energy. However, communities located around geothermal developments have reported serious environmental, social, and economic impacts from these activities. Local agricultural economies and traditional ways of life are being undermined by water pollution, resource extractivism, and undemocratic implementation of projects, and communities in resistance face harassment and criminalization. This collection of interviews conducted by the author with grassroots activists in July 2023 highlights tensions around a form of energy that is often presented as low-impact, cheap, and readily available, but which actually carries heavy costs for local communities.



Women of Batu Bajanjang community during a sit-in in 2018, protesting the deployment of the Army (in the background) in the guise of a "combat training" to intimidate the local resistance against the geothermal mining project. Text on the hats reads "Save Gunung Talang", the catchphrase that united the communities encircling Mt. Talang. Photo Source: Salingka (circumference of) Gunung Talang Alliance.

In 2014 the new Geothermal Law entered into force in Indonesia. The Law excludes the geothermal industry from the category of mining in order to enable investment in geothermal power plants in otherwise protected Indonesian forests. Two-thirds of geothermal mining prospects are located deep in forest areas. Abandoning protections for the island's forests is a denial of the mandate and responsibility of the Government to protect the integrity of nature. It is an organized sabotage of the sustainability of people's lives in the Indonesian archipelago.

Geothermal energy projects have been plagued by technical failures and serious accidents since their development in the 1980s. These failures, however, have been largely hidden from the public eye. Since the early 2000s, the Ministry of Energy and Mineral Resources (ESDM), facilitated by the World Bank Group and the Ministry of Finance, has expedited licenses for geothermal projects in Indonesia to attract international and domestic investors. A special joint initiative (Sarana Multi Infrastruktur) was developed to foster investment with incentives like pre-financing of the financially risky exploration phase. Rushed development, also fueled by growing demand for "green" energy, has given rise to social and environmental problems, as well as increasing local resistance. Major players in the oil and gas industry are

also heavily invested in geothermal power development. Categories of high and lowcarbon energy more aptly refer to asset classes held by the same corporate actors.

The privatization of the electricity sector since the late 1990s and the absence of alternative perspectives on how energy demand gets formulated now piggy-backing on the de facto privatized legislation process in the Parliament and across government offices. Two reports produced in 2021 and 2022, in the wake of a gas blowout that killed villagers in North Sumatra, encapsulate common concerns about the geothermal industry's reckless encroachment into people's life-space, and the way they operate with complete impunity (reports are linked in the reference section).

The School of Democratic Economics works directly with communities across the Archipelago. Building on years of collaboration through this work, the author interviewed local activists in July 2023. The interviews below provide a further glimpse into how "deep heat extraction" for electricity generation impacts the lives of ordinary people who must take on major risks for the sake of the geothermal industry. They are translated from Indonesian by the author and lightly edited for clarity and length.



Map of Indonesia. Photo source: Google Maps, 2023.



Map of Indonesia with approximate locations of interviews. Photo source: Google Maps, 2023.

Interview 1: North Sumatra

Informant: Anonymous

Location: Mt. Desa Sibanggor Julu, Sorik Marapi, North Sumatra

Project: WKP (geothermal work concession) Sorik Merapi-Roburan-Sampuraga, Mandailing Natal, N.Sumatra

Background: The Power Plant is owned by PT Sorik Marapi Geothermal Power, owned by KS ORKA Group. The plant achieved its first commercial operation date (COD) in October 2019. On January 25, 2021, the main production well leaked hydrogen sulfide gas, which killed five women who were working in their crop fields nearby. This tragedy was the first of six similar failures between 2021 and 2022. Not a single lawsuit for gross negligence has ever been filed. In each incident, the operator was permitted to restart operations within weeks of the tragedy, without any publicly verified investigation by the Ministry of Energy and Mineral Resources which regulates the industry. The anonymous speaker in this case risks his life and his family's security by sharing thoughts in inter-community mutual learning discussions, due to intense intimidation and surveillance by state security apparatuses working on the company's behalf.

Hendro Sangkoyo: Two years have passed since the tragedy on January 25, 2021 in your village. How do you see what has been happening in your homeland in the wake of this geothermal extraction project?

Informant: Eastward, northward, southward, make a well pad. Now from the Tango well pad, which used to leak H₂S [hydrogen sulfide], we have made a road to make a well pad. Later, the project pipeline will pass through. Ironically, this has also entered the protected forest area. The well pad is planned to be built towards Mt. Sorik Marapi, about three kilometers to the top of the mountain. Two more wells will be built.

There has been no additional electricity [for our community]. Even more frequent power outages, no additional electricity from the project.

This is the social impact after the entry of the project. What I feel is that fraternity and friendship are dwindling. The community is divided: those who need jobs from the project, and those who don't like the project.

The economic impact is this: the wage standard in the project is higher than for farm work. Farmers can only pay workers IDR 75,000 per day. Now when people are invited to work in

the fields, they say, in the project the wage is IDR 100 thousand per day. Better to work in a company.

There are also quite a lot of young people who are now unskilled laborers in companies, around 30 of them (laborers). In terms of the environment, we have experienced the consequences since 2021. Now the most immediate impact is the water crisis. Rice fields used to never lack water. Now

irrigation is difficult. Also water sources for drinking water. This is the only source. Now you can't take the water.

There is also the issue of cultural change. There are many project worker friends from outside the area. The culture is different. So the young people in this village are influenced by their lifestyle. Drinking and so on. There are schoolage girls who don't go to school anymore... eloping with project workers.

We should not neglect everything because of investment needs. There are not many people who care about the environment. But what about in the future, don't let it become a regret. Don't leave tears for our children and grandchildren. Leave the spring. I'm already sad now. Even if I want to mobilize these young people, we need a job. I can't move them anymore.

Interview 2: West Sumatra

Informant: Indah

Location: Ds. Batu Bajanjang, Solok District, West Sumatra Province

Project: WKP Gunung Talang-Bukit Kili, Solok Subprovincial District, West Sumatra Province

Note: Indah is a young peasant-activist from Mt. Talang, a college graduate in business management. She has been part of her community's resistance against the geothermal project.

Background: In November 2017, villagers set fire to a vehicle of Hitay, the Turkish company that operates the geothermal plant. The company was exploring the area, guarded by army troops with guns, without the community's consent. The whole of 2018 was replete with open fights; people got arrested, and some were imprisoned. Hitay eventually backed down and relinquished the concession to the Government. At present the project is dormant.

Hendro Sangkoyo: What has happened in Gunung Talang? Why did the residents refuse the geothermal project?

Indah: Since the geothermal project entered the scene, they have not been transparent. They always force their way in. For example, there is no land acquisition yet, but they are already forcing their way in to measure the land. At first people didn't know what they wanted to do. They bought land, but they didn't tell them what they were using it for. But fortunately, only a few have sold their land. Even then, the land that has been bought by the council members is quite far in, so to enter the company's land, you have to pass through the residents' land first. Now for the residents' land, they force the residents to sell their land, whether they want to or not, whether they like it or not.

Hendro Sangkoyo: How did they force them?

