Challenging dominant sustainability worldviews on the energy transition: Lessons from Indigenous communities in Mexico and a plea for pluriversal technologies

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A R T I C L E   I N F O

A B S T R A C T

Little research exists on how alternative understandings of sustainability and societal well-being, such as those developed by marginalized Indigenous populations, can enrich and possibly challenge dominant visions of sustainability anchored in Western discourses on sustainable development and ecological modernization. This paper addresses this research gap in the context of the transition towards low-carbon energy sources by addressing the following question: how do Indigenous worldviews contrast with modernist visions of sustainability in the context of the energy transition? To do so, it first builds a conceptual framework contrasting modernist and Indigenous sustainability worldviews. Second, it applies this framework to the case of wind energy developments within the territory of three Zapotec communities located in southern Mexico, with the discussion relying on 103 interviews with key stakeholders, six focus groups and participant observation. Results show that the Zapotec sustainability worldview contrasts strikingly with wind developers' modernist propositions, which tend to reproduce the region's past colonial arrangements in terms of cultural domination, non-recognition of Indigenous identities and disrespect for local customs. This contrast has led to many conflicts and misunderstandings around wind energy projects. The paper concludes that different conceptualizations of sustainability must be recognized to ensure an inclusive and just energy transition, and advances the concept of "pluriversal technologies" to emphasize the need for technologies that embrace ontological and epistemological diversity by being co-designed, co-produced and co-owned by the inhabitants of the socio-cultural territory in which they are embedded.

1. Introduction

The concept of sustainable development (SD), which is derived from the Brundtland Report (Brundtland et al., 1987) and epitomizes the modern Western idea of sustainability, was brought to the forefront of the world's academic and policy agenda with the introduction of the Sustainable Development Goals in 2015. There is no unanimous definition of SD. While some authors argue that it has become a buzzword that lacks a clear definition and that it should be characterized to avoid being misinterpreted or even co-opted (e.g. Aquino Moreschi, 2013; Martinez & Llaguno, 2013), others state that its meaning should intentionally be left vague to allow people with different positions on sustainability to find common ground (e.g. Abrahams, 2017; Anand and Sen, 2000). Others still reject the concept as an anthropocentric and ethnocentric (i.e. Western) illusion that is often imposed at the expense of other worldviews[1] from the Global South and North alike (e.g. Escobar, 2015) and that naively assumes the possibility of endless "sustainable" growth on a finite planet (e.g. Latouche, 2009).

Beyond these discussions on the definitions and conceptual underpinnings of SD in Western academic circles, there is also

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[1] Worldviews can be defined as the "inescapable, overarching systems of meaning and meaning-making that, to a substantial extent, inform how we interpret, enact, and cocreate reality; they are complex constellations of epistemic capacities, ontological presuppositions, and ethical and aesthetic values that converge to dynamically organize a synthetic apprehension of the world" (de Witt & Hedlund, 2018, p312). Worldviews are thus the vehicle by which humans interpret, understand and act in the world.

growing recognition that Indigenous[2] epistemologies, science and ethics have much to offer to the sustainability debate (Loomis, 2000). Some studies have examined how Indigenous knowledges can offer certain key conceptual contributions toward a fairer and more sustainable future (Beling et al., 2018; Kothari et al., 2014; van Norren, 2020). However, very little research exists on how alternative understandings of sustainability and societal well-being, such as those developed by marginalized Indigenous populations, can enrich and possibly challenge dominant visions of sustainability (MacArthur and Matthewman, 2018). This topic is particularly relevant in the context of the transition towards low-carbon energy sources given the significant implications that the deployment of low-carbon technologies has for human well-being in both the Global North and South. While renewable energy technologies (RETs) are vital in the transition to a zero-carbon future, their impacts on communities and biodiversity have often sparked resistance, notably among Indigenous populations (Martin & Hoffman, 2011; Martinez, 2020; Velasco-Herrejón & Bauwens, 2020; Kerr et al., 2015). Research in the area has mainly focused on the impacts of the deployment of RETs on human rights (e.g. Finley-Brook and Thomas, 2011) and well-being (e.g. Godoy, Reyes-García, Byron, Leonard, & Vadez, 2005; Velasco-Herrejón & Bauwens, 2020); however, the distinct contributions that Indigenous worldviews can make to the energy transition have often been ignored (Forster, 2016). Further research on and greater recognition of the capabilities and perspectives of local Indigenous populations are thus necessary to enable a fairer and more harmonious energy transition.

This paper seeks to address this research gap by answering the following question: *how do Indigenous worldviews contrast with modernist visions of sustainability in the context of the energy transition?* It does so through a case study illustrating the significance of giving voice to differing conceptions of sustainability when considering the introduction of renewable energy technologies. Previous studies on Indigenous responses to renewable energy projects have mainly focused on people's relation to nature (Howe, 2014) and land (Torres Contreras, 2021) and their resistance to imposed developments (e.g Alonso and García, 2016; Carnero, 2017; Martinez and Llaguno, 2013). Other authors, such as MacArthur and Matthewman (2018), focused on the institutional setting to examine how conceptual insights offered by Māori knowledge challenge dominant energy narratives and practices. In addition, El Mekaoui et al. (2020) have recently pointed to the importance of considering governance processes when reflecting on notions of the sustainability of energy megaprojects. The present study builds on and goes beyond this literature by considering other key sustainability dimensions within Indigenous worldviews, such as the economic, social and spiritual dimensions, and how these dimensions can contribute to a fairer and more harmonious energy transition. Furthermore, this paper analyses the worldviews of both Indigenous communities and energy developers and thereby offers a comparative perspective that is useful when contrasting different understandings of sustainability and the energy transition.

The paper first provides an overview of the literature on both Western and Indigenous perspectives on sustainability and the energy transition. Second, relying on this literature review, the paper builds a conceptual framework to highlight the factors that distinguish modernist and Indigenous worldviews on sustainability. Third, the paper applies this framework to understand the perspective of three Zapotec communities regarding new wind energy developments in the Isthmus of Tehuantepec, southern Mexico.

The Isthmus is regarded as one of the best locations in the world for the generation of power through wind turbines; nonetheless, the implementation of renewable energy projects has sparked significant social opposition among Indigenous communities, which has led to controversy concerning the impacts of this new industry (Huesca-Pérez et al., 2016). The empirical findings of this research draw on 103 semi-structured interviews, six focus group discussions and participant observation conducted between September 2017 and January 2019 with community members to provide comprehensive and profound insights into their understandings of sustainability. These understandings are subsequently discussed in light of policy and academic conceptualizations of sustainability.

The results indicate that Zapotec peoples in southern Mexico have a distinct perspective on sustainability and a unique cosmovision that often clash with the modernist propositions of energy developers. These contrasts have led to much conflict and misunderstanding between Zapotec communities and wind energy projects, which tend to reproduce the region's past colonial arrangements in terms of cultural domination, non-recognition of Indigenous identities and disrespect for local customs. The paper concludes that the plurality of voices among and the perspectives of people on the ground have to be heard and taken into account to develop a more diverse and holistic vision as to how an inclusive and sustainable energy transition can be achieved. The paper thereby advances the concept of "pluriversal technologies," which highlights the need for a more comprehensive account of differing visions of sustainability. The remainder of this article presents the theoretical framework on which the empirical work is grounded (Section 2), the methodology used (Section 3), the empirical analysis (Section 4), the discussion of the findings (Section 5), as well as some concluding remarks and some implications for future research (Section 6).

2. Literature review and conceptual framework

2.1. Modernist worldviews on sustainability and the energy transition

The modernization theory of development is an umbrella term for various paradigms that emerged in the 1950 s seeking to describe and explain the processes of transformation from traditional or so-called underdeveloped societies to so-called modern and developed societies (Power, 2018). These paradigms are united around a central idea, namely that progress is the universal basis for development, which is conceptualized as a process of evolutionary stages (Rostow, 1960). In this view, traditional societies are considered as backward, simple and primitive, while Western societies are depicted as ideal economies that have reached the final stage of modernization: the age of "high mass consumption" (Rostow, 1960). Traditional structural and cultural features are thus regarded as incompatible with such development and therefore must be overcome.

During the same period in which the abovementioned paradigms emerged, early environmental writings linked population growth in the Global South to environmental destruction and shared a negative perception of traditional societies as being one of the main causes of this problem. Neo-Malthusian discourses such as Hardin's (1968) "tragedy of the commons" saw traditional cultures and their inefficient forms of natural resource management and unconstrained population growth as a threat to the planet's limited natural resources that would inevitably lead to overexploitation and population collapse. These theories often neglected the mounting evidence concerning the sustainable use of natural resources by Indigenous peoples and the long history of traditional non-coercive mechanisms of population control among such peoples (Kallis, 2019).

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[2] Indigenous peoples can be defined as "peoples descended from [and who have maintained cultural ties to] the original inhabitants of a place where state institutions not of their own making assert jurisdiction and, as a consequence, do not now control their political destinies" (Martin & Wilmer, 2008, p. 584).

In the 1980s, a new consensus emerged concerning the notion of SD, culminating in the publication of the Brundtland Report (Our Common Future) in 1987 and the 1992 Earth Summit (UN Conference on Environment and Development) in Rio de Janeiro, Brazil (Redclift, 2005). This consensus led to the establishment of the current definition of SD as "development which meets the needs of current generations without compromising the ability of future generations to meet their own" (Brundtland et al., 1987). It also established the three equally important social, environmental and economic pillars of SD, which together seek to ensure a fair and ecologically sound future with a strong focus on free-market competition, social justice through state welfare, the rule of law, good governance and effective representative democratic institutions (Vermeulen, 2018).

