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Realistic Solutions to the Social Unacceptance of Renewable Energy Projects

How to make Renewable Energy Projects acceptable

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Abstract

Renewable Energy is not as sustainable and well received as it is believed. Like all technologies, they follow a process of acceptance through the various levels of society: politics, market, community. The obstacles to the acceptance of renewable energy plants range from technical, social, cultural, political reasons and vary depending on the energy taken in case, the region in which the site is located, the scale and numerous other factors combined with the context in which the renewable project is to be installed. Since those technologies are site-specific, study cases are discussed for every energy (hydroelectric, wind, solar, geothermic) to better understand how the acceptance works in both developed and developed countries, what are the most common barriers for communities and the drivers that help accepting the projects. Protecting the landscape, maintaining the status quo, the high cost of investment are the main barriers in developed countries while in developing countries people are concerned about the forests and rivers on which they depend, for sustainable development that improves living standards. Technical knowledge is also a barrier in developing countries due to the lack of skilled workforce. Among other factors, culture also affects the acceptance of a technology, culture that can change and integrate with technology and vice versa. Barriers to acceptance in the field of renewable energy can be overcome through collaboration with energy and non-energy communities, considering the opinions of end users and adapting the project to their requests. It is necessary to invest in training and sensitizing people rather than in improving the efficiency of already mature technologies. Only by educating society about renewable energies technologies it will be able to understand that it is necessary to accept and spread them to complete the transition towards a sustainable, clean, green world.

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Introduction: Why did this work and this did not?

Renewable energy plants are essential to move towards a sustainable low-CO2, low-pollution and environmentally friendly society. Despite the good intentions of renewable energy installation and generation companies, some plants are rejected by the community living near the site, while other plants are being clamored for by other communities. The reasons behind the apparent rejection of a Renewable Energy project labeled with simplicity NIMBY (Not In My Backyard) phenomenon are numerous and vary according to each energy source, community, culture, country, quality of life, education and other related factors. Of the same nature are the reasons that instead push communities to adopt the same plants. It is therefore necessary to clearly understand the reasons that lead to rejection in one case and acceptance in the other so that companies that propose renewable energy plants can succeed in their project and create energy communities without resistance. The first step to understand why one plant has been successful and another has not is to ask it directly to the people concerned or to the communities. Their essential feedback is of great help to developers who can re-propose the modified project after complaints, requests and opinions from customers. This simple feedback process is one of the ways to improve the acceptability of the sustainable project and in this document we will analyze in detail numerous other methods by which the installation companies of renewable energy production plants have made their works acceptable and also methods that instead have led to greater contestation and the loss of the advantages that communities could have obtained.

Methods

This document aims to create a model of "best practices" to make acceptable or increase the acceptability of renewable energy production plants through the study of some significant cases, divided by energy source, both in which the projects have been contested by the communities with protests and formal requests to block the construction and in which the projects have been well accepted by the communities without resistance thanks to the efforts prior to the implementation of the project by informing and considering the opinions of members of the energy community. The cases examined were found through a Google Scholar search using keywords as “Contested Renewable Energy Projects” “Opposition to Wind Farms / Hydroelectric Power Plants / Solar Power Plants” “Renewable Energy Acceptability". The cases considered, at least one successful and at least one negative, are divided by energy source and will be discussed one after the other to determine the differences in approach, clearly understand the errors made in the acceptance of projects and show the effective methods by which to make otherwise rejected projects acceptable. In addition to the specific cases, the drivers and barriers that energy companies encounter in proposing projects to communities will be treated holistically, such as how to overcome these barriers and increase the drivers that lead people to accept renewable technology. Culture is another major factor that can decrease acceptability and for this reason significant episodes will be reported and commented on to understand how culture can influence energy choices and the acceptance of new and renewable technologies.

1 Acceptance and Acceptability

To understand the meaning of Acceptance and Acceptability applied to renewable energy, it is appropriate to start from the adoption of a technology in the broadest sense of the term. Adoption is a process that originates from the discovery of an innovation and reaches the final use of a tool that exploits it. Adoption is therefore an individual or collective choice to accept and use a tool and can be divided into two chronological processes based on the interaction between man and technology (Barcenilla & Bastien, 2009) (Lee, Kenneth, & Larsen, 2003): first acceptability and then acceptance. Acceptability is an a priori phenomenon of man's confrontation with the tool, predicts the intent to use it, it is the at least positive mental representation that a user has before using the tool (Tricot, et al., 2003). Subsequently, acceptance is a pragmatic evaluation a posteriori and implies a user activity after evaluation (Fèvrier, 2011). So when the user is confronted with a new technology, he assesses its acceptability at first and then its acceptance when it is actually used (Bobillier-Chaumon & Dubois, 2009).

There are several criteria to determine the acceptability of an instrument, the main ones of the most shared theories will be reported here:

- Ergonomics. The main criteria are Usability and Accessibility. The first expresses an easy and effective use to complete a task (Shackel, 1981) and is divisible into five dimensions: efficiency, satisfaction, ease of learning, ease of use and reliability. The second indicates that a tool should be flexible and suitable for everyone (Bastien, Scapin, & Leulier, 1998).
- Social psychology. The behavioral intention defined by the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) determines real behavior and acceptability. The intention is determined by the criteria: Performance, Attitude and Subjective Norms (Li, 2008). Performance is described as the success of completing the task, Attitudes as belief towards the tool, and Subjective Norms as social pressure to use a tool or not. Two additional criteria are Agency and Self-efficacy (Beillerot, 2004): the first is defined as the personal influence of the user on the functioning of the tool and

the second is defined as the personal judgment of being competent enough to implement a skill to use a technology (Compeau & Higgins, 1995). The user has no reason to act if he is not convinced that he will meet with some success.

Regarding Acceptance, the literature proposes a large number of criteria, but some are more cited than others such as Utility, Social Differences, Aesthetics and Ease of Use.

Acceptance and acceptability therefore appear as subjective concepts. On the other hand the subject, the user is a psychological actor inserted in society and using the tool or technology in a given context for a specific task, the influence of the environment and experience such as judgment, emotions, attitude, motivation, is important and can vary acceptability or acceptance (Alexandre, Reynaud, Francois, & Navarro, 2018).

The above criteria are also applicable to renewable energy production technologies: Usability and Accessibility are essential to spread the use, for example, of photovoltaic panels, which can be easily installed on the roof of homes and connected to the domestic grid. Performance, if good enough, makes a renewable energy project more acceptable, the attitude that the company shows is equally important and the approach with which the project is proposed must be as positive as possible. The Subjective Norms vary for each site and the construction company must be able to break through the mentality of the community to modify the subjective norms, often incorrect, that do not allow acceptance.

1.1 Social Acceptance

Acceptance, here in particular Social, is defined more broadly than above through its three dimensions identified in 2007 (Wustenhagen, Maarten, & Burer, 2007):

- Socio-Political Acceptance: it is the acceptance of a technology by politics, actors and policy makers, organizations and stakeholders of the public to innovation. These categories must act to improve the acceptance of renewable energy sources by other categories and therefore this Acceptance is the first request because it is essential for its diffusion through the main channels such as politics.

- Market acceptance: it is the marketing process and therefore the adoption of a technology at a commercial level because it is sufficiently accepted by consumers in the first place and by investors. This acceptance comes as a result of the actions of the political class that may have encouraged the use of renewable sources through laws, investments, concessions or higher taxes on non-renewable sources.
- Community acceptance: it is the acceptance of local investors, of local companies that train their employees to meet the growing demand, thanks to the greater acceptance of technology, of emerging energy communities interested in making the energy transition. There are two sides: the NIMBY (Not In My Backyard) phenomenon is the resistance to an unwanted project that leads to economic losses, losses of obtainable advantages and social conflicts (Economou, 2010). The virtuous phenomenon PIMBY (Please In My Backyard) is the diffusion of a project that has proved to be advantageous and therefore desired by other neighboring communities (Jobert, Laborgne, & Mimler, 2007).

Socio-Political and Market Acceptance includes the economic conditions of the territory or region, the ownership of the public or private site and the laws that regulate it, the prices of current electricity often unfavorable compared to generation from renewable sources, the technology used and the high initial investment costs, taxes on commercial technologies, the prevalence of fossil fuels, the difficulties in accessing credit and financing, the absence of a regulatory framework and government standards. In Community Acceptance, public perception is central and the factors it includes are lack or fragmentation of information and knowledge about new technologies, distrust of the new unknown, lack of impartiality and objectivity, suspicion of investors and energy companies, and uneven acceptance of different renewable energy sources.

2 Same but different projects

The nature of renewable sources is territorially uneven, intrinsically non-programmable, of variable intensity and duration, often with low energy density and in places not economically viable for production and transmission. Because of these conditions, production plants must be built where renewable energy is available. While a coal or natural gas power plant can be built almost wherever you want and receive the fuel by transporting it from fossil fuels, renewable energy generation plants do not have the privilege of transport and must therefore be built at the source of the "fuel" or on the ridges or on the coasts where the wind blows strongest, in mountains or rivers where water flows faster or in the plains, in deserts where the sun hits the earth with more intensity and frequency. Due to the proximity to the source, they cannot be located "out of sight, away from the mind" but can be close to inhabited centers, historical, cultural, natural tourist places to be protected and this makes the plants more difficult to accept than something distant and invisible (hence the origin of the meaning NIMBY). They inevitably lead to social conflicts and forms of opposition from those who perceive interference in land use (Pasqualetti, 2004).

This chapter collects the most common reasons why renewable energy plants are accepted and rejected: what incentivizes communities to accept an installation and what causes them to oppose it. Always considering the almost uniqueness of each project, many incentives and disincentives are common to many but not all, they have different intensities and different origins. This is therefore a first look at community reactions to renewable energy projects.

2.1 Opportunities

Before discussing the reasons behind rejection or acceptance, it is appropriate to consider what a Renewable Energy project generates in addition to energy: economic effects as monetary benefits for neighboring communities in the form of price reductions in monthly bills, sharing of project profits, new jobs before and after construction, benefits and/or costs in terms of tourism and undoubtedly an economic boost for the region where the investment takes place (Del Rio & Burguillo, 2009). Not only financial consequences but also environmental and quality of life impacts: possible interruptions or changes to the balance of the ecosystem in the proximity of the project, the impact perceived by residents such as landscape deterioration, noise and visual pollution and other imbalances or improvements in the quality of life in the area.

Since renewable energy sites and therefore their plants to produce it are decentralized, they are an excellent opportunity for rural development as well as creation of numerous new long-term jobs in developing countries (Souvik & Sourav, 2017). In fact, in developing countries a renewable energy project is more effective and fruitful (IEA, 2010) because it greatly improves access to electricity, cleaner and more efficient cooking facilities (REN21, 2009) with the help of small and autonomous configurations such as photovoltaic panels, small hydroelectric turbines and bioenergy that can meet the local demand of the rural community in an economical and clean way. These small and diverse generation configurations ensure energy security by expanding supply options and avoiding dependence on conventional fossil fuels, which are not available locally, with variable prices and often already very high for a poor region. In reality, developing countries are heavily dependent on fossil fuels and any oil crisis, even a minor oil crisis, can collapse the economy of those countries.

Renewable energy projects for sustainable development also include opportunities to adapt the territory to climate change (Parry, Canziani, Palutikof, Van der Linden, & IPCC, 2007) by anticipating and mitigating certain phenomena: cooling buildings through solar energy counteracts the increase in average temperature (Moomaw, et al., 2011), dams built for hydroelectric power plants create reservoirs that can regulate increasingly frequent floods as global warming worsens (WCD, 2000), solar and wind power generation does not need water and therefore can be used in arid areas and can power pumps that draw water from underground to ensure irrigation in nearby agriculture, afforestation along coasts and riverbanks reduces erosion and the planted species can be used as biomass to generate bioenergy.

The benefits and opportunities presented by renewable energy plants are manifold and more and more communities are adopting driver-driven sustainable solutions for their energy supply, but just as many communities are pushing this progress away because barriers imposed by themselves, politics, economics or developers, prevent them from accepting plants in their territory. The success or failure of a renewable energy plant depends on the willingness of the public to accept innovation (Bertsch, Hall, Schumacher, Weinhardt, & Fichtner, 2015) without this acceptance it is unlikely to reach a sufficient level to replace energy production from fossil fuels and inhibit global warming (Devine-Wright P., 2007).

2.2 Barriers

Analyzing the barriers that block the general and local sociopolitical acceptance of renewable energy is instrumental in determining the drivers that push communities to overcome these barriers and accept energy innovation.

The barriers against a renewable energy project are identifiable through the study of the literature of similar projects then the analysis of case studies on installations at local, regional, national and international level. If possible, visiting the project site directly is useful to see the real conditions and interact with stakeholders such as the installation company, investors, trade associations, policy makers, non-governmental organizations and above all the community on which the project will affect can help an accurate evaluation and a more effective measurement. This interaction can take place through interviews or questionnaires administered to identify points of view, reveal shortcomings on each side, clearly determine barriers that hinder completion or a condition of better use of the project.

