“Just” Energy Transition

Learnings from a Solar Park case study in India

Delft University of Technology

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Learnings from a Solar Park case study in India

Master Thesis submitted to Delft University of Technology

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by

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Even before I started thinking about thesis topics, I was sure of one thing. I wanted to do something relevant to India, my home. I explored many topics, including gender and energy, coal to renewable transition, to energy efficiency in Indian agriculture. All topics were interesting, which made it difficult for me to choose a topic for my thesis. Somehow, in the massive pile of research papers I downloaded, I found something called energy justice!

As an engineer, choosing a topic like justice with philosophical, moral, and ethical connotations was personally a challenging task. Conducting a case study on such a sensitive topic, in a country like India, during the peak of the 2nd covid wave added to my challenges. I am content that I could overcome all those challenges and deliver something of value at the end of this six months-long journey. This was indeed not possible without the guidance of my amazing committee members, who believed in me with this research. First of all, I am grateful to my first supervisor, Dr. Linda Kamp, for her unwavering support during these times. Your motivation and checking up on me every week kept me on track, especially during personally difficult circumstances. I am also very thankful to my second supervisor Dr. Udo Pesch for his guidance on everything related to justice and his critical feedback throughout the process. Finally, I thank my chair, Dr.ir. Ivo Bouwmans for being patient and kind with me, even when I could not keep the deadlines. I would also like to thank Dr. Nihit Goyal for guiding and supporting me in my endeavors.

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Abbreviations

GW	giga watt
SEZ	Special Economic Zones
MW	Mega Watt
CoSEM	Complex System Engineering and Management
SC	Scheduled Caste
ST	Scheduled Tribes
NGO	Non Government Organisation
SPD	Solar Power Developers
EPC	Engineering Procurement and Construction
NSM/ JNNSM	Jawaharlal Nehru National Solar Mission
VGF	Viability Gap Funding
NOC	No Objection Certificate
SIA	Social Impact Assessment
EIA	Environmental Impact Assessment
RTI	Right to Information Act
MLA	Member of Legislative Assembly
G.R.	Government Resolution
LARR act	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
CSR	Corporate Social Responsibility
MEDA	Maharashtra Energy Development Agency
IFC	International Finance Corporation
ESMS	Environmental and Social Management System
SEBI	Securities Exchange Board of India
DCR	Domestic Content Requirement
SHG	Self Help Groups

Executive Summary

In the case of India, the challenge of transition to cleaner energy sources and meeting the ever-increasing energy demand is particularly complex. Given that the country lies in the tropical belt, policymakers are eying the vast solar potential of the country to achieve its renewable energy target of 170 GW. To meet this target, India needs land ranging from 55,000 sq km (approx. size of Switzerland) to 125,000 sq. km (approx. size of Greece) to deploy various renewable energy resources.

Of the 170 GW target, 100 GW will be achieved through solar energy generation, 60 GW of which comes from ground-mounted solar panels. Three phases of the National Solar Mission launched in 2010 will ensure that the country meets its target by 2022. Under NSM, several ultra-mega solar projects were commissioned in different parts of India. Research in the western countries has shown that massive infrastructure development for renewable energy projects has led to instances of injustices in these projects. India is no exception to this phenomena. In India, these projects have helped governments at national and regional level to meet their climate targets but emerging evidence from Gujarat, Karnataka, Rajasthan show that local communities are invariably bearing the costs of such developments. The limited scientific literature on energy justice issues in India showed that these projects are deepening the existing socio-economic inequities in the society. Thus, one of the objectives of the research is to generate more empirical evidence on instances of (in)justices during the implementation of renewable energy project.

We conducted a 158 MW utility-scale solar project case study to see whether justice concerns identified in cases of ultra-mega projects are also present in implementing a smaller project. The project under consideration is located in the drought-prone rural region in Maharashtra, India. We collected data through interviews and document reviews. Fourteen locals were interviewed to find out what they feel about different aspects of implementing a solar project. Interviews were telephonic and conducted in Marathi, a native language. The audio recordings were transcribed and digitized manually. The quotes used in the report were later translated into English. Qualitative data analysis techniques such as meaning condensation, interpretations, categorization and narrative structuring were used to analyze the data.

This research used Energy Justice framework to understand the injustices caused during the project life-cycle of a solar park. The framework focuses on where are the injustices, who is ignored and is a fair process followed during the implementation of an energy project. Additionally, review of formal rules and key project stakeholders in helped visualizing the broader context within which injustices occur.

Injustices with respect to parameters such as land, employment opportunities, energy provision, local development, risks, responsibilities, access to information, decision-making process and meaningful participation were identified. In terms of distributional justice, analysis of the interviews showed that locals, especially poor and uneducated locals, bear the brunt of the development of the solar park. Some locals received paltry amount as remuneration and lost access to land which further made them sell their livestock, thus impacting their livelihood options. Employment generation was limited and the quality of jobs was not satisfactory for most locals as they were temporary, low wage jobs. Locals were also not the primary beneficiaries of the energy generated. They still do not have uninterrupted access to electricity for irrigation. Locals also expect that since project developers are using local resources, they should take initiatives for local development. Non-participation of companies further fuel the discontent of locals towards such project developers. Finally, changes in resource use such as land has led to increase in the temperature near the project site, making it difficult for locals to live and carry out farming in the area. Excessive use of water from surface and groundwater resources for solar park has the potential to threaten the availability of water in the already water-scarce region.

In terms of procedural justice, locals were subjected to various injustices. They were kept deprived of full and impartial information about a solar project before land acquisition. As a result of local power dynamics, rightful beneficiaries were kept deprived of jobs and developmental money in the form of tax, as those with power tended to accumulate these benefits. Meaningful participation via democratic inclusion of all stakeholders was not realized as legal provisions were bypassed and voices of locals were not heard unless they took extreme steps such as hunger strikes.

Plausible factors that led to the injustices include lack of transparency, accountability, and participation that led to unjust procedures. Unjust procedures then resulted in unjust outcomes. The outcomes were the distributional injustices and feelings of unfairness discussed during the interviews. Prevalent corruption, involvement of intermediaries, political influence, and domination further exacerbated the situation.

Based on the results obtained through the analysis, policy recommendations for the state government were formulated. They include (i) setting higher standards for environmental and social impact assessment, (ii) designing auctions to minimize corruption and stimulate local development, (iii) designing an appropriate land-use policy, (iv) protecting workers, and (v) empowering locals and strengthening civil society.

Significant limitations of the research include small sample size, skewed sample composition as all interviewees were male, lack of other data collection methods such as participant observations, and limitations of the used ones because of Covid. Due to these limitations, this research could be framed as a starting point and many aspects introduced in this research could be investigated more thoroughly.

Nonetheless, some future recommendations for research are described. Important insight generated during the thesis is that energy justice framework should look for alternative and contextual understanding of justice notions to understand the justice outcomes of renewable energy projects in developing countries. More evidence of energy justice issues within Indian context could be generated to guide evidence-based policy framing. Comparative analysis of solar and other energy sources or comparing India with other countries could also generate valuable information about trends and trajectories of justice issues. Multi-disciplinary research into corporate business models, processes, and stakeholder management could also provide meaningful, practical knowledge to guide future policy framing and avoid the instances of injustices.

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1. Introduction

To meet India's renewable energy targets of 2022, massive amount of land and infrastructure development is required. Estimates of the total land footprint needed to meet the 2022 target range from 55,000 to 125,000 km2 - the equivalent of between the size of Switzerland and Greece! Being a tropical country with significant solar energy potential, ground-based utility-scale solar projects have received government impetus in the past few years. This chapter introduces reader to the broad context of such development and what this development means for local communities. Section 1.1 introduces the problems arising out of major public development works in India including solar parks. Section 1.2 identifies the research gaps that this research intends to fill. This is followed by the introduction of the main research question and sub-research questions in section 1.3. Finally, in section 1.4, scientific relevance and relevance to the Masters program is described.

1.1 Problem Definition

Energy is an essential commodity that drives the development of any nation. As the nations worldwide embarked upon the newfound paths of development, energy consumption in these countries grew exponentially. The growing energy demand is accompanied by rising concerns about the diminishing conventional resource base and climate change. Thus, countries are transitioning to renewable, low carbon, environment-friendly fuels and technologies to meet the energy demand. This trend is also evident in IEA's projection that renewables' share in the energy mix increases and is primarily driven by utility-scale solar PV and wind power (IEA,2020b). However, energy transition towards a low-carbon pathway is an immense challenge.

India's focus on renewable energy

In the case of India, the combined challenge posed by meeting the rising energy demand and energy transition is particularly complex. Suppose India wants to meet various sustainable development goals, it has to maintain the target economic growth of 8-10%, which makes it especially vulnerable to immense energy and the climate crisis in the coming decades (Bardhan et al.,2019). We can see a glimpse of it in the fact that even after a phenomenal increase in the installed capacity, India faced a power deficit of 2.5% at the end of 2014-15 (Rathore et al.,2018). Moreover, much of this increased capacity came from thermal power plants leading to more greenhouse gas emissions (Rathore et al.,2018). Therefore, to meet the

energy demand yet maintain its climate goals, India is eyeing the vast potential of renewable energy sources. According to International Renewable Energy Agency, renewable energy could meet one-fourth of India's total energy demand (Majid et al.,2020). India is a tropical country having around 300 sunny days a year, so theoretically a vast solar power potential (Rathore et al.,2018). As a result, solar power has received the particular focus of policymakers in the last decade.

Solar sector development and its plausible implications

Under Jawaharlal Nehru National Solar Mission (JNNSM), the Indian government set an ambitious target of installing 100GW of solar power capacity by 2022(Rathore et al.,2018). 60 GW of this is to come from ground-based solar, whereas the remaining 40 GW should come from rooftop solar PV installation (Mohan,2017). In India, state governments, central government and private utilities drive the energy sector (Majid et al.,2020). The state of Maharashtra, too, aims to utilize the potential of solar power generation in the state, which is estimated to be 1.5 million units/MW/year through solar photovoltaic systems & up to 2.5million units/MW/ year through solar thermal systems (MEDA,2021). The new draft policy, 'Unconventional Energy Generation Policy 2020' of the Maharashtra government, where, of the total target of 17GW renewable energy, 12 GW solar generation capacity development is planned (Prasad,2020).

Like every other developmental project such as dams, power plants, Special Economic Zones(SEZs), realizing the ambitious target of commissioning 60GW solar power capacity on the ground requires land and massive infrastructure development. In India, the development of dams, SEZs, so called wastelands has led to a plethora of social justice issues such as social-political marginalization of vulnerable communities, loss of land and livelihoods, displacement, food insecurity, amplification of class and caste inequalities, among others (Blaikie & Muldavin,2014; Kashwan,2017; Levien,2011; Mukherji,2012; Nayak,2013). If history is any guide, renewable energy projects like massive solar and wind parks in India could also be probed for the presence of similar issues.

A case study of the Charanaka solar project illustrates that the upper caste or economically well-off people took the opportunities created as a result of the solar park. At the same time, the pastoralists and small farmers were impacted, albeit negatively, as they lost the lands and means of livelihood associated with it (Yenneti & Day,2015,2016). In Karnataka's Pavagada,

similar concerns were observed. Landowners who leased their lands complained that they were not appropriately informed about what leasing their lands meant in reality as they lost access to their lands, at least for 28 years (Saldanha & Rao,2020). Some highlighted that jobs were promised to locals, but in reality, the companies brought workers from other states like Orissa, Jharkhand, and West Bengal (Saldanha & Rao,2020). Women lamented that they now have to walk long distances to fetch water and firewood for their families. Some people in the Dalit colony of the village do not have access to electricity, water, job, or food (Saldanha& Rao,2020). These issues highlight the need for a more responsible approach towards India's planning, development, and operation of such utility-scale solar projects.

1.2 Identifying Research Gaps

The social justice issues as identified in the previous section are not prevalent only in countries like India. Several European and North American nations have witnessed that the development of renewable energy projects can lead to cases of injustice. Most of the research on social justice in these countries has used the Energy Justice Framework to analyze the individual cases of renewable energy projects.

Conceptual overview of Energy Justice

Energy justice is a relatively new field in social science research. Here justice principles are applied to various energy-related domains like energy systems, policies, security, climate change, et cetera (Jenkins et al., 2016). It aims to evaluate where injustices emerge, which communities are ignored, and what processes exist for unfolding and remedying such injustices (Jenkins et al., 2016). Jenkins et al. (2016) base their conceptual review on three philosophical groundings. The first two, namely distributional and procedural justice, are based on the works of Rawls and McCauley (Jenkins et al., 2016). The third one is a' recognition-based' approach to justice based on Fraser's works (Jenkins et al., 2016). Based on Jenkins et al. (2016) review, distributional justice seeks to identify where energy injustices emerge during the production and consumption of the energy. Recognition-based justice aims to identify which sections of society were ignored or misrepresented during the planning,

production, and consumption phase (Jenkins et al., 2016). Lastly, procedural justice seeks ways in which decision-makers have engaged with communities to identify a fair process as it eventually affects the social acceptance of the project (Jenkins et al., 2016). Apart from this, B. Sovacool and Dworkin (2015) argue in " Energy justice: Conceptual insights and practical applications" that energy justice serves as (i) a conceptual tool to integrate distributive and procedural justice concerns better, (ii) an analytical tool to understand how values are built into and (iii) resolve common problems in energy systems and a decision-making tool to make better-informed choices. Energy justice is meant to ensure that energy permitting and siting do not violate the communities' fundamental civil rights and are well informed and represented in the decision-making processes (B. Sovacool & Dworkin, 2015).

Applying Energy Justice framework

Jenkins et al. (2016) document several cases of energy transition where energy justice concerns were visible. In German Energiewende, the disproportional financial burden on lower-income clusters and physical siting of transmission lines to transport energy from Northern windmills to Southern industries have caused distributional injustices (Jenkins et al., 2016). The Isle of Lewis example shows a flawed approach in recognition, misrepresentation, and

disrespect in planning a local windfarm project (Jenkins et al., 2016). Jenkins et al. (2016) also highlight several other cases where procedural injustice happened. Other studies by Pesch et al. (2017), Mouter et al. (2018), Milchram et al. (2018), Walker and Baxter (2017) present cases of social acceptance and justice from North America and Europe.

Hanger et al. (2016) presents a study from Morocco to understand community acceptance of large-scale solar installation in developing countries. They find that community acceptance, in this case, is almost universal because solar power is perceived to be environment-friendly and the level of knowledge about the project was low (Hanger et al., 2016), highlighting the procedural injustice done to the local communities. The case study of Charanaka Solar Park in Gujarat, India, highlights the distributional, procedural, and spatial justice concerns caused by the park's development (Yenneti & Day, 2015, 2016; Yenneti et al., 2016). Other studies conducted by Saldanha and Rao (2020) and Bedi (2019) highlight similar energy justice

concerns in Karnataka and Kerala, respectively. These empirical, qualitative studies illustrate incidences of injustices that adversely impact the livelihoods of local communities and lead to further marginalization of vulnerable communities. These stories about justice issues in solar energy infrastructure caution us against deepening the existing socio-economic inequalities.

Research gaps

Hanger et al. (2016) argue that justice issues have been addressed mainly in wind energy and transmission lines in Europe and North America. Hanger et al. (2016) and Aklin et al. (2018) further argue that most of the literature on public or social acceptance focuses on industrialized societies, and little evidence exists for developing countries. In the case of India, some studies highlight social justice concerns in large development projects related to dams, SEZs, forests (see Yenneti et al. (2016), Kashwan (2017), Levien (2011), Blaikie and Muldavin (2014), and Nayak (2013)). However, only a couple of case studies explain the justice concerns in often large utility-scale solar projects (Saldanha & Rao, 2020; Yenneti & Day, 2016). Moreover, while the Indian case studies analyze the impact of big solar parks on social justice, research on methodically mitigating that impact is missing.

1.3 Research Question

This research aims to address the gaps identified in the previous section. It does so by conducting a detailed case study of 150MW solar park projects in Satara district, Maharashtra, India. As discussed in the section 1.1, State government of Maharashtra aims to install 12 GW solar power capacity by 2025. Indian states of Gujrat and Rajasthan receive highest amount of solar radiation whereas other states like Madhya Pradesh, Maharashtra, Punjab, Haryana, Bihar comparatively receive less (Rathore et al., 2018). As a result, there is less scope for commissioning ultra mega solar projects (more than 500MW capacity) such as Charanaka and Pavagada in states like Maharashtra. To meet the state-level renewable energy generation target in such a scenario, smaller parks ranging from a few MW to 100 MW or more than that appear to be a viable solution for such state.

The research adds to the literature about energy justice concerns in ground-based utility-scale solar parks in India. Current literature is limited to analyzing the justice concerns using the energy justice framework in cases of India's ultra mega solar project(above 500MW capacity). We use the Energy Justice lens to study social justice concerns in a much smaller utility-scale solar project (around 150MW). The research answers the following main research question:

How can governments make utility-scale solar power projects in India more responsible towards the communities they inhabit?

Above question will be answered through a series of sub-questions as follows:

1. What are the formal rules in use and stakeholders involved in the implementation of a utility-scale solar project?
2. Where are the injustices, who is ignored and has a fair process been followed during the implementation of a utility-scale solar project in India?
3. Which factors contribute to the (in)justice in utility-scale solar project under consideration?
4. How can such a project be made more responsible?

1.4 Relevance

Energy systems are understood as sociotechnical systems meaning that they do not function independently but are the outcomes of the activities of human actors (Geels, 2004). Thus, energy systems as complex sociotechnical systems have implications that go beyond technology. Development, implementation as well as interventions in such systems have social implications as well. In this research, we study a case of solar park in the broader context of the communities it inhabits, so it aligns well with the main idea of the CoSEM program.

A couple of case studies of mega solar parks in India highlight energy justice issues in these projects. This study involves analyzing the social implications of a utility-scale solar park on the local communities and recommending ways to make such projects more responsible by addressing the injustices such systems create. The research outcome would help stakeholders

in countries like India as they have just started their energy transition drives and such large renewable projects are there to stay. In terms of scientific contribution, this study aims to generate empirical evidence of energy (in)justice in the Indian context and adds to the limited literature on this subject.

In this chapter we identified the research gaps and defined the research questions. The next step is to select an appropriate methodology for each of these questions. This is discussed in the next chapter 2, where we describe the research methods and the reasons why those methods were chosen.
After that, in chapter 3, to build the understanding of energy justice and its tenets, a theoretical background on energy justice framework is provided.
In chapter 4, institutional rules and important actors involved in the solar energy implementation in India are discussed.
Chapter 5 and 6 provide the analysis of the case study, where chapter 5 focuses on the findings from interviews whereas chapter 6 identifies the factors that caused the injustices discussed in chapter 5.
In chapter 7, results are discussed with respect to the previous findings and applicability of the energy justice framework along with a set of recommendations for state governments based on the findings.
Lastly, concluding the thesis in chapter 8, answers to all research questions are provided, besides highlighting the limitations, scientific contribution and future research recommendations.

2. Methodology

This chapter describes the methodology used to answer the research questions mentioned in the previous chapter. Section 2.1 describes the purpose and research method used for each of the subquestions. Section 2.2 introduces the research approach and data collection methods followed in different subsections. So, in 2.2.1, reader can find the reasons behind choosing case study methodology and case location. In 2.2.2, geographical and demographic context to understand the regional peculiarities is given. This is followed by sub-section 2.2.3 which introduces and motivates the choice of data collection methods, namely interviews and document review. In 2.2.4, details about data analysis is given. Lastly, in section 2.3, learnings from the field work are shared to help the wider research community interested in carrying out field research in India.

2.1 Research Sub-questions

To answer the main research question of *"How can governments make utility-scale solar power projects in India more responsible towards the communities they inhabit?"*, following subquestions are answered:

What are the formal rules in use and stakeholders involved in the implementation of a utility-scale solar project?

This question is answered in chapter 4. It aims to understand how India's solar energy sector is being governed and which are the main actors. Stakeholders and formal rules in use are studied based on document reviews and interviews. Formal rules are understood as constitutions, laws, property rights that structure political, economic and social interaction (North, 1991). So the main documents reviewed in this phase include government publications, laws, policies, public statements about the project. Knowing the actors and formal rules in use will help define the broader context within which instances of (in)justice occur or may occur.

Where are the injustices, who is ignored and has a fair process been followed during the implementation of a utility-scale solar project in India?

This question is answered using a qualitative case study of a 150MW solar park in Satara, Maharashtra. The case study involved semi-structured interviews of locals, as the primary motive is to understand the instances of (in)justices locals see/face or have seen/faced. For this, in chapter 3, literature about energy justice and case studies about justice in some developmental projects in India were reviewed. This was done to develop the theoretical understanding of the energy justice theory and to understand justice concerns peculiar to India. The understanding so developed was then used to create the questionnaire and structure the interviews. The answer to this question can be found in chapter 5.

Which factors contribute to the (in)justice in utility-scale solar project under consideration?

Interviews were analyzed to identify the factors that led to various instances of distributional and procedural injustice during the solar parks' planning, development and operation phases. Based on the analysis of interviews and the rules in use, this question identifies the values, norms, practices, particular to the institutions and stakeholder interaction that result in the (in)justice. This question will be discussed in chapter 6.

How can such a project be made more responsible?

Finally, based on the analysis for questions 2 and 3, this question provides policy recommendations to the government to minimize the unintended impact of solar power projects on the local communities. The answer to this question can be found in chapter 7.

2.2 Approach and Data collection

It is essential to understand local communities' perception about the utility-scale solar project under consideration to know if there is a feeling of unjust or unfair treatment, why some people feel that way, and how their feelings or concerns could be addressed better in the future. Thus, this research used the case study methodology to understand the energy justice concerns in utility-scale solar projects in India.

2.2.1 Case Study

Since we need a rich, in-depth description and insight about one instance of a utility-scale solar project, an explanatory case study is an appropriate strategy (Johannesson & Perjons, 2014). Case studies allow us to focus on a ”case” to get a detailed, comprehensive account of anything from individual life cycles, group behavior, organizational rules, managerial processes to international relations or a country’s growth story within the real world context (Yin, 2009). In a case study, evidence can be gathered through documents, archival records, interviews, direct observation of participants, and physical artifacts (Yin, 2009).

For this case study, interviews and documents are used as the primary data collection methods. Documents including government publications, organizational records, newspapers, or magazines will be used. Interview data will be analyzed using the qualitative approach of content analysis (Johannesson & Perjons, 2014).

This research studies local communities near 150MW capacity solar projects in Man Taluka, Satara district, Maharashtra, India. This solar project and area were chosen for two main reasons:

1. Indian states of Gujrat and Rajasthan receive the highest amount of solar radiation, whereas other states like Madhya Pradesh, Maharashtra, Punjab, Haryana, Bihar comparatively receive less (Rathore et al., 2018). Moreover, solar energy projects require contiguous land, which is limited in India (Bedi, 2019). As a result, there is less scope for commissioning ultra mega solar projects (more than 500MW capacity) such as Charanaka and Pavagada in states like Maharashtra. To meet the state-level renewable energy generation target in this scenario, smaller parks, ranging from a few MW to 100 MW or more, appear to be a viable solution. Hence a solar park of 150MW could be a good representative case.

