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## A capability approach to analyse well-being impacts of wind energy infrastructure

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## Abstract

This paper operationalises the capability approach to analyse the tensions and trade-offs in assessing well-being outcomes generated by the production of wind energy, and how these reflect social acceptance at the local level. Specifically, the paper addresses the difficulties in understanding the voice of Indigenous people living near wind energy infrastructure in Southern Mexico and how their conceptions of well-being can be used to estimate the impact of wind energy development on three different communities. The methodology involved a three-stage process that integrated semi-structured interviews, focus groups, a survey, and participatory workshops, involving 450 participants. The findings conclude that community acceptability of energy infrastructure such as wind farms will only be achieved through inclusive community engagement that considers valued ways of being and doing of the local population. These include increasing the opportunities for people to live in good health, skilled employment in the industry, engaging and integrating local culture, values, worldviews and needs, and having a collective approach to the distribution of economic benefits that may strengthen social networks. By focusing on the recognition of valuable human capabilities from a participatory mixed-methods perspective, this paper contributes to a more compelling body of theory on social wind energy impacts that focuses on locally defined priorities and perspectives. Furthermore, this study also shows how the inclusion of community members as co-researchers is crucial to validate and locate local knowledge at the forefront while allowing local stakeholders to exercise greater voice and agency in how the research is conducted and designed. We hope that this methodology can offer useful insights for the design and implementation of future renewable energy projects that have environmental and social sustainability in mind.

## 1. Introduction

The 2015 United Nations Climate Change Conference in Paris marked a major step away from a carbon-based world. This agreement recognised that renewable energy is central to avoiding catastrophic climate change. As of 2010, the global electricity generation mix has experienced a rapid rate of change, with renewables as the fastest-growing source of electricity generation. This is primarily due to declining costs for solar and wind power as supported by state-level renewable targets (IEA 2022).

However, adopting ambitious renewable energy targets has had profound social implications, particularly on a local scale. To gain a holistic understanding of how these impacts occur in communities where projects

are installed, it is important to understand the well-being implications of these impacts and how they may link to the politics of local approval of renewable energy infrastructure.

Wind energy offers an emblematic case of these dynamics, highlighting the tensions between the technical and the social. At the technical level, wind energy enjoys a large cost advantage over other technologies. And if countries deliver their climate pledges, wind capacity will grow by 210 gigawatts each year (IEA 2022). Nonetheless, despite extensive support for this technology at the public level, low success rates in planning applications are threatening its expansion mainly due to local opposition on a local, community level (e.g. Reusswig *et al* 2016, Fournis and Fortin 2017, Giordono *et al* 2018, Wolsink 2018).

There is an important body of literature looking at factors affecting the social acceptance of wind energy projects. These factors include the visual impact, radar operations and noise (e.g. Williams and Whitcomb 2008, Hoen *et al* 2009, Ciardi and Crum 2010, Lilley *et al* 2010) and environmental effects such as the effects of turbines on birds and bats (Kunz *et al* 2007, Powlesland 2009, Valença and Bernard 2015). Other authors have also looked at symbolic, affective and socially constructed aspects of rejections such as place attachment (Devine-Wright and Howes 2010, Veelen and Haggett 2017) landscape permanence (Cowell 2010, Rygg 2012, Price *et al* 2020) as well as the have livelihood impacts (e.g. Dai *et al* 2015, Normann 2020). Visschers and Siegrist (2014) also focus on benefits and risks, while Truelove (2012) and Demski *et al* (2013) analyse emotions and public values. Community acceptance research has also moved to analyse case studies of opposition responses to wind energy projects, with a focus on the opinions of nearby residents and stakeholders (e.g. Swofford and Slattery 2010, Whitmarsh *et al* 2011, Hall *et al* 2013, Kermagoret *et al* 2016, Leiren *et al* 2020). And more recent literature has aimed to critically review the existing literature and address renewable energy technologies (RETs)-related justice implications as well as inequalities (Batel and Adams 2016, Batel and Devine-Wright 2017, Ellis and Ferraro 2016, Gross 2007, Walker *et al* 2014, Wolsink 2018).

However, literature on social acceptance is still characterised by a top-down perspective on people's relation to energy infrastructure (Batel *et al* 2013, Batel 2020). Studies that adopt a theoretical approach and move away from the use of surveys within positivist frameworks, engaging communities in defining the impacts on well-being are rare. This paper focuses on the tensions and trade-offs in assessing well-being outcomes generated by the production of wind energy. Specifically, the paper addresses the difficulties in understanding the voice of Indigenous people living near wind energy infrastructure in Southern Mexico and how their conceptions of well-being can be used to estimate the impact of wind energy development on three different communities.

To understand the differing well-being impacts on individuals neighbouring wind farms, the paper builds on Velasco-Herrejón and Bauwens (2020) who proposed the use of Sen and Nussbaum's capability approach (CA) (Sen 1985, 1992, Nussbaum 2003) as a useful framework to capture how renewable technologies, such as wind, are enhancing (or constraining) the capabilities of individuals in Indigenous communities. The bottom-up nature of the CA enables the identification and weighting of valuable things that people can do or be, which is crucial for understanding what is important for communities that live in areas affected by the development of wind farms and other low carbon technologies. Moreover, the approach is based on a participatory principle that acknowledges the importance that people give to being involved in decision-making.

This paper will expand on the description grounded approach used for the identification of capabilities and how this method can help visualise the relationship between well-being and energy infrastructure projects. By focusing on the recognition of valuable human capabilities from a participatory mixed-methods perspective, this paper contributes to a more compelling body of theory on social wind energy impacts that focuses on locally defined priorities and perspectives. Furthermore, this study also shows how the inclusion of community members as co-researchers is crucial to validate and locate local knowledge at the forefront while allowing local stakeholders to exercise greater voice and agency in how the research is conducted and designed. We hope that this methodology can offer useful insights for the design and implementation of future renewable energy projects that have environmental and social sustainability in mind.

This paper first examines the expectations and challenges involved in the development of wind farms in three communities in Southern Mexico. Then it depicts how the CA can be a useful tool to assess the well-being impacts of energy infrastructure and introduces the participatory mixed methodology. Using this approach, this paper summarises the main results and discusses the extent to which wind energy developments are enhancing (or constraining) the individual capabilities of people living in local communities.

## 2. Wind energy and community acceptance in the Isthmus of Tehuantepec, Mexico

The region of the Isthmus of Tehuantepec was identified as Mexico's main wind resource and one of the best areas in the world to establish wind farms (Nahmad *et al* 2014), a fact that became of great interest to the

federal and state governments, as well as local and international companies (Orozco 2008). Following a major energy reform that began in 2008 and allowed the investment from international private capital in the country (IRENA 2015), large utility companies began operations, constructing a network of 29 wind energy developments that produce 2709 MW (GWECa 2023). Additional installations of at least 13 new wind farms are now underway, in order to harness the remaining 6000 MW of potential capacity in the region (Mejía-Montero *et al* 2020).

The Isthmus of Tehuantepec is politically shaped by a colonial legacy, strong Indigenous identity, and high levels of marginalisation. The social character of the Isthmus of Tehuantepec is reflected throughout history by its cultural identity. From antiquity to present times, the existence of diverse Indigenous groups such as the Zapotecs, Mixes, Zoques Huaves, Cinantecos and Chonlates have given the region a multicultural character. Among the region's population, 31.2% self-classify as Indigenous (INEGI 2020), and 61.7% are below the poverty line (Coneval 2020). This compares to 9.4% (INEGI 2015), and 40.1% in the whole of Mexico (Coneval 2022) respectively. Additionally, whilst what constitutes ethnic identity changes across time and according to the cultural context and group of people, the Indigenous population in Mexico is generally characterized as groups who deserve special attention due to the social disadvantage they experience compared to the rest of Mexico's inhabitants (Flores and Telles 2012).

