

RENEWABLE ENERGY DEVELOPMENT AND ENVIRONMENTAL JUSTICE IN
THAILAND: CASE STUDIES OF BIOMASS ENERGY PROJECTS IN ROI-ET
AND SUPHANBURI PROVINCES

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ร้อยเอ็ดและสุพรรณบุรี

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต

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เยจิ ยู: การพัฒนาพลังงานหมุนเวียนและความยุติธรรมด้านสิ่งแวดล้อมในประเทศไทย: กรณีศึกษาโครงการพลังงานชีวมวลในจังหวัดร้อยเอ็ดและสุพรรณบุรี (RENEWABLE ENERGY DEVELOPMENT AND ENVIRONMENTAL JUSTICE IN THAILAND: CASE STUDIES OF BIOMASS ENERGY PROJECTS IN ROI-ET AND SUPHANBURI PROVINCES) อ.ที่ปรึกษาวิทยานิพนธ์หลัก : อ.ดร.คาร์ล มิเดิลตัน, 109 หน้า.

งานวิจัยนี้มีวัตถุประสงค์เพื่อตรวจสอบพัฒนาการ และความก้าวหน้าของโครงการพลังงานชีวมวลต่างๆ ในประเทศไทย โดยผ่านมุมมองของกระบวนการความยุติธรรมทางสิ่งแวดล้อม แม้ประเทศไทยได้อนุญาตให้ผู้ผลิตพลังงานเอกชน สร้างพลังงานจากชีวมวล ซึ่งเป็นพลังงานทดแทนที่สำคัญ เพื่อเพิ่มความมั่นคงทางด้านพลังงานและลดปริมาณการปล่อยก๊าซคาร์บอนไดออกไซด์ ถึงอย่างไรก็ตาม โครงการพลังงานชีวมวลบางโครงการในประเทศไทยก็ได้ส่งผลกระทบต่อสิ่งแวดล้อม และสังคม อาทิเช่น ปัญหามลพิษทางอากาศ และปัญหาสุขภาพที่พบในชาวบ้านที่อาศัยอยู่บริเวณใกล้เคียงกับโครงการเหล่านั้น ซึ่งก่อให้เกิดความไม่ยุติธรรมต่อสิ่งแวดล้อม

ด้วยการนำแนวความคิดเรื่องความยุติธรรมทางสิ่งแวดล้อมมาประยุกต์ใช้นั้น งานวิจัยนี้จะประเมินผลว่า โครงการพลังงานชีวมวลชีวมวลต่างๆ ในประเทศไทยนั้นจะต้องอยู่ภายใต้สภาพใดบ้าง จึงจะถือได้ว่ามีความยุติธรรมทางสิ่งแวดล้อม ซึ่งได้มีการทำกรณีศึกษาโดยใช้วิธีวัดเชิงคุณภาพ เพื่อเก็บข้อมูลจากพื้นที่ที่ทำการวิจัยนี้ในจังหวัดร้อยเอ็ด และสุพรรณบุรี ในเดือน มิถุนายน 2556

งานวิจัยนี้ชี้ให้เห็นว่า ประการแรก เป็นไปไม่ได้ที่พลังงานทดแทนจะเข้ามาโดยไม่ส่งผลกระทบต่อสิ่งแวดล้อม และชุมชนใกล้เคียง ประการที่สอง ในกระบวนการก่อสร้างนั้น ไม่ว่าจะเป็เทคโนโลยีล่าสุด หรือการสร้างตามแบบมาตรฐาน สิ่งเหล่านี้มักจะขึ้นอยู่กับการต้องการของฝ่ายธุรกิจซึ่งจะดูช่องโหว่ของนโยบายและกฎหมายของประเทศไทยเป็นหลักในการตัดสินใจ และประการสุดท้าย งานวิจัยนี้จะขอกล่าวว่า เมื่อเกิดปัญหาดังที่เห็นได้จากการณ์จังหวัดร้อยเอ็ดนั้น ปัญหาดังกล่าวไม่ได้รับการแก้ปัญหาก็เหมาะสม สืบเนื่องมาจากการแสดงความรับผิดชอบที่ค่อนข้างจำกัดจากฝ่ายธุรกิจ และการเข้ามามีส่วนร่วมอันจำกัด หรือน้อยนิดจากองค์กรปกครองส่วนท้องถิ่น เช่น องค์การบริหารส่วนจังหวัด และองค์การบริหารส่วนตำบล.

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YEJI YOO: RENEWABLE ENERGY DEVELOPMENT AND ENVIRONMENTAL JUSTICE IN THAILAND: CASE STUDIES OF BIOMASS ENERGY PROJECTS IN ROI-ET AND SUPHANBURI PROVINCES. ADVISOR: CARL MIDDLETON, Ph.D., 109pp

This thesis examines the development of biomass energy projects in Thailand from the perspective of environmental justice. Thailand has allowed private power producers to generate energy from biomass, an important source of renewable energy, in order to increase energy security and to reduce CO₂ emissions. However, some biomass projects in Thailand have resulted in negative environmental impacts and social problems, such as air pollution and health problems for villagers near the projects, and thus result in environmental injustices.

Applying the concept of environmental justice, the thesis assesses conditions that ensure environmental justice in biomass power projects in Thailand. A case study was carried out using a qualitative methodology to collect data during field research conducted in Roi-Et and Suphanburi provinces in June 2013.

This thesis points out firstly, that renewable energy generation is not always free of negative impacts to the environment and nearby communities. Secondly, construction including technology utilization and operational standards depend on the will of private companies due to loopholes in Thai policies and regulations. Lastly, the thesis argues that problems were not adequately addressed in the case in Roi-Et province because of the limited accountability of the business sector and provincial administrative government, as well as the limited influence of Local Administrative Organizations (LAOs) such as the Provincial Administrative Organization (PAO) and Tambon Administrative Organization (TAO).

Field of Study: International Development Studies

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Student's Signature

Advisor's Signature

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LIST OF ABBREVIATIONS

AEDP	–	Alternative Energy Development Plan
CDM	–	Clean Development Mechanism
CER	–	Certified Emission Reduction
CSR	–	Corporate Social Responsibility
DEDE	–	Department of Alternative Energy Development and Efficiency
EGAT	–	Electricity Generating Authority of Thailand
EGCO	–	Electricity Generating Public Company Limited
EIA	–	Environmental Impact Assessment
EPA	–	Environmental Protection Agency, USA
EPPO	–	Energy Policy and Planning Office, Thailand
ESP	–	Electrostatic Precipitator
GHG	–	Green House Gas
HIA	–	Health Impact Assessment
IPP	–	Independent Power Producer
ISO	–	International Organization for Standardization
LAO	–	Local Administrative Organization
MEA	–	Metropolitan Electricity Authority
MEE Net	–	Mekong Energy and Ecology Network
MP	–	Member of Parliament
NEB	–	National Environmental Board
NEPC	–	National Energy Policy Council
NESDP	–	National Economic and Social Development Plan
NEQA	–	National Environmental Quality Act
NGO	–	Non-Governmental Organization

ONEP	–	Office of Natural Resources and Environmental Policy and Planning
PAO	–	Provincial Administrative Organization
PCD	–	Pollution Control Department
PDP	–	Power Development Plan
PEA	–	Provincial Electricity Authority
POI	–	Provincial Office of Industry
REDP	–	Renewable Energy Development Plan
SOP	–	Standard Operating Procedure
SPP	–	Small Power Producer
TAO	–	Tambon Administrative Organization
TEI	–	Thailand Environment Institute
UNFCCC	–	United Nations Framework Convention on Climate Change
VSP	–	Very Small Power Producer

CHAPTER I

INTRODUCTION

1.1. Problem Statement

In facing the dual global crises of climate change and energy insecurity, renewable energy has emerged as an alternative source of powering the world. Securing sufficient energy is still a significant priority for most countries in order to maintain and speed up economic growth, while reducing carbon emissions is necessary to mitigate global climate change. Though many renewable energy sources such as solar, wind and hydropower exist, bioenergy is considered an influential future source of energy (Raju, Shinoj and Joshi, 2009, p.65). Bioenergy is defined as renewable energy produced from biomass resources such as agricultural and industrial residues.