2. Another reason was the accessibility of the area. During these extraordinary times of lockdowns and curfews, it was crucial to make sure that the location is somewhat near my hometown Pune to arrange a visit to these villages if rules permit. Another criterion was that the communication with the local communities should be accessible and direct. As a result, Maharashtra, where communities speak Marathi, the author’s mother-tongue, or some dialect of Marathi, was a natural choice.

2.2.2 Research Context

Satara district is located in the western part of Maharashtra state of India. The district comprises 11 talukas (blocks), namely Satara, Karad, Wai, Mahabaleshwar, Phaltan, Man, Khatav, Koregaon, Patan, Jaoli, and Khandala.

Fig 2.1: Political map of India *(Source: Survey of India https://surveyofindia.gov.in/documents/polmap-eng-11012021.jpg)*

Fig 2.2: State of Maharashtra *(Source: Survey of India https://surveyofindia.gov.in/documents/polmap-eng-11012021.jpg)*

Fig 2.3: Satara district *(Source: Maps of India https://www.mapsofindia.com/maps/maharashtra/tehsil/satara.html)*

On the whole, Satara district has a tropical climate. May is the warmest month of the year, with an average temperature of 28.1°C (GoI,2018). Temperature averages around 21.4 °C in December, the coldest month of the year(GoI,2018). The winter season starts in December and lasts till mid-February. This is followed by the summer season up to the end of May, followed by the southwest Monsoon season from June to September (GoI,2018). October and November constitute the post-Monsoon season (GoI,2018).

Changing topography affects the rainfall across the district. Thus, the western part has high rainfall because of the mountains of Western Ghats. The eastern part, being the rain-shadow region, receives less rainfall (GoI,2018). Taluka-wise decadal average rainfall ranges from 493.15 mm in Man taluka in the eastern part to a maximum of 4867 mm in Mahabaleshwar taluka in the district's west (GoI,2018). The north-eastern and south-western part of the district comprising of entire Khandala, Phaltan, Khatav, Man talukas, and part of Koregaon and Karad, which have experienced drought for more than 20% of the years, can be categorized as "drought area" (GoI,2018).

The solar projects under consideration cover around 1000 acres of land in Man taluka, shown in Fig. 1.3. With the lowest average rainfall in the district, this taluka has experienced years of drought and hot summers with maximum temperatures reaching 45°C (GoI,2018). Less rainfall and limited irrigation facilities make agriculture difficult in the region. Hence, people rely on allied activities such as cattle, sheep, and goat rearing. Moreover, migration for work and educational purposes is quite prevalent in the region (Ghodke,2018). The most recent drought experienced by the region was in 2018-2019. Around 1400 families from Man taluka had to move to a cattle camp near Mhaswad with their cattle, as they could not provide enough water and fodder for their animals (Iyer,2019). This camp, shown in Fig 1.4, was opened unusually early on 1st January, even before the advent of the summer (Iyer,2019).

Fig 2.4: Cattle-camp at Mhaswad, Man taluka*(Source: The Indian Express https://indianexpress.com/article/india/maharashtra-drought-first-cattle-camp-already-home-animals-5546690/)*

Fig 2.5 Cattle-camp at Mhaswad, Man taluka*(https://www.galli.in/2012/08/for-a-few-drops-more-arko-datto.html?189db0&189db0*

In recent years, water conservation efforts by civil society initiatives such as the Paani foundation and good monsoon years have improved the water availability in these villages. However, there is always a looming threat of having consecutive bad monsoon years. In this taluka lie the villages of Palsawade, Varkute-Malavadi, Shirtav, Devapur, and Banagarwadi which host the 158 MW solar power parks of two developers. More about the solar parks is discussed in chapters 4 and 5.

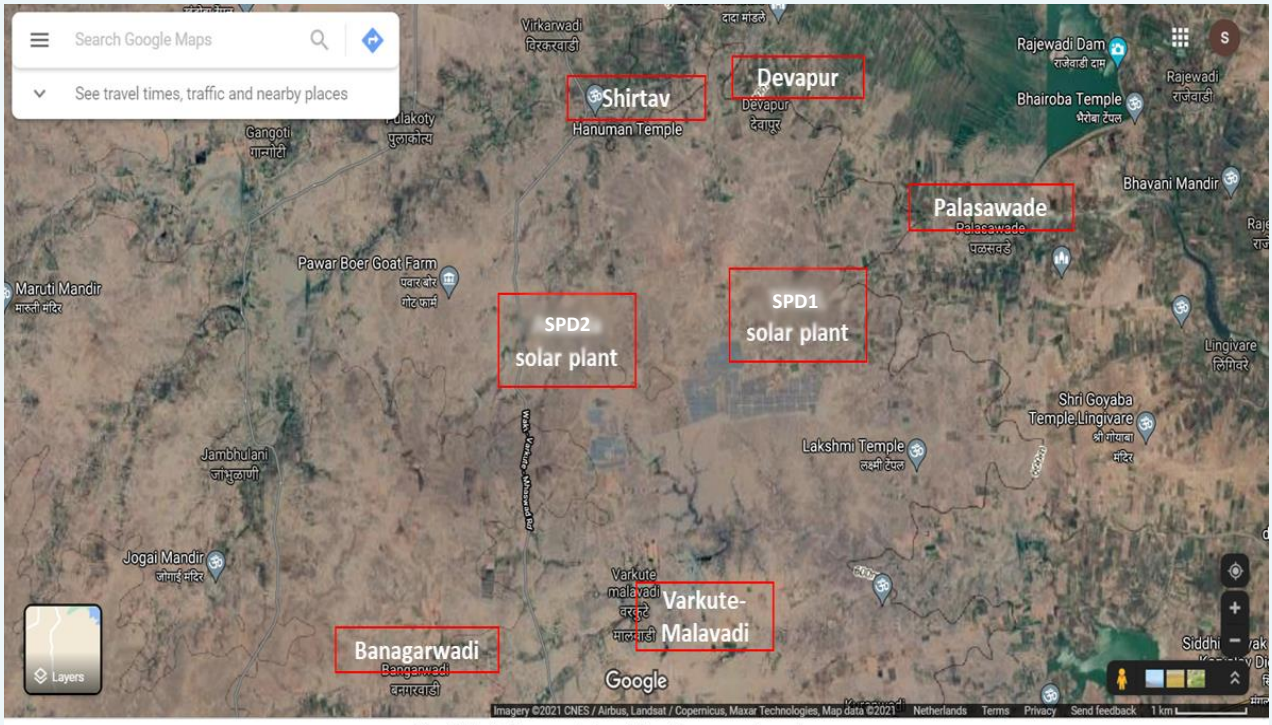


Fig 2.6: Solar park location*(Source: Google maps https://www.google.com/maps/@17.5641878,74.8158905,8623m/data=!3m1!1e3!5m1!1e4)*

Before discussing the social profile, it is crucial to know the caste-based hierarchy (Varna system) and position of women, particularly in rural Indian society. The author compiled the information about the social profile using information from census data, interviews, and her contextual understanding. There are four major castes in the Hindu religion based on occupation or position in society. These are Bramhin (Priests, teachers, scholars, etc.), Kshatriya (Nobles, warriors, administrators, etc.), Vaishya (Merchants, farmers, traders, etc.), and Shudra (Common laborers, workers, artisans, etc.), in that order. They are further divided into several sub-castes. Every Hindu falls in one of these castes. Over the years, the rigidities of the ancient Varna system have reduced. A person belonging to any caste is legally free to pursue any occupation or lead a life of their choice. The Constitution of India also prohibits any discrimination based on sex, caste, race, religion, or place of birth. Nonetheless, caste and gender remain important factors determining one's power and position in Indian society.

Dominant castes in these four villages are Dhangars and Maratha, both Kshatriyas. In general, with many influential Maratha leaders, Maratha is a dominant caste in Maharashtra politics. Dhangars, a herding caste, because of their numerical majority, also holds a dominant position in the region. The majority of landholders in these villages belong to the two castes mentioned before. There are also families belonging to 'Scheduled Caste (SC)' and very few 'Scheduled Tribes (ST)' categories. As stated before, the Indian constitution prohibits discrimination based on caste or sex. However, such discrimination is still prevalent (see a recent report by Evans & Sahgal (2021)). Sometimes it is exhibited in apparent manners, while at other times, it is more subtle. In either case, it warrants detailed investigation and thorough observation to verify if it is still being practiced in these villages and if yes, then how. The same applies to the socio-economic and political status of women in these villages. For more data on the social profile such as education, working-non working population, see Appendix C.

2.2.3 Data collection

As stated earlier, primary data collection was done through interviews and document review. Interviews were carried out in India. Before primary data collection could commence, we tried to gather information about the region and the solar parks through online resources such as news articles, documents, government and company websites. However, not much information was available about the projects compared to other Indian mega-solar projects such as Charanaka or Pavagada. One plausible reason for this could be the size of the project. Unlike Charanaka or Pavagada, which were touted as Asia's largest solar parks when they were launched, the project in Man taluka is small, and government involvement in these projects is minimal. Nevertheless, we did get some critical information from the documents, which further helped us during the interviews.

Interviews

To learn how people see their world and interpret their experiences, we need to talk to them. Thus, Interviews form a cornerstone of this research. Unlike surveys or questionnaires, there is no clear-cut methodology of doing a qualitative interview (Kvale, 1994). However, taking a nomethod approach like an unstructured interview could be a time consuming and even a futile exercise. Thus, we made a few choices based on the information we gathered, in the beginning, to give some structure to these interviews. A semi-structured research interview is defined as (Kvale, 1994),

"an interview whose purpose is to obtain descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomena."

Such interviews are structured enough to address the topic of interest, yet they allow an interviewee to offer new meanings to the topic under consideration (Galletta, 2013). Considering the time constraint and COVID circumstances, we aimed to interview 30 to 40 people living in the villages around the solar park to know what they feel about the development and operation of the solar project in their vicinity. However, due to the second COVID wave in India and ensuing travel restrictions, we could only interview 14 people. Eleven interviews happened in May 2021, and the remaining 3 in July 2021 when the author's family visited the villages. Thirteen of the interviewees were locals from villages Palasawade, Varkute Malavadi, Devapur, Shirtav, and Banagarwadi. One government servant was

interviewed. All the interviews were telephonic and were audio-recorded. Participants were selected using the snowballing technique. As stated earlier, the purpose of the interviews is to understand interviewees' feelings about the solar project, whether they carry a feeling of being treated unfairly or unjustly during the planning, commissioning, or operation phase of the project. Thus, the questions asked tried to understand these specific aspects of interviewees' experiences. The questionnaire used for the interviews is included in the Appendix A. Only in the case of a government servant, an unstructured interview was carried out.

Indian case studies about justice issues were referred to derive the questions for interviews. These include justice issues related to the solar energy infrastructure in case studies by Yenneti et al. (2016), Yenneti & Day (2015), Yenneti & Day (2015), Bedi (2019), Saldanha and Rao (2020). Energy justice literature is ripe with case studies from Europe and North America. However, very few studies exist in the literature that uses this framework in countries like India. Thus, case studies about social justice and environmental justice in India are studied to contextualize distributional and procedural in India's context. These include Blaikie & Muldavin (2014), Levien (2011), and Nayak (2013).

Before commencing the interview, all interviewees were informed about the research topic, author's background information such as education, hometown, etc. Additional questions of participants regarding the research, usage of collected data were answered to their satisfaction. Participants were informed about the consent form, and their verbal consent was taken at the beginning of every interview. The consent form can be found in the Appendix B.

Several photographs depicting the region, villages, people, animals, solar parks are used. These photographs are sourced from newspapers and websites. Some are clicked by the author's father, Shamrao, who visited these villages in July 2021 after the Covid restrictions in India were lifted.

Qualitative interviews are often criticized for not being objective, implying that they could be biased and subjective and hence not scientific (Kvale, 1994). Nevertheless, can the notions of injustice or unfairness be objective? Without having lived a person's life or experienced his/her realities, how can a researcher living outside the context objectively know if what happened in a particular situation is unjust or unfair? Pesch (2021) argues that feelings of fairness are relational and object-based. They emanate when people think they deserve something but do not get it, whether tangible goods and services like food, electricity or intangible entities such as respect and recognition (Pesch, 2021). So to understand if someth-

-ing is unjust or unfair, we must rely on the interviewee's perception of his/her lived reality. Moreover, the brighter side to this debate could be that these seemingly unscientific conversations in common language could develop more sophisticated scientific conversations and a refined understanding of the human world (Kvale, 1994).

Document Review

Another method for data collection was the review of the documents gathered throughout the research period. Documents can provide data on the context within which research participants operate (Bowen,2009). Also, information from documents can help guide the interviews and observations (Bowen,2009). Document review was used to gather evidence and verify findings from other sources (Yin,2009). Document review is praised as a less time-consuming and cost-effective method of data collection (Bowen,2009). Moreover, documents are stable in that they are unaffected by the researcher or the process, and they cover an extended period, many events (Bowen,2009; Yin,2009). At the same time, documents can be hard to retrieve and provide insufficient details as most documents are created for a specific purpose other than research (Bowen,2009).

In our case, documents were hard to retrieve. Most of the documents used in the research were available online, for example, news articles or census data. However, a more detailed account of villages' socio-economic profiles is available offline at the Gram Panchayat offices. Due to the second Covid wave, the author could not travel to these villages in May 2021, and we could not access that data. We got a couple of documents when the author's family visited these villages in July 2021.

2.2.4 Data analysis

Interview data were analyzed using the qualitative approach of content analysis. We conducted 14 interviews, a combined duration of 570 minutes. Transcripts of the audio recordings were written down in Marathi, first on paper and then digitized.

The digital Marathi transcripts were finally translated into English using Google Translate. Google Translate engine does not always pick up the slang, dialect, or speech peculiarities of a native speaker. Thus, the author modified the quotes used in the report to better resemble the statement made by the interviewee. The analysis and categorization of the injustices into

either distributional or procedural was done manually. Different approaches including meaning condensation, categorization, narrative structuring, interpretation (Kvale, 1994), were used to analyze different parts of the interviews.

2.3 Learnings from the field work

When conducting a case study in a diverse and complex country like India, we need to take into account myriad factors such as research topic, time-frame, researcher's age, language, gender, university (or education), researcher's access to people in the region, among other things. Some of these factors are identified by Narayan (1993).

I had gone to India to conduct this case study in April-May. Although I had planned to visit the villages in person, I could not travel due to Covid restrictions. Thus, I made all calls from my home in Pune. In March, April, May, and July 2021, I talked to 40 people. Of which we recorded 14 interviews. For analysis, we only used the recorded interviews. However, interaction with all these 40 people provided valuable insights, which were noted after each call.

I was born in the Pune district of Maharashtra, so my mother tongue is Marathi. Because of its vicinity to the expanding Pune city, I had seen my region develop from a small cluster of villages to a thriving town-ish region. Moreover, my region is geographically different from the region where the solar parks were located. My village is closer to the Western Ghats received ample rainfall. Thus, it was initially difficult for me to imagine the struggles of people in the relatively under-developed drought-prone region of Man taluka.

Nevertheless, since I was brought up in a village near Pune city, I was aware of the rural side of the country. I had an idea about the general social and political structure of a village. So when I decided to do a case study, I first retrieved contacts of Sarpanch and Upasarpanch (Elected village head and his/her deputy) of these villages with the help of some politicians in my family who had friends active in Satara politics. I called one of the sarpanches to plan a visit to the village. However, in my opinion, when I gave a reference to the politician from Satara, the sarpanch did not seem very impressed with that politician's credentials. From my experience, I believe that the political affiliation of someone can make a huge difference. So, I decided to approach the sarpanches and villagers with the help of a private organization like GramOorja

to ensure that people from the village do not get a wrong idea about my political affiliation. GramOorja is dedicated to rural energy solutions, and they help researchers like me to organize field visits.

Thus, I contacted them in late March. One online meeting and couple of emails later, they told me about their inability to arrange a visit due to the second Covid wave in the state. Meanwhile, I was able to get in touch with a politician in Pune who gave me the contact details of 3 people in the villages near solar parks. Two of them talked to me off the record, and one talked on-record. The first few calls made to the villagers made me skeptical about the choice of case study location and topic. People seemed unwilling to talk about the project because of the political influence. In addition, as villagers and potential interviewees had not seen me in person and all interaction was telephonic, I believe it was difficult for them to trust me. Nonetheless, one of the first three people did allow me to record the call. But, he did not talk about the project much as he had political aspirations and wanted to be politically correct. The other two people talked at length (20 to 30 minutes each) but did not want to be recorded because of political influence and personal stake. All these three initial contacts promised me that they would share some contacts with me. However, they did not receive my call later on. So another dead end!

Since the politician friend I contacted was active in Pune and not in Satara, I realized that he did not have many ground-level contacts. The contacts he forwarded were either local politicians or influential people who were unwilling to talk. During that period, I was also directly talking to two Sarpanches, but they were busy with the Covid relief work in their villages. One of the sarpanches asked me to first visit him and the village personally after Covid is over, have a chat and then he will help arrange everything. That was not possible. Firstly because of Covid. Secondly, because I had to collect data before coming back to the Netherlands in June. Thus, I had to look for other ways to reach the villagers.

I was trying to collect information about the projects, and thus I was looking for any digitized local newspaper publication. While looking for news, I came across one reporter from Man taluka whose name was mentioned on the news. I googled him, and I got his contact number mentioned on his Facebook profile. I reached out to him, and he forwarded me some contacts from Palsawade and Varkute Malavadi. Meanwhile, I also came across Mann Deshi Foundation, a prominent NGO in Man taluka working at the grassroots level. I contacted th-

-em on LinkedIn, and they put me in touch with some people from Palsawade, Shirtav, Devapur, and Varkute Malavadi. These people, later on, provided me with more contacts.

I contacted all of them, and I got some critical insights regarding researching in rural areas. Some of them were very busy with Covid related problems and work. So they could not talk much. One person told me that people would be reluctant to talk on the record because of the politically sensitive research topic and political interference in one of the projects. Someone I contacted also mentioned that people might be uncomfortable talking to me about the project because I was a girl. Also, when I tried to contact a couple of women sarpanches, their husbands received all my calls. One interviewee on record told that there are women leaders in the village but only for a nominal purpose. All power lies with the male family members. Another person advised me to not read out the consent form and directly interview people, based on his own research experience. If I still need to read the consent form, he asked me not to read the full version. Because he felt that an attempt to be very transparent may unintentionally scare people. Most of the potential interviewees were illiterate, uneducated, or less-educated innocent people, and they were not familiar with all these research activities. Thus, he told me that any strange thing like a consent form may unintentionally make them conscious and wary. Nonetheless, for 10 interviews, I read out the entire consent form and answered all the questions interviewees had before starting the interview. For the rest 3 interviews, instead of reading out the consent form, I summarized the main points of it, answered all their questions and took their permission before recording.

This chapter described the research methodology used for the thesis. It provided reasons why that particular methodology and case study location were chosen. It introduced reader to the geographical and social context of the location. It further explained the data collection and analysis techniques used in chapter 5 and 6. Finally, it provided some useful insights for conducting research in India.

The next step is to conduct the research using the methodology. To carry out interviews and their analysis, basic understanding of justice and energy justice is required. Thus, in the next chapter, theoretical background about energy justice is provided. This background helped design the questionnaire for interviews and their analysis in chapter 5.

3. Theoretical Background

In this chapter, topics of justice and energy justice theories are described. This chapter serves as a background reading and it does not directly answer any of the research questions. It, however, helps build reader's understanding about justice issues and how they may manifest within the context of renewable energy projects. Section 3.1 is a small introduction to the huge topic of justice which describes what justice means in general. Section 3.2 specifically focuses on energy justice framework and its two tenets, namely distributional justice and procedural justice. In 3.2.1, distributional justice is described and the parameters that will be used to analyze the distributional justice outcomes in the case study are mentioned. In 3.2.2, procedural justice concerns are explained which are eventually used for the case study in chapter 5.

3.1 What is Justice?

Justice is one of the most important moral values that occupies center stage in ethics and legal and political philosophy (Miller, 2017). Over the years, justice has meant different things for different people. With biblical notions of the "Golden Rule" or the "Ten Commandments," Christians refer to justice as divine law commanding human behaviour. In contrast, for Greeks, justice was simply living a virtuous life where slavery was not considered morally wrong (B. Sovacool & Dworkin, 2015). For libertarians, justice can be about individual liberty and minimum government control, while in social philosophy, it can be about equality and welfare (B. Sovacool & Dworkin, 2015). Several modern conceptions of justice focus on "fairness" in distributing goods and services to create fair social structures (B. Sovacool & Dworkin, 2015). So, in the contemporary world, justice concerns itself with determining ways to logically allocate goods, services, opportunities, powers, benefits, burdens, and obligations in a society (Gauba, 2003; B. Sovacool & Dworkin, 2015).

So today, naturally, laws, institutions, social systems, individual or collective actions, decisions, and judgments are viewed as just or unjust. The very nature of these things raises many issues of justice. For example, who benefits and who bears the burden of a development project such as a highway or a dam? Or how do we assess the impact they create?, who has the responsibility to compensate for the adverse impacts? Who are the beneficiaries, how do we distribute the compensation among them, and so on. Various justice theories focus on different aspects of the previously mentioned things. Therefore, in social justice theory, John

Rawls describes justice as the ”first virtue of social institutions,” and the basic structure of society, how various social institutions distribute the rights, duties, advantages, and disadvantages of social cooperation become the prime focus of research (Rawls, 2020). Environmental justice focuses on distributing environmental hazards and access to all-natural resources, equal protection from burdens, meaningful participation in decisions, and fair distribution of benefits (Jenkins, 2018; B. Sovacool & Dworkin 2015). Climate justice deals with the justice issues that arise because of climate change, such as impacts of climate change, burden sharing, responsibility allocation, climate policies, and others (Caney, 2020; Jenkins, 2018).

However, why do we develop different theories of justice? Miller (2013) argues in his book titled ”Justice for Earthlings” that we do so because “we want to order and explain our intuitive beliefs about what fairness requires in different situations.” So when people observed that energy projects and policies create injustices, various energy justice frameworks were developed.

3.2 Energy Justice

With a future threatened by climatic adversities, sea-level rise, pollution, scarcity of conventional energy resources, and a host of other factors, we need fresh ways to tackle some age-old and some new ethical dilemmas these challenges pose. Smoke from the coalfired power plant is choking the entire planet and not just the people living around it. However, some of us desperately need coal at the moment to fulfill our basic energy demands at affordable prices. Transitioning to cleaner fuels for transport is the need of the hour, but building the necessary infrastructure requires enormous investments. Decisions of prioritizing one of the options over the other by any group of people have implications for us all. So how do we strike a balance between the needs of various people on this one planet we call our home? As complex sociotechnical systems, energy systems and the related issues such as energy production, access, affordability, security, consumption, et cetera have profound implications for societies at large (Jenkins et al., 2016; B. Sovacool & Dworkin, 2015). Furthermore, if we know this, how do we assess and mitigate the impact of negative externalities caused by individual or collective actions in the energy domain?