Juchitán is the district of the region where the best wind energy resources are concentrated and where the 'wind energy corridor' has been established. Wind farms are located in five municipalities: Asunción Ixtaltepec, Juchitán, El Espinal, Santo Domingo Ingenio, and Unión Hidalgo. This study analyses the factors affecting wellbeing in the latter three of these localities, which, as will be described in section 4, were selected based on their citizens' general position on wind farms, and their similar characteristics that allow comparability.

Initial reception of the wind energy industry in the region was not contentious. Local landholders were instead negotiating terms to obtain more favourable land-leasing conditions (Lucio 2016). In 1994, the Electrical Federal Commission (CFE) installed the first wind farm with a capacity of 1.575 MW. Even though the second wind farm was built in 2006 and the other projects followed soon after, the lack of sufficient information from the government and development agencies, as well as the failure of developers to meet expectations about the project's start dates and administer clear payment schemes, started to cause discomfort among landowners (CCC 2015). Furthermore, the development of wind energy was predominantly approached from a techno-economic/top-down perspective, focusing mainly on distributing permits to produce electricity or siting infrastructure in windy areas. This meant that the developers' relationship with the local population was also approached in a top-down manner, leaving vast parts of the population excluded from debates and decisions on wind energy in the area (Mejía-Montero *et al* 2020).

Grievances at the community level surged in the following years, resulting in constant road blockages around wind farm projects and adjacent national highways. These tensions picked up in 2012, when a 396 MW development (known as Mareña Renovables, located in San Dionisio del Mar) that was hailed as the largest scheme in Latin America (IADB 2016) was cancelled due to conflicts linked to land speculation and tensions between two different social groups, the Zapotecs and the Huaves (e.g. Hurtado Sandoval 2015). More recently, in June 2022 the CFE nullified the electricity supply contract of the multinational Electricité de France, thereby cancelling community-based resistance (e.g. Huesca-Pérez *et al* 2016) have raised alarms at different corporate and societal levels.

Various scholars have examined social dynamics resulting from the installation of wind farms in the Isthmus of Tehuantepec, highlighting asymmetric information, land grabs, and varying levels of conflict (e.g. Huesca-Pérez *et al* 2016, Avila-Calero 2017, Dunlap 2017, Zárate-Toledo *et al* 2019, Velasco-Herrejón and Savaresi 2020, Mejía-Montero *et al* 2020, 2023, Peña-Azcona *et al* 2021, Ramirez 2021, Alonso Serna 2022, Dunlap and Arce 2022, Torres Contreras 2022). While this research has increased the understanding of the social impacts of renewable energies in the region, this study seeks to contribute by advancing a participatory approach to examining local experiences of well-being impacts resulting from the installation of wind farms in municipalities.

### 3. Usefulness of the CA to analyse well-being impacts of energy infrastructure

Concerns over well-being are often central to justifications for opposing wind energy projects. Well-being related concerns are most immediate for individuals in proximity, or adjacent to, wind power installations. These conceptions may vary between different individuals and can depend on factors such as gender, age, race, class, and place. To better understand well-being impacts of such developments, this paper advocates using the CA. The CA is a normative framework which can be used to assess people's well-being, social arrangements, and policy-making to generate societal changes (Robeyns 2005). The approach was conceptualised by Amartya Sen and Martha Nussbaum (see Nussbaum 2001, 2007, Sen 2001, 2011), and

aimed to establish the goals and purposes of economic development. It ventures beyond schemes that centre on resource-based normative theories (Dworkin 1981, 2002), happiness, or desire-fulfilment; instead, Sen and Nussbaum proposed focusing on people's perspectives about what they can do and be, and reducing impediments to living a life that they value. Recognising the diversity of human populations, the CA can capture the complexities of multidimensional well-being and acknowledges that different types and amounts of goods may be needed to reach comparable levels of a good life (Robeyns 2005).

The CA is useful for identifying how energy infrastructure impacts upon well-being as it can link material, mental, and social well-being to economic, social, political, and cultural aspects of life. For example, when considering the well-being of a community neighbouring a wind farm one might include both increasing their income, and also a guarantee to conserve local wildlife. Concepts of 'functionings' and 'capabilities' are at the core of the CA. A functioning is something which an individual can be or do, and which they value/achieve—including activities or states of existence such as reading, dancing, being in good health, or not feeling ashamed. Opportunities to realise these functionings, whether one chooses to or not, are the capabilities. Given the high value the CA places on the freedom to choose, it is capabilities, rather than functionings, that are of greater concern. In the case of people living near wind farms, focusing on functionings would dictate a particular lifestyle which may not be aligned to their aspirations whereas recognising their capabilities can be key to understanding varying responses to energy installations. For instance, opposition to wind energy might not relate to the income received from hosting wind turbines (a functioning), instead it may stem from a lack of real opportunities to engage in paid skilled work or poor access to the decision-making processes on how these projects could enhance their livelihoods (a capability).

It is, however, relevant to acknowledge that the CA has received several criticisms. For instance, it has been challenged for being too individualistic (Evans 2002, Ibrahim 2006, Leßmann 2022). Another critique is that the CA proposes local solutions to global problems, and therefore does not address structural inequalities (Clark *et al* 2019). Similarly, Sen's work has been criticised for focusing on the immediate causes of poverty, disregarding the underlying social processes (Patnaik 1998), and not providing a sufficient analysis of the complexities of power relations (Gross and Wilson 2020). However, critics have also showed its usefulness as a conceptual and normative paradigm that reframes analysis of well-being and development by proposing a way to analyse and facilitate notions of a good life. Sen clarifies that the openness of the approach is one of its greatest strengths.

The CA has influenced several studies that have linked the CA with energy research. Melin *et al* (2021) in their introduction to a special issue on energy justice and the CA offer a comprehensive account of work that has been done to date. Wood and Roelich (2020) use Nussbaum's central capabilities to propose a pluralistic appeal to the three tenets of energy justice to integrate a 'broader range of moral approaches and concepts'. Corvino *et al* (2021) and Frigo *et al* (2021) have used the CA to analyse questions related to what constitutes a morally justified energy production and consumption.

In more applied work, the CA has been used to conceptualise and operationalise the relationship between well-being, technology, energy services and energy poverty, both in Southern and Northern contexts (Day *et al* 2016, Malakar *et al* 2018, Middlemiss *et al* 2019, Malakar and Day 2020, Wang *et al* 2021). A second stream focuses more specifically on the development impacts of electrification in different Southern countries (Fernández-Baldor *et al* 2014, Arnaiz *et al* 2018, Cole 2018, Malakar 2018). In a recent contribution, Wood and Roelich (2019) also drew from Day *et al* (2016) framework to capture tensions between well-being and climate change mitigation.

Meanwhile, energy research and the CA have also been combined to look at the social acceptance of new energy systems and their impacts. For instance, Wildt *et al* (2020) used agent-based modelling to assess the potential impacts of decentralised systems in terms of capabilities, as a way of addressing justice and ethical concerns in anticipation of future impacts. Similarly, Hunt *et al* (2021) analyse the extent to which renewable energy developments are enhancing or inhibiting capabilities among Aboriginal people in Australia.

This study builds on Velasco-Herrejón and Bauwens (2020) who also demonstrated that the CA can be a useful framework to capture how renewable technologies, such as wind, are enhancing (or constraining) the capabilities of individuals in Indigenous communities. Indeed, levels of acceptance of wind farms were explained by the impacts of wind energy siting and its outcomes on people's valued lives. Based on this capacity of evaluating multidimensional impacts on a diversity of people, the CA offered insights about aspects of acceptance that have been neglected or overlooked by other approaches. This paper extends this work by expanding on the methodology employed to visualise the relationship between well-being and energy infrastructure projects from a grounded approach. We hope that these methods can offer useful insights for the design and implementation of future renewable energy projects that have environmental and social sustainability in mind.



## 4. Methodological approach

To explore community perceptions about the well-being impacts of wind energy, the research adopted a ‘grounded approach’ that aimed to unravel the meanings of people’s interactions and experiences (Glaser and Strauss 2017)<sup>4</sup>. Adopting a grounded and people-centred approach, the study articulates people’s voices and capabilities and appreciates how these are enhanced or constrained because of the deployment of wind energy in their locality.