Indah: This is land for a National Strategic Project. People should not obstruct national strategic projects. If we don't want to sell, we are indirectly considered obstructing then we are threatened with the law. There are penalties for obstruction.

Hendro Sangkoyo: After the community refused, what was the company's reaction?

Indah: After the community refused, they even brought soldiers, POLDA (Regional Police), Brimob (Mobile Brigade, military police), Satpol PP (Public Order Enforcers, police units under the control of the local governments) to

the location, to deal with the community. They tried in various ways to get into the location. First, they said they wanted to do combat training, while the community was in the heat of the geothermal rejection issue. They wanted to conduct combat exercises in a location adjacent to the geothermal project site. And that seems far-fetched, because there have never been war exercises there before, while the area is productive agricultural land.

Hendro Sangkoyo: So now what do your friends or residents think about geothermal?

Indah: Bad. Because the community here also often seeks information about what geothermal is, about [...] the impacts in areas affected by geothermal projects. The community has even conducted a comparative study to Mataloko, to see the problematic geothermal project in Mataloko. In Sarulla, there was also a gas pipeline that exploded, and the community was affected by toxic gas. That's why the community is more anticipatory of things that will have an impact in the future both for themselves and for many people. Parties that support the company: the Nagari government, district government, provincial government, and even the central government, and state apparatus, all support the company, such as the brimob, satpol PP, police, army, and even the navy.

Hendro Sangkoyo: Now the company that operates the Gunung Talang geothermal project has handed it back to the government, and is said to be continued by another company. If they enter again, what is the attitude of the friends here? Will you reject them again?

Indah: Yes. It's because people are more informed and much more knowledgeable. Because this is an agricultural area. So people prefer agriculture over geothermal, because geothermal will damage the forest, the community's water source.

Hendro Sangkoyo: What is your personal reflection on geothermal?

Indah: Geothermal is a community divider. Because of geothermal, people in the community clash against each other. People who are against it and people who are for it. The same story happens between the community and the government.

Interview 3: East Nusa Tenggara

Informant: Joseph Erwin

Location: Nunang, Wae Sano, West Manggarai Subprovincial District, East Nusa Tenggara Province

Project: Geothermal Work Area (WKP) Wae Sano, West Manggarai, East Nusa Tenggara Province

Note: Joseph Erwin is a farmer from Nunang, a hamlet of Wae Sano village. He has been at the forefront of his community's protest against the geothermal project in his living place, on the waterfront of Lake Sano Nggoang, the largest caldera lake in East Nusa Tenggara.

Background: In March 2019 the Wae Sano geothermal project proceeded after the World Bank-funded company, PT Sarana Multi Infrastruktur (SMI) filed the environmental impact assessment report. Since then, the Wae Sano community has fiercely opposed the project. On October 25, 2023, the World Bank officially pulled out of the project.

Hendro Sangkoyo: What has happened in Wae Sano?

Joseph Erwin: Why people are resisting... First from an ethical point of view, the development company does not respect the local community. It feels like the people of Wae Sano don't exist. The exploration area is actually in the community's living space, where there are villages, there are plantations as a source of livelihood. The exploration area has a rather



The Wae Sano Community staged a "Earth Produce Parade" in Labuan Bajo, West Manggarai District Capital, March 4 2022. Source: Floresa.co. "Warga Wae Sano Minta Bank Dunia Hentikan Pendanaan Proyek Geothermal" (Wae Sano Community Demand the World Bank to Stop Financing Geothermal Project), March 5, 2022.

steep topography. The exploration area is on the slope of the water catchment area as a source of water for the community from several villages, Lémpé, Nunang, and Dasak, [out of ten villages in Wae Sano village, the three villages are directly affected by geothermal exploration activities].

Hendro Sangkoyo: How did people come to the conclusion that geothermal is dangerous? What is the learning process?

Joseph Erwin: First, from their "socialization". In the socialization, they said that geothermal is good. As a layperson about geothermal, I believed and disbelieved what they said at the beginning. From the socialization, it turns out that the exploration is indeed a very deep drilling, and the location is in the community's living space. Now you can imagine, if the drilling is that deep, then there is a possibility that the water level [of the lake] will drop. As we learned in elementary school, water goes

downhill. In our rejection process, we got information that in other places, geothermal actually has a very bad impact on people or living things, especially in Mataloko [another geothermal project in the neighboring District of Ngada, 100 kilometers East of Wae Sano].

Well, we don't just hear or read news from the media. We ourselves have also witnessed it firsthand. The impact there is very bad. The exploration area has actually caused losses to the community, and it just adds to my belief that what the experts say is not necessarily true. Actually [...] there is a very bad impact in Mataloko. What was said in the socialization that geothermal is good, does not bring bad impacts and is environmentally friendly is a lie. Mataloko was destroyed. What they predicted, in the field at the time of exploration did not match [what occurred]. The drilling position that they thought was good turned out to have to be moved to another place, and was destroyed in another place.

Hendro Sangkoyo: When the community resisted, were there intimidation or negative responses from project supporters?

Joseph Erwin: The signs are there. From time to time when we refused, there were signs of intimidation. On one occasion, the company, government, police, TNI (National Army of Indonesia), PP, and SKPD (agencies of Regional Government) of West Manggarai district were present at the village office. It felt like Nunang was at war. The people of Wae Sano actually don't have any problems. We reject it, that's our right. But having to bring in security forces is actually a form of pressure that the company or government has begun to rely on.

Interview 4: Banten

Informant: H. Dhoif

Location: Padarincang, Banten Province

Project: WKP Kaldera Rawa Dano, Desa Padarincang, Padarincang District, Banten Province

Note: H. Dhoif is a community leader in Padarincang. He has been an outspoken critic of geothermal mining in general, and particularly of the geothermal power plant project in Padarincang.

Background: Exploration drilling for the Padarincang geothermal project started in early 2018. The community openly rejected the project and blocked access roads to the project site. At present the project has not resumed operation.

Hendro Sangkoyo: What has happened to create such a strong and persistent resistance from the people of Padarincang to the geothermal project?

H. Dhoif: It is clear that the majority of people in our area are farmers. This is an area that is

very fertile, has enough water, and has had a very large and very high economic value so far. Related to the entry of a new economic activity such as geothermal, it should be an added value [...] not a threat, you know. When the new activity is offered to the people, the people are positioned to choose. And basically, for humans whose minds, spirits, and bodies are healthy, choosing must be better than what already exists. Meanwhile, this new economic activity of geothermal extraction is a form of new economy whose value and existence is a threat to the people's eternal economy. This is the real problem. And the value of the contribution that this geothermal extraction activity will provide will not be comparable to the enormous natural wealth of Padarincang which is very potential and certainly eternal, because it synergizes and is in line with natural conditions.

Yes, we have to understand this side first. So, in our opinion, this activity is very, very worthy to be rejected by Padarincang residents. What this new economy offers is "contribution", "employment", "Corporate Social Responsibility", for example ... We interpret the contribution as value, added value, from the existing plus the value for welfare, that's the formula.