The limited success of environmental and climate justice vis-à-vis decision-making related to

respective domains prompted the need to have a more focused framework explicitly tailored to the energy domain (Jenkins, 2018; B. Sovacool & Dworkin, 2015). Thus, even though Energy Justice shares the same philosophy as environmental and climate justice (Jenkins, 2018), it focuses exclusively on energy-related topics. Energy justice, like environmental justice, is based on the core tenets of distributional justice, procedural justice, and justice as recognition (Jenkins, 2018) that includes more significant socio-political issues of representation and economic relations between the state and firms and local groups (LaBelle, 2017).

In energy justice scholarship, various frameworks have emerged based on different tenets or principles of justice. In tenet-based frameworks, two uncontested tenets, namely procedural and distributive justice, are always used (van Uffelen, 2021). Furthermore, the recognition justice tenet was proposed in 2013 (see D. A. McCauley et al. (2013)). In 2017, another tenet of restorative justice was introduced by R. J. Heffron and McCauley (2017), which was presented

as a ”dimension” of the previously mentioned three tenets (van Uffelen, 2021).

Instead of tenets, some scholars base their frameworks on certain principles. In one such framework introduced by B. K. Sovacool et al. (2013), energy justice was conceived as a conceptual, analytical, and decision-making tool based on eight core principles: availability, affordability, due process, good governance, sustainability, intergenerational equity, intragenerational equity (or distributive justice), and responsibility (B. Sovacool & Dworkin, 2015). These frameworks are then applied to various cases at different levels, which create another paradigm to view energy justice. For instance, universal and particular energy justice account for global and local interpretations of energy justice, respectively (LaBelle, 2017). The universal energy justice looks beyond the regional boundaries to assess the energy (in)justices using eight aspects proposed by B. Sovacool and Dworkin (2015) to help build just universal energy systems (LaBelle, 2017; B. K. Sovacool et al., 2013). While in particular, energy justice focuses on local energy debates, decisions, and actions (R. J. Heffron & McCauley, 2014; LaBelle, 2017). Some scholars view energy justice from a production point of view as transitions towards a low carbon future (Healy & Barry, 2017; R. J. Heffron et al., 2015; Lappe-Osthege & Andreas, 2017; D. McCauley & Heffron, 2018; D. McCauley et al., 2016). While some others focus on achieving long term energy efficiency without compromising on individual wellbeing through consumption based approach (Bouzarovski & Simcock, 2017; D. McCauley, 2018; D. McCauley & Heffron, 2018; Rasch & Köhne, 2017; Walker & Baxter, 2017; Yenneti &

Day, 2015, 2016; Yenneti et al., 2016).

One might then wonder, do we need 'just' energy transitions only because of ethical reasons? Scholars believe that energy justice concerns have very practical implications, and hence they matter beyond moral or philosophical reasons (B. Sovacool & Dworkin, 2015). As B. Sovacool and Dworkin (2015) identify, conflicts over distributional or procedural issues can affect local livelihoods and cost companies a hefty sum of money due to delays, lawsuits, missed opportunities, social dislocation and the damage of corporate reputation'. Moreover, these issues have psychological connotations which may affect our energy transition efforts in the long term. So, what are people's energy and energy project-related woes, and whom do they blame for those issues, can shape 'investment decisions, personal behaviour and even trust in information about energy and institutions supplying or regulating it' (B. Sovacool & Dworkin, 2015).

Thus, despite the common criticism of the dominant influence of western theorists and anthropocentric viewpoint (B. K. Sovacool et al., 2017) as well as focus on industrialized societies (Aklin et al., 2018; Hanger et al., 2016; Yenneti & Day, 2016), scholars believe that energy justice has the potential to build a solid foundation for communities seeking justice at local, regional, or national levels concerning energy systems (Jenkins, 2018). For this research, we chose the widely used uncontested tenets consisting of distributive and procedural justice. The reason behind selecting these tenets was the existence of empirical evidence of its applicability to the solar projects in India (see Yenneti & Day (2015) and Yenneti & Day (2016)). These tenets will help us answer subquestion 2, where are the injustices, and was a fair process followed in our specific solar project case in chapter 5. What do these tenets mean is discussed in detail in the following subsections.

3.2.1 Distributional Justice

In the past decade in Europe, debates over distributional justice concerns in the renewable energy projects have increased significantly (see Breukers and Wolsink (2007), Catney et al. (2014), Cowell et al. (2011), Gross (2007), Simcock (2014), Toke (2002), and Van der Horst and Toke (2010)). Distributional justice concerns in these case study analyses comprise of distribution of economic benefits such as profits and compensation, social benefits such as the creation of jobs, education, etc., energy benefits in terms of access to energy to burdens

like loss of land and livelihoods (Yenneti & Day, 2016). It is sometimes argued that the environmental and energy benefits of renewable energy accumulate at regional, national, and international levels. In contrast, the community at the local level suffers environmentally and socially in terms of noise, land and habitat loss, visual impact, et cetera (Yenneti & Day, 2016). Moreover, these disparities in costs and benefits could also be present within local communities where one section of society benefits more while the others have to suffer (Yenneti & Day, 2016).

In simple terms, distributional justice refers to the distribution of benefits and burdens. It helps researchers to analyze where injustices emerge. Distributional justice argues that enabling conditions for wellbeing such as employment, food, shelter, clean air, water, and other environmental goods is a fundamental right of people (B. Sovacool & Dworkin, 2015).

D. A. McCauley et al. (2013) define distributional justice as the "physically unequal allocation of environmental benefits and ills and the uneven distribution of their associated responsibilities". These include government, public and private responsibilities and distributions of risks (D. A. McCauley et al., 2013; van Uffelen, 2021). Jenkins et al. (2016) also accept this definition and adds distributions of 'freedoms that is the extent of choice a person has over his/her life' to this tenet.

According to Jenkins et al. (2016), distributional justice deals with issues related to siting of energy infrastructures such as solar panels, windmills, transmission lines, et cetera, and the questions related to access to energy services. Box 3.1 and 3.2 present some of the distributional justice concerns in renewable energy projects from Germany and India respectively.

These individual interpretations by different scholars are but narrow and risk missing crucial injustices, if applied individually. Thus, van Uffelen (2021) proposes the broadest possible interpretation. It comprises distribution of 'all material goods and bads such as resources, wealth and pollution, and immaterial goods and bads such as responsibilities, duties, rights, risks, opportunities (which, in the energy context, often refers to accessibility – including time – and affordability), flexibility, freedom and power' (van Uffelen, 2021) while referring to distributional justice.

Following from the above interpretations of distributional justice, we focus on material goods

Box 3.1 :Distributional justice in German Energiewende

German Energiewende

Decarbonisation as well as removal of nuclear power from German energy mix

- German government's Feed-in-tariffs(FiTs) guarantee priority access and profitable electricity prices for renewable energy producers. However,
- The scheme's cost is then transferred to consumers who have to make additional payments in their electricity bills. This creates an additional financial burden, especially on lower-income communities (Jenkins et al.,2016). On the other hand, this could also create a positive distributional justice effect by making renewable energy production much attractive to private individuals, farmers, project managers, banks, and funds (Jenkins et al.,2016).
- Distributional justice concerns are also created due to the physical siting of the project or network infrastructure such as transmission lines. In Germany, most renewable energy is produced by wind turbines situated in the northern regions. However, the energy-intensive industries are located in the south. This situation requires new transmission lines to transport electricity from North to South. Bavaria region in Germany opposed the development of new power lines resulting in proposals of "electricity tariff zones" where southern regions may have to pay a premium for their electricity (Jenkins et al.,2016).

Box 3.2 :Distributional justice in Charanaka solar project

Charanaka, India

A mega-solar project (above 500 MW) at Charanaka village in Gujrat, India.

- For local communities, the solar project created several low-wage, unskilled, temporary jobs. Local roads were built, free solar streetlights were provided, and a wide range of temporary businesses was set up. Project developers benefited due to huge profits from the FiTs (Yenneti & Day,2016)
- Large farm landowners benefited more than landless farmers and pastoralists (Yenneti & Day,2016).
- Loss of farmlands and lack of long-term, permanent jobs jeopardized the livelihood options, especially for pastoralists and small farmers (Yenneti & Day,2016).
- Developers experienced project delays due to local conflicts caused by a workforce brought in from outside the villages. Thus, developers had to pay a hefty sum as fines (Yenneti & Day,2016).

Box 3.3: Procedural justice in Canadian Wind Energy program

Canadian Wind Energy

Findings from a case study that explores the ways in which governments/developers plan and execute the projects and how does it affect local communities' experiences.

- Meaningful participation: Some respondents from Ontario and Nova Scotia (two regions being studied) felt that their opinions were heard during the open houses and general information sharing sessions. Some others felt that these sessions were a "waste of time" (Walker & Baxter,2017).
- Awareness: Some respondents complained that they were unaware of the community-based wind development program's investment opportunities (Walker & Baxter,2017).
- Lack of control: The majority of respondents felt that they had little control over the decisions regarding the project, such as where the turbines were built (Walker & Baxter,2017).

Box 3.4 : Procedural justice in Charanaka solar project

Charanaka solar park, India

Findings from a case study that shows how the failure of procedural justice could lead to large undesirable impacts on the livelihoods of rural communities as well lead to the marginalization of certain communities.

- Information exchange: Some respondents, especially the older citizens, said that they did not receive any information about the development of the solar project from the government or the project developers (Yenneti & Day,2015). During the land acquisition process, no information about the specific development was given in the land acquisition notices (Yenneti & Day,2015).
- Inclusion: Respondents claimed that no effective participatory and inclusive meetings with the village community were held during the solar park decision-making process (Yenneti & Day,2015).
- Representation: Caste hierarchy plays a significant role in power and voice, especially in rural India (Yenneti & Day,2015). As there were no concrete arrangements for information exchange and inclusive decision-making, villagers came together to form representative groups. However, the leading roles in these groups were occupied by the most influential and powerful members generally belonging to the upper caste communities (Yenneti & Day,2015). Education, too, played an important role while deciding the leaders of the representative groups.

such as land, monetary returns on land, employment opportunities, energy provision and accessibility, local development, and immaterial goods as described above in the case study in Chapter 5.

3.2.2 Procedural Justice

Procedural justice is the most important of justice variables to influencing community acceptance of renewable energy (Walker & Baxter, 2017; Yenneti & Day, 2015). A wind energy case study conducted by Gross (2007) in Australia concludes that procedural justice strongly affects the trust in public institutions and the empowerment of communities. In general, procedural justice is about fairness in the institutional procedures and implementation of projects or policies (Yenneti & Day, 2015).

Furthermore, Yenneti and Day (2015) argue that unfair procedures are unjust and are more likely to lead to unjust outcomes.

D. A. McCauley et al. (2013) define procedural justice as ”a call for equitable procedures that engage all stakeholders in a non-discriminatory way”. This includes ”access to information, access to and meaningful participation in decision making, lack of bias on the part of decisionmakers and access to legal processes for achieving redress” (B. Sovacool & Dworkin, 2015). It concerns access to decision-making processes governing the distributions mentioned in the previous section. Procedural justice is influenced by formal legal systems and informal institutions such as practices, norms, values, and behaviours (Jenkins et al., 2016).

Jenkins et al. (2016) make explicit three mechanisms necessary to attain procedural justice at local levels. Firstly it identifies the necessity to mobilize local knowledge to achieve inclusive and meaningful engagement of local affected communities in decision-making processes (Jenkins et al., 2016). This implies that effective participation is not just limited to physical involvement in the decision-making, but it involves the inclusion of local knowledge, discourse, and stories (Jenkins et al., 2016). Secondly, it seeks impartiality and full information disclosure by the government and concerned industries along with sympathetic engagement mechanisms (Jenkins et al., 2016). Lastly, it emphasizes the need for representation of different sections in various institutions such as business, governmental bodies, as well as nonstate actors such as civil society organizations, as it has a significant impact on the decisions made (Jenkins et al., 2016).

Box 3.5: List of parameters used for analysis in chapter 5

	Parameter	(In)justice analyzed with respect to
Distributional	Land	• (Loss of) Access to land and its impact. • Compensation received
	Employment opportunities	• Number of jobs created • Primary beneficiaries of jobs • Type of jobs
	Energy provision & accessibility	• Primary beneficiaries of generated solar energy • Access to electricity in general
	Local development	• Local infrastructure development • Local economic development • Other initiatives started by SPDs
	Immaterial goods	• Impact of solar project on risks, responsibilities, or freedom of locals
Procedural	Access to information	• Impartial and full information disclosure about the solar park
	Decision-making process	• Involvement of locals in various decisions regarding solar park
	Meaningful participation	• Inclusion through meaningful and democratic participation • Giving 'voice' (enfranchisement) to the local communities

For this study, we mainly analyze the parameters such as access to information, decision--making process, and meaningful participation of locals. Box 3.3 and 3.4 present some cases of procedural injustice from Canada and India.

The chapter described the general notions of justice before diving into the energy justice literature. It explained distributional and procedural justice as understood in the energy justice literature. This understanding was used to construct the questionnaire for interviews. Box 3.5 enlists the parameters used in chapter 5 which were derived from the literature discussed in this chapter.

As described in the beginning of this chapter, today laws, institutions, individual or collective actions, decisions, and judgments are viewed as just or unjust. Thus, the next chapter focuses on the formal rules and actors involved in the solar energy implementation in India, to understand the context within which the injustices identified in chapter 5 occurred.

4.Institutional Rules & Project Stakeholders

This chapter answers the first research sub-question, *"What are the important rules in use and stakeholders involved in the implementation of a utility-scale solar project?"* to know within which context the injustices identified in chapter 5 occur. Moreover, it provides information regarding the legal provisions already in place that could prevent the injustices and make solar projects more responsible. Section 4.1 presents key policies and regulations that govern the solar energy sector in India and Maharashtra. Subsection 4.1.1 introduces the reader to the multilevel governance framework of India within which different laws and regulations are implemented. In 4.2.2, energy policy framework is introduced that describes key pieces of legislations and policies. It includes Electricity Act, 2003, National Solar Mission and Renewable Energy Policy, 2015 of Maharashtra. After that, in 4.2.3, complementary policies that apply to the solar parks are introduced. These include Land acquisition act, Environment Protection Act, Groundwater abstraction and waste management rules. In section 4.2, project stakeholders in the solar parks in Man taluka are introduced. Although there are many stakeholders and actors, for this research the primary focus has been SPDs, EPC contractors and local communities which are explained in this section.

4.1 Key Policies and Regulations

To govern the country of billions, the Constitution of India created a federal parliamentary system with 28 States and 9 Union Territories, enabling a complex multilevel governance structure. Thus, it is imperative to introduce this structure as it forms the legislative and executive organs playing crucial roles in implementing the policies described in the subsequent sections.

4.1.1 Constitutional framework

At the Union (central) level, law-making power resides with two houses of parliament, namely the Loksabha (Lower House) and Rajyasabha (Upper House). Council of Ministers, led by the Prime Minister of India, forms the executive organ of the government at the Union level. At the Regional (state) level, the union level system is replicated in the Chief Minister, Legislative Assembly, and Legislative Council. At the local level, cities, towns, and transitional (from rural to urban) areas are governed through Municipal Corporations, Municipal Council, and City Council. For rural areas, local self-governance of the village, block, and district is realized through Gram Panchayat, Panchayat Samiti, and Zilla Parishad, respectively. Fig. 4.1 represents the three tier Panchayati governance structure responsible for implementing policies in general.

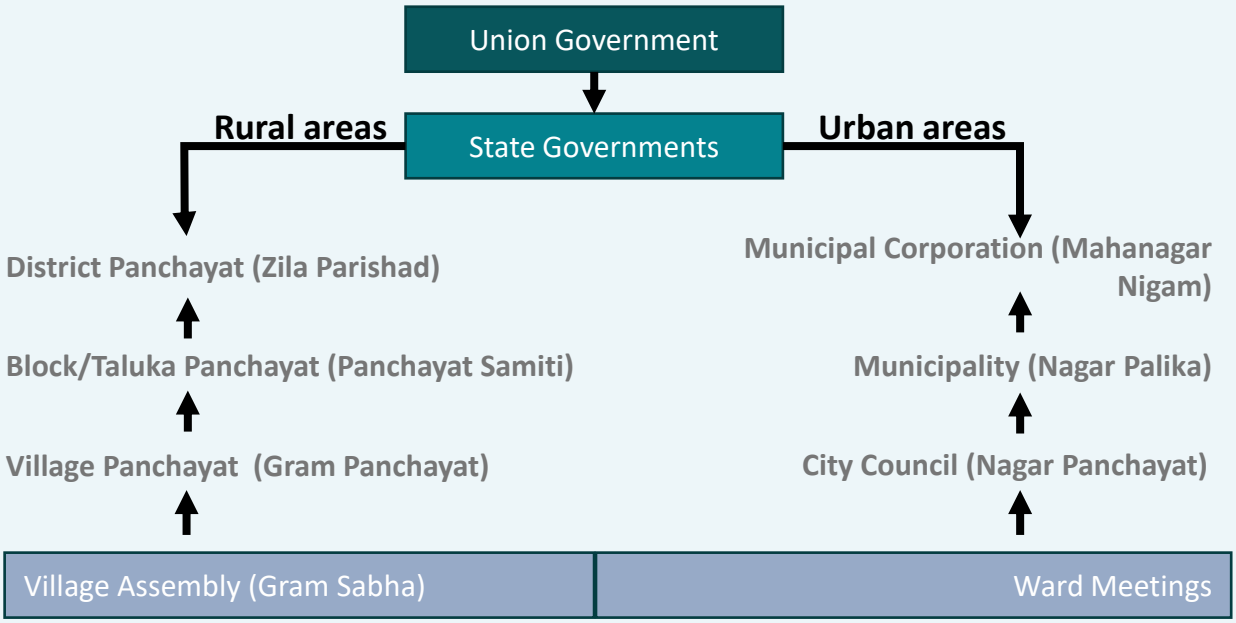


Fig 4.1: Panchayati Raj System *(Source: author)*

Each of these levels is conferred with certain powers and tasked with responsibilities to govern their jurisdiction. The Constitution of India consists of 3 lists of subjects, namely Union, State, and Concurrent lists. As the names suggest, the Union government can make laws on the subject enlisted in the Union list, and states can make laws on State list subjects. The concurrent list consists of subjects on which both Union and states are allowed to make laws. Electricity falls in the Concurrent list of subjects. Hence, both Union and State governments can design policies, plans, or programmes and create acts, rules, notifications, circulars, or guidelines to develop this sector. As for villages, state governments are directed to devolve powers and responsibilities to the Gram Panchayats in that state. Gram Panchayat is an institution of self-government for villages consisting of elected members. Headed by a Sarpanch, its primary responsibilities include preparing plans for economic development and social justice and implementing development schemes in the village.

4.1.2 Energy Policy framework

A long-term, transparent and credible policy framework is imperative for any nascent industry to attract the investment necessary to accomplish ambitious targets (Ghosh et al., 2012). As mentioned in the previous section, Electricity is a shared responsibility of states and central government. Consequentially, the Union and states both have some policies and acts for its

development. This report mainly focuses on the provisions for Solar Energy Development in the Renewable/Unconventional Energy policies of the central government and state of Maharashtra, as is relevant to the case under consideration. Box 4.1 summarizes the institutional arrangement for solar energy governance.

Electricity Act 2003

Electricity Act (EA),2003 that came into force in June 2003, consolidates and replaces several older laws on electricity (S. C. Bhattacharyya, 2005). One of the core objectives of the act was to promote competition in the Indian electricity industry (S. C. Bhattacharyya, 2005). EA 2003 was the first national and legal regulation that mandated the State Electricity Regulatory Commission (SERCs) to develop renewable energy in their States (Schmid, 2012). In addition to various provisions, the act gives rights to state governments to make rules for energy generation plants regarding, for example, required permissions, compensations, environmental impact or damage to public, or private property.

National Solar Mission

In 2008, the National Action Plan on Climate Change envisaged solar energy development as a National Mission (Sharma et al., 2012). As a result, the Jawaharlal Nehru National Solar Mission, also known as NSM, was launched in 2010. The NSM adopted a three phase approach with an immediate focus on creating an enabling environment to accelerate the solar energy penetration across India to meet the ambitious target of deploying 100GW (previously, 20GW) through the development of off-grid, rooftop, and grid-connected solar power by 2022 (GoI, 2008).

Several solar projects, including those considered in this case study, were developed under the Batch-III phase-II of NSM (MSEDCL, 2018, 2019). In Phase-II of NSM, installation of 10GW utility-scale solar power projects were envisaged, of which 4GW would be developed under the central scheme, and the remaining 6GW would be developed under various State specific schemes in batches (GoI, 2008; MNRE, 2021). Projects in Batch-III of this phase are to be set up by Solar Power Developers (SPDs) on Build-Own-Operate (BOO) basis under Viability Gap Funding (VGF) mode (GoI, 2008; MNRE, 2021). Solar developers are selected based on the minimum VGF requirement quoted in INR/MW.

Box 4.1: Institutional arrangement for governance of renewable energy projects

UNION

EA, 2003
- Gives right to states to create rules and regulations for energy generation plants required permissions, compensations, environmental impact or damage to public, or private property.

NSM, 2008
- Private SPDs can set up solar parks on Build-Own-Operate basis in VGF mode under Phase II batch III of NSM

LARR Act, 2013
- Regulates land acquisition for developmental purposes including solar parks by government agency
- Requires developers to consult concerned self-government institutions (Gram Panchayat, Gram Sabha) during land acquisition
- Provides guidelines and rules for Social Impact Assessment of projects
- Union government has allowed states to create alternative mechanisms for private land acquisition for renewable energy development

Environment Protection Act, 1986
- EIA notification issued under this act requires projects to obtain environmental clearances
- Renewable projects are exempt if they are not operating in eco-sensitive zones

Groundwater Abstraction rules
- Infrastructure users and developers involved in renewable energy projects must obtain a No Objection Certificate (NOC) before extracting groundwater

STATE

Renewable Energy Policy (State of Maharashtra), 2015
- Electricity generated from renewable energy plants can be sold to the state distribution utilities or can be used for captive purposes.
- Land acquisition for the project is SPD's responsibility
- Private landowners may give their lands on a rental/lease basis for solar projects.
- Solar projects are exempt from obtaining a NOC/consent from the Pollution Control Board.

