Research Review

Andean Energy? On Animating Forces Beyond Battery Storage

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In the Andean highlands of Bolivia, Chile, and Argentina a multiplicity of forces pulse through the land. The creatures and entities inhabiting it have long transformed this seemingly arid landscape into a vibrant web of vitality. As the world races towards electromobility (ostensibly to address our climate emergency[1]), this region is being recast as a massive repository of lithium, a mineral deemed essential for storing and mobilizing a different kind of power in batteries.

At first glance, the constellation of concepts Andean communities have coined to describe these forces[2] may seem to correspond to the modern understanding of energy. However, notions like *kallpa* and *kamaqen*[3] resist such equating. Unlike energy, which abstracts physical forces from their environmental and social contexts to make them quantifiable and extractable, *kallpa* and *kamaqen* remain deeply embedded in ethical obligations and relational exchanges with the land. In other words, these understandings resist translation into the same generic term as they reflect profound ontological differences.

Outside view of "Cerro Rico" in Potosí, one of the highest cities in the world (13,419 feet). Location: Potosí, Bolivia. Photograph by Mario Orospe Hernández.

Nevertheless, the lithium found within what some now call the *Lithium Triangle* is extracted from saline water pumped from the vast salt flats underground to develop lithium-enabled

electrification technologies grounded on the abstract modern concept of energy. This process involves drawing brine from a fragile network of waterways and subterranean lagoons rich with this mineral. Justified by a narrative that positions lithium-ion batteries as central to solving the ecological crisis, this accelerating extraction is already having severe consequences for Indigenous communities such as Quechua people in Bolivia and Kolla people in Jujuy and the Atacama Desert. It disrupts the ecosystems and relationships that *kallpa* and *kamaqen* have nurtured.

In this sense, batteries can be theorized as devices that extract a particular kind of power from their source and mobilize it elsewhere[4], severing it from the communities and ecosystems that sustain it. Building on an effort to *think through batteries*[5], we might ask: What does the rush to extract lithium for their production reveal about batteries' underlying concept of energy? And how does this abstract understanding overshadow alternative ontologies and relations, such as those cultivated in Andean worlds?

This essay is set against the backdrop of the massive ongoing extraction of lithium which affects the Andean region (home to more than 60% of the world's resources[6]) and also regions in countries like Australia, China, and the US.[7] Furthermore, this essay explores how challenging the disciplinary boundaries that separate the religious from the secular can open space for alternative perspectives. These alternative perspectives can help us to reimagine the trajectory of climate futures. Ultimately, I argue that learning from these animating forces of mutual nurturing invites users of battery-powered devices to rethink their technologies and their underlying concept of energy through the lens of vulnerability and reciprocity. One of the most important things we can learn is to view humans as interdependent with—rather than dominant over—other-than-human beings.

Challenging Dominant Notions of Energy

The energy humanities challenge the conventional perception of “energy” as an ahistorical cosmological force or a purely objective scientific concept. Instead, the discipline scrutinizes it as a historically constructed notion, made effective through what some scholars in this emerging field of study define as energy assemblages—an interplay of discursive paradigms, material infrastructures, and political strategies that secure and sustain these systems. In her influential work, *The Birth of Energy*[8], Cara Daggett traces how the 19th-century development of thermodynamics (deeply embedded in the material and ideological contexts of the Industrial Revolution and imperial aims) transformed the modern understanding of energy into a quantifiable, controllable, and ultimately commodified entity. Modern energy was thus conceptualized as the capacity to perform *work*; however, this understanding reduced work to an abstract activity detached from the specificities of beings and their corporal relations. In this framework, energy became central to interpreting numerous physical processes, from the movement of machines to the functioning of biological organisms.

This shift enshrined energy within a framework of efficiency and productivity, often at the expense of environmental and social well-being. Moreover, its commodification, bolstered by an entire energy assemblage, facilitated the widespread adoption of fossil fuels, enabling global trade while further entrenching the extractive practices that sustain the capitalist economy. Lithium-ion batteries extend this logic by functioning as a stockpile of energy, available for access when needed, rather than as a dynamic flux requiring adaptation to natural rhythms. In this sense, batteries perpetuate a notion of energy as storable ‘fuel,’ reinforcing a worldview in which power is commodified and abstracted from its ecological and social contexts, with little regard for the communities and ecosystems bearing the costs

of their production and usage.

