The Importance of implementing Energy Justice and Energy Democracy Principles in Energy Projects in Mexico

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Abstract

This papers aims at examining the importance of adopting energy democracy and energy justice principles in carrying out energy projects in Mexico. These concepts have gained international relevance in recent years due to the climate change and the energy transition; however, they have not been adopted to evaluate the feasibility of Mexico's energy projects. In this context, this research analyzes the Eurus wind farm in the state of Oaxaca, which was recognized for complying with Mexican regulations and paying particular attention to environmental and social impacts, as well as governance issues; even it has gained international recognition. Nonetheless, from its construction to its current operation it has had conflicts with the communities. The main findings are that when analyzing this project under the crucible of energy democracy and energy justice, we found several negative impacts and deficiencies in its development, the reason being the absence of these principles when evaluating this energy project.

Keywords: Energy democracy, energy justice, energy regulation, energy projects, social impact.

JEL classification: D63, D74, K32, O13.

1. Introduction

The governmental bodies of the Mexican Energy Sector: the Ministry of Energy (SENER, Spanish acronym), the Energy Regulatory Commission (CRE, Spanish acronym), and the Security, Energy and Environment Agency (ASEA, Spanish acronym), among others, have evaluation instruments whose main purpose is to eliminate or mitigate environmental impacts (the Environmental Impact Statement - MIA) and social impacts (the Social Impact Assessment - EvIS) that could arise through the implementation of an energy project.

On the other hand, in Mexico, the *General Administrative Provisions on the Evaluation of Social Impact in the Energy Sector* were published in the Official Gazette of the Federation (DOF, 2018) requires from projects' promoters, among other aspects, to evaluate and implement the measures that guarantee identification, characterization, prediction, and assessment of possible social impacts,

applying a gender perspective to avoid discrimination and exclusion. Furthermore, the evaluation must contain a specific section for indigenous communities in the project's area of influence. In order to support this situation, it is essential to consider that energy supply is a necessary condition for economic and human development, so its expansion, especially for those who do not yet have secure access to it (Hess & Ribeiro, 2016).

Although many strategies exist to reduce the social impact of projects, it has been shown that they are not enough since conflicts with communities continue to arise during the construction or execution phase of projects that seriously affect their operation and cost. In some cases, these problems are rooted in deeper issues that can be addressed from both energy democracy (ED) and energy justice (EJ) and the relationship between them, which are described below.

ED and EJ are different but complementary concepts that share common elements. ED includes, among its objectives, adopting a vision of more distributed and locally based energy systems, while EJ refers to decision-making process in energy projects and the need to achieve fair and equitable results. In recent years, these two concepts have gained relevance due, in part, to the climate change and the energy transition. However, despite the fact that renewable energy sources provide favorable technological characteristics for the adoption of the elements that make up these concepts, the refusal to take them into account during the conception and implementation of energy projects could result in their obstruction or cancellation, as the case of the Eurus wind farm in Mexico, which is analyzed in this research.

Despite the Eurus project received international recognition and complying with Mexican standards, it presented conflicts due to some deficiencies detected when carrying out an analysis based on the criteria of ED and EJ, among which stand out the identification of negative social impacts related to conflicts in private property, lack of transparency and lack of representation in decision-making, as well as unequal remuneration for the lease of land to individuals, which could have been avoided if the principles of ED and EJ had been followed.

This paper is distinguished with respect to the current specialized literature in the following: 1) it states ED and EJ to have an adequate framework for developing energy projects in Mexico, 2) it examines the Eurus project under the crucible of ED and EJ detecting many deficiencies, and 3) it provides recommendations for countries with similar characteristics.

This paper is organized as follows: section 2 states the concepts of ED and EJ to have an adequate framework for developing energy projects; section 3 examines the Eurus Wind Farm development in the province of Oaxaca in the context of the ED and EJ concepts; and, finally, section 4 presents the conclusions.

2. Energy Democracy and Energy Justice

2.1 Energy democracy

According to Szulecki (2018), there is no single and precise definition of ED, it has been poorly defined, a political exhortation rather than a well-defined concept. Other authors argue that it can be understood as a increasing social movement that look for redistributing influence to the inhabitants for the transition to the use renewable sources to generate energy. This movement argues that fossil fuel-based systems and vast profits of multinational companies have perpetuated inequalities, exacerbated vulnerabilities, and promoted injustices in communities worldwide (Stephens, 2019). In

this regard, Morris & Jungjohann (2016) suggest that ED occurs when citizens and communities can produce their energy, even financially damaging energy corporations.

It can be also said that ED has a political dimension and an economic base combining the technological transition of the sector of energy with a strengthening of democracy and citizen participation, which includes in its objectives a better distribution of locally based systems of energy, with a regionally suitable combination of different renewable sources that fully meet the energy needs of society.

It is important to point out that one of the critical points that marks the appearance of ED is the German energy transition, which had its origins in the 1970s, based on Danish legislation and an American law called the Public Utility Regulatory Policies Act (PURPA) of 1978 (Morris & Jungjohann, 2016, p. 3), which opened the door to the energy sector for wind farm developers.