LOCAL

Gram Panchayat
- SPDs have to obtain a NOC from the concerned Gram Panchayat before commencing the development of the park
- SPDs pay taxes to Gram Panchayats

Gram Sabha
- Meetings of villagers and SPD's employees should be organized to discuss the impact of the project or SIA report(if conducted).
- Gram Panchayat is expected to grant NOC only after such discussions are carried out

Renewable Energy Policy, 2015

Following the national vision, state governments in India promote renewables on the regional level through independent policies and programmes (Sharma et al., 2012). The Government of Maharashtra (GoM) approved the state's renewable policy titled" Comprehensive Policy for Grid-connected Power Projects based on New and Renewable (Nonconventional) Energy Sources" in June 2015 (GoM, 2015). This is a comprehensive policy for generating and promoting electricity from solar, wind, bagasse/biomass cogeneration, small hydro, and waste in the state of Maharashtra (GoM, 2015).

According to this policy, solar power projects of 7500 MW will be developed in the state. 2500 MW will be developed in a public-private partnership mode, and other developers will develop the rest of this capacity. Electricity generated from these projects can be sold to the state distribution utilities or can be used for captive purposes. Land acquisition for such a project is the project developer's responsibility, and the land so procured is given 'non-agricultural' status by the government. The policy also mentions that private landowners may give their lands on a rental/lease basis for solar projects. Besides, this policy exempts solar projects from obtaining No-Objection-Certificate (NOC)/ consent from the Pollution Control Board.

4.1.3 Complementary Regulations

In addition to the policies and laws designed particularly to encourage the growth of renewables in the country, several other regulations are applicable to the renewable energy projects.

Land acquisition (LARR) Act, 2013

This act is officially known as the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013. It is an essential piece of legislation regulating land acquisition for developmental purposes, including renewable energy projects. It outlines the process to be followed when land is acquired for a public purpose by any government agency(GoI,2013). The act states that the land acquisition process for public purposes is to be carried out in consultation with local self-government institutions like Gram Panchayat and Gram Sabha (GoI,2013). It also contains provisions for those who are not the landowners but whose livelihoods depend upon it, such as agricultural laborers. The

compensation for acquired land needs to be four times the market value in rural areas.

Furthermore, it requires Social Impact Assessment (SIA) to identify affected families and calculate the social impact when land is acquired. The SIA report thus prepared has to be presented for public hearing at the affected area, and it also needs to be appraised by a multi-disciplinary expert committee (GoI,2013). With many stringent procedural requirements, some stakeholders believe that the act complicates the already tricky land acquisition process (Y. S. Sharma,2015; WRI et al.,2021). Thus, with encouragement from NITI Aayog, the country's premier think-tank, the Union government has allowed states to create alternative mechanisms for private land acquisition for renewable energy development (WRI et al.,2021). An amendment to the LARR act, called LARR (Maharashtra Amendment) Act, 2018 exempts projects such as rural infrastructure including irrigation and electrification from SIA requirement.

Environment Protection Act, 1986

This act was enacted in 1986 to provide for the protection and improvement of the environment. It confers powers on the Union government to establish authorities to prevent environmental pollution in all its form and tackle specific environmental problems peculiar to various parts of India. Under this act, the Environmental Impact Assessment (EIA) notification was issued in 2006, requiring projects in most sectors to obtain environmental clearances (WRI et al.,2021). However, several renewable energy projects such as solar, on-shore wind and small hydro (up to 25MW), biomass, and waste to energy (up to 15 MW) are exempt from conducting an EIA as long as these projects are not operating in eco-sensitive zones (WRI et al.,2021).

Groundwater abstraction rules

Central Ground Water Authority (CGWA), functioning under the Ministry of Jal Shakti, has issued a set of guidelines regarding groundwater use. As per the guidelines, infrastructure users and developers involved in renewable energy projects must obtain a No Objection Certificate (NOC) before extracting groundwater (WRI et al.,2021).

Waste Management rules

As per the E-waste (Management and Handling) Rules, 2016, and most central bidding

documents, developers are responsible for disposing of photovoltaic (PV) waste (WRI et al.,2021). However, these rules do not mention solar panel waste (WRI et al.,2021). Besides, the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 also do not specify details regarding solar cells and modules (WRI et al.,2021).

4.2 Project Stakeholders

The strategies and rules outlined in the previous section govern the overall solar project development and implementation process. Key stakeholders at different levels work together during various phases of solar project development to realize a thriving solar ecosystem. Fig. 4.2 shows the general set of actors involved in the project implementation.

As can be seen in the figure 4.2, at project level we have 3 key stakeholders. This research focuses on the stakeholders at local level namely the developers, Engineering, Procurement and Construction (EPCs) contractors and communities as a supporting environment. The solar projects at Satara are being developed by two project developers, hereinafter called as SPD-1 and SPD-2.

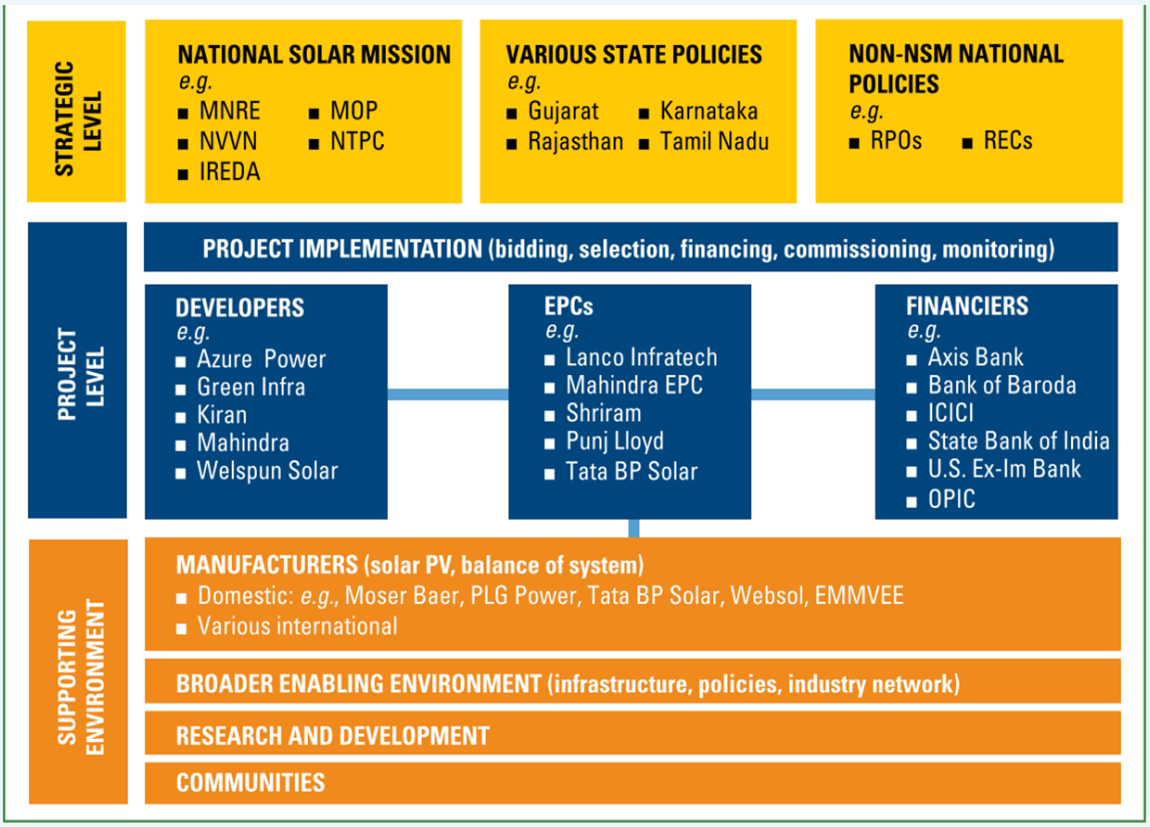


Fig 4.2 : Key Stakeholders *(Source: taken from (Ghosh & Jaiswal,2012))*

SPD-1 is a wholly owned subsidiary of one of the largest integrated power company of India. It commissioned its solar park in Palsawade during Phase I and Phase II of NSM.

SPD-2, formerly known by a different name, is a demerged undertaking of yet another power sector company X. In January 2016, company X won 100 MW in an auction conducted by SECI to develop a 500 MW solar capacity in Maharashtra (Chandrasekaran,2017). This project is now being developed by SPD-2. This project has experienced significant execution delays because of changing management, legal hurdles, and land acquisition (Chandrasekaran,2017; Singh,2020). Fig. 4.3 shows the solar park development timeline of both developers.

The additional 30 MW capacity of SPD-1 and SPD-2's 100 MW plant were sanctioned under Phase-II Batch-III of the National Solar Mission. Owing to the multi-layered policy framework of India, the provisions for solar power projects in the Renewable Energy Policy of the Maharashtra government are also applicable to these projects.

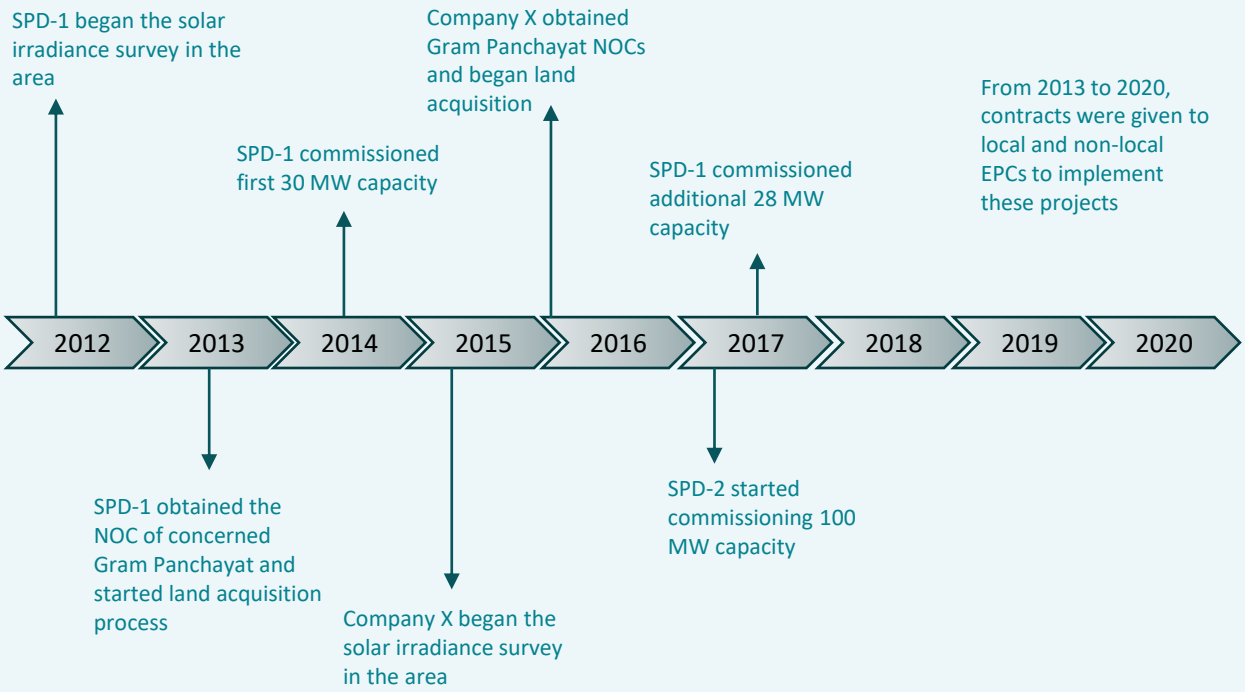


Fig. 4.3: Solar park development timeline

As per the provisions, SPD-1 and SPD-2 could promote solar parks without any equity participation from SECI or state government agencies. Also, according to Maharashtra state's policy, the private land for such a project is to be procured by the project developers themselves, and a deemed non-agricultural status is given to the land so procured. Moreover, such projects are required to obtain necessary clearances and "No Objection" certificates(NOC) from concerned governing bodies. However, they were exempted from obtaining a NOC from the Pollution Control Board. Fig. 4.4 shows the actors and formal rules relevant to the implementation of this project.

Thus, both SPD-1 and SPD-2 (erstwhile Company X) first started surveying the area around Palasawade, Devapur, Shirtav, Banagarwadi, and Varkute-Malavadi around 2012 and 2015, respectively. These surveys were carried out to compile the solar irradiance data of the region to identify the prime locations for installing the solar panels. Once the lands were identified, the next task was to buy those lands. In the very beginning, both developers took the help of the local middlemen. These middlemen were usually the people from the concerned villages who approached the identified landowners on behalf of the developers. They convinced the owners to sell their lands to the developers. Some interviewees said that intermediaries were later removed, and the project developers directly contacted landowners for their lands. Project developers then obtained the NOCs from the concerned gram-panchayats. After acquiring the lands and obtaining necessary permissions, the developers submitted their proposals to concerned state government authorities to provide transmission infrastructure.

The next stage was commissioning the project. Contracts were signed with various local and non-local EPCs to procure building materials, construction, and other operational tasks. EPCs are experts in building projects, and they have an understanding of the local challenges that may affect the project implementation (Ghosh & Jaiswal,2012). From interviews, we gathered that some local contractors got construction and procurement contracts. Some more established contractors from outside the state of Maharashtra got engineering contracts. These contractors are now responsible for the day-to-day administration and smooth operation of the projects.

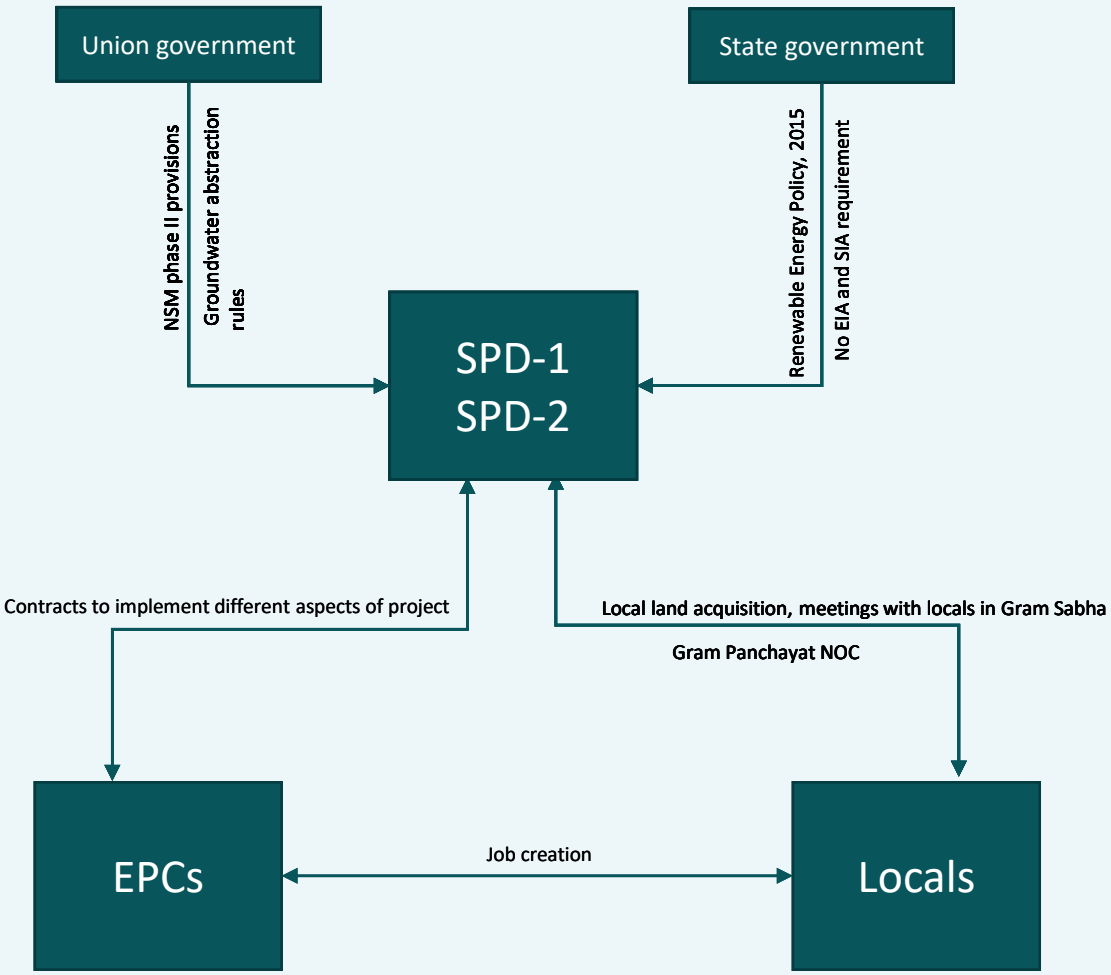


Fig. 4.4: Actors and formal rules at project level

This chapter answered the first sub-research question. It described the formal rules in place to govern the solar energy projects. It also described the institutions and actors that are important at project level and how they are related to each other.

This knowledge will help reader understand the context within which injustices identified in the next chapter 5 occurred. It will also help in analyzing the factors responsible for the injustices in chapter 6. Moreover, it will help in answering the last research question in chapter 7.

5. Analysis-part I

This chapter answers the important sub-research question of *"Where are the injustices, who is ignored and has a fair process been followed during the implementation of a utility-scale solar project in India?*" The analysis is divided into two sections. In section 5.1, distributional justice concerns for local communities of the villages in terms of land, employment opportunities, energy provision and accessibility, local development and immaterial goods like risk, responsibilities are explained in sections 5.1.1, 5.1.2, 5.1.3, 5.1.4 and 5.1.5 respectively. In Section 5.2, procedural justice concerns are described in terms of access to information (5.2.1), decision-making process(5.2.2) and meaningful participation of locals (5.2.3).

5.1 Distributional Justice

In simple terms, distributional justice refers to the distribution of benefits and burdens. In this section, we analyze the distributional justice outcomes, as discussed in chapter 3, in terms of land, employment opportunities, energy provision, local development and immaterial goods. These outcomes have been assessed based on interviews, documents, and information gathered from company websites.

5.1.1 Land

Based on the interviews, one of the significant impacts that villagers felt was regarding the land, remuneration received, and access to the land.

"In rural areas, nobody was willing to buy these lands even for 30,000-40,000 Rs per acre. At that time SPD-1 took their lands for 1.5 – 2 lakh Rs per acre", claimed Respondent 1.

As pointed out earlier, this area is a water-scarce region with underdeveloped irrigation facilities. Hence agriculture is complex. So when someone offered money for their fallow, unirrigated lands, people sold them without much thinking. This was also because of their expectations and the information they received (See section 5.2).

The land acquired for the solar parks came entirely from private landholders, even though a few hundred acres of government land around these villages was available. This private land was mostly used for grazing, where people used to plant trees fit for animal consumption. With the loss of access to that land and the absence of alternatives, many people had to sell their animals.

"No, now our area was 8-9 acres. So after selling that, now we don't have anything where I can graze my sheep. That business had to be closed." said Respondent 3.

Another villager, Respondent 5, said,

"...Madam, the thing is...Since there is a drought here, there were animals... buffaloes, goats, sheep... so on... we had so many animals... that land was used for grazing the animals...(After the solar park was built) there was no alternative arrangement... People sold 50% of the cattle they had ... The rest now manage the fodder from grazing lands or from somewhere else... 50% of the cattle were reduced."

Chetna Gala Sinha, founder of Mann Deshi foundation, a local NGO, on the occasion of opening a cattle camp in 2019 said that,

Fig 5.1 : Animal population in the village decreased significantly *(Image Source: Shamrao)*

"*The dairy industry is a critical source of livelihood in this region, and it has become more so in the last few years. Because even when milk prices are low, farmers get a sustained cash flow. It's less uncertain than farming" (Iyer,2019).*

Thus, losing the land indirectly led many small and poor farmers to sell their animals. It was equivalent to losing a sustainable source of livelihood for the present and years to come.

In addition, respondents told that people received different remuneration for their properties. Respondent 5 said,

"*At that time, madam, they (company) gave 1.5 or 2 lakh (per acre) for such lands ... I mean they (company) bought the land in paltry amounts .. there were poor people, people with*

difficulties ... the company bought lands mostly from such (people). and then later, in the end, a Guntha got a little higher price .. I mean, in the end, now they (farmers) don't give (their lands). I mean, now if a farmer is in the middle ... I mean, his land ... but he doesn't give it .. Then (company) paid him some five or six lakh rupees and took his land ..."

Another villager, Respondent 2 recalls, "*The company had appointed agents here. In this area. And the agents bought the lands of the poor farmers who have nothing to do with the world (too innocent), at very low prices.*"

The price offered for these lands ranged from mere 35,000 Rs (403 €) to almost 10,00,000 Rs (11507 €) per acre.

In case of Respondent 3, the situation was a little different. He did not want to sell his land but eventually ended up selling it for around 3 lakh per acre. He said,

"Look, I am illiterate... into shepherd business ... I got a price of 3 lakh 20 thousand rupees per acre. But some were now traded for seven lakh, eight lakh rupees. But my opinion was that if the land is coming in between, they should leave the same amount of land to us on one side. But that is not happening, they told"

However, Respondent 7 said that some people got an equivalent piece of land outside the park instead of getting monetary compensation. The company also helped these people in making those lands cultivable by leveling them and adding good soil.

Many respondents did acknowledge the positive impact of selling lands like getting jobs around their villages, thus avoiding migration to big cities like Pune and Mumbai or receiving money for otherwise commercially unattractive, fallow lands. According to Respondent 2,

"People got employment. The land is gone. They got some money in exchange for the land. People did some works from it (the money). I mean, someone sold the land, someone dug wells, dug up bore wells , someone paid for children, or for a job in Pune-Mumbai ... I mean that money was used for good in the end."

Nonetheless, the land is not just another piece of material possession that people have. Most people have an emotional connection with their lands, even if it is a fallow land. It gives them a sense of belonging. This was evident through various interviews where respondents said

they have heard people regretting their decisions to sell the lands for solar parks. They feel that the newly developed water canal around these villages and good monsoon years could have made farming possible on their sold lands. To sum up in words of Respondent 3,

"Once the land is in the possession of the company, the common man does not get the land. The common man cannot go and buy land (elsewhere). Take us for example. Now the money is gone. Spent everything and now nothing, no choice. No land and nothing. If you sell your land and go to another place to buy, no one speaks below five and six lakhs rupees(per acre). There was a lot of remorse at that time that we were at a loss (while selling to the company)... But it is how it is, the mistake made is not repeated again and again ... it will have to be repented."

In summary, different people received different remuneration on their lands. Some received money whereas some were given equivalent piece of land elsewhere. Moreover, people received different sum of money for their lands. Reasons behind obtaining a particular remuneration are unknown and need more enquiry. Some farmers, especially those having other livelihood options, benefited through monetizing their otherwise fallow lands. Poor farmers or pastoralist whose livelihoods were land-linked suffered more than others for two reasons. First, because of lost access to land, they had to sell their animals which provided them less but sustained income, jeopardizing their livelihood. Secondly, the money obtained as compensation was spent quickly and people were left with temporary low-wage jobs discussed in next section.