Remembering that each community has its own barriers to acceptance, here below are discussed the more general obstacles and shared a priori by most sites. So, we proceed from broader barriers such as market and diffusion to then scale up and analyze local obstacles such as culture and protection.

Economic barriers are due to market failures, often external and caused by human activity. Failure occurs by definition when the responsible agency involved does not perform or does not meet the requirements required by the client, specifically for the renewable energy sector it can occur with:

- Insufficient investment in research and development programmes.
- Unassessed environmental impacts leading to greenhouse gas emissions beyond the limits imposed by law (Baumol & Oates, 1998). Monopolies that reduce competition between suppliers and customers and the opportunity to enter and exit the free market.
- Too high initial investment costs are unaffordable for many potential customers, particularly in developing countries.
- Financial risks due to uncertainty about the price of future electricity. High returns are required for risky investments compared to established technologies. This increases the cost of sustainable projects (Gross, Blyth, & Heptonstall, 2010).

Information barriers are based on the site-specific nature of renewables. The production of energy, for example wind power, depends on the place selected for the installation of the plant, where the wind speed is sufficient and constant. Therefore, before construction it is necessary to ensure that the selected region is favorable, assurance that is drawn from the data available in global weather databases. In most cases these data are not available or are not detailed locally. The unavailability of meticulous data reduces the accuracy of the modelling and output of the plant on project, thus increasing the risk of failure and uncertainty about return on investment (Sen, Ganguly, Das, Sen, & Dey, 2016). In the worst case the plant may be too small to be useful in a certain location or the energy of the wind, sun, water may not generate enough energy to meet local demand, or the latter is too high for the plant (Painuly, 2011). The availability of a source over time should also be considered: it can vary seasonally as in monsoon regions where for long periods of the year the sky will be covered by clouds and solar panels will not be able to generate energy, they will work well instead outside these seasons. Not only information but also training: qualified human resources with sufficient skills are needed to use and maintain the renewable source plant. This problem is acute in developing countries (Barua, Urmee, Kumar, & Bhattacharya, 2001). Workforce training and ensuring timely access to spare parts for maintenance are vital requirements for the success of a renewable project (Martinot, 1998). There is little public and institutional awareness of the technical and financial aspects of implementing the sustainable transition, which acts as a barrier (Sadorsky & Henriques, 2008).

The most common policy obstacles are regulations designed around monopolistic or near-monopolistic suppliers such as state-owned power companies. These policies protect the production, transmission and centralized distribution of dominant energy, in almost all cases non-renewable, which makes it difficult to include renewable quotas.

The purely social barriers affecting the spread of renewables can worsen if they are not adequately treated (Renn, 2004). The rejection of a technology is the result of ignorance. The perceived low level of knowledge discourages stakeholders, both developers and residents, from participating in discussions, decisions and how public funds should be spent thus hindering sustainable development (Pereira, Prada, & Santos, 2016). People often rely on their own knowledge, although limited due to distrust of the risks and benefits claimed by experts (Siegrist & Cvetkovich, 2000). It is difficult to change people's minds after they have made a decision, so they should be informed as soon as possible (Friedl & Reichl, 2016).

The socio-cultural barriers are at the local level and not very common between the different cases of disputes. As the energy transition progresses, local opposition against various energy developments is increasingly widespread" (Ocelik, Lehotsky, & Cernoch, 2021). Opposition can result from various factors, the most common being the sense of identity of the place (Devine-Wright & Batel, 2017), political ideology including also the anarchist and green-anarchist (Sovacool & Dunlap, 2022), opinions on climate science or economic growth (Vesa, Gronow, & Yla-Anttila, 2020), poor perceived social guarantees or increased environmental risks (Kirchherr, Charles, & Walton, 2016).

Often disputes arise from a lack of communication and adequate information, other times from a strong protection of the territory from the communities. These will be treated in detail in case studies divided by energy source later.

2.2.1 NIMBY

Social barriers of different nature are grouped and masked under the NIMBY phenomenon, an acronym that stands for "Not In My Backyard" to indicate a favorable adhesion to a technology or development in general but an opposition when this technology is in the area of interest as near one's residence or an emotional place. The phenomenon is often attributed to selfish motives ostensibly to oppose technologies that jeopardize the maximization of one's individual utility, however it is not typically true (Wolsink M. , 2007), the reasons are more illogical and emotional, dictated by the lack of knowledge of the subject. Those who reject renewable technologies at any distance and have expressed positive opinions about them show logical inconsistencies in their preferences and such rejections are therefore inexplicable that can occur in the case of intangible preferences (Bertsch, Hall, Weinhardt, & Fichtner, 2016). Renewable energy plants often exist on very small scales while conventional energy plants are large-scale. For this reason, small systems are installed in greater number and at a shorter distance from residential places, thus increasing the NIMBY phenomenon (Sharpton, Lawrence, & Hall, 2020).

Social opposition to renewable energy projects can occur not only on the technology itself but it is possible that the community will not accept licensing or the location of new infrastructure connecting the plant to the grid. For example, rural residents may be in favor of wind energy but oppose the way developers manage projects in their community perhaps because they are marginalized in the planning process.

2.2.2 Protests

It is easy to trigger conflict when barriers are broken down by force and the help of the law. Although on paper the plants are feasible and have the permission and approval of the official bodies for construction and commissioning, the adjacent community is still opposed to the project because the barriers demonstrated so far are still present, valid, although they have been bypassed. A study compares the resistance to energy projects of different nations of the planet, the responses of governments and energy agencies (Temper, et al., 2020). It shows that violence against protesters is more common than you think, among nine classes of energy technologies cases of conflicts involving fossil fuels were frequent such as coal (37%), oil and gas (9%), pipelines (7%). A fifth of the sample, out of 130 cases analyzed, concerned low-carbon technologies such as nuclear energy, renewables and 8% transmission lines. The most conflictual renewable energy is hydroelectric while the least conflictual are wind and solar with the lowest levels of perceived impact. The vast majority of cases lasted two to five years, indicating that opposition involves an extended period and legal action. A significant example is the Frøya wind farm in Norway which in 2005 led to a referendum, in 2012 to a concession, in 2019 to construction and another referendum. Other cases lasted even less than a day: short sit-ins or demonstrations. The podium for the average of the longest cases is Northeast India with 5.3 years, coastal Norway with 4.7 years and Central Appalachians with 3.9 years.

The results of the mobilizations are delays in the construction of the project, the most frequent outcome in 71% of cases in northeastern India, political and/or regulatory changes, maintenance of the low-carbon status quo, no change, withdrawal of the project or phasing out of existing infrastructure.

2.3 Drivers

The major barriers preventing the acceptance of renewable technologies have been widely discussed, therefore, now the drivers trying to break down these barriers are analyzed. It is clear that to break down the barriers it is necessary to implement the exact opposite and for this reason it is necessary to better understand what are the barriers that involve the site in question. In absolute general, local public acceptance of renewable energy and grid expansion is to allow the public to have greater participation in new installations through shared ownership: you feel more responsible if you own a part of a project and try to be more involved in it to prevent it from failing or not yielding as much as you would like. If the barrier to break down is distrust of developers (Siegrist & Cvetkovich, 2000) because they are believed to be motivated by financial gain alone, investors and local developers that the community trusts can be involved (Wustenhagen, Maarten, & Burer, 2007) or involve the public directly in the decision-making process to build trust between developers and the community from scratch (Jobert, Laborgne, & Mimler, 2007). To break down the barrier of lack of knowledge and education, local educational campaigns are created in schools and public meetings for adults, clear and objective information on renewable sources is disseminated and residents' participation in dialogue with politicians and developers is increased.

To better understand the dynamics between barriers and drivers in approaches for the deployment of renewable technologies, actions and reactions to the introduction of smart meters in some countries were analyzed (Geels, Sareen, Hook, & Sovacool, 2021):

- In the Netherlands there was an initial social opposition that led the institutions to organize social debates, technical adjustments, pilot projects to improve social acceptance.
- In Portugal, the first pilot project was followed by others that enabled learning and steadily increased confidence in technology and its social acceptability.
- In the UK, the government has continued to invest in technology while ignoring objections. These social objections piled up and ended up blocking the transition due to the amount of opposition and low acceptance of technology.
- In Norway, prolonged preparations through experiments, networking and stakeholder consultations ensured good acceptance and thus rapid deployment of the technology towards the desired sustainable goals.

The most effective and socially accepted approaches have been those of Portugal and Norway, while the Netherlands have corrected the situation along the way and the United Kingdom has simply failed.

There are drivers that do not break down barriers but exploit concepts that people are used to such as biomass systems, widely accepted as a source of alternative fuels, but always combustible, which however eliminate greenhouse gases and have a lower cost. In a similar way, private solar is well accepted because it is useful to save energy bought from the grid and useful to protect the environment because it complements a green mix otherwise fossil. One barrier that this driver cannot yet break down is the high initial capital cost. Sufficient incentives can act as drivers for the spread of wind energy: making noisy and cumbersome technology acceptable in exchange for monetary compensation (Rosso-Ceron & Viatcheslav, 2015).

A developer should always prioritize establishing mutual trust with the community, this is the most effective driver, the emotional one. Increasing mutual trust occurs through community participation and dissemination of information. A transparent process allows residents to stay informed at the stages of development. On the contrary, where there is no communication, residents consider the project deceptive and harbor mistrust. Considering the specific demands of local communities, developing a win-win partnership will also facilitate the construction of new facilities and future operation. The drivers become the residents themselves who create a network of local supporters that spread trust in renewable sources. It is important and an excellent incentive to ensure that the benefits, compensations and perceived costs of a project are equally distributed among all participants in a community (Segreto, et al., 2020).

Every energy source has its own problems

The oppositions to renewable energies are of a different nature from conventional ones and within them they are even more varied depending on the renewable source of the contested project. Finally, whatever the source of the project, each has its own specific obstacles due to the context in which it is located including politics, economy, culture and other local factors. This chapter will make clear the difference in conflicts between projects proposed in already developed countries and in non-developed or developing countries. The approaches that companies use to overcome barriers and impose themselves in the territory without generating acceptance and therefore fueling opposition are shown, the ways in which other agencies have created a virtuous circle of diffusion of acceptance of renewable energy by collaborating with local communities and territorial policy are also shown. At the end of the chapters, it will be possible to define guidelines, "best practices" on how to make a renewable project acceptable, how to avoid conflicts and manage a successful renewable energy policy.

3 Hydroelectric Power

The discussion of conflicts of renewable projects begins with hydroelectric projects. Since the plants that exploit the potential energy of the water of lakes and rivers on the mountain ranges are the technology closest to the conventional as there is a power plant and large civil works are necessary to create a basin or to divert a river is also the most conflictual technology among renewables, just below the conventional ones.

3.1 Developing South Asia

The region in South Asia mainly composed of India, Nepal, Pakistan and other smaller nations is a predominantly mountainous territory and among its mountains flow many rivers useful for generating hydroelectric power even in remote regions. The rate of exploitation of the country's hydroelectric potential is 29%, a rate that could increase greatly with the use of energy generation technologies directly from rivers, without creating large dams but building small plants on the watercourse.

3.1.1 A contended basin between India, Nepal, Bhutan

The first case that is dealt with here is the dispute of the Ganges-Brahmaputra-Meghna basin (hereinafter GBM). Through this case we want to communicate from the beginning that electricity, in particular hydroelectric energy can reach very high levels of contestation and reach international policies as in this case.

The GBM basin covers about 1.75 million square kilometers in the five countries of India, Bangladesh, Nepal, China and Bhutan. It is home to over 600 million people, which determine the highest concentration of poor people in the world. Low per capita water availability, relatively high-water consumption and groundwater contamination are the factors that have prevented guaranteed access to drinking water for 20% of the basin population (SAWI, 2013). While the hydroelectric potential of the rivers of the basin in question is around 200,000 MW, the underuse of the energy obtainable from these waters has led to electricity shortages of 15-30% in the territory compared to the demand in the peak load (Rasul, 2015). Climate change impacts involving the GBM basin are also expected to intensify violence and the frequency of natural disasters in the near future. Hydroelectric projects in the region must therefore be carried out considering the water, energy and environmental risks that involve all nations that share the basin. Projects that are difficult to implement if current conditions persist because the integrated approach to risks would require a high level of regional cooperation.

The Integrated River Basin Management (IRBM) approach is the most common policy recommendation to address energy, water and environmental issues in South Asia (Sadoff, et al., 2013). However, this holistic, multilateral and integrated approach to transnational rivers has failed to address political conflicts and deep mistrust among South Asian countries[1]. Despite the recognition of political conflicts as the obstacle to multilateral cooperation on water (Akter, 2015) and energy (Ebinger, 2011) IRBM studies have fallen into a political void that has inhibited both the accuracy and political relevance of the approach.