Thailand, one of the most rapidly industrializing and developing countries in the world, plans to expand its energy supply. Energy demand for Thailand has increased in three decades of rapid economic expansion, from 2,838 megawatts (MW) in 1982 and 16,700 MW in 2002 to 26,121 MW in 2012 (Energy Policy and Planning Office [EPPO] 2012; Greacen and Greacen 2004, p.518). Expansion of energy supply and demand is a driving force behind maintaining and increasing economic growth in Thailand.

At the same time, Thailand seeks to increase energy produced from renewable energy sources to mitigate the dual crises of climate change and energy scarcity. According to the Thai Alternative Energy Development Plan (AEDP 2012-2021), the target is to source 25% of total energy consumption from renewable energy generation by 2021. Biomass is an especially important source for renewable energy in Thailand because agricultural residues are abundant (Papong et al., 2011). While the power generation potential of agricultural residues such as rice husk and sugarcane waste reached 3,070 MW in 2009, the total installed capacity of biomass power plants is 1,397 MW in Thailand, as of September 2011 (Juntarawijit and Juntarawijit, 2012;

EPPO 2009; EPPO 2011). It is within this context that the development of biomass power plants is promoted in Thailand.

Among eighty-eight biomass power plants installed in Thailand, on one hand, plants including Decha Bio Green Project in Suphanburi province and Roi-Et Green biomass power plant in Roi-Et province operate with minor environmental impacts (EPPO, 2012b and 2012c). On the other hand, as with the Buasommai biomass power plant in Roi-Et province, some plants result in negative environmental and social impacts including air pollution and health problems for villagers living near the projects, and thus perpetrate environmental injustices.

There are many definitions of environmental justice. According to the US Environmental Protection Agency (EPA), the concept of environmental justice is defined as “*the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies*” (Environmental Protection Agency [EPA], United States). The key concepts of environmental justice are: distributive justice that refers to the distribution of environmental benefits, harms, and risks; procedural justice which refers to access to information and participation in decision-making processes; and justice as recognition, which means equal recognition of different people, groups and places (Walker, 2012).

To illustrate, several power projects in Thailand have resulted in conditions of environmental injustice. Pak Mun hydropower dam and Mae Moh lignite-fired power station are well-known cases which caused villagers to suffer the loss of livelihoods and severe health problems (Middleton, 2012, pp.297-9).

In applying the concept of environmental justice, this thesis examines the impacts and benefits of biomass projects on the environment, affected communities, project developers, and the wider society through case studies in Suphanburi province and Roi-Et province in Thailand. Additionally, the research identifies the conditions

under which current renewable energy policies for biomass projects can attain truly sustainable development.

1.2. Research Questions

1.2.1. Main Research Question

Under what conditions do biomass energy projects in Thailand ensure environmental justice?

1.2.2. Sub-Research Questions

- 1) In terms of distributive justice, what are the benefits, harms, and risks of the projects? Who benefits from the projects and who experiences harms and risks?
- 2) In terms of procedural justice, what are the relevant laws and policies and were they followed in the case of the projects? Who participated in the decision-making process? Was there sufficient access to information, public participation and access to justice? Were all points of view considered?
- 3) In terms of justice as recognition, have all negative impacts of renewable energy projects been recognized by policy-makers?
- 4) Why do biomass energy projects respect environmental justice, while others do not?

1.3. Objectives

1.3.1. Main Objective

To assess what conditions result in environmental justice in biomass power projects in Thailand.

1.3.2. Sub-Objectives

- To examine the impacts and benefits of biomass projects on the environment, affected communities, project developers, and the wider society.
- To analyze the policy-making process of the projects and the relationships among diverse actors including project beneficiaries, affected villagers, and civil society.
- To examine whether all negative impacts of renewable energy projects have been recognized by policy-makers in Thailand.
- To compare a case of a biomass power plant operating without serious problems in Suphanburi province to another case, which has created respiratory and other problems for villagers in Roi-Et province

1.4. Conceptual Framework

1.4.1. Defining the Concept of Environmental Justice

Environmental justice refers to the fair distribution of environmental impacts and sufficient participation in the decision-making process of development projects. According to the US EPA, “*Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.*” (US EPA, 2008; cited in Walker, 2012, pp.8-9)

There are plural definitions of environmental justice. According to the Coalition for Environmental Justice (in Central and Eastern Europe), “*a condition of environmental justice exists when environmental risks, hazards, investments and benefits are equally distributed without direct or indirect discrimination at all jurisdictional levels and when access to environmental investments, benefits, and*

natural resources are equally distributed; and when access to information, participation in decision-making, and access to justice in environment-related matters are enjoyed by all” (Steger, 2007).

1.4.2. Conceptual Framework

Environmental justice is composed of three key concepts: 1) distributive justice, 2) procedural justice, and 3) justice as recognition. Distributive justice means the equal distribution of environmental harms, risks, and benefits among stakeholders. Procedural justice includes public participation, access to information, transparency, and accountability on the part of project developers. Justice as recognition means that policy-makers should consider the situations of different social groups equally (Schroeder et al. 2008; Middleton 2012; Walker 2012).

Historically, environmental activists and scholars mainly focused on the (in)equality of outcomes, that is, the distribution of environmental risks and benefits in terms of distributive justice (Walker and Bulkeley, 2006, p.656). However, they recognized that the environmental justice framework focusing on distributive justice could have a limitation to addressing and pointing out environmental problems because it is difficult to achieve “even” distribution of environmental risks. Thus, participation in key processes and recognition were both conceived as alternative notions to supplement distributive justice. Subsequently, this thesis also chose three key components to explain the concept of environmental justice (see Table 1).

Table 1 Concepts of environmental justice

Environmental Justice		
Distributive Justice	Procedural Justice	Justice as Recognition
Equal distribution of environmental harms, risks and benefits	Access to information, public participation, and access to justice	Equal recognition of people, groups or places

1.4.2.1.Distributive Justice

Distributive justice focuses on the fair distribution of outcomes such as public goods (benefits) and public burdens (harms and risks) (Walker, 2012, p.10; Gross, 2007, p.2279). In this thesis, harms, risks and benefits are considered in the outcomes of development projects. While benefits mean positive impacts, both harms and risks refer to the creation of negative impacts on different stakeholders. However, there is a difference between harms and risks: harms refer to impacts that happen after the implementation of projects, and risks refer to impacts that have not yet happened but are anticipated to happen in the future.

Therefore, in the context of biomass energy projects, stakeholders such as local communities, project operators, electricity consumers, and power utilities in Thailand can all potentially receive different harms, risks, and benefits (see Table 2).

Table 2 Anticipated environmental harms, risks, and benefits of biomass energy projects on stakeholders

	Harms	Risks	Benefits
Local community	Unpleasant residential environment caused by noise, odor, air, and water pollution; Health problems; Decreased land value.	Long-term health impacts; Division of community into groups who oppose and groups who support the project.	Employment; Additional income by selling agricultural residues.
Project operator	-	Unstable biomass supply caused by price increases; The cessation of plant operation by villagers' strong opposition.	Profits by selling electricity to energy utilities Enhanced reputation by developing renewable energy.
Electricity consumer	-	-	"Clean" electricity.

PEA/MEA	-	Unstable electricity supply	Having a source of electricity connected to the power grid.
Local authority	-	Increased tax expenditures used for affected villagers.	Tax revenue from operating plants.

1.4.2.2.Procedural Justice

Procedural justice is concerned with the fairness of decision-making processes. Important elements of the concept are 1) access to information, 2) access to public participation in government decision-making, and 3) access to justice. The 1992 Rio Declaration (and in particular, Principle 10), which mentions these three principles of access, was adopted by 178 nations at the United Nations Conference on Environment and Development. The three access principles aim at achieving “transparent, equitable and accountable decision making” that constitute the pillars of good environmental governance (Thailand Environment Institute [TEI], 2012, p.ii). Therefore, in this thesis, the concept of procedural justice also includes the three access rights.

“Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided” (Principle 10 of the 1992 Rio Declaration).

To achieve procedural justice in development projects, government and developers need to provide sufficient information related to the projects to the public and communities who may potentially be affected by the projects (access to

information); the public and the people should not be excluded in the decision-making process (public participation); and the national legal system should guarantee their voices to be heard and decision-makers to be made accountable (access to justice). This thesis uses the definition of the three principles, as defined below by The Access Initiative (TAI), a coalition of civil society groups working together to promote the implementation of the access rights at the national level (TEI, 2012, pp.iii-iv).

- ***Access to information*** – *the ability of citizens to obtain environmental information in the possession of public authorities. “Environmental information” includes information about air and water quality and information about whether any hazardous chemicals are stored at a nearby factory.*
- ***Public participation*** – *the ability of citizens to submit informed, timely and meaningful input and influence decisions, general policies, strategies and plans at various levels and on individual projects that have environmental impacts and implications.*
- ***Access to justice*** – *the ability of citizens to turn to impartial and independent arbiters to resolve disputes over access to information and participation in decisions that affect the environment or to correct environmental harm. Such impartial arbiters include mediators, administrative tribunals, and courts of law, among others (TEI, 2012, pp.iii-iv).*

Several articles of the Thai Constitution and other Thai laws promote and guarantee these three access rights at the national level (see Table 3).

Table 3 Legal framework to ensure the three access rights in Thailand

	Constitution	Specific Legislation	Other Legislation
Access to Information	The 2007 Constitution grants the right to access information possessed by state agencies (Article 56), the right to receive information and explanation from state agencies before they approve or implement a project (Article 57), and the right to submit complaints, and receive the results of consideration of such complaints without delay (Article 59).	Official Information Act 1997 grants public access to all types of information held by the government, including environmental information	
Public Participation	The 2007 Constitution codifies the right to participate in the decision-making process of the State Official (Article 58), the right to participate on local governmental organizations (Article 287), an inspection mechanism of the work of the local governmental administration (Article 282), and a mechanism enabling the local community to participate with the local government agencies in the work to promote and protect the quality of the environment (Article 290).	National Environmental Quality Act 1992 (Article 6)	Prime Minister's Office Regulation on Public Hearings B.E. 2548 (2005) – <i>state agencies have the final decision p.133</i> The State Enterprise Capital Policy Committee Regulation on Public Hearing B.E. 2543 (2000), under the State Enterprise Capital Act B.E. 2542 (1999)
Access to Justice	The 2007 Constitution codifies the right to participate in local governmental organizations (Article 287), an inspection mechanism of the work of the local governmental administration (Article 282), and a mechanism enabling the local community to participate with the local government agencies in the work to promote and protect the quality of the environment (Article 290).	National Environmental Quality Act 1992 National Health Act 2007	The Official Information Act 1997 Office of the Prime Minister Regulations on Public Hearings 2005

Source: Reconstructed from TEI, 2012 and UNESCO, 2011

1.4.2.3. Justice as Recognition

Justice as recognition emerged as another main concept of environmental justice to supplement distributional justice and procedural justice. Justice as recognition deals with the misrecognition of some people, groups and places in comparison to others, for example those divided along lines of gender, race, religion, ethnicity and so on (Walker, 2012, p.50). Therefore, the concept of justice as recognition focuses on the “*cultural and institutional processes of disrespect, denigration, insult and stigmatization which devalue particular people or places*” (Walker, 2010, p.35). Justice as recognition is a crucial concept of environmental justice in that lack of recognition not only causes inequitable distribution but also can be the foundation of further distributive injustices (Schlosberg, 2007, p.14).

In context of biomass power projects in Thailand, this thesis focuses on institutional processes such as the regulation of the VSPP program, the Energy Regulatory Commission (ERC)’s recognition of the VSPP program and biomass power plants and biomass power plant developers’ recognition of the impacts on villagers living near the power plants.

1.4.3. Claiming Environmental Justice

A review of the Thai Constitution and laws related to environmental and social impact assessments and regulations of the VSPP program in developing biomass power projects demonstrates that biomass power development projects in different provinces share the same legal environment at the national level in Thailand. In this context, factors which cause differences in the environmental and social impacts between the biomass power projects in Suphanburi province and Roi-Et province depend instead on the interpretation and implementation of these laws, together with the stakeholders’ will and actions. Therefore, this thesis focuses on the behaviors of local stakeholders, such as project operators, provincial authorities, and local communities, to understand the differences between successful and unsuccessful biomass projects in Thailand from the perspective of environmental justice. To narrow

down the differences, comparative study was applied to the research, and the points for comparison are as follows:

- Project operators
 - Are there high standards on construction including technology utilization and operation standards?
 - Is there commitment to Corporate Social Responsibility (CSR)?
- Provincial authorities
 - Are there well-planned regulations on local development projects from the district itself?
 - Does the provincial authority take accountability and responsibility for the well-being of the local people?
- Local communities and civil society
 - Are there a well-organized local communities or civil society organizations?
 - Are there active local social movements?

1.5.Scope of Research

The field research was carried out in two biomass power plant sites in Suphanburi province and Roi-Et province in Thailand. The two provinces were selected as case studies to compare projects which have shown different social and environmental impacts, in spite of being governed by the same national laws and regulations in Thailand. In addition, although there are diverse materials as a biomass source in Thailand (see Section 2.3), the biomass power plants use biomass combustion systems with the same feedstock, in this case rice husk as a main fuel and wood waste, which also makes them comparable.

1.5.1. Decha Bio Green Rice Husk Power Plant¹

Decha Bio Green Co. Ltd. was established in order to construct a renewable biomass power project in Suphanburi province in Thailand. Decha Bio Green Rice Husk Power Plant installed a 7.5 MW steam turbine generator, a boiler, and a biomass combustion system (Decha Bio Green Company Limited, 2009). The goal of the project is to generate electricity from rice husk for sale to Thai distribution systems such as MEA and PEA.

Decha Bio Green Rice Husk Power Plant is open to public visit, and it does not generate much smoke by virtue of having installed an emissions control system in the smokestacks that exceed European Standards (C. Greacen, personal communication, May 1, 2013). Also, it has not been widely criticized by local people, although there are some local issues (see Chapter 4).

1.5.2. Buasomma Biomass Power Plant²

Buasomma Electricity Generating Co. Ltd. has developed 6.4 MW and 9.9 MW biomass power plants in Roi-Et province, Thailand. Next to the Buasomma biomass power plants, there is an additional 9.9 MW biomass power plant named Roi-Et Green³, owned and operated by the Electricity Generating Public Company Limited (EGCO), one of the subsidiary companies of EGAT. Roi-Et Green biomass power plant started operation in 2003, and the Buasomma 6.4 MW and 9.9 MW biomass power plants have been operating since 2006 and 2009 respectively. These three biomass power plants utilize biomass combustion system, a fire boiler system,

¹ Decha Bio Green Co. Ltd., 99 Moo 3, Suphanburi-Bangbuathong Road, Thambol Salee, Amphur Bangplama, Suphanburi province 72150, Thailand.