In the 1970s, the term *Energiewende* was coined when the conservative German rural community protested against the construction of a new nuclear plant and the industrialization area. The region's inhabitants fought against large companies' arrival to the city, arguing that they would change the local environment and obtain the most profits. In contrast, the community would run with most of the risks. This can be synthesized in the phrase "socialize the risks and privatize the benefits".

Specifically, the *Energiewende* involves the German energy sector's decarbonization and the elimination of nuclear energy from its energy matrix. This change in strategy is accompanied by a shift towards increasingly decentralized production and the gradual replacement of large-scale nuclear power plants and fossil electricity sources as stated in McCauley *et al*. (2016). However, as early as 1980, the Öko-Institut, a research laboratory of independent analysts, published a book entitled "Energiewende", and although one of its subtitles mentioned "Growth and prosperity without oil and uranium", the most ambitious scenario proposed was 45% renewable energy and 55% coal. Even today, coal remains as a relevant factor in Germany's energy transition (Jacobs, 2012).

Although, as mentioned above, the *Energiewende* had its inception in the 1970s, it is until 2011 that the term became known around the world and was closely associated with Chancellor Angela Merkel. She supported the Energiewende, which began as a struggle for ED (Morris & Jungjohann, 2016, p. 5). While there is a pressing need to change energy sources from fossil and nuclear to renewable, the energy transition also provides the opportunity to establish a more distributed and locally controlled energy infrastructure (Stephens, 2019). Kunze & Becker (2014) mention that with the new green technologies available such a transition is possible, including the participation of new actors: producers, consumers, and cooperatives. In this sense, solar energy projects for the communities and cooperative schemes for infrastructure are attempts to recover the systems of energy.

Society is globally connected in many ways, in particular when talking about climate change, the energy policy around the world should be oriented toward the principles of ED. There is a simultaneous intentional consideration and commitment to three types of social activism according to Stephens (2019), namely, 1) resistance to energy systems dominated by fossil fuels, 2) recovery of energy infrastructure, and 3) restructuring of energy systems.

Currently, ED is a movement that is gaining strength. An example of this is the Green New Deal resolution promoted by the US Congress (Ocasio-Cortez, 2019). This resolution aims to radically change the US economy to fight climate change while fighting inequality and maintaining jobs. Regarding the fight against climate change, the Green New Deal aims to decarbonize the US

economy in 10 years, making the second country with the highest greenhouse gas emissions, only behind China, to have a net level of zero emissions.

Socioeconomically, ED includes, among other things, ensuring employment, access to healthcare, housing, basic resources, and quality education. This seeks to protect the population from the loss of jobs that decarbonization would entail and lay the foundations for a new production system. Like the ED movement itself, the Green New Deal faces mainly three problems:

- The first has to do with how ambitious the plan is, these are changes so profound that only a massive coordinated effort could put them into practice.
- The second is the lack of specificity. The US Congress proposal is a relatively simple document of just fourteen pages where the lines of action or the budget are not detailed.
- The third is resources, the plan will require a huge amount of money.

Another ED in action is a recent complain in France against a fuel tax (the yellow jackets). These protesters have been making the political powers aware of the need to change their climate policy strategy towards strategies that empower and benefit disadvantaged communities, away from regressive taxes that exacerbate economic inequalities (Stephens, 2019). Addressing the goals set by ED is a massive challenge in the social, economic, and technological sense since much of the global economy is based on coal, gas, and oil as primary energy sources. Finally, the amount of resources required to carry out the proposed goals is only compared with the number of resources currently related to the use of fossil fuels as the main energy input worldwide, including its infrastructure and value chain.

2.2 Energy Justice

The EJ term was first used in research by Guruswamy (2010). However, this paper is more focused on sustainable development. Similarly, Hall (2013) addressed the EJ term in his research but it does not describe the term itself. In fact, he stated that "There is to date no existing definition of energy justice", focusing instead in ethical consumption.

Regarding a formal definition of the EJ term, an early attempt was made in 2013 by procedural according to McCauley *et al*. (2013). These authors established that EJ studies typically three fundamental forms of justice: distributive, recognizable, and procedural. After, following this trend, Heffron & McCauley (2014) addressed the effects of the three tenets of EJ in the energy supply chain. Subsequently, the literature in EJ as a concept increased, giving us a seminal article about energy decisions reframed as justice and ethical concerns (Sovacool *et al*., 2016)

Some research addresses the issue of EJ and the existing problems around this concept. However, they do not expressly define the concept of EJ; such is the case of Sovacool *et al*. (2016) and Sovacool (2014) that promote EJ as a promising avenue to be investigated in-depth, emphasizing how the costs and benefits of energy production and consumption should be distributed. Furthermore, if future generations are left with an atmosphere polluted by the depletion of fossil fuels. This will undoubtedly amplify the effects of climate change. In this way Jenkins *et al*. (2016) began the analysis of EJ by questioning how benefits and losses are distributed or remedied, and victims are recognized. On the other hand, EJ offers, first and foremost, an opportunity to provide new cross-cutting agendas to examine biases and prejudices (Jenkins *et al*., 2016).