Well, while, the contribution itself no one can mention the numbers, but the threat was clearly felt by our community at the beginning of the work as well, such as the occurrence of floods and so on. There were several tens of hectares of rice fields that were then covered by the floods, due to the land leveling at the geothermal site. And from these things, the people of Padarincang massively rejected: this activity is not suitable to be in our area. Because the economic value of our community per month is between 45 to 60 billion rupiah. That is from the results of people's rice fields, people's plantations, horticulture and so on. We did not calculate the value of tourism, because it is difficult to calculate mathematically and the value is not constant. We believe this new economic activity will not be able to contribute that much to our community. While deforestation is bound to happen, the availability of water will definitely change

because of the activities that cause deforestation¹.

Also like what happened in other areas, to produce one megawatt (MW) of electricity from geothermal like in Dieng (another huge geothermal power plant in Central Java), it takes 1500 liters of water per minute. Can you imagine like in Padarincang, which [wants to generate] 170 MW, if per MW it requires 1500 liters of water per minute? The contract is 35 years, approximately 4.5 quadrillion liters of water needed, right. Not a small amount. And it will definitely affect [our region's] climatology and the economic order of our people, and that's what we don't want. And that is the basis of why we refuse. Why we disagree with this new form of economy in Padarincang. The barometer of community welfare is different between us and those in the city or elsewhere.

Hendro Sangkoyo: But there is another argument, that geothermal is an electricity generation that produces very little carbon dioxide. That's the reason. Much lower emission than coal.

H. Dhoif: That's right, because the process is invisible to the eye, in the bowels of the earth. It's considered low emission because it doesn't release smoke. But what happens in the bowels of the earth who knows? And the great damage that will be a threat to society, who knows because it happens in the bowels of the earth. Because in the bowels of the earth itself, we know in general that the substances contained there are very, very many, compared to coal which is only CO₂. And there are many dangerous substances contained there that are harmful to the environment and humans actually if there is a leak, and there must be a leak. Like the H₂S, which can cause shortness of breath and so on... it's worse than coal. And the injustice is that when people use coal to enjoy electricity, people will die from the pollution in congregation while everyone enjoys it. But with geothermal, we are threatened. Those who use [electricity] are not threatened. It's not fair either if the enjoyment is shared

equally but the threat will be [borne by] the people of Padarincang.

Hendro Sangkoyo: Do you have any criticism towards the state administrators... Jakarta?

H. Dhoif: Absolutely. Because of the implementation of the policy, and the so-called policy I also don't understand. Who is the policy for? Because the policy issued is not necessarily policy for the general public. Ideally, the policy should be virtuous in nature. But this is different. It tends to impose on the grounds that it is a National Strategic Project (PSN). The problem is that the state controls but does not own. These living spaces belong to the people. The homeland and all that belongs to the people. If the people feel threatened by the [activities], the state should be more responsive. Because these new economic activities are not in harmony, not in line with the nature in our area. But this [project] tends to impose various kinds of measures that are more likely to be intimidative in nature; that are more likely to disrespect our rights as citizens; that tend to no longer respect people's ownership of their living space. Where the land, water and air are more threatened. The government should be wiser in addressing such matters as well. We know that the policy was made universally and applies to the entire Indonesian archipelago. But according to the constitution, the people are also a social control. The people will know what risks they will bear. [The government] must also pay attention to the people, if they reject it.

Interview 5: Banten

Informant: Umi Eha

Location: Padarincang, Banten

Project: WKP Kaldera Rawa Dano, Padarincang Village, Padarincang District,

Banten Province

¹ In other words, not only will geothermal mining cause deforestation, but such deforestation will also compromise the integrity of the region's waterscape (aquifer and surface water).

Note: Umi (mamma) Eha is a highly respected elder in Padarincang. She has been part of the community's protest against the geothermal project.

Hendro Sangkoyo: What does Umi Eha think about the continuation of the geothermal project in the Padarincang area?

Umi Eha: The project will not be able to enter and operate in Padarincang. Because we will remain defensive.

Hendro Sangkoyo: Why does Umi Eha refuse?

Umi Eha: It has often been asked and often answered. Why? Because it is destructive. There is no benefit, only harm. That's all.

Interview 6: Central Java

Informants: EM and SI

Location: Batur District, Dieng Plateau, Banjarnegara District, Central Java Province

Project: WKP Candradimuka, Mangunan & Wanayasa, Banjarnegara, C.Jawa

Note: EM and SI are potato farmers and women activists in Dieng, Central Java. They both live in the armpits of the geothermal power plant project's wells, pipelines and electricity generation complex.

Background: Dieng geothermal power plant started operation in 2005. This highland region has been repeatedly shaken by serious volcanic activities. In 2011, 1,200 villagers were evacuated due to gas outbursts and an earthquake at the project site. Besides



Potato farmers in Raditya Mahendra Yasa, Central Java, with geothermal installation in the background. Photo source: Kompas/P Raditya Mahendra Yasa (WEN), September 13, 2012.

contaminating some key water springs in the area, the geothermal plant has registered repeated failures and gas blowouts since 2016, which incited protests from local farmers. In 2019, the operator began to build the second unit, located between densely populated settlements. Up to the present, villagers have been staging various protests against the Unit-2 development.

Hendro Sangkoyo: Can you share what you and your fellow community members have been experiencing since the geothermal power plant project began its operation?

Actually, I live in close proximity to the geothermal project, which has been operating for 21 years. From time to time, the company continually expanding their operation, constructing new drilling wells that are so close to where we live. Around the house where my large family lives, the well water now is terrible. Some taste salty, some changed color like lime. But we have no other water sources, so we keep on drinking the water and use it for cooking and everything. In the dry season, the water level would drop like never before. Can you imagine, all of us in Dieng live on the mountain-high slope. We used to have no problem at all with finding water. Hendro Sangkoyo: I heard there is a new

about it? **EM and SI:** The expansion is the development of Unit Two of the power plant. If you visit Dieng today, the whole landscape and the roads for a few kilometers are full of iron pipes for

project expansion in the area. Can you tell

such a development, particularly in the hamlets of Sekundang, Kepakisan and mBèdèng. After my village openly rejected the expansion project, the company moved the location to the neighbouring Kepakisan village.

Hendro Sangkoyo: How does the project work on a daily basis? What do they do?

EM and **SI**: First, they never asked us the residents. We woke up and suddenly there is a

new structure here and there. When we insist to find out or ask questions, they threaten us with criminalization. I myself was criminalized in this way. The company spread a rumor that I stole their metal components. I was interrogated at the local police precinct (POLSEK) and asked whether I took such things. It does not make sense. For such a big energy company, at least they should have some CCTV or other monitoring equipment for their stuff.

Hendro Sangkoyo: Do they instigate division between those who are pro-project and those contra-project?

EM and **SI**: In my village, the company deploys project workers from my village, and in fact, from my big family. So the pro and con conflict develops even within my own family.

Hendro Sangkoyo: How does the project impact farming, the daily livelihood in your villages?

EM and SI: They have been trying to grab the Senthulu waterspring, a very important water source for many villages. At the time being they "rent" a stream that goes to the Kepakisan village, the project site, while the source of that particular stream actually belongs to my community. My community is divided into those who allow the company to use our water and those who are against it. The village head now openly lets the company use the water.