To understand why designing hydroelectric plants in the GBM basin is complicated, the political relations oriented towards energy collaboration of the countries involved must be analyzed. Since the Jaldhaka hydroelectric project in 1961, Bhutan and India have collaborated on five large plants, mostly financed by India with 60% of the cost provided as a grant and the rest as a soft loan. This relationship, however, is seen by analysts as an agreement between customers and not a hydroelectric cooperation (Hali, 2013). A joint secretary at Nepal's Ministry of Foreign Affairs said: "In the past there has been suspicion between Nepal and India in the use of hydroelectric resources. But recent developments have been positive. We have signed two energy development agreements – Upper Karnali and Arun III – and an agreement on energy trade. [...] Sub-regional cooperation in the field of energy is fully possible in the near future." Although several respondents suggested that the projects at stake face key challenges for the region. A World Bank energy expert comments: "While Bangladesh and India are keen to engage in regional cooperation, Indian politicians are still hesitant. The

[1]The failure of South Asian cohesion is simplistically indicated by the conflict between India and Pakistan, Bangladesh, Nepal and a series of historical and ethno-religious issues that have created a fragmented landscape marked by mistrust (Huda & McDonald, 2016).

current change in attitudes on the part of Indian politicians may fail to overcome entrenched nationalistic perceptions." (Huda & Ali, 2018).

There are significant differences in perceptions between producers in Bhutan and Nepal and hydropower buyers in India and Bangladesh regarding the purpose and impact of projects: while Indian and Bangladeshi politicians want hydropower projects to generate the necessary electricity, Nepal believes India's real goal is to regulate the waters of the basin's shared rivers. Former Nepal Water Minister Dipak Gywali confirmed this version by adding "Despite the rhetoric, what India needs is water regulated by these tributaries of the Ganges and not so much electricity" (Gyawali, 2011) and that regulating the flow of rivers would gain important benefits in irrigation, flood control and navigation that it refuses to acknowledge. In fact, a professor at Kathmandu University said that hydroelectric dams will flood a lot of land in Nepal and the benefits of the work will end up downstream, in India, in the form of electricity and irrigation. If Nepal were to pay unreasonable costs to flood its territory and not be able to use that water for irrigation then it would have to be adequately compensated, compensation that India is reluctant to compensate, it only wants to pay for energy and not additional externalities such as water and floods. On the Bangladesh side, the situation is more political: even if India builds a dam and agrees to give a share of electricity to Bangladesh, it is likely that this still contests the project, says an Indian energy expert. To some extent it can be attributed to the emotional nature of water issues but mainly mistrust is due to India's long-standing practice of unilaterally diverting the waters of shared rivers and interfering in the internal affairs of smaller countries (Pandey, 2016).

As an official in the Bangladesh government's Power Division reports, India prefers to deal bilaterally rather than engage in multilateral cooperation. It is likely that India will buy electricity from Bhutan or Nepal to sell it to Bangladesh. India thus insists on a bilateral approach to exploit the power discrepancy with neighboring countries and maintain its hegemony (Johnson & Thayer, 2016). This fragmented approach in which India acts as an intermediary between hostile countries will not facilitate the high integration needed to exploit and protect GBM rivers and undermine acceptance of hydropower projects.

Between Bhutan and other countries in conflict there is a difference in priorities in the field of development: this state adheres to the concept of Gross National Happiness of which nature conservation is one of the four pillars. Unlike India and Bangladesh, which have followed conventional development paths, Bhutan is unlikely to collaborate on hydroelectric projects at the expense of the environment even if compensated.

The obstacles are not only political but also social. In developing regions, and particularly in rural regions, many people still rely on natural resources for their livelihoods. In this case the population of the basin depends on the waters of the transnational rivers that they use most to irrigate their fields. Telling these people that water will be diverted to produce electricity through a Run-of-the-River project is not easy and indeed unlikely to accept. This type of implant and the conflicts involving it will be discussed in more detail in the next chapter.

One of the key requirements for successful environmental peace and resource exploitation is broad stakeholder participation leading a bottom-up approach (Carius, 2011). In this situation, the impediments arise from gaps in perception regarding the environmental costs and benefits of dams and from the challenge in the use of transnational waters. The inclusion of civil society in the management of natural resources is necessary to build the capacity, legitimacy and awareness necessary to manage and provide innovative solutions to these obstacles (Bruch, 2016), as happened during the project of the International Commission of the Sava River Basin between Slovenia, Croatia, Bosnia and Herzegovina and Serbia (Čolakhodžić, Weinthal, Troell, & Nakayama, 2014).

According to experts of environmental peacebuilding and water security (Sinha, 2009), external facilitators can play an important role in the success of cooperative enterprises, influencing design and implementation methods by ensuring a comprehensive approach to water, energy and the environment instead of the fragmented one preferred by India. If it were possible to replicate or emulate the role of the World Bank in the Indus Water Treaty for hydroelectric projects, then it would greatly alleviate the insecurity felt by smaller countries towards India's hegemony.

An innovative way to address the water issue could be to invite members of opposition political parties and address concerns in open dialogues and forums. Including members of the opposition in the framework of hydroelectric cooperation may seem problematic but it is a pragmatic step to resolve the internal political deadlock, to consider the opinions of the parties by accepting or rejecting them with scientific data.

The management of the transnational waters of the GBM basin can be tackled in conclusion by adopting a multilateral, global cooperation approach, possibly facilitated by an external institution, involving civil society for a bottom-up point of view and considering the opinions of the opposition to consolidate the democratic process in the affair. Conflict resolution of this scale is a long-term path, but cooperative planning is the most viable approach to peace and ecological, energy and economic sustainability in the region.

3.1.2 The chance for development

Run-of-the-river (ROR) hydropower, also known as high-prevalence deviation in the case being treated, can represent a paradox for sustainability, i.e. when priority is given to the development of renewable energy, here hydropower, to achieve the national sustainable development goals without including the communities involved in the projects causing damage to their territory rather than improvement. In Nepal, many of these hydroelectric projects highlight social and political inequalities and fuel conflicts. This mountainous region does not have enough electricity to meet its needs and therefore needs low-carbon renewable energy to be sustainable and ensure its energy independence. Considering that the exploitation rate of hydropower potential in Nepal in 2015 was 1.5% (Rasul, 2015), the technology of high ROR deviation electricity generation allows to exploit the potential at relatively low costs and for a long life (Kumar Sharma & Thakur, 2017).

It is common to promote ROR hydropower projects by including social benefits rural development through road construction, electrification of villages, job creation, funding for education in rural areas, health care and agricultural subsidies (Alam, et al., 2017). This is a big difference between sustainable development in an already developed area and a developing one, the renewable project is not only electricity but is a global momentum of the village in modernity. As you will see later, this does not always happen and energy companies have different visions.

Contrary to the name, Run-Of-the-River projects do not allow rivers to flow freely but dams divert the flow of streams. These dams regardless of scale extend over the entire channel effectively disrupting river connectivity (Huber & Joshi, 2015), in that stretch impacting on communities that relied on the water of that river for crop irrigation, fishing, mill feeding and sustenance, all activities now compromised (Anderson, Moggridge, Warren, & Shucksmith, 2015). Technology, in addition to moving the river from its bed and making it flow further downstream on the same or another bed, introduces new hydrological and social risks that are difficult to predict, manage and mitigate, especially given current forecasts on climate change (Kumar & Katoch, 2017). Prolonged drought in the dry season combined with the drying up of underground springs has led farmers to give up winter crops (Jodha, 2005) creating a growing need for reliable irrigation. With regard to global warming, mountain communities like these in Nepal are vulnerable to increasingly frequent violent phenomena such as floods, landslides, avalanches, droughts and even earthquakes due to the geological youth and dynamism of the mountain range (Agrawala, Raksakulthai, Larsen, Smith, & Reynlods, 2003).

The study that will be discussed here analyzed twelve sites of hydroelectric generation through ROR (Crootof, Shrestha, Albrecht, Ptak, & Scott, 2021). In all the sites considered, the availability of water has been drastically altered, there has been loss of fish and absence of water under the dam in most of them. A project manager at one plant said: "Not a single drop comes out. We should release 10% but because [of lack of electricity] we don't release water" (Interview, February 22, 2017). Water was released into the original natural channel only during the dry season from November to May when the turbines were shut down for maintenance or if communities had negotiated a release of water for cremation services, never for environmental flows. Such a negotiation is a clear sign of a barrier not broken down but overcome by legal means, not accepted.

The availability of water for irrigation remained unchanged at six sites, decreased in two and increased in three. Reliable water supply was coveted by more than 90% of farmers, and at the two sites where water availability has dropped, they have expressed deep resentment of the hydroelectric project. Along the drained rivers farmers complained about the loss of the cooling effect of rivers in the summer and the absence of a natural boundary for livestock and wildlife, a double loss for them. On the contrary, at the three sites where it has increased, farmers have expressed gratitude for the energy company and have even switched to cash crops that required less land and less labor, a so-called double victory. Unlike the other sites, these three, Andhikhola, Ridi and Seti were designed to support local irrigation, so water was diverted from the sedimentation basin into the canals of the fields. Of these three, only two of the twelve in total, Andhikhola and Ridi benefited from electrification. Two other sites, Daraundi A and Upper Madi, had no access before or after the construction of the plant and did not even benefit from new roads or improvements.

Roads to promote the hydroelectric project are highly desired by residents because they increase the value of land, improve local markets and the ease of travel to urban areas for services such as healthcare, education and employment. Despite these benefits, only three sites benefited from road development and one, Modi, benefited from improvement. Developers in the past have faced long delays due to the construction of roads and transmission lines and/or have been responsible for construction costs when they realized they would never have been completed otherwise. For this reason, they now only look for sites with pre-existing energy and road infrastructure to avoid uncalculated financial costs.

All hydroelectric projects hired local staff during construction, but locals complained that the proposed jobs were temporary and unqualified. Not always, some have kept local even after construction and some have become public relations operators and officials as in Ridi and Modi.

Andhikhola and Seti, two particularly virtuous sites compared to the others, compensated farmers for the loss of land and crops by providing other benefits to communities, thus mitigating their social and ecological impact. Domestic or foreign power companies such as the Nepal Electricity Authority or Chinese companies have only followed the mitigation requirements stipulated during construction and rarely renegotiated or given post-construction benefits. "Hydropower developers are seen as saviors because they will make roads, schools and clinics... We are not here to build a road, we are here to build hydropower" said one official. Farmers acknowledge the burden they impose on developers and one explained: "We feel bad for developers, they need water even in the dry season [...] But this is our chance to develop."

Protests and strikes were common at all sites but were particularly difficult to deal with for independent producers who could not count on the same capital support as a multinational company. "During construction, time is money." A private developer noted, in Nepal's monsoon-dominated climate there is a limited construction season. Protests and strikes are largely motivated by the exclusion of communities from the planning and decision-making process of project development. The communities considered had limited access to specific knowledge on electricity development and process participation, with exceptions: when they were recognized and involved in planning, as in Ridi, the negative impacts of the project were reduced and desired needs such as water for irrigation, roads and electrification were provided. Given the lack of procedural justice, many communities have adopted opposition strategies to be heard. "During construction the biggest problem was social" as one engineer explained, "There was always conflict during construction. Protests and strikes interrupted all work for two or three months." At nine of the twelve sites these protests sought compensation for the negative impacts of the construction, in Lower Modi-1 five strikes that blocked construction for two months allowed the negotiation of an improved road, water supply for the village, employment for 16 locals and funding for schools and community development projects.

The developers "use the pressure of money" to influence affected communities and complained that "there is no legal mechanism to solve the social problem." To avoid the high costs of buying land, one developer explained that "some companies buy land even ten years ago, they don't say why they buy it and save money." To avoid ceding too much power to communities, one producer said he did not hire more than 50% of his workforce from locals for fear of a debilitating strike.

By law, a public notice and consultation with the community interested in the project is required if it exceeds 1MW (Commission N. L., 1997). Eight out of twelve sites only discovered the new project once construction began, indicating little or no knowledge of the impacts. Therefore, without information and without an inclusive process, communities were excluded from the discussion of impacts and pre-construction negotiations. Continuing to follow Ridi's case, the ward leader shared news of the project with the inhabitants and unanimously decided that they would not accept until the company visited them. And so it was: developers and board members went door-to-door to meet with families and discuss how the project would affect them. The developer spent years in the village building trust: "It was important for the success of the project that people trusted us." In fact, some members had worked on a nearby hydroelectric project and thanks to the knowledge gained they wanted to be sure that "they had not been cheated". After a year of negotiations, the communities agreed to water for irrigation all year round. "Water was their right, they were using water for irrigation" the developer said about the concession. In addition, the community received shares in the company, improvements to irrigation canals with concrete, a control dam in the affected section to provide the promised irrigation water downstream, a contribution to the annual maintenance costs of the canals, subsidized electricity and a new water supply for local villages. In return, the community agreed to cooperate and not interrupt construction operations. By providing communities with water and electricity, developers suffer a decrease in revenue, however, in successful projects such as Andhikhola and Ridi they have recognized long-term benefits, monetary savings, friendly relations with communities, and avoided delays and extra project costs.