The methodology of this research is constructivist in nature as the findings are created while the investigation proceeds, i.e. through the various interviews and questionnaires with people living adjacent to wind farms. Hence, even though this approach allows respondents to define the focus of the enquiry, it also considers that the researcher cannot ‘be neatly disentangled from the observed in the activity inquiry into constructions’. Therefore, the findings or outcomes of this enquiry are themselves a creation or construction of the authors’ inquiry process (Smith *et al* 1994: 128). Thus, the responses of the participants will be used to construct a ‘real’ picture of their capabilities.

### 4.1. Identifying capabilities: perfecting a tool for collecting well-being data

According to Ibrahim (2008) the CA is difficult to operationalise because of two reasons: the ‘counterfactual problem’ and the ‘difficulty of inter-personal comparisons’. The counterfactual problem relates to the fact that capabilities measure the potential or the range of choices, rather than the actual achievements of an individual. The identification of the counterfactual is thus not easy due to the variety of human choices and available alternatives. Sen responds to this critique by arguing that:

*‘In assessing the freedoms that we enjoy and examining how unequal we are in that respect, the informational basis of the evaluation has to take into account our counterfactual choices (what we would choose) and their relation to what is made to happen [...] Sometimes the nature of counterfactual choices are very easy to guess, e.g. that people would choose to avoid epidemics, pestilence, famines, chronic hunger’* (Sen 1992: 66).

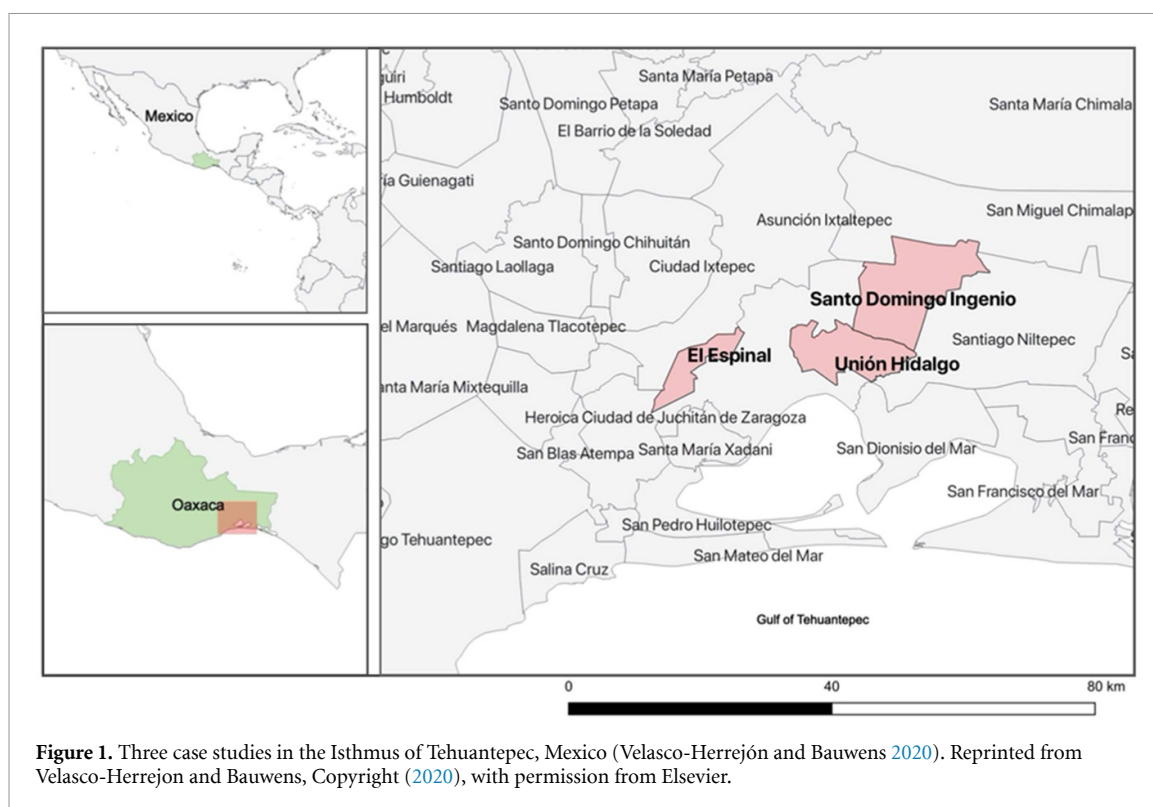
Following Ibrahim (2008) this analysis overcomes this counterfactual problem by asking people about their ‘unfulfilled capabilities’, or the most important things that they wished to achieve and could not.

As for the difficulty of interpersonal comparisons, the research overcomes this difficulty by identifying human capabilities, simply by asking people about these capabilities. However, there has been a widespread consensus that the direct identification of capabilities is rather difficult, and therefore several authors have mainly focused on the measurement of functionings as proxies for capabilities (Ibrahim 2008).

Reviewing these attempts, these can be divided into two main categories: (1) top-down assessment of human capabilities and (2) the grassroots exploration of people’s capabilities. The first uses secondary data to identify capabilities and/or develop indices of human well-being (e.g. Anand *et al* 2005, Comim 2016). This method deals with several concerns, such as finding suitable weighting and aggregation systems in addition to dealing with the difficulty of interpersonal comparisons. However, this method can be insufficient for Global South contexts as it limits the analysis of capabilities to a specific list of pre-defined capabilities by ‘Northern’ scholars (e.g. Nussbaum (2003) list of capabilities), rather than deriving these lists from people themselves, which is one of the main purposes of this research. The second bottom-up method focuses mainly on identifying and measuring potentially valuable human capabilities through participatory methods. The work of Alkire (2002), Clark (2003), Ibrahim (2008) and Uyan-Semerci (2007), among others, adopt this methodology.

Like these grounded attempts to identify capabilities, this research also stems from the belief that capabilities can be measured directly. Nevertheless, capabilities can be vague concepts, and therefore to assess them we need to move from conceptual to observational levels (Ibrahim 2008). At the conceptual level, the research studies the elements of a good life and the extent to which wind farms are contributing to these understandings of well-being. To move from the conceptual to the observational level, the research focuses on a number of ‘elements of a good life’ that people living near wind farms have reason to value. Many of these ‘elements of a good life’ are in fact capabilities, i.e. a set of functioning bundles from which people can choose to lead the lives that they have reason to value. For example, if the participant mentions money (the capability of generating income) the research explores the reasons for valuing this capability and, whether it was achieved or not and the reasons for their (in)ability to achieve the capability satisfactorily, or in the ‘money’ case, the income levels to provide for themselves and their families.

<sup>4</sup> Ethical approval for the work with adult participants for this research was granted by the Department of Politics and International Studies (POLIS) ethics committee at the University of Cambridge in February 2018. The research was conducted in accordance with the principles in the Declaration of Helsinki and in accordance with statutory requirements.



**Figure 1.** Three case studies in the Isthmus of Tehuantepec, Mexico (Velasco-Herrejón and Bauwens 2020). Reprinted from Velasco-Herrejón and Bauwens, Copyright (2020), with permission from Elsevier.

**Table 1.** Community demographics and relevant variables in the three case studies.

	El Espinal	Santo Domingo Ingenio	Unión Hidalgo
Population	8730	7681	14 542
% unemployment	2.7	8.3	5.3
The average duration of education (years)	10.9	8	9.3
% population that speaks an Indigenous language	32.2	3.9	47.22
% of people living in poverty (2020)	34.2	63.3	57.6
Human development index <sup>5</sup> (2015)	0.776	0.678	0.743

Source: Constructed by the first author using data from INEGI (2020) and Coneval (2020).