5.1.2 Employment Opportunities

Arguably, job opportunities were the most significant aspect of developing solar parks that the locals were interested in. Whenever a major project such as this is operationalized in the underdeveloped rural regions, locals expect employment opportunities:

"The company is coming to that barren hill. Farming is not possible there, no drinking water. People's expectations obviously increased when they heard that the company would come to such a place. (They felt) that (their) children should start working there. If our children start working here instead of going to work in places like Mumbai-Pune, it will create a financial source for their families (while staying close to the families). This expectation was fulfilled...",

said Respondent 1.

However, people eventually realized that the solar power industry is mechanised and less labour intensive. Respondent 1 pointed out

"It(job opportunities) will be less here than other projects ... I mean other companies, factories need more workers. Since it is a natural source, it needs less workers. But its fine no... Even if it is just 25 families, they got the opportunity".

Besides, some respondents also claimed that all the people who sold their lands did not receive jobs as promised (see section 5.2).

Both companies preferred locals while hiring for different positions. Although respondents acknowledged that most of the jobs offered were unskilled, temporary, low-wage jobs. The company also offered technical jobs such as engineers, technicians, or project managers to qualified locals. For example, Respondent 8 from one of the villages worked in Pune city when one of the companies started developing their project in 2012. When the company management got to know the qualifications of Respondent 8, they called him for an interview. Once passing the interview, he was offered an appropriate position at the plant facility.

However, due to the lack of technical expertise, most of the well-paying job opportunities could not be availed by the local workforce. Companies had to rely on a qualified workforce from outside towns, cities, and states. Non-technical jobs mainly were related to security, construction, solar-plate installation, cleaning, grass-cutting et cetera. Jobs such as these are temporary and contractual. So naturally, they do not offer a yearly sustainable income. For example, many villagers received jobs during the construction phase, but now that the construction is over, they are jobless. Moreover, the wage is low, even by the rural standard.

One of the respondents who worked as a security supervisor at the park said,

"Now this is a drought prone region, what (money) will you get?. Because of covid, there is no work, there is no business, so (whatever the money) people are satisfied. If a farmer is paid Rs. 400 (4.60 €) per day for a day's work, then the company pays only Rs. 375 (4.32 €) ".

This respondent, Respondent 3, himself gets a salary of Rs. 11450 per month (so approx. Rs. 380 per day). Respondent 2 told a similar story. He said,

"*The company now has (employed) some men in security ... around 100, 125 are in security. So the company actually pays them a salary of Rs 9,000. That's about 300 rupees a day.*"

Fig 5.2: Machines brought in to clean the panels *(Source: Shamrao)*

According to these respondents, the salary is not enough. Many workers have routinely fought for the wage increase (see section 5.2).

Recently, one of the companies has brought robots to clean the solar panels. Now, this is a praiseworthy initiative, especially considering the amount of water needed to clean the panels manually. However, this means that locals lose the income they got from the temporary jobs of cleaning the panels.

Thus, people's expectations regarding the amount of jobs were far from reality. Lack of knowledge about this aspect (see section 5.2) could be the reason behind such expectations. Nonetheless, highly mechanized nature of solar industry further reduced job opportunities for locals. Besides, some locals who sold lands did not get a job indicating the additional cost paid by those landowners. Moreover, the temporary, low-paying nature of jobs restricted the choices of locals in terms of education, healthcare that would determine their future for generations to come. Thus, uneducated, poor landowners stand to lose more than the rest.

5.1.3 Energy Provision and accessibility

The nearest substation of the regional transmission system operator, Maharashtra State Electricity Transmission Company (MSETCL), is in Dighanchi, Sangli district. So people feel that all the energy generated by this solar park in the Satara district goes to the adjacent

district. Part of this energy is sold to big industrial clients, and the rest is sold to Maharashtra State Electricity Board (MSEB).

According to some interviewees and Census 2011 data, until recently, these villages experienced regular power cuts referred to as 'load-shedding' for around 8 to 12 hours per day. With such past experiences, when people realized that an energy project is coming to their villages, they started expecting free electricity.

Fig 5.3 : Company substation *(Source: author)*

Respondent 6 said,

"As a villager, they (company) use our revenue. That is, they use wind, they use solar energy, soil, land. I mean, they use everything. Our village does not get any benefit from that. I mean, we don't get no light (electricity) from solar energy anywhere. We expect (them) to provide free solar energy."

With consistent efforts from the government, the electricity situation has improved over the years, and the frequency of power cuts has reduced significantly. Now the villages receive electricity 24/7 for household consumption unless there is the disruption caused due to extreme weather events or technical failures. However, some respondents complained that they still receive electricity for a limited period for agricultural purposes.

"There is a power plant nearby but there is a problem of electricity. The supply line above us

does not have a single phase. There are 3 phases. Other villages have single phase so motor works continuously. That is an important issue for us. Since water supply (motors) work on 3 phase connections, there are problems like load-shedding etc.", Respondent 4.

"There is light (electricity) in the village. But the light for agriculture… 3 phases etc … it has a problem. We get it (electricity) sometimes at 11 pm in the night, sometimes at 12 am. Even if we get it during the day, the motor does not work. It trips immediately for some reason.", Respondent 7.

When villagers from Respondent 4's village communicated this problem to the officials of one of the companies, they offered a separate set of dedicated solar panels to power these motors. Although villagers appreciate the company's efforts, they point out the issue with this solution. Respondent 4 said,

"We were given the option of solar. But the thing is, it just works during the days … there is nothing for storage. When we have sunrise during the day, it (panels) continues (to generate electricity) till sunset. Besides there is a problem because the distance is too much … I think the length of the pipeline is 2 km. And it (panels) does not generate much motor power. So the water doesn't go up much. Water does not reach the water tank."

According to interviewees' accounts, the other company did not take any such initiative. While talking about SPD-2, Respondent 6 told,

"Nothing like that has happened yet on water wells… besides they should give solar powered plants (panels) to the school in the village. The village should be given as much as it (company) can from the C.S.R fund. There are water supply wells in the village. They (company) can install panels to run the motors on these wells."

For locals who are still deprived of 24 hour electricity, solar project in the area meant free and uninterrupted electricity supply. However, they still do not have 24 h electricity for agricultural and irrigation purposes. Despite project is built on their lands, they were not the direct primary beneficiaries of the electricity. Here too, locals bear the burden of energy infrastructure whose primary beneficiaries are some industries in the adjacent district. Locals, in this case, are indirect beneficiaries if the excess electricity is sold to MSEB.

5.1.4 Local Development

With such projects, people expect ample local development in terms of infrastructure such as good roads, electricity, basic facilities like schools, hospitals et cetera. These villages already had sufficient infrastructure, thanks to the efforts of locals, governments, and NGOs. They had all-weather roads connecting them to nearby towns, primary and secondary schools. Based on some interviewee accounts, transport facilities are not well developed, so people mostly rely on private vehicles. There is a primary healthcare center but no big hospital, multi-specialty clinic present in these villages. Not much has changed in terms of infrastructure in the past few years because of the solar project. However, most respondents had a positive outlook towards the presence of the project as far as development was concerned.

Respondent 4 said about SPD-1's solar park,

"*The advent of the (solar) project certainly brought development. Because the thing is... Unemployed boys in the village or those who had jobs in the suburbs got employment here. The company's support is also good from the C.S.R fund. They are doing a good job. See, now unemployed people work and support themselves, do business from agriculture and so on. Or for those who are economically weaker, those who are from backward classes, the company gave them goats, chickens from C.S.R Fund or trained them in sewing business or farming. SPD-1 guides us well. Recently, they also informed us about organic farming.*"

Apart from creating job opportunities for locals, the project also helped boost local businesses by building materials supplies. Some people got permanent contracts for security, cleaning, or grass-cutting. Thus, people who owned or started such complementary ventures benefited because of the development of the solar park.

Development is a subjective notion. Various regions have different developmental needs. For example, in a water-scarce region like Man, water conservation and development of irrigation facilities take priority. Other initiatives for empowerment of locals or upgrading the infrastructure are also valued. Thus, when people were told about the solar park development, they expected these companies to invest in the local development, especially through their CSR funds. Moreover, the local Gram Panchayats expected tax money from these companies, which could eventually be used for various developmental purposes.

Through interviews, we realized that the approach to local development differs from company to company and largely depends on the company management. So, in case of SPD-1, respondents generally had positive things to say because of the past and present work the company has been doing. However, respondents were not very happy with SPD-2's approach.

While talking about SPD-1 and its parent company, Respondent 1 told,

"*That company is a well-wisher of these villages. It is doing a good job here and they really try to understand the village and the farmers as well. Devapur, Palsavade, Shirtav, Varkute, Bangarwadi, some five to ten villages like these have been adopted by this company for past 30-40 years ... for the overall development of the village.*"

Thus, this company is more involved in local development. According to interviewees' accounts, they have provided computers to local schools, helped empower women through creating awareness about and starting Self Help Groups (SHGs) where women can come together and start a small local business to improve their living conditions. They also provide animals such as goats and chickens to the needy to have some income source. Besides, they are also involved in guiding the local teachers, farmers, and youth in things like digital education, organic farming, or jobs markets. They have also helped locals in their water conservation efforts with their watershed initiative. Besides, the company also pays a few lakhs in taxes to concerned Gram Panchayats.

Fig 5.4 : [redacted] Watershed initiative near Palasawade projet site *(Source: taken from company website https://www.[redacted]empowers-communities-at-Palsawade-Maharashtra-with-Watershed-Initiative)*

As for SPD-2, interviewees point out that they have not paid any taxes yet. It could also be on account of project implementation delays. Two respondents were hopeful that the company will deliver on its promises, such as free or low-cost electricity, and take some local developmental initiatives. Nonetheless, the majority of respondents seemed unhappy with SPD-2's approach so far. While talking about SPD-2, Respondent 6 told:

"*Our water, air, soil, land are used here. This is where the plant is built. We should get tax from this. They should give something to the village from the C.S.R fund. Build school, build colleges, build gutters, build houses for poor who have no houses... build small bandhara (dams). These are the things we need. If they do this much, that is also enough.*"

In summary, whenever big infrastructure projects are implemented in rural areas, locals expect that it will result in some development. Especially when locals saw that big companies like SPD1 and SPD2 are benefiting through the use of local resources, they expected that these companies would take meaningful social initiatives. There is no formal rule dictating such companies to participate in local development. However, non-participation may exacerbate the discontent and fuel the feelings of unfairness among locals. This is especially true in cases such as this, where locals at large are not benefiting through the production of electricity or jobs.

5.1.5 Immaterial goods

Here we talk about the benefits and burdens for locals regarding immaterial goods such as risks, responsibilities, or freedom as described in chapter 3.

As described in 5.1.1, dairy as a side business and animals have helped these people survive for generations. Losing access to land made many people sell their animals, thereby risking the livelihood prospects of their and future generations. With a lack of necessary education and vocational skills, most of these people can only be employed in low-skilled jobs that are mainly unorganized and provide meager incomes. These jobs come without any formal job security and benefits. In such a scenario, they have limited choices regarding where to spend and how much to spend. Especially if a person is a sole breadwinner in a joint family of 4 adults and two children, a salary as low as 11000 Rs per month restricts choices beyond imagination.

"I am the only child. I don't have a brother. My parents and I, wife and two children (is my

family). As long as there were sheep, we could manage, we could fill our stomachs. Now if the payment is not made on time, or there is unexpected medical expenditure or there is a festival then the money I get (salary) is not enough. See, if Rs 10,000 payment is received, around Rs 2000 go to the father's hospital. He is a sugar patient (diabetic). Now we have children, if one of them falls sick, then some money goes there…", Respondent 3.

Apart from this, another possible risk for locals could emanate from water usage. Companies need a significant amount of water, especially for cleaning solar panels. Through interviews, we understood that both companies had made their arrangements for water supply within the solar park. It includes constructing ponds for rainwater harvesting, water abstraction from the Rajewadi dam, buying water tankers from local suppliers, and digging up bore-wells within the park. Rajewadi dam is built on Man river and is the biggest lake in the vicinity of these villages. Local water suppliers have wells or bore wells for groundwater abstraction. According to all respondents, the past two years have been good monsoon years. So the dam is full, they have enough water in their wells and river Man. However, a series of consecutive drought years, which is not new for this region, could worsen the situation and lead to local conflicts over water.

Fig 5.5 : Pond constructed by the company for rainwater harvesting (at the back)
(Source: Shamrao)

Lastly, respondents complained of rising temperatures in the vicinity of the solar park. People do not have any scientific evidence to prove the rising

temperatures. However, it has created an additional burden on those who have farms near the solar project. They have to arrange more water for their plants and crops. Respondent 14 told,

"No, no ... Company would not listen to one or two farmers ... the farmers have to bear the consequences... we have our own tanker... Last year, we took water from the lake, brought it to farms with tankers and (that's how) the coconut trees survived. It was an awful situation. Horrible temperatures ... up to 40,42,43 degrees Celsius!"

In summary, companies benefit from exploiting local water resources for the operations of the solar park. Exploiting groundwater resources in areas of already falling water table results into unwarranted cost for present and future generations of locals. Rising heat is a problem for all. However, it is a total burden for farmers having farms near the project. These farmers did not sell their lands, so they did not get any benefits in terms of jobs or compensation. In this situation, those who have money can arrange for irrigation, but those who are poor have to compromise their food security and they stand to lose more.

5.2 Procedural justice

As described in chapter 3, procedural justice can be understood as the fairness in the institutional procedures and implementation of projects or policies. Unjust procedures lead to unjust outcomes. This does not mean that just procedures always lead to just outcomes. In this section procedures followed during planning, development and operation phase of the solar park in Man taluka are described. Firstly, it describes procedures in terms of access to information. This is followed by decision-making process and meaningful participation.

5.2.1 Access to information

Procedural justice requires impartial and full information disclosure by the government and industry (Jenkins et al.,2016). This case involves two solar projects being developed by two different companies. SPD-1's plant development process started from 2011-2012. Respondents recall how they first got to know about the project,

"*...it was through the company that we, villagers came to know that we are going to have a solar company here*", said Respondent 1.

Respondent 4 told,

"*Look, we didn't know anything at that time. We had only read about solar energy. We had read a lot in books. I mean, that's it. But we never thought that such a big project could come near our village. In 2013, they (company) had installed a device. To measure air humidity or rainfall here. Then they did a thorough study and chose this area (to install panels).*"

Thus, in the first instance, while talking about SPD-1's project, respondents agreed that they were informed about the solar project by the company officials. However, they further said that they had never seen a solar project before in their lives. So they were not aware of the scale and the kind of development.

"Solar was a first time issue. When the project was to take place, I had no idea that such a big project would take place in the village in 2013. Even though I am an electrical engineer myself, I had no idea. So, for someone like common villager, there was zero knowledge. Only the ordinary farmers, whose lands were bought, knew that the company (project) was going to be here. But no one knew what the company would look like." , said Respondent 8.

Respondent 1 added further,

"(We should have been aware) of the technical things... People were only told that 'There is going to be a company here.' There is going to be a solar company, a power generation project. But people were not aware of what is going to happen, what is going to be built or how."

SPD-2's project development process started around 2015. During land acquisition, people were not aware of the scale of development, for example, the amount of land required for the entire project of 100MW. Respondent 2 recalls,

"Initially, the land was purchased by the company at very low prices. But as the company kept on buying more land, the price which was initially Rs 35000 per acre became about Rs 350,000 to 400,000 per acre. (This happened) because people started realizing that now this company needs about 250 acres of land, only 100 acres has been bought so far. Another 150 acres of land will be required. So people noticed that now the value of our land will increase. Now we can get 50 thousand, 100 thousand, 200, 300 or even 500 thousand for the land".

Apart from this lack of information, people were also not aware of the implications of having such a big solar project in their vicinity. As stated by respondents, this was the first time villagers saw a solar project. Most of the previous developments that they had seen or heard of

were regarding manufacturing or chemical factories. So they were aware of the hazards of having such companies in the villages.

Respondent 1 told, "*Chemical companies come. Their chemical seeps into the groundwater, into our wells. It has a detrimental effect on the villagers. Our people had doubts about this (side-effects of solar project) before. At that time such a dialogue had taken place with the people of the company. They (company officials) had said that this is a solar energy project. So there will be no such side effects*"

However, after the project was commissioned, villagers started experiencing rise in temperatures, especially around the project site.

Respondent 14 said, *"Now, in case of this plant (solar park), the gate of that park is on the boundary of our farm. Summer temperatures are so terrible (rising). We have a small settlement there (on the farm), you cannot even stand there (cause of heat). It's so horrible. The heat is rising."*

Furthermore, respondents said that after commissioning the plant, some villagers felt that this project and rising temperature negatively affected the rainfall as the region went through another drought cycle. So to clear their doubts, some of them went to talk to company officials. Respondent 1 said that farmers should have been told about this practical issue beforehand. When he brought up this matter with the company official, the official agreed that the heat was rising but denied it affects rainfall. Respondent 1 feels that even if this is true and solar projects do not affect rainfall, they (villagers) would like the company to prove that such is not the case scientifically.

Another instance of flawed information sharing could be seen in the job creation aspect of a solar project. As described in section 5.1, locals expect jobs from any big development such as this. However, being a mechanized, less labour intensive sector, job prospects were low from the beginning. According to interviewees' accounts, people sold lands to expect they will get a job at the project site. At least, that is what they were promised.

Respondent 10 recalls, "*I had no idea. They just said that there will be a company (project). They also said that they would hire a man in the house. Initially, land prices were not so high. Rs 45,000, - 50,000 per acre. I mean, they had promised ... that they will give a job to one man per acre. They didn't do anything like that. That is a different story."*

Respondents seemed content that the project is generating employment, be it through temporary, low-wage jobs that ensured livelihoods for at least some families. However, the realization that these projects do not require much workforce came quite later during the operation phase of the plant.

Respondent 1 was aware that more information about the project would have strengthened the local's position in the negotiations with the company. It would have helped them put forward their demands to concerned companies such as free electricity or jobs to the locals before giving NOCs to them. Besides, if people were aware of the option of leasing lands, they may have preferred that over losing their ownership, as can be inferred by different interviewee accounts.

Findings show that locals were not given full, impartial information about solar projects, associated employment opportunities and implications of having a solar park in the vicinity. This unjust procedure resulted into unjust outcome identified earlier in the distributional justice section. Moreover, lack of information about existing legal provisions indirectly led people to lose their land ownership which resulted into additional distributional justice concerns.

5.2.2 Decision-making process

The plant development process started with experts surveying the land in the region. They installed machines to measure solar irradiance to identify the prime locations for the park.

Respondent 3 tells,

"We used to be in the region, on our farms (lands), grazing sheep. The people from SPD-2 used to come here. VIP people used to come. We wondered if the canal (for irrigation) was going to be built. (At that time) canal survey (by government) was also going on. Later on, those people would come to us and ask who owns this land. What is the gat number (survey number) of this land? What is the gat number of that land? Whenever they came to us, they would bring a 7/12 Extract. (And would ask), Is this area yours? Is that your name? (on the Extract)"

Around 1000 acres of land was acquired for both projects combined. Interviewees told that the companies took help of several intermediaries (middlemen) from the areas to acquire the lands.

Respondent 4 said,

"Agents ... there were 3-4 such chains (of agents). The original agents were different, then there were different ones that were from the villages. And then there was the 3rd separate chain that told (the previous chain) who the farmer was (who used to be) the man close to him(farmer), he explained (about land acquisition) and convinced the farmer, telling him you will receive the money... "

He further added that these agents used to be the close-aids of some influential local or regional politicians. He said, " *...these agents came together. And then let's say in my case for example, I don't know much about it (solar project or anything), so (in such case) they said, we will give you 2 lakh rupees. The rate that they got (from company) must be different (higher). Because during the last few agreement , it (the rate) went to about 10 lakhs per acre.*"

Besides, such developmental projects are mandated to obtain a NOC of Gram Panchayat. Moreover, to ensure democratic decision-making, the development of such a scale must be brought up for discussion at the local public forum, Gram Sabha. In the case of the SPD-1's plant, interviewees said that no such public meeting was held to discuss the planned development by Gram Panchayat.

Respondent 10 said, while recalling how the company got Gram Panchayat NOC,

"The sarpanch had received a call from regional politician asking him to do so and so. The Gram Sevak (a government employee appointed in the village to assist and advise villagers in matters of community welfare and development) was but a little smarter. They (Sarpanch and Gram Sevak) took two signatures and copied the signatures of the rest (of the panchayat members). That is how the resolution was passed. I noticed that. Then we asked for it (the passed resolution) under RTI (Right to Information act) and when we asked people (panchayat members), they said those were not their signatures. After they told so, we then filed a complaint to the tehsildar saying "We have been deceived" which was signed by the members. But when they called us for an inquiry, what happened was that the people who signed that is the panchayat members, they disappeared. Later, someone said they got Rs 50,000"

Respondent 4 and 14 also told a similar story about how procedures were bypassed and decisions were made.

In SPD-2's case, Respondents 6 and 7 told that Gram Sabha was held. Company officials attended this Gram Sabha. However, it was not the discussion or information-sharing session about the project. Respondent 7 said that they did not organize any Gram Sabha to discuss whether a NOC should be provided to the project or not. Respondent 6 said that in the Gram Sabha that was organized, the company officials distributed some kits to the poor in the village, including a shawl and a coconut. He also recalled that in that Gram Sabha, the company officials had promised that they would do something for the village in the future. Thus, even if the Gram Sabha was held in this case, its purpose was not upheld.

Apart from that, interviewees claim that they have seen discrimination in the hiring process because this process is influenced by people outside the company, mostly influential locals.

"Injustice has happened ... Injustice has really happened to some people. And how it happened was, those who were influential started (working) at the scheme and there were some who were deprived even after giving their lands", says Respondent 4.

Respondent 5 told, *"The thing is, there are some people... for example, someone who has helped sell more land to the company...such people go there and intimidate company officials, (they) ask them to employ their people"*

In addition to that, company officials also influence the decisions made regarding locals. Respondent 4 narrated what he saw in terms of the changes in company management and its implications on the promises made during acquisition.

He recalls, "*The people, whom SPD-1 tasked with acquiring lands, who promised certain things to landowners at that time, are no longer available. And those who are here now, they say, we were not here then, so we are not bound by what they (former people) promised. And now what are they doing, the officials say, you were paid for your land, right? Then the matter is over, you already got the compensation! But when buying land, they promised that they will hire one person in landowner's house.*"

For locals, the struggle does not end there. Once the solar park was built, the company started paying taxes to the concerned Gram Panchayats. This money was meant for the development of those villages. However, that did not happen,

"They show the work they did is worth Rs. 100,000, in which the work's worth Rs. 20,000 and

the rest Rs 80,000, these people (Panchayat members) will steal. This is how they splurged all Rs 48 lakh (the tax money). There were people in the process who have actually demolished their (small) houses and built bungalows. Basically, castiesm is very prevalent here. In our village, 70% are Dhangar community and the other 30% are Ramoshi, Maratha, and Harijan. So the other 30 percent does not have much power. For the last 55 years, only 70% of these people have been in power and no matter how much fraud they have committed, no one is speaking against them. Only Rs 63,000 off 48 lakh are left. They showed the village an expenditure of Rs 48 lakh but compared to that spending no progress was made.", says Respondent 4.

