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From global to local: impact assessment and social implications related to wind energy projects in Oaxaca, Mexico

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ABSTRACT

In order to forecast likely impacts, Environmental Impact Assessment (EIA) has been applied worldwide. There are numerous social and cultural impacts that can hardly be addressed in a single EIA, and raise the awareness of social issues and proper assessment therein. This paper analyzes the social conflicts related to wind development projects in the Isthmus of Tehuantepec, Mexico using a qualitative approach. By conducting a Constellation Analysis (CA) in our case studies, this article aims at: 1) identifying the challenges and improvement opportunities for the social and environmental assessment of wind energy projects in Oaxaca, and 2) presenting CA as a novel approach to visualize and identify social and environmental issues. This paper emphasizes the relevance of earlier assessment of social implications to projects. This example can contribute to a better understanding of further research at Mexico's regional and national levels, as well as in other regions or countries with similar development patterns.

Abbreviations: CA: Constellation Analysis; CDM: Clean Development Mechanism; CFE as in Spanish: Federal Electricity Commission; CIC: Community Interest Company; EIA: Environmental Impact Assessment; ESF: Environmental and Social Framework; FPIC: Free, Prior and Informed Consent; IFC: International Finance Corporation; ILO: International Labour Organization; LGEEPA as in Spanish: General Law on Ecological Balance and Environmental Protection; NEPA: National Environmental Policy Act; PDD: Project Design Document; SEMARNAT as in Spanish: Secretariat of Environment and Natural Resources; SENER as in Spanish: Secretariat of Energy; SIA: Social Impact Assessment; UNFCCC: United Nations Framework Convention on Climate Change; WB: World Bank.

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Introduction

The worldwide efforts to climate change mitigation have driven the development of renewable energy resources. The UN Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, and their instruments, such as the Clean Development Mechanism (CDM), have stimulated the development of renewable projects in several low and middle income countries (Lloyd and Subbarao 2009; Lau et al. 2012; Paris Climate Change Conference 2015). In this context, industry-scale renewable energy projects such as wind and solar farms have increased all over the world. Despite the importance in reducing greenhouse gas emissions by substituting fossil fuel combustion, renewable energy projects are beset with implementation difficulties due to social impacts in several countries (Stigka et al. 2014; Batel and Devine-Wright 2015; Huesca-Pérez et al. 2016). Additionally, there were a considerable amount of criticisms on the effectiveness of the instrument and the characteristics of applying different CDM projects (Benecke 2009; Lederer 2011; Böhm et al.

2012; Corbera and Jover 2012; Ervine 2013; Phillips and Newell 2013; Gartman et al. 2014; Reinecke et al. 2014).

Social aspects of environmental impact assessment

Environmental impact assessment (EIA) is a process that assists in ensuring that possible significant direct and indirect effects of a project are identified and considered before implementation (IFC 2012; Therivel and Wood 2018). The EIA shall identify these effects on various elements: a) population and human health; b) biodiversity; c) land, soil, water, air, and climate; d) material assets, cultural heritage and the landscape; e) the interaction between the receptors (OJEU 2014). In the year 1970, EIA was first legally established in the United States of America (U.S.A) through the National Environmental Policy Act (NEPA). Since then, EIA has been adopted and ratified, giving it legal force, in many countries (Wood 2003). Although EIA started as an environmental instrument, it is increasingly seen within a broader context of

promoting sustainability, especially involving social impacts (Jay et al. 2007; Glasson et al. 2013), in projects and policies (Dendena and Corsi 2015).

There are numerous social and cultural implications that are difficult to address in a single EIA, which raises the awareness of the lack of assessment for social issues. The social dimension of impacts involves all probable impacts to people's wellbeing, including environment, land, community, livelihoods, and culture (Smyth and Vanclay 2017). There are measurable socio-environmental impacts of wind energy, for example noise pollution as a disturbance on human health (Henningsson et al. 2013); or even landscape disruption (Nadaï and Labussière 2013). The socio-cultural dimension is more challenging to enumerate. Culture identifies communities and some of them have a strong attachment to their tangible (e.g. archaeological sites) and intangible cultural heritage (e.g. language, music, art) which should be protected and considered in project planning (Smyth and Vanclay 2017). Integrating community perceptions and cultural diversity can address the concerns of indigenous communities and incorporate their local knowledge, thus improving the understanding of mitigation measures and fair compensations plans (Nzeadibe et al. 2015; Hanna et al. 2016).

Some authors argued that since social awareness is not the main objective of EIA, an improper incorporation of social issues within the EIA might lead to public opposition (Esteves et al. 2012; Larsen et al. 2015). There is also the uncertainty that participation processes within EIA can fully cover requirements on social issues. Larsen et al.'s (2015) research in Denmark found an insufficient treatment of social impacts within EIA, however, the authors concluded that if practice were improved EIA in Europe could address social impacts in one integrated assessment.

Social Impact Assessment (SIA) has evolved in the last decades, as part of the same EIA or as an independent process or parallel tool. The SIA '*is analyzing, monitoring and managing the social issues associated with planned interventions*' (Vanclay 2003 p.5). It can be an effective mechanism in an international context, for example, where no legal regulation is available at the national level, or as a planning tool for improving business benefits and to assist the proponent's decision-making process (Vanclay 2003; Esteves et al. 2012). Involving the public in the decision-making process of planning has become increasingly beneficial worldwide. A good practice on SIA involves a participatory process and understanding of the local community, which facilitates agreement-making processes, increases public participation and ensures participation of vulnerable people (Esteves et al. 2012). Public involvement must be an integral part of SIA (Barrow 2000) and participation should take place in earlier stages of the planning process. However, the

scope of the assessment should be a responsible learning process and also depends on the combination of evaluation, education, and participation itself (Barrow 2000).

SIA methods are applied worldwide by multilateral financial institutions. The World Bank (WB) is a forerunner concerning social effects and guidelines of early consultations for indigenous peoples in EIA projects (Roberts 2006; Dendena and Corsi 2015). Since 1980, the WB has been assessing the social impacts of involuntary resettlement by their financed projects, and in 1984 they were addressing indigenous peoples in bank policy (Beddies 2011). The International Finance Corporation (IFC) sets compliance levels followed by most international financing organization, e.g. guideline requires to obtain the 'Free, Prior and Informed Consent' (FPIC) in case of indigenous peoples involvement and land rights or access to land (IFC 2012). In 2016, the WB board approved a new Environmental and Social Framework (ESF), which broaden the scope of applications of the *Environmental and Social Safeguard Policies*. It was expected to go into effect in early 2018. The environmental and social standards are mandatory requirements applying to WB- financed investment projects (World Bank Group 2017).