Unfortunately these double victories were the exception rather than the rule, the negative impacts outweigh the benefits: climate change leading to floods and droughts, labor shortages caused a double loss (O'Brien & Leichenko, 2000). Ensuring tangible benefits for the communities involved in the project such as more water availability and access to electricity can prevent Nepal from sacrificing mountain communities to achieve paradoxical sustainable development models and instead engaging in a development model that promotes economic growth, social inclusion and ecological protection.

In developing regions, the renewable energy project alone is not enough, but additional benefits for the local territory are needed for it to be accepted. Being seen as an opportunity to raise their standard of living, communities want to protect their land and try to take advantage of the upcoming project. Unfortunately, low education and exclusion from planning prevents them from protecting themselves and they are forced to protest. To make such projects acceptable in similar places it is necessary, as exemplified by the Ridi site, to build mutual trust, guarantee benefits for the development of the territory, share the success of the project through discounts on electricity and shares and finally, ultimately, listen to the requests of the community and satisfy them.

3.2 Reindeers' land at risk in Norway

In the two previous chapters, political and social barriers in developing countries have been addressed. This chapter explores the conflict in the land use of a developed country with an area potentially exploitable to generate hydroelectric power but in fact protected by the indigenous population, important for their culture. This indigenous population is the Sàmi and the developed country is Norway. Indigenous peoples and ethical minorities are more vulnerable to the development of renewable energy such as hydropower (Sovacool, 2021) and are the categories that most oppose the development of this source in the world. Here in Norway land development and hydropower pose a great threat to the cultural and material needs of the Sami people through the loss of pastures essential for reindeer herding (Osterlin & Raitio, 2020).

Before proceeding, the people of the Sami must be better understood: they are the natives of northern and central Fennoscandia (Riseth, 2003), reindeer herding (*rangifer tarandus*) is essential for the culture and livelihood of the people for millennia. The breeding of this cattle is carried out on about 40% of the Norwegian territory, particularly in the center-north, the traditional homeland Sàpmi which includes parts of Sweden, Finland and Kola. Livestock farming requires large seasonal pastures free from industrial development and other human ailments, however the direct and indirect effects of development have made pastoralism difficult in recent decades (Kayhko & Horskotte, 2017).

The conflict between the development of the territory and the owners of Sàmi reindeer is historic: in the period from 1968 to 1982 the Sàmi together with environmentalists protested strongly against the hydroelectric project in the Alta River through civil disobedience, hunger strikes, courts and involving international organization and organizations for indigenous rights. The efforts did not prevent the damming of the river but allowed a complete reform of Norwegian policy towards the indigenous people (Berg-Nordlie & Tvedt, 2019). More recent is the ruling of the Supreme Court of Norway in October 2021 which ruled that two wind farms in Fosen violated the right of the Sami to enjoy their culture for which the license and expropriation decisions were invalid.

Indigenous influence in decision-making is a fundamental prerequisite for safeguarding culture and livelihoods. The indigenous people have a chance of influencing the planning and this is an incentive to get them involved. However, non-participation risks being mistaken for the consent of the Samis, which is generally unlikely since indifferent people do not act (Thomassin, White, Stead, & David, 2010) and covert rejection and secret acceptance cannot be revealed by definition through public hearings. Events at which the statements of the representatives provide an overview of the concerns of the actors protesting against the projects and are the most accessible source of information. Opposition stakeholders are likely to participate first in public hearings as well as use other tactics such as attracting media attention.

The Sami owners of reindeer have the Immemorial Right to Use "ontani tids bruk" to practice reindeer breeding (Kayhko & Horskotte, 2017). According to the Norwegian Constitution "The authorities of the State shall create the conditions that allow the Sámi people to preserve and develop their language, culture and way of life" (IPBES, 2019). Therefore, state authorities have an obligation to consult the Sami Parliament and the reindeer herding industry on matters affecting the interests of indigenous people.

Small hydropower projects create physical barriers with infrastructure such as roads, dams and pipelines by altering flow regimes, temperature, sediment deposition, river nutrient cycle (Lange, et al., 2018), which in turn modify landscapes and contribute to biodiversity loss (Paetzold, Yoshimura, & Tockner, 2008). These changes affect human activities such as agriculture, hunting, fishing and ecotourism along with the cultural, spiritual, aesthetic value of landscapes important to both local and indigenous peoples (Kelly, 2019). These physical barriers in addition to visual and sound disturbances of the plants cause changes in reindeer behavior and lead to indirect loss of pasture, risk of collisions between reindeer and traffic and takes more time to spend pastoralism to manage herds in new areas resulting in conflicts with the agricultural industry and other land uses (Eftestol & Coleman, 2018). In short, these plants cause a chain of imbalances to reindeer, to reindeer owners and to agricultural industries. Another related problem is the increase in traffic for recreational activities thanks to the new roads built for the plant, making the area more attractive for other possible types of development.

It has also been shown that the authorities' lack of knowledge of reindeer herding leads to negative discrimination and a reduction in the quality of life of reindeer owners (Mollersen, 2018).

To provide some data: as of April 2021, there were 30 small hydropower plants in operation in Troms, many of which were located in grazing areas. For another 28 authorized projects construction had not yet begun, fifteen of these were located on reindeer pastures. If authorized projects were built, the number of hydroelectric plants in reindeer pastures would double in a few years. A study collected eight years of proposals for small hydropower in the region and found 33 plants authorized, built or under construction in areas used for reindeer grazing which most Sami representatives opposed. Reindeer farming was one part or only reason behind the rejection of 17 of the 26 rejected hydroelectric proposals. Most cases with indigenous opposition have been authorized. Therefore, indigenous influence seems rather limited and the potential realization of 27 projects considered unacceptable by reindeer owners seems possible. For example, the reindeer herding districts Mauken-Tromsdalen, Cokolat and Birtavarre have been involved in ten different projects in the eight years of study but the path is only at the initial hearing. Depending on how the case develops, reindeer owners may be required to participate in additional hearings, on-site inspections, and developer dialogues during the planning period.

The study found that the proposals might be unacceptable to reindeer owners but not to their representatives, they might be less willing to accept uncertainty and risks, and they might have a different view and knowledge of what constitutes an unacceptable impact. Regarding acceptance, while some owners oppose some cases accept others. This variability is attributable to the different impact of the project, opinions on renewable energy in the various districts, trust in agencies, how the developer manages the project, how the authority issues licenses, knowledge or influence on the process (Aas, Devine-Wright, Tangeland, Batel, & Ruud, 2014). It is important to understand that the phenomenon Not In My Pasture is unfounded and acceptance depends on the factors listed above. As is common in these disputes, communication is vital and fosters acceptance if the communities concerned are considered and especially if they can influence the process so as to obtain the conditions they consider an acceptable compromise for the construction of hydroelectric plants at the expense of grazing their reindeer.

4 Wind Power

Wind turbines are exemplary, almost the symbol of conflicts over the acceptance of renewable energy. Given their enormous scale and the position deliberately in places as high as hills and therefore visible by force of things are almost always the cause of disputes for disfigurement of the landscape. The acceptance of wind energy is not only hampered by landscape pollution but by six categories of factors: technical characteristics of the project, environmental impacts, social impacts, economic impacts, contextual factors and individual characteristics. Attitudes against wind energy sites are different for each plant with a different mix of the six factors mentioned above and will now be discussed (Wolsink M. , 2007).

4.1 Acceptance and Diffusion factors in Europe

Technical characteristics of wind projects include the size of the farm, the number and height of turbines, their visibility and distance from residential areas, and the need for improvements to the electric and road transmission infrastructure. These will influence the impacts that the plant will have on the environment, economy and society and consequently on social acceptance. Among all the features, the dimensions of the turbines from which their visibility are perceived as a main barrier.

Environmental impacts also consider landscape, protected areas and increased traffic as well as changes to wildlife biodiversity and greenhouse gas emissions. It happens that both supporters and opponents of wind energy mask their true intentions behind climate logic or nature protection or particular species since these oppositions can have legal relevance in planning procedures. Feasibility studies must therefore also evaluate these impacts for the sake of truth.

Social impacts include concerns that turbine noise may adversely affect human health, well-being and quality of life as noise pollution is associated with learning problems, sleep, cognitive disruptions, stress and anxiety. However, the existing literature on adverse health effects does not report any article demonstrating a causal link between people living near wind turbines, the noise they emit and the consequent physiological effects on health (McCunney, et al., 2014). Such annoyances are related to individual characteristics rather than actual noise, in any case these disturbances or perceived effect influence social acceptance.

The economic impacts concern tourism, agriculture, local profits and income generation such as jobs, taxes and value added to the place, the economy of individuals (electricity price, land income and value of properties in close proximity to the site). The perceived equitable distribution of costs and benefits among the community also affects acceptance like all other impacts. In particular, local ownership and participation of residents increases the acceptance of the project (Breukers & Wolsink, 2007) while the ownership of a multinational negatively affects (Szarka, 2007), even a change of ownership can be negative implying a preference for the status quo (Linnerud, Toney, Simonsen, & Holden, 2019). If recreational tourism in the area is affected it could have negative impacts, but wind energy could also create new forms of tourism (Frantal & Wolsink, 2011).

Contextual factors shape the perception and assessment of the impacts of wind energy development and thus its acceptance. The attitude is more positive if the electricity produced is used in the national territory and contributes to the nation rather than being exported (Liebe, Bartczak, & Meyerhoff, 2017). People want a fair trial and participate in it, to be heard, considered and well informed (Zoellner, Schweizer-Ries, & Wemheuer, 2008). The phase is also important: inviting people's participation after the announcement of a project can trigger opposition to it (Wolsink M. , 2007).

Individual characteristics such as sociocultural values, identity and attachment to the place, political climate and local public opinion of wind energy are important in determining the acceptance of the technology. A reason for opposition is the concern that wind energy weakens the cultural roots and lifestyle, the immutability and identity of the place (Devine-Wright & Howes, 2010). On the contrary, studies show that direct knowledge and familiarity with energy puts people in tune (Devine-Wright P. , 2007). Knowledge can be replaced by skepticism if residents believe that wind development has reached saturation in their territory. Curiously, people seem more concerned about wind projects in recreational areas than where they reside (Ek & Persson, 2014).

Within the European Union, wind energy diffusion rates have been relatively low despite satisfactory wind harvesting conditions. Germany and Spain are the countries with the most installed capacity and above-average wind energy penetration, but they have regions with low penetration despite the positive wind data collected. In Norway, 98% of electricity production already comes from renewable sources and opponents of wind are opposed to further plants that would only destroy nature without further benefits to the mix. On the contrary, in Poland, which is heavily dependent on coal, concern about the effects of coal elimination prevails: the preservation of the coal sector takes priority over climate policy (Szulecki).

Three factors were encountered as drivers in all regions and they are economic impacts: economy of individuals, degree of local ownership of plants and impacts on local profits. Other common but not unanimous acceptance factors (absent only in the Balearic Islands) are social impacts on health and quality of life. Distance from residential areas is among the most important barriers in most regions but slightly less in Italy and sparsely populated central Norway. Unlike Italy where there is little attention to the impact of wind energy development and the debate revolves around landscape conservation, in all other regions low impacts on greenhouse gas emissions are a driver of acceptance. The impact on the tourism sector is the only one that is believed to have a negative effect on social acceptance. However, in Latvia and Spain it appears to have had a neutral effect. Contextual factors related to the planning and authorization process are on average positive drivers. In the survey carried out by the study that obtained the reported data, Italian stakeholders attributed a higher score to these factors than all other reasons. Somewhat strange given the series of investigations and arrests for corruption in the national wind sector (Oles & Hammarlund, 2011). Moreover, in Italy the public is not involved in the concession procedure unless public consultations are established (Linnerud, Aakre, & Leiren, 2018). As noted for hydropower in the dedicated chapter, in Norway identity and attachment to the place is a priority and is an important barrier in rural regions including the areas of the Sàmi, the indigenous reindeer herders. In Latvia, too, patriotic feelings converge in the opinion that "land values" should not be destroyed by the wind industry.

Social acceptance or resistance to wind energy always depends on the context. It is not possible to generalize and any research project must take this into account. Each project is unique and addresses unique challenges and opportunities, rooted in the local context. The specific nature of the context must prompt manufacturers and researchers to strengthen drivers and reduce site-specific barriers. Local conflicts can be mitigated with an integrative approach that considers the socio-cultural and economic needs of communities. Reducing the visual impact of wind turbines, the impact on the landscape and on wildlife and birdlife, ensuring community participation and ownership can improve social acceptance (Di Nucci & Krug, 2018).