Thus, few individuals influenced the decision-making process during the development and operations phases of the park. Some individuals got money to bypass the laws designed for ensuring participatory decision-making. Like other unjust procedures, this too manifested into a series of distributional justice concerns identified earlier.

5.2.3 Meaningful participation

Meaningful participation here means inclusion through meaningful and democratic participation and giving 'voice' (enfranchisement) to the local communities (Yenneti & Day,2015). There were several instances where locals were not involved, or their voices were not heard.

During the land acquisition process, Respondent 3 recalls that he had migrated (seasonal migration of Dhangars) to another region in Maharashtra called Umbraj when the intermediaries called him and invited him for discussion. They told him that he would get money and a job. However, he told them that he does not intend to sell his land. Even if he sells, instead of monetary compensation, he would like to have an equal land area in some corner on the project's boundary.

He recalls, *"They (intermediaries) said that agreements are already made in the name of the company. So it (giving an equal piece of land) cannot be done. They said (if you don't sell), where will you get the road from to go to your land? This and that! (They said) The company will give notice. (They said) they (the company) will not give way (roads to the land area) to those people. I mean, the agents created a scary atmosphere. (Intermediaries asked) Can you really fight with the company for the road? (they said) The company is very big! So eventually we had to sell the land"*

As promised, Respondent 3 got a job at the solar park after selling his land. But for some

others, getting a job at the park was not so easy. Respondent 10 tells his experience,

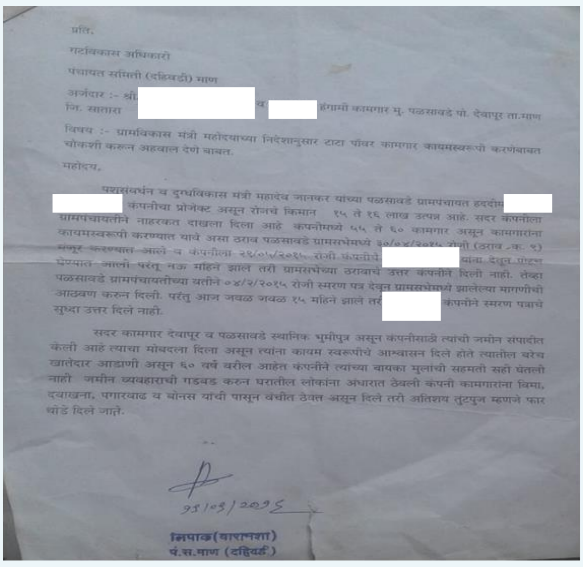
"In the beginning, they said that they would hire those whose lands they took. But then nothing happened. They took some 5-7 people and removed the rest. I then went to the MLA of our taluka and told him that we were fired. We asked him to give a letter to the company, asking them to take us back. The letter was then sent to the company. But they (company) said that now, there are CCTV cameras. Some workers are no longer needed (in security). So we won't take you. But then then they asked us to wait for a month. Before this (work) I was driving a rickshaw in Mumbai. I sold the rickshaw and returned to the village to work at the solar plant but then they fired me. Many people were removed. After that, after sitting (waiting) for a month, my wife also said that now this (job at the park) is gone and that (rickshaw) is also gone. Now go to Mumbai. What will you do by just waiting here? My father said the same thing. We thought, either ways I will have to go to Mumbai for work. There is no point in waiting, we don't have a job here. There were three of us who decided that we would go on a hunger strike. The journalists who are close to us supported us a lot"

After this, the company acted and Respondent 10 got the job. In another interview, Respondent 6 told that all those who sold their lands did not get jobs. He said,

"Many farmers did try to protest (for jobs) but then (some people) spread fear that this company belongs to some big corporate names in India or this company is related to some Union minister or Prime minister. This scares farmers and so they remain silent"

For those who did get a job, the situation is not very bright either. As described in section 4.2, solar project developers usually hire Engineering, Procurement, and Construction (EPC) contractors to carry out various daily operations. Most of the locals then work for the solar park through these contractors. Some of these are local contractors, and some are situated far away outside the State of Maharashtra. Most of the jobs offered by these contractors are temporary, low-wage jobs (see section 5.1). Locals feel that they should have better job security and get permanent employment at the park. Gram Sabha of one of the villages passed a resolution and submitted it to the company. As the company did not take any action, locals wrote to the government officials at the block level to investigate the matter.

Being contractual workers, they are left out of social security schemes such as Provident Fund and other benefits like a minimum wage that any worker in the formal, organized field would



प्रति,

गटविकास अधिकारी

पंचायत समिती (दहिवडी) माण

अर्जदार :- श्री [redacted] व [redacted] हंगामी कामगार मु. पळसावडे पो. देवापूर ता.माण जि. सातारा

विषय :- ग्रामविकास मंत्री महोदयांच्या निर्देशानुसार टाटा पॉवर कामगार कायमस्वरूपी करणेबाबत चौकशी करून अहवाल देणे बाबत.

महोदय,

पळसावडे व दुष्काळी मंत्री महादेव जानकर यांच्या पळसावडे ग्रामपंचायत हद्दीत [redacted] कंपनीचा प्रोजेक्ट असून रोजचे किमान १५ ते १६ लाख उत्पन्न आहे. सदर कंपनीला ग्रामपंचायतीने नाहरकत दाखला दिला आहे कंपनीमध्ये ५५ ते ६० कामगार असून कामगारांना कायमस्वरूपी करण्यात यावे असा ठराव पळसावडे ग्रामसभेमध्ये [redacted] रोजी (ठराव क्र. ९) मंजूर करण्यात आले व कंपनीला २५/०४/२०१५ रोजी कंपनीचे [redacted] यांना देवापूर पोस्टात नोंदणी पत्र पाठविण्यात आले. परंतु नऊ महिने झाले तरी ग्रामसभेच्या ठरावाचे उत्तर कंपनीने दिली नाही. तेव्हा पळसावडे ग्रामपंचायतीच्या वतीने ०४/१२/२०१५ रोजी स्मरण पत्र देवून ग्रामसभेमध्ये झालेल्या मागणीची आठवण करून दिली. परंतु आज जवळ जवळ १५ महिने झाले तरी [redacted] कंपनीने स्मरण पत्राचे सुध्दा उत्तर दिले नाही.

सदर कामगार देवापूर व पळसावडे स्थानिक भूमीपुत्र असून कंपनीसाठी त्यांची जमीन संपादीत केली आहे त्याचा मोबदला दिला असून त्यांना कायम स्वरूपीचे आश्वासन दिले होते त्यातील बरेच खातेदार आदाणी असून ६० वर्षे वरील आहेत कंपनीने त्यांच्या वायका मुलांची सहमती सही घेतली नाही जमीन व्यवहाराची गडबड करून घरातील लोकांना अंधारात ठेवली कंपनी कामगारांना विमा, दवाखाना, पगारवाढ व बोनस याची पासून वंचीत ठेवत असून दिले तरी अतिशय तुटपूंज म्हणजे फार थोडे दिले जाते.

25/09/2015

निपाळ(वारणशा)
पं.स.माण (दहिवडी)

Fig 5.6 : Letter written to the block development officer
(Source: Shamrao)

get. Moreover, locals feel that the contractors are misappropriating the money that solar developer pays.

"I mean, SPD-1 should make all these people permanent (employees). This privatization (contract system) should be removed. You (company) pay Rs 8-9 lakh to the contractor. He (contractor) manages everything in 2 lakhs. Leave 9 lakhs, even if you give 5 lakhs (directly)to those who are working there, they will work happily. " , Respondent 4.

"Now if the company gives a tender to someone, they (contractors) must be receiving a higher salary per person. Around Rs 12,000 to 13,000 per worker. But boys (who work there) only get Rs 9000. That means that the company (contractors) may be taking some money out of their actual salary.", says Respondent 2.

Respondents are aware of the implications of not availing the government protections at work. For example, Respondent 10, who works at SPD-1 plant now receives a salary of around Rs 18,000 per the government order called G.R.(Government Resolution). However, Respondent 3, who works at SPD-2 and holds the same position as Respondent 10 gets only Rs 11,000. It is because SPD-1's security is affiliated with the district Guard Board whereas SPD-2's security is not. So G.R.'s released bi-annually, which usually leads to upward salary revision, does not apply to SPD-2's security.

Thus, workers who are not affiliated with any such board meant to protect their interests suffer. They have to routinely stage protests and go on hunger strikes for various demands. Respondent 4 explains,

Fig 5.7 : News article about hunger strikes in 2019 *(Source: Shamrao)*

"...the salary is low. It's been 2 years in this lockdown, salary has not increased. The salary of security increases a lot because the security is attached directly to the Guard Board. Therefore, government rules apply to them. So it grows automatically. But the others who are there have not been made permanent or the official staff. Those who are in technical, labor will never get a salary increase unless they fight with the company."

Besides salary, workers also have other complaints regarding the work environment and facility. For example, Respondent 3 said that facilities like a high-mounted security stand are not available. Also, equipment like safety torch is no good. At SPD-1's plant, respondents say that workers' safety receives utmost importance, so they receive appropriate equipment, including safety shoes and hand gloves. However, they too have specific complaints regarding roads, facilities, and management.

Fig 5.8: Road to the solar park *(Source: Shamrao)*

Respondent 4 talked at length about his experience as a worker at the park. He said,

"These labourers now... They should be given such facilities. Today people have been working there for 7 years. We need to understand what their problem is. In 7 years we have not gotten a road to get there (solar park). Now when it starts raining, the road will be muddy. It is a bit of forest area. Anything could happen. There are snakes and wild animals. If it is raining then raincoat should be given on time. The CSIC was being cut (from the salary) during this corona period... If a person falls ill at home or an employee falls ill, they get money etc. for the hospital. I still don't know where they go after getting cut and no one has benefited from it till date. Now 60-70 people work there. In summer, the temperature here is 45° internal. I mean, then it will be 48° outside for sure. Don't you think we need cooling, water, etc. in 47 degrees? I do not know. The current manager is not perfect. We (workers) were going to contribute and bring the cooler etc. ourselves. They (company) said no. They said they'll give. We are still to get it. Such things should not happen. Today, everything that is going on (at the park), is because of the workers, right?"

Apart from these matters, interviewees also had some important points regarding the social initiatives taken by the companies in the villages. As described in 5.1.4, the approach to social development differs from company to company. One of the companies was not involved in the local development at the time of the interviews. Interviewees talked in detail about the approach of the other company regarding social initiatives. Respondents 1 and 2 told that this company involves locals planning which activities to take up and identifying the beneficiaries for the said activity. Respondent 1 also said that the company surveys with the help of social researchers to decide which sectors to prioritize. Despite this, some locals were unhappy. For example, respondent 5 said that these initiatives did not lead to anything concrete and beneficial, citing an example of a watershed initiative of the company.

Thus, in some cases voices of locals were not heard or taken seriously during the land acquisition process. Rightful beneficiaries had to protest and sit on hunger strikes to obtain the promised jobs as locals' requests through institutions such as Gram Sabha were not taken seriously. Even after ensuring the distributional justice by giving jobs to rightful beneficiaries, companies routinely fail to acknowledge the locals' concerns and expectations regarding work environment.

This chapter answered the 2nd research question by identifying the distributional and procedural justice issues through the interviewee accounts. It shows that prima facie some benefits were created in terms of local jobs and social development. However, more critical look at it explained how some unjust procedures, practices, disregard to local geographical and social context, and the very nature of solar power projects led to a series of injustices for locals by subjecting them to unwarranted burdens. Whilst companies benefited through generated revenue and governments moved closer to achieving their renewable energy targets.

These injustices occurred because of the presence or absence of certain factors during the planning, development and implementation of the project. In the next chapter 6, these specific factors responsible for the injustices are identified and discussed.

6. Analysis-part II

This chapter answers the third sub-questions *"What factors contribute to the (in)justice in utility-scale solar project under consideration?"* Injustices identified in the previous chapter occurred due to either the absence or presence of the factors discussed in this chapter. Section 6.1 discussed the lack of transparency, followed by lack of participation in section 6.2. In section 6.3, impact of political influence, corruption and domination during the project life-cycle is discussed. Section 6.4 discusses the justice implications of lack of accountability. Finally, injustices caused due to changes in resource use are discussed in section 6.5.

6.1 Transparency

Transparency is an essential component of good governance, as found in the working definition of good governance by the UN, ADB, IMF, and OECD (Gisselquist, 2012). Some scholars interpret transparency as release of information by public or private institutions, some see it as a means to reduce information asymmetry, while some others define it as the "increased flow of timely and reliable economic, social and political information which is accessible to all relevant stakeholders" (Williams, 2015).

Through the interviews, we found a lack of complete and impartial information sharing, both on parts of project developers and government. In a public project, a public notice has to be issued informing people about the planned development. Information explicitly focused on this aspect is not available, but based on interviewee accounts, they received information through company officials or intermediaries and not via a public notice in newspapers. Some villagers got to know about the project only after the beginning of the construction of the park.

All 13 interviewees from the villages said that they lacked information about some aspect of the solar project. For example, company officials informed a few well-educated, influential people or landowners about the planned solar project, irradiance survey, and land acquisition. However, all villagers were not aware. Without accurate information, some villagers also felt that the survey is being carried out for a planned water canal in the region. Furthermore, all interviewees were unaware of the scale and kind of development as they had never seen a solar project before. The lack of information manifested in different forms including excessive job expectations and lack of knowledge about the potential impact in terms of rising heat during the operation phase of the plant.

Under the NSM, private companies who develop solar projects without any participation from government entities need to acquire the necessary land on their own. The Renewable Energy Policy of the Maharashtra government mentions that landowners can also lease the land. However, people were unaware of the option of leasing land. Six interviewees talked about the potential benefits of leasing land instead of selling them. People also feel that if the government had educated them regarding solar projects and their various aspects, they would have been better positioned to negotiate with solar park developers.

The impact of not having complete information can be seen in various distributional justice outcomes. For example, people with lands adjacent to the solar park have to arrange more water than usual to keep their crops alive. Those who sold their lands now lament the decision because of the compensation they got. A limited amount of jobs were created, which were temporary and low-paying. Low wage and losing access to land has impacted their and future generation's livelihoods. Others who learned from this experience are now unwilling to sell lands for such projects. They have decided that if somebody needs land for such a project, they will only lease them so as not to lose ownership.

6.2 Participation

In the broadest sense, participation is an instrument to empower weaker sections of society to initiate action and influence development processes and outcomes (ADB,1994). It lies at the heart of democracy and aims to convey information about public needs and demands from the public to policy-makers and implementers, and vice versa (Masango, 2002). Participation can either be direct or through intermediate institutions or representatives. However, participation of representatives, viz. elected leaders, does not necessarily mean that the concerns of all sections of society are heard. Thus, it is necessary to have processes that are genuinely inclusive to ensure meaningful participation.

In chapter 4, we saw that the LARR Act, 2013 requires SIA to be done before land acquisition for public projects, only if the land is being acquired by a government agency. Moreover, to fast-track the RE-sector development, states are free to formulate their own land acquisition policies. As described in section 4.3, Maharashtra's land acquisition policy exempts rural electrification infrastructure from the SIA requirement. Since according to Renewable Energy Policy, land acquisition is SPD's responsibility, there is no requirement of conducting an SIA

or holding a public hearing of the SIA report in the affected area. The only requirement for the project developers was to obtain a NOC of concerned Gram Panchayats. Even though this requirement was adhered to by the developers, it failed to protect the interests of the villagers as villagers did not get a chance to voice their concerns (see section 6.3).

Gram Sabha is a public forum that exists to discuss issues of public importance, local governance, and development in the village. Drafting and implementing development plans for the uplift of the villages would be vetted and monitored by the Gram Sabha. People felt that organizing such a meeting and inviting company officials to the meeting would have led to better negotiation.

However, through interviews we understood that Gram Sabha was bypassed (see section 5.2.2). In the process of bypassing Gram Sabha and obtaining the Gram Panchayat NOC, project developers lost a significant opportunity to improve participation.

Without a detailed social and environmental impact assessment, it would have helped developers more if a Gram Sabha was organized. Because, firstly, it would have given villagers a chance to discuss their fears and expectations regarding the project. Secondly, developers would have benefitted through the local knowledge to minimize the socio-ecological footprint of their project. In the case of one company, Gram Sabha was not called before the project development. While in the other case, even though Gram Sabha was called, it was in name only, and people feel that nothing significant came out of it. Thus, it can be inferred that both companies did not do enough to make the planning and development process more participatory.

Companies in India are required to spend 2% of their annual profit on various CSR initiatives. There is no requirement that this should be spent in their area of operation, but it is generally followed in practice. In our case, companies' CSR policies and the approaches in implementing those policies differ. Two interviewees elaborately explained how one of the companies involves local community leaders and conducts a survey with the help of researchers while selecting their focus areas for social activities in the village. In case of the other company, all interviewees who talked were not happy with the company's overall CSR approach and initiatives.

Involving public in the activities meant for their development is also significant as it affects

the brand image of a company. It can potentially affect the general perception of solar power or energy developers as some entity ripping off local resources (see section 5.. However, for both companies, there were some areas in which they could improve. Interviewees felt that there should be more (number) and better (representation) participation while deciding the social initiatives. This would have ensured better identification of beneficiaries and investments in the right initiatives. For example, with more meaningful public meetings, people could communicate what they need. Moreover, companies could also identify the problems explicitly caused due to the solar park and could focus on mitigating that impact.

6.3 Intermediaries, corruption, political influence and domination

These are some systemic factors peculiar to India that eventually affected many procedural and distributional justice outcomes in the solar park development. The involvement of intermediaries has long been a challenge in the effective implementation of the LARR Act, 2013 (WRI et al.,2021). It was no different in our case either. According to the act, monetary compensation for the acquired land should be four times the market price of the land. Based on interviewee accounts, this requirement was fulfilled in some cases, and people got fair compensation. However, there were also instances where illiterate, poor, needy, and innocent people were deceived by intermediaries who bought their lands in paltry amounts (see section 5.1.1).

The reasons why people were deceived could be general awareness and lack of information about the planned development. As a result, they had little idea about the rise in the value of their lands. When people started noticing the development and potential land requirement, they realized the growing value of their lands. Thus, those who waited and were more aware got substantial returns on their property. However, this has left the ones who got lesser returns with the feeling of injustice and unfairness, even though some did get the compensation according to law. In one case, intermediaries also intimidated the landowner and forced him to sell his property by sharing false information about the implications to create an environment of fear. Another interviewee account claimed that intimidation tactics were also used to stop people from protesting against the company. Companies can also be a victim in some cases. For example, one interviewee told about an instance when some locals tried to extort money from one of the companies. Company then filed a police complaint

against those individuals.

Corruption is also central to many procedural and distributional injustices in India. In this case, eight interviewees claimed that the erstwhile Gram Panchayat members and Gram Sevak were corrupt. The companies paid money to influential politicians, both local and regional, to obtain NOCs. As a result, Gram Sabha was bypassed, and a significant opportunity to negotiate with the company was lost. The accusations of Gram Panchayat members stealing the tax paid by one of the companies, if true, would mean that villagers were kept deprived of the money meant for their development.

Besides this, certain people's political influence and domination in society have also led to instances of injustice. One interviewee said that due to the interference of some politicians, rightful beneficiaries of the jobs could not get them. Whereas those who were close to the politician got those jobs. Contractors, too, were accused of stealing money from the salaries of the employees, which has exacerbated the discontent of workers (see section 6.4).

Claims of corruption, intimidation, or political influence and domination could sometimes be politically motivated and need further investigation. Nevertheless, such factors not only affect the villagers but also project developers and contractors involved. Villagers suffer various injustices which affect their present and future. It can seriously jeopardize their ability to have a better lifestyle and access to better opportunities. This may even chain some of them to the age-old shackles of poverty. Besides, again, incidences of corruption and intimidation in the name of a company can tarnish the company's image and affect the company's and energy projects' social acceptability. Practices such as corruption, intimidation, political influence, and domination affect how companies perceive the ease with which they can operate in an area. Thus interference in company's administrative matters like hiring or contracting could also make companies re-evaluate their investment decisions in certain regions.

6.4 Accountability

In general, an organization or institution should be accountable to those affected by its decisions or actions. Accountability depends on transparency (Johnston, 2006). It is needed to ensure that those who govern follow the established rules defining acceptable processes and outcomes are followed (Johnston, 2006). Moreover, it is crucial that people demanding

accountability feel confident that they will not be subjected to unwarranted consequences, that officials will respond honestly and that their demands are taken seriously (Johnston, 2006).

As discussed in section 5.2, people got monetary compensation and were promised jobs as a return on their lands. However, not all the rightful beneficiaries got the jobs. Some others were employed for the initial construction and development phase but later removed during the operations and maintenance phase. Intermediaries who promised jobs were not in a legal position to promise one. Moreover, changes in the company management and involvement of EPCs further complicated the situation. For example, the lands were acquired in the name of solar developers. However, different aspects of project implementation like construction, cleaning, maintenance, security, etc., are carried out by various EPC contractors. Thus, there were instances where officials refused to employ locals claiming that they were not the ones who promised jobs.

Moreover, most were temporary and contractual jobs like grass-cutting or construction laborers in the informal (unorganized) sector. Implications of this are explained in section 5.2. Interviewees said workers have to fight, protest and sit on hunger strikes for their demands like wage increase, timely payments, increased occupational safety, working hours, and job security. One interviewee also said that workers fear protesting at one of the companies as they feel that they might easily be removed from the job. Besides, some of the EPC contractors are not local. In such cases, workers feel that there is a communication gap, and without contextual knowledge, senior managers fail to understand workers, their expectations, and issues. Locals also demand that the workers should be employed directly by the solar developers on its payroll to fix the accountability issue.

Furthermore, multiple actors' implementation of solar projects creates a chaotic environment where it is easier for companies to dodge responsibilities and bypass regulatory provisions. Lack of government protection for many of these workers exacerbates the situation further. Moreover, there seems to be no easily accessible redressal mechanism. One option available to locals is Labour courts. However, legal recourse in India requires more time and money. Thus, people have to resort to instruments like strikes more often as a quick and cost-effective way. This leads to some out-of-court settlements where some or all demands are fulfilled. However, these results are mostly temporary, which means the next time workers demand

something, they again have to go through the ordeal of strikes and protests.

6.5 Changes in resource use (land and water)

Changes in the use of resources such as land and water have a far-reaching impact on the local population and environment. Section 5.1 discussed that impact in terms of distributional justice outcomes at length.

Total land needed to meet the 2022 renewable energy target ranges from 55,000 to 125,000 km2 - the equivalent of size between Switzerland and Greece (WRI et al., 2021). Such massive requirements of land and subsequent changes in use may have a significant ecological impact. In addition to that, the rising demand has shot up the land prices. While people may receive more return on their land, diverting the land for other purposes may create competition among other uses such as food production, grazing, etc. In our case, the diversion of private land for solar parks resulted in losing access to the land. It caused the landowners to sell their cattle and sheep on which they depended for sustenance.