An elevated awareness of the relevance of SIA has been notable in emerging countries, where there is increasing investment, but also conflicts between companies and local communities due to land scarcity, and weak institutions (Vanclay et al. 2015). Therefore, it is important to consider the cumulative dimension of impacts on a range of environmental, economic and social issues, both spatially and temporally (Franks et al. 2013). Assessment, management, and monitoring of impacts are fundamental when considering the effects on indigenous people (Vanclay et al. 2015). Early EIA and SIA can be important project planning instruments, in terms of final decisions and mitigation measures, especially when an integrated approach is pursued. Sloomweg et al. (2003) identified three settings for a one-process integral framework for EIA and SIA: biophysical (natural environment), social (human), and the institutional setting. Such an integrated assessment shows a wider and more profound framework of the variety of impacts.

Whereas a legal framework in most countries supports EIA, SIA is not commonly legislated worldwide. In some selected cases, a social assessment was required in order to approve a project. In Queensland, Australia a *Social Impact Management Plan* is needed as part of the EIS; in South Africa, *Social and Labor Plans* are mandatory for mining projects, as well as in the Philippines a *Social Development and Management Program* is required also for mining projects (Vanclay and Esteves 2011; Esteves et al. 2012).

Wind energy development in Mexico and impact assessment

Until December 2013, electricity generation in Mexico was reserved to the state-owned utility called the Federal Electricity Commission (Comisión Federal de Electricidad—CFE). The energy reform in 2013 successfully introduced structural changes and allowed the participation of large private firms in the national power sector (Alpizar–Castro and Rodríguez–Monroy 2016). The energy reform has a direct impact on a long-time conflict concerning the land tenure (Baker 2016). There are several regulations in Mexico that have the objective to promote renewable energies, such as General Law of Climate Change, Law of Energy Transition, and the Climate Change National Strategy (DOF 2008, 2012, 2015).

In January 2016, the total capacity of wind energy in Mexico was 2,800 MW in 32 wind energy farms, of which 23 are sited in the Oaxaca state (SENER 2016). The Oaxaca state and especially the Isthmus of Tehuantepec has been a major hub in the wind energy development due to its extraordinary wind power potential (Elliott et al. 2003). Most of the wind parks in the Tehuantepec region have been supported by CDM and international development agencies (e.g. WB, Inter-American Development Bank) (Gartman et al. 2014). It is important to state that Oaxaca is one of the poorest and most marginalized states in the country. In 2016, 70% of Oaxaca state inhabitants lived in poverty, and 27% in extreme poverty (CONEVAL 2016). Moreover, 47% of the state's population have an indigenous background, making it one of the states with highest indigenous diversity in the country; with 13 official indigenous communities (Huesca-Pérez et al. 2016).

Legal framework of social issues in environmental assessment

Mexico's first environmental law applying EIA appeared in 1977 for hydraulic infrastructure. However, in 1988 the General Law on Ecological Balance and Environmental Protection (LGEEPA abbreviation in Spanish) came into force and applied specifications for developers (Barrow 1997), and in 1996 committed to improving public participation (Weidner 2002). There is actually no specification concerning social aspects; the only mention of human-related impacts in the LGEEPA is that an EIA is required for projects or activities affecting human health (Art. 28, XIII); however, it is not clear what it covers. In general, noise, vibrations, air, and visual pollution are subject to prevention and mitigation measures (Art. 155,156). There is a general regulation concerning cultural aspects, like archaeological sites and historical monuments (tangible) and areas with

indigenous heritage (intangible), but only applied for protected natural areas (Art. 45, VII), and not strictly compulsory for EIA. Furthermore, the resolution of EIA from the environmental authority is limited only to the environmental aspects (Art. 35) (DOF 1996). The *Environmental and Social Safeguard Policies* have been the mechanism for addressing environmental and social issues in WB financed wind energy projects in Mexico (Ledec et al. 2011).

As for public participation, according to the Mexican regulation of EIA ((DOF) Diario Oficial de la Federación 1996), a public EIA consultation is actually not a mandatory process (Article 41 of the EIA regulation). Citizens can request a public consultation within 10 days of a project's publication and a public hearing within 25 days if major environmental or public health hazards are likely. This participation process is conducted by the environmental authority (SEMARNAT) and it is the citizen's responsibility to request more information from the environmental authority who publishes new projects online ((DOF) Diario Oficial de la Federación 1996).

A new national regulation (resulting from the energy reform) establishes SIA as a requirement from the Secretariat of Energy (SENER) for the energy sector's projects, specifically oil projects and electricity generation ((DOF) Diario Oficial de la Federación 2014a; DOF 2014b), and requires that an indigenous consultation is conducted ((DOF) Diario Oficial de la Federación 2014a). In 2017, part of the Isthmus of Tehuantepec, among other regions in Mexico, was declared an economic special zone (ZEE in Spanish), which has a new legislation of financial incentives for high productivity areas (DOF 2017a).

Even though there is greater focus on social impacts, there is still a research gap concerning the assessment of social issues in environmental assessments, especially considering social disadvantages or weaknesses (e.g. indigenous groups). This paper analyses and emphasizes the relevance of the prior assessment of social implications related to wind development projects sited in the Isthmus of Tehuantepec, Mexico, throughout a qualitative approach. The aims of this paper are: 1) identify the challenges and improvement opportunities for the social and environmental assessment of wind energy projects in the Oaxaca state 2) present CA as a novel approach to identify social and environmental issues related to our case studies.