4.2 Case Studies

Short paragraphs follow that demonstrate right and less just processes to foster the acceptance of wind farms in different communities around the world, both economically developed and developing. It will be clear at the end of the case studies how renewable energy can be promoted in a sustainable way thanks to the positive examples but above all to the negative examples that clearly show the processes not to be repeated that have reduced acceptance and caused opposition.

4.2.1 Unexpected Development in Gubbio

Gubbio is an Italian town located in a hilly region rich in ridges. At a distance of 11 km from the historic center, in Cerrone, a remote location, far from inhabited centers, not visible from the plain of Gubbio outside the panoramic road, in the summer of 2021 the largest collective wind farm in Italy was installed (ANSA, 2021). It is thanks to this invisibility that it was possible to install a single one wind turbine without opposition, or almost. Proceeding in chronological order: after passing the sustainability assessment in August 2020, the construction of the wind farm begins on a ridge in the Umbria region near Gubbio. This project was promoted by ènostra, a non-profit company that through a model of participation and sharing builds wind and photovoltaic plants in Italy and Europe (Nadotti, 2022). The project located on a relief needed the construction of a road leading to the plant. The installation of the 999kW turbine took place the following summer and went into operation in October 2021 with an estimated electricity production of 2GWh per year (enostra, 2021). After the success of this first turbine, a second was installed not far away and about two years later, in Castiglione always on top of a hill where before there was uncultivated agricultural land. This collective plant does not constitute an energy community because initially the territory had not been involved and in the case of the second turbine the pro-loco association and the mayor agreed with the agency but if in the first case there was a limit imposed at 200kW this time it was decided not to wait for the implementing decrees of the government on the Energy Communities. Community or non-community, the price to participate and win a share of energy ranges from € 1500 to € 2000 per user while the minimum threshold for the prosumer tariff (producer + consumer) or a stable price over time without market fluctuations is € 500. Quotas that will undoubtedly lower the bills of anyone who believed in the project and purchased its supply. Determining the acceptance drivers of this case is very simple: the invisibility, the distance and the absence of people in the vicinity of the implants allows people even against these technologies for inexplicable reasons not to see and not hear them. The barriers instead have been experienced by the promoting agency ènostra which has not been able to count on the support of the territory or even the support of the decrees for energy communities. There was someone who opposed the project: an architect and political leader presented a judicial act to be challenged at the Regional Administrative Court (TAR) but when in February 2022 there was an amendment to article 9 in which the environment was equated with the natural landscape, this appeal was withdrawn (Aquaro, 2023). According to this political representative, the wind turbines on the hills between Perugia and Gubbio, rich in historical heritage and precious landscapes, would have lost all attractiveness. Statement with little implication in reality as the turbine of the first plant "you can actually see it only when you get underneath, the sound of the large blades that cut through the air does not clash with the beauty of the hilly landscape" reports the newspaper La Repubblica (Nadotti, 2022), therefore, as already mentioned, invisible normally and in addition in an inaccessible area before the construction of the road to the plant. Regarding the second turbine, the uncultivated agricultural land used is already anthropized by the presence of antennas, but according to this opponent while the wind turbine ruins the landscape, the antennas do not. In any case, both projects have been verified with the criteria Anev, Greenpeace and Legambiente. He continues “The thing that no one wants to understand is that renewables, compared to traditional energy sources, have a ridiculous yield. Let's say that they are standing because they are funded by the PNRR”. The barrier with which the politician is bumping into is his lack of awareness of renewable energy, it is certain that they have a "ridiculous" yield compared to fossil fuels that must be remembered have taken millions of years to form and that their use has caused the climate change that the whole planet is suffering, but now the people connected to that wind power plant will receive clean energy, at lower, fixed and independent prices.

In Gubbio an example of transition from the bottom has been realized that promotes environmental protection by selecting optimal sites and a model of energy democracy within everyone's reach through membership of the company's cooperative and becoming members we are awarded a supply from renewable sources with guarantee of origin (ènostra, 2023).

4.2.2 Green whatever it takes

This paragraph discusses a case study in which a project is opposed by local communities but is made legally viable through changes in the law to force renewable energy despite well-defined barriers. The wind project in question called Enercon India is located in a densely forested region, just outside the Bhimashankar Wildlife Sanctuary (BWS), a mosaic of flora, fauna and puts at risk the forest-dependent livelihoods on which the inhabitants rely. The project also threatens the ecology of the landscape, so it is contested by local activists and large-scale public, civic and private institutions. The project was commissioned in 2008 and its construction began in December 2009, it was allocated 0.6% of the forest area under the BWS for an installed capacity of 113MW (Byatnal, 2011). The construction required the acquisition of large plots of land, 192 acres, the reclamation of the purchased forest areas, the felling of the trees present, the overbuilding of a road to allow access from the lower ghats to the site, the widening of the road to allow the passage of the 72 turbines and finally the construction of an electrical substation and related transmission lines. The draft violates the Supreme Court order that each state must declare a 10 km radius of buffer zone as ecologically sensitive zones around protected areas, which must be free from development activities (MoEF, 2011). However, the state of Maharashtra, where the BWS buffer zone is located, has not declared it as ecologically sensitive even after strong pressure and protests from environmentalists. The project is currently in operation and provides electricity to the grid, but not to the communities living in the villages immediately near the site, which do not have access to the project's electricity, in fact they have blackouts that last for up to three days. The population that the project feeds is located in the distant city of Pune and the industrial facilities of the region.

The combination of federal and regional incentives makes renewable energy a highly profitable sector for private energy producers. The wind sector has grown a lot thanks to the participation of private individuals and is accused of forced and illegal land acquisition, this is where the contestation of the project under discussion takes place (Jamwal & Lakhanpal, 2008). In India, all development projects except renewable energy are required to perform an environmental impact assessment when located in or near areas of high biodiversity. There are three classes by which industrial development is classified: red, orange and green according to pollution and threat to biodiversity. In 2011, following petitions from wind turbine manufacturers, the Federal Ministry of the Environment reclassified the renewables sector and excluded wind and solar plants of any capacity and hydropower plants up to 25MW from the red list and moved them to the green list. This maneuver has opened a breach for the penetration of clean energy projects in areas rich in biodiversity.

Building a wind energy project requires the purchase of a large amount of land, and developers know this well. That is why it is easier to designate forest areas so it is necessary to request permission only from the Federal Ministry of Environment and Forestry. In fact, the Ministry has already diverted almost 3900 hectares of forest for wind energy even in ecologically sensitive areas. "For farmland we have to get it from farmers and then convert it into commercial land for the creation of a wind energy project. It is a long process that takes too long. It is easier to contact the Ministry (of Environment and Forestry) because we know exactly who to contact and they will give us permission." Words of an interviewed developer.

Local people in nearby villages objected to the project because of the lack of development, the threat it poses to their livelihoods and the ecology of the area. Residents said the project disrupted agricultural practices by dumping rubble on rice paddies and causing landslides in the region, questioning the "sustainable" nature of the project, which effectively deforested hundreds of hectares of forest. Enercon officials denied that the project had "caused any disruption to livelihoods or the environment. We produce renewable energy and contribute to the sustainability of the planet." Regarding the results of community development, they replied that they had given jobs and built a common room to the community.

All development projects must be approved by the elected council of the local village in the form of a Certificate of Non-Objection to begin work. Developers held meetings with local communities promising development outcomes such as reliable access to electricity, jobs, road improvements, schools and community halls to convince them to grant approval to the project. A social approach relatively similar to the virtuous case encountered in Nepal during the discussion of a hydroelectric power case. In an interview, a board member said, "The developers of the project were very nice people when they came to get our signatures. They promised us everything [...] if we gave permission for the project." However, the project did not provide adequate results to all affected villages, instead they were concentrated on the least affected villages. In addition, to access international funding from the Clean Development Mechanism, the developers submitted the project to the United Nations Framework on Climate Change (UNFCCC) and said it will bring economic prosperity, access to electricity and social benefits to rural communities. None of these three things happened in rural communities close to the project presented. Going into detail, during meetings between developers and people from Kharpud and Kude, the villages closest to the site, they were asked to clean the temple area, improve road access, provide access to electricity, repair the road they damaged by transporting large equipment to the site and remove rubble that fell in the rice fields, but the developers did not do so.

The interview with villagers revealed that 15 of them had received employment in the wind energy project. A 20-year-old member from Shivegaon, a village 9km from the site who works as a security guard for the project and was involved in the protests stopped protesting when he got the job and pushed other people to stop the protests. In Kharpud, a much closer village and stronghold of the opposing political party at the time of construction, only one man was recruited as a security guard, perhaps because he served in the past as a forest guard. The man was asked to influence the agitated inhabitants and renounce opposition to the wind project.

The Chief Conservator of Forests had stated that the buffer zone of the wildlife sanctuary does not contain wildlife and therefore the project will not cause disruption to the ecology of the Western Ghats. A subordinate officer said in his investigative report, however, that the area is known to be home to endangered mammals, reptiles, and birds such as the giant squirrel and leopard among numerous other species of fauna and flora. Despite these discrepancies, the project was authorized.

The project was eventually embroiled in a national controversy in the wake of resorts and tourist guesthouses being built in the buffer zone that should have been declared an ecologically sensitive zone according to environmentalists. The issue was examined and the Western Ghats were divided into cultural zones for 63% and natural for the remaining 37%. Natural areas must be preserved from industrial and related activities while cultural areas are open to development activities even if subject to environmental impact assessment (Kasturirangan, 2013). This Kasturirangan report deregulated the area as a sensitive area and fostered and legitimized the development of renewable energy in top-quality conservation areas on the basis that renewable energy is sustainable.

Comparing the story with one of the same genre but in a developing country one can see the difference of the protests: while NIMBY protests in developed countries are mostly attributed to aesthetics, in developing countries they are linked to land use and traditional livelihoods for marginalized communities. This case shows how state agencies and private companies in these countries define laws favorable to renewable energy projects to pursue predatory development at the expense of ecology, natural resources needed by the inhabitants of the areas and impacts on the environment. Influencing the development of renewable energy in rural communities can marginalize and exacerbate the living conditions of already disadvantaged groups. Energy geographies are not predefined but the consequence of social and political processes that have far-reaching implications.

This case is a clear example of the wrong sustainable development, the exact opposite of cooperation for an energy community. Hundreds of hectares of biodiverse forest with endangered animals have been deforested to install a mega wind farm. Forest chosen specifically for the simplicity with which permits can be obtained. Wind farm that by law should not have been located in that area on the border of a natural sanctuary, as it should have been declared an ecologically sensitive area. In addition to not being recognized as such, the ministry has amended the law to allow the project to be carried out anyway and thus paving the way for other predatory projects in areas to be protected. The developers promised everything that the inhabitants of the neighboring villages wanted only to get permission and then give nothing, or almost nothing, of what was promised. In addition to causing damage to the crops of the locals on which their survival depends, the developers did not electrify the village but directed the electricity generated by the site to the industrial district and a larger and more distant city. It should be remembered that this project was funded by the UNFCCC to develop rural areas in a sustainable way, which did not happen so, in addition to the damage to the villages also the mockery of not having paid a penny. The producers also tried to bribe the young people of the villages by offering them a job at the plant and asking them to influence other residents to stop the protests. Finally, this project along with other resort resorts in "ecologically sensitive" areas has been involved by environmentalists in a national controversy, ending up favoring other such projects only because they are sustainable (Lakhanpal, 2019).

4.2.3 Heritage sites versus wind energy in Japan

In Japan, the majority of protestations against wind farms concerns the lack of recognition by the authorities of the cultural and identity value of rural everyday landscapes, not covered by the laws for the protection of cultural heritage. While many projects were cancelled because people are concerned about landscape degradation, just as many projects were completed because the court process failed to justify the landscaping rights received by residents. To oppose the construction of wind farms, there are no legal rights that protect everyday contexts of rural areas not listed as cultural heritage. The right to landscape, therefore, is hardly guaranteed because only "good natural landscapes" are protected from the construction of wind farms and other works. Japan's "nature conservation laws" (*Shizen-Hogo Ho*) such as the Natural Parks Law, Nature Conservation, and Cultural Property Protection do not cover everyday natural landscapes although they mean a lot to residents. In these places changes are immediately felt, catalyze attention to projects and create opposition movements. Here are some disputed sites and the reasons behind the disputes that led to both the victory of the locals and the victory of the electricity company:

- Hamada, Wind Farm Project, 2018. After assessing the environmental impact of the project, the governor stated "viewpoints and landscapes exist in the area, including Mt. Uzukiyama. The coordination of the locations and color of the facilities should be examined on the opinions of experts and local residents." (Shimane Prefecture)
- Tsuruoka, Tsuruoka-shi Wind Power project, 2020. Concerns about the nearby Japanese heritage registered site and the sacred mountain worship site important for national tourism. In a week the plan was withdrawn after opposition from the prayers. (Chosyu Newspaper, 2020)
- Tsu, 2020. The size of the plant was just below the threshold of the evaluation of the law. Residents became aware of the project a year after construction began. After a letter of protest, some explanatory meetings were organized with the developers, but the work was finally suspended. (Ise Newspaper, 2021)

- Matsuzaka, Mie Matsuzaka-Hachisu Wind Farm, 2021. The project suffered a sudden opposition due to concern about the presence of rare species in the area such as the Japanese Capricorn, a national natural monument, and the deterioration of the landscape given the position of the turbines on the ridge. ("Departure from the Deadline" Residents' Repulsion: Large-Scale Wind Power Generation in Matsusaka, Planning Progress, 2021)

The case of Tsu city is significant: the size of the project was just below the scope of the legal evaluation for which no evaluation was conducted. Only after a year from the beginning of construction was an explanatory meeting held for residents. This meeting was followed by a letter of protest for the project, therefore, the operating entity held further meetings with the inhabitants to explain and inform but this did not appease the anger of the locals. Construction work was forcibly suspended in 2021.