Hendro Sangkoyo: What is your demand now?

EM and **SI**: We want to live in peace and safety. The government should have protected us the farmers by not letting companies to destroy our living environment. If possible we don't want to have geothermal project here. We want to live like we used to since long ago. The water is clear, we live normally and safely. We can live without electricity but we cannot live without nature.

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*All photos provided by the author.

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Cite this article:

Sangkoyo, H. (2023). "Community Resistance to Geothermal Development in Indonesia: Interviews with Community Activists." *Commodity Frontiers* 6: 38-48. doi: 10.26300/ahrq-jq87.

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The Ethanol Frontier and Brazil's Rural Reconfiguration

Thomas D. Rogers

Keywords: Brazil, ethanol, sugarcane, agribusiness, rural labor

Abstract: This piece describes Brazil's 1970s sugarcane ethanol production boom and the arrival of the cane frontier in western São Paulo state. It argues that this region's labor and land tenure transformations became typical of the country's agribusiness-focused economy.

d he recent release of Brazil's 2022 census data has triggered debates about the country's slower-than-anticipated population growth and shifting geographic patterns. Two years ago, the 2022 population was projected at 213.3 million. But the census found just 203 million people, meaning the country is growing at its slowest rate of the past century and a half (Reuters, 2023). People have also distributed themselves in new ways. The huge southeastern cities showed the slowest growth rates. Quicker-growing areas lie in the central and western regions of the country—zones of intense agribusiness activity. Márcio Pochmann, the new director of the Brazilian Institute of Geography and Statistics, described in a recent interview a "demetropolitanizing" of the country. Its "interiorization," he said, was driven by the most dynamic sector of the economy: production of raw materials for export (TV Forum, 2023). Agricultural commodities have crept across Brazilian geographies since the first half of the sixteenth century, but the patterns visible in the 2022 census arguably began in the 1970s. Examining a single agribusiness commodity and one of its frontiers from that decade can help illuminate contemporary trends.

A decade into the regime that began in 1964, the military dictatorship launched a Second National Development Plan that incorporated aggressive support for agricultural commodity production. "Agriculture," the 1974 Plan stated, "which has generally performed well recently, is called to play a new role in Brazilian development, with a much more significant contribution to GDP growth." General (and President) Ernesto Geisel's planners anticipated that Brazil would "show itself capable of realizing its vocation as a global provider of food and agricultural raw materials" (Governo do Brasil, 1974, p. 4). Federal agencies catalyzed fertilizer production, supported new crop variety research, and offered credit and technical support to growers. Through the plan, they hoped to manage agricultural development based on regional assessments of national resources, basic infrastructure, "demographic importance," and concentrated investment (Albuquerque, 1977, pp. 1, 8).

A year after that sweeping plan's release, Geisel announced a National Alcohol Program (Proálcool) to incentivize the production of fuel alcohol. Almost all its generous funding went to projects using sugarcane as their raw material, opening a protracted period of expansion in the sugar agroindustry. Much of the growth came through intensification in traditional areas of production like the coastal Northeast and central São Paulo. But federal and state planners also carried out zoning studies and encouraged sugarcane's spread into areas with little or no history with the crop. Western São Paulo was one of those places. Regional development officials in the small city



Regional highway through sugarcane fields, Vicência, Pernambuco, 2002. Photo source: Thomas D. Rogers,

of Araçatuba responded immediately to Proálcool's announcement. Within a month of the program's debut, they released a preliminary study on the prospects for alcohol production facilities in their area. The ethanol frontier swept over Araçatuba and, over the next three decades, transformed the region.

Araçatuba had no history with sugarcane cultivation, but it did have experience as an agricultural frontier. Linked to the capital by rail in the first decade of the twentieth century, the region was advertised to prospective immigrants as a land waiting for settlement (Mappa da Província de São Paulo). As with so much of central and western São Paulo, coffee was the first commodity crop to arrive in Araçatuba and by the late 1920s the northwest contributed nearly a tenth of the state's overall coffee production. Between 1930 and 1950, cotton enjoyed a brief boom in the region and

the fiber and oil processing facilities it spawned helped initiate a modest agroindustrial sector. A meat-packing plant opened in the 1950s, which in turn spurred the growth of the cattle business (Rossi Rego, 1990, pp. 18, 23, 25). Cattle brought Araçatuba a small measure of fame as the town's market earned a reputation for setting the price of cattle on the hoof, gaining the nickname "Capital do boi gordo" (Capital of the fat steer).

The ethanol frontier's arrival to Araçatuba looked like the previous waves in some ways, as rural producers switched some of their land over to the new crop. But ethanol's rise also differed from the coffee, cotton, and beef episodes. First, sugarcane alcohol production was carefully planned. Federal officials directed support toward areas they thought could accommodate the new crop. A national report on the creation of "Alcohol Poles," or alcohol-

production zones, foresaw production centers in non-traditional sites of production, to extend development opportunities to regions that lacked infrastructure and rural employment. Places like Araçatuba (SNI, 1982). And state agents had no intention of displacing cattle as they encouraged sugarcane planting. Rather, they sought to create what the state Agriculture Secretariat called a "cane-cattle complex" (consórcio cana-boi) (Secretaria de Agricultura, 1983). Planners envisioned farmers converting pastures to cane fields and making cattle-raising more efficient on smaller areas of land by feeding them distillery waste (Bini, 2009, p. 2).

Second, land prices soared with sugarcane's spread. Between 1969 and 1985, Araçatuba's land prices grew at the second-highest rate in the state. Neighboring São José do Rio Preto, also an ethanol boom region, showed the highest increases (Rossi Rego, 141). Planners had crafted a version of their projected "cattle-

cane complex," but it came at the expense of smallholders. Between 1960 and 1980, the number of landholdings of 10 hectares or smaller dropped by nearly two-thirds (over the same period, the state as a whole saw that category of properties dwindle by one third). The smallest properties, up to five hectares, also lost a fifth of their area during this time. Rental agreements fell by two-thirds, as the landless families who had farmed others' lands were priced out of the market (Zanelato, et al. 49-54). One study of a municipality in the region found that in the 1980s most landowners decided to rent their lands for cane planting, eliminating the more diversified planting they had maintained before. Between 1980 and 2000, the rural area lost 81 percent of its population to the city as people abandoned farming and were pushed out of tenancy relationships (Bini, Costa, and Dias, 43-44).



Sugarcane fields after harvest, Escada, Pernambuco, 2003. Photo source: Thomas D. Rogers,

Third, and linked directly to the shifts in property use, sugarcane's spread ushered in sharp changes to the local labor market. The long-time president of Araçatuba's rural workers' union, Aparecido Moura, told me that migrant cane workers began pouring into the area from other states-Minas Gerais, Mato Grosso do Sul, and Bahia. To a certain extent, their numbers helped to strengthen the union. But most of these workers lacked formal employment ties. Given the pejorative label "bóia-fria," or "cold lunch," they fell outside the reach of the unions. More than 2,000 people per year passed through and the union struggled to help them. The union's trajectory shows us the experience of at least part of the rural population (Moura interview). The trend away from small-scale farming registered in the property ownership statistics was confirmed by the greater predominance of wage-earners among union membership, which peaked in the 1980s. The union as a whole declined in power and importance in the 1990s.