Methodological approach

For the purpose of this research, we used a qualitative analytical approach by applying a Constellation Analysis (CA) (Schön 2007) conducting focus group discussions and semi-structured interviews with relevant stakeholders (Longhurst 2016), and case study

research (Yin 2014). The decision to use a CA, was to a wide range of stakeholders with complicated relations in wind energy development in the region of the Isthmus of Tehuantepec as well as to introduce a novel, participative approach in the socio-environmental assessment. For this research, a total of 21 semi-structured interviews, five focus group discussions, and five CA workshops were conducted. Additionally, literature and official documents were reviewed regarding our case studies. The data was collected during several field research trips to the region (March 2014, May 2015) alongside meetings; interviews and workshops were held to observe previous cases from the field (see Appendices Table 1, Table 2, Table 3). This fieldwork and workshops were conducted before the national energy reform (see discussion section). CA is an inter- and transdisciplinary tool for mapping and identifying of elements within a complex system, as well as their relations and the dynamic between them (Schön 2007; Bruns et al. 2010). In order to map relations, the components used provide a character of each element. There is no hierarchy between elements and the major focus is on the relationship between them:

- Social actors (e.g. indigenous groups, local authorities, national government)
- Natural elements (e.g. wind, landscape, wildlife)
- Technical elements (e.g. wind turbines, power stations, wind park roads)
- Signs/symbols (e.g. standards, laws, concepts, regulations)

The different elements, characterized by different colors and graphical representations, are afterward linked with each other, thus indicating relations. The diverse possible interactions are represented as follows: simple (simple line), tenuous (discontinuous line) directed (line with arrow), incompatible (crossed-out line with arrow), resistive (line with rectangle), and conflictive (line with lightning) (Schön 2007).

The resulting constellation diagram summarizes the vision of the participants regarding their own experiences with the wind energy development in the region. Different CA diagrams were developed considering our case studies: a) two cases of wind energy projects in the Isthmus of Tehuantepec; and b) the vision of academia, a wind energy company and an indigenous opposition group. The goal is to highlight the relevant elements problems and relations in the complex interaction of technology diffusion, society, and sustainability of wind projects in this region of Mexico. The characteristics of the analyzed cases are summarized as follows:

- Case 1 shows the conflicts and concerns within a private wind park financed by international

institutions, sited on community indigenous land. The workshop was held in March 2014 in the municipality of Unión Hidalgo, Oaxaca with the participation of four landowners, who are leasing the land to the wind company.

- Case 2 shows the institutional barriers as well as the challenges for a wind project developed by the members of indigenous community land (community wind farm). The semi-structured workshop was held in February 2014 in the municipality of Ixtepec, Oaxaca with the participation of the main promoter of the project, and three active project members.
- Case 3 are three CA for different stakeholders: 1) scientific-academic perspective held in March 2014 in Mexico and Oaxaca cities, 2) a wind energy company with interest in wind parks in the area carried out in May 2013 in Germany, and 3) indigenous peoples' opposition representatives held in March 2014 in the municipality of Juchitán de Zaragoza, Oaxaca.

Main findings based on CA

In this section, the main findings based on the CA are presented. The cases were chosen due to social similarities (indigenous communities, land tenure conditions), despite the different scenarios (participation processes within a private wind park, and a planned community wind park). The cases are described as the CA results, and supplemented from findings from interviews and discussion groups.

Case 1. Private Wind Park and the role of international policies to contribute to the local sustainable development

The wind park 'Piedra Larga I' consisted of 11 wind turbines with a total of 90 MW installed capacity. The project was financed by the WB and supported by the CDM, and it started operations in 2012. It is sited on 765 ha of community land (of which, 26 are for infrastructure) in the municipality of Unión Hidalgo in the Isthmus of Tehuantepec (SEMARNAT 2008). A second phase of the wind park 'Piedra Larga II' (also with CDM support) was under construction at the same time of the workshop. In this particular case, the stakeholders were a group of community landowners holding a lease agreement with the wind company.

Figure 1 presents the diagram that resulted from the CA. The stakeholders are: *National government*, *Oaxaca state government*, *municipal authorities*, *CFE*, *wind energy companies* (developers of the wind project), *Bienes Comunes representative* (official representation of the community), *Unión Hidalgo community members*, *landowners*, *indigenous peoples*

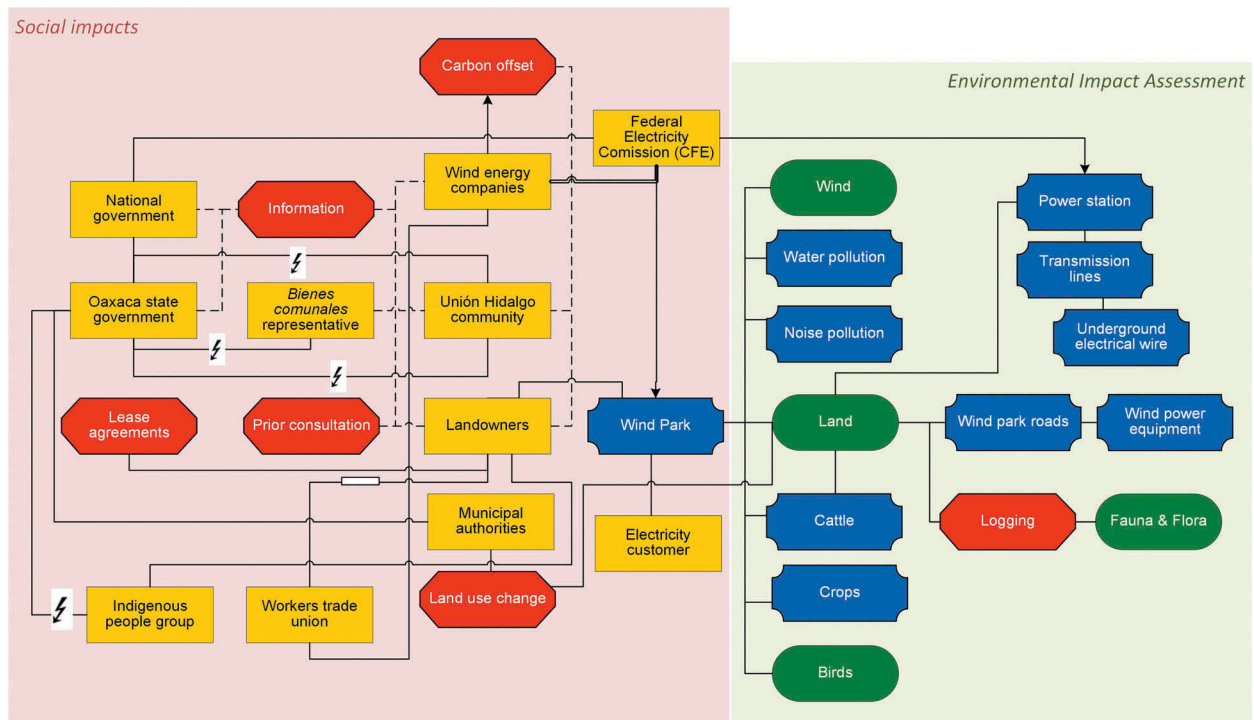


Figure 1. Constellation analysis diagram of a private wind park (March 2014).

group, Workers Trade Union (construction workers of wind park), and electricity customers.