More recent investigation mentions that EJ concerns the decision-making process for energy projects and the need to achieve fair and equitable results (Vitéz & Lavrijssen, 2020). Energy justice is also concerned with the current situation in the sector playing a role in planning what should come about from a "fair" perspective. This reveals that equality is a principle of law (Vitéz & Lavrijssen, 2020). Although, on the other hand, there has been increasing research interest in EJ in the above context, as stated by Lacey-Barnacles *et al*. (2020). These authors made a review work about EJ research in developing countries.

There are two dominant theoretical frameworks of EJ (Lacey-Barnacles *et al*., 2020). First, there are three core tenets framework (Heffron & McCauley, 2017), and second, the eight-principle decision-making framework (Sovacool & Dworkin, 2015). This paper is based in the three core tenets (procedural justice, distributive justice, and recognition justice); because we consider that this framework focuses more precisely on the problems related to developing energy projects in Mexico. Table 1 shows how is the interaction among the tenets of EJ is given.

Tenets	Evaluative	Normative
Distribution	Where are the injustices?	How should we solve them?
Recognition	Who is ignored?	How should we recognize it?
Procedural	Is there fair process?	What new processes?

Table 1. The interaction among the tenets of Energy Justice.
Source: The evaluative and normative contributions of energy justice (Jenkins *et al*., 2016)

Below is presented a short discussion of the three core tenets of EJ.

2.2.1 Distributive justice

Distributive justice recognizes the distribution of environmental gains and damages. It also evaluates inquiries regarding the suitability of technologies. Distributive justice looks for the equitable distribution of gains and damages among all individuals, despite income, gender, race, among others. In recognition that some resources are inevitably unevenly distributed (the location of wind resources, for example), such claims of fairness require that evidence of inequality be combined with an argument for fair treatment (Jenkins *et al*., 2016). Next, two aspects of distributive justice aimed at addressing these market failures are described: the distribution of damages and the redistribution of benefits.

With respect to the distribution of damages for electricity consumers, the *Energiewende* in Germany has a series of implications for distributive justice. This change in strategy points towards the replacement of nuclear plants and fossil sources due to the new German energy strategy. However, this change remains to be seen as a decrease in the consumption of fossil energy sources (Jenkins *et al*, 2016).

Regarding the redistribution of benefits, philosopher David Hume mentions that "justice is a conventional device for preserving social order by resolving disputes between individuals who are making incompatible claims on relatively abundant but ultimately scarce resources" (Campbell, 2010, p. 15). However, Hume also suggests that justice has to do with both the distribution of benefits and harms (Jenkins *et al*., 2016).

2.2.2 Justice of recognition

Justice of recognition can manifest itself as a lack of recognition and misrecognition, a distortion of people's views that may seem degrading or despicable (Jenkins *et al*., 2016). This perception is especially acute when it comes to supposedly irrational objections that cannot be easily countered by scientific and technical arguments, such as the aesthetic impact of wind turbines on the landscape or mistrust of a project's corporate funders and beneficiaries (Jenkins *et al*., 2016).

2.2.3 Procedural justice

Procedural fairness refers to access to the decision-making process on previously presented distributions. It manifests itself as a call for fair procedures that involve all stakeholders in a non-discriminatory manner and has become synonymous with politically excluded civil rights movements in North America (Jenkins *et al*., 2016).

Procedural justice is based on "access to" and "pressure from" multilevel legal systems. However, it is also driven by softer non-regulatory influences, such as practices, norms, values, and behaviors (Jenkins *et al*., 2016). Below are three inclusion mechanisms designed to achieve fair results by mobilizing local knowledge, disseminating information, and better institutional representation.

Mobilization of local knowledge is a critical factor in the specialized literature that looks for inclusion and commitment from affected audiences. This concept is mainly related to indigenous communities. This pattern of ignoring indigenous knowledge about the environment arises within various energy contexts to the detriment of communities and decision-making sustainability (Jenkins *et al*, 2016). Early intervention is essential for an effective consultation process and, therefore, local communities' participation is imperative concerning to procedural justice aspects. Local knowledge mobilization is equally critical outside indigenous contexts (Jenkins *et al*., 2016).

With respect to information divulgation, procedural justice needs participation and disclosure of information by public and private sectors. For example, in this context, many governments place public consultation at the center of energy and environmental strategy for decision-making (Jenkins *et al*., 2016). The dissemination of information can be an engine to promote more ethical and sustainable consumption practices and energy production sources globally. Regarding institutional representation, an unequal representation in a wide range of institutions, including businesses, local, national and international government bodies, and gender and ethnic minority inequalities have long been observed in governing bodies (Jenkins *et al*., 2016).