Another founding tenet of hegemonic visions of SD is the ecological modernization theory, which argues that it is possible to reconcile economic progress with the well-being of the environment and that ecological problems can be resolved through technological and business innovations (Fisher & Freudenburg, 2001). In this "win–win" approach to environmental problems, nature is primarily seen as a resource, like labor or capital, that, if used productively, sustainably and efficiently, can serve as an endless source of so-called "green growth" (Redclift, 2005). There is hence a strong focus on increasing energy and resource efficiency as well as on product and process innovations such as sustainable supply chain management, cleaner production, biomimicry, circular economy and eco-design (Bauwens, Hekkert, & Kirchherr, 2020; Calisto Friant, Vermeulen, & Solomone, 2020). It is assumed that through these innovations, economic growth could be effectively "decoupled" from environmental degradation, leading to a dematerialized and decarbonized "green economy" created by a third (Rifkin, 2013) or even fourth (Sachs et al., 2019) industrial revolution.

For the energy transition in particular, this decoupling entails a strong focus on the deployment of renewable energy innovations (e.g. solar, wind, hydro, biomass, geothermal, bio-digestion) and low-carbon technologies and infrastructures (e.g. electric vehicles, carbon capture and storage, smart grids and heat pumps) (Kittner et al., 2017; Richardson, 2013). The idea is thus to decarbonize the energy system by electrifying it and powering it with low-carbon electricity (Baruah et al., 2014). This approach focuses on the supply side and pays little attention to reducing energy demand through lifestyle changes and socio-cultural transformations (Labanca et al., 2020).

In the last four decades, the ecological modernization theory and SD have gone hand in hand to promote a certain vision of sustainability, one powered by high-tech innovations, international trade and eco-efficiency and leading to a hyper-globalized world where clean technology enables a materially abundant future for all. This hegemonic idea of sustainability is deeply ingrained in Western materialist, individualist and positivist worldviews (Dryzek, 2013). It is thus an ethnocentric proposition that does not acknowledge other cosmovisions, such as those of Indigenous peoples in the Global South (van Opstal & Hugé, 2013). Moreover, it is an anthropocentric proposition that views nature as a commensurable and substitutable commodity and considers humans superior to other forms of life (Escobar, 2018).

Sustainable development has also been heavily criticized for assuming the possibility of endless economic growth on a finite planet (e.g. Latouche, 2018; Martínez-Alier et al., 2010; Vanhulst & Beling, 2014). In fact, an increasing body of evidence has demonstrated that the expected decoupling of economic growth from environmental degradation proposed by the modernization theory has not occurred and will most likely not occur on the scale required to avoid an irreversible environmental collapse (e.g. Haberl et al., 2020; Hickel & Kallis, 2019; Parrique et al., 2019). Degrowth and post-development scholars have thereby discred-

ited SD as an oxymoronic ideal that desperately attempts to sustain an inherently unsustainable societal system (e.g. Blühdorn, 2017; Gudynas & Acosta, 2011; Redclift, 2005).

SD and the deployment of renewable energy infrastructure (e.g. dams, wind farms) have often led to the privatization and enclosure of Indigenous territories (Fletcher, 2012; Sullivan, 2017). While this process is framed as a positive mitigation strategy necessary to prevent catastrophic climate change, it can often simultaneously endanger livelihoods, violate human rights or impose additional hardships on communities that are already struggling to adapt to climate change (Avila, 2018; Dunlap, 2019; Marino & Ribot, 2012). According to some authors, renewable energy facilities can therefore renew historical processes of accumulation by dispossession[3] and colonialism (Normann, 2020). In this perspective, the emergent idea of "energy colonialism" (Batel et al., 2013) highlights that it is not an accident that Indigenous regions are the preferred locations for energy mega-projects: ongoing settler colonial logics of elimination place poor, rural Indigenous communities at greater risk of capitalist exploitation and dispossession worldwide (Lloyd & Wolfe, 2016). Despite increasing legal protection in many countries (Velasco Herrejon & Savaresi, 2020), Indigenous territories continue to be threatened by green grabbing – the appropriation of land and resources for environmental ends (Fairhead et al., 2012).

This has also been the case in the Isthmus of Tehuantepec, where the relationship between and inseparability of Indigenous people and their land have come under strain (e.g. Howe, 2014; Nahmad, Nahón, & Langlé, 2014; Oceransky, 2010). Studies on this issue have shown that structural conditions and inequalities have allowed the transfer of land to private corporations and argued that local communities face a process of *despojo* (land dispossession) by the wind energy industry (e.g. Alonso and García, 2016; Carnero, 2017; Martinez and Llaguno, 2013). According to these authors, this had led to a continuous process of energy colonialism, as Indigenous peoples are forcefully displaced from their communities, either directly or indirectly to escape the impacts of wind farms and other energy infrastructures, which often render farming or habitation impossible (Dunlap, 2018; Siamanta & Dunlap, 2019).

2.2. Indigenous worldviews on sustainability and the energy transition

Indigenous peoples offer an approach to sustainability and well-being that radically differs from hegemonic Western worldviews. While they have largely gone unrecognized in mainstream sustainability literature (Tom et al., 2019), there are a plurality of alternative Indigenous concepts, such as *Buen Vivir* (*Sumak Kawsay* in the Quichua language) from Ecuador, *Vivir Bien* (*Suma Qamaña* in the Aymara language) from Bolivia, *Ubuntu* from South Africa, *Ecological Swaraj* from India and the Haudenosaunee concept of good mind (*Ganigonhi:oh* in the Onondaga language). While all these Indigenous visions of sustainability and well-being have inherently different and diverse philosophies, they also share many components that clearly distinguish them from modernist views of SD.

First, they are ontologically relational, as they establish no conceptual division between different aspects of life (Escobar, 2014). The spiritual, social, political, economic and environmental dimensions of sustainability are thus viewed as inherently interrelated and interdependent elements that cannot be addressed independently (van Norren, 2020). Humans are seen as one component of a large web of life who share the same planet and cosmos with a multitude of equally important spirits, animals and plants (van Opstal & Hugé, 2013). This eco-centric cosmovision recognizes

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[3] A concept presented by David Harvey (2003) that seeks update Marx's theory of primitive accumulation to consider the ways in which dispossession occurs in present-day capitalism in its various forms.

the inherent interconnectedness of all life and promotes a deep sense of spatio-temporal belonging, humility and gratitude for the riches of the natural world (McCaslin, 2005; Sheridan & Longboat, 2006). Sustainability is hence viewed as living harmoniously and in balance with all forms of life (van Norren, 2020).

Moreover, nature is seen as sacred, unique and incapable of being replaced or exchanged for private gain; thus, ecological imperatives are placed above socio-economic growth and development (Beling et al., 2018; Kothari et al., 2014). This vision is deeply opposed to the ecological modernist idea that environmental impacts in one region (e.g. from a dam or wind farm) can be mitigated elsewhere by replacing destroyed ecosystems (Nirmal & Rocheleau, 2019). In fact, the very act of quantifying and commodifying nature to translate it into monetary forms through "ecosystem services" and "natural capital" can be seen as an offence to a sacred and unique territory whose value is incalculable and unsubstitutable (Escobar, 1999; Sullivan, 2017).

Another key characteristic of Indigenous worldviews is their epistemological pluralism, which considers Western science and technology as being as valuable and important as traditional forms of knowledge, such as ancestral wisdom passed down orally by elders and spiritual experiences (e.g., dreams, conversations with spirits and animals, drug-induced hallucinations; Studley, 1998). By considering other forms of knowing and knowledge-making, Indigenous worldviews differ significantly from the epistemological positivism of hegemonic SD visions, which acknowledge modern scientific reasoning as the only legitimate means of uncovering the truth (De Sousa Santos, 2014; Singh, 2019; Tom et al., 2019).

Indigenous worldviews translate to economic structures that are completely different from Western structures and that are based on social and solidarity economies rather than competition and private property (Calisto Friant & Langmore, 2014; Kothari, Salleh, Escobar, Demaria, & Acosta, 2019). Reciprocity, equality and solidarity are valued above accumulation and profit, and social equity, fairness and harmony are sought through informal systems of non-monetary exchange, cooperation and the sharing of skills and resources (Kothari et al., 2014; Paradies, 2020). Similarly, there is a sense of collective stewardship of natural resources, which should be cared for and protected in a mutually beneficial process of nurturing and healing (Princen, Manno, & Martin, 2015; Sheridan, Longboat, & He, 2006). Territories and natural resources are therefore often owned and managed through communal structures rather than privately (Beling et al., 2018; van Norren, 2020). There is also a key attachment to autonomy and self-sufficiency in the provision of basic human needs such as food, shelter and housing (Demaria & Kothari, 2017). Communal territories are hence protected and nurtured to maintain biodiversity and ensure the health of local ecosystems, which are the basis of Indigenous economies. Collective sufficiency and frugality are also often promoted not only to preserve natural balance but also as a form of freedom and self-mastery (Paradies, 2020; Singh, 2019).

In line with the need to preserve social harmony, Indigenous forms of governance are often centered around strong direct democratic processes, whereby decisions are taken in communal assemblies that seek consensus through non-hierarchical deliberation (Nirmal & Rocheleau, 2019; Paradies, 2020). This participatory bottom-up form of governance decentralizes power in self-organizing networks of democratic communities (Beling et al., 2018; van Norren, 2020). For larger institutions, which horizontally regroup various communities, elected representatives are often chosen as spokespersons rather than leaders and answer directly to local institutions (Kothari et al., 2014; Nirmal & Rocheleau, 2019). In Ecuador, Indigenous worldviews led to the establishment of the Rights of Nature in the new 2009 Constitution, which is guided by Indigenous principles of *Buen Vivir* (Calisto Friant & Langmore, 2014). The Ecuadorian Constitution also recognizes traditional forms of justice and land tenure to ensure that local socio-cultural practices are respected and maintained (Government of Ecuador, 2008). Similarly, in Bolivia, Indigenous principles of *Vivir Bien* led to the proclamation of a plurinational state that recognizes the diversity of cultures and peoples in Bolivia and their right to self-determination and autonomy (Porto-Gonçalves & Leff, 2015).