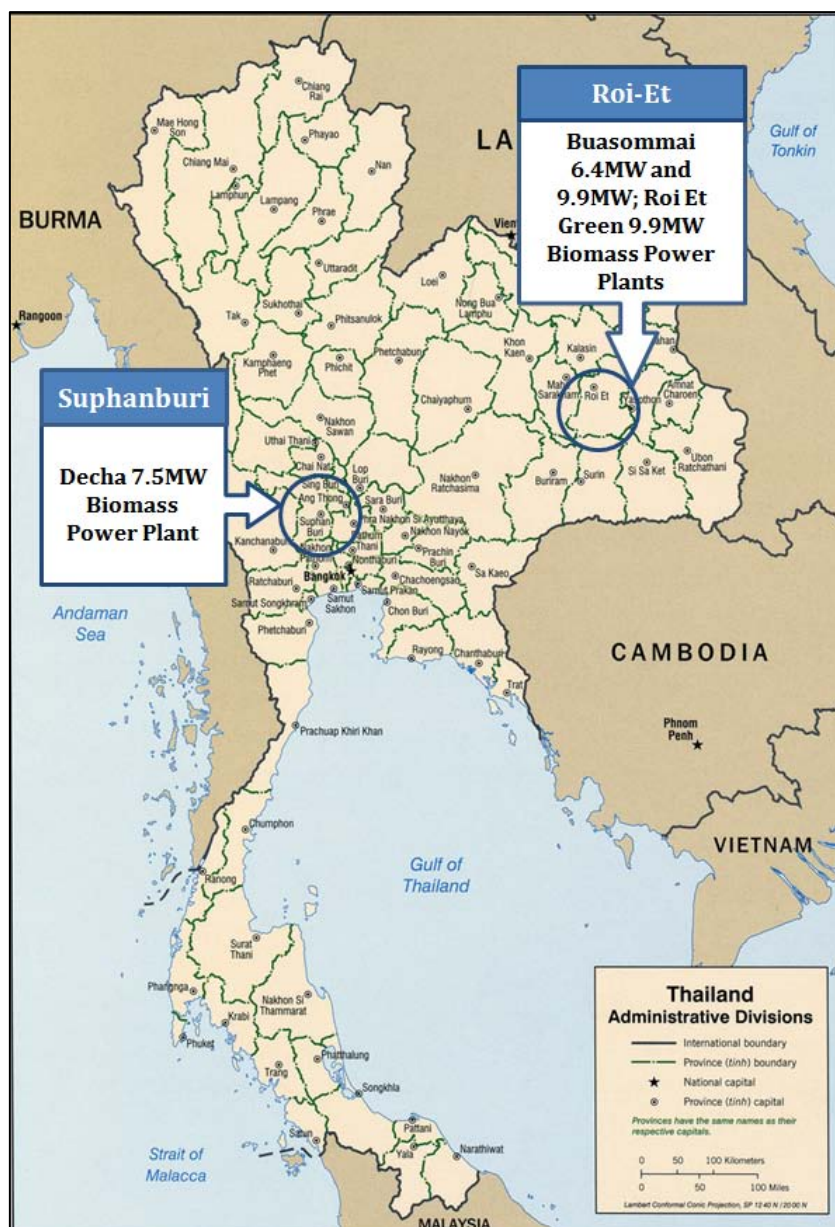
² Buasomma Electricity Generating Co. Ltd., Tambon Nuamuang, Roi-Et-Kalasin Rd., Amphur Muang Roi-Et, Thailand.

³ Roi-Et Green Company Limited, 222 Moo 10, Tambon Nuamuang, Amphur Muang Roi-Et 45000, Thailand.

and a steam turbine generator.

While the Roi-Et Green biomass power plant is perceived as a positive project by nearby villagers, the Buasommai biomass power plants have resulted in environmental problems, including increased dust and waste of water in the villages and health problems such as skin and eye irritation and respiration problems for individuals (Focus on the Global South, 2012; Sarnsamak, 2012, April 4).

Figure 1 Map of Biomass Power Plants in Suphanburi and Roi-Et Provinces



1.6. Research Methodology

1.6.1. Secondary Research

Documentary research was started at the initial stage to collect and review secondary data. The purpose of documentary research is to collect general information surrounding the current research at the national level, as well as specific cases at the local level to compare with primary data, which was collected during field research.

Secondary data was collected by focusing on environmental justice, Thai power development plans, renewable energy policies (especially about biomass energy projects), and relevant items in the Thai Constitution, laws or policies regarding environmental justice in development projects. Relevant academic articles, reports published by Non-Governmental Organizations (NGOs), and newspaper articles were collected for information about social and environmental impacts of biomass development projects in Thailand.

In addition, an internship at Mekong Energy and Ecology Network (MEE Net), a Bangkok-based organization working on power sector issues in the Mekong region, was undertaken for four months from February to May 2013 to deepen the understanding of the Thai energy sector and to create rapport with MEE Net staff and researchers. MEE Net was immensely helpful in arranging the fieldwork by reaching out to its network and introducing local civil society activists for the purposes of this research project.

1.6.2. Primary Data Collection

Case study research using qualitative research methodology was carried out to collect primary data during field research in Suphanburi province and Roi-Et province in Thailand. Fieldwork was conducted in Suphanburi for three days from 22 to 24 June, 2013 and in Roi-Et for eight days from 10 to 13 June and from 26 to 29 June, 2013. During the field research, Thai-to-English interpreters, who were familiar with

the local situation, assisted in communicating with local Thai people, collecting data in Thai, and translating data into English. Key informant interviews, observation, focus group discussions and in-depth interviews as research tools were conducted during the field research.

1.6.2.1.Observation

Observation is one of the most basic skills used during field research, not only to collect data but also to understand the current situation and directly observe what happen in the field. Mapping was conducted to illustrate general information about the communities, such as the location of biomass power plants, sources of biomass, and the number of households and villagers. After mapping, observation focused on the conditions of water and air quality, noise, and odor to capture the environmental impacts of biomass power plants on the communities. Also, the day-to-day livelihoods of the communities were observed in order to compare the quality of life before and after the construction of biomass power plants.

1.6.2.2.Key Informant Interviews

Key informant interviews were carried out during the field research to grasp an overview of the local situation. Local key informants were selected among diverse actors such as local officials, local academics, local civil society activists, senior villager leaders and project operators in the communities. Semi-structured interviews and snowball interview techniques were applied as research tools.

Through the semi-structured interviews with key informant in the field, general information was gathered about the overview and history of the biomass projects in the community and their environmental and social impacts on the community. Then, following with key informants' suggestions, several in-depth interviews with affected villagers and village headmen were conducted (see Appendices B and C).

1.6.2.3.Focus Group Discussion

To understand the “big picture” of the issue, focus group discussions were conducted in the Roi-Et province following local key informant interviews. Village headmen and vice headmen from affected villages such as Moo 10, Moo 12, and Moo 13, TAO members, and local health clinic officers were selected as each focus group to identify their concerns and village movements (see Appendix A).

1.6.2.4.Informal and In-depth Interview

During the field research, informal interviews (where the researcher was spontaneously introduced to villagers and spoke with them on an unofficial basis) were conducted to create rapport with villagers and to find relevant participants for in-depth interviews.

For in-depth interviews, both random interviews and purposely-selected interviews (for example, with most affected villagers who live near the plant or the warehouse of rice husks and villagers who experienced problems with developers) were carried out for fourteen villagers in Suphanburi province and twenty-one villagers in Roi-Et province (see Appendix B and C). Applying the conceptual framework of environmental justice, questions related to the three concepts of distributive justice, procedural justice, and justice as recognition were posed to the villagers.

1.7.Data Analysis

Interviews were recorded by note-taking by hand and typed into Microsoft Word documents to manage and code data properly. Data and documents collected in Thai were translated into English with the assistance of interpreters. Also, mapping and photography of local villages and biomass power plants were carried out to visually capture the situation of villagers.