As shown in Figure 1, there is a complex relationship between different stakeholders and with natural and technical elements. In particular, participants in the CA workshop established a conflictive relation between (a) National and Oaxaca state governments concerning the provision of information, (b) wind energy companies with landowners related to prior information; and (c) landowners and carbon offset from the projects. In addition, there is an incompatible relation within: (a) The national and state governments with the Union Hidalgo community; (b) Bienes Comunales' representative with the state government; and (c) indigenous peoples group with the state government. The diagram shows an alliance between wind energy companies and CFE; and a resistance relation between the Workers Trade Union and landowners.

Participants considered 'wind' as a local resource to be used for the local benefit, and perceived they are losing their land before wind energy companies: 'we, the indigenous, do not know about laws or new technologies, but we do know when our land has been affected'. The landowners' concerns about the wind park are principally the impacts to the environment: a) land loss due to new wind park roads infrastructure and wind power equipment handling, b) logging without prior notice, and therefore effects on the local flora and fauna, c) water pollution due to improper waste management of turbines oil and lubricants, and their negative effects on the crops, d) noise pollution because of the proximity to urban areas, e) cattle disturbance by shadow flickering (also from interviews 8

and 9). Other complaints were made regarding how the land was not only used for the wind turbines but also for transmission lines, underground electrical wires, and power stations. Locals mentioned that there was an increasing number of wind parks commissioned in the area over the last years with the respective cumulative effects not been properly evaluated (also discussion group 1). There is a general lack of trust because the participants considered inaccurate prediction of impacts in the EIA, lack of measures to decrease bird mortalities, as well as scarce public results and proper documentation (e.g. monitoring of bird fatalities) from the wind park management (also discussion group 1). Furthermore, they considered inappropriate proceedings, poor practice within the EIA, and a need to review the national environmental system (from interview 20). The EIA documents stated there was no previous information to assess environmental impacts on birds (Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) 2008), and they focused then on different species affected during the construction phase (reptile, mammals, etc.) (SEMARNAT 2011). Both documents, from a two-stage wind park, suggested a detailed monitoring in the future.

The participants in the workshop pointed out significant impacts on the community, which includes mainly complaints from landowners regarding land property and the lease agreements. They considered the land lease contracts showed lack of transparency to the landowners, and especially to the whole Union Hidalgo community. According to the discussion group, there are at least 1000 active members of this community and while not all have a land agreement, they are part of the community either working on the leased land or living

in the proximity. They considered the different conditions and payments within the lease contracts as an unfair process. Some participants also mentioned cultural changes within the community, as 'in the past, there was only a spoken commitment, no written contracts between them. Now it all has changed and one cannot trust each other anymore' (discussion group 1).

The participants considered that suitable prior *information* and *prior consultation* should have been essential for local communities before starting the project; due to the failure of this basic step, *opposition* from local residents were then raised prior to the wind park's second stage along with other future projects in the area, led by the *Indigenous people opposition group*. It is important to point out that not everyone in the region is against the wind energy development in the area, and some participants considered that they were satisfied with the monthly payment they received. Generally, residents are unsatisfied with the wind park's management (discussion group 1, interview 8). In addition, some of the residents in the region who are not part of the wind energy development (e.g. they own land but do not lease it yet, no owning land but being part of the community) and some wished they could be partaking of the benefit sharing (Interview 7). There is—in general—limited knowledge about wind energy (technology, impacts, development, etc.) in the discussion group. Some participants considered the local universities as a possible information dissemination source (Discussion group 1).

Lastly, in words of the participants, one of the main reasons for the strong opposition in upcoming wind projects is that the *wind energy companies* and all levels *government* are missing their responsibility of giving *information* and providing an effective *prior consultation* to civil society, especially to the indigenous communities in the area. They appealed for the ILO Convention 169, which protects the rights of indigenous peoples to participate and be consulted, where the concept of 'Free, Prior and Informed Consent' is fundamental for indigenous rights regarding renewable and sustainable projects (Langbroek and Vanclay 2012; Hanna and Vanclay 2013; Hanna et al. 2016; Papillon and Rodon 2017). In 2014, Oaxaca's government was still lacking a specific role in wind energy development, as they expected to have more responsibilities in the planning process (Interview 18).

This analysis is particularly important in the context of international environmental policies, especially with CDM as an international financing support mechanism, which has been widely applied in Oaxaca to support wind parks. CA participants felt *carbon offset* do not benefit the communities but the companies.

Case 2. Community wind parks potential and institutional barriers

This case study shows the institutional barriers as well as the challenges and opportunities for community

wind parks in Mexico (Figure 2). Ixtepec is a municipality in the Isthmus of Tehuantepec, with community land. According to the participants, since 2009, some members of the *Ixtepec communal* (mainly with indigenous background) wanted to launch a *community wind park*, by gaining the approval of the community in a public meeting called *Asamblea comunal*. They have been financially and technically supported by a *Community Interest Company (CIC)*, called *Yansa*, and future *social investors*. From the very beginning, this project plan has struggled to realize the wind park. The participants considered the institutional barriers hindering the development of such projects. Decision-making and planning are made at the national level, *SENER* is the planner and the *CRE* is responsible for the permitting process through *auction bids* from *wind parks* candidates (the *wind power companies* mainly with *international financial banks*). According to *SENER* authorities, it is difficult to think about community schemes in Mexico because the municipalities have insufficient financial resources, and a subsidy at the national level was considered as 'being impossible' (Interview 18).

In fact, the first idea of a *community wind park* came up when some members of the *Ixtepec community* complained about a new *power station* and *transmission lines* on community land without prior notice. The complaints of participants turned into a *civil-rights trial* against the *CFE* (Thomas 2015), arguing that the electricity infrastructure was affecting the region's *agricultural and indigenous rights*, guaranteed by the *ILO Convention 169 Framework*. They considered that the *Oaxaca state government* should support the community in coordination with the local *municipal authorities*, influenced by *local political actors*, making the conflict even more complex.