Indigenous people also have a different conception of time, which is often viewed as a cyclical movement, the rhythm of which is determined by spiritual rituals, ceremonies, celebrations and festivities in which surplus is collectively consumed and shared (Studley, 1998). These rituals provide spaces for social bonding and solidarity, remembrance of past generations or connection with future ones, respect for spirits and other forms of life and harmonious connection with nature, often through the sustainable sowing or harvesting of crops or collective management of cultural territories (Bollaert, 2019). These socio-cultural practices are often linked to natural cycles of life and death, such as the passing of seasons or the arrival of certain animals (such as migrating cattle or birds) (Sullivan, 2017). Moreover, time is not viewed as a deterministic movement from past to future but rather as a process shared with ancestors and future generations, which must be acknowledged and respected (Bollaert, 2019; van Norren, 2020). This spiritual notion of time and the collective construction of identity through rituals are directly opposed to utilitarian ideas of development and modernization, which conceives time as a linear upward path to material abundance and individual achievement (van Opstal & Hugé, 2013).

The application of Indigenous worldviews to the energy transition implies the development of energy systems that respect local sovereignty and avoid the destruction of unique ecosystems (Sovacool, Burke, Baker, Kotkalapudi, & Wlokas, 2017). Several studies examining Indigenous-led energy transitions in different national contexts, such as Canada (Brewer II et al., 2018; Lowan-Trudeau, 2017), Mexico (Avila-Calero, 2017) and New Zealand (MacArthur & Matthewman, 2018), have stressed how traditional beliefs can inform alternative energy systems that are profoundly sustainable, decolonial and socially just. In opposing large-scale energy projects and extractive activities, Indigenous peoples have often sought energy sovereignty through decentralized renewable energy technologies owned and managed directly by local communities. In Ecuador, the philosophy of *Buen Vivir* led to the Yasuni-Ishpingo-Tambococha-Tiputini initiative, which attempted to gain international support for its mission of keeping oil in the ground and preserving the Yasuni National Park, which is one of the most biodiverse spots on Earth and home to two uncontacted Indigenous tribes that live in voluntary isolation (Vallejo Silva & Calisto Friant, 2015).

2.3. Conceptual framework: Differentiating Western and Indigenous worldviews on sustainability

From the above literature review, it is clear that Indigenous people have a radically different approach to both sustainability and the energy transition when compared with modernists' views. To summarize and help the reader to better understand and navigate these differences, we developed an analytical framework that identifies the main differences between modern and Indigenous sustainability propositions (see Table 1 and Appendix 1 for a detailed version of this framework).

To develop this framework, this paper builds on the results of Section 2.1 and reviews previous frameworks or typologies that specifically distinguish the characteristics of Western sustainability worldviews from those of Indigenous peoples (e.g. Bollaert, 2019; Kothari et al., 2014; van Norren, 2020). In addition, general conceptual frameworks or typologies that not only distinguish

Table 1
Differentiation of Indigenous and Western worldviews on sustainability.

Aggregate Dimensions	Components	Indigenous worldviews	Modernist worldviews
Underlying philosophy	**Ontology** (Beling et al., 2018; Bollaert, 2019; Calisto Friant et al., 2020; de Witt & Hedlund, 2018; Johnson et al., 2011; Koltko-Rivera, 2004; Studley, 1998)	**Relational**: sets no division between society, nature and spirituality.	**Rational**: sets divisions between society, nature and spirituality.
	Epistemology (Calisto Friant et al., 2020; de Witt & Hedlund, 2018; Johnson et al., 2011; Koltko-Rivera, 2004; Studley, 1998; van Norren, 2020)	**Pluralist:** traditional and scientific knowledge valued equally.	**Positivist:** only recognizes scientific knowledge.
Environmental dimension	**Human-nature relationships** (Beling et al., 2018; Koltko-Rivera, 2004; Kothari et al., 2014; Studley, 1998; van Norren, 2020; van Opstal & Hugé, 2013; Vos, 2007)	**Eco-centric:** nature as sacred and indivisible from humans so must be cared for, respected and nurtured.	**Anthropocentric:** nature as a resource or form of capital to be used sustainably and efficiently.
	Ownership structures (Kothari et al., 2014; van Opstal & Hugé, 2013)	**Commons:** communal ownership and management.	**Private property:** private ownership and management.
Socio-political dimension	**Political governance** (Beling et al., 2018; Beumer et al., 2018; Kothari et al., 2014; van Norren, 2020; Vos, 2007)	**Decentralized direct democracy:** bottom-up self-governance through local assemblies.	**Representative democracy:** elected leaders rule through powerful national institutions.
	Social justice and equity (Hopwood et al., 2005; Kothari et al., 2014; Vos, 2007)	**Equity and solidarity:** strong local structures of solidarity and reciprocity.	**Meritocracy and welfare:** meritocratic market distribution of wealth and state welfare for the rest.
	Perspective on the state (Beling et al., 2018; van Norren, 2020)	**Plurinationality:** seek a plurinational state as opposed to oppressive nation state.	**Rule of law:** nation state is key for rule of law, freedom and welfare.
Economic dimension	**Economic framework** (Beling et al., 2018; Kothari et al., 2014)	**Social and informal:** focus on social and solidarity economy, local sovereignty and self-reliance.	**Global trade and productivity:** focus on international market competition for green growth.
	Perspective on economic growth and development (Beling et al., 2018; Calisto Friant et al., 2020; van Norren, 2020; Vos, 2007)	**Degrowth/post-growth:** gross domestic product (GDP) not an end in itself.	**Pro-growth:** GDP necessary and valuable end it itself.
Spiritual dimension	**Sense of identity and fulfillment** (Bollaert, 2019; Koltko-Rivera, 2004; Schwarz & Thompson, 1990; Studley, 1998; van Egmond & de Vries, 2011)	**Collective and immaterial:** human dignity and identify seen as communal and spiritual.	**Individual and material:** human dignity and identity fulfilled through individual and material aspirations.
	Time orientation (Bollaert, 2019; Koltko-Rivera, 2004; Studley, 1998; van Opstal & Hugé, 2013)	**Cyclic and ancestral:** ancestors and traditions are remembered in festivals, with time often being understood as cyclic or spiral.	**Linear and future driven:** focused on future gains and returns on investments, with a linear understanding of time.
	Spirituality (Koltko-Rivera, 2004; Kothari et al., 2014; Studley, 1998)	**Central:** integral and holistic component of social harmony.	**Secondary:** left to the private sphere.

modernist and Indigenous perspectives but also consider a wide range of other sustainability propositions were also reviewed (e.g. Beumer, Figge, & Elliott, 2018; Calisto Friant, Vermeulen, & Solomone, 2020; Dryzek, 2013). Finally, to further strengthen the framework, we reviewed a number of general typologies that do not specifically acknowledge or integrate Indigenous worldviews but feature established well-recognized typologies for understanding different sustainability worldviews (e.g. de Witt & Hedlund, 2018; Schwarz & Thompson, 1990; van Egmond & de Vries, 2011). Integrating the abovementioned literature ensures the strength and validity of the proposed framework, as it integrates and synthesizes the main distinguishing criteria and conceptual components identified in previous research.

However, as both Indigenous and Western worldviews are diverse and complex, any such framework is bound to feature generalizations and simplifications. Indigenous propositions concerning sustainability and well-being were thus synthesized to contain the most common and prominent features found in the academic literature (Section 2.1). Similarly, when considering Western worldviews, we focused on perspectives on SD and ecological modernization, which represent the hegemonic views on sustainability. It is thus worth noting that some radical social movements in the Global North could better identify with Indigenous worldviews as represented in Table 1 (e.g. the degrowth movement, the transition town movement, the great transition initiative and the ecovillage movement; Bina, 2013; Feola & Jaworska, 2019). Our objective is not to oversimplify the plurality of different sustainability visions but rather to establish a synthesis of the main differences between modernist and Indigenous worldviews on sustainability in order to determine how these worldviews relate

to the perspectives of the Zapotec communities and to help uncover their unique relation to the energy transition.

To facilitate the reader's understanding of the framework, it is divided into five aggregate dimensions. The first dimension is the underlying philosophy, which is by far the most common differentiating criterion in the literature, as it represents the root philosophical principles that underlie all other components. The environmental dimension, which is the second most common differentiating criterion in the literature, deals with human–nature relationships and ownership structures. Third, the socio-political dimension represents key elements of governance and political thought. Fourth, the economic dimension describes the core economic principles, ideas and practices. Finally, the spiritual dimension addresses people's relationship to time, spirituality and human fulfilment.

3. Materials and methods

3.1. Case study

The Isthmus of Tehuantepec in Mexico was selected as a suitable location to conduct an inquiry into alternative understandings of sustainability in the energy transition due to the recent introduction of the wind energy industry in the region. Indeed, this area has been identified as one of the best in the world for the establishment of wind farms (Nahmad, Nahón, & Langlé, 2014). Following a major energy reform in 2008 that facilitated international private capital investments (IRENA, 2015), large international utility companies started to operate in the region and to install wind energy turbines, which accounted up to 6,238 MW in 2020 (REVE, 2020).

Furthermore, Tehuantepec straddles the state of Oaxaca, a region shaped politically by its Indigenous identity, as well as by the legacy of colonialism, high levels of marginalization and profound levels of inequality. It is one of three states with the highest Indigenous population percentage in Mexico, as 43.7% of its population self-classify as Indigenous (INPI, 2015). It is also one of the poorest: according to the National Population Council's (CONAPO, 2015) marginalization index, 84% of the municipalities in the Isthmus of Tehuantepec face a moderate, high or very high degree of marginalization.[4] Mexico generally has high levels of income inequality, having a 43.4 coefficient in the GINI 2016 Index[5] (World Bank, 2016). This level of inequality greatly affects Oaxaca specifically given the legacy of colonization and discrimination against Indigenous and non-white people.