Data was analyzed according to the conceptual research framework, which is categorized into one main research question and four sub-research questions. Firstly, information about the harms, risks, and benefits of diverse stakeholders, including local community villagers, biomass power plant developers, and local authorities were used to answer the first sub-research question: *In terms of distributive justice, what are the benefits, harms and risks of the project? Who benefits from the projects, and who experiences harms and risks?*

Secondly, information about procedural justice was assessed by access to information, public participation and access to justice. This information was used to answer the second sub-research question: *In terms of procedural justice, what are the relevant laws and policies, and were they followed in the case of this project? Who participated in the decision-making process? Was there sufficient access to information, public participation, and access to justice? Were all points of view considered?*

Thirdly, data on Thai policies and regulations on small renewable energy project was used to answer the third sub-research question: *In terms of justice as recognition, have all negative impacts of renewable energy projects been recognized by policy-makers?*

Lastly, data collected from two field sites in Roi-Et province and Suphanburi province, which sought to describe distributional justice and procedural justice as mentioned above, was compared to answer the main question: *Under what conditions do biomass energy projects in Thailand result in environmental justice?* and the fourth sub-research question: *Why do some biomass energy projects respect environmental justice while the others do not?"*

1.8.Limitations of Research

The most crucial constraint of the field research emerged from the difficulties of communicating with local Thai people who cannot understand English. To

minimize the limitation, the field research was conducted in English with help and support of Thai interpreters who not only can speak English but also are familiar with the local situation and the problems in Roi-Et province and Suphanburi province.

Another limitation of this research was the inability to access or conduct interviews with local authority officials and biomass power plant operators, especially in Roi-Et province where negative environmental and social impacts were documented. However, through the observation of a monthly meeting of a three-party committee (consisting of provincial government officers, TAO members, and affected villagers) with the biomass power plant company, data and information about the opinions and behaviors of local government officers and project were collected. This helped to mitigate the limitation not of being unable to conduct in-depth interviews with government officers and project operators.

1.9. Significance of Research

Most notably, this thesis helps to fill gaps in knowledge in the existing research on renewable energy development. This is because most research on biomass energy development emphasizes only the potential positive impacts on the environment and energy sector. By pointing out that some biomass energy projects can also have negative impacts, this thesis provides an opportunity to rethink assumptions about renewable energy development, which is generally considered not to harm the environment and people. Based on the comparative study of different biomass power plants, this thesis suggests several solutions on how to reduce the risks and harms caused by such projects.

In terms of the conceptual framework, the concept of environmental justice helps to examine Thailand's energy policy and renewable energy expansion strategy and its impacts on environment and villagers from the multiple angles: the environmental impacts of the project (distributional justice), the political procedures such as decision-making processes and the government's accountability (procedural justice) and policy-makers' recognition of impacts from renewable energy projects

(justice as recognition). Therefore, the concept of environmental justice helps to systematically analyze the problems and impacts of renewable development projects in Thailand. This thesis provides new insight on how environmental injustices occur in renewable energy projects in Thailand.

Furthermore, the research identifies under what conditions Thailand's current energy policies can attain sustainable development by comparing three different cases: one case in Suphanburi province which has created minor environmental impacts, and two cases in Roi-Et province. While the latter has negative environmental and social impacts, the former is perceived as a positive case by villagers.

CHAPTER II LITERATURE REVIEW

This chapter aims to review, within the context of Thailand, renewable energy policies and planning for biomass projects, environmental and social guidelines on development projects, and the concept of environmental justice in order to find gaps in this knowledge within the academic field. In Section 2.1, Thai policies and planning for renewable energy development and biomass power projects are provided, and in Section 2.2, environmental and social guidelines on development projects in Thailand are discussed. In Section 2.3, biomass energy development in Thailand is described. In Section 2.4, the history of environmental justice and its use in the context of Thailand are provided. Lastly, gaps in knowledge are discussed.

2.1. Renewable Energy and Biomass Policy and Planning of Thailand

The Energy Industry Act, B.E. 2550 (2007) is the key law governing the energy sector in Thailand (Greacen and Greacen, 2012, p.7). As such, successive Thai governments have followed the following main policy objectives for the power sector:

- Energy security: procuring sufficient energy supply to meet demand
- Energy reliance: reduced dependency on imports
- Promotion of renewable energy: increasing renewable energy share
- Efficient use of energy: reducing energy intensity
- Diversifying fuel risks
- Reducing CO₂ emissions
- Minimizing impacts from energy procurement
- Fair and reasonable costs of energy service to consumers

To realize these policy objectives, the Thai government has promoted national renewable energy development to secure energy security and to reduce greenhouse gas (GHG) emissions. Also, the Thai government has recognized renewable energy as a “Sunrise Industry” since it has the potential to create jobs and help stabilize major

farm crops such as cassava and sugarcane (Sutabutr, 2010).

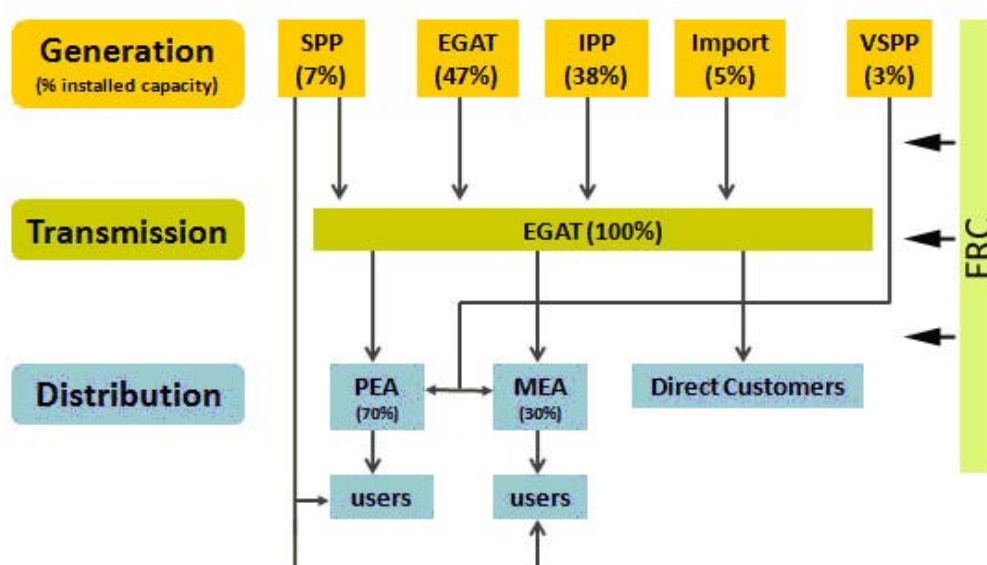
In this context, the National Energy Policy Council (NEPC) of Thailand created the Renewable Energy Development Plan (REDP: 2008-2022) under the Energy Industry Act to replace fossil fuel imports with domestic alternative energy sources in January 2009. The main goal of the plan was to increase the share of renewable energy to 20% within 15 years. However, in 2011, the plan was revised to the Alternative Energy Development Plan (AEDP: 2012-2022) under Prime Minister Yingluck Shinawatra, and it increases the share of renewable energy to 25% of Thailand's energy demand (Greacen and Greacen, 2012, p.8).

In addition, Thailand has carried out several practical policies to promote grid-connected renewable energy development in Thailand. According to the structure of Thailand's power industry, 47% of electricity is generated from the state-owned Electricity Generating Authority of Thailand (EGAT). Another, 48% is from private companies including Independent Power Producers (IPPs, comprising 38%), Small Power Producers (SPPs, making up 7%), and Very Small Power Producers (VSPPs, contributing 3%). The remaining 5% is imported from outside of Thailand (Figure 2). IPPs and SPPs can sell their electricity to EGAT, and VSPPs can sell generated electricity to two state-owned distribution systems, the Provincial Electricity Authority (PEA) and the Metropolitan Electricity Authority (MEA) (Tongsopit and Greacen, 2012, p.2).

Thailand started the SPP and VSPP programs to support Thailand's distributed electricity structure. The SPP program was initiated in 1992 for private companies to generate electricity (up to 90 MW) through fossil fuel cogeneration and renewable sources. However, because of high bureaucratic barriers, power plants with planned capacities of around 10 MW were bothered to apply for the SPP program (Greacen, 2013). Therefore, in 2002 Thailand initiated the VSPP program for only renewable energy sources of up to 1 MW to export into the power grid and in 2006 revised the program for not only renewable energy, but also fossil fuel cogeneration energy projects up to 10 MW (Greacen, 2013). Finally, the Thai government recognized that

VSPPs could play a larger role in meeting the nation’s commitment of sourcing 25% of the power supply renewable energy by 2022. In this context, Thailand has provided access to the grid and instruments such as Feed-in Tariffs (FiTs), low-cost financing, and tax incentives for SPPs and VSPPs to promote renewable energy development. In fact, SPPs and VSPPs produce the majority of renewable electricity in Thailand as result of support from these practical policies (Greacen and Greacen, 2012, p.17).