#### 4.2. Data collection

Three communities were selected for this study. All three are located in the Juchitán district of the Oaxaca state (the southern half of the geographic Isthmus of Tehuantepec) (figure 1). These communities share a range of characteristics (table 1). All three communities had wind farms installed between 2009 and 2017 and new wind developments have been planned in all three. Moreover, all three communities have a percentage of the Indigenous population and have comparable levels of poverty (INEGI 2015). Unión Hidalgo has the highest proportion of the Indigenous population, followed by El Espinal. Although Santo Domingo does not have a large population that speaks Zapotec, their everyday culture is based on Zapotec culture. This culture, known locally as *Binnizá*, shows its richness in everyday life through language, clothing, food, ritual, and festivities that require active community engagement, emerging from the syncretism between Zapotec pre-Columbian culture and Catholic teaching. The three cases were purposely selected to study variations in community responses to wind energy infrastructure. The first case, El Espinal, appeared to have considerable levels of acceptance of the wind farm projects. The second case, Santo Domingo Ingenio, was selected to allow for the observation of a community where there was a more mixed record of both resistance and acceptance to wind farms; although wind energy has been accepted to some extent, conflicts between landowners, government, and wind energy companies are pervasive. The third case study, Unión Hidalgo, provides an example of opposition and conflict around wind farms. Levels of acceptance were determined based on the number of projects in development or in operation that have been stopped or

<sup>5</sup> The Human Development Index (HDI) ('Human Development Index (HDI) 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).

blocked for more than two weeks between 2009 and 2017 due to local opposition: in El Espinal, no projects from the four existing wind farms have been discontinued, in Santo Domingo Ingenio six out of nine projects have been halted, and in Unión Hidalgo all five existing projects have been stopped or delayed for at least two weeks (Velasco Herrejon 2021).

To assess the well-being impacts of wind farms in the Isthmus of Tehuantepec, an evolving and flexible participatory research design was introduced to allow the combination of qualitative data (or depth) with quantitative data (or breadth) to triangulate and validate qualitative research findings, so that theoretical, empirical, and observable conceptions of well-being accounts of people living near wind farms could be explored.

The **first stage** of the research design started in September 2017 and lasted until January 2018. This stage involved the use of qualitative methods in the form of semi-structured individual interviews, focus groups and participant observation in the three communities. This qualitative research methodology offered an inductive and flexible model (Kelly 2012) to explore (1) elements of a good life (used as a simplified definition of capabilities as discussed in the last sub-section) and (2) how these conceptions are associated with everyday interactions with wind farms. In total, 64 residents of the three selected communities participated in interviews and focus groups. Participants included people that own land where the wind farms are established, farmers, agrarian authorities, local wind farm employees, and people affected by wind farms that do not receive benefits. Table 2 (interviews) and table 3 (focus groups) indicate the place where participants are from, their profession and their gender<sup>6,7</sup>. Using a snowball sampling, participants were selected so that a balanced representation of ethnicity, age, gender and socioeconomic status could be achieved. All interviews and focus groups were held in Spanish, given that all respondents felt comfortable speaking this language. While interviews offered a safe space to establish individual standpoints regarding a situation, attitudes, values and feelings, focus groups generated qualitative data based on group interaction and discussion (Seale 2017). Both instruments facilitated insights into how people of different sex and age groups define, discuss and contest how wind farms impacted their well-being. The differentiation of the method was mainly based on stakeholder preference of whether they felt more comfortable having a one-on-one conversation or in a group. Open-ended interviews were primarily held with authorities, community members and local NGO representatives (mainly people that did not receive direct benefits from windfarms or preferred having a private conversation). Focus groups were carried with existing farmer committees that rented their land to wind farms as well as an opposition group to these developments. They preferred having a conversation in a group since they could then use this space to discuss other matters after our conversation.

During these same four months, the first author also took part in participant observation to engage in the daily activities, interactions, events and rituals of all three communities (Musante and DeWalt 2010). At least four weeks were spent living in the home of a family in each locality, taking part in house chores, home-schooling children, helping out in the family business and attending parties and family gatherings. This method allowed the first author to have a sense of what it is to be part of a community and widen her understanding of their everyday interactions with wind turbines.

From April to June 2018, the **second data collection stage** involved participatory research to emphasise a bottom-up approach with a focus on locally defined priorities and local perspectives (Cornwall and Jewkes 1995). This approach sought to engage more respondents in the study through a survey, while also facilitating spaces for collective reflection about capabilities, well-being, and community acceptance of wind energy.

The transition to a participatory methodology enabled the involvement of local co-researchers as well as other participants to share and analyse their conditions of life and aspirations, which is key to understanding people's capabilities while recognising and validating Indigenous knowledge allowing people to exercise greater voice and agency in how the research is conducted and designed. Indigenous scholars Denzin *et al* (2008) and Wilson (2008) refer to participation as an approach that can be used for Indigenous research since it allows questioning of 'western' norms by identifying conceptions of well-being that are very dissimilar from the ones held by wind energy developers, governments, and the outside researcher. Moreover, participatory research recognises that as a non-Indigenous researcher, the first author could not directly conduct research from an Indigenous perspective (Kovach, 2015). Yet, along with a framework that comprises of Indigenous co-researchers, the study can give validity and centrality to Indigenous voices (Wilson 2008).

This second stage consisted of two main methods: participatory workshops and a survey. Students from the Social Sciences University (UNID) located in El Espinal, were invited to participate in the data collection

<sup>6</sup> Note that the sum of participants in both tables is 67 since some people participated in a focus group and were also individually interviewed.

<sup>7</sup> Informants choose to agree whether to add their name to the report or remain anonymous. Professions have been generalised to maintain their anonymity.



**Table 2.** Participants in semi-structured interviews (total of 49).

Place	Position/Profession	Gender
People who live near wind farms (No. of interviews 32)		
El Espinal	Taxi driver	M
El Espinal	Market vendor	F
El Espinal	Sports coach	M
El Espinal	Primary schoolteacher	M
El Espinal	Business owner	F
El Espinal	Business owner	F
Santo Domingo Ingenio	Primary schoolteacher	M
Santo Domingo Ingenio	Spouse of wind farm employee	F
Santo Domingo Ingenio	Chicken vendor	F
Santo Domingo Ingenio	Festivities coordinator	F
Santo Domingo Ingenio	Festivities coordinator and bank cashier	M
Santo Domingo Ingenio	Primary schoolteacher	M
Santo Domingo Ingenio	Spouse of wind farm employee and business owner	F
Santo Domingo Ingenio	Grocery store owner	M
Santo Domingo Ingenio	Retired schoolteacher	M
Santo Domingo Ingenio	Secondary schoolteacher	F
Unión Hidalgo	Primary schoolteacher	M
Unión Hidalgo	Member of a culture collective	M
Unión Hidalgo	NGO employee and comunera	F
Unión Hidalgo	Comunero	M
Unión Hidalgo	Retired schoolteacher	F
Unión Hidalgo	Undergraduate student	F
Unión Hidalgo	Undergraduate student	M
Unión Hidalgo	Farmer	M
Unión Hidalgo	Primary schoolteacher	F
Unión Hidalgo	Farmer	M
Unión Hidalgo	Consultant	F
Unión Hidalgo	Homemaker	M
Unión Hidalgo	School teacher	F
Unión Hidalgo	Homemaker	F
Unión Hidalgo	Farmer	F
Unión Hidalgo	Taxi driver	M
Land tenants (No. of interviews 14)		
Santo Domingo Ingenio	Farmer and member of landowner committee	M
Santo Domingo Ingenio	Farmer and Ejido commissariat	M
Santo Domingo Ingenio	Farmer and business owner	M
Santo Domingo Ingenio	Farmer, Ejido commissariat and member of landowner committee	M
Santo Domingo Ingenio	Farmer and business owner	M
Santo Domingo Ingenio	Farmer and accountant	M
Unión Hidalgo	Schoolteacher and member of landowner committee	M
Unión Hidalgo	Retired school administrative	F
Unión Hidalgo	Schoolteacher and member of landowner committee	M
Unión Hidalgo	Farmer and member of landowner committee	M
Unión Hidalgo	Farmer and member of landowner committee	M
Unión Hidalgo	Farmer and member of landowner committee	M
Unión Hidalgo	Farmer and member of landowner committee	M
Unión Hidalgo	Farmer	M
NGOs and collectives (total of 3)		
Mexico City	Transnational justice coordinator	M
Mexico City	Human and environmental rights manager	M
Mexico City	Human rights director	M

and analysis of the research voluntarily. Ten students and two other community members decided to participate as co-researchers, who are also the authors of this paper; among the co-researcher, three were from Santo Domingo Ingenio, two were from Unión Hidalgo and seven were from El Espinal and Juchitán.