However, the critique of the extractive processes necessary for battery production alone might be insufficient to fully grasp the historical contexts that shaped the concept of energy underpinning them. By illuminating alternative place-based perspectives—such as Andean notions of a network of animating forces, which must be understood on their own terms and within a broader constellation of concepts—we can steer these discussions in potentially transformative directions.

The underground mine inside "Cerro Rico" in Potosí, historically one of the world's largest silver extraction sites, active since Spanish colonization in the 16th century. Location: Potosí, Bolivia. Photograph by Mario Orospe Hernández.

Reciprocal Exchanges of Animating Power in Andean Worlds

The Quechua concepts of *kamaqen* and kallpa offer a profoundly different understanding than the abstracting concept of energy that permeates modern disciplines, technologies, and practices. While their resulting energy assemblages aim to quantify, control, and exploit natural forces, these Andean notions are rooted in alternative ontological and epistemological frameworks that emphasize the interconnectedness of all beings. They are part of a broader network of alternative understandings of materiality[9], personhood, agency, and ethical obligations, articulating a model for mutual relations between humans and other-than-humans.

Historical[10] and archaeological records[11] show *kamaqen* as a foundational concept, deeply rooted in pre-colonial cultures and persisting today. Derived from the verb "kamay," meaning to animate or to charge with life, it has often been translated as "life force" or

“animating essence”[12]. However, such translations only scratch the surface of its multifaceted meanings. *Kamaqen* is not uniformly distributed; it can be accumulated, lost, or exchanged, depending on the actions and relationships of the beings involved, including natural and human-crafted entities like textiles. The notion of *kallpa*, in turn, is closely related but emphasizes the physical and spiritual strength that flows through all beings. It encapsulates vitality and power, often associated with the capacity to act or exert influence within the world[13]. *Kallpa* manifests in multiple ways, such as in the heat emanating from the Sun, which held great significance for the Incas, and in thunderbolts, which have been associated with the Catholic saint Santiago since colonial times. Hence, both are respected as forces of great power.

The flows of *kallpa* and *kamaqen* animating Andean communities[14], also known as *ayllus*, are nurtured through the entire community but sustained by powerful embodiments of alterity forces[15] known as *wak’as*[16], which Marisol de la Cadena translates as “earth-beings” to emphasize that they are not transcendent divine spirits but deeply connected to the material world[17]. These other-than-human beings are powerful and agential and must be respected through offerings that feed them as part of a socially regulated flow of reciprocity known as *ayni*[18]. Failure to maintain this flow can result in illness, ecological imbalance, or social discord.

Promotional poster from the Bolivian government promoting lithium industrialization. Source: Mario Orospe Hernández.

Troubling Religious and Secular Boundaries

These complex forms of relationality, agency, and personhood that challenge conventional Western divisions of reality into subject/object, matter/spirit, or living/inert, have long been

obscured by vocabularies emerging from the dichotomy between the religious and the secular. For instance, the first colonial missionaries, rather than seeking to understand Indigenous epistemologies and practices, sought to either appropriate or eradicate them. Thus, they transformed these understandings of multiple animating forces into Hispanicized notions, such as *ánimu*[19] (a concept linked to Christendom's concept of the soul[20]) or dismissed and combated them as idolatrous practices. Later, modern secular anthropologists would categorize these interactions as "rituals," viewing them as symbolic actions representing meaning rather than lived material practices with real-world effects.

My current research involves engaging with interlocutors impacted by the expanding lithium extraction in Bolivia, a process deeply informed by Western technological and scientific regimes. In my fieldwork, I have witnessed how these Indigenous ways of knowing and living prevail, although not in a static way. Contrary to romanticized views that could consider them untouched ancestral traditions, these practices evolve as they experience frictions and tensions—first with Catholic worldviews and now increasingly with modern secular discourses and practices.

Dating back to pre-colonial times, miners have performed offerings when extracting minerals from the underground to secure favor for successful enterprises and prevent workplace misfortunes. These practices, known as *ch'allas*, consist of alcohol libations and food offerings aiming to feed earth-beings, namely, the material embodiments of *kamaqen* and *kallpa*. Through these acts, Andean relational ontology and principles of reciprocity regulated and mediated mining activities, embedding humans within a network of obligations to other-than-human forces.