The introduction of the wind energy industry to the region was not originally contentious. Developers approached Indigenous landowners, who initially agreed to have their lands leased to build wind farms without much hesitation (Nahmad, Nahón, & Langlé, 2014). However, tensions developed as the price negotiation process progressed and turbines were erected. While, in theory, the establishment of wind farms represented an opportunity for the region, friction between local resistance groups, developers and the government is putting further investments at risk and affecting the well-being of local populations (CCC, 2015).

Three communities with similar characteristics located in the region of the Isthmus of Tehuantepec were selected (see Figure 1). In these three communities, wind farms have been previously installed (between 2009 and 2017), and new wind farms are being planned, leading to ongoing conflicts between local populations and wind energy developers. The three communities have similar populations (with each being home to around 10,000 people) and comparable levels of deprivation (with poverty rates ranging from 34.2% to 63.3%), low education figures and a Human Development Index of around 0.700 (see Table 2). In addition, the three communities each have a strong Indigenous population and heritage.

3.2. Data collection and analysis

The present study a combination of mixed methods and qualitative methodological tools, including 103 semi-structured individual interviews, six focus groups, and participant observation carried out between September 2017 and January 2019. Interviewees were selected using snowball sampling (Seale, 2004), starting with a small number of initial contacts fitting the research criteria (with participants being selected to achieve a balanced representation in terms of age, gender, ethnicity, socioeconomic status and relationship to wind farms; see Table 3), who then made referrals to other potential interviewees in their networks. This procedure was followed until theoretical saturation was reached (i.e. no new codes or concepts emerged by conducting additional interviews; Rijnsoever, 2017). We also sought diversity in terms of participants by interviewing a wide range of different actors, including local inhabitants, non-governmental organizations (NGOs), energy developers, government representatives and academics (see

Table 3).[6] This purposive sampling procedure was aimed at selecting the most information-rich cases to offer a robust answer to the research question (Quinn Patton, 2021). Our sample size is considerably larger than the minimum sample sizes for this method recommended in previous studies, which have usually considered around 50 participants (Rijnsoever, 2017). This large sample size further enhances the confidence, robustness and solidity of the findings.

To encourage interviewees to respond openly and freely, participant anonymity and confidentiality were guaranteed, and all responses were anonymized during the coding process. All interviews and focus groups were held in Spanish given that all respondents felt comfortable speaking this language. Interviews explored (1) understandings of sustainability and (2) how these conceptions are associated with their everyday interactions with wind farms (Table 3). Interviews and focus groups were conducted during the participant observation to allow the first author to engage in the daily activities, rituals, interactions and events of all three communities (Musante & DeWalt, 2010). The first author spent four weeks living in the home of a local family in each locality, taking part in cleaning activities and cooking, home-schooling children and attending parties and family gatherings. This allowed a more in-depth understanding of people's relationships with nature and everyday interactions with wind farms. All interviews, focus groups discussions and voice notes were manually transcribed. The data was analyzed using the NVivo 12 software following guidelines for thematic analysis using nodes (Bergin, 2011). Coding focused on the identification of Zapotec worldviews and modernist visions of sustainability and their relationship to the installation of wind energy infrastructure. Transcripts were read several times and grouped into themes according to the dimensions proposed for the theoretical framework (Table 1).

4. Empirical findings: Indigenous understandings of sustainability in southern Mexico

This section analyses how study participants experience the dimensions described in the conceptual framework and interact with the nascent wind energy industry in the Isthmus of Tehuantepec. The underlying philosophy, the ecological dimensions, the socio-political dimensions, the economic dimensions and the spiritual dimension are presented in turn.

4.1. Underlying philosophy

4.1.1. Ontology

Academics and opponents of wind energy in Unión Hidalgo refer to the concept of *comunalidad* as a central organizing principle. *Comunalidad* is a communal cosmovision central to Zapotec cultural identity. The primary theorists associated with this philosophy are José Rendón Monsón, Floriberto Díaz, and Jaime Martínez Luna (Aquino Moreschi, 2013). *Comunalidad* is founded in the struggles that the people of the Sierra de Oaxaca have engaged in since the end of the 1970s against the dispossession of their natural resources and to defend their right to self-determination and

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[4] This index considers deficiencies in basic education and housing, residence in small, dispersed and isolated localities, and low monetary income (CONAPO, 2015).

[5] The Gini coefficient is based on the comparison of cumulative proportions of the population against cumulative proportions of income they receive, and it ranges between 0 in the case of perfect equality and 1 in the case of perfect inequality (OECD, 2020)

[6] Interviewee identifier codes have been generated to ensure the anonymity of all participants and to provide the reader with information about the informant while reading the empirical discussions. Six codes have been produced as following: participants whose code starts with the letter C are people living in the proximity of a wind farm who do not hold a lease agreement with a wind energy developer, and therefore are categorised as non-direct beneficiaries. Participants starting with the letter L are residents of the three communities who hold a tenancy agreement with at least one wind energy developer. Participants starting with the letter D are people working for a wind energy company. G stands for people who held a position in the local, state, or federal government at the time of the interview. The letter N stands for participants who work at a non-governmental organisation, and, finally, participants with a letter A hold a research position in an academic institution.
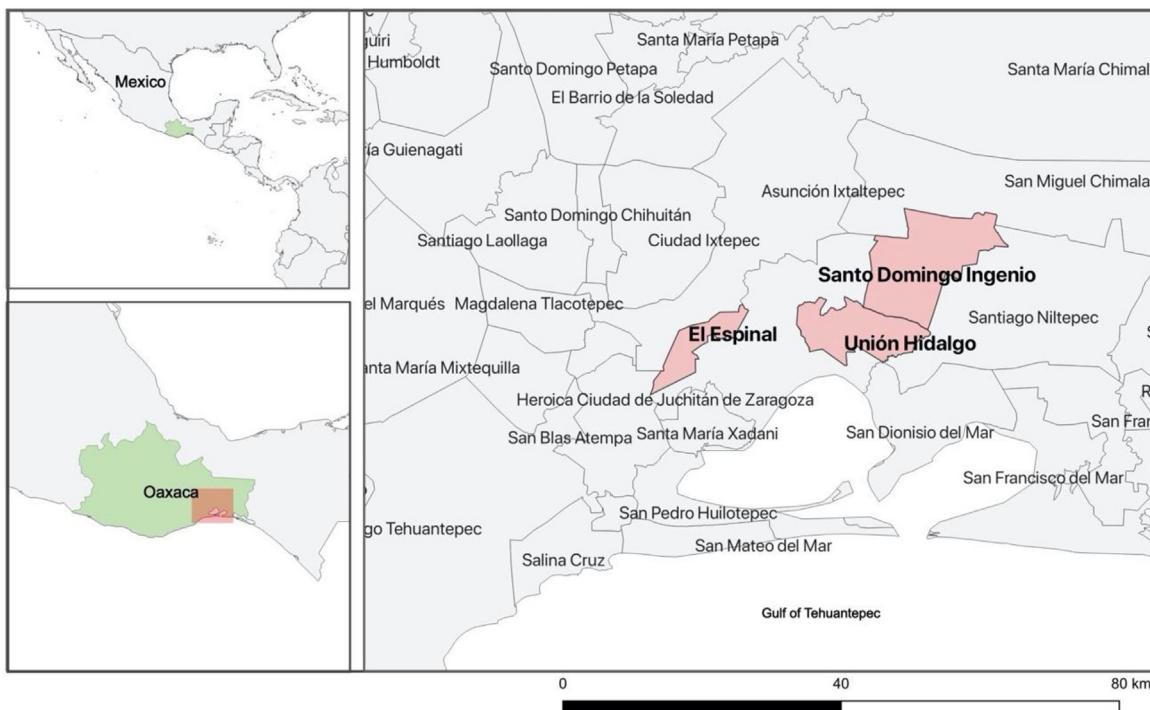
Source: Map by Alejandro Guizar Coutiño

Fig. 1. Three case studies in the Isthmus of Tehuantepec, Mexico. Source: Map by Alejandro Guizar Coutiño.

Table 2
Community demographics and relevant variables.

	El Espinal	Santo Domingo Ingenio	Unión Hidalgo
Level of community acceptance of wind energy projects	High	Medium	Low
Population (2015)	8,824	8,208	14,704
% women	51	50	52
% unemployment	3.3	8.3	5.3
Average duration of education (years) (2015)	9.9	7.5	8.5
% education lag	17.8	28.2	15.7
% Indigenous population	36.7	5.4	53.6
% of people living in poverty (2015)	34.2	63.3	57.6
Human Development Index[1] (2015)	0.776	0.678	0.743
Distance to the closest turbine (meters)	2,000	500	500

[1]The Human Development Index (HDI) ("Human Development Index (HDI) | Human Development Reports," n.d.) is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development (0.800–1.000 very high, 0.700–0.799 high, 0.550–0.699 medium, 0.350–0.549 low).
Source: INEGI, 2015

Table 3
Semi-structured interview respondents.

Actor	Type of participant	No. of interviews
Community	People who live near wind farms (three communities)	27
	Land tenants (three communities)	14
	Agrarian authorities	3
	NGOs and collectives (three communities)	5
Wind energy developers	Local representatives (eight companies)	12
	National representatives (eight companies)	13
State and National Government	Local government (three communities)	12
	Government of the State of Oaxaca	5
	Ministry of Energy	1
	National Commission for the Development of Indigenous People	1
Academia		6
NGOs (National)		4
Total of participants in semi-structured interviews		**103**

living conditions. It is a conceptual attempt to produce a more appropriate category to think about Indigenous people, providing the possibility of going beyond ideas that limit them to the condition of "colonized" (Aquino Moreschi, 2013). In a broader perspective, it is part of the efforts of Indigenous people in Latin America against "internal colonialism" (i.e. relations of domination between the state and Indigenous communities; Aquino Moreschi, 2013).