Two initial participatory workshops were organised with participating co-researchers (figure 2). In the first workshop, the general research objectives and framework of the study were presented and modified

**Table 3.** Participants in focus groups.

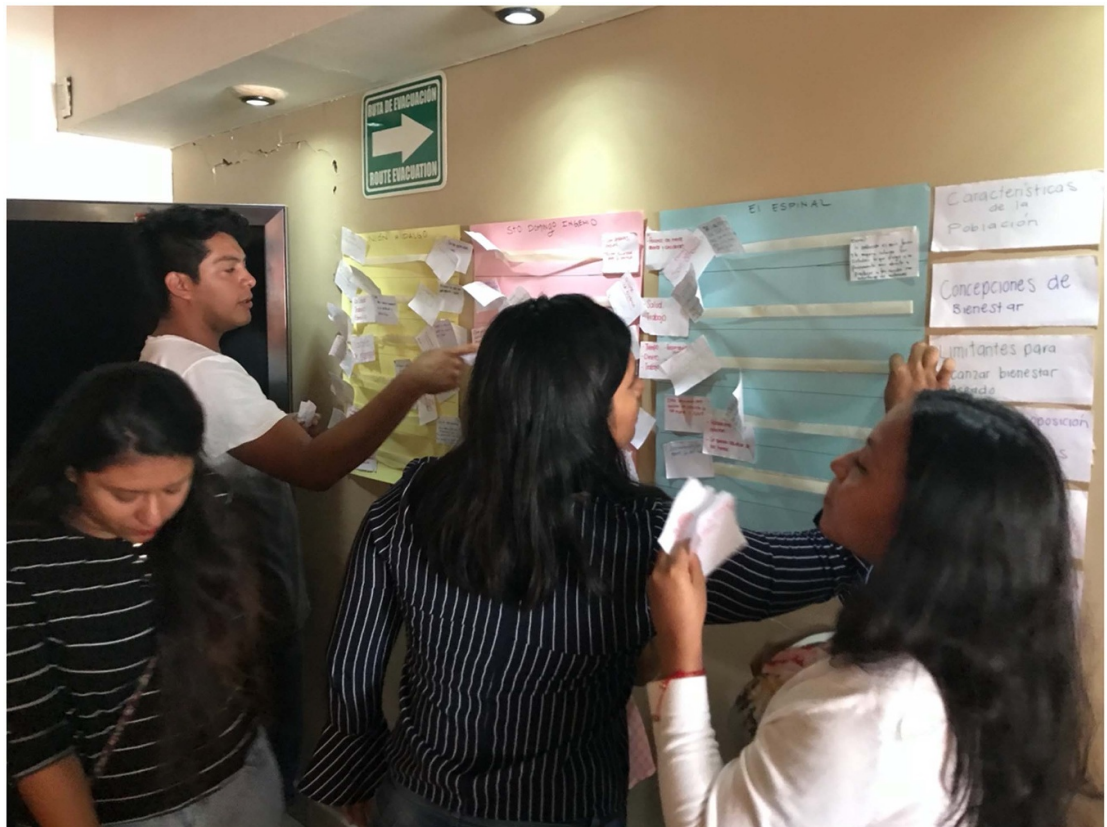
Position/Profession	Gender
Focus group 1 (Non-tenant farmers in Unión Hidalgo)	
NGO employee and comunera	F
Business owner and comunera	F
Business owner and comunero	M
Farmer	M
Focus group 2 (Committee of land tenants in El Espinal)	
Farmer and member of landowner committee	M
Farmer and member of landowner committee	M
Landowner and business owner	M
Farmer and member of landowner committee	M
Focus group 3 (Committee of land tenants in Santo Domingo Ingenio)	
Farmer and member of landowner committee	M
Farmer	F
Farmer	M
Farmer	M
Farmer	M
Farmer	M
Focus group 4 (Committee of land tenants in in Unión Hidalgo)	
Schoolteacher and member of landowner committee	M
Farmer and member of landowner committee	M
Farmer and member of landowner committee	M
Farmer and president of landowner committee	F

based on co-researchers' feedback. The workshop started with an initial presentation of the research questions and theoretical framework that were initially proposed for this study. Workshop participants discussed the relevance of these concepts in the light of their experiences, as residents of the communities proposed as case studies, and their relationship with wind farms.

The importance of the association between well-being and community acceptance of wind energy was confirmed by workshop participants as well as the relevance of understanding well-being by operationalising the CA. They asserted that developers had not understood what people in the communities have reason to value and that this had been a source of tensions and disagreements. They also showed interest in taking part in a study that would unveil the different aspirations of people living in the Isthmus of Tehuantepec. When describing the concepts of functionings and capabilities, the co-researchers established that these concepts could be difficult to communicate to study participants and confirmed that discussing 'elements of a good life' would be a good and meaningful way of discussing well-being aspirations within the Zapotec culture. They also said that asking about 'the three most important things of a good life' could also be a good formulation.

After this discussion, each co-researcher noted down two lists of capabilities. One list included the capabilities that she/he had reason to value as an individual and the second one contained the capabilities that she/he believed her/his community valued. These two lists were shared and discussed among participants. Differences between individual capabilities were first considered, and then differences between individual and community capabilities were debated. Once the main commonalities and differences were delivered between co-researchers, the first author proceeded to show them a list of capabilities that resulted from the interviews and focus groups conducted in the first stage of the research. Contrasts and similarities were again discussed until there was an agreement on a final list of capabilities that people in the three communities have reason to value that were then used as focal points of analysis to jointly design the methodology used in this second stage of the research, where diverse community perceptions were turned into a set of questions for an in-person survey.

As a result of the workshop, the following capability domains were identified: income/money (the ability to generate income), education (having/being able to attain an educational level), employment/job, health (being able to be in good health), physical safety, communal respect and discrimination (being able to live without discrimination), family and friends (having/being able to have strong family relationships), social capital, and political and community participation (being able to participate in communal and political



**Figure 2.** Participatory workshops with co-researchers (first author's photograph Juchitán 2018).

matters). Participatory efforts ensured that the language of the questions was clear and adapted to the local context, while also improving trust and learning (Scherhauer *et al* 2018). For instance, because the denomination 'income' is foreign in this region, the idea had to be redefined in the local language to 'money' and adapted the data collection methods to acknowledge local conceptions of revenue.

After identifying the different capability domains that need to be assessed, a second workshop was held to decide on a methodological tool to assess these capabilities and their relation to wind farms. During this second workshop, different options were explored such as a formal closed-ended survey, structured interviews or focus groups. As a result of this collective reflection, an open-ended questionnaire was proposed to follow up on the research inquiry to (1) increase the involvement of local people in the conversation about capabilities and their relationship with wind farms by using a method that initiates discussions in a familiar, non-threatening way<sup>8</sup>, and (2) to triangulate and broaden the validity of research findings from stage one by introducing a quantitative and more structured approach to data collection that allows for comparisons between the three communities.