In summary, landscape elements and socioecological factors motivate community opposition. Two lessons can be learned from these cases: the first is that local residents pursue the legal benefit of "landscape conservation in everyday and regional community contexts" when the "right to sight" is contested, the second is respect for the right to express public opinions and participate in community development in order to create a favorable environment in residential areas in the form of a "regional community consensus".

In case of severe resistance movements, operators can change the position and size of the project. Regarding location, mountain ranges are popular sites for turbines but for fear of landslides, plains or offshore areas are preferred. A reduction in the scale of the project can reduce the sense of conservation of the landscape and meet the consensus of the community. However, the reduction in size basically results in a reduction in efficiency and sustainability economy of the project. The best path to take as an energy operator is to build relationships with the inhabitants from the early stages if not even before the project, gain trust with a view to gaining community consensus, without which it is difficult to complete the plant although it does not violate the law (Kohsaka & Kohyama, 2022).

5 Solar Power

The plants to generate solar energy have characteristics that differ greatly from other plants such as hydroelectric and wind. First of all, they develop mainly horizontally rather than vertically, therefore, the barrier of visibility of wind turbines does not exist here. Domestic photovoltaic panels but also higher power systems do not require large works as happens instead to hydroelectric systems. Another advantage compared to acceptance is the installation on the roofs of buildings instead of on the ground: in this way they do not occupy land that can rightly be dedicated to agriculture or other more virtuous activities and also avoids the problem of glare due to the reflection of the sun on the panels and facades of neighboring buildings. Installing a renewable energy system directly on people's homes indicates very good acceptance, meaning that tenants or homeowners are aware of renewable energy, the benefits it offers and have agreed to invest in solar generation. Behind the choice of these people there must have been a work of dissemination, awareness, incentive and facilitation by renewable energy agencies and institutions in the sector. Convincing a person to install a system on their home could be easier than convincing many people to build a large solar system in their community. It is in the case of high-power plants that the oppositions and the will of those who want to develop the territory or those who want to preserve the landscape value of a barren and uncultivated field occur. Recalling that solar energy is renewable energy whose plants are the least conflictual, follows the analysis of some cases of barriers encountered in the spread of this energy source both on the side of developers and citizens involved. As in the previous chapters, examples from developing and developed countries are included to provide a comprehensive overview of the acceptability and acceptance of renewable technologies.

5.1 Barriers to Concentrated Solar Power in India

In this paragraph we want to show how the diffusion barriers are not always due to the opposition of people but from technical, political and social reasons without excluding the relative technological novelty of concentrated solar plants in developing countries. The challenges faced by the concentrated solar energy (CSP) market in India, a developing country rich in controversial renewable projects are then explored, as has been noted in the course of this document given its popularity.

Concentrated solar energy is a mature technology with an efficiency ranging from 7% to 21% (energysage, 2019). Its advantage is that it can lower the curve of daily demand: during low load hours the energy captured is stored and delivered during peak hours. The possibility of energy conservation puts this technology in front of photovoltaic panels as they must immediately transmit the energy produced to be consumed (Vergura & Lameira, 2011). The direct component of irradiance (DNI, Direct Normal Irradiance) in India is on average 4.4 kWh/m^2 per day so 13780 TWh of energy per day for which 633000 TWh of thermal energy generated per year. Ergo the technology has great potential for India, despite this, its development is stalled because there is no long-term plan that can spread it.

The first obstacle to diffusion and acceptance by developers is the absence of reliable DNI data. The Ministry of New and Renewable Energy (MNRE) was unable to provide accurate data to the developers of the national solar power deployment project and were therefore forced to rely on NASA satellite modelling data. As feared, DNI's ground-based data at the time of project implementation were 10-15% lower. This lower irradiance than the estimated influence on the yield of the project and clearly on the financial sustainability of the project. Similarly, the developer of another project had to increase the number of reflector loops up to 40 to generate the promised power, resulting in a considerable financial burden. This is one of the most crucial barriers according to the World Bank report (ESMAP, 2010).

There is little or no investor confidence in energy, and this is slowing the growth of technology. The lack of confidence can be explained by the fact that India did not have any facility to verify the technical and economic feasibility of the PSC when the MNRE Ministry was called for tenders (Bhushan, Kumarankandath, & Goswami, 2015). Therefore, there was not enough research and development on the technology at that time and companies had no previous experience in the field (Indian power sector, 2014). Initial projects that turned out to be more expensive and less profitable than expected alienated investors. To spread technology again, it is necessary to rebuild investor confidence, they must be the first to accept it.

The Ministry of New and Renewable Energy used the operation of reverse auctions for the assignment of projects. This auction reduced the cost of CSP to such a low level that India became the country with the cheapest CSP tariff in the world, the average bidder was 36.49% lower than previous FIT (Feed In Tariff) (Bose & Sarkar, 2019). This record offer is attributable to unawareness of upcoming challenges and developer inexperience. These low tariffs led to financial difficulties in the supply of equipment and delays in projects. India kept prices low for the public, which is noteworthy, but did not guarantee the reliability and speed of installation of the projects. We need changes to the policy framework and stricter qualifications for bidders and tougher penalties for projects that are lagging behind (Bridge To India, 2016).

In addition to the lack of experience in the production of CSP projects there is a lack of domestic facilities for the production of receiving tubes, mirrors and pointing devices for chasing the sun. Without local suppliers, the development of these projects has to rely on foreign companies and this produces delays and a good opportunity to further develop the production sector is lost. In addition, the continuous increase in import duties poses a serious threat to projects. There is therefore a strong demand for local CSP components to alleviate the strain on the supply chain, to save on projected production costs of 15-20% and to generate new jobs (ESMAP). This demand cannot be met in the short term because there is a lack of skilled labor. The lack of knowledge and expertise within the enterprise on component management has already caused delays in the completion of projects. To solve this barrier the only direction to take is to organize short-term training and master's programs for solar power generation systems.

Water is essential for solar thermal power plants such as CSPs, which consume 2 or 3 m^3/MWh of water. In India, plants consumed 19.9 m^3/MWh of water, much more than the average (Singhal, Suresh, Arora, Singhvi, & Rustagi, 2018). In addition, the sites where projects have been installed where there is a high DNI are also places with water scarcity and the water supply is provided by outsiders aggravating the operating cost by a lot. It is recommended, therefore, to use dry cooling and adopt dirt-repellent coatings for reflective modules, you will have lower efficiency but also lower operating costs (Shirole, 2020).

The technology evaluated in this case has achieved less political acceptance given the tenders to win projects and funds, but it has not been possible to achieve market acceptance and that of the communities is still far away. Investors lost faith in the technology when they realized that the real data was lower than estimated and the investment would yield less than they thought. The society was not involved in the diffusion of the technology given the experimental phase of the project, their acceptance could also have been positive since this type of plant should not cause any visual disturbance and is far from inhabited centers and protected forest areas. To improve the acceptance of concentrated solar energy, it is necessary to rebuild trust with investors through the construction of pilot plants that demonstrate the potential of the technology, to start a data collection campaign on particularly sunny territories based on NASA satellite data so as to create a database for new sites in which to install new plants. Adopt equipment that allows to lower the cost of operation and maintenance, for example dirt coatings given the absence of water in areas with high DNI. In this way the energy price of these plants can decrease and neighboring communities can buy energy at a lower price favoring the use of renewable energy.

5.2 Local opposition to Solar Installations in Japan

In Japan from 2019 to 2022 there were about 40 opposition campaigns against solar PV plants (Nakayama, 2021). Solar PV projects mainly encounter the following challenges: deterioration of the landscape and ecosystem such as increased risk of extinction of native species (Morris & Owley, 2014), increase in heat waves and glare due to light reflection of plant (Wiseman, 2021), increased risk of catastrophes due to terrain modification (Kaneko, 2019) and finally the impact on human well-being (Wallsgrove, 2019). For the first disputes it is effective to avoid laying the panels on the ground near private houses so as to reduce the occupied area and the reflection on the houses that would follow, or plant trees between the houses and the plant to disperse the reflection (Aridagawa-cyo, 2018). In Japan, the introduction of renewable energy is welcomed and considered a promising solution to the severe energy shortage after the great earthquake in 2011. Renewable energy sources have been promoted at national level according to the principle of economic freedom (Sekikawa, 2015). Historically, there were no legal restrictions on the selection of venues before the new phase of the "principle of freedom of economic activity" present in Article 22, paragraph 1 "Everyone has the freedom to choose his occupation" and Article 29, paragraph 1 "The right to own property is inviolable" of the Constitution of Japan (T., 2020) (Tsujimura, 2021). However, with the increase in the number of solar PV installations, the number of negative opinions about the plants has also increased. These negative perceptions were related to the destruction of nature and the disturbance of the life of residents due to the installations. After growing opposition, prefectures have begun to look for where and under what conditions the consent of residents can be reached and where municipalities would grant approvals of appropriate sites for which energy sources (Naito, 2019). In addition, municipalities no longer consider invitations from commercial operators but follow the preferences of local residents (Saeki & Kondo, 2018). Here are some examples of legal proceedings involving conflict between residents and facilities:

- Higashiura, Nagoya, 2019. The residents had requested the cancellation of the permit for the development of a photovoltaic system but the Nagoya Court of Appeal did not recognize the value of the landscape citing similar previous cases. Residents lost the case. (Kohyama S. , 2019)
- Shimanto, Kochi Prefecture, 2021. A similar lawsuit instead saw residents win because the project would have arisen on a cultural landscape according to the Cultural Heritage Protection. (Contractor sues Shimanto City for Disapproval of Mega Solar Construction: The Basis of the Landscape Ordinance is "Injustice", 2021)
- Ito, Shizuoka Prefecture, 2021. The municipality was supposed to issue approval for the installation of the project but refused a permit to occupy the river during construction, The operator sued the prefecture and won. This is a case where the

prefecture lost to a company. (Appeal Case for Cancellation of Disapproval of River Occupancy (Ito City): Tokyo Appellate Court Judgement, 2021)

Following the principle of economic freedom, local residents often first noticed the negative impact of solar installations only after commercial licenses for construction were granted. The protests began immediately after the project began. Residents are forced to file a lawsuit to revoke those licenses, since they had already been granted (Takada, 2019). In disputes, however, it is generally difficult to win by appealing to landscape preservation and project suspensions are difficult to implement once permits are granted. Given the short period for the start of the projects, residents have little time to organize opposition movements. In response to the increase in opposition, operators are increasingly entering into lawsuits, municipalities are no longer granting permits as easily as previously (Kohyama S. , 2018) and many have begun to require environmental impact assessments such as the creation of ordinances to protect natural landscapes that were not listed or covered by laws such as the one for natural parks (law no. 161, 1957) which may not have values as assets cultural or rare ecosystems but a meaning for the people of the region (Kohsaka & Kohyama, 2022).

Subsequent actions taken by Japan's municipalities and prefectures after growing opposition have been effective. Initially, the low opposition can be attributed to the need for businesses and people in the country to recover after the severe earthquake that caused the acceptance of nuclear power to fall after the Fukushima accident and consequently raised the focus on renewable sources. As the number of plants increased, still poorly regulated, people showed resistance and local institutions promptly raised the standards of the projects by asking for an environmental impact assessment, researching the appropriate sites for the appropriate energy sources and following the preferences of the residents. Regulation, raising standards and the inclusion of citizens within planning has improved the social acceptance of photovoltaic installations.

Residents have been shown to pursue the legal benefit of landscape conservation in disputes with renewable and in this case solar-powered projects. Residents want to be able to participate in community development in order to create a supportive environment around their homes. Although the plants do not violate the law and the installation operations take place lawfully, residents can in any case not accept them and for this reason it may be helpful to ask during the preliminary phase of the projects for a "community consensus" to evaluate local acceptance and possibly take steps to increase it, as happens in other countries examined for example India and Nepal, although in these countries consent is obtained almost by buying it. The barrier concerning the obstruction of the view of the landscape is not easily mitigated, a solution could be to reduce the scale of the project, but this reduces the generable power, another solution could be to move the project to less visible areas but in the new place it could meet other oppositions and would in any case have less efficiency because no longer in the site designated as more appropriate. In these cases, assessing the actual historical, cultural and affective value of the site is important to discern the reasons behind the refusal and possibly consider what the priority of the residents is. They should always have the last word if the planning process is democratic and there is already a broad general acceptance of the technology.