Martinez Luna (2013) defines *comunalidad* as a "human attitude towards the common" and as the "root through action and horizon of Indigenous peoples." He describes it as a horizontal philosophy in which humans and nature have a close relationship founded in movement, survival and protection that is governed by three founding principles: (1) collaborative forms of work, which are the basis for directing, organizing and representing the community; (2) mutual respect, which requires recognizing others as equals and as part of a same whole; and (3) reciprocity, which asserts that there is a necessary and natural relationship and, thereby, intrinsic interdependency between people, communities and natural ecosystems. These interdependent relations call for satisfying basic needs in conjunction with others, and horizontalizing all human activities such as work, celebration, and representativeness.

However, not all local people sympathize with the idea of *comunalidad*. Some members of Unión Hidalgo mentioned that they have started to "become afraid of the idea of *comunalidad*" or to perceive it "as a backward concept" (G4). As noted previously, such

stances are often due to its link to indigeneity, which has historically been associated with shame or underdevelopment (de Sousa Santos, 2009). Specifically, the notion of *comunalidad* has become problematic due to the incapacity of traditional ways of organization to provide economic resources to the locality and to secure certain public services, such as sewage and roads. Respondents in Unión Hidalgo noted that other communities, such as El Espinal and Santo Domingo Ingenio, have been able to overcome basic hardships; the respondents also noted that they had heard inhabitants of these communities proudly stating that they have been on a development path since the arrival of the wind energy industry. Consequently, a number of respondents see *comunalidad* as a romantic approach to their community and culture that has little to offer them given their poverty-stricken context. This group in Unión Hidalgo views the concept of *comunalidad* as an external academic imposition of "what the community ought to be" that is misaligned with the community's current reality and what its inhabitants have reason to value.

By contrast, wind energy developers, which are mainly based in Spain, France and Italy, follow an underlying philosophy rooted in the paradigm of modernization. This entails the transformation of traditional practices and customs of the local population towards a sustainability scheme that requires people to unreservedly accept clean energy production infrastructure as a necessary "evil" in pursuit of a greater good. Companies consider themselves as champions of SD capable of contributing to both economic growth and "solutions to combat global warming and its effects" (ACCIONA 2020). Developers propose wind farms as a rational choice to economically "develop" communities (D12) by providing them with jobs and alternative sources of income. Following this reasoning, people resisting the construction of wind farms have been categorized as members of anti-development groups. As José, a member of a local collective in Unión Hidalgo, explained, "developers say that we are not interested in the development and progress of the community. They call us *anti-eólicos*[7]" (C18). This was a characterization that local people resented, as, during interviews, they clarified that what they opposed was not clean energy in itself but rather the way in which its production was being imposed in the local context.

4.1.2. Epistemology

The epistemology of *comunalidad* is based on knowledge conceived and expressed in daily communal practices that ultimately aims at social transformation and emancipation. Moreover, it values what is local, including thinking about ways of life that are more respectful towards the environment, advance community's self-determination and ensure food self-sufficiency (Martínez Luna, 2013).

This view contrasts with developers' approach to knowledge, which is mainly founded in "scientific" knowledge that comes from abroad and is shared through formal education and training. Under this paradigm, the value of local knowledge, which is mainly orally transmitted through the Zapotec language, is disregarded. Local people felt aggravated by this positivist epistemological approach because they perceived it as not acknowledging local expertise and skills, which in turn resulted in local experts being prevented from participating in technical decisions concerning wind farm installations. Such knowledge can prove valuable in terms of improving the efficiency of wind farm construction (C16). In fact, wind turbines in the Isthmus commonly use gravity-based foundations made of slabs of steel-reinforced concrete. Using local architectural knowledge, local engineers perfected the order in which these slabs are welded to flexible steel straps, allowing installa-

tions to be completed in half the planned time. Moreover, local workers identified ideal locations for constructing fords for water crossing based on their knowledge of how water is channeled in the region (D23). These contributions reflect the extent to which local traditional knowledge can provide key insights for the deployment of renewable energy technologies; increased recognition of the value of indigenous epistemologies would thus produce greater benefits for all actors involved.

4.2. Ecological dimensions

4.2.1. Human–nature relationships

Under the worldview of *comunalidad,* nature and humans share an interconnected relationship of survival and protection. From an eco-centric perspective, land is seen as a living resource that must be shared and cared for. People's livelihoods, as well as their bio-cultural heritage, depend on the preservation of regional plants and animals. This worldview leads to conflicting views on the impact of new technological developments.

While wind farms are designed to offset the use of fossil fuels and thus contribute to a sustainable, low-carbon future, wind power poses its own environmental challenges. One of the main environmental issues associated with wind power is that wind farms have an impact on wildlife, particularly birds and bats, which risk collision with the spinning blades and other parts of wind power machinery (e.g. World Bank, 2012). Although local residents are uncertain as to the extent and severity of this impact, they believe that the large number of wind turbines installed in the region has caused birds to change their migratory routes (C19, C21, C24, L13). Rosario, a local schoolteacher in Unión Hidalgo, asserts that one characteristic of the town at dawn and sunrise was the singing of birds, which is now not as loud as it was before (C24).

Inhabitants of Santo Domingo Ingenio and Unión Hidalgo do not believe that developers have adequately addressed health and environmental concerns, which contributes to the inhabitants' unfavorably stance towards new wind farms. In both municipalities, residents explained that developers were not forthright about the significance of the negative environmental impacts and, at times, fail to take seriously local people's concerns regarding the environment. For instance, residents suggested that companies appoint an employee to collect dead birds every morning (L12, C27, C28, C29). Overall, the respondents suggested that a study would be needed to account not only for the impacts of each wind farm individually but also the cumulative environmental and health effects of all developments in the region. Such a cumulative study would provide the local, state and national governments with the information required to establish environmental and health guidelines. Taking such steps would address local people's concerns regarding the environmental impact of wind farm development. Doing so would be important because, in the local eco-centric culture, the environment is perceived as being linked to human life, meaning that it should be cared for, respected and nourished (Martínez Luna, 2013).

4.2.2. Ownership structures

The *comunalidad* worldview establishes the ownership of land as communal. In Unión Hidalgo, residents narrated how their grandfathers used to go to the fields, "*clean the bush*" and erect wooden fences around plots to grow local crops such as corn, pineapple, melon and sesame. Once an individual was no longer using a plot of land, "*you removed the fence so that someone else could work it*" (C28). As Dr. Manzo explained, this "*goes beyond the idea of private property*": communal land is territory owned by everyone and can be freely used by anyone who needs a plot to satisfy basic needs such as food or shelter (A2). Therefore, the

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[7] Anti-eolian or anti-wind.

territory consists of three complementary layers (physical, symbolic and economic; (Guerrero Osorio, 2013) and, as such, is understood as a resource that is to be shared and cared for. As Díaz (2007: 40–42), an academic from Oaxaca working on *comunalidad*, explains, "that gives us birth and food and shelter; this is why we are not owners of the land. Between mother and child there are no ownership arrangements, only a relationship of mutual belonging".

The wind farm industry, however, does not recognize this relationship with the land. Instead, wind energy companies have encouraged the idea of private ownership in accordance with a capitalist logic, thus transforming the territory into a marketized commodity that can be bought and sold for profit. Given this non-recognition of local ownership paradigms, opponents of wind energy in the Isthmus consider the installation of wind farms a form of dispossession associated with colonialism (Alonso and García 2016). Though land is not being legally appropriated, since, under the Mexican law, the land remains under communal ownership (Binford, 1985), the understanding of the way in which land is owned and managed is being modified in accordance with foreign norms of occupation, which has led to local tensions. The relationship with land thus changed in accordance with Western ideas of individual ownership, and communal forms of land management have been disregarded by developers. Regarding this topic, a tenant noted that lamented that "*we tried to assemble all land possessors to establish a regional committee, but developers did not back this motion because we had individual contracts*" (L3).

4.3. Socio-political dimensions

4.3.1. Political governance

Under *comunalidad*, governance is a collective endeavor. *La autoridad* is the communal institution in charge of solving community problems, decision-making and agreement-building, and it operates following the notion of "commanding while obeying," which is based on principles of reciprocity and service (Guerrero Osorio, 2013). Decisions are usually made in an *asamblea general*, which is usually constituted by one member of each family, with each vote counting equally (Martínez Luna, 2013). As one tenant in Santo Domingo Ingenio noted, "*Politics in our town is known to be an instrument for the search for alternative solutions to collective problems and not a personal business*" (L15).

Communal governance differs from the wider Mexican system of governance at the state and national levels, which is characterized by a hierarchical system of decision-making and obedience. This structure favors developers, as decisions made by officials working for the federal and Oaxaca governments would largely be accepted and followed by local authorities. Once on the ground, developers had to summon general agrarian and political assemblies to reach agreements on tenancy guidelines and prices. These assemblies were a threat to wind energy representatives, who found it easier to work under representative rather than direct democracy; as one developer observed, "*it's easier to agree with two or three people than with 500*" (C16). Pressured by business agreements and impatient investors, most developer representatives attempted to extract individualized decisions from local authorities instead of adhering to the local governance rules defined by the *autoridad.* As one developer representative stated, "*Now, I do individual meetings because otherwise in general assemblies they come up with other issues*" (D2).

Wind energy companies failed to recognize the value that local people assigned to communal decision-making. This in turn weakened the collective governance structure: the companies "*individualized the land and decision-making… Divide and conquer they thought: we are 214 egidatarios; divide them and they will have less strength*" (L14). Another respondent noted that "*If the commoners*

had unionized, they would have negotiated with other unions and reached a better business deal" (C26). Consequently, recognizing, respecting and following communal decision-making processes became a key factor affecting the acceptance of new developments. One Ministry of Energy official reflected that "*the wind energy industry has to think of people not as individuals but as a community and understand how daily practices, decisions and procedures are in accordance with this cosmovision*" (G4).