On the one hand, the participants identified some challenges for the *community wind park*. They found there is a competition between social enterprises like the *CIC-Yansa*, and the *wind energy companies*, with international finance. They also identified a challenge regarding the infrastructure; new *wind park roads* construction in agreement with the community, and suitable and national manufacturers of *wind power technology* for the region as well as *technology suppliers*.

On the other hand, the participants named numerous opportunities to foster public participation. The development of the community wind park project has been under several *consultation processes* with the whole community since the beginning. They have elected *group representatives* (e.g. women, senior residents, etc.) to collect opinions and to work on other alternative productive projects, supported by a planned *Fiduciary for the community* which aims to improve *human development* and reduce the current *unemployment* in the area. There

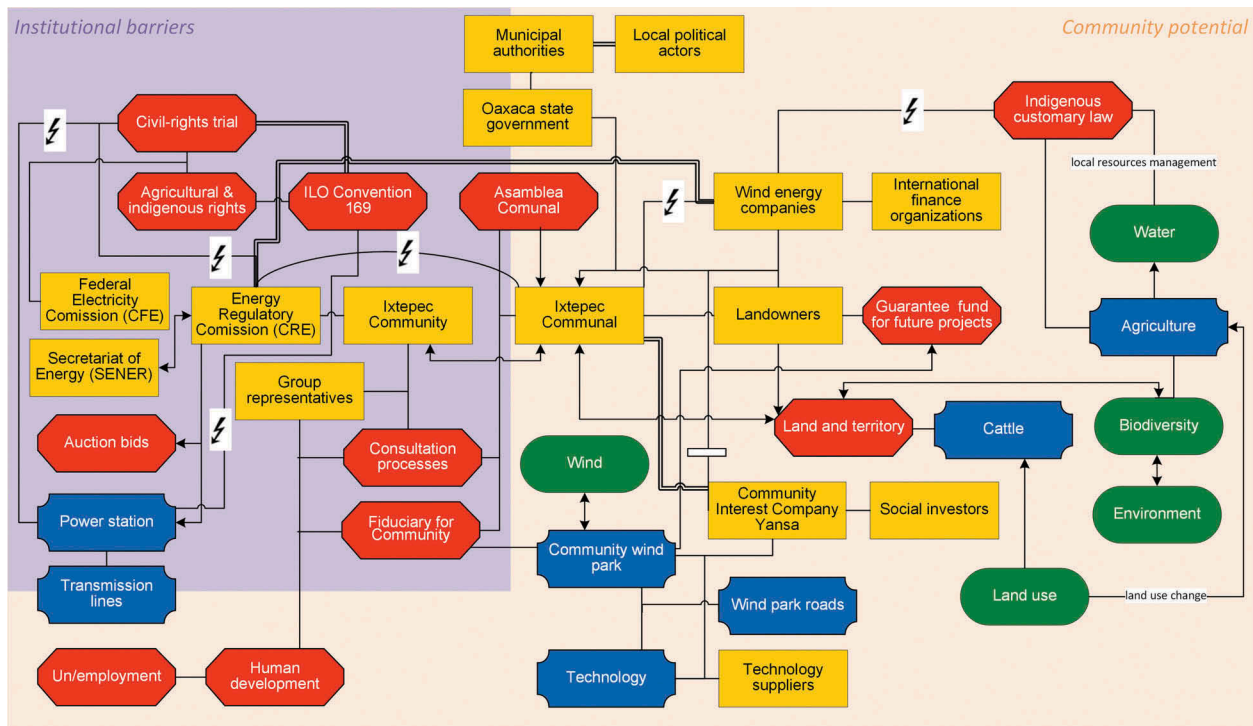


Figure 2. Constellation Analysis Diagram of a private wind park (February 2014).

was an opportunity to develop a benefit-sharing program, which would share profits with the community and not only with the landowners. Hence, the developers of the community wind park planned a *guarantee fund for future projects* to finance future wind parks in the area, with technical and business support to future *landowners*.

The participants considered *wind energy companies* in the area are not aware of the relationship between the indigenous communities with their *land and territory*. Therefore, their *indigenous customary law* could even direct local resources management (also Interview 10) (Guevara Romero et al. 2015). The Mexican Constitution (Art. 2) recognizes the country as a multicultural nation, where indigenous have rights to own procedures and organization, as well as use of the natural resources, excepting ones of national interests (DOF 2017b). They also assumed that by empowering their community through participative approaches, it would improve relations with the local *environment and biodiversity* as well as learning how to adapt the land use from agricultural to industrial. Other actors considered a significant potential to create community partnerships, as well as other approaches like small-scale wind energy in the region due to the great wind resource (Interview 5, 16).

Other perspectives (from the indigenous opposition, academia, and wind energy company)

In this section, we present the main concerns raised in the CA workshops conducted for a) an organized

group of indigenous peoples against wind park development, b) scientific-academic participants, and c) a private wind energy company with the interest of developing projects in the area.

The CA workshop with the opposition group (Figure 3 in Appendices) showed that the reason for indigenous opposition was created due to an inappropriate prior consultation with the *indigenous peoples*. The participants emphasized that *Prior consultation* within *indigenous peoples* should be an integral part of the Mexican EIA.

The participants considered the *government*, the *wind companies*, and the EIA process are not being aware of the difference between *land and territory*, its resources (*sea, rivers, water, fauna and flora, wind*), and their local economic activities (*fishing, crops, and cattle*). For them, the responsibilities of the multi-level governance system are not clear and who should be doing what, e.g. in terms of *information*, which is actually provided by *traditional media and local radio* to the communities. The opposition considered themselves as defenders of *indigenous and agrarian rights*, demanding the right to a *prior consultation* in terms of the *ILO Convention 169*. Thus, members of the opposition and other local members have *requested invalidity* of their undergoing *lease agreements* due to the lack of *information and proper consultation*. According to the participants, these opposition protests have faced a clear criminalization by the local and regional government (Avila-Calero 2017), adding a conflictive relation between local opponents and the *wind energy companies*.

The CA workshop with members of the academia (Figure 4 in Appendices) pointed out the relevant *role of the international financing organization and their financing requirements*⁷ within the *wind energy companies*. The participants mentioned *information and participation* shortages regarding wind energy development especially from the *national and state* government to the communities. This multi-level governance approach stands away from the local level and the *community*; where an *opposition* has grown between *landowners and residents without land* (mainly because of an unequal distribution of benefits), thus growing conflictive relations between municipal authorities and indigenous representatives (*Ejido and Comuna*). The participants mentioned a paradox regarding international policies making impacts at the local level, *international finance organizations* are promoting the wind development, but also an *opposition* at the local level, which is relying on international agreements, such as the *ILO Convention 169*.