Figure 2 The Structure of Thailand’s Electricity Industry



Source: Data as of December 2010, compiled from EGAT’s *2010 Annual Report*, Section 2.1: “Planning and Strategy.” Cited in Tongsovit and Greacen 2012, p.2.

Nevertheless, research points out the challenges for policies in promoting renewable energy development in Thailand (Greacen, 2013). There are technical regulations and commercial regulations for the VSPP program under the “Regulations for the Purchase of Power from VSPP (for the Generation Using Renewable Energy).” However, these documents do not mention specifically environmental or social regulations. Also, Environmental Impact Assessments (EIAs) are not required for VSPP projects generating electricity under 10 MW, and the existing process is not transparent in its selection of SPP or VSPP from private companies who apply for the program (Sawangphol and Pharino, 2011, p.572; Greacen, 2013).

2.2.Environmental and Social Guidelines on Development Projects

According to the Constitution of the Kingdom of Thailand B.E 2550 (2007) enforced on 24 August, 2007, Articles 56 and 57 ensure the right to information and complaints⁴, and Article 67⁵ emphasizes the assessment of development projects.

The Academic Working Group on International Conference (HIA 2008: Asia and Pacific Regional Conference on Health Impact Assessment) (Sukkunnoed et al., 2008, pp.11-12) emphasizes that under Section 67 of the Constitution, three points should be completed before the implementation of any project or activity with a high potential to seriously affect the community:

⁴ Part 10 Right to Information and Complaints

Article 56. A person shall have the right to get access to public information in possession of a State agency, State enterprise or local government organization, unless the disclosure of such information shall affect the security of the State, public safety, interests of other persons which shall be protected or private information as provided by law.

Article 57. A person shall have the right to receive information, explanation, and reason from a State agency, State enterprise or local government organization before permission is given for operation of any project or activity which may affect the quality of environment, health, and sanitary conditions, the quality of life or any other material interest concerning him or her or a local community and shall have the right to express his or her opinion on such matters to agencies concerned for consideration in that matters.

In undertaking any social, economic, political and cultural development planning, appropriation of immovable property, city planning, land use zoning, and issuance of regulations which may affect the interests of the people, the State shall thoroughly hold public hearings procedure prior to implementation.

⁵ **Article 67.** The rights of a person to give to the State and communities participation in the conservation, preservation and exploitation of natural resources and biological diversity and in the protection, promotion and preservation of the quality of the environment for usual and consistent survival in the environment which is not hazardous to his or her health and sanitary condition, welfare or quality of life, shall be appropriately protected.

Any project or activity which may seriously affect to the community in quality of the environment, natural resources, and health shall not be permitted, unless its impacts on the quality of the environment and health condition of people in the community have been studied and evaluated; and procedure on public hearing from the people and those affected, including from an independent organization, consisting of representatives from private environmental and health organizations and from higher education institutions providing studies in the environmental, natural resources, and health field, have been obtained prior to the operation of such project or activity.

The rights of a community to sue a government agency, State agency, State enterprises, local government organization, or other State agencies which are juristic persons, to perform the duties as provided by this provision shall be protected.

1. *An assessment of the impacts on health and the environment.*
2. *A process of hearing of the opinions of local people and stakeholders.*
3. *An appreciation of the opinions of the Independent Organization on Environment and Health* (Sukkumnoed et al., 2008).

Apart from the Constitution, there are other relevant laws that aim to mitigate environmental problems caused by development projects in Thailand. According to the Enhancement and Conservation of the National Environmental Quality Act (NEQA), B.E. 2535 (1992), the EIA process has been applied in Thailand “as a tool for environmental planning and management on the economic development projects screening approach” since 1981 (Office of Natural Resources and Environmental Policy and Planning [ONEP], 2012, p.4).

ONEP defines that the EIA process is “the study for forecasting the environmental impacts, both negative and positive impacts from development projects or significant activities. EIA has been used to establish the appropriate mitigation measures for preventing and mitigating environmental impacts for these projects or activities” (ONEP, 2012). Also, the public participation process can be implemented along the stages of the EIA process, and the “public, NGOs and relevant agencies affected by the projects” can share their opinions and experiences about project development and assessment (ONEP, 2012, pp.4-5). Rights and duties related to public participation in the enhancement and conservation of national environmental quality are guaranteed by Sections 6 to 8 of the NEQA 1992. However, the problem is that the NEQA 1992 lacks “a detailed provision on people’s participation” (TEI, 2012, p.134).

In addition, according to Sections 46 and 47 under the NEQA 1992, the Ministry of National Resources and Environment together with the approval of the National Environmental Board (NEB) has decided the “categories and magnitude of projects or activities of government agency, state enterprise or private project” which are required to submit EIA reports to ONEP and the Expert Review Committee for consideration and approval before further proceedings (ONEP, 2012, p.5).

Among the thirty-four types and sizes of project and activities, biomass power plant projects are categorized as thermal power plants (Category 18). According to the NEQA, any kind of thermal power plant exceeding 10 MW in capacity should prepare and submit an EIA report during the application for a permit of project construction or operation. This means that VSPPs with a capacity of less than 10 MW do not have any obligations to carry out an EIA study or submit a report to the environmental authority.

2.3. Biomass Energy Development of Thailand

Previous research on renewable energy development, especially that on biomass energy, agrees that Thailand has a great opportunity to utilize biomass as a renewable energy source because agricultural residues are abundant in the country (Papong, Yuvaniyama, Lohsomboon and Malakul, 2004; Juntarawijit and Juntarawijit 2012; Nuntavorakarn and Sukkumnoed, 2008; Barz and Delivand, 2011).

According to the Department of Alternative Energy Development and Efficiency (DEDE) under the Ministry of Energy in Thailand, biomass is defined as “*organic materials from various sources*” such as agricultural and industrial wastes (as follows) that can be used to produce energy (Papong et al., 2004, p.2):

- **Rice Husks:** residues from milling of paddy
- **Bagasse:** fibrous residues from the processing of sugar cane
- **Wood wastes:** residues from wood processing (mostly from rubber and eucalyptus trees) and replanting efforts
- **Oil palm wastes:** residues from the production of crude palm oil
- **Cassava wastes:** residues from the production of starch
- **Corn cobs:** residues from the milling of corn
- **Coconut fibers and shells:** residues from the production of coconut milk and oil
- **Distillery slop:** waste from the production of alcohol

Much research points out that biomass energy projects have several potential benefits: firstly, biomass can be an alternative energy source; secondly, it can solve the problem of agricultural residues disposal; thirdly, it has a positive effect on national or regional economic growth and employment; fourthly, it enhances energy security by reducing the import of fossil fuels; and lastly, it can reduce GHG emissions (Carlos and Khang, 2008; Panwar, Kaushik and Kothari, 2011; Ali, Nitivattananon, Abbas and Sabir, 2012; Silalertruksa, Gheewala, Hünecke and Fritsche, 2012).

As biomass is one of the most important renewable energy sources, under the SPP and VSPP Program, eighty-eight biomass power plants are currently operating, and 284 biomass power plants are planned for operation in Thailand. Of the eighty-eight operating power plants, twenty-two biomass power plants (25% of the total) have been installed capacity of more than 10 MW up to 90 MW, under the SPP program, and sixty-six biomass power plants (75% of the total) are operating under the VSPP program (see Table 4).