Over time, as colonial influences demonized these practices, they started becoming

associated with *El Tío* (“the uncle” in Spanish) —a handmade stone figure shaped like the Devil regarded as the owner of mineral wealth and the guardian of mineshafts across the Bolivian and Peruvian Andes. Extensive anthropological literature during the 20th century examined the meaning and significance of these practices in silver and tin mineshafts, revealing how they embody both resistance and adaptation in the rise of the industrializing global economy[21].

Celestino Gallegos, a miner on Potosí Mountain, honoring “El Tío” – a handmade devil-shaped statue guarding the mining gates of “Cerro Rico.” Location: Potosí, Bolivia. Photograph by Mario Orospe Hernández.

In my ethnographic work with lithium industry engineers and chemists, I have observed how these relational practices are being reinterpreted today. One of the most striking aspects I noticed during participant observations and conversations with interlocutors in the evaporite mineral sector is the absence of *El Tío* in the lithium mining context. Unlike the silver and tin industries, lithium mining is highly technologized, relying on solar evaporation and now on direct-lithium extraction (DLE), which has rapidly altered relationships with materiality.

Nevertheless, members of the surrounding communities and some technicians still practice offerings to earth-beings to honor tradition, even in this high-tech context. When these offerings occur, their effects often surprise even those highly skilled technicians trained in modern science and technology. One day, I was invited to participate in a *ch’alla* organized by the state-owned lithium company, YLB. After the ceremony, which was held in honor of Pachamama[22], an engineer originally from the region but educated in the country’s top engineering schools shared:

> ***"I participate in these ceremonies out of respect. But if I had to describe my position, I'd say I experience a kind of tension between my technical and scientific training and the knowledge of my ancestors. I feel caught in the middle. Sometimes, I want to believe again when doing these offerings, but I'm afraid because when you make a ch'alla once, Pachamama and the other tutelary beings can get used to it. And when you don't feed them, things can go wrong—there might be accidents or bad luck. That's my fear: I don't want them to get used to it because things might start going wrong if I fail them someday due to my technical obligations."***

In other words, even within a highly technologized mining setting like this one, these offerings remind technicians that the mountains, salt flats, and animals are sentient beings integral to a larger network of reciprocal relationships. Feeding these earth-beings seems to re-enact the web of relational exchanges among animating forces—of *kamaqen* and *kallpa*—which lie beyond the abstract concept of energy currently justifying their extraction as batteries' raw materials.

Thus, this ethnographic experience has underscored for me the need to think beyond the secular/religious divide when engaging with these understandings of animating forces and the interactions they foster. Such an approach challenges modern conceptualizations of

energy and dominant forms of technology[23], not merely as tools but as world-making practices embedded in and reproducing specific ontological, moral, and cultural frameworks.

Implications and Horizons

Learning from this Andean understanding of animating forces compels us to a fundamental shift in how we relate to the land. When we, users of battery-powered technologies, consider in depth its lessons beyond the religious/secular divide, the calls to action that it invokes are no longer about preserving certain places deemed ‘sacred’ by sincerely held beliefs while continuing to extract what our secular frameworks have rendered as ‘resources’ or ‘raw materials’ elsewhere. By positioning Indigenous perspectives on equal ontological footing rather than equating them to the predominant notion of energy or reducing them to religious aspects or matters of belief, *kamaqen* and kallpa reveal a deeper truth: everything, including each of us, is interwoven. This means that disrupting such a web of reciprocity by taking from the land and its inhabitants without giving anything back inevitably leads to environmental harm. Unfortunately, the increasingly severe droughts affecting this region[24] affirm the stark reality of ignoring these relational principles.

Río Grande Boron miners and YLB Lithium miners burning k’oa (“mesa”) offerings to Pachamama and Llipi Llipi Mountain. Location: Nor Lípez, Bolivia. Photograph by Mario Orospe Hernández.

The current trajectory of the ‘green’ energy transition, driven by the economic logic of endless accumulation, perpetuates a cycle of extraction and destruction. The idea that we can maintain our consumerist lifestyles simply by replacing its necessary fuel with a decarbonized one is an illusion rooted in the modern secularized imaginaries of human

omnipotence and the dominant concept of energy that materially supports them. Fostering a truly sustainable future for all who share our home Earth—humans, other-than-humans, those who lived in the past now fossilized, and those yet to come—requires us to listen to other ways of knowing and living genuinely. As their alterities help fundamentally reimagine energy assemblages, this will be crucial in the pressing (and ultimately inescapable) task of transforming modern industrial societies' production and consumption. habits.