The CA workshop developed with members of a wind energy company (Figure 5 in Appendices) (e.g. the *project planning* responsible), considered *local acceptance* as the major challenge for further *wind park* development in the region. Since there was no official national requirement for social effects assessment, *EIA* was focused on the environmental impacts. They mentioned as the main environmental impacts to take into account in the region, *noise, bird fatalities* (due to *bird migration corridors*), effects on the *local flora and fauna*, and *soil and groundwater protection*. Regarding social and cultural effects, they called for *indigenous communities'* participation and *lease agreements* to be considered within in *EIA*. The participants considered there are diverse stakeholders, political local actors (e.g. the *Transportation Trade Union*), and opposition groups (mainly *indigenous groups*), who have conflictive relations with the *wind energy companies*.

Discussion

We discuss our main findings related to the social issues and environmental assessment in the Isthmus of Tehuantepec, in Oaxaca, Mexico. There are participation weaknesses, especially concerning indigenous communities and their culture. However, there is an opportunity for community wind potential. We identified *EIA* challenges and improvement toward impact assessment practice in Mexico.

Participation weaknesses

The results showed shortcomings in practice regarding social issues as well as participation deficits in our case studies. Global institutions requirements and the national legal framework have shaped local participation. A top-down private wind park has not allowed

proper local community participation mainly due to up-front planned projects. There is, however, a local initiative for a community wind park but it has been hindered by the limitations of the legal framework and promotion of community initiatives.

The findings on Case 1 are that community has primary concerns on the effects on the environment (birds, cattle, soil, underwater, noise) as well as on the community (land property and lease agreements) and its culture (indigenous people, social customs, and values). This is especially important with the increasing numbers of wind parks in the region and their cumulative impacts.

Local acceptance is seen as a major challenge for the wind energy company (as seen in our CA). Additionally, diverse conflicts and opposition to further wind development have risen in the region. Contrary to the results of a local social assessment research project (Nahmad-Sitton 2011), which argued the opposition comes only from non-owners, we found out many landowners who currently lease their land also disapproved of the wind parks management (Case 1, discussion group 1, and interview 8). The opposition from landowners is also based on the belief of unfairness within the lease agreement, concerning differences on conditions and payments. There is a high opposition to upcoming wind energy projects in the region, and the main argument is that the wind company and all levels of governments are missing their responsibility of giving information and providing an effective project consultation to civil society, especially when addressing indigenous communities and their culture.

As for who is responsible for ensuring public participation, the sole legal regulation for public participation was the *EIA*, whose responsibility falls under the national environmental authorities (SEMARNAT). Since the end of 2014, with the requirement of the energy sector, SENER is also tackling this process. The question remains on how these sectors are linked and how the communication between them can bring about more effective and meaningful participation in future projects.

Public participation has been an issue in the Mexican wind energy development, and the opposition group to wind energy has grown in Oaxaca. Gartman et al. (2014) suggested that involvement in decision-making and financial participation (in form of community-ownership, for example) could significantly improve public participation and acceptance.

Community wind potential

The essential findings on Case 2 are that challenges for the wind community are faced by lack of institutional opportunities and financial incentives. However, there is a clear opportunity for fostering

not only a community wind park but also public participation at the local level. There is a significant interest of the stakeholders to not only to be passively consulted but also to be actively part of the development (e.g. by launching community wind parks or small-scale wind turbines). Therefore, the national planning system plays a relevant role in promoting future community projects, as well as to tackle other alternatives and the need of domestic wind technology.

The impact of community wind ownership could improve social acceptance. Some findings suggested 40–100% higher socioeconomic impact levels (job creation, incomes, etc.) in community funding partnerships, compared to those from privates' development (Beery and Day 2015; Larsen et al. 2015). Thus, improving social acceptance levels is essential for future project implementation. Participation is a democratic right of citizenship to influence political decision-making, and should not be seen as a way to decrease or remove opposition (Wright 2012).

EIA challenges and improvement ahead its practice

Mexico has faced for a while challenges concerning lack of open public information and poor diffusion of basic information, as well as in building environmental capacities (Weidner 2002). Our findings identified the relevant role of EIA in Mexico's wind development.

The EIA statements from our case study 1 emphasized the economic aspects of the projects, however, the statements showed lack of detailed environmental information (concerning birds and other species) and monitoring (Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) 2008; Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) 2011). According to the *Strategic Environmental and Social Assessment for the wind development in the south of the Isthmus of Tehuantepec* (Idom 2015), this area is the most important bird corridor in America stretching from Canada to Central America, yet there is no adequate management of impacts to this corridor due to lack of monitoring information.

Some interviewees (Interview 4 and 5) considered the authorities as responsible for the basic steps of environmental protection, as well as public participation at the project level. Thus, is very important (for SEMARNAT) to update environmental information, identify and clarify which information is reserved due to industrial property, and which must be openly public for the sake of environmental protection. Reinforcing the EA system through a variety of information access points is essential, as well as open sector communication to be followed to all levels.

The public participation within the EIA in our case was limited or non-existent. The EIA documents from

case 1 do not document any stakeholder participation (Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) 2011), while the online CDM files Project Design Document (PDD) involved only some national authorities. This limited participation can be explained because the participation process within the EIA is through an online notice of intention and a further written request by the citizens, which restricts access in remote communities. Furthermore, some EIA data can be kept by the companies due to data protection and industrial property (Art.34) (DOF1996), which restricts providing valuable information via online (Odparlik and Köppel 2013).

Mexico's new SIA requirement for planned and future energy projects is a clear step forward regarding social impacts evaluation, and an integrated socio-environmental assessment ensures higher environmental standards (Dendena and Corsi 2015). Adopting SIA as a separate assessment methodologically has been considered as a risk of superficial treatment (Glasson 2001).

It is important to state that the fieldwork in the area and the workshops were conducted before an SIA and an indigenous consultation was compulsory by law from the energy sector for every electricity and oil project in the country, and the panorama might have changed with the time. Besides the historical energy reforms, two strong earthquakes hit the Isthmus of Tehuantepec in September 2017, damaging the basic infrastructure and affecting also the social context. It would be interesting to know if the public's perception has changed thereafter.