Moreover, their employment quality was not sufficient to ensure a good lifestyle for these landowners and their future generations. Educated villagers did get a well-paying formal job at the park, but because most landowners were uneducated, they had to rely on temporary, low-skilled jobs. While landowners might attain a degree of security for a short period, there is a high degree of economic risk in long-term dependence on a model that does not provide for diversified livelihood options. Two interviewees also felt that the acquired land was adequately cultivable, more so after constructing the government canal. Consequentially, many landowners now regret their decision to sell the land.

The cleaning of solar panels during the operation and maintenance stage can be highly water-intensive. Estimates range between 7,000–20,000 litres being required per MW per wash (WRI et al., 2021). Due to approximately 56% of all solar installations being located in arid and semi-arid areas of India (e.g., Gujarat and Rajasthan), this brings significant risk to the local ecosystem and communities (WRI et al., 2021). Though new technologies are aiming to automate the cleaning process and optimize water use, their uptake, and effectiveness remain to be seen (WRI et al., 2021).

During the operations and maintenance phase, 60% of the water used for cleaning is sourced from the ground through borewells, while the remaining 40% comes from surface water sources such as rivers, canals, and lakes (WRI et al., 2021). Groundwater is preferred by most developers and Operations and Maintenance (O&M) contractors as it is practically free and operationally easy to abstract (WRI et al., 2021). For groundwater extraction, specific regulatory permissions are required, for example, a NOC from the water board, but these are not always adhered to (WRI et al., 2021).

In our case, too, the companies arrange water in multiple ways. They have constructed small ponds within the park for rainwater harvesting. Besides that, they have dug up borewells and source water from the nearby Rajewadi dam and local water suppliers who usually have private borewells. Information about whether the companies have acquired the NOCs could not be known. However, the potential impact of groundwater and surface water extraction can be imagined, especially in a drought-prone area. Although villagers claim they have not faced any water shortage in the past couple of years because of good monsoon rainfall, the looming water crisis cannot be ruled out. The impact of land-use change on women, agricultural laborers, landless pastoralists could not be known because of the lack of interviews from this section.

This chapter identified lack of transparency, accountability and participation, presence of corruption and political influence, and changes in resource use as the underlying factors that led to the injustices observed in chapter 5.
Next chapter discusses whether the findings of chapter 5 are in-line with the previous research on Indian solar projects. It recommends steps to counter the impact on justice outcomes created by the factors identified in this chapter.

7. Discussion

In previous chapters, injustices and factors responsible for them were identified. This chapter discusses those findings in section 7.1. It is followed by a discussion on energy justice framework in developing countries in section 7.2. Finally, in section 7.3, answer to the final subquestion, "How can such a project be made more responsible?" is provided.

7.1 Findings and previous research

Results discussed in chapter 5 are in-line with the previous research on the implications of solar project implementation in India. Although there is not much empirical evidence to generalize all findings, a pattern is visible. Arguably, major injustices highlighted in this and previous research are linked to land acquisition, ownership and land-use changes during the development of solar parks. Case studies in Kerala and Gujarat show that solar projects in India are not immune to land acquisition and uneven development mistakes of the past (see Yenneti et al. (2016) and Bedi (2019)). While national policy document, such as NSM, underlines the need to protect vulnerable communities during energy transition, this intent appears to be lost in practice. For instance, in Kerala, the government promoted solar energy infrastructure on tribal land without due consideration to local developmental ambitions and social implications (Bedi, 2019). In Gujarat too, the vulnerable communities lost their livelihoods due to the enclosure of common land and extra-legal land acquisition mechanisms followed during the implementation of the project (Yenneti et al., 2016).

As discussed previously, Maharashtra was no exception. In our case, land acquisition was SPD's responsibility unlike Kerala/Gujarat where state governments were involved. As a result, the provisions of LARR act, 2013 such as SIA or minimum compensation were not applicable in Maharashtra's case. This resulted into free hand to intermediaries acquiring land at any price they want and lack of transparency and accountability discussed in chapter 6. Moreover, all of the land acquired was private. This meant that locals, especially pastoralists, lost their rightful grazing grounds and majority of them ended up selling their animals which happened to be their sustainable income source. Furthermore, farmers near the project site suffered due to rising temperatures.

Very much like the Karnataka and Gujarat case studies, the development promises made during the project implementation were in stark contrast to the development realities for locals in Man taluka, exacerbating the injustices experienced by them. At Pavagada and

Charanaka, locals were promised jobs but eventually labours from other states were brought in by the developers (see Yenneti & Day (2016) and Saldanha & Rao (2020)). In our case, locals were preferred for jobs. However, majority of the jobs were low-wage, unskilled, temporary jobs. Very few qualified locals got well-paying jobs at the project site. Rest of the well-paying jobs went to non-locals. Besides, locals' expectations regarding the number of jobs were not fulfilled. In Charanaka, the upper caste and economically better off communities availed the opportunities created (Yenneti & Day, 2016). Similarly, in Man taluka's case too, rightful beneficiaries were deprived and influential people benefited more by the opportunities created.

Moreover, development itself is a subjective notion. Although much information is not available on this front, some insights gathered through interviews suggest that developmental visions of locals were not given due considerations. For example, locals expected free and 24 hour electricity from the solar park. However, they were not the primary beneficiaries of the project. They still experience load shedding, especially when they wanted to use electricity for agricultural and irrigation, which further fuelled their discontent. This is similar to the findings of Saldanha & Rao (2020). In Pavagada, locals complained that they leased their lands for the solar project but were now deprived of jobs, electricity, food and water. Besides, sometimes people have distinct developmental visions. For example, in Kerala's case, locals did not view large solar energy project as a development and preferred having an educational institution instead on that land (Bedi, 2019). In our case, locals had positive opinion about a solar energy plant for being "environmentally good" and they viewed it as a development. But they expected that the SPDs will take some initiative for local development. However, some of them felt it is unfair that the SPDs are either not doing enough or are not taking concrete initiatives to ensure long term development.

As for procedural justice, findings in terms of access to information, decision-making process and meaningful participation are inline with the available Indian case studies. As noted in Yenneti & Day (2015), Bedi (2019) and Saldanha & Rao (2020), locals were either not adequately informed or misinformed about the planned solar projects before land acquisition. Yenneti & Day (2015) and Bedi (2019) describe how local visions and repeated requests of interests groups were ignored by the decision-makers, indicating problematic decision-making process and

lack of meaningful participation. Man taluka's case was no different from these previous experiences. In this case too, people were not fully informed, decision-making process was heavily influenced by influential people who indulged in corrupt activities and meaningful participation of locals was not realized during planning, development or operations phase of the solar park.

7.2 Energy Justice framework in developing countries

Tenet-based justice framework that include distributional, procedural and recognition justice are widely used in energy justice literature. Bedi (2019) acknowledges that energy injustice enables the examination of energy infrastructure to understand how such infrastructures make or unmake lives and livelihoods, especially of those individuals who have historically bear the disproportionate burdens of developmental and environmental projects in India. In this research too, we were able to reveal local burdens of solar energy development using the two tenets of energy justice framework. This however was realized by using energy justice with its broadest possible understanding.

Interpretations of distributional justice proposed by scholars including B. Sovacool & Dworkin, (2015), D. A. McCauley et al. (2013), Jenkins et al. (2016) appear but narrow and risk missing crucial injustices, if applied individually. Thus, in this research we used the distributional justice in its broadest sense by combining all these interpretations as proposed by van Uffelen, (2021). Using such a broad understanding was necessary to understand the holistic impact of renewable energy infrastructure that moved beyond just the physical siting and energy access or creation of employment opportunities. Moreover, inspirations were taken from other justice literature such as 'spatial justice' used in Yenneti et al. (2016) to understand how unjust land acquisitions in India can jeopardize the already precarious lives of land-linked vulnerable communities.

As for procedural and recognition justice, overlapping conceptualization make their independent application difficult in cases like India. Recognition injustice occurs 'in various forms of cultural or political domination, insults, degradation and devaluation' and it demands that individuals are fairly represented (Jenkins et al., 2016). However, is it a generalization that an occurrence of recognition injustice is underlined by a flawed formal procedure or informal practice? In India, majority of big public infrastructure projects such as

dams or highways have seen locals being ignored, displaced or threatened as a result of the procedures and practices followed under the notions of development (see studies by Blaikie & Muldavin (2014), Mukherji (2012), Nayak (2013)).

Moreover, question about the scope of application of these tenets remain unanswered. For example, should evaluation of procedural or recognition justice be restricted to the involvement and representation of locals as inhabiting community or should it go beyond that and include experiences of locals working at the project site? What should be termed as a just distribution of benefits and burdens?

Thus, alternative formulations of justice need to be incorporated in energy justice to understand the actual impact of energy infrastructure in developing countries. For example, people from rural India usually migrate to better developed urban areas in search of job opportunities. Thus, when massive renewable energy infrastructure is being built in rural areas, people naturally tend to expect jobs at such sites. Without alternative and contextual formulation of justice, one might think that providing jobs to all rightful beneficiaries would ensure achievement of distributional and procedural justice. However, if such jobs are temporary and low-paying then they restrict livelihood options and opportunities for such workers and their future generations. Also, consider the absence of government security to temporary workers and appalling labour rights situation in India. In this scenario, can we really say that procedural justice is being upheld by involving locals in decision making and giving jobs to rightful beneficiaries if they have to routinely fight for wage-increase or safe working environment? And we are not even considering the presence or absence of arrangements made for the upliftment of marginalized communities including women who have been disproportionately affected more for years due to cultural subjugation.

In summary, any justice frameworks including energy justice that aim to evaluate and design the renewable energy infrastructures in developing countries like India should try to incorporate the contextual understanding of justice. As argued in the existing literature, injustices in India cautions us against the renewable energy infrastructure deepening the already existing socio-economic inequities in the country. Thus, integrated policies that give due considerations to local resources availability and local developmental visions is necessary to ensure sustainable energy transition in countries like India.

7.3 Policy Recommendations for State Government

Based on the analysis of chapter 5 and 6, and the previous findings discussed in the beginning of this chapter, certain policy measures are recommended to the government to make solar projects more responsible towards the communities they inhabit.

1. **Aspire to higher standards of Environmental and Social impact assessment requirements:**

Solar projects in India are exempted from carrying out Environment and Social Impact Assessment studies (NSM Division 2017; Yenneti, 2016). Maharashtra government's Renewable energy policy, 2015 also exempts solar projects from conducting environmental impact assessment (GoM, 2015). However, a recent draft version of the new Renewable policy, 2020, asks solar projects to obtain a NOC from Maharashtra Pollution Control Board (Prayas Energy Group, 2021), which is a step in the right direction.

Provisions of the LARR Act, 2013 regarding the SIA are pretty elaborate (see chapter 4). However, they are not applicable to the cases where private companies acquire the land for the project. Thus, the first logical step is to bring private companies under the gamut of this act. Due to the LARR's procedural intricacies, the Union Government has given the states the right to draft their guidelines regarding the acquisition of private lands to expedite the development of the solar sector (WRI et al., 2021). Thus, communities are bound to suffer in the absence of a socially and environmentally aware land acquisition policy. In the short term, to mitigate the negative social externalities, the government may think of effectively using the present institutional structure. For example, Maharashtra can mandate organizing Gram Sabha meetings involving company officials. These meetings can be reported to the concerned division in Maharashtra Energy Development Agency (MEDA) or District collector (being the chief revenue officer of a district), or Tehsildar (chief officer for local revenue administration of a taluka). This data can then be used while awarding future projects, and corrective actions against defaulters could be taken.

In the long term, once companies start doing enough participatory governance of their projects by involving locals, the government can and should mandate conducting an elaborate SIA. The government can also use IFC Performance Standards and the World Bank's Environmental and Social Framework while awarding the project. These frameworks are

accountability mechanisms that typically call for developers to have Environmental and Social Management Systems (ESMS) to address four areas: issues in connection with siting and land acquisition; baseline assessments for environmental, ecological/ biodiversity, and social impacts; stakeholder engagement; and the inclusion of grievance redressal mechanisms (WRI et al., 2021).

India has several corporate governance mechanisms that could be applied in ways that encourage the RE sector to address its environmental and social impacts. These include provisions under the Companies Act and disclosure obligations mandated by the Securities Exchange Board of India (SEBI), as well as soft law requirements such as the National Guidelines on Responsible Business Conduct (NGRBC) (WRI et al., 2021).

2. Design auctions to minimize corruption and stimulate local development:

As identified in chapter 5 and section 6.1, the involvement of intermediaries led to several distributional and procedural injustices. The question as to why companies involve intermediaries during the private land acquisition for a project could help disincentivize the involvement of intermediaries. One of the ministers in the Union government claimed that the cost of land for renewable energy projects is around 3 to 5 percent of the total project cost (The Economic Times, 2014). Although it is a small fraction of total project cost, research into the burden of land acquisition cost on companies and its link to the competition created by the VGF model could be carried out (see chapter 4). It could be investigated whether the poor, unaware landowners are paying the cost for lower bid prices quoted by companies under the VGF model.

Along with provisions like Domestic Content Requirement (DCR), provisions for local job creation could also be added to the auction as a qualification or winner-selection requirement in the long term. Alternatively, the government can include an employment strategy as part of the state's solar policy. For example, under Maharashtra's Renewable Energy Policy -2015, 80% of unskilled workers and 50% of semi-skilled/skilled workers have to be selected from the Gram Panchayat area where the project is located (GoM, 2015). Additionally, the project developer is expected to spend 2% of the total profit made for work under social responsibility (GoM, 2015).Both these requirements apply to Bagasse/Agricultural Waste based co-generation

Co-generation Power Projects, Small Hydro Power Projects, Biomass-based Power Projects, Industrial Waste based Power Projects. Solar projects in the state could also be asked to adhere to similar requirements.

3. Leasing lands and creation of land-use policy:

Renewable Energy Policy, 2015 mentions that private landowners can also lease their lands (GoM, 2015). However, as discussed in section 6.1, landowners were not aware of this option. As a result, project developers ended up buying private land. Government can look into the reasons behind companies adopting such a business model. Leasing the land will keep the land ownership with farmers/landowners so that they can benefit from the growing valuation of it in the future (Nathan, 2015). Moreover, leasing reduces the project cost makes the affected landowners "partners in development," as mentioned in the LARR Act, 2013 (Nathan, 2015).

Besides, local conflicts and feelings of discontent arising from land ownership can hamper the progress of energy transition. Thus, the government can design a land-use policy that incorporates and promotes multiple uses of solar park land (Ghosh et al., 2012). The government could consider "solar-cropping" or "solar sharing," where electricity and food can be produced simultaneously from the same piece of land (Nathan, 2015). The electricity produced can be directly used for powering the agricultural pumps for irrigation which has been successfully demonstrated in Japan (Nathan, 2015). Moreover, a well-designed set of panels can improve photosynthesis, avoid sunburn of plants and reduce irrigation requirements (Nathan, 2015), which is especially beneficial in arid regions.

4. Protect the workers:

Heat is considered an environmental and occupational hazard affecting one's health due to high-temperature exposure (Samaniego-Rascón et al., 2019). Heat-related stress includes dehydration, heat exhaustion, heatstroke, and death. Since most solar projects are located in areas with high solar irradiance, policies for a safe working environment, health, and welfare have to be devised.

As identified in chapter 5, most of the workers employed at solar projects are low-wage,

low-skilled workers in a largely unorganized sector. The state of Maharashtra has enacted the Unorganized Workers Social Security Act, 2008. It has also constituted a Welfare Board to formulate schemes for social security benefits to the unorganized sector (Waghmode, 2018). In the short term, the board should make sure that the workers employed by contractors are affiliated to the respective governing board if there are any. It will ensure that workers benefit from various Government Resolutions (GRs), which are released periodically. For example, there are district-level Security Guards boards for security personnel in Maharashtra. The Welfare board could make sure that all security guards' contractors are members of the concerned board. The government can set expectations in line with international best practices regarding human and labor rights due diligence in the long run.

The state government can adopt the National Action Plan on Business and Human Rights, which the Government of India is currently developing. The government can incentivize solar project developers and EPCs to publish their due diligence reports periodically.

5. Empower the locals and strengthen the civil society:

Gram Sabha is envisaged as the foundation of grassroots democracy (Rout & Sahu, 2013). Maharashtra Village Panchayats Act, 1959 allows for the periodic meetings of the Gram Sabha in all the villages of Maharashtra. Duties and powers of Gram Sabha, as mentioned in the act, include:

i. Approving the social or economic development plans, programmes, and projects to be implemented by Gram Panchayat.
ii. Granting permission to Gram Panchayat for incurring any expenditure
iii. Conveying its views to Gram Panchayat before the concerned panchayat takes any decision about proposals of land acquisition in the village

Besides, the act also mentions that Gram Panchayat shall report its expenditure on developmental work to the Gram Sabha every six months. Thus the Gram Sabha is meant to strengthen the democracy and improve accountability of Gram Panchayat (Rout & Sahu, 2013). There are several success stories of Panchayati Raj Institutions and their contribution to developing the social capital. For example, in Uttar Pradesh, they have improved overall infrastructure, medical facilities and strengthened primary education (Prasad, 2016). A survey in South India showed that people from more disadvantaged social groups attend the Gram Sabha meetings. Such meetings help distribute resources to the neediest rightful beneficiaries

(Besley et al., 2005). In another instance, the Supreme court of India sent a matter related to the bauxite mines of Vedanta Group back to the Gram Sabha for its active consideration (Mishra, 2016). Conducting Gram Sabhas enabled the locals to share their views and opinions on the Vedanta project, which has since been stalled (Mishra, 2016). So, Gram Sabhas failing to express their views and concerns is unfortunate (see chapter 5), and thus government should take appropriate steps to empower this institution. Since the state government has the right to confer powers and duties on panchayat raj institutions like Gram Sabha and Gram Panchayat, Maharashtra can give more powers and duties to Gram Sabha. As a first step, the government could create more awareness about the powers and duties of Panchayati Raj Institutions with the help of civil society organizations.

As discussed in section 6.1, many injustices could have been avoided if people had known about the solar energy projects and government policy for these projects. Thus, like a true guardian of citizens, the government should proactively educate the locals where such projects are planned. NGOs such as Mann Deshi Foundation have a significant local presence in Man taluka and could spread awareness about renewable projects. Additionally, the government can open another information channel by empowering and educating the local Self Help Groups (SHGs) through the state's Maharashtra State Rural Livelihoods Mission-UMED Abhiyan.

Empowering the locals can help develop the necessary social capital. In this way, locals will be in better position to identify, assess and communicate their problems with the concerned companies. The government and civil society can simultaneously guide companies to particularly invest in resolving issues caused by their activities, instead of general focus areas like education.

This chapter discussed the results of the case study and compared them with the existing research. It further discussed the energy justice framework and its applicability to Indian context. Lastly, it answered the final research question of the thesis.
Next, chapter 8, concludes the thesis by answering all research question, highlighting the scientific contribution and limitations and provides recommendation for future research.

8. Conclusion

This chapter provides the conclusion of the thesis. In section 8.1, conclusive remarks answering all of the 4 subquestions and main research questions are given. Section 8.2 describes the scientific contribution of the research followed by the discussion on limitations in section 8.3. Finally, section 8.4 concludes the thesis with future recommendations for research.

8.1. Answering the main research question

The main research question "How can governments make utility-scale solar power projects in India more responsible towards the communities they inhabit?" is answered through a series of subquestions.

1. The first question in this series is "**What are the important formal rules in use and stakeholders involved in the implementation of a utility-scale solar project?".** This question is answered in chapter 4. Document review and interviews were mainly used to understand the context within which the utility-scale solar projects are operated in India.

The federal structure of Indian polity creates a multi-level governance environment for the Electricity sector. Union government creates an overarching policy set-up to boost the electricity sector growth in the country. Important Union government laws and policies for solar sector governance include the Electricity Act 2003 and National Solar Mission. Among other provisions of the Electricity Act, 2003, states make rules for permissions, compensation, and environmental damage regarding energy generation plants. NSM, adopted in three phases, focuses on creating an enabling environment to accelerate solar energy penetration in India. The solar parks in Man taluka were commissioned under phase II batch III of NSM. The Union laws and policies are supplemented by the State government's independent policies for the renewable energy sector. The state of Maharashtra has a Renewable Energy Policy launched in 2015. This policy provides a set of guidelines that solar power developers in Maharashtra must follow. Provisions regarding land acquisition, land status, and environmental impact are some of the crucial provisions of the Renewable Energy Policy, 2015.

In addition to this, there are complementary pan-India rules for land acquisition, groundwater abstraction, environmental impact, and waste management that are applicable to solar projects. State governments are free to modify certain provisions of the Union government's guidelines and laws for their states to boost the deployment of solar energy to meet the ambitious targets set under NSM. As a result, provisions like EIA or SIA, which are time-consuming and procedurally cumbersome, usually receive lesser priority in the state policy in the shorter run. Panchayati Raj institutions like Gram Panchayat, Zila Parishad form the bottom-most level of the multi-layer governance structure. Responsibilities of these institutions include developing their administrative jurisdictions, protecting the interest of locals, and ensuring social justice.

Besides, project implementation involves various union and state-level institutional actors, project stakeholders like solar developers, EPC contractors, and financiers, and an enabling environment like the R&D community and local communities. Solar developers are usually big companies having investment capital that bid for solar projects at government-organized auctions. These developers then hire EPC contractors having expertise in their respective domains. EPC contractors then implement different aspects of the solar park development like construction, engineering, operation maintenance, or security. Local communities provide land, labour, and other important resources like water necessary for the successful implementation of the project. SPD1 and SPD2 are the two companies involved in developing 58MW and 100MW solar projects spread across approximately 1000 acres of land in Man taluka. EPC contractors from within and outside the state of Maharashtra are involved in implementing the solar projects. Local communities from Palasawade, Shirtav, Devapur, Varkute-Malavadi, and Banagarwadi provide necessary resources for these projects.

2. Second question, "**Where are the injustices, who is ignored and has a fair process been followed during the implementation of a utility-scale solar project in India?"** is answered in chapter 5. Theoretical background necessary to answer this question is described in chapter 3.

In chapter 3, several parameters such as land, monetary returns on land, employment opportunities, energy provision and accessibility, local development, immaterial goods access to information, decision-making process, and meaningful participation were identified. These parameters helped us categorize distributional and procedural justice concerns in chapter 5.

As farming is difficult in the region, the private land acquired was mostly used for grazing. Losing access to land indirectly led many farmers and pastoralists to sell their animals which were equivalent to losing a sustainable source of livelihood. Moreover, there was no uniformity in the company's actions regarding land acquisition. For example, various landowners got different compensation on their lands. Some people got more than the market price, whereas some got paltry amounts. In some cases, people were given equal pieces of land outside the park instead of money. Although people acknowledged the local job creation, there is a feeling of regret regarding selling the land (see 5.1.1).