4.3.2. Social justice and equity

Equity and solidarity also play an essential role under *comunalidad*. Within the cosmovision these two concepts fall under the broad principle of reciprocity, which is understood as foundational. Reciprocity asserts that independence does not exist; instead, there is a necessary and natural relationship between people, and interdependency, equity and solidarity are therefore intrinsic. The "communal self" is responsible for participating in community life, assuming responsibilities and satisfying basic needs in collaboration with others (Briseño Roa, 2013). A community's strength lies in reciprocity and interdependency.

The arrival of wind energy developers has further contributed to the loss of the importance of the principle of reciprocity in all three communities. This loss is particularly reshaped through growing inequalities, which have become accepted. Employment for only a small portion of the population, new tenancy payments that only benefits certain farmers and one-way community benefits enjoyed by local governments have established hierarchies of power that break with reciprocal relationships in these communities (Martínez Luna, 2013). Developer–community relations thereby become transactions of *power over*, in which the community feels unable to correspond on an equal stance. Developers' non-recognition of the value of reciprocity among the local population translates into practices that make people feel disrespected and not recognized as equals. These sentiments have in turn, has become an important factor affecting people's negative attitudes towards new wind energy developments.

4.3.3. Perspective on the state

Given the region's colonial past, local people regard the federal state as a threat to their Indigenous identity and culture. Indigenous people throughout Mexico have been historically and systematically discriminated against (de Sousa Santos, 2009). This discrimination has produced cultural and institutional processes that disrespect and devalue of Indigenous people, particularly in comparison to non-Indigenous people or those of mixed backgrounds (Comim, 2015). Such discrimination is reflected in Indigenous people's current socio-economic situation, which is characterized by conditions of poverty and marginalization fueled by migratory processes that cause geographical and territorial dispersion (Bárcenas, 2005). Discrimination has threatened Indigenous peoples' cultures and traditional languages and has occasionally been explicitly fueled by institutionalized campaigns intended to "integrate" Indigenous people into the broader "national development and culture." For example, in the 1950s, the Mexican government initiated a campaign to standardize Mexican culture and impose Spanish as the official language (Velasco Cruz, 2003). Given the country's long history of institutional and everyday social discrimination, many people have actively decided to conceal or even deny their Indigenous backgrounds.

However, this denigration has been contested, and there have been attempts at revaluating Indigenous identity. On the eve of the Fifth Centenary of the European landing in America (October 12, 1992) there was movement across Latin America to re-signify ethnic identity by recognizing cultural diversity. In Mexico, the cycle of protests that occurred around 1992 was renewed in 1994 by political action fueled by the *Ejército Zapatista de*

Liberación Nacional (EZLN), a guerrilla organization predominantly comprised of Indigenous people belonging to different ethnic groups living in the state of Chiapas (Velasco Cruz, 2003). These recent Indigenous movements suggest a change in Indigenous peoples' relationship with the state, particularly in terms of advocating for Indigenous autonomy and self-determination within a pluricultural nation.

Though both El Espinal and Unión Hidalgo have a high percentage of Indigenous inhabitants, their divergent colonial histories have resulted in different varying attitudes towards wind farms. While El Espinal has a rich Indigenous background, its historical relationships with the Spanish and French crowns have led to a favorable attitude towards foreigners. The town was first established by the Spanish crown in 1690 as a *Hacienda* (plantation estate). Indigenous people began to populate the area as farmers who served who served a feudal economic system characterized by a hierarchical structure founded on the respect of the rule of law and government regulation. By contrast, Unión Hidalgo was formed shortly after the War of Independence (1810) when the state government of Oaxaca forcibly merged the scattered Indigenous *rancherías* (settlements). However, the inhabitants of Unión Hidalgo were never formally colonized or forced to live under colonial rule and thus see developers as a new external threat to their cultural and natural values. Consequently, they have also opposed the construction of wind farms through communal action by establishing a commoners' assembly based on collective decision-making that provides a space in which to organize oppositional actions such as marches.

4.4. Economic dimensions

4.4.1. Economic framework

Comunalidad's economic framework is founded on a solidarity economy in which labor is a work of exchange used to acquire basic needs. Collective work (*tequio* or *mano vuelta* in Spanish, meaning "hand in return" or mutual aid) is the basis for directing and organizing productive chores, acquiring prestige and representing one's community. *Tequio* is voluntary work that members of a community engage in towards a collective good, such as creating public infrastructure such as roads, fences, schools and churches; cleaning a river or a park; or planting trees or painting walls. Families can also request *tequio* to help construct or repair houses or to organize celebrations such as weddings (e.g. knitting the *enramada*, a palm-based temporary roof used for special occasions). *Tequio* is founded on principles of reciprocity, interdependence and work horizontality that serve to bind society. Luzmar, an inhabitant of Santo Domingo Ingenio, explains that *tequio* was mainly a communal response to prevalent poverty and neglect by the state and federal governments. Residents could provide themselves with basic services and entertainment by coming together and contributing their time and labor (L12).

However, this form of collective labor has been in decline over "the last 50 years" (L12). The most prevalent hypothesis to explain this decline is that a government reform providing municipal funds for public infrastructure made *tequio* initiatives redundant: "Now that the government has money, people don't want to give *tequio* anymore, and, if you help, they might then keep the money" (C12). A secondary school teacher in Santo Domingo Ingenio explained that society in the Isthmus has slowly evolved into a more individualized culture: *"We have been losing the collective culture that was a principle of our people; we have lost our collective traditions; people no longer care if their neighbors are okay…people now put themselves first. We young people have not been capable of reversing this pattern"* (C16).

The arrival of wind energy developers has further contributed to the decline of this tradition in all three communities. As people in the Isthmus increased their income through the wind farm industry, "they started to prefer to pay someone else to go to give *tequio* on their behalf…Now many people just pay someone to do the food, distribute the beer, clean after the party" (C19). This situation replicates a colonial distribution of labor in which individuals of Spanish descent did not participate in community tasks, and the most difficult work was left for the *Macehuales* ("common people") (Martínez Luna, 2013):85. In the context of the introduction of a new industry such as wind energy, Guillermo, a representative of a human rights organization, describes this situation as worrisome, as "when the community is not well organized and strengthened, it is very easy for foreigners to take advantage of people's vulnerable poverty condition" (N1).

In addition, as noted previously, the introduction of the wind energy industry has reinforced economic inequalities among local peoples. Although landholders have always been economically better-off than the rest of the population, as they held the main economic means of production (agriculture and livestock farming), economic differences have historically not been socially significant in people's everyday lives. All residents had equal access to social festivities, and, in general, social arrangements were not marked by drastic socio-economic differences (C5). The introduction of the wind energy industry, however, has further polarized the economic and social positions between tenants and the rest of the community.

4.4.2. Perspective on economic growth and development

For *comunalidad*, preserving Indigenous identity, local values and human dignity takes precedence over economic growth. Therefore, any economic activity that hinders these values is perceived as a threat to people's well-being. This suggests that human dignity is required for enhancing other capabilities such as being able to access and distribute resources and the way these are distributed (Velasco-Herrejón & Bauwens, 2020). A central problem in the cases studied here was that the recognition of Indigenous identity and culture was subordinated to economic interest, which was often framed as development and national modernization. In some cases, developer interactions reproduced colonial practices that misrepresented Indigenous culture. Simultaneously, the pressures of capital accumulation from transnational markets operated alongside the federal state, which acted as an advocate of private interests by pushing for economic growth and development at all costs.

4.5. Spiritual dimension

La fiesta is the highest form of sociality and is the most important symbol (and practice) of the communal, which reflects *comunalidad's* link to spirituality. These events can be patron saint festivals or other celebrations of a civic, religious or agricultural nature, such as weddings or birthdays that are celebrated according to the intergeneric rules of a specific community at a given time (Guerrero Osorio, 2013). The three localities each have their own collective festivities. In El Espinal, a candle is lit for the patron saint's vigil (*vela*). The entire community carves this candle before the *vela*; this carving is "*very delicate and laborious work, and therefore we need all the community to achieve the thickness required for three days of vigil*" (C5). In Santo Domingo Ingenio, all attendants of the *vela* contribute to its costs by giving *limosna* (alms) to the *mayordomo*, who is the person in charge of overseeing the organization of the *fiesta* in a particular year (C10). In Unión Hidalgo, residents collectively cook the food served at the *vela*. Preparing the main dish requires continuous overnight stirring, which residents divide amongst themselves in shifts (C19). In such fiestas, relationships between families and neighbors are created, repaired or broken. During *la Fiesta*, time is not conceived as a resource that needs

to be conserved but rather as a reminder that given that life is short and must be collectively enjoyed at its fullest. Unlike communal work and land ownership, the *fiesta* has gained strength and importance over time.

How developers engage with these festivities has been a key factor shaping attitudes towards wind farms in the three communities. Developers in El Espinal actively contribute to local *velas* by setting up their own "stands," paying for part of the infrastructure; in turn, they are allowed to invite guests to the festivity. This offer is usually extended to their staff, service providers, and tenants. Developers in Santo Domingo do not contribute to the *velas*, although two developers participate in other important occasions, such as providing families with baskets of local goods for Mother's Day and Christmas. Participants highly appreciated this gesture and distinguished these developers from those that do not provide anything. Conversely, a developer in Unión Hidalgo did acknowledge the local value of *velas*, but rather than contributing to the existing organization, opted to organize its own: the *vela del aerogenerador* (wind turbine vigil). This event catered exclusively for wind farm tenants and their families, meaning that it disregarded local customs. For instance, developers raffled a pick-up truck, giving tickets to event attendees based on each tenant's number of hectares in the wind project. The community did not contribute to the celebration, as food and beer were distributed only by the developer. Participants recalled such events with indignation and disapproval. As one explained, "*it would have been better for the developer to act as a* mayordomo *of an already established* vela *that followed all the customs and not make a flawed imitation. Also, he should have invited everyone and not only tenants. This would have made people see the developer with different eyes, but what they wanted was to divide: only those who are part of the project get the benefits*" (C30).