A consulting firm conducted a similarly comprehensive survey of the boards of directors and executive teams of energy companies on the Fortune 250 list. Its central figure revealed that 84% of members were white males, in contrast to the black, Hispanic, Asian, and female representations. British Petroleum revealed in a survey of 3,000 oil and gas professionals that 72% believed the industry was still dominated by "men" and "whites", with notable geographic variation and some study cases show improved in the representations of minorities and gender in their results (Rigzone, 2013).

2.3 Relationship between justice and energy democracy

Energy democracy has to do with the participation of society. Rather than a top-down approach, energy policies should also be bottom-up as much as possible, as policies that take into account and are shaped by the opinions of individuals that have the flexibility to respond to their current and

changing needs, and are suitable to facilitate consumer ownership (Vitéz & Lavrijssen, 2020). Finally, the concepts of ED, EJ, and market regulation could influence developing a more coherent approach in regulating the energy sector. Moreover, better regulation can provide a helpful framework within which it is possible to weigh the trade-offs of regulatory choices when modernizing the regulation of energy markets (Vitéz & Lavrijssen, 2020).

On the other hand, EJ focuses on providing the "just" environment to fulfill such objectives. That is, they can be seen as complementary concepts. In addition, from the perspective of the principles of good regulation, it can be observed common elements between ED and EJ, such as independence, responsibility, transparency, participation, effectiveness, and efficiency.

In Figure 1, from Vitéz and Lavrijssen (2020), it is illustrated the "umbrella" function of EJ and ED concerning the elements of good regulation. That is, how these concepts, complementary among themselves, promote good regulation by safeguarding independence, responsibility, transparency, participation, effectiveness and efficiency.

Figure 1. Umbrella function of Energy Justice and Energy Democracy.
Source: The Energy Transition: Democracy, Justice and Good Regulation of the Heat Market (Vitéz & Lavrijssen, 2020)

The principles mentioned in Figure 1 are described below, which are common to both the ED and EJ concepts.

a) Independence
This principle implies that a regulatory authority must be independent of all market parts to ensure fair competition. This can be ensured by giving a regulatory authority a sufficient degree of discretion to act within the regulatory framework (Vitéz & Lavrijssen, 2020). Political independence is another aspect of this principle, not yet firmly established. It refers to the "degree to which an agency makes day-to-day decisions without interference from politicians in terms of offering incentives or threats and/or consideration of political preferences".

b) Accountability
While the principle of independence is essential to ensure objective and consistent decision-making, there is a danger that independence will lead a regulatory authority to act beyond its mandate (Lavrijssen & Ottow, 2012).[1]

[1] It can be noticed that accountability and independence are two sides of the same coin, which shows a constant tension between them (Lavrijssen & Ottow, 2012, p. 39). Regulatory authorities' greater control and

c) Transparency
The principle of transparency legitimizes independence from a regulatory authority, and secondly, it contributes to the effectiveness of economic regulation. Regulatory authorities must be open to interested parties. Besides, the authorities must explain to their citizens and businesses regulated the fundamentals of their decisions (Vitéz & Lavrijssen, 2020).

d) Participation
The participation of all stakeholders is essential for the benefit of economic regulation (Vitéz & Lavrijssen, 2020). According to the European Commission, greater participation is likely to generate more confidence in the final result (European Commission, 2001).

e) Effectiveness
Policies must be effective and based on unambiguous objectives, an assessment of the impact and, when available, of past experiences. Effectiveness also depends on applying policies in a proportionate way and decision-making at the most appropriate level" (European Commission, 2001).

f) Efficiency
Effectiveness implies a need for efficiency; for the energy sector's governance, the principle of efficiency is more relevant when considering the market as a whole. The central objective of efficiency is to guarantee an effective relationship between regulation and regulatory action results and the costs necessary to achieve these results (Vitéz & Lavrijssen, 2020).

3. Analysis of social impacts in an energy project in Mexico when established rules are insufficient

In 2017, around 110 Mexican infrastructure projects were at risk due to social conflicts; 54 were from the energy sector, 31 of them resulted from the energy reform. Between 2012 and 2017, the states (provinces) with more social conflicts due to energy projects development were Oaxaca with 14; Puebla with 8; and Veracruz and Quintana Roo with 4 each. The most important reasons for the conflicts were the lack of consultation with the communities and the possible environmental impacts, according to an investigation carried out on February 19, 2017, by the newspaper *El Economista* (Carriles, 2017).

The lack of secondary regulations in the energy reform to carry out the EvIS and the lack of an Indigenous Consultation Law has created a legal vacuum. As a result, various organizations have taken advantage of stopping projects, putting the energy reform's effectiveness at risk. Following the Hydrocarbons Law (DOF, 2020) and the Electricity Industry Law (DOF, 2020), it is required to present an EvIS to carry out any energy project. However, some consulting companies' lack of training to identify potential social conflicts in communities has led to projects being bogged down in conflicts with them. Figure 2 shows energy projects of various types (hydroelectric, pipelines,

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accountability legitimize independent regulatory authorities' decisions and ensure that authorities' actions do not go beyond necessary (Vitéz & Lavrijssen, 2020).