CA as a qualitative analytical approach

We presented CA as a novel approach to identify the status quo of the social and environmental issues within wind projects in the Isthmus of Tehuantepec, based on our particular cases. The workshop model, as a participative form, allowed all participants to express their concerns and conceptualize the information in a simple and clear way. The performance of CA must be supplemented by other analytical approaches, in order to achieve deeper analysis. Case study research, semi-structured interviews, and literature and document review helped to support the information. We dare to say CA could be conducted in project planning processes, facilitating the developers to predict social concerns at an early stage of the project. In the EIA process, CA can be manageable performed, assisting in the Scoping step, for example with local communities' consultation, helping to identify the first key impacts on social and cultural aspects.

Conclusions

We analyzed the social conflicts related to the wind energy deployment in our case studies in the Isthmus

of Tehuantepec in Oaxaca, Mexico. With this paper, we reiterate the relevance of socio-cultural issues of projects and their proper assessment. Based on our results and discussion, EIA did not consider socio-cultural implications, as well as a limited participation of the general public (even more limited indigenous participation). Addressing cumulative effects also in the social context seems to be a great challenge in a short and long-term.

The major challenge is seen in the evaluation of social implications in the EIA in Oaxaca. Despite that, EIA can clearly incorporate social issues in an integral evaluation (Larsen et al. 2015), but it needs to be dealt with in a far more depth than currently does. SIA could strongly assist a deeper evaluation of social impacts and human aspects, especially with indigenous communities, but not exclusively. Such a black or white decision is too difficult to state, it does not matter whether a SIA enhances an EIA (in a toolkit as in WB-financed projects), or within a single EIA (as it covers human aspects). EIA could better address human aspects, and in the case of our research project, also when concerning the socio-cultural aspects of indigenous communities. The Secretariat of Energy is issuing regulations concerning SIA and indigenous consultation, which highlight the importance of such evaluation. As Vanclay and Esteves (2011) stated, SIA should be recognized as a tool to be adapted and improved by authorities, rather than just a social impact statement. We see it as a great improvement opportunity, it remains to be seen its evolution and whether there is a successful bridge between EIA and SIA.

Although there are institutional challenges for community wind parks, it is also seen as an opportunity to foster not only community ownership (and other schemes, like small-scale generation) but also public participation and acceptance at the local context.

We found essential aspects from global to local levels. While international organizations play a relevant role with their financing requirements, local organizations (e.g. indigenous communities) trust on international agreements (e.g. ILO Convention 169). There are challenges at the institutional setting on how to deal with top-down approaches such as CDM, but also with bottom-up initiatives like community wind parks. This example might contribute to building further analysis at the regional and national levels, as well as in another regions or countries with similar development patterns.

We presented CA as a qualitative novel approach to identify social and environmental issues in a participative form, applied on our cases at hand. CA could be conducted in project planning at an early stage, as well as in the EIA process in the scoping step. It can assist to identify and predict social and cultural concerns, e.g. when consulting local communities.

Note

1. The World Bank has updated their requirements on the *New Procurement Framework and Regulations for Projects* after 1 July 2016.

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Appendices

Table 1. Semi-structured interviews.

	Place	Interviewee	Date
1	Juchitán, Oaxaca	CEO local wind energy company with international support	13.02.14
2	Juchitán, Oaxaca	Chief representative international wind energy company	13.02.14
3	Juchitán, Oaxaca	Social representative international wind energy company	14.02.14
4	Juchitán, Oaxaca	Energy municipality authority	14.02.14
5	Santo Domingo Ingenio, Oaxaca	Local representative	14.02.14
6	Juchitán, Oaxaca	Local university professor	14.02.14
7	Santo Domingo Ingenio, Oaxaca	Local farmer without leased land	15.02.14
8	Santo Domingo Ingenio, Oaxaca	Local farmer with leased land	15.02.14
9	Santo Domingo Ingenio, Oaxaca	Representative of local committee	15.02.14
10	Juchitán, Oaxaca	Representative national wind energy company	17.02.14
11	La Venta, Oaxaca	Representative local opposition group	19.02.14
12	Tehuantepec, Oaxaca	Three local university professors	21.01.14
13	Tehuantepec, Oaxaca	Local university professor	21.01.14
14	Ixtepec, Oaxaca	Three community wind project members	22.04.14
15	Oaxaca de Juárez, Oaxaca	Representative regional energy authority (Renewable Energy Department from Secretariat of Tourism)	28.02.14
16	Oaxaca de Juárez, Oaxaca	CEO local small-scale energy projects company	28.02.14
17	México, D.F.	Official from Climate change policies department from the environmental authority (SEMARNAT)	28.06.15
18	México, D.F.	Official from Sustainability department from the energy authority (SENER)	18.05.15
19	México, D.F.	Official from Social impact department from the energy authority (SENER)	20.05.15
20	México, D.F.	Researcher from Law Insitute.	20.05.15
21	Germany	Representative Latin-America department of a German development bank	11.04.16

Table 2. List of CA workshops.

	Place	Approach from	Participants	Date
1	Unión Hidalgo, Oaxaca	Private wind park	Four landowners plus moderator	13.03.14
2	Ixtepec, Oaxaca	Community wind park	Three active community members plus moderator	23.02.14
3	Juchitán, Oaxaca	Opposition to wind parks	One representative plus moderator	12.03.14
4	Mexico City	Academic experts	Two social researchers from Oaxaca city and one university professor from Mexico City, plus moderator	14.03.14
5	Germany	Wind energy company	Two staff members plus moderator	16.05.13

Table 3. Focus group discussion.