Table 4 Current status of biomass power plants in Thailand

Status of project	SPP			VSPP		
	Number	Installed capacity (MW)	Sold to grid (MW)	Number	Installed capacity (MW)	Sold to grid (MW)
Installed, Selling to grid	22	614.00	362.10	66	851.685	362.315
Planned	11	458.80	343.50	273	2,211.908	1,769.078
- Under consideration	5	148.00	121.00	48	307.740	249.000
- Waiting for PPA ^a	3	214.00	133.50	36	181.488	156.418
- Waiting for COD ^b	3	96.80	89.00	189	1,722.680	1,363.660
Total	33	1,072.80	705.60	339.0	3,063.593	2,131.393

Source: Energy Policy and Planning Office (EPPO), Ministry of Energy, 2012a.

a: PPA: Power Purchase Agreement

b: COD: Commercial Operation Date

When it comes to discussing biomass power plant projects and their impacts, which types of technologies are installed in the biomass power plants should be considered. Most biomass power plants in Thailand use direct-fired technology with boilers and associated steam turbines, and some have installed gasification systems in the power plants (Juntarawijit and Juntarawijit, 2012). While direct-fired technology is quite simple to install, its problems include low conversion efficiency and the release of harmful pollutants. Therefore, pollution control systems are necessary to mitigate the technical weaknesses of direct-fired biomass power plants. Since gasification technology has high electrical efficiency, it is emerging as a “promising technology” (Salam et al., 2010, p.ii). However, it has other risks such as a high tar content of fuel (Juntarawijit and Juntarawijit, 2012). Different technologies create different types of consequences to the environment as well as society.

Another problem is that biomass energy projects are under-utilized, even though the Thai government has promoted biomass energy utilization since the 7th National Economic and Social Development Plan (NESDP) in 1992. Therefore, most previous research points out the barriers in utilizing biomass energy in Thailand. The research argues that institutional, technical, policy, and information barriers are important factors that hinder the development of biomass utilization in Thailand (Pamong et al., 2004; Carlos and Khang, 2008; Sawangphol and Pharino, 2011). In detail, they explain that the coordination between government agencies and private developers is poor, standards and information on biomass systems and technology are not sufficient, and current policies are not enough to support the projects. VSPP and SPP programs for renewable energy development projects, make up only 10% of power generation in Thailand (see Figure 2, p.22).

In addition to the barriers, Prasertsan and Sajjakulnukit (2006) briefly point out the Thai public holds misperceptions of renewable energy because most Thai people still have “a monster image of power project[s]” caused by problems in the past that have led to destroyed crops. In this sense, they recommend that the Thai government focus on changing public perceptions and shifting the image of renewable energy.

While most previous research focuses more on the development potential in Thailand and its barriers, some researchers examine the impact of biomass energy project on the environment and local people. Juntarawijit and Juntarawijit (2012) point out that environmental and health impacts of biomass power plants result from the poor technology in biomass energy conversion and the lack of proper national law to regulate the impacts. Nuntavorakarn and Sukkumnoed (2008) argue that public participation is very important in implementing renewable energy development projects in Thailand by providing controversial biomass power projects in Nakhon Sawan and Singh Buri provinces as examples.

This literature is significant because there has not been sufficient research on the negative impacts of biomass projects, which are considered to be clean energy development, nor under what conditions biomass projects result in serious environmental impacts. However, it is not sufficient to show the general picture of biomass energy projects and their benefits and negative impacts on the environment and local communities in Thailand.

2.4.Environmental Justice

2.4.1. History of Environmental Justice

The concept of environmental justice can be a relevant framework with which to analyze Thailand's biomass energy projects' social and environmental impacts during the preparation and implementation processes. Since the concept is made up of distributive justice, procedural justice, and justice as recognition, development projects' multidimensional impacts can be identified in a systematic way.

The term environmental justice was introduced by the environmental justice movement in the United States (US) in the late 1970s. African-Americans protested the dumping of toxic wastes in a landfill in Warren County, North Carolina in 1982 (Schroeder et al., 2008, p.547). Also, the explosions of the Union Carbide chemical plant in Bophal, India and a gas plant in Mexico City injured and killed a number of

residents living near the plants (Schroeder et al., 2008, pp.547-8). Through these accidents and villagers' protests, environmentalists realized that environmental problems and risks are not distributed equally between race, class, gender or countries. In this context, the concept of environmental justice emerged as a framework to explain the inequality of environmental impacts. Significantly, social movements against environmental racism that applied the framework of environmental justice had a significant success when the US Environmental Protection Agency (EPA) formed the Office of Environmental Justice in 1994 (Walker, 2012, p.18).

As we can see from the US, the concept of environmental justice was first emerged as a social movement and a form of civil rights politics in the US. Applying the concept to strategies of environmental and social movements went beyond the US and expanded throughout global civil society. South Africa, a country well-known for apartheid, a system of racial segregation, experienced environmental inequality problems in the post-apartheid period in the early 1990s. The problems resulted in discrimination against black communities as oil refineries and other polluting facilities were sited within these communities. A strong network between South African NGOs and US activists played a crucial role in including several environmental rights in the Bill of Rights of the South African Constitution: "everyone has the right to have access to sufficient food and water ... an environment that is not harmful to their health or well-being ... to have the environment protected, for the benefit of present and future generations" (as cited in Walker, 2012, p.31). In the initial stage, the concept was mainly used to raise racial or ethnic issues in environmental problems.

In the mid-1990s, the concept arrived in the United Kingdom (UK). Friends of the Earth (FoE) first applied the environmental justice framework to their movements. However, the case of the UK differed from the cases in the US and South Africa because FoE pointed out environmental inequalities that was related to social class or income, instead of racial identity (Walker, 2012, p.26-27).

As the environmental justice globalized beyond the US and was applied to

environmental inequality problems around the world, it has moved from being mainly focused on race or ethnicity to become more inclusive and aware of differences of gender, income, age, and the rights of future generations (Buckingham-Hatfield et al., 2005; Dobson, 1998, Walker and Bulkeley, 2006, p.655). In other words, 'justice to whom' became more inclusive of other environmental issues experienced by vulnerable social groups beyond the racially marginalized.

The framework of environmental justice, firstly used in the US, has been transferred to new areas such as UK, South Africa, and South America, but the application of the frame in Asia is still rare (Walker, 2012). It is worth noting, however, that many communities and activists seek environmental justice, and their actions can be understood as pursuing distributional, procedural, and recognitional justice, even if they do not specifically use the term environmental justice in their work.

2.4.2. Environmental Justice in Thailand

Even though there is not a great deal of existing research applying the concept of environmental justice in Thailand, it does not mean that Thai scholars and civil society organizations (CSOs) have not studied and worked on issues related to environmental injustice problems in the country. They have focused on conflicts caused by large-scale development projects and pointed out the lack of public policy processes by applying other terms such as environmental equity or inequality (Nuntavorakarn and Sukkumnoed, 2008; Sajor and Ongsakul, 2007).

In Thailand, conflicts surrounding government-led power development projects occurred between 1990 and 1997 because of the growth of national energy demand (Nuntavorakarn and Sukkumnoed, 2008, p.295). Well-known cases are Pak Mun hydropower dam and Mae Moh lignite-fired power station. These cases caused distributive injustice because, while the power generated by the dam and the power station was used in the central area of Thailand including Bangkok, local people living near the project areas experienced environmental harm and suffered from livelihood and health problems.

Therefore, Thai civil society groups have tried to engage the power planning process as well as pointing out negative impacts to the government. Civil society groups have prepared and proposed an alternative version of the Power Development Plan (PDP) which is prepared by state-owned EGAT (Permpongsacharoen, 2004; Greacen and Greacen, 2012) and sets the official electricity demand forecast. At the same time, they have organized a consultation workshop with local affected communities in order to create more space for people to participate in the power planning process by sharing information and experiences within communities in Thailand (MEE Net, 2013). Even though the term environmental justice is not used in Thailand, civil society research and activities aim to reduce distributive inequality problems and improve participation in the decision-making process.