Developers in El Espinal and Santo Domingo Ingenio realized that they could reduce tensions with the local communities by recognizing the value of the *fiesta* and contributing as equals towards it. However, the developer in Unión Hidalgo failed to recognize the collective and spiritual worldview of the local population. Instead of contributing, it attempted to co-opt and change ancient customs for its own benefit, which is a form of cultural domination (Fraser, 1996). By imposing foreign values on a significant Zapotec festival, the developers in Unión Hidalgo entrenched the local population's negative attitudes towards wind energy developments.

Table 4 below summarizes the findings by applying the framework to the views of both Zapotec communities and energy developers. While some distinctions exist between the three studied communities, the table focuses on their commonalities.

5. Discussion

This discussion is structured around three core messages based on the above findings: the importance of recognizing both different sustainability visions and differences among different Indigenous communities and the need to develop pluriversal technologies (as defined in Section 5.2).

5.1. The importance of recognizing different sustainability visions

The findings demonstrate that while installing wind farms in the region, developers have not properly recognized local people's understandings of well-being and social justice. Nonetheless, local communities strive to be co-producers and meaningful participants in the energy transition to enhance local well-being and quality of life while providing renewable energy for society as a whole. Therefore, to achieve a socially inclusive energy transition, the wind energy industry needs to recognize and embrace local values and worldviews. This is confirmed by most of the study participants, who advocate for the wind energy industry recognizing and incorporating local forms of ownership, production, governance, work and celebration into its development processes. Once the local culture is understood, valued and embraced, residents should be more willing to listen to and discuss offers that could potentially enhance people's livelihoods, promote access to meaningful employment and improve public infrastructure. However, the exacerbation of social polarization resulting from wind farm construction, which the inequalities created under capitalism, also needs to be taken into consideration within this process. In this regard, it would be critical to not impose ownership structures and employment systems that operate under a modernist logic of private property and individual gain and to instead co-create alternative models that respect communal economies and practices.

The findings of this research therefore point to the need to go beyond a universalist approach and embrace a plurality of sustainability visions. Echoing the notion of justice as recognition (Fraser and Beschäftigung 1998), we stress the importance of recognizing that there is not one understanding of sustainability and that this act of recognition will be required to overcome obstacles in terms of distribution and due process when designing and deploying renewable energy technologies such as wind farms. In fact, *comunalidad* emerged as an effort to counter dominant understandings of "sustainable development" that were preventing Zapotec communities from reimagining themselves in the light of their own values (Aquino Moreschi, 2013). This study highlights the importance of continuing the work that began these efforts in the 1970s.

5.2. The need for pluriversal technologies

The apparent disjuncture between modernist development and an Indigenous identity has been presented as a dilemma for both opponents and allies of the wind energy industry: inhabitants must decide to either follow Indigenous traditions that focus on local self-sufficiency, solidarity and harmony with nature or opt to embrace the wind energy industry paradigm, which advocates for the marketization of collective resources through individual property arrangements and the commodification of nature. Deliberations over these two apparently incompatible choices are subject to additional pressure due to the view that "time is money," which is an integral aspect of the capitalist process of accumulation and its coercive laws of competition (Polster, 2016). The assumption here is that making a hasty decision between the two choices may lead to irreversible negative economic consequences for the region. The imperative to reduce greenhouse gas emissions in order to combat climate change and prevent irreversible ecological collapse further contributes to the urgency of finding effective solutions.

We propose that to go beyond this apparent dilemma, "pluriversal technologies" are required. These can be understood as *technologies that embrace ontological and epistemological diversity by being co-designed, co-produced and co-owned by the inhabitants of the socio-cultural territory in which they are embedded.* Building on the concept of "pluriversal designs" formulated by Escobar (2018), we seek to emphasize the need for technologies operated through decentralized communal structures that preserve and enhance local socio-cultural practices while allowing for the democratic co-construction of just and sustainable futures.

Particularly important in this regard is the need for participatory design—that is, the direct involvement of people in the co-design of the technologies they use (Schuler & Namioka, 1993; Simonsen & Robertson, 2012). Indeed, unique local skills and knowledge can actively contribute to improving technology, as illustrated in our case study by the way in which traditional knowledge contributed to optimizing the design and location of wind

Table 4
Summary of the results.

Aggregate Dimensions	Components	Comunalidad worldview	Developers' worldview
Underlying philosophy	**Ontology**	A horizontal philosophy founded in mutual respect and interconnection. People are interdependent and equal, and there are therefore no relationships of domination and control.	An individualist approach to business practices. Relationships are transactional and can lead to power asymmetries. The strongest competitor wins.
	Epistemology	Knowledge is found in daily communal practices that aim at social transformation and emancipation while valuing what is local.	Scientific rationality is valued as a tool for transformative change.
Ecological dimensions	**Human-nature relationships**	Eco-centric – nature and humans have a relationship based on survival and protection. The environment is considered a form of natural heritage that is a constitutive part of the Zapotec identity.	Nature is a commodity that can be used sustainably.
	Ownership structures	Communal ownership of land, which is seen as a source of life that should be shared and cared for.	Land is owned privately under a capitalist logic that is protected under the law.
Socio-political dimensions	**Political governance**	Governance is seen as a shared endeavor for collective and not individual advantage. Decisions are made in communal assemblies.	Accountable representative democracy and elected leaders are needed to reach agreements.
	Social justice and equity	Power and prestige are shared through work aimed at improving the community. Service is a pathway to status and recognition. Though there is a system of meritocracy based on public service, this does not translate into economic inequalities since the community builds its own welfare system, which is unrelated to the national state.	The market leads social relations, which may lead to inequalities. These inequalities can be alleviated through corporate social responsibility programs.
	Perspective on the state	The federal state is seen as a threat to Zapotec identity and culture due to its efforts to integrate Indigenous people into the broader "national development and culture."	The state is an actor that can legitimize social interventions and can bring certainty to operations by restoring the rule of law.
Economic dimensions	**Economic framework**	Society functions based on a solidarity economy in which labor is exchanged to communally attain basic needs. Collective work is the basis for directing and organizing productive chores, acquiring prestige and representing the community. This collaborative approach emerges as a response to poverty and national government neglect.	Global labor market trends require specialization and promote a materialist understandings of wealth that aims at prioritizing individual economic improvement as opposed to collective benefits.
	Perspective on economic growth and development	Preserving Indigenous identity, local values and human dignity takes precedence over economic growth. Therefore, any economic activity that hinders these values is perceived as a threat to people's well-being.	Economic growth will benefit society through a trickle-down effect.
Spiritual dimension	**Sense of identity and fulfilment**	The sense of fulfilment is based in the collective endeavor that is manifested through the system of cargos and tequio, usually organized around the fiesta.	Individual well-being is of greatest importance. Individuals' overall well-being will be reflected in communities' overall well-being.
	Time orientation	Time-bound spiritual festivities such as the fiesta establish the rhythm of community life through commemorative events, solidarity and collective enjoyment of life.	In terms of time, the focus is on generating long-term steady profits through investment in infrastructure in a linear trajectory of growth.
	Spirituality	Spirituality is a central component in everyday life from the fiesta to the community's relationship with nature and society.	Spirituality is part of the individual private sphere, which is not mixed with business.

turbines. The co-design process should, however, go much further by also allowing for the participation of local communities in all the steps in the technology's life cycle, ranging from initial conceptualization to installation, use and disposal.

Hence, the second key component of pluriversal technologies is co-production, which highlights the importance of renewable energy technologies leading to meaningful jobs and economic opportunities. The importance of co-production was stressed in our case study, as many Indigenous people sought employment opportunities from new energy developments. However, for this to be possible, it is key to ensure these technologies can be locally repaired and disassembled and that local people are provided with the skills, tools and knowledge required to autonomously use and operate them. This includes the local production of spare parts, turbine oil and other key components.

The third central aspect of pluriversal technologies is co-ownership. Research on community-based energy projects has shown that involving nearby communities in the ownership of low-carbon energy infrastructures (i.e. in the decision-making and surplus distribution processes) can help address important local concerns and enhance social support for these infrastructures (Bauwens & Devine-Wright, 2018). Indeed, local ownership can lead to a better distribution of the economic benefits that new technologies bring about and can help establish, preserve or reinforce local democratic economic structures. The decentralized control of these technologies is also key to ensuring their accessibility and affordability. It may seem overly ambitions to suggest that renewable energy developments may consider introducing co-ownership, co-production and co-design which the key elements of pluriversal technologies. Yet the positive experiences of energy communities in Europe have demonstrated the viability and effectiveness of this participatory approach to the energy transition (Bauwens, Gotchev, & Holstenkamp, 2016).

The concept of pluriversal technologies also echoes the notions of "appropriate" or "intermediate" technology proposed by Schumacher (1973) and the concept of "convivial tools" coined by Illich (1973). The notion of appropriate technology stresses the importance of considering the local context, including local skills and resources, to ensure that technologies are well-adapted to local needs and circumstances (Vetter, 2018). Convivial tools focus on the emancipatory potential of technologies and institutions, which must allow for local autonomy, social equity and solidarity, as well as creative freedom and direct control over one's work (Kerschner et al., 2018). Both concepts highlight the need to use locally adapted materials and technologies that can be built, maintained and repaired without foreign experts and are not environmentally harmful. While acknowledging the crucial importance of these aspects, the notion of pluriversal technology goes further by emphasizing the need to value the ontological identities, spiritual customs and epistemic traditions of other worldviews to enable the construction of a "future in which many futures fit" (to paraphrase the slogan of the Zapatista movement).