	Place	Meeting	Topic	Date
1	Unión Hidalgo, Oaxaca	Asamblea comunitaria	Private wind parks	19.02.14
2	San Dionisio del Mar, Oaxaca	Asamblea comunitaria	Private wind park (not yet constructed)	19.02.14
3	San Francisco del Mar, Oaxaca	Asamblea comunitaria	Private wind park (not yet constructed)	20.02.14
4	Ixtepec, Oaxaca	Informal meeting	Community wind park (planned)	21.02.14
5	Zapote, Oaxaca	Informal meeting	Community wind park (planned)	23.02.14

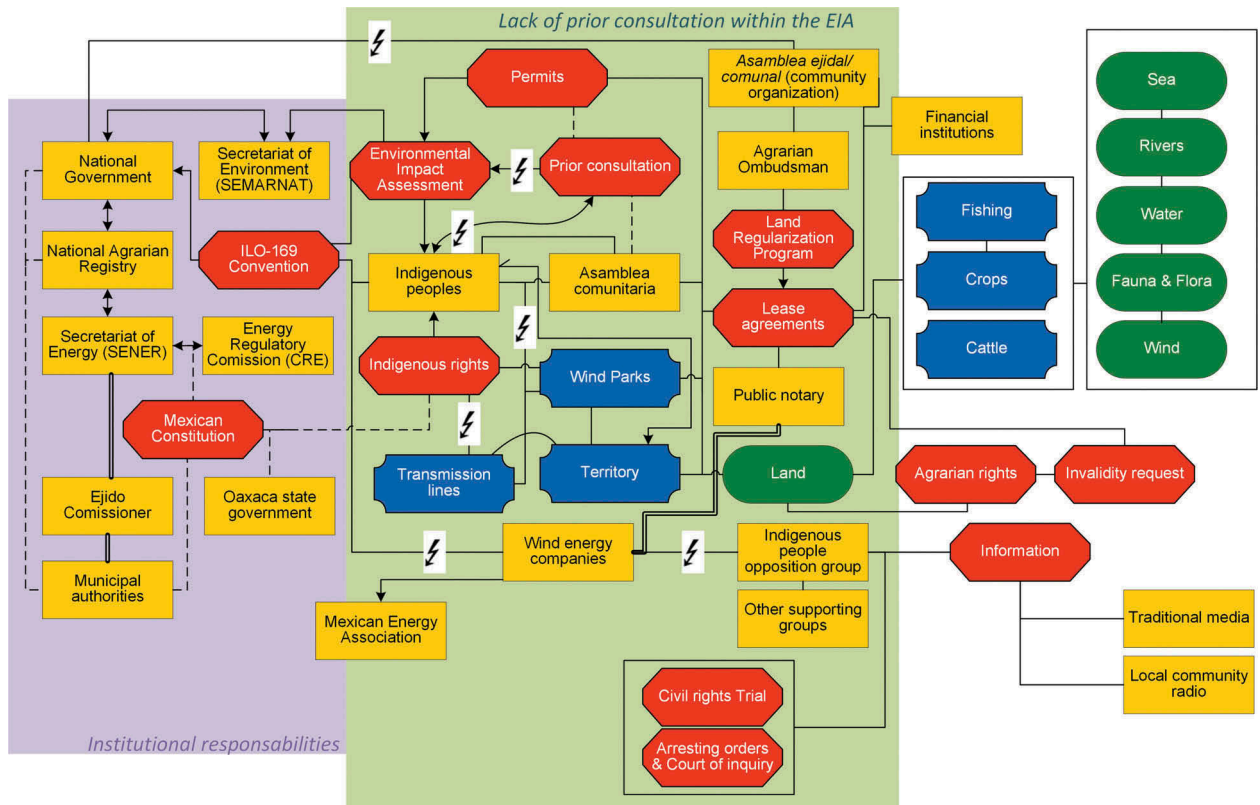


Figure 3. Constellation analysis diagram of indigenous peoples' opposition.

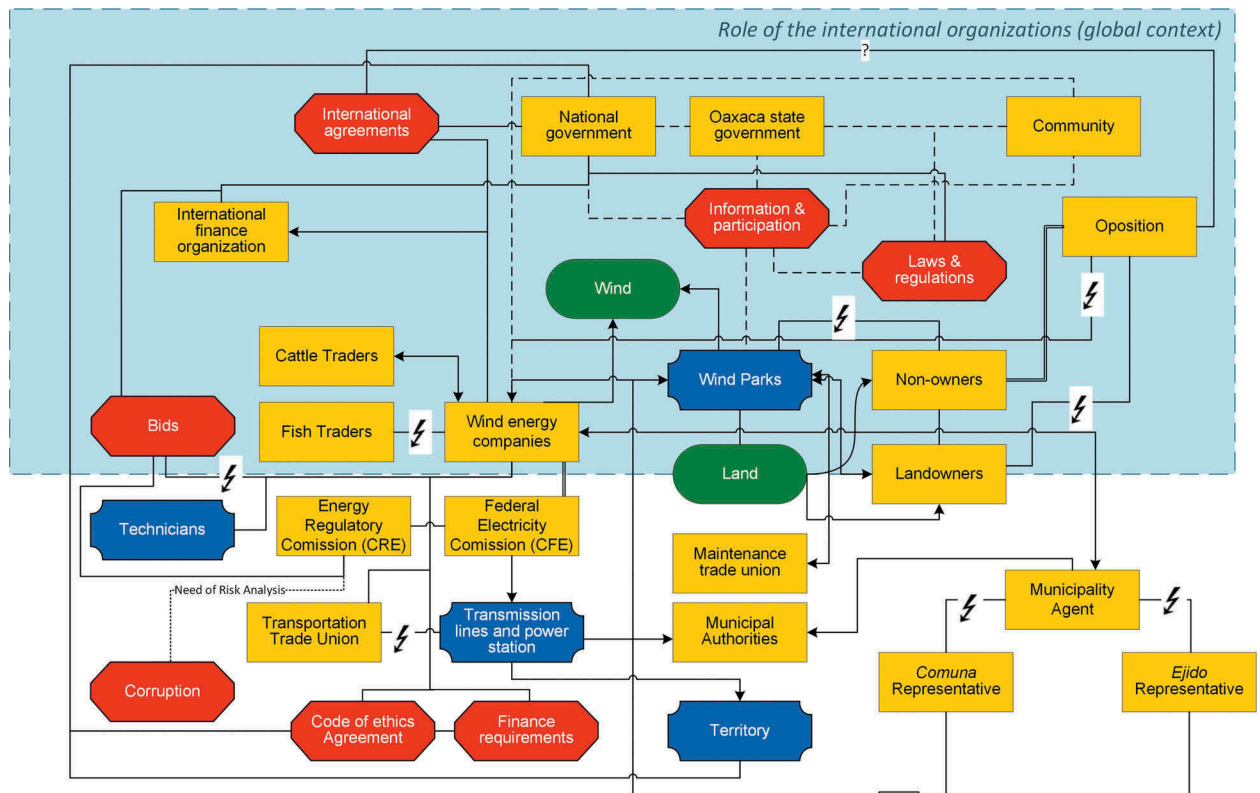


Figure 4. Constellation analysis diagram of academia.