In 1980, just five planting seasons after the National Alcohol Program's launch, Araçatuba had one sugar mill and one distillery, drawing on 23,000 hectares planted in cane (up from just 5,000 a decade earlier). Five years after that, Araçatuba's cane fields sprawled across 70,000 hectares and alcohol had become the second most valuable agricultural activity behind cattle (Zanelato, et al, 40-45; Bini, 2). By the 2000s, Araçatuba produced nearly as much alcohol as the top-producing regions in the state, ranking a close third in volume (Secretaria de Energia). These production levels matched the hopes of

the federal zoners, the state officials pursuing cattle-cane harmony, and the regional development advocates who had responded so quickly to the National Alcohol Program's announcement. Along the way, though, they reconfigured the rural natural and human geography. As the union leader Moura put it, the exploding ethanol industry resulted in the "expulsion of man from the land" (Moura interview).

In the years after 1975, regional and national news outlets carried story after story about the armies of migrant workers who poured into the fields, driving the ethanol boom—the bóias-frias who planted and cut the sugarcane for ethanol. But it was not just cane that demanded their labor. The highly seasonal and intensely demanding cane sector was just one of a host of crops that depended on the rapid mobilization and then dispersal of large numbers of workers. Coffee, oranges, peanuts, cotton, and others all require many hands for a comparatively short period of time. The agricultural emporium of São Paulo and, increasingly, the semi-arid savanna region that sprawls across the heart of Brazil (the cerrado), stand in for a mode of organizing agriculture and its labor that first became recognizable in the sugarcane ethanol agroindustry. Planters depended on the migration of hundreds of thousands of seasonal workers, a large proportion from the northeast region (Silva; Menezes). This pattern was starkly visible in places like Araçatuba—ethanol frontiers that were abruptly transformed by cane's decisive arrival in the 1970s, 80s, and 90s.

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*All photos provided by the author.

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Cite this article:

Rogers, T.D. (2023). "The Ethanol Frontier and Brazil's Rural Reconfiguration." *Commodity Frontiers* 6: 49-53. doi: 10.26300/1fvq-ba69.

Commodity Frontiers is an open-access journal edited by the CFI Editorial Board, Mindi Schneider, senior editor. Read it online at the <u>Brown University Digital Repository</u>, or our website, <u>commodityfrontiers.com</u>.

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Powering Progress?:

Discourses and Realities of Big Oil's Investment in Renewable Energy

Charlotte Marcil

Keywords: oil majors, renewable energy, greenwashing, techno-optimism

Abstract: Big oil claims leadership in the so-called renewable energy transition. Among the world's largest publicly traded and investor-owned oil and gas companies, Shell, BP, and Chevron include "renewable" and "low-carbon energy solutions" in their advertising campaigns and company documents. But how much do oil and gas majors actually invest in "renewable energy," and what, exactly, do they count as "renewable?" Based on corporate annual reports and public research that questions their data, this article shows that oil majors' investments in "renewable" energy are both low and inflated. Oil makes up the vast majority of capital expenditures for Shell, BP, and Chevron, while they use "renewables" as a catch-all phrase for almost anything that isn't oil.

hen you imagine a world without fossil fuels, what do you see? Electric vehicles charging at every former fuel pump? Children riding bikes down rows of cozy, single-family homes, powered by 100% renewable energy? A picture-perfect beach view with offshore wind turbines dotting the horizon?

These are among the images that animate Shell's recent ad campaign in the UK, #PoweringProgress. With idyllic scenes of progress—testaments to the power of human innovation—the June 2022 campaign featured a poster, a television ad, and a promotional YouTube video stating, "The UK is READY for cleaner energy."

In June 2023, Shell's campaign was banned by the UK's Advertising Standards Authority because it gave an inaccurate impression of the company's energy portfolio. The ASA deemed the ads deceptive by omission. They failed to acknowledge that far from being a renewable energy leader "powering progress" toward a lower-carbon future, Shell's investment in renewable energy has been abysmal (ASA, 2023).



Cambridge Shell sign by night. Photo source: Will Line, 2012. Unaltered. Wikimedia Commons.

Oil Majors' Recent Spending on Renewables

ike many other oil majors, Shell loudly touts its investments in renewable energy and strategies for lowering greenhouse gas emissions. Before the 2022 ad campaign, the company ran dozens of advertisements as part of its 2018 "Make the Future" campaign, highlighting its contributions to advancing a low-carbon future

(Lim, 2018; Make the Future, n.d.). Other companies like BP, Exxon, and Chevron have been doing the same for years (Chapman, 2019; Wade and Scheyder, 2016; Dembicki, 2021). But how much do oil and gas majors actually invest in "renewable energy," and what, exactly, do they count as "renewable"?

Shell

According to Shell's 2023 annual report, the company's capital expenditure for 2022 was \$25 billion. Half of the total budget - \$12.5 billion - went to oil and oil products. Of the remaining half, \$4.8 billion (19%) went to marketing, \$4.2 billion (17%) to integrated gas, and \$3.5 billion (14%) to "renewables and energy solutions" (R&ES) (Shell, 2023, p. 32). Within Shell's \$3.5 billion expenditure on R&ES, \$2.9 billion (or 12% of its capital expenditure) went towards "low-carbon energy solutions" (Shell, 2023, p.75).

But Shell has a history of inflating its investment in renewables, according to the international nongovernmental organization, Global Witness. In 2023, the group alleged that Shell overrepresented its spending on renewables by including natural gas investments in its R&ES budget in its 2021 annual report (Global Witness, 2023a). In the report, Shell claimed it spent 12 percent of its total \$19.7 billion expenditure on R&ES. Upon investigation, however, Global Witness discovered a significant portion of Shell's R&ES spending went towards natural gas, which, despite having a lower carbon intensity than petroleum, emits significant amounts of methane—a fossil gas 25 times more potent than carbon dioxide (Global Witness, 2023a).

According to the group, in reality, Shell spent only \$288 million on wind and solar generation in 2021, making up only 1.5% of the company's overall spending.

Despite receiving backlash from Global Witness and other advocacy groups for misrepresenting its investment in renewables, Shell will not markedly increase its R&ES spending in 2023. Instead, the company plans to invest \$2-4 billion in R&ES, a figure comparable to its \$3.5 billion expenditure the previous year (Shell, 2023, p.75).

British Petroleum (BP)

Shell is not an outlier in the industry. BP—another top-ten oil and gas producer—also failed to demonstrate a marked commitment to renewables in recent years. In 2022, BP's capital expenditure was \$16.3 billion (BP, 2023, p.24). In total, the company spent \$6.252 billion on customers and products, \$5.278 billion on oil production and operations, \$3.227 billion on gas, \$1.024 billion on low-carbon energy, and \$549 million on other businesses and corporate (BP, 2023, pp. 36, 352).