Boron and YLB Lithium miners wearing red ponchos (poncho rojos) atop Llipi Llipi Mountain. Location: Nor Lípez, Bolivia. Photograph by Mario Orsope Hernández.

Footnotes

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[1] Carrington, "Why the Guardian Is Changing the Language It Uses about the Environment."

[2] I am grateful to Matías Ledesma and Gustavo Sardinas ("Rumi") from the Mink'akuy ayllu for their insightful explanations of the diverse Quechua concepts that form this constellation. In addition to *kallpa* (vital force) and *kamaq* (generative power), which are central to this essay, other terms such as *k'anchay* (light) and *illa* (the energy of lightning) offer additional perspectives. It is important to note that all these concepts are not interchangeable synonyms but rather a multiplicity of interrelated terms, each articulating different ways life is animated and sustained through relationships between humans and other-than-human beings.

[3] In this essay, I will use the spelling system adopted by the Academia Mayor de la Lengua Quechua to refer to these terms. As the Quechua language, known as *Runasimi* by its native

speakers, did not originally have a writing system, different spelling conventions emerged since the colonial invasion. In the Hispanicized spelling of Quechua, prevailing in colonial lexicons, “kallpa” was written as “callpa” and “kamaqen” as “camaquen.”

[4] Weinberg and Bonelli, “Lithium: Towards a Theory of Bipolar Transitions.”

[5] Henare, Holbraad, and Wastell, *Thinking through Things: Theorising Artefacts Ethnographically*.

[6] US Geological Survey, “Mineral Commodity Summary: Lithium.”

[7] Howard Center for Investigative Journalism, “Lithium Liabilities.”

[8] Daggett, *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work*.

[9] Arnold, “The Andean Material World.”

[10] Salomon, “Introductory Essay.”

[11] Bray, “An Archaeological Perspective on the Andean Concept of Camaquen: Thinking Through Late Pre-Columbian Ofrendas and Huacas.”

[12] Taylor, “Camac, Camay y Camasca En El Manuscrito Quechua de Huarochirí.”

[13] Giovannetti and Páez, “Poder, Reciprocidad y Ordenamiento Del Cosmos En El Shincal de Quimivil (Catamarca, Argentina).”

[14] Ricardo Cavalcanti-Schiel, “Las Muchas Naturalezas En Los Andes.”

[15] Alterity is a philosophical concept evoking radical otherness, i.e., something that cannot

be fully grasped or comprehended, hence revealing in its difference the limits of our understanding, our subjectivity, and even our world. This concept was central to authors like Emmanuel Levinas in the Jewish philosophical tradition or Enrique Dussel in the Latin American philosophy of liberation. See: Hand, “Being for Every Other: Levinas in the Anthropocene.”

[16] Mannheim and Carreño, “Wak’as: Entifications of the Andean Sacred.”

[17] De la Cadena, *Earth Beings: Ecologies of Practice across Andean Worlds*.

[18] Wutich, Beresford, and Carvajal, “Ayni Real and Imagined: Reciprocity, Indigenous Institutions, and Development Discourses in Contemporary Bolivia.”

[19] Bugallo and Vilca, “Cuidando El Ánimu: Salud y Enfermedad En El Mundo Andino (Puna y Quebrada de Jujuy, Argentina).”

[20] The decolonial philosopher Enrique Dussel insisted that the notion of the “soul” was not originally a Christian concept. In his view, the messianic movements led by Yeshua emphasized the primacy of the flesh over the ethereal realm of ideas—a perspective more in line with Plato and Plotinus, which later entered Christianity through Greco-Roman influence. See: Dussel, “Epistemological Decolonization of Theology.”

[21] See, for example: Nash, *We Eat the Mines and the Mines Eat Us*; Taussig, *The Devil and Commodity Fetishism in South America*.

[22] *Pachamama,* often translated as “Mother Earth,” is a central figure in Andean cosmologies. She is revered as a nurturing force sustaining human and ecological life. Unlike transcendent deities from the Judeo-Christian tradition, she embodies an immanent

presence and is honored through offerings to seek blessings for prosperity and balance.

[23] Hui and Lemmens, *Cosmotechnics: For a Renewed Concept of Technology in the Anthropocene*.

[24] For example, Bolivia experienced its hottest winter on record in 2023, causing severe droughts across most of the country that lasted several months. See https://english.elpais.com/climate/2023-10-18/severe-drought-parches-bolivia-my-biggest-fear-is-running-out-of-food-and-water.html.

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