The questionnaire was informed by previous studies on capabilities (e.g. Biggeri *et al* 2006, Ibrahim 2006, Anand *et al* 2009). The starting point was simple open questions enquiring (1) what are the three most important elements of a good life, (2) which is the most important element and why, (3). what are the three most important things that they wished to achieve in life but could not and why. The section then looked at the capability domains: income/money, education, employment/job, health, physical safety, communal respect and discrimination. This was done by asking (1) whether they value a specific *capability* or not; (2) why they value/do not value it (*reasons for valuing this capability*); (3) whether they have achieved it or not (*functioning*); and (4) why they have succeeded/failed in achieving it (*conversion factors*). In a second section, the instrument investigated their achieved functionings by asking respondents about their aspirations following the installation of wind farms in their community. More precisely, respondents were asked whether they considered that wind farms had contributed to the enhancement of these basic capabilities and their general individual and communal well-being.

<sup>8</sup> Questionnaires are a well-known method among respondents in all three case study sites. The government and NGOs gather data using questionnaires on a yearly basis.

**Table 4.** Workshops and discussion groups organised for feeding back survey data.

Actor	Respondents	Number of workshops
Community	People that live near wind farms (three communities)	3
	Owners of land where wind farms are constructed (three communities)	3
Government	Local government (three communities)	3
Developers	At least one representative from all companies	1
	Total number of workshops to feed questionnaire results back	10

Source: constructed by the authors.

The sample frame was based on the street map of the locality or using Google Earth and ArcGIS, which allowed us to identify houses geographically in each area of each locality and consult directly with individuals living in all neighbourhoods. Houses were selected using a stratified random sample to construct a proportional sample of each neighbourhood of the three localities, considering only adults aged 16 and over. Data was gathered in the mornings and evenings to attain a balanced representation of men and women from different ages. Following data collection, all co-researchers would gather daily to discuss our experiences and take note of any relevant data that was not captured by the questionnaire. This second stage resulted in 382 questionnaires across the three communities. The sample was composed of 54.7% of women, with an average age of 33, an average of almost 10 years of education and 34% reported having a relationship with the wind farm industry.

Lastly, the **third research stage** involved participatory workshops and group discussions with members of the three participating communities from November 2018 to January 2019. The aim of these interactions was to (1) feed results back from the questionnaire to participants; (2) further triangulate, complement, and collectively analyse data collected during the second stage and first stages.

The first workshop was held with the 12 co-authors to plan a strategy to feedback the data to individuals and groups that participated in the research: during this workshop we discussed who was going to be involved, when, and how was data going to be presented and discussed. Given the availability of time and resources, a total of 10 workshops were organised (table 4): one open for all community members, one for landowners, one for government officials in each locality and one for developer representatives. Photos of the workshops can be seen in figures 3 and 4.

During workshops, the authors first presented the main findings, in four sections. The first section outlined the main research questions, objectives and methodology of the study. The second section presented the capabilities that people have reason to value in the three communities. The third section explored the relationship between these capabilities and the process and outcomes following the installation of wind power. Finally, the fourth section mentioned the main conclusions derived from the analysis of the survey and proposed points for discussion with workshop participants. Authors organised themselves so that each would be presenting one section. Discussion with all workshop attendants happened both throughout and after the presentation. Participants were free to ask questions about the data or share remarks and disagreements. Further deliberation was encouraged by the authors which resulted in an interactive process where information from the survey was fed back to participants and at the same time, workshop attendees unveiled connections between findings and filled relevant gaps. Workshops lasted between two and five hours.

Workshops helped clarify and confirm quantitative results, such as understanding the reasons why respondents do not participate in decision-making in relation to wind farms even though they find that engagement is valuable. In sum, the participation of the local population in the design, administration, and analysis of information during stages two and three ensured a bottom-up approach to the research design and the dissemination of initial research findings.

#### 4.3. Data analysis

The data were analysed in three phases. First, the qualitative data collected during the first stage was transcribed and coded using NVivo by the lead author. Coding was focused on the identification of valued capabilities and factors affecting the acceptance of wind energy according to commonly occurring topics. This data was then collectively analysed, synthesized, and validated through the workshops with the co-authors using participatory tools such as matrix scoring and ranking (Chambers 2008). Second, quantitative data was analysed by conducting chi-square tests to compare the values of the variables of interest across the three communities. This analysis was then confirmed and simplified with co-researchers. Third, workshop data was then coded by authors and grouped into main themes as a last effort to group capability dimensions for each community, and to what extent these were enhanced or constrained by wind energy infrastructure.





**Figure 3.** Workshop to feed results back to government officials in Unión Hidalgo (first author's photograph 2018).

#### 4.4. Positionality and challenges to participatory methods

As previously mentioned, participatory research aims to valorise the experiences of communities in their own terms focusing on local priorities, processes, and perspectives (Cornwall and Jewkes 1995). This type of research is reflexive, flexible, and iterative (Cornwall *et al* 1995, Chambers 1997) and offers the opportunity to engage people as active contributors (Chambers 1997). Such an approach requires tools that are centred on direct interactions with the field. For this study, this included in-depth interviews with participants, participant observation, workshops, and group discussions.

However, there are critiques of the ethics of participatory research which raise concerns about unresolved issues of power, positionality, and community ownership (Hickey and Mohan 2005). We approached this research recognising these concerns and acknowledge how participatory methods such as doing fieldwork on foot, can affect the nature of community dis/empowerment, outside/insider relations, and grounded radical politics and advocacy (Hickey and Mohan 2005, Vergunst and Ingold 2008). It is therefore necessary to reflect on how positionality and the methods used had an impact on the research.

Positionality played an important role on how the lead author and co-researchers, approached participants, got access to research spaces, and how participants responded to the different forms of engagement. Critical research has examined the intersectionality of elements that form a researcher's perspective of the field and how the researcher is perceived through the lens of class, education, gender, race and politics (Pulido 2017).

The lead author worked at a wind energy company located in the region from October 2013 to April 2015. She did not work or live in either of the localities chosen for the study. Nonetheless, she felt ethically bound to state her work background and current status as a PhD student from the outset of every interaction so that the person could decide whether they could trust the researcher and would like to participate in the research.

Class, ethnicity, and race formed another crucial identity which had to be acknowledged and negotiated during fieldwork. As a colonial vestige, race and presumed racial differences are a criterion for class differentiation in Mexico (Seed 1982). Darker skin is associated with lower income levels and fewer years of schooling. Consequently, the colour of your skin can help others draw conclusions about a range of issues, including economic and educational attainment (Zizumbo-Colunga 2017). In the three localities, the lead-author's class privilege was recognised due to her skin which was identified as white in the South Mexican context. Although this privilege influenced access, it is worth mentioning that, because of her being





**Figure 4.** Workshop to feed results back to community members in Unión Hidalgo (first author's photograph 2018).

a Mexican woman with familial roots in the southern region, she was able to relate to study participants in a way that a person from Mexico City or the northern region could not. These characteristics allowed the lead author to approach young people, landowners, and government officials because these are the actors that she had more experience approaching with during the post in the wind energy company. However, she found it difficult to properly connect with poor and landless women and men as she was seen as an outsider.

Co-researchers had stronger links to the three communities. Being born and raised in this region allowed them to overcome some of the access issues experienced by the lead-author. They could understand (and some speak) Zapotec and knew the social norms that enabled the data collection to be done in a way that participants felt safer and more comfortable, allowing them to engage in conversations with women and disadvantaged segments of the population. Their municipality of origin had little impact when engaging with participants from another municipality. In general, participants felt comfortable sharing their experiences when knowing that they were from the Isthmus. Being students was also a trait that facilitated researcher's access to participants, since the population recognises undergoing education as a positive trait.

Undergoing a collective analysis, synthesis, and validation of the data among researchers and then with the wider community had several advantages. Discussions helped to challenge the assumptions of the lead-author as well as co-researcher about the participants, data collection approaches and instruments. Continuous reflection and modifications to the data and analysis collection process (re-defining times for collecting data, places, and ways to discuss findings, and the selection of data to be analysed) allowed researchers to widen spaces of participation, and to move the study from a top-down positivist approach towards a more bottom-up, community led process. The lead-researcher initially proposed concepts, places, and ways of collecting and analysing data. Nonetheless, co-researchers slowly took the lead of these decisions and finally were the ones that decided how, when and where the findings dissemination workshops would take place. They were the ones providing the information and engaging participants, so that they could also assume leadership of the process.