At best, BP spent only 6 percent of its total capital expenditure on renewable energy in 2022. But because the company's definition of "low carbon energy" includes hydrogen, CCS, power trading, and BP's share in bioenergy businesses, in addition to solar, offshore, and onshore wind, the actual proportion is likely much lower (BP, 2023, pp. 3).

While BP does not disclose its advertising expenditures in its annual report, Global Witness reported that in the first seven months of 2022, the company spent £840,000, or roughly \$1.039 million, on a series of Facebook and Instagram advertisements that ran in the UK (Global Witness, 2023b). The ads promoted BP's progress in developing sustainable business practices, including emissions cuts, electric vehicles, and renewable energy, but failed to mention that over fifty percent of the company's annual spending went towards fossil fuels.

Chevron

Other oil and gas majors, including Chevron, omitted detailed information on their renewable energy investments in their 2022 annual reports. Instead, their reports include broad, vague statements about previous investments, or future plans to invest in low-carbon products like hydrogen, carbon capture and storage, and biofuels.

In 2021 and 2022, Chevron's capital expenditures (including oil exploration costs) totaled \$20.8 billion (Chevron, 2023, p. 46). During the same period, the company claimed it invested \$4.8 billion in lower carbon strategies, including \$2.9 billion for the acquisition of the Renewable Energy Group (REG), a biofuels company

(Chevron plc, 2023, 34). The report, however, makes no mention of wind energy development and only one mention of solar: a project that was constructed "to generate renewable energy for the company's oil and gas operations in the Permian Basin" (Chevron plc, 2023, 38).

As this evidence shows, oil and gas majors, Shell, BP, and Chevron, did not invest substantially in renewable energy in 2022. Nor have they ever. Between 2010 and 2018, BP spent only 2.3 percent of its capital expenditures on low-carbon energy sources, Shell spent 1.2 percent, and Chevron spent 0.2 percent (Gabbatiss, 2022). Yet, their rhetoric tells a vastly different story. A 2022 study found that BP, Chevron, ExxonMobil, and Shell increasingly included sustainability-coded language in their shareholder reports between 2009 and 2020 (Li et al., 2022). For all companies, the keywords "climate change," "transition," "emissions," and "low-carbon energy" appeared more frequently over the study period. But at the same time, the company's actions directly

contradicted their discourses, as they continued to invest in fossil fuels at a rate that dwarfed their spending on renewables.

Climate Change as An "Engineering Problem" with "Engineering Solutions"

In June 2012, then-Exxon CEO Rex Tillerson described climate change as an "engineering problem" with "engineering solutions" (Daily, 2012). Tillerson's diagnosis represented an important shift in industry discourse on climate change. No longer able to contest the scientific consensus of human-caused climate change, the industry shifted from denial to greenwashing, relying in particular on the discourse of technological optimism to disguise its ongoing (and growing) contribution to the climate crisis.

Discourses of technological optimism, which maintain that rapid technological progress will yield solutions to the climate crisis, have appeared

	Shell	British Petroleum	Chevron
Total capital expenditure in 2022	\$25 billion	\$16.3 billion	\$20.8 billion
Expenditures on "renewable" energy in 2022	\$3.5 billion	\$1.024 billion	\$4.8 billion \$1.9 billion (minus biofuel company acquisition)
"Renewables" as share of total capital expenditures	14%	6.3%	23% 9% (minus biofuel company acquisition)
What the company includes as expenditures in "renewables"	Hydrogen, natural gas, carbon capture and storage, electric vehicle charging stations, solar, wind, other "environmental solutions" and "low-carbon fuels"	Hydrogen, carbon capture and storage, power trading, bioenergy, solar, wind	Biofuels, geothermal, hydrogen, carbon capture, offsets, "other emerging technologies," \$2.9 billion acquisition of biofuel company

Summary of "renewables" expenditures and definitions from Shell, British Petroleum, and Chevron 2023 annual reports. Complied by the author.

frequently within oil majors' climate change communications over the past decade (Lamb et al., 2020). Throughout the years, these discourses have taken many forms: from advertising "emerging technologies" to touting the progress of high-tech, "low-carbon" solutions.

In Shell, BP, and Chevron's most recent annual reports, discourses of technological optimism are omnipresent. For example, Chevron frequently uses the phrase "emerging technology" when describing products within its low-carbon energy strategy, but fails to provide concrete examples of the very technologies it touts. Under the header "Business and Energy Outlook," the company states:

Chevron aims to grow its traditional oil and gas business, lower the carbon intensity of its operations and grow lower carbon businesses in renewable fuels, hydrogen, carbon capture, offsets, and other *emerging technologies* [emphasis added] (Chevron, 2022, p. 33).

Although Chevron explicitly names several products within its "lower carbon business," the phrase "emerging technologies" is deceptively vague. It implies that additional, developing technologies will play a role in Chevron's lower carbon business and help the company lower its emissions. Yet, the report includes only one explicit example of the "other emerging technologies" Chevron plans to invest in. The company states:

Chevron is exploring opportunities to commercialize and scale *the next generation of emerging technologies*, including geothermal energy, to grow lower carbon solutions [emphasis added] (Chevron, 2022, p. viii).

Geothermal is hardly an "emerging technology." It is one of the world's oldest and most well-established energy technologies, used by Indigenous peoples in North America 10,000 years ago, and becoming commercially available in the United States in 1930 (U.S. Department of Energy, n.d.). Chevron itself has produced commercial geothermal energy since the 1990s (Chevron Corporation, 2007).

More importantly, while there may be "renewable" ways to use geothermal energy, the environmental and social impacts of its extraction through hydraulic fracturing and horizontal drilling are anything but (see Hendro Sangkoyo's piece in this issue). If fracking is the "emerging technology" of choice for realizing "lower carbon solutions," then it seems almost anything that isn't oil can count as "renewable" in the language of the oil and gas majors.

Chevron's failure to provide concrete examples of new technologies it plans to develop (aside from geothermal) suggests that the phrase "emerging technologies" is nothing more than a trick of technological optimism, used to inflate the company's purported investment in renewable energy and commitment to decarbonization. Further, Chevron, Shell, and BP use the language of technological optimism in their annual reports to suggest that so-called "lower carbon" technologies, which rely on fossil fuel production and infrastructure, are green or will be green in the near future. Instead of renewable electricity generation, Chevron's "low carbon" strategy focuses on lowering the carbon intensity of its traditional oil and gas operations and investing in "renewable fuels," hydrogen, carbon capture, and offsets (Chevron plc, 2023, 33). The company's advertising emphasizes its commitment to renewable energy by focusing on investments in "renewable" biofuels.

However, the processes underlying the production of biofuels like ethanol, renewable diesel, renewable heating oil, and renewable aviation fuel often require the use of fossil fuels and fossil fuel infrastructure (U.S. EIA, 2022). And although biofuels burn cleaner than traditional fossil fuels, they still emit carbon dioxide. Even lipid feedstocks, which have relatively low carbon intensities and are made from used cooking oil, animal fats, and grease, require large inputs of hydrogen—usually derived from fossil fuels—to be produced at scale (U.S. EIA, 2022).