[2] The ejido in Mexico is a system of distribution and possession of the land considered an achievement of the Mexican Revolution. It consists of granting land to a group of people for their exploitation. The Agrarian Law establishes in its article 11: "The collective exploitation of ejido lands may be adopted by an ejido when its assembly so decides, in which case the provisions relating to the form of work organization and exploitation must be previously established. Of the resources of the ejido, as well as the mechanisms for the equitable distribution of benefits, the constitution of capital reserves, security or social services and those that make up the common funds" (SEDATU, 2018).

wind, photovoltaic parks, and high voltage lines) throughout the country, which during 2017 had to be suspended or delayed due to problems with the communities (Carriles, 2017).

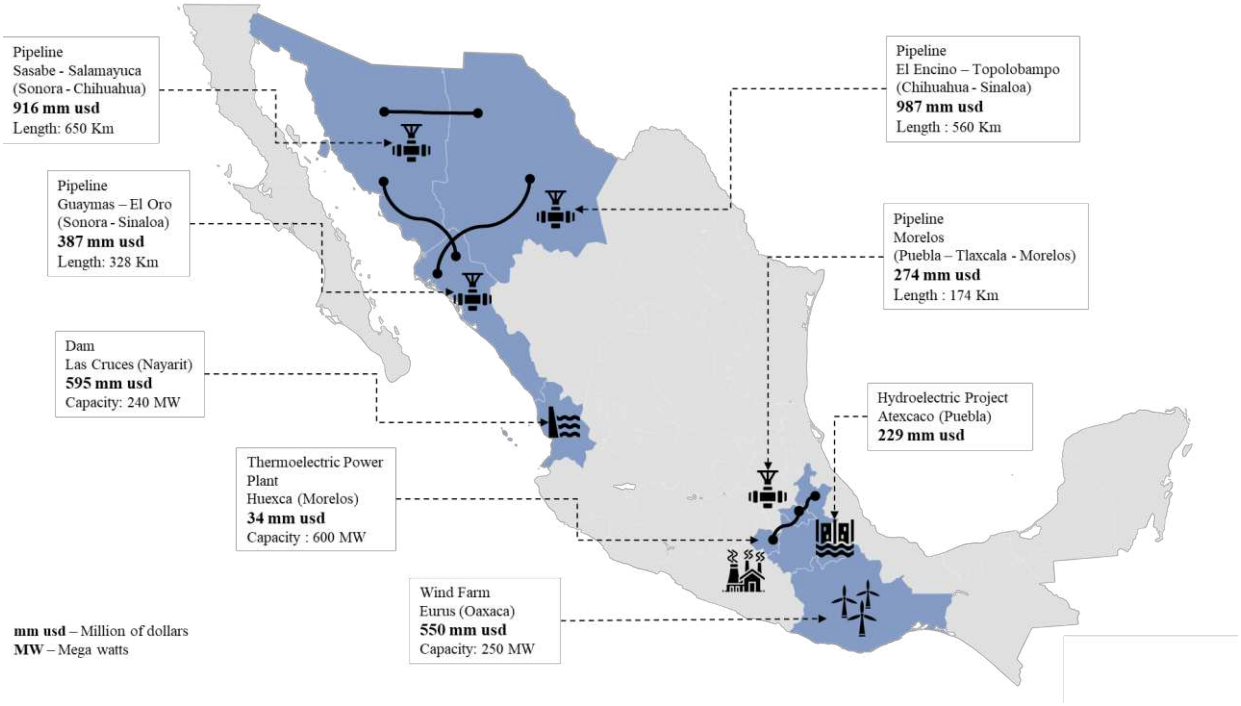

Figure 2. Mexican projects in the energy sector at risk due to social conflicts.
Source: Own elaboration based on information from (Carriles, 2017).

3.1 Analysis of the Eurus Wind Farm in Oaxaca

The Eurus wind farm is located in Juchitán de Zaragoza, Oaxaca, on a 2,500-hectare land leased in Ejido La Venta (Isthmus of Tehuantepec), it has an installed power capacity of 250.5 MW distributed in 167 wind turbines of 1,500 kW each and began its commercial operation in 2009 (SEMAEDESO, 2020).

This wind farm is the product of an effort by the private company Cemex to improve the environment since its processes tend to have high environmental pollution levels. With this complex, Cemex is expected to reduce electricity costs by 10% and reduce its pollutant emissions by the end of its construction (Cortés, 2009).

The ACCIONA Company developed the project and required an investment of 550 million dollars (Energías Renovables, 2009). Nevertheless, it is one of the largest wind farms in Latin America, producing an average of 989 GWh of electricity annually, equivalent to the consumption of a population of 500,000 inhabitants, which avoids the emission of around 600,000 tons of CO_2 (ACCIONA, 2015).

In March 2015, the Eurus wind farm won the *BID Infrastructure 360° 2015* award, awarded by the Inter-American Development Bank (BID), in the *Impact on Population and Leadership* category. This award recognizes outstanding sustainability practices in infrastructure investments in Latin America and the Caribbean, paying particular attention to climate and environment, as well as to issues related to social impact, governance, and innovation. According to the Zofnass-Harvard

Program, an evaluation report, the Eurus project "has shown excellent performance in improving the quality of life of the community in which it is located" (ACCIONA, 2015).