6 Geothermal Heat Pumps

Geothermal energy has been harnessed for over a century and accounts for less than 1% of global energy production. Its use has always been limited to specific places on earth where there is a high soil temperature gradient and where underground heat sources heat underground water reservoirs, rare conditions that have made the technology difficult to spread. Recent instead is the use of land or underground water, depending on the season, for the absorption of heat for domestic heating and for the rejection of heat in order to cool buildings. In detail, a residential geothermal system called Ground Source Heat Pump (GSHP) during the winter transports thermal energy from the ground or groundwater to provide heating to the environment and during the summer the energy transfer is reversed: the ground or groundwater absorbs thermal energy from the building to cool it. These systems are key to harnessing shallow geothermal energy resources as they can be installed almost anywhere since they do not require geothermal resources such as steam or hot water (Hughes, 2008).

GSHP systems are composed of three main elements (Calabro & Fazio, 2012):

- A medium for absorbing or dispersing heat from soil or water.
- A heat pump that converts this heat into an appropriate temperature level.
- A system for the distribution of heating and cooling inside the building.

When designing a GSHP system, factors such as local climate, layout and use of the building (Rafferty, 2003), heating and cooling requirements (I. Dejanović, 2010) and soil characteristics (composition, morphology, humidity, thermal properties, hydrogeological conditions) must be considered. These factors, among which the most important the identification of the thermal properties of the soil, are only design factors useful to engineers, but what determines the success of a heat pump also involves financial and social factors as well as technical.

The installation cost depends on the type of system (open or closed, horizontal or vertical), the type and size of the collectors, the load of the house, the terrain, the functions of the system and the current technology market. It is estimated that the installation of a 10kW residential system in Europe requires from 1100 to 2100€ per kW (IEA, 2011). The cost of operation is influenced by the price of electricity, fuel, system performance, climate, use and user habits (Younis, Bolisetti, & Ting, 2010), however, they are particularly affordable in areas where the cost of traditional systems is high and the cost of electricity is low (Self, Reddy, & Rosen, 2013). The cost of maintenance is low compared to most more classic options: it does not need a boiler or stove, has a simple design, the components are not exposed outdoors and are long-lasting (Schonder, 2004). This system is clearly suitable for already developed societies given the high cost and dependence on electricity. In a developing region there are more advantageous technologies than this one to invest in.

Heat pumps are a relatively new technology and are not yet as popular as other house-installed systems such as photovoltaic panels. In this paragraph we analyze the reasons why this technology is advantageous and worthy of being disseminated then show what actions can act as drivers for its acceptance at various levels of society.

The technological advantages are obvious: the union of two services, heating and cooling in a single system and the efficiency (and energy and economic savings) that derives from it, the adaptability to available resources and needs, the use of more stable and constant means, the soil and underground water, compared to outdoor air, reliability, long life, the absence of unattractive and noisy outdoor units from which less maintenance derives, the absence of combustion therefore the safety of not having to manage tanks with flammable material. It is a technology that is not influenced by the variation of seasons, climate and time, it is decentralized and reduces the curve of power demand at peak times (Huttrer, 1997).

The environmental benefits of adopting a GSHP technology are the contribution to the reduction of greenhouse gases and the absence of pollutant production, saving the combustion of fossil fuels. There are no risks in transport, storage, operation or risks of contamination of groundwater.

This technology also brings socio-economic advantages such as low operating and maintenance costs compared to other systems, the return on investment in a few years, the increase in the value of the property. It is an economically viable solution that uses an independent local energy source and contributes to employment growth given its emerging uptake (Esen, Inalli, & Esen, 2006).

It is important to pay attention to potential negative impacts from the operation of the plant. In fact, there is a possibility that the operation of the exchanger will fail or there will be a leak of antifreeze fluids in the subsoil due to improper installation methods and in the use of non-certified material. Avoidable eventuality with the use of certified equipment and installers. Improper sizing can lead to reduced underwater flow in case of oversizing or disturbance of the soil thermal balance if undersized (Johnston, Narsilio, & Colls, 2011). The operation of the plant is based in any case on electricity with all the impacts it entails. The combination of GSHP and other renewable technologies can lead to a zero-emission air conditioning system.

6.1 Diffusion barriers

The benefits listed seem to promise the ultimate solution to the extreme cold and heat that climate change is causing. So what prevents the spread of this technology?

In the financial field, the cost of the initial investment is high and therefore the payback period is long and uncertain, considering the low energy intensity of the project. The value of the investment is not reflected in the value of the property in the immediate future. It remains to be defined who is responsible for the investment between the tenant and the landlord (Thilliez, 2008). The dilemma expands when it comes to a housing complex with multiple families and administrators. In any case, due to the long life of the implant, it is likely that not only those who have invested in the plant will benefit from it. In the technical sphere there is a shortage of qualified personnel to install and promote the systems, also due to the lack of certifications, guidelines and standards for design and installation. Unfamiliar installers can increase costs to account for unknown costs and/or oversize the project. The necessary infrastructure for systems is lacking and the space available in urban areas is limited. Installation is even more difficult and above all expensive in existing buildings (Sanner, Karytsas, Mendrinos, & Rybach, 2003). In the market sector, this technology has to compete with fossil fuels that are still too cheap. Operating costs depend on the price of electricity, which is also influenced by non-renewable energies. It is difficult for consumers to access technology due to the reasons above and the small market that drives up costs (Dougherty). Information is also an obstacle: there is a low level of generalized awareness of consumers, industry, agencies and policymakers about the benefit of technology, and the availability of cost information is limited.

6.2 Diffusion actions

Now, however, it would seem that all these barriers are insurmountable and the low diffusion of this technology is well justified. Obviously, the barriers reported do not outweigh the benefits and advantages that technology can bring, moreover many of these barriers can be broken down through effective dissemination actions in all financial, political, technological and information areas: Providing financial incentives (Geng, Sarkis, Wang, Zhao, & Zhong, 2013) such as loans with favorable rates, grants, tax reductions, eliminating these financial obstacles can increase the acceptability of these projects. Develop financial models in which the installation of exchangers is carried out by public companies (as is the case for electricity or gas pipeline networks) in order to reduce the initial cost. Develop a regulatory and legal framework for business, technology and installation (National Ground Water Association, 2003), create a strategic regional or national development plan, create an institutional body responsible for authorizations and minimize the documents required for issuing authorizations, define a lower price for electricity when used by GSHP systems (California Energy Commission, 2011), all actions that can promote acceptance not only in the political class but also among investors and facilitated consumers.

Diffusion actions to be undertaken in the technological sector are to define certificates, standards and guidelines for installers, suppliers, maintenance technicians and equipment (Aikins & Choi, 2012). Investing in research and development of technology, training designers and installers and informing policy makers (Office of the Deputy under Secretary of Defense, 2007). Create infrastructure and coordination between designers, installers and stakeholders to develop efficient and cost-effective systems. In addition, awareness programs on heat pumps and their benefits can be organized to improve acceptance among communities, collect and evaluate objective data from geothermal systems in use, promote demonstration pilot projects and finally publish guides on best practices for investing in heat pumps and how to best use them.

A survey of people involved in the heat pump industry in Greece, among customers and manufacturers, identified that the actions that can most incentivize the installation of GSHP systems are tailor-made tax exemptions (91.7% agree), raising public awareness of the technology and its benefits (91.6% agree), educational activities for installers (91.6%), more installations of demonstration sites in government buildings (90.5%) and finally policies that accelerate the use of renewable energy in residential buildings (90.5%). According to the people consulted, financial barriers, in particular the high investment cost, are the main reason for the low penetration of the geothermal system, then the low level of awareness of insiders and the general public. Facilitating installation in existing buildings through new drilling methods could increase its uptake.

The barriers of this technology are known and are purely technical and financial. Once these have been knocked down through subsidies and training, society should encourage diffusion thanks to the high social acceptability and the infinitesimal invasiveness of heat pumps, almost totally underground (Karytsas & Choropanitis, 2017).

7 The Influence of Culture

Shared norms, transmitted values, mutual behavior, what constitutes a culture is often invisible to those who live it from within their society (Steers, Meyer, & Sanchez-Runde, 2008). The apparent invisibility of culture can act as an unrecognized barrier against the energy transition and sustainable in a broad sense. There are customs and traditions developed in the last century that have led certain societies to use a lot of energy inefficiently, in this chapter we discuss the effects of these energy-inefficient cultures and observe how they can be corrected or mitigated.

7.1 How people move

The first cultural area that is discussed is mobility and in particular aggressive driving, speeding, automated mobility and ridesharing. At the wheel people can fidget or drive recklessly: exceeding speed limits, honking and flashing headlights, vulgarity, tailgating, locking the fast lane (Ellison-Potter, Bell, & Deffenbacher, 2001) and other behaviors that have direct implications on the car's fuel consumption and consequently on the pollution of greenhouse gases that cause climate change. Aggressive driving leads to higher emissions than normal driving, 20-40% more carbon dioxide and 50-255% more nitrogen oxide (Gallus, Kirchner, Vogt, & Benter, 2017). In the United States, where the car is essential for moving between cities and states, men are more likely to be impatient when driving and running engines empty, wasting energy and polluting, in France a psychological study suggests that exceeding the limits is due to social pressure from peers and a greater feeling of control of time during speeding (Cristea & al., 2013). These cultural norms also plague those who drive hybrid electric vehicles, for example by aggressively running the internal combustion engine to recharge the electric motor through regenerative braking, negating carbon savings (Ella Graham-Rowe, 2012). Automated mobility i.e. letting the vehicle drive itself can bring positive benefits such as reducing energy intensity, energy demand of travel, despite the increase in complex demand for travel due to convenience for elderly and disabled users (Wadud, MacKenzie, & Leiby, 2016). It is not the vehicles themselves that are the advantage but the ability to improve traffic, avoid accidents and drive efficiently. Together with ride sharing, electric and automated vehicles will revolutionize transport-as-a-service by reducing CO2 emissions by more than 90% in 2030 compared to Business-as-usual scenarios (Sprei, 2018). However, "in urban and crowded areas it will be very difficult to start autonomous driving," says a KPMG automotive executive, even if a vehicle perfectly identifies pedestrians and anticipates future actions, the action to be taken may differ between cultures (KPMG, 2019). Ride sharing and carpooling can reduce the use of public transport and taxis (Shaheen, 2018) however the cultural norms against these practices revolve around safety and social embarrassment: children are taught never to get in the car with a stranger (Nielsen & al., 2015), the car is a private place, a personal place and it would be strange to invite someone to such an intimate place. In short, although ridesharing offers many advantages, it does not offer the freedom and emotional status that you have driving your own car.

7.2 Problems with Solar Systems

In developing countries, knowledge of technology is relatively low, especially of new technologies whose operation is difficult to understand. Because of this difficulty of understanding, families can come up against these devices of home generation. In Bangladesh, domestic solar systems have been deployed as part of an international women's empowerment program. What the panels need to function is not clear to the families who adopted them: one family dismantled its panel daily to take it for a walk so that it "wouldn't get tired" (Sovacool & Drupady, 2012). In Papua New Guinea, home solar systems have been subject to frequent vandalism, sabotage and theft under an unbridled and entrenched system of resource-sharing clans. The panels benefit a particular house instead of the whole community and for this reason they are destroyed. In Nepal, solar systems are installed at community level to create mini-grids, there a Buddhist mother covered the panels with leaves to make it part of nature and another laid out the laundry on it, given the large and warm surface. In Thailand, the absence of a culture of repair between communities meant that more than half of solar systems would not function within a few years before the end of the national rural electrification program (Green, 2004). The adoption of solar has led many families to watch television, leading some communities to believe that local ethnic identity was eroded and lost due to progress. As a last strange example, the use of a panel as a coffee table in Mongolia is reported by a family of nomadic shepherds who spend many months in the countryside, outside the national network.

These misuses of solar energy, even smart in the case of laundry, are due to low knowledge of the technology. Solving this barrier should be very easy by instructing households at the time of installation on what it needs to function, i.e. receiving direct sunlight and nothing else. Theft and discrimination against those who have taken the path of progress are obstacles that must be addressed within the community, developers have no leeway in these phenomena.