It is however important to recognise the limitations of a participatory methodology. Participatory methods do not necessarily lead to greater rates of public engagement in the research and are not enough to fully address the political implications and power inequalities that allowed certain groups to play an active role in the conversations and for others to remain silent. For instance, finding a neutral place for organising workshops opened to all the community was a relevant challenge. Even though community workshops were

widely advertised through local and social media, attendance was relatively low. While discussing this issue with co-researchers, we concurred that existing community tensions discouraged people from attending to avoid levels of confrontation, and this is why we opted to do more workshops with selected groups (landowners, resistance groups, government officials and developer representatives, which were mostly men). This meant that other relevant stakeholders that did not belong to these groups had limited way of engaging with the research. Similarly, discussions while in groups were generally led by the president of the committee, or leader of the group, which had implications on what participants could share during these conversations. Furthermore, co-researchers could not partake fully in the writing of this paper due to limited English proficiency.

Future research could therefore pay more explicit attention to the power dynamics that might not allow equitable participation. This would include investigating ways of improving engagement particularly for women, and landless inhabitants. Stakeholders in academia should also make efforts to increase access of Indigenous scholars by opening publication formats that enable simpler approaches of sharing and discussing data, such as allowing manuscripts to be written in languages other than English.

## 5. Results and discussion

When asked which capabilities they perceived as most valuable, survey participants across the three communities reported similar answers. However, the workshops and semi-structured interviews uncovered notable differences about why these capabilities were valued (see tables 5–7). The instrumental value in enhancing other capabilities meant that, across methodologies, being able to live a healthy life (health) was considered an important capability in all three localities. Strong family relationships (family) was the second most important capability in the survey; with semi-structured dialogues revealing the intrinsic value of its contribution to well-being and harmony. Strikingly, having a job was the second most important capability in the interviews and workshops, but its importance was seen differently in the three communities. In Santo Domingo Ingenio, a job was regarded as a stable income and not linked to effort and/or honesty, unlike in Unión Hidalgo and El Espinal where references were made to effort and not *‘taking the easy path of corruption’* (Regalado 2017).

The capability to attain an education was ranked third in the interviews and workshops and intriguingly was valued for different reasons by the different communities. In El Espinal a higher education was considered to be an instrumental capability for getting a job. In Santo Domingo Ingenio, education was a sign of status or success, and an instrument to *‘avoid being fooled by the government’* (Santiago 2017), whereas in Unión Hidalgo, it was mentioned as a capability for expanding children’s access to schooling. Generating income (money), the fourth most valued capability in all three methodologies, was also considered important for different reasons. In El Espinal money was a way to afford ‘luxuries’ such as eating at a restaurant, travelling, or going to see a movie. In Santo Domingo Ingenio, money meant both to provide basic goods and food for the family, but also *‘to live the good life’* which was commonly linked to *‘alcohol and women’*. Finally, people in Unión Hidalgo did not necessarily see money as a source of happiness and instead were more concerned with its importance to live a dignified life including good food (being able to consume meat and fresh produce from the market) and basic education. In sum, quantitative findings offered statistically significant results, while qualitative and participatory methods offered participants more freedom to discuss capabilities not mentioned in the survey; such as the importance of public services and the value of community collaboration, being respected, being treated as equals and being in peace, as well as an explanation of why people value a capability and not another.

The perceived impact of wind energy on well-being and the resulting attitudes towards the wind-power industry varied between the three communities (figure 5). Across all capabilities, the residents of Unión Hidalgo, where opposition to the deployment of wind energy was highest, perceive lower positive impacts associated with the introduction of the wind energy industry than residents in the other two localities across all valued capability dimensions. Whereas small differences between Santo Domingo Ingenio and El Espinal were not statistically significant. The perceived positive impact of wind farms on individual well-being was low and did not have any significant differences between communities, in contrast the perceived positive impact on collective well-being was generally higher but notably the Unión Hidalgo was statistically much less than the other two regions. Taken together, this suggests that positive impacts of wind farms are primarily experienced collectively; whilst the low positive impacts at the individual level across communities may be attributed to the conflicts between the individualised approaches of the wind energy industry and the collective aspects of local traditions (such as contrasting claims about communal land ownership (Torres Contreras 2023) and consensus-seeking decision-making).

Reasoned discussion based on the CA facilitated understandings of how local communities conceive well-being which in turn is associated with the way they understand and are affected by wind energy.

**Table 5.** Results from the survey question: what is the most important element of a good life? Adapted from Velasco-Herrejón and Bauwens, Copyright (2020), with permission from Elsevier.

	Unión Hidalgo %	Santo Domingo Ingenio %	El Espinal %	Total %
Health*	36 <sup>b</sup>	55 <sup>a</sup>	35 <sup>ab</sup>	41
Family	23	24	35	28
Jobs	17	4	6	9
Money	5	5	4	5
Non-recognition	5	3	7	5
Life itself	4	2	3	3
Education	2	4	1	2
A good environment	4	1	1	2
Religion	0	1	4	2
Well-being	2	0	1	1
Housing	2	1	0	1
Eating	0	1	1	1
Happiness	0	0	2	1
Safety	0	0	0	0

Source: constructed by the first authors based on (Velasco-Herrejón and Bauwens 2020).  $N = 358$ . Surveys with responses that were unable to be ranked were excluded.

**Table 6.** Results from the interview question: what is the most important element of a good life?.

	El Espinal %	Santo Domingo Ingenio %	Unión Hidalgo %	Total %
Health	7	17	21	15
Jobs	22	15	15	17
Education	19	15	15	16
Money	15	4	8	9
Family	4	13	6	8
Housing	14	0	4	6
Eating	0	7	9	5
Public services	0	4	10	5
Non-recognition	7	4	2	5
Comm collaboration	0	4	4	3
Happiness	4	2	0	2
Safety	4	2	0	2
Travel	4	2	0	2
Respect	0	4	0	1
Equality	0	2	2	1
Be in peace	0	2	2	1
A good environment	0	0	2	1
Religion	0	0	0	0
Well-being	0	0	0	0
Life itself	0	0	0	0

Source: constructed by the first author.  $N = 64$  Interviews.

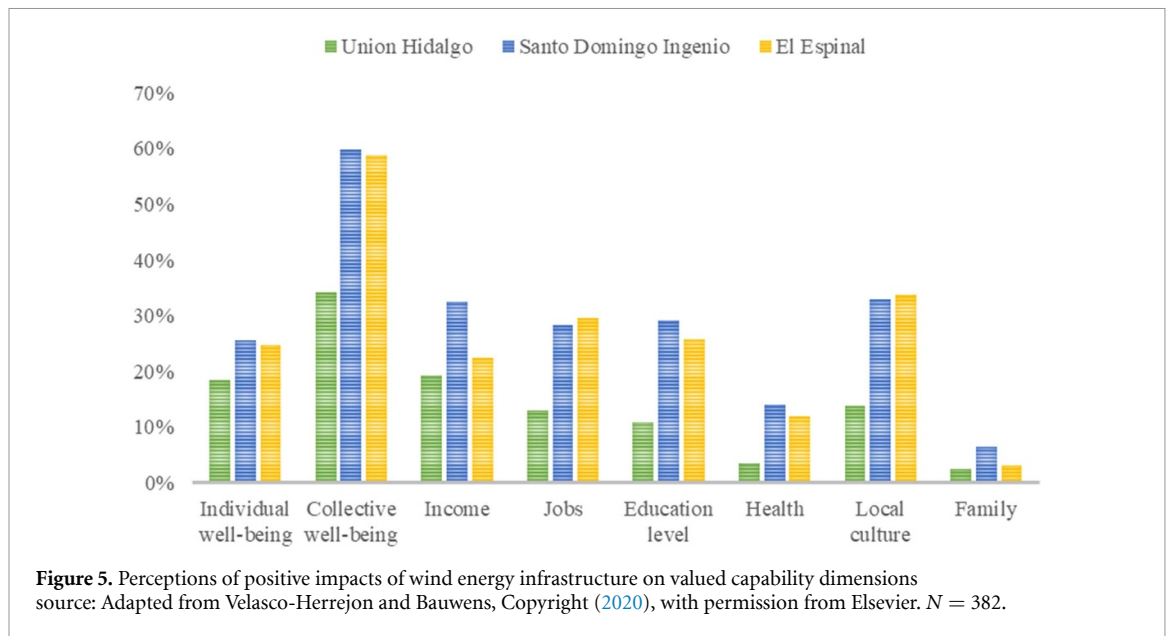
**Table 7.** Capabilities agreed as most valuable during workshops with co-authors.