The municipality of Juchitán, where the Eurus wind farm is located, has just over 98,000 inhabitants, of which approximately half are indigenous language speakers. The registered population density is 108 inhabitants per square kilometer, with an average age of 28 years and a literacy percentage of 86.7% (INEGI, 2020). This means a percentage of the illiterate population of 13.3%, which is very high compared to the national average of 5.5%, surpassed only by Guerrero and Chiapas States with percentages of 13.6% and 14.8%, respectively (INEGI, 2015). In addition to the fact that the average level of schooling in Oaxaca is 7.5, it is, in other words, a little more than elementary school when the national average is 9.2, only Chiapas is below 7.3 (INEGI, 2015).

Regarding poverty indicators, the state of Oaxaca moderately exceeds the national average figures in cases of lack due to educational backwardness, lack of access to health services and housing spaces; however, when it comes to access to social security and essential housing services, Oaxaca is well above the national average (SEDESOL, 2015).

For the specific case of the municipality of Juchitán, the lack of access to health services stands out still above the average for the state of Oaxaca and the lack of access to social security, similar to the state average. However, on the other hand, it stands out that the municipality of Juchitán has a favorable figure concerning the indicator of (lack of) essential housing services below the national average, less than half, and well below the state average. In general, 60.2% of the total population of the municipality of Juchitán is in a poverty situation, and 11.3% in a situation of extreme poverty (SEDESOL, 2015). Finally, the land is held in common through the ejido structure of land ownership (Baker, 2016).

The municipality of Juchitán stands out for its large number of indigenous towns, which are located very close to the geographic influence of the project (SENER, 2020). Juchitán has a significant concentration of the Zapotec population and other indigenous peoples, such as Huaves, Zoques, Mixes, and Chontales (INPI, 2017).

3.1.1 Positive social impacts reported

a) Infrastructure and environment
The impacts generated in both phases, construction and production, were managed through a Social and Environmental Action plan. Actions were carried out, such as improving the roads around the park, creating a drainage system to avoid water accumulation in flooded areas, monitoring and controlling noise during construction, and preserving archaeological remains. (ACCIONA, 2015). From the point of view of EJ, these actions provide recognition by considering the affected inhabitants.

b) Community support and participatory approach
During the project's development, the surrounding population's needs and opportunities were identified through surveys and opinion studies. As a result, a Community Investment Plan was launched aimed at the economic, social, and environmental self-sufficiency of "La Venta" through projects in different fields such as reforestation, waste management, professional training in wind energy, self-employment, and health education. (ACCIONA, 2015). These actions comply with the principles of strengthening democracy and citizen participation in ED; related to EJ, the recognition part was met. However, procedural justice was not identified since the opinion polls and studies aimed to identify the needs of the surrounding population, but they were not inquiries about whether the residents agreed with the project's development.

c) Boost to education
Social projects include the development of small power wind turbines with the Universidad del Istmo, with various theses; 24 Wind Energy Masters Scholarships; training courses and training in tailoring, confectionery, electricity, computing, and typical embroidery, with 400 trained people, and training, with the support of the Distance University of Mexico in Higher Education programs related to renewable energies, with several participants (ACCIONA, 2015). These actions can be categorized within the principles of ED that transform towards a just and equitable society. Regarding EJ, it can be identified within the principle of redistribution of benefits by promoting education and technology transfer to the region's inhabitants.

d) Development of the economy
"La Venta" agricultural project has also been promoted through the constitution of 11 rural production companies and 70 beneficiary landlords and a typical embroidery micro-enterprise with women (ACCIONA, 2015). From the ED perspective, these actions contribute to the fulfillment of the transformation principle towards a just and equitable society; besides, from the EJ approach, the principle of distributive justice is fulfilled by granting benefits to the region's inhabitants.

e) Health benefits of the population
In the field of health, a program to detect uterine cervical lesions was promoted with 600 women treated, and sex education talks have been given to young people about HIV/AIDS and unwanted pregnancies with 100 participants (ACCIONA, 2015). Similarly to the previous impact, this one contributes to the fulfillment of the principle of transformation towards a just and equitable society, in addition to addressing a significant deficiency of the population of the region, since as mentioned above in the municipality's poverty indicators, a significant proportion of the inhabitants lack access to health services. Seeing all these positive impacts naturally raises the question: Why do conflicts arise around this project despite these benefits?