Besides, people had high expectations regarding local job creation. However, they soon realized that the solar industry is mechanized and less labour intensive. Nonetheless, some jobs were created, and companies preferred locals for these jobs based on qualification. However, the quality of employment was not satisfactory. Most jobs created were temporary, low-skilled, low-wage jobs. Some rightful beneficiaries were not offered any jobs at all (see 5.1.2).

Another contentious issue was energy. Locals are not the primary beneficiaries of the energy generated in these solar projects. Despite having a solar project in their villages, locals still do not have access to electricity 24/7, especially for agricultural purposes. Furthermore, when locals first got to know about the project; they expected that they would get free electricity. There is a feeling of unfairness since this expectation is not fulfilled (see 5.1.3).

People expect regional development whenever a project like this is implemented. The presence of solar projects led to the development in terms of local job creation and the growth of some local businesses. However, not much changed in infrastructure such as roads, transport, or healthcare in the villages. Besides, both companies had a different approach to local development. People were primarily satisfied with one company's activities while criticizing the other for not doing enough (see 5.1.4).

The operationalization of the solar park also created some additional burdens in terms of risks and responsibilities for locals. Lost access to land and sustainable sources of livelihood, and

low-wage temporary jobs jeopardized people's freedom to shape their future. Moreover, the parks led to a rise in temperature and heat in the region. This and the plant's own operations created more competition for water in an already water-scarce region (see 5.1.5).

People said that the companies informed them about the solar park. However, as they had never seen a solar project before, they were not aware of the exact nature and implications of the project. Without enough information, people expected a lot more in terms of jobs and free electricity. People also realized that lack of information regarding leasing the land or what to expect from such projects affected their position in negotiations (see 5.2.1).

Companies surveyed and identified the land for the project. Intermediaries were then involved who influenced the decision-making process from the commencement of land acquisition. They misinformed landowners about jobs and, in some cases, intimidated them, forcing them to sell the lands. Gram Panchayats of concerned villages provided NOCs to the projects without adequately discussing the development of projects at Gram Sabha meetings.

Moreover, influential locals interfere in the company decisions like hiring processes. One of the companies paid taxes to the concerned Gram Panchayat, but people claim that money was misappropriated by the Panchayat members (see 5.2.2).

Lastly, people narrated their experiences about participation and inclusion in the solar project development. Some people feel that they were not included and their voices regarding land acquisition, job hiring, work environment, worker safety, and the social initiatives taken by the company (see 5.2.3).

3. Third question**, "What factors contribute to the (in)justice in utility-scale solar project under consideration?"** identifies the values, norms and processes that caused or may have caused the injustices. These are discussed in chapter 6.

Lack of transparency (see 6.1), participation (6.2), and accountability (6.4), involvement of intermediaries, incidences of corruption, political influence and domination (6.3), and changes in resource use (6.5) are identified. These factors caused and may cause different

distributional and procedural justice issues described in chapter 5. Complete and impartial information disclosure by project developers and the government was lacking. Rules and regulations regarding information disclosure, such as organizing a Gram Sabha meeting, were not followed. This resulted in people selling the private land and then animals, expecting more jobs, lacking knowledge about implications such as increased temperatures. This affected their position in negotiations and jeopardized their present and future livelihood.

As a public forum, Gram Sabha provides a platform for all locals, especially the vulnerable sections of society, to participate in decision-making. As Gram Sabha was not organized to discuss the planning and development of the solar project, villagers did not get a chance to voice their opinions and fears and negotiate with the company.

Intermediaries, corruption, and political influence also led to several injustices. For example, intermediaries intimidated people and misinformed the illiterate, poor, needy, and innocent people, leading to distributional injustice cases. Corruption made it easier for companies and panchayat officials to bypass the rules. Political influence and domination led to the deprivation of rightful beneficiaries of remuneration offered by the company. Corrupt panchayat officials misappropriated the tax money meant for village development. Corrupt contractors misappropriated the money got from solar project developers meant for the salaries of workers.

Furthermore, a lack of accountability for the promises made during land acquisition caused some injustices. For example, intermediaries who promised jobs were not in a legal position to promise one. Different actors implementing the projects made it difficult to fix accountability. Solar project developers acquiring land and EPCs implementing the project in reality, changing management staff of the company made it easier for officials to dodge the responsibilities. The informal, temporary nature of the jobs and lack of government protection to such workers further exacerbated issues related to accountability. This often caused locals to protest and go on hunger strikes.

Lastly, changes in the use of resources like water and land have potentially risked locals' livelihoods and future generations. Diverting the land and water for other purposes may create competition among other uses such as food production, grazing, irrigation, etc. Excessive requirements for water may also cause water scarcity in the drought-prone where the solar park is located.

4. Finally, **"How can such a project be made more responsible?"** recommends specific policy measures for the government to mitigate the negative impact of solar project development on local communities.

Various policy measures were recommended for the state government that seeks to improve the transparency, participation, accountability of companies, gram panchayat, counter corruption and optimize the land use. It includes (i) aspiring to higher standards of environmental and social impact assessment, (ii) designing auctions to minimize corruption and stimulate local development, (iii) Leasing lands and creation of land use policy, (iv) protecting the workers, and (v) Empowering the locals and strengthening the civil society.

Answer to the main research question "**How can governments make utility-scale solar power projects in India more responsible towards the communities they inhabit?":**

National Solar Mission was launched in 2010 to create an enabling environment to accelerate solar energy penetration across India. Of the 100 GW target, 60 GW of solar energy capacity has to be realized through ground-mounted solar panels. Thus, utility-solar projects are being set up in different parts of India, ranging from a few MW to a few hundred MW. The solar projects in Man taluka were sanctioned under phase II batch III of NSM. They were commissioned under the Renewable Energy Policy, 2015 of the state of Maharashtra.

Apart from these overarching policies, rules such as LARR Act, 2003, Groundwater abstraction rules, waste management, and environmental impact assessment rules apply to solar project development in India. Besides institutional actors, solar project developers, EPCs, and local communities constitute the critical stakeholders in the project implementation process.

The complex governance scenario of solar sector and an attempt to fast-track the deployment of solar lead to lapses on various fronts of governance. Research conducted for the thesis reiterates that even though people view the RE sector as "environmentally good," without good governance, we as a community stand to lose the social and environmental capital because of such projects. Various justice concerns regarding livelihood impact due to land and water use change, energy injustice, labour, and human rights violations call for a resilient and responsible approach to the development of the RE sector.

Issues such as corruption, political influence, lack of transparency, accountability, and participation plague the RE sector and other industries alike. Nevertheless, India cannot lose this chance offered by the energy transition. The governments in India should recognize what many scholars believe, that the RE sector is uniquely poised to create a future that is more just, equitable, and sustainable.

The recommendations in section 6.2 are easy to write than implement. As all recommendations suggest, governments cannot do this alone. To protect its citizenry and act genuinely as people's guardians, it should start with empowering the local community and strengthening civil society. Whether the goal is to mitigate climate change, achieve clean energy targets, or attain sustainable development goals, building from the bottom is imperative. It will help create necessary checks and balances at the local level where such projects are coming up. Government can focus on strengthening the grassroots level civil society initiatives and improving the functioning of Gram Sabhas to make the governance of solar projects more transparent, participatory, and accountable. Injustices and unfairness are felt and experienced by the locals. Thus, they are better positioned to understand the nature and extent and eventually address them through various means by directly negotiating with the companies.

At the same time, the government should partner with the private actors in the RE sector to create an enabling environment for them to go beyond basic environmental or social compliance. For example, the government can incentivize companies to go beyond obtaining a Gram Panchayat NOC and build responsible businesses that proactively try to govern better and minimize their ecological and social footprint. It can be done by setting up higher environmental and social impact assessment standards and designing these elements into auctions as selection or qualification criteria. The government can also make companies accountable to locals by mandating companies to hire locals and spend their CSR locally, primarily targeted to mitigate the impact caused by their operations. Lastly, the government can also bring together businesses and locals for solar project development. Innovative land-use policies such as solar-cropping or solar-sharing can be explored in the utility-scale solar sector within the state.

8.2. Scientific contribution

The main scientific contribution of this study is the empirical evidence of justice concerns in utility-scale solar projects. As identified in chapter 1, Indian case studies focusing on energy justice in general and solar in particular are limited. Moreover, the case studies so far focused on ultra-mega utility-scale solar projects (above 500 MW). Thus, this study shows that smaller utility-scale projects too have similar injustice concerns identified in previous case studies.

Additionally, the research adds to the limited literature on energy justice in developing countries. As argued in chapters 1 and 2, energy justice literature is dominated by western case studies and interpretation of energy justice. This study provides evidence-based findings of how justice issues related to RE projects are experienced in India.

8.3. Limitations of this study

Time constraints and restrictions due to CoVID have resulted in some limitations of this study.

First, the sample size: It must be noted that the total combined population of these villages is around 8000 (see appendix). We had planned to conduct at least 30 individual interviews because of the time allotted for the master's thesis. However, only 14 interviews could be conducted. It limits the number of representatives from each section of the society like landowners who sold the land, workers, business people, pastoralists, landless agricultural labourers, etc.

Second, sample composition: All respondents were male. No female representation in the sample makes it hard to know how such projects affect their lives. Vulnerable communities like landless villagers and pastoralists who depend on other's lands could not be interviewed. Perceptions of other sections of society like youth, senior citizens could not be known. Experiences of people who are usually subjected to caste-based discrimination could not be known.

Third, observation: In a case study, observation is also an essential method of data collection. Because of covid, participant observation could not be carried out at all. The observation could have helped reveal information about the norms, values, and practices of local communities.

Fourth, a limited number of documents: Since this project is smaller than other ultra-mega solar projects in India, there was a lack of online documents. Many documents containing village-specific data, land details, demographic details are available at the Gram Panchayat office. Due to the inability to travel there, these documents could not be gathered. Besides, conducting interviews, establishing trust, and making interviewees feel comfortable on a call is difficult. Many opportunities to get information were lost because of this issue.

8.4. Recommendations for future research

This section presents several recommendations for future research. However, these should not be considered as limited.

While writing this report, India's installed renewable energy capacity crossed the 100 GW mark. However, as identified in chapter 1, research on justice in implementing renewable energy projects in India is still limited. Thus, more research and case studies about different renewable energy projects, including wind and solar, could be carried out to enrich our understanding of the issue of justice within the context of India. Moreover, as solar energy takes center stage in India's energy transition efforts, more empirical evidence about justice issues in solar energy projects from different parts of India could provide stronger arguments. It could inspire comparative policy analysis of different Indian states to generate valuable knowledge to guide evidence-based policymaking in the country.

Alternative and contextual formulations of justice could be researched to improve the applicability of the energy justice framework to developing countries. Furthermore, comparing Indian experience with other countries based on similarities in socio-economic development, education, renewable energy targets, geography, politics, et cetera could also generate interesting insights for energy justice research.

Research on the business models followed by renewable energy developers could help reveal any links among the business models, government policies, and justice issues caused during the implementation of RE projects. Besides, research in corporate governance in the world

could also provide valuable information regarding the best practices to mitigate the negative social and environmental externalities caused during the life cycle of a renewable energy project.

Additionally, multi-disciplinary research into energy projects implementation is necessary. It will help further the knowledge about the socio-technical nature of such projects. Besides, research into designing the institutional rules, stakeholders, and process management is necessary to mitigate the negative impact. The particular focus could be on questions like who should have a voice at which stages of project implementation, what should be the powers and responsibilities of key stakeholders, which sections of the society are affected the most and how to give the most vulnerable section a seat at the negotiation table, what should be the just distribution of burdens and benefits and who should determine that, and so on.

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Appendices

Sample interview questionnaire

Sources- Yenneti (Charanaka solar park), Asian Development Bank, Arun Nayak(Hirakud Dam)

General technology questions:

- Could you tell me how long have you been living in this area, in this house?
- Do you see any changes in the area in terms of technology?
- What are the technologies you have used in the past and what are the technologies you are using at present?
- Why do you think the change of technology you have adopted is important?
- How did you adapt to the specific technology?

Knowledge - General knowledge about solar parks (clarify what respondents mean of each term like solar energy etc)

- Can you talk about the implementation of the solar park in this area?
- Did you know about solar energy and panels before? What did you know?
- Who were involved in establishing a solar park in the phase of construction, development and maintenance? What are the positive and negative impacts of solar parks (intervention): economic, environmental, scenic, visual to the place and to the community?
- What are the positive and negative aspects of solar energy vis-a-vis other alternative energy sources?
- Should solar energy be a higher priority as an answer to climate change for that particular area? If yes, why and if not, why not?
- What is the power situation in your village? How will the solar park improve / worsen the situation of "electricity" in.....?

Knowledge about specific aspects of the solar park

- Can you talk more about the site of the existing project location? What was the utility of the site before?
- When did construction begin at the site? And was this the original site proposed/selected?
- Can you talk more about the magnitude of the solar park, the ideal place of installation of project, the project proponent, what is going to happen with the energy produced, and any other concerns and comments.
- What characteristics did you like or dislike about solar energy parks?
- Are there any specific characteristics of the solar energy park that would decrease or increase your support of the project?

Knowledge about the process of decision making – (clarify what respondents mean of each term like decision making)

- Who are the actors involved in the decision to place the project in.....? And at the existing site?
- Who makes the final decision and what steps are taken to reach that decision?
- If you do not agree with the existing system, what are the issues, concerns that are needed to be taken into account?

Do you know about land use - (clarify what respondents mean of each term like land use, zoning plan)

- Who uses (used) the land on what to locate? For what?
- Who uses (used) the surrounding land? For what?
- Was there any 'public' or 'gifted' land? For commons?
- Was there any grazing land used seasonally by some communities?
- Was the land cultivable? If not then what did you use the land for?
    - Prompt: small trees, plants, for cattle rearing etc
- Did you have any private property on the land under solar park?
    - Prompt: temple, well, bore-well, trees etc.
    - Did you get compensation for that as well? In what form?

Perceptions / attitudes towards the project –

- How is the village being benefitted due to the project?
- What are the opportunities that would be created?
- What did you expect when you first got to know that a solar park is going to be built?
- What are the main problems afflicting the area.....due to solar park?
- Can you please explain if the solar park cause, require or bring any issues such as resettlement and rehabilitation of any groups, creating problems to local communities by any ways, and socio-cultural and livelihood impacts.
- Do you think, expanding this park will cause conflicts later? 20 years down the line? What conflicts? Why?

Feelings of equity and / or justice

- Were you aware of what was going on and where in the context of solar park?
- What are the benefits of the project for you?
    - How much land did you give to the project? Was it the only piece of land?
    - Who compensated? How much and when did the process of compensation start? Are you satisfied with it?
    - Did you get to negotiate the price with anyone? Was it at par with market value? What was the market value?
- Who benefits from the project?
    - Prompt: the term 'benefits' to be clarified
    - Were there different monetary compensation for different people?
- What is going to happen with the energy produced and where is it going?- are you a recipient of the energy produced? If so, what appliances run on solar energy?
- What benefits does this project bring to the community? And to.....? And to.....?
    - Were you promised anything by the govt, company
- Do you have to pay to access the resources (solar park, energy produced etc)
    - prompt: clarify what does these terms means for them)
- In your opinion, what would be the best place for the solar park in.....? And in.....? Why?
- Do you think losing ownership of land affects you in any way? Or your children? How ?
    - Prompt: As a community, sense of belonging

Feelings of community participation/empowerment and trust on institutions –

- How representative is the policy of.....in.....? (prompt: Any representation in making the plot allotment policy or Govt. resolution)
- In the development of park starting from policy, which stage does the people are or should be included?
- Who must have be consulted in.....before approving the project?
- Who should be involved in the process of deciding whether to approve or reject the project?

- Who should have been involved in the entire process – policy formulation, conceptualisation, project design, implementation, operation and maintenance?
- Does the fact that the solar energy park installed in your neighborhood than any other neighborhood affect your support of the project?
- What is the model of power generation? Do you know about the management of the procedure?
- How confident are you in the government's ability to regulate the operation of the project?
- How confident are you of the sincerity of their intentions?
- How confident are you of the developer’s ability to fulfill their proposals?

Consent form

Please tick the appropriate boxes	**Yes**	**No**	
Taking part in the study			
I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	□	□	
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	□	□	
I understand that taking part in the study involves audio-recording of the interviews. I am aware that my interview will be translated to English and transcribed as text **Risks associated with participating in the study**	□	□	
I understand that taking part in the study involves no known risks	□	□	
Use of the information in the study			
I understand that information I provide will be used for a thesis report	□	□	
I understand that information I provide will be used for research publication	□	□	
I understand that information I provide will be used for online publication on website	□	□	
I understand that personal information collected about me that can identify me, such as [e.g. name, address, occupation, caste, age, sex, education, income, marital status], will not be shared beyond the study team.	□	□	
I agree that my information can be quoted in research outputs	□	□	
Future use and reuse of the information by others			
I give permission to use anonymised transcript of my interview for research purposes	□	□	
I give permission for the anonymised transcript of the interview that I provide to be archived in TU Delft Research Data Repository so it can be used for future research and learning.	□	□	
I give permission for the anonymised transcript of the interview that I provide to be archived in TU Delft Research Repository so it can be used for future research and learning.	□	□	

Village data

State Name	District	SubDistr	Village_Nam	Name	Level
Maharastra (27)	Satara (527)	Man(0425	Devapur(56345	Devapu	VILLA

Total Number of HouseHold : 471

Population	Persons	Males	Females
Total	2,506	1,398	1,108
In the age group 0-6 years	262	142	120
Scheduled Castes (SC)	552	301	251
Scheduled Tribes (ST)	18	9	9
Literates	1,708	1,084	624
Illiterate	798	314	484
Total Worker	1,020	655	365
Main Worker	1,009	651	358
Main Worker - Cultivator	339	251	88
Main Worker - Agricultural Labourers	530	307	223
Main Worker - Household Industries	33	5	28
Main Worker - Other	107	88	19
Marginal Worker	11	4	7
Marginal Worker - Cultivator	3	2	1
Marginal Worker - Agriculture	3	2	1
Marginal Worker - Household	4	0	4
Marginal Workers - Other	1	0	1
Marginal Worker (3-6 Months)	9	4	5
Marginal Worker - Cultivator (3-6 Months)	3	2	1
Marginal Worker - Agriculture Labourers (3-6 Months)	3	2	1
Marginal Worker - Household Industries (3-6 Months)	2	0	2
Marginal Worker - Other (3-6 Months)	1	0	1
Marginal Worker (0-3 Months)	2	0	2
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	0	0	0
Marginal Worker - Household Industries (0-3 Months)	2	0	2
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	1,486	743	743

State Name	District	SubDist	Village_Name	Name	Level
Maharastra (27)	Satara	Man(0425	Varkute	Varkute	VILLA

Total Number of HouseHold : 925

Population	Persons	Males	Females
Total	4,047	2,028	2,019
In the age group 0-6 years	512	281	231
Scheduled Castes (SC)	764	383	381
Scheduled Tribes (ST)	4	2	2
Literates	2,452	1,356	1,096
Illiterate	1,595	672	923
Total Worker	1,736	1,058	678
Main Worker	1,587	1,002	585
Main Worker - Cultivator	676	467	209
Main Worker - Agricultural	508	241	267
Main Worker - Household Industries	21	10	11
Main Worker - Other	382	284	98
Marginal Worker	149	56	93
Marginal Worker - Cultivator	81	29	52
Marginal Worker - Agriculture	25	5	20
Marginal Worker - Household	3	0	3
Marginal Workers - Other	40	22	18
Marginal Worker (3-6 Months)	105	37	68
Marginal Worker - Cultivator (3-6 Months)	48	16	32
Marginal Worker - Agriculture Labourers (3-6 Months)	20	3	17
Marginal Worker - Household Industries (3-6 Months)	2	0	2
Marginal Worker - Other (3-6	35	18	17
Marginal Worker (0-3 Months)	44	19	25
Marginal Worker - Cultivator (0-3 Months)	33	13	20
Marginal Worker - Agriculture Labourers (0-3 Months)	5	2	3
Marginal Worker - Household Industries (0-3 Months)	1	0	1
Marginal Worker - Other Workers (0-3 Months)	5	4	1
Non Worker	2,311	970	1,341

State Name	District	SubDist	Village_Na	Nam	Level
Maharastra (27)	Satara	Man(0425	Shirtav(5634	Shirta	VILLA

Total Number of HouseHold : 181

Population	Persons	Males	Females
Total	795	394	401
In the age group 0-6 years	98	49	49
Scheduled Castes (SC)	231	119	112
Scheduled Tribes (ST)	0	0	0
Literates	473	283	190
Illiterate	322	111	211
Total Worker	375	192	183
Main Worker	368	189	179
Main Worker - Cultivator	170	84	86
Main Worker - Agricultural	110	50	60
Main Worker - Household Industries	3	1	2
Main Worker - Other	85	54	31
Marginal Worker	7	3	4
Marginal Worker - Cultivator	0	0	0
Marginal Worker - Agriculture	6	3	3
Marginal Worker - Household	0	0	0
Marginal Workers - Other	1	0	1
Marginal Worker (3-6 Months)	6	3	3
Marginal Worker - Cultivator (3-6 Months)	0	0	0
Marginal Worker - Agriculture Labourers (3-6 Months)	5	3	2
Marginal Worker - Household Industries (3-6 Months)	0	0	0
Marginal Worker - Other (3-6	1	0	1
Marginal Worker (0-3 Months)	1	0	1
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	1	0	1
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	420	202	218

State Name	District	SubDist	Village_Nam	Name	Level
Maharastra (27)	Satara	Man(0425	Palsavade(5634	Palsava	VILLA

Total Number of HouseHold : 235

Population	Persons	Males	Females
Total	1,075	554	521
In the age group 0-6 years	125	67	58
Scheduled Castes (SC)	111	58	53
Scheduled Tribes (ST)	0	0	0
Literates	627	370	257
Illiterate	448	184	264
Total Worker	732	373	359
Main Worker	627	305	322
Main Worker - Cultivator	459	230	229
Main Worker - Agricultural	157	69	88
Main Worker - Household Industries	4	2	2
Main Worker - Other	7	4	3
Marginal Worker	105	68	37
Marginal Worker - Cultivator	85	55	30
Marginal Worker - Agriculture	7	4	3
Marginal Worker - Household	1	1	0
Marginal Workers - Other	12	8	4
Marginal Worker (3-6 Months)	77	51	26
Marginal Worker - Cultivator (3-6 Months)	59	38	21
Marginal Worker - Agriculture Labourers (3-6 Months)	6	4	2
Marginal Worker - Household Industries (3-6 Months)	1	1	0
Marginal Worker - Other (3-6	11	8	3
Marginal Worker (0-3 Months)	28	17	11
Marginal Worker - Cultivator (0-3 Months)	26	17	9
Marginal Worker - Agriculture Labourers (0-3 Months)	1	0	1
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	1	0	1
Non Worker	343	181	162