7.3 The traditional Cuisine

In most cultures of the world, women act as firewood gatherers, cooks and nurses, exposing them to domestic risks such as smoke from inefficient stoves harmful to health (Kumar & Igdalsky, 2019). Conventional stoves, more traditional, have heating efficiencies of 10-12% so 90% of the energy content of wood or coal used is wasted. Better stoves require switching to less harmful fuels such as biomass, firewood, require better combustion chambers, walls that drive hot gas closer to the pots, and a chimney. Suitable materials, fire-resistant metals and high-temperature ceramics with increased insulation are also needed (Sovacool & Brown, 2011). In addition to these technical factors, a modern stove must be compatible with the culinary culture of a given community (Vigolo, Sallaku, & Testa, 2018): the cooking speed, the ingredients used and the common diet, the type and volume of local wood used in the stove. Stoves that cannot quickly boil water or bake certain types of bread are rejected in favor of traditional ones. In India, for example, they are rejected by women because they cannot cook chapatti, an unleavened flatbread, efficiency does not allow women to gather, the absence of smoke does not flavor the dishes and the heat used for food cannot heat the domestic environment (Khandelwal, et al., 2017). Among the refusals also religious reasons: biogas could be derived from pork waste, sacred for Muslim families, but also for the absence of the hearth: the spirit of fire would have been offended if the food had not been cooked on the hearth. Regarding safety, in Ethiopia there has been concern about a more efficient fire and in Botswana the opposite: the lack of a fire in the case of solar stoves cooking without visible flames. Regarding solar stoves, the typical problem of the sun arises, which at night cannot operate the ovens that cook meals for workers who start their shift before dawn. These cultural barriers to adopting more efficient systems are very difficult to eradicate. As long as culture is firm and so central to people's lives, the spread of these systems cannot happen in the short term.

7.4 Country you go custom air conditioning you find

Heat is the largest global end use for energy and accounts for 50% of total energy consumption for homes and industrial applications. Therefore, heat consumption has the most varied social and cultural aspects in the world. In Norway there is a tendency to heat all the rooms of the house even those not in use so as to allow the free movement of occupants in space. In Japan they use the *kotatsu*, a domestic heater equipped with a heating unit under a table and blankets that trap the heat under the table to heat those nearby. Additional heating needs are met by electric mats or kerosene heaters that are both highly inefficient. In China the *tong feng* practice of opening windows often erodes the energy efficiency and heat gains of heating systems, "ventilating the room" to let in fresh air causes unintentional heat leakage during the winter (Gippner & al., 2011).

7.5 Integration: Not just Barriers but virtuous Drivers

Cultural attitudes and social norms significantly influence energy consumption just as price signals, national programmes and regulations in preventing the use of energy applications critical to the energy transition. No matter how well a technology or energy system performs on the project, it could have little or no impact on a society if no efforts have been made to make it culturally compatible. As in a chemical reaction, a low-carbon transition requires activation energy to overcome a barrier. A catalyst that can reduce this activation energy for a faster reaction (development) can be cultural awareness and guidance: ideas, customs and behaviors merge with technological artifacts and infrastructure to create new cultures of driving, automation, cooking and heating. As intelligent systems are increasingly integrated, machines will need to be sufficiently culturally aware and embody culture to avoid barriers to energy transition.

Culture and awareness of it do not always act as a barrier but can support and accelerate the transition process. Two examples of integration are extracted from two of the areas discussed. In transportation, in the Middle East Careem is an alternative to Uber (Boyd, 2019), a private taxi service, because it has adapted to the culture in which women were forbidden to drive until recently (Mohamed & Bromfield, 2017) and it is required that their reputation is not endangered when traveling in a stranger's car. For this reason, Careem drivers in Saudi Arabia are required to follow social norms such as not conversing while driving and not looking at passengers from the rearview mirror. In the kitchen, in Central America a solar cooker project was not accepted because women had to sit down to use it. Then the unit was modified by raising it and allowing standing use (Patrice, 1994).

To improve the sociocultural acceptance of renewable technologies, ministries, energy and climate agencies can collect data on culture and population trends. Governments can establish greater community involvement during authorization discussions to reduce cultural biases and recognize that collective phenomena such as culture shape aspirations, capacities, and actions for low-carbon transitions (Vijayendra & Walton, 2004). Researchers can become aware of cultural diversity and be trained to recognize and reduce biases related to developing technologies. Energy producers and operators can consult community leaders before the project starts instead of after. It is also possible to aim instead of reducing costs and improving the efficiency of systems, to educate end users on the technologies they will encounter. Instead of relying on imported Western technologies, developing countries can incentivize the design and production of technologies at home by local developers who know firsthand the cultural dynamics of the customers they serve. Without research, policies, awareness-raising programmes and adequate projects that overcome cultural barriers, the true potential for sustainable energy transition will remain only potential and never become reality (Sovacool & Griffiths, 2020).

Conclusions

Engagement in co-creation

The fruits of research into improving the social acceptance of renewable energy generation systems can be seen in the five projects whose representatives participated in the Sustainable Places 2022 workshop (Ospina, et al., 2023). These five similar projects want to deal with energy communities and the improvement of demand and response (DR) of the latter. The method of engaging users for the project was different for each project: HESTIA has involved families in the design and development of its platform, co-creation is fundamental and stimulating to create supply and demand projects with a bottom-up approach. It is important for participants to communicate with developers to be aware of the process and their involvement at every stage. SENDER first disseminated information through events, workshops, consultations and surveys, then through social pressure and gamification it involved citizens in implementation and installation activities and finally an online forum was created, beta users enrolled in the program and exhibitions and seminars were organized to demonstrate to citizens the impact of their electricity market demand and response actions. ReDREAM has provided benefits over time to maintain user engagement, offered added value so that the benefits obtained outweigh the costs and finally built a reliable ecosystem with a set of principles: customization, feasibility, transparency, simplicity, findability and automation. ACCEPT focused on user awareness and recruitment campaigns such as workshops, meetings and presentations. iFLEX recruits end users by promoting short and clear enrollment surveys, device information, incentives, rewards, and free installs. These recruitment strategies were then adapted according to the needs and interests encountered in customers: ReDream adapted them according to their attitude towards technology (Tech diffy, Tech enthusiast, Tech agnostic and Tech conformist), (Gómez-Barredo *et al.*, 2021) to meet concerns about privacy and ability to use technologies, iFLEX adapted its own based on user feedback, for example in Greece few participants had water boilers as a flexible resource, the main objective of the project, so other high-consumption devices were included in the project so as not to lose flexibility.

The challenges faced by the projects are varied, the first faced by ReDREAM was the difficulty in locating suitable users especially in areas where heating is gas and where photovoltaic panels are not used. Another challenge was understanding what the flexibility and benefits of participation in the project entails due to the different regulatory frameworks in each country. For this reason, training and education were necessary during recruitment. Once users understand the major challenges of European energy systems, they also understand the importance of their role in the electricity market and are more willing to participate. iFLEX had to add clauses regarding the proper use of installed equipment to ensure that it was not altered or removed in end-user houses.

To keep participants involved throughout the project, iFLEX rewards the participant through lotteries to retain end users who respond to surveys or by offering the opportunity to pay for electricity at a lower price if they participate in the project. They can be symbolically incentivized with badges when answering other people's questions on the online platform or sharing tips or best practices. If lawful, incentives can also be monetary compensation for their energy flexibility. A central approach to user engagement is to convey closeness by constantly communicating with them and informing them about the project and their participation status, providing technical support and contact in case of problems or requests. Important in co-creation is not only how much users have influenced the solutions but also the knowledge gained on the functioning of the previously unknown design. So the performance of the solution can be improved without necessarily altering the technical design but working on expectations and how to accommodate them.

The results of these projects highlight that energy communities address climate change in a meaningful and proactive way, while ensuring their own energy security. In this way, energy communities are learning and using innovative technologies and are able to save money even in the face of the current energy crisis.

Learn from mistakes, together

Development is a trial-and-error process. Energy generation technologies from renewable sources are relatively recent and their development has been rapid from the end of the twentieth century until today thanks to the research to reduce dependence on fossil fuels and limit the greenhouse effect that the use of fuels has caused. In recent years their diffusion in the world has been wide, especially from the 2010s onwards. Their acceptance over time and space has varied greatly: the countries already developed after the race to renewable through incentives, are now saturated with renewable plants and find it difficult to find new sites due to the absence of actual economic convenient places to generate energy and because of the resistance of society that wants to defend the landscape and cultural right of the country. On the other hand, developing countries heavily dependent on fossil fuels because they are still relatively cheap encounter difficulties in spreading new renewable technologies, potentially very useful for achieving energy security and independence, due to the absence of an energy market that cannot offer those technologies because without sufficient data, sufficient skilled workforce and indigenous suppliers. Not only because of the market in an experimental state but also because of the resistance from rural communities who want to defend the territory that for centuries they have exploited as a means of subsistence, forests and rivers endangered by the grip of the environmental impact of renewable projects and climate change that deteriorates ecosystems.

In this document, the acceptance of renewable projects at various levels of society, market and politics has been discussed extensively. From the beginning it was clear that a closer approach to the people is needed, a comprehensive approach of all parties involved: the project developers, the communities close to the project and the political leaders needed to verify the legitimacy of the democratic process. For all cases examined and especially all cases of resistance with negative outcomes it is easy to deduce that greater communication, collaboration and understanding between stakeholders would have helped to certainly improve trust and awareness in renewable energy and possibly acceptance of the project of the case.

The nature and context of each renewable plant for each energy source are variable and so are the motivations behind the rejection. The most common social barriers in developed countries are landscape preservation, ecosystem conservation and maintaining the status quo, most of the time concealed by the NIMBY phenomenon. To break down these barriers it is necessary first of all to educate and train people on the benefits and impacts of renewable plants, then build trust through information meetings, consider the proposals made by the community to add improvements useful to increase acceptance and ensure through environmental impact assessments and any other type of legal guarantee that the project will respect sustainability and agreements with the community.

In developing countries the barriers are of a different nature, mainly oriented to the defense of the territories to which they rely because they are still means of subsistence on which to depend. The communities also see the project as a way to develop and often do what they can to improve their living conditions, a goal that the developers of the project should also pursue since the aim should be to develop the country. Instead, there are many cases of renewable plants that once obtained legal permits from the ministry and neighboring communities build their predatory projects and connect them to the grid that goes to the richest and most distant cities, without developing rural communities in any way. This does not always happen clearly, but unfortunately positive cases are the exception. It is understandable the craving for energy for a developing country being directly proportional to the national Gross Domestic Product, but it is not understandable the discrimination of minorities and rural populations that these projects jeopardize and not even the predation of protected natural areas made legal precisely in function of the construction of the projects. Measures are therefore needed to ensure respect for rural communities and the right to be considered during the planning of installations involving them. Building trust, listening, and possibly accepting requests from village members improves project acceptance, and leaders may be more likely to grant the "non-objection consent" that developers need to proceed with the work.

Socio-technical barriers in the market such as insufficient data accuracy, low skills of companies and the high cost of technology can be reduced over time by organizing data collection campaigns, mainly meteorological, at the most suitable sites, training young operators through courses funded by regions, trade associations or in collaboration with universities and higher education institutes and financing start-up companies or local start-ups that provide the technologies required by the local market to start the sustainable energy transition from below. Socio-political barriers such as the lack of standards, guidelines and regulatory frameworks for new energy sectors can be broken down by creating state-level bodies, made up of technicians and professionals in the sector, which designate standards or adapt national ones with the international ones currently in force, publish guidelines that regulate the market and relations between companies, customers and owners of buildings or land to avoid tax ambiguities.

The ideal path to acceptance of a renewable technology should be as follows: initially the technology is known only to researchers who need to propose it to policy makers to obtain funds and create applications that can exploit renewable technology. These applications can be pilot or demonstration plants installed in public or institutional buildings. By demonstrating in this way the advantages of the technology and the monetary benefits that sustain the market and therefore investors can fund research and produce that technology in cheaper and more efficient ways. Subsequently, the market and companies must look for customers who until now did not know the new technology but now, thanks to the information and awareness provided by both private and public bodies in the form of explanatory meetings, conferences, meetings, innovation fairs, consultancies, commercials etc., have become aware of the new technology and appreciate its benefits. At this point the government can help customers who want the new technology and developers who want to sell it by financing the spread through incentives and bonuses to favor the market. By now acceptance is widespread and renewable technology can be improved by setting efficiency and installation standards, defining guidelines and fostering employment in the new sector through training.

Undoubtedly the paths of a technology and its acceptance in society can differ in numerous ways, the one presented above is ideally the simplest and most linear path imaginable. In reality, many more factors influence the acceptance of a renewable energy production project and in this document they have been extensively discussed. In a totally general way it can be concluded that to increase the acceptance of renewable energy plants it is advisable to invest more resources in educating and raising awareness of people rather than in the efficiency of technologies that is already quite advanced. It is also advisable to assess the actual sustainability of the planned plant, i.e. whether the benefits it entails in terms of electrification of rural areas, independence and energy security, reduction of greenhouse gas emissions outweigh in absolute value the environmental and social impacts in terms of extinction of already endangered species, deterioration of the ecosystem, risk of aggravating the violence of atmospheric events and decrease in the standard of living of community in the vicinity of the site and their well-being.

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