3.1.2 Negative effects

It should be noted that this project was recognized for its exemplary management of the attention is paid to the social impacts generated. However, negative impacts were identified from ED and EJ scopes, which are described below.

a) Conflicts related to private property
One of the most harmful social impacts that have been generated is the conflict over legal possession of the land where the wind resource is located. There is a presidential decree from 1964 (DOF, 1964), in which the communal assets were confirmed and titled. This communal landholding structure was reformed in 1992 to allow for some divestment of community holdings. However, any order, lease, or conveyance of land must be made with the consent of the community in which the ejido is held (Baker, 2016). In most of Mexico's States, ejido[2] property is the predominant one; Oaxaca and Mexico City are distinguished by having a higher percentage of communal property, 78

[2] The ejido in Mexico is a system of distribution and possession of the land considered an achievement of the Mexican Revolution. It consists of granting land to a group of people for their exploitation. The Agrarian Law establishes in its article 11: "The collective exploitation of ejido lands may be adopted by an ejido when its assembly so decides, in which case the provisions relating to the form of work organization and exploitation must be previously established. Of the resources of the ejido, as well as the mechanisms for the equitable distribution of benefits, the constitution of capital reserves, security or social services and those that make up the common funds" (SEDATU, 2018).

and 67 percent, respectively (CEDRSSA, 2015). Contracts between the developer and the region's inhabitants were made personally, even though the lands belong to the community. Activists and community members opposing wind development frequently cite the violation of the ejido as the chief offense of multinational companies engaged in the region's wind development (Baker, 2016). Therefore, there is a default in all the principles of EJ since it does not fulfill distributive justice, recognition justice, or procedural justice. Unfortunately, these conditions have originated a high number of conflicts in the region derived from this scheme.

b) Lack of transparency and representativeness in decision-making

It has been stated that the contracts usually do not offer transparent and truthful information on the rights that the owners have when leasing their land. On what will happen to the wind installations once the contract is terminated, the contracts lack clauses of payment updates. They do not make a precise distinction between productive farms and vacant land (CDPIM, 2013, p. 18). The common elements of good regulation shared by ED and EJ are not being considered since there is a lack of transparency and participation of the region's inhabitants in decision-making. Yenneti and Day, have mentioned that "the voices of the poorly educated and the already least advantaged sections of a community are likely to be unheard and dominated by the educated, higher status and more affluent members of the same community, and other development agents such as local governments, private investors, and the central state in any policy decisions or legal mechanisms, including renewable energy" (Yenneti & Day, 2015).

c) Unfair remuneration for land leasing

International experience shows that the remuneration paid by the operating company of a wind farm for the lease of land ranges between 1% and 5% of the gross income from the sale of energy from a wind farm, and according to the European Association of Wind Energy, land rent represents 3.9% of total costs. However, Mexico's case is drastic, considering the value well below the international standard and standing at percentages ranging from 0.025% to 1.53% (CDPIM, 2013, p. 16). According to INEGI data, 60% of the landowners in the area are illiterate, which could explain why abuses in contracts have become widespread (CDPIM, 2013, p. 20). In Mexico, as no entity regulates the fair value of land, values are paid well below the parameter, which causes a situation of delicate tension in the communities where the wind farms are installed (CDPIM, 2013, p. 17). This aspect violates the principle of ED that promotes the transformation towards a just and equitable society. Also, distributive injustices are being incurred, as there is no fair distribution of benefits. Furthermore, besides procedural injustice, there is no institutional representation and injustice such as lack of recognition and respect. Additionally, as we mentioned before, there is a significant concentration of the Zapotec population and other indigenous peoples in the area. Therefore, we are also talking about the unjust treatment of marginalized communities. It is common to associate negative social impacts on indigenous communities caused by the development of oil and gas projects. For example, the exploration of oil and gas reserves in Mexico requires the development of land and ocean resources that are vital to indigenous communities (Baker, 2016). However, negative impacts are not only observed in oil and gas projects development, but as we observed, the Euros wind park, a clean energy project, also has negative impacts on indigenous communities without achieving procedural justice, or a just process for deciding how to distribute the burdens and benefits of the system (Moore, 2013).

d) Inequitable distribution of environmental benefits and damages

Ironically, this resource-rich region also has the second-lowest electrification rates in the country (CFE, 2012). According to INEGI (2020), the percentage of households in Oaxaca with electricity in 2005 was 92.1%, and in 2010 was 94.3%, which indicates an increase of 2.2%. On the other hand, this percentage in 2015 was 95%, which means an increase of 0.7% during the 2010-2015 period, which is not significant compared to the previous period. Furthermore, taking into account

that the Eurus wind farm had been in operation since 2009, and in 2015 twenty-six additional wind farms had already been installed on the Isthmus of Oaxaca region, the disproportion in the distribution of benefits is very notable. (Arena Pública, 2018). On the other hand, from the perspective of environmental impacts, the project had several negative effects, such as the affectation towards birds and bats, due to the mortality caused by collisions with wind turbines, habitat fragmentation, and noise (Navarro & Bessi, 2016). Furthermore, in this region is the white quail (Odontophorus guttatus), listed as subject to special protection according to NOM-059-SEMARNAT (2006, p. 72). Also, there was alteration to the landscape since there is an inevitable visual impact (SEMARNAT, 2006, p. 6). According to the project proposal is a reversible and temporary impact since the modification will only exist during the life of the project (SEMARNAT, 2006, p. 81). This alteration has affected underground water flows, since hundreds of tons of cement and rod are used to fix the wind turbines, which is why some of these works interrupt the water flows (Navarro & Bessi, 2016). Contamination of the subsoil and water from oil spillage on their blades and the main coil, which has caused contamination to the subsoil and the water of farmers that have ranches near the place, and depending on the type of wind turbine. This represented 200 to 400 liters of synthetic oil for each wind turbine per year (Navarro & Bessi, 2016).