Recently, Middleton (2012) applied the concept of environmental justice in the Mekong region to address regional energy trade projects which have created environmental and social inequalities across the borders between Thailand, Laos and Myanmar. This research applies the concept of environmental justice to biomass energy development in order to analyze the problems in a systematic way.

2.5. Gaps in Knowledge

Renewable energy and biomass energy development is emerging as an alternative energy source in the search to reduce carbon emission and mitigate climate change in the world. In particular, Thailand has promoted renewable energy and biomass energy, as it has an abundance of agricultural residues to use as sources of biomass energy, including rice husk, sugarcane bagasse, and wood wastes. Existing research has focused on its economic potential and positive impacts such as economic growth, employment, and clean energy. However in practice, biomass power plants have resulted in negative impacts on the environment and local people living near plants in Thailand. The environmental and social issues caused by renewable energy projects are emerging as a new issue in Thailand, and research highlighting the negative impacts is still limited. Therefore, this thesis focuses on the process of biomass energy projects and examines factors which result in either positive or

negative impacts by biomass energy projects to fill the gap between the existing research and the real situation.

CHAPTER III
ENVIRONMENTAL JUSTICE OF BIOMASS POWER PLANTS
IN ROI-ET PROVINCE

The purpose of this chapter is to describe and analyze the impacts and problems related to the biomass power plants in Roi-Et province by applying the conceptual framework of environmental justice. Also, the research compares biomass power plants under the different management of two companies, namely Buasomma biomass power plant and Roi-Et Green biomass power plant, which are perceived very differently by villagers in Roi-Et. In Section 3.1, an overview of the biomass energy development in Roi-Et is provided. Then, in Section 3.2, the concepts of environmental justice, distributive justice, procedural justice, and justice as recognition of biomass power plants are described and analyzed. Lastly, in Section 3.3, the summary and conclusion of this chapter are provided.

3.1.Overview of Biomass Energy Development in Roi-Et Province

In Nuamuang sub-district, Muang district, Roi-Et province, there is one rice mill and three biomass power plants using rice husk as a main fuel, located on a single plot of land within an area 300 square meters. The rice mill is managed by Buasomma Company, and the owner has two biomass power plants – 6.4 MW and 9.9 MW – inside the rice mill under the Buasomma Electricity Generation Company Limited (see Photograph 1). The other biomass power plant, named Roi-Et Green biomass power plant, is operated by EGCO, one of the biggest Independent Power Producers (IPPs) in Thailand, which has a capacity of 9.9 MW (see Photograph 2). Additionally, the dumpsite and Roi-Et High Voltage Substation of EGAT are located in the other side of the biomass power plants complex.

The rice mill was first built and established as a very small operation in 1980 and then was extended twice, in 1992 and in 1994, into a large rice mill, which can process 1,650 tons of paddy per day (Buasomma I Biomass Power Plant, 2012, p.37). In 2003, the first biomass power plant in the province, Roi-Et Green biomass power

plant operated by EGCO, started operating by buying rice husk from the Buasommaï rice milling company. Buasommaï Company realized from EGCO that rice husk was a valuable energy source for electricity generation. Therefore, Buasommaï Company planned to construct its own biomass power plants. So 6.4 MW and 9.9 MW Buasommaï biomass power plants have been operating since 2006 and 2009, respectively.

The rice mill and three biomass power plants are located in a residential area. Within 3 km from the biomass power plants complex, there is one elementary school and three villages, Moo 10, Moo 12 and Moo 13, where 988, 691, and 1098 villagers live, respectively. During the winter season from October to January when wind blows from the biomass power plants to the villages, villagers suffer from the smoke and dust of biomass power plants, especially the two Buasommaï biomass power plants. Until the first Buasommaï biomass power plant was operational, villagers did not experience serious health problems from the first EGCO-operated plant. Therefore, in 2006, the leadership of village headmen organized a network to monitor the impacts of biomass power plants in Nuamuang sub-district (former Moo 13 village headman, personal communication, June 29, 2013).

Photograph 1 (Left) Buasommaï 6.4 MW and 9.9 MW biomass power plants
Photograph 2 (Right) Roi-Et Green 9.9 MW biomass power plant



3.2.Environmental Justice

In the following sections, the Buasommaï 9.9 MW power plant is considered from the perspective of distributive, procedural and recognitional justice. Since no information about the 6.4 MW was provided by Buasommaï Company and both biomass power plants are established and operated by the same company, the following sections focus on the 9.9 MW power plant and assume that both power plants follow similar procedures. Aspects of the plants operation are contrasted with the Roi-Et Green biomass power plant operated by EGCO.

3.2.1. Distributive Justice

3.2.1.1.Benefits

In terms of the benefits of biomass energy development, the most obvious is the extra income that biomass power plant companies receive by selling electricity to the Provincial Electricity Authority (PEA) or Metropolitan Electricity Authority (MEA), state-owned distribution systems. The 9.9 MW Buasommaï biomass power plant sells 8 MW, and Roi-Et Green biomass power plant sells 8.8 MW to PEA⁶. The remaining electricity is used inside the biomass power plants and the rice mill. Also, since the biomass energy is classified as renewable energy, when power producers sell electricity to power utilities, they receive an additional payment called an “adder” on top of normal prices, which adds US \$0.010 per kWh for biomass power plants with installed capacities more than 1 MW (Tongsopit and Greacen, 2013, p.439 and p.442). It means that biomass power plants can sell electricity at a higher price by using rice husk, which is an agricultural by-product from the rice mill without extra costs.

Before the construction of the Buasommaï 9.9 MW biomass power plant, Buasommaï Electricity Generating Company applied for Clean Development

⁶ Details for the sale of electricity from the Buasommaï 6.4 MW biomass power plant were not available.

Mechanism (CDM) funding and claimed to UNFCCC that the biomass power plants would contribute environmental, social, and economic benefits to nearby area. Firstly, the biomass power plants would solve environmental problems caused by decaying rice husk from the rice mill. Secondly, poor households could generate extra income by selling rice husk or other biomass to the company. Thirdly, job opportunities including for 150 workers during construction and around 32 employees after operation for management and maintenance, would be provided to the villagers in the local area. And lastly, the biomass power plants would create cash flows for the local economy (Buasommai I Biomass Power Plant, 2006).

However, villagers from Moo 10, 12, and 13 totally disagree with the company's claims by stating that households have not earned extra income because they have only small rice paddies, around 4 or 5 rai (1rai = 0.16 hectare), for their families. The average rice yield between 2006 to 2010 was 370 kg per rai during the wet season and 674 kg per rai during the dry season (Srisompun and Isvilanonda, 2012, p.101). In fact, Buasommai biomass power plants buy rice husk for 600 Thai Baht per ton, and Roi-Et Green power plant pays 900 Baht per ton (Moo 10 village headman, personal communication, June 11, 2013). The additional income from selling rice husk is therefore comparatively small. In terms of job opportunities in the biomass power plants, villagers do not want to work there because they believe that working inside the biomass power plant is dangerous (focus group meeting, June 12, 2013). One villager said that workers come from other nearby provinces such as Si Saket, Buriram, and Surin provinces (Villager #S2 and #S3, personal communications, June 11, 2013). Regarding the local economy, village headmen said that the cash flow is just for the biomass power plants, not for the local economy and villagers. They stated strongly that there were "*no benefits, just costs from the biomass power plants*" (focus group meeting, June 12, 2013; see Table 5).

Table 5 Buasomma Company and villagers' thoughts on benefits from Buasomma 9.9 MW biomass power plant

	Buasomma Company's Claims	Villagers' Refutations
Job opportunity	150 workers during construction and 32 employees for operation and maintenance	Workers from other provinces and local people do not want to work at the power plants
Local Economy	Extra income for poor household by selling rice husk to the company	Not sufficient rice husk to sell to the company
	Cash flow for "local economy"	Cash flow for "only company itself"
Environmental Problems	Environmental problems can be solved	Environmental problems have been created