5.3. The importance of acknowledging the plurality of Indigenous worldviews

The third core finding emerging from our study is that, far from portraying Indigenous peoples as a monolithic group, our research points to spatial and temporal variations in worldviews both between and within Indigenous communities due to their specific histories and local contexts. These differences are reflected, for instance, in the varying levels of acceptance of and diverse attitudes towards wind farms across communities and, in particular, in El Espinal and Unión Hidalgo, attitudes that are related to their divergent colonial histories. The different attitudes towards *comu-*

nalidad within communities serve as another example of these varying worldviews.

These variations result from the continuous transformation of Indigenous traditions. On the one hand, values that were once strong are now under pressure from other worldviews introduced by mass media and globalized markets. Eco-centric, collective and relational forms of understanding life are thus often weakened by materialist, rational and individualistic Western worldviews. On the other hand, when faced with negative consequences of development, some communal values might be strengthened, such as local democratic practices and organizations, which can be reinforced in the local process of resistance and contestation to modernity. These processes are illustrated by the establishment by inhabitants of Unión Hidalgo of a commoners' assembly based on collective decision-making, which provided them with the strength to face developers and wind energy supporters and helped to restore their dignity as Indigenous people. By doing so, this community institutionalized processes that enabled it to define and act to preserve its culture and democratically decide on the future it wanted.

Overall, our results are in line with those of Reyes-García et al.'s (2020) study of Indigenous peoples' local attitudes towards the construction of a controversial road in the Bolivian Amazon. While highlighting the diversity in local opinions and arguments related to the construction of large infrastructure projects, Reyes-García et al. challenge "portraits of Indigenous Peoples as uniform blocks of resistance towards new infrastructure development" (p. 9). For pluriversal technologies, it is therefore key to embrace this pluralism and adapt to local circumstances without making prior assumptions or considering "one-size-fits-all" solutions, even within Indigenous groups.

6. Conclusion

While there has been growing recognition that Indigenous knowledge can enrich the sustainability debate, Indigenous peoples have largely been marginalized in these discussions thus far. Our work contributes to better understanding the differences between Western and Indigenous sustainability worldviews by analyzing the conflict between Indigenous peoples and wind energy projects in southern Mexico. Indigenous traditions favour a horizontal philosophy founded in mutual respect and interconnections between humans and nature. Their knowledge is grounded in daily communal practices that aim at ecological harmony, social emancipation and solidarity. Conversely, wind energy developers' approach to sustainability advocate for the marketisation of collective resources through individual property arrangements and the commodification of nature. These arrangements often lead to power asymmetries between companies, communities and the State. The results indicate that the non-recognition of these differences reproduce the region's past colonial arrangements of cultural domination and mis-recognition of Indigenous identities and disrespect for local customs such as communal labor, direct democracy and collective land ownership.

To reconcile the imperatives for a sustainable energy transition and respect for and recognition of local cultures and worldviews, we propose the concept of pluriversal technologies. Pluriversal technologies are technologies that embrace ontological and epistemological diversity by being co-designed, co-produced and co-owned by the inhabitants of the socio-cultural territory in which they are embedded. By embracing both modern technologies and indigenous knowledge, the concept of pluriversal technologies can allow for an alternative path towards a zero-carbon future that does not replicate colonial patterns of domination and dispossession. This approach can not only reduce resistance to new energy

developments but also lead to entirely new forms of conceiving socio-technical change that may be inherently fairer and more sustainable as they do not rely on the privatization, commodification and exploitation of people and nature. The concept of pluriversal technologies thus provides a democratic, decolonial and post-extractivist vision by which to overcome the some of the key socio-ecological challenges of the 21st century.

Admittedly, this study has several limitations, which represent various viable avenues for further research. First, the specific geographical and social features of our case study limit the generalizability of the results. Further research could analyze the Indigenous understandings of sustainability in different socio-cultural contexts. Second, this study focuses only on the energy transition, particularly large infrastructure projects. It would be interesting to research other dimensions of sustainability transitions, such as the circular economy, sustainable agriculture, bio-economy, energy communities and biodiversity conservation. Third, our chosen study represents an ongoing case, so it remains to be seen how energy infrastructure is further deployed and how the differences between modern and Indigenous worldviews are addressed. Future research is therefore needed to examine how the process of instal-

ling wind farms has evolved. Despite these limitations, this research nonetheless provides a unique analytical framework with which to better understand the inherent contradictions between Western and Indigenous visions of sustainability and highlights how they can be resolved through pluriversal technologies. It is therefore hoped that this paper may provide insights for future research, projects and policies seeking to support the energy transition in culturally diverse areas.

Acknowledgements

Appendix 1. Detailed conceptual framework

Aggregate Dimensions	Components	Indigenous worldviews	Modernist worldviews
Underlying philosophy	**Ontology** (Beling et al., 2018; Bollaert, 2019; Calisto Friant et al., 2020; de Witt & Hedlund, 2018; Johnson et al., 2011; Koltko-Rivera, 2004; Studley, 1998)	**Relational**: Sets no division between individual, community, nature, science and spirituality.	**Rational**: Sets divisions between individual, community and nature and between science and spirituality.
	Epistemology (Calisto Friant et al., 2020; de Witt & Hedlund, 2018; Johnson et al., 2011; Koltko-Rivera, 2004; Studley, 1998; van Norren, 2020)	**Pluralist**: Spiritual, subjective, experiential, and traditional knowledge valued as much as scientific knowledge. Predominantly oral transmission of knowledge.	**Positivist**: Objective, scientific rationality only valid and recognized form of knowledge. Predominantly written transmission of knowledge.
Environmental dimension	**Human-nature relationships** (Beling et al., 2018; Koltko-Rivera, 2004; Kothari et al., 2014; Studley, 1998; van Norren, 2020; van Opstal & Hugé, 2013; Vos, 2007)	**Eco-centric**: Nature as sacred, incommensurable, unsubstitutable and spiritually indivisible from humans, and must be cared for, respected and nurtured. Humans and non-humans equally important and interrelated elements of life.	**Anthropocentric**: Nature as commensurable and substitutable resource/capital, which should be used sustainably, productively and efficiently. Humans are viewed as superior and independent from non-humans.
	Ownership structures of natural resources (Kothari et al., 2014; van Opstal & Hugé, 2013)	**Commons**: Communal ownership and management centred around the sacredness of local territory.	**Private property**: Private ownership and management centred around the efficient, sustainable use and global trade of natural resources.
Socio-political dimension	**Political governance** (Beling et al., 2018; Beumer et al., 2018; Kothari et al., 2014; van Norren, 2020; Vos, 2007)	**Decentralized direct democracy**: Grassroots, bottom-up self-governance where communal assemblies seek consensus and representatives are elected as "spokespersons" rather than "decision-makers".	**Representative democracy**: Elected officials have decision-making power checked by strong accountability and transparency mechanisms.
	Social justice and equity (Hopwood et al., 2005; Kothari et al., 2014; Vos, 2007)	**Equity and solidarity**: Equitable and fair distribution of power and wealth sought through strong societal systems of solidarity and reciprocity.	**Meritocracy and welfare**: Inequalities accepted in meritocratic market distribution of power and wealth. Excessive inequality, poverty and injustice is addressed by state welfare.
	Perspective on the state (Beling et al., 2018; van Norren, 2020)	**Plurinationality**: State has been an oppressor of cultural and natural values. Seek a plurinational state governed through bottom-up democracy.	**Rule of law**: State as key to the establishment and respect of rule of law, freedom and welfare. Seek to enhance democratic governance and effective regulation.
Economic dimension	**Economic framework** (Beling et al., 2018; Kothari et al., 2014)	**Social and informal**: Focus on social and solidarity economy, and informal non-monetary exchange based on reciprocity. Local sovereignty, autonomy and self-reliance in the provision of basic needs (food, water, shelter etc.) seen as essential.	**Global trade and productivity**: Focus on globalization, international trade and free markets to generate green growth and sustainable development. International market competition seen as a motor for innovation, productivity and eco-efficiency.
	Perspective on economic growth and development (Beling et al., 2018; Calisto Friant et al., 2020; van Norren, 2020; Vos, 2007)	**Degrowth/post-growth**: GDP growth is not seen as an end in itself as it often leads to privatization, commodification and marketisation of life and the commons.	**Pro-growth**: GDP growth seen as a necessary and valuable end it itself that fosters continuous innovations, sustainable technologies, material prosperity and human development and well-being.

(*continued*)

Aggregate Dimensions	Components	Indigenous worldviews	Modernist worldviews
Spiritual dimension	**Sense of identity and fulfillment** (Bollaert, 2019; Koltko-Rivera, 2004; Schwarz & Thompson, 1990; Studley, 1998; van Egmond & de Vries, 2011)	**Collective and immaterial:** Life and identity centred around the fulfilment of collective immaterial goals and aspirations.	**Individual and material:** Life and identity centred around the fulfilment of individual material goals and aspirations.
	Time orientation (Bollaert, 2019; Koltko-Rivera, 2004; Studley, 1998; van Opstal & Hugé, 2013)	**Cyclic and ancestral:** Focus on the present relations and the past (ancestors, rituals and traditions) often with a non-linear (cyclic or spiral) understanding of time.	**Linear and future-driven:** Focus on the future (through technology, investments, planning and management systems) through a linear understanding of time.
	Spirituality (Koltko-Rivera, 2004; Kothari et al., 2014; Studley, 1998)	**Central:** Spirituality as an integral and holistic component of the cultural relationship with the world and a key element of well-being and social harmony.	**Secondary:** Spirituality left to the individual's private sphere and not considered an essential component of sustainability or well-being.

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