Therefore, since the benefits generated directly by the project, specifically the generation of electricity, are not distributed equitably with the region's inhabitants, there is no distributive justice. Nevertheless, environmental damages derived from the project directly impact the economy of the region's inhabitants, whose main economic activities are agriculture and livestock. The impact on groundwater flow by infrastructure works, contamination of the subsoil with oil spilled by wind turbines, and insufficient energy access to rural and poor zones may reduce production and opportunities to promote society's welfare. Specifically, women, children, and the poor are more affected. On the contrary, providing equality to energy access may bring in the benefits of income equilibrium, gender equality, and sustainable socio-economic development of the society (Qarnain *et al*., 2020)

Unfortunately, even in 2020, there are still negative social impacts affecting Oaxaca farmers due to conflicts among the Federal Electricity Commission (CFE), the state power company, and the wind farms' developers. In the specific case of ACCIONA, the company that developed the EURUS wind farm, they have a conflict with CFE, since CFE assured that it is paying ACCIONA up to three times the value of electricity compared to other wind companies. This affects farmers in the region since if the contracts that ACCIONA entered into with CFE were canceled, they would no longer receive income from the property's rental (Morales, 2020).

On the other hand, the lack of electricity in 52,147 homes in Oaxaca (5%) added to the fact that until 2018, 206,062 homes did not have a television (17.9%), and 583,528 homes did not have a radio listening device (50.8 %), has generated an atmosphere of adverse conditions for the education of children of those homes since they did not have electricity or the means of communication. They have not been able to follow the classes on television, taught since August 2020, such as part of the strategy of the Ministry of Public Education for the restart of distance school activities due to the lack of conditions caused by the Covid-19 pandemic (Zavala, 2020). Table 2 identifies which were, in our opinion, the positive and negative effects on the development and operation of the Eurus project, based on the EJ and ED approach.

Table 2. Summary of the assessment from energy democracy and energy justice perspectives

Positive effects	Negative effects
Improvement of local infrastructure	Conflicts related to private property
Preservation of the environment	Unfair remuneration for land leasing
Community support and participatory approach	Lack of transparency and representativeness in decision-making
Boost to education	Inequitable distribution of environmental benefits and damages
Development of the economy	
Health benefits of the population	

Source: Authors' own elaboration.

4. Conclusions

Energy infrastructure projects may impact society and the environment in the region. Positive and negative impacts may appear in the development of this type of projects.This statement applies to both fossil and renewable energy projects, such as the Eurus wind farm.

The Eurus wind farm project stands out for its good management in the area of social impact, which is why it received the *360º Infrastructure* award. This is the most relevant of its kind in Latin America. Despite this, there were social conflicts related directly to the construction and operation of the project.

As a result of the analysis carried out on the Eurus wind farm project from the perspectives of ED and EJ, various negative social impacts were identified, among which are the conflicts related to land ownership, the lack of transparency and lack of representation in decision-making, as well as unequal remuneration for land leasing. Furthermore, an increase in poverty level was identified due to the unequal distribution of the resources granted by developers as payment for the lease of land to individuals, even though a large part of the territory of the municipality of Juchitán is communal land. On the other hand, the project's positive impacts were expected to identify an increase in homes' percentage with electricity. However, this percentage remained practically unchanged in the period between 2010 and 2015.

The negative impacts could have been avoided or mitigated if democracy and EJ principles had been considered during the project's development since all of them fall within the scope of ED and EJ principles. Also, negative environmental impacts were identified, such as oil seepage in groundwater flows and contamination of the subsoil and water, which also translate into negative social impacts since they affect the region's inhabitants, whose main economic activities are agriculture and livestock. These negative impacts, seen from the approach of democracy and EJ, could have been mitigated since one of the principles of EJ is the distribution of damages, which avoids social conflicts that delay or stop projects impacting the total cost.

Although it is common to think that the negative social impacts that renewable energy projects entail could be minimal, the Eurus wind farm analysis results show that significant negative social impacts are generated; despite complying with current regulatory prescriptions. Therefore, it can be considered that the current regulations regarding the social impact of projects could be substantially

enriched if the principles of ED and EJ are included as evaluation factors in the feasibility and sustainability of an energy project.

It was observed, as a result of this project analysis, that the affected community has specific characteristics and needs, which must be considered during the planning of similar projects, in addition to the need for a legitimate entity that provides representation to the inhabitants of the region where developments are carried out. Finally, in view of the results obtained in this research, the main recommendation for countries with similar characteristics when carrying out energy projects is to consider the crucible of ED and EJ to avoid conflicts with the communities.

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