Like Chevron, Shell's definition of "low-carbon energy solutions" encompasses a range of products beyond wind and solar. Shell defines "low carbon products" broadly as "those that have an average carbon intensity that is lower than conventional hydrocarbon products, assessed on a lifecycle basis" (Shell, 2023, p.88). So in addition to



Chevron motor oil en Anti-Freeze. Photo source: Alf van Beem, 2013. Unaltered. Wikimedia Commons.

solar and wind energy, Shell's low-carbon products include e-mobility and electric vehicle charging services, low-carbon fuels (biofuels/HEFA), environmental solutions, hydrogen, as well as carbon capture and storage (CCS) technologies (Shell, 2023, p.88).

The problem is that although they may play a role in decarbonization in the future, many of these technologies are not economically viable or adequately scalable at present. What's worse, many of them are not as "green" as the industry would like us to believe. On the contrary, "low-carbon energy solutions" like renewable biofuels, hydrogen, and CCS require further investments in fossil fuel production and fossil fuel infrastructure, including natural gas pipelines (IEA, 2019, p. 15).

For example, although the oil and gas industry often refers to hydrogen as a renewable or low-carbon energy product, only one type of hydrogen, known as "green hydrogen," is produced without fossil fuels. Currently, most hydrogen is "gray hydrogen," which is produced through steam methane reforming (SMR), a process that breaks down methane derived from fossil fuels into hydrogen and carbon dioxide (Sierra Club, 2023; Saadat and Gersen, 2023). "Blue hydrogen" is also produced using SMR, through the carbon capture and sequestration of natural gas or coal emissions.

According to a report from the International Energy Agency, in 2019 less than .01 percent of hydrogen was produced using water electrolysis (IEA, 2019, p. 42). By contrast, roughly 75 percent

of hydrogen was produced from natural gas, 23 percent from coal, and the remainder from oil and electricity (IEA, 2019, p. 38). The report estimates that hydrogen production accounts for 6 percent of global natural gas usage and 2 percent of global coal usage (IEA, 2019, p. 17). Due to its high fossil fuel intensity, IEA estimated hydrogen production is responsible for 830 million tonnes of carbon dioxide per year, equivalent to the annual emissions of the United Kingdom and Indonesia combined (IEA, 2019, p. 17).

Oil and gas firms like Shell, BP, and Chevron fail to disclose what percentage of their hydrogen is produced from fossil fuels in their 2022 annual reports. Instead, "hydrogen" is often used as a blanket term, regardless of whether it is green, gray, or blue. This omission gives the impression that all hydrogen is low-carbon or fossil-free, even though it is not. Ultimately, portraying hydrogen as a universally low-carbon technology gives the industry license to continue to produce fossil fuels and expand fossil fuel infrastructure, under the guise of investing in renewable energy.

Similarly, CCS is frequently lauded as a "green" technology by the oil and gas industry, but to date, most captured carbon has been used for enhanced oil recovery (EOR), a process that increases the productivity of oil fields (Robertson and Mousavian, 2022). While companies often present CCS as a way to decarbonize fossil fuel combustion, research has shown that the CCS industry would have to grow 2-4 times larger than the current oil and gas industry to mitigate 14–20 percent of total anthropogenic CO₂ emissions by 2050 (Mac Dowell et al., 2017). Given that the oil and gas industry developed over more than a century, it is "highly improbable" that CCS will account for more than 1 percent of CO₂

mitigation in the next 35 years. The notion that CCS technologies will develop rapidly enough to mitigate the harms of fossil fuel combustion is both overly optimistic and highly deceptive. The industry's promotion of CCS as a way to clean and green oil production not only takes resources away from proven renewable energy technologies but also serves to prolong the lifespan of the fossil fuel business.

Conclusion

Ithough oil majors paint a rosy picture of their relationship to renewables, beneath it all, they remain staunchly committed to their core business of fossil fuel production. While they loudly promote "emerging technologies" and "low carbon solutions," they quietly lobby against climate policies, fund disinformation about renewable energy, and roll back their pledges to reduce carbon dioxide emissions. Already, BP and Shell have reneged on their planned emissions cuts and oil output reductions after bringing in record profits in 2022 (Halper & Gregg, 2023; Bousso, 2023).

The industry's confidence in emerging energy solutions—grounded firmly in the climate delay discourse of technological optimism—serves only to perpetuate the extraction and combustion of fossil fuels. Scholars, activists, and political leaders must not be lulled into complacency by the sustainability claims of the oil majors. If it is possible to advance a truly renewable energy transition that is not only rapid but equitable, then we must continue to pursue accountability for the oil and gas industry's ongoing deception and invest our time and energy in just and equitable energy technologies, not false solutions.

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Cite this article:

Marcil, C. (2023). "Powering Progress?: Discourses and Realities of Big Oil's Investment in Renewable Energy." *Commodity Frontiers* 6: 54-61. doi: 10.26300/70a4-9m78.

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A Preindustrial Perspective on Renewable Energy

Brian	Lander	

Keywords: photosynthesis, wood, premodern energy, forests

Abstract: In this think piece, environmental historian Brian Lander discusses historical links between energy types and economic growth. While premodern energy regimes were largely "renewable" and "sustainable"—limiting the production, consumption, and circulation of things—they were not without environmental and social problems. He argues that in modern times, a simple "return" to fossil-free energy will not resolve these deeper issues.

n the modern world it is widely accepted that the economy should grow, and that a Lack of growth is a bad thing. This is not surprising because economic growth gives many people increased access to goods and energy. In premodern times—by which I mean before fossil fuels—things were very different. Wind could move ships and windmills but could not be harnessed to do much else. Water could turn mills along rivers, but the amount of energy was limited and it required building dams that blocked fish runs and impeded boat traffic. Until the widespread adoption of fossil fuels over the past two centuries, most energy in human societies originated with solar radiation that was captured by plants via photosynthesis and which powered the labor of humans and their livestock. In many parts of the world the key material for heating and cooking was wood, which was therefore as essential to people's lives as food, so it is not surprising that people were much more concerned about the sustainability of their wood supply than about economic growth. Since people depended on their local environments to provide them with most of their needs, and there were limits to how much could be extracted from those environments. they had no option other than renewable energy.

In modern times governments strive to attract industrial production to drive economic growth, but this was not the case before fossil fuels. It took a lot of wood to produce salt, metal, ceramics, glass and other goods, so these industries were often considered dangerously parasitic on local wood supplies. In 1615 James I of England strictly banned the use of wood for making glass, saying "the great waste of timber in making glass is a matter of serious concern" since "timber hath been of all times truly esteemed as a principal patrimony in this our realm of England."1 In the eighteenth century there were widespread protests in France against the expansion of the "devouring furnaces" of the metal industry and Swiss farmers burned down a local ironworks that was burning up the local forests. Wood-based industries were often based in remote locations because they tended to face resistance from local people in any place where wood was not abundant. Sustainability, not wealth creation, was the main economic idea.