El Espinal	Santo Domingo Ingenio	Unión Hidalgo
Health	Health	Health
Good job	Good job	Jobs (in general)
Education	Education	Education
Money	Activate de economy	Money
		Family

Source: constructed by the first author.  $N = 2$  workshops.

Quantitative findings that unveil low impacts on well-being on key capability dimensions confirm that wind farms have not contributed to valued ways of doing and being of local people, thus revealing reasons for opposition. This finding is especially relevant for Union Hidalgo, where qualitative data confirmed high local opposition as well as a lack of perceived positive well-being impacts resulting from the establishment of wind energy in the community.

Though, according to the quantitative analysis, 33% of people have a direct relationship with the wind farm industry, benefiting either through land leases or jobs, the unequal distribution of these benefits has



resulted in a negative impact on family and social networks, which are considered a significant element of well-being in this context. Respondents recognised that wind energy is increasing inequality among the population and within families (for more information please refer to Velasco Herrejón and Bauwens 2023). Moreover, they maintain that negative impacts caused by wind energy should result in collective benefits, and not in individual compensations to a section of the population. In this context, individual achievements are not perceived as an overall well-being improvement.

Health was confirmed as a main element of well-being in both qualitative and quantitative methods. Conversely, assumed negative impacts on human health now and in the future constituted one of the main causes of community opposition to wind turbines. The lower percentage on how wind farms are perceived in relation to being able to live a healthy life may be a sign of lagging investments from the wind energy industry in health, which otherwise may increase social acceptability to wind energy.

Employment was also a common well-being dimension valued across communities. This was raised as a significant determinant for well-being during the surveys, and qualitative interviews confirmed its value and relationship to wind farm opposition. When developers first arrived at the Isthmus of Tehuantepec, jobs were offered as one of the most important trade-offs. However, while employment is widely available during the construction phase of wind developments, this only lasts approximately two years, leaving an average 3.4% of all former workers permanently employed, often in technical jobs that are held by foreigners.

An increase in insecurity was also a cause for opposition. Particularly, participants in Santo Domingo Ingenio asserted that the incoming income from the wind energy industry was mainly spent on alcohol, which in turn augmented the incidence of violence. Furthermore, there was an increased perception that there was ‘*new people with money*’ and that this increased the incidence of home burglary.

Another reason that explains why people do not perceive a change in their well-being is that even though, most wind energy companies have made investments to improve local infrastructure related to health, education, and culture, interviewees stated that funding has been provided through local governments that have low levels of accountability, particularly in the case of Unión Hidalgo and Santo Domingo Ingenio. On the contrary, in the community that has shown higher levels of acceptance of wind energy, El Espinal, the government has provided sporting and cultural facilities, as well as higher education scholarships using wind energy funds. This finding supports studies that have highlighted the importance of transparency and trust in public actors when benefit allocation appears suspect (e.g. Gross 2007, Walker *et al* 2010, Fournis and Fortin 2017, Dwyer and Bidwell 2019).

Lastly, another finding that was not reflected in the quantitative data but was a relevant issue raised during the final workshop is the insufficiency of spaces where local people may take part in decision-making about well-being investments, either by the government or directly by the wind energy companies. Participants voiced their interest in taking part in decisions about their lives and not as passive recipients of benefits, a practice that was associated with new forms of colonialism (e.g Velasco-Herrejón *et al* 2022).

In sum, understanding valued ways of doings and beings of people living adjacent to wind energy infrastructure may increase the acceptability of these developments by undertaking policies that aim at improving valued well-being elements. In the context of Southern Mexico, acceptability may be further



increased to the extent that economic advantages are more equally distributed among the population to increase the collective well-being of the population and avoid the weakening of social networks. This could be achieved not only through the better distribution of tenancy payments among farmers but also by contributing to the betterment of the municipality such as the paving of streets and improvement of common areas such as parks and sports areas. Moreover, investments that aim at increasing the opportunities for people to live in good health, more employment and training opportunities that will allow the population to increase their access to skilled jobs, in the wind energy industry are also key components that may increase people's well-being. Finally, the way people are involved in this process is fundamental to acceptability and well-being outcomes. People valued the feeling of their aspirations being recognised as much as they valued improvements in their well-being.

This work's contributions to improving our understanding of community acceptance are three-fold. The study's CA to social acceptance contributes to debunking the validity of NIMBY—'not in my back yard' motives—and echoes studies that characterise this stance as pejorative (Devine-Wright 2005, Van der Horst 2007, Wolsink 2007, Haggett 2010, Petrova 2013, Rudolph 2014). Findings unveil more complex, well-being driven motives of opposition. And, by looking at the importance of community participation and engagement of Indigenous co-researchers in the creation of knowledge about well-being impacts of energy infrastructure, the study contributes to a better understanding of a bottom-up approach to social acceptance, extending existing literature that highlights the importance of fostering community engagement (Wolsink 2007, Mendonça *et al* 2009, Aitken 2010, Batel *et al* 2013, Stadelmann-Steffen and Dermont 2021). Finally, the results also extend critical literature on social acceptance by highlighting the importance of contextual studies, that look at 'what is being said, how, by whom and for whom, within research on people's responses to RETs. Consequently, the study raises the need for a context-sensitive framework, such as the CA, rather than normative and abstracted generalisations.

## 6. Conclusion

In this paper, we faced a question that a priori was trivial, even obvious to answer, namely, about the outcome of a sustainable infrastructure initiative (wind farms) on people's conceptions of their well-being. Operationalising the CA, the research shows how the discussion of people's aspirations can lead to improved awareness of well-being implications related to the deployment of energy infrastructure in Indigenous communities.

This paper provided a description for the use of a participatory mixed methodology, that started with a qualitative analysis, followed by quantitative results and a final qualitative stage, which proved essential for achieving bottom-up, balanced and reliable conclusions about the influence of different factors on people's values and conceptions, overcoming the problem of reproducing misrepresentations of social impacts of wind energy formulated by outsiders.

Findings conclude that community acceptability of energy infrastructure such as wind farms will only be attained through inclusive community engagement that pays particular attention to valued ways of being and doing of the local population. These include increasing the opportunities for people to live in good health, skilled employment in the industry, engaging and integrating local culture, values, worldviews and needs, and having a collective approach to the distribution of economic benefits that may strengthen social networks.

The contributions of this study are twofold. First, it adds to the social acceptance of RET literature by providing a methodological approach that engages communities in the production of knowledge about well-being impacts. Second, it contributes to the CA literature that relates to democracy to human capabilities by promoting people's participation in the selection and weighting of capabilities.

Future avenues of research include exploring relations between the different dimensions of well-being and their link to dynamics of power. Looking at these complexities may further explain barriers for participation, inclusion, co-production, and empowerment of local communities. The methodology can also be employed to investigate the link between justice as recognition and the CA to bring more to the fore underlying issues of energy colonialism and dispossession brought by RETs installed in traditional and Indigenous communities. This methodology can also be replicated in other contexts where RETs are being installed, which can further include comparing two different case studies, as well as integrating these factors into energy systems models to analyse the technical and financial viability of the resulting policy recommendations.



## Data availability statements

The data cannot be made publicly available upon publication because they contain sensitive personal information. The data that support the findings of this study are available upon reasonable request from the authors.

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The authors have confirmed that any identifiable participants in this study have given their consent for publication.

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