Fossil fuels revolutionized our economies and societies both because they provide vastly more energy than we can access from photosynthesis and because they are extracted from small areas. Only a small amount of solar energy can be captured by plants in a given area, so economies

¹ This paragraph based on Joachim Radkau, Wood: A History (Cambridge: Polity, 2012), 101-134. Quote on page 125.



James Sinclair, fourteenth Earl of Caithness (British - Queen Anne's Oak), 1864. Photo source: J. Paul Getty Museum, Google Art Project.

based on photosynthesis were based on limited quantities of energy and materials distributed over vast regions. The paucity and dispersed nature of photosynthetic energy is the main reason why premodern governments and economies were much smaller than modern ones.

The tendency of modern people to desire economic growth is a direct result of the seemingly endless economic expansion made possible by fossil fuels. Before fossil fuels people thought very differently about these issues, and the way they thought about them

provides an important insight on what is wrong with modern society. Premodern people thought about energy in a way that was fundamentally "sustainable" because to be unsustainable meant disaster. Whereas hundreds of millions of people in the twenty first century can expect to gain more stuff and use more energy, this was simply impossible before fossil fuels. The amount of economic productivity in a photosynthetic economy was fundamentally limited, and only a small number of people could ever hope to accumulate substantial wealth because the only way to do that was to exploit the labor of many other

people. Most people were not thinking about getting rich, they were thinking that they might starve if the next year's crops failed, or freeze if they had no firewood. In other words, premodern people tended to be fundamentally concerned with survival, and their economic strategies tended to center on reducing risk rather than on growth.

Fossil fuels are fundamentally non-renewable, and they now make up somewhere between 60 and 85 percent of the world's energy use. Nuclear power is also not renewable, though it is not unsustainable in the way that fossil fuels are. Hydroelectricity is renewable in that it runs from the energy embedded in global weather systems, but collecting it requires damming rivers, which often destroys fish populations. This means that hydroelectricity is often gained at the expense of fish: renewable food sources destroyed to provide renewable electricity. Even solar and wind energy increase human impact on the planet. Collecting solar energy on the scale that would be necessary to provide for the human population's current usage would cover vast areas of land with solar panels, most of which would be absorbing solar energy that would otherwise feed plants. Windmills expand the area of the earth used by humans both vertically and into the oceans.

One of the main questions environmentalists disagree on is whether economic growth could ever be sustainable. Techno-optimists maintain that improved technologies and managements can save us. They envision a modernized electricity grid powered entirely without fossil fuels. Critics maintain that this is impossible given current technology and the amount of energy humans currently consume, and that we should instead focus on reducing the consumption of energy and resources. The consumption level of people in Europe and Japan in the 1960s and 70s is often held up as a relatively sustainable version of modernity, and it would be even more energy efficient if it was achieved using the technology now available.

The example of the medieval village chasing off industrialists exemplifies what "renewable"

meant in premodern times: a focus on ensuring the continued availability of the plant materials that were the basis of life. It thus also meant sustainable, and is an example that can help us think about what a society based on renewable energy might look like. It's worth emphasizing, however, that even premodern photosynthesisbased economies were not neutral: farmland was created by destroying natural ecosystems, and the wood burned by humans would otherwise have supported life in the woodlands. The energy regime was renewable and sustainable, but it required transforming ecosystems. While anthropogenic climate change is a matter of existential concern for human societies, it is not the only environmental problem, and one might argue that people in rich countries see it as the central issue simply because it is the only environmental issue whose negative effects can't be shunted onto poorer countries.

Energy is one aspect of our unsustainable economic model that could at least conceivably be solved by technology, but the same is not true of the destruction of the earth's biodiversity to make way for anthropogenic landscapes, the most widespread of which is agriculture. Although medieval villages may be a model for how humans could live sustainably in terms of energy, those agricultural societies were also built by clearing forests and their inhabitants to create human ecosystems. So even if we were able to build a modern grid that was powered without fossil fuels, which will not happen anytime soon, we would only have solved one environmental problem. There is no technological fix for eight billion humans all aspiring to live increasingly resourceintensive lifestyles. Economic growth will always require increased production of materials. So, an end to economic growth, a reduction in the consumption of the wealthier segments of the world's populations, and a turn towards more equitable distribution of resources is still the only solution to a longterm sustainable future. Renewable energy is just one part of the solution.

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Cite this article:

Lander, B. (2023). "A Preindustrial Perspective on Renewable Energy." *Commodity Frontiers* 6: 62-65. doi: 10.26300/33c1-4s89.

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Commodity Frontiers

Capitalism, Contestation, and the Transformation of the Global Countryside The Journal of the Commodity Frontiers Initiative



Image: Llamas grazing behind the old signboard of the "Cuprita" copper mine, Bolivia. Hanne Cottyn, 2018.

Mission Statement

Commodity Frontiers is the Journal of the Commodity Frontiers Initiative (CFI). Edited by a group of scholars and researchers from various disciplines and organizations in the CFI Network, the Journal explores the history and present of capitalism, contestation, and ecological transformation in the global countryside. The point of departure is the commodity frontier concept, which describes sites and processes of the incorporation of "resources" into the expanding capitalist world economy; resources like land, raw materials, knowledge, and labor. In the past 600 years, commodity frontier expansion has been characterized by ecological and distributional conflicts; the displacement and dispossession of Indigenous peoples and other groups; racialization and othering across colonial, settler colonial, and postcolonial geographies; and the production of class, gender, race, and other inequalities.

Each themed issue of *Commodity Frontiers* includes articles about theorizing, studying, and teaching with commodity frontiers. The Journal features reflections and reviews on the uneven and often violent dynamics of capitalist expansion, social change, and ecological transformation on global as well as local scales, in the past and at the present. Contributors include historians, social scientists, (political) ecologists, artists, and activists who work on global commodity production and circulation, rural societies, labor history, the history of capitalism, colonial histories, social metabolism, and conflicts and counternarratives in the countryside. *Commodity Frontiers* endeavors to carry out one of the central goals of the CFI: to provide long historical perspectives on problems that are often assumed to be modern, and to link historical and contemporary research to critically recast our thinking about sustainability, resilience, and crisis.

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Objectives

Commodity Frontiers aims to provide accessible content from multiple perspectives on the past, present, and future of commodity frontier expansion and dynamics. We feature research and educational activities undertaken by academics, artists, activists, and other civil society actors. By inviting short contributions from our multidisciplinary and multi-sectoral networks, and distributing the open-access Journal through our website and the Open Journal System, we aim to reach a broader audience than typical academic publishing allows. We strive for "real-time" reports and reflections on contemporary issues, and contributions that link past and present.

Editorial Process

The articles in *Commodity Frontiers* are not double-blind peer reviewed. Rather, Section Editors purposely invite contributions related to the theme of each issue from experts in respective fields. All articles are reviewed by Section Editors and at least one Editor-in-Chief.

Contributions

Articles that appear in *Commodity Frontiers* are invited contributions. We do not accept uninvited manuscripts. If you would like to contribute to *Commodity Frontiers* or the CFI, please email Mindi Schneider (mindi schneider@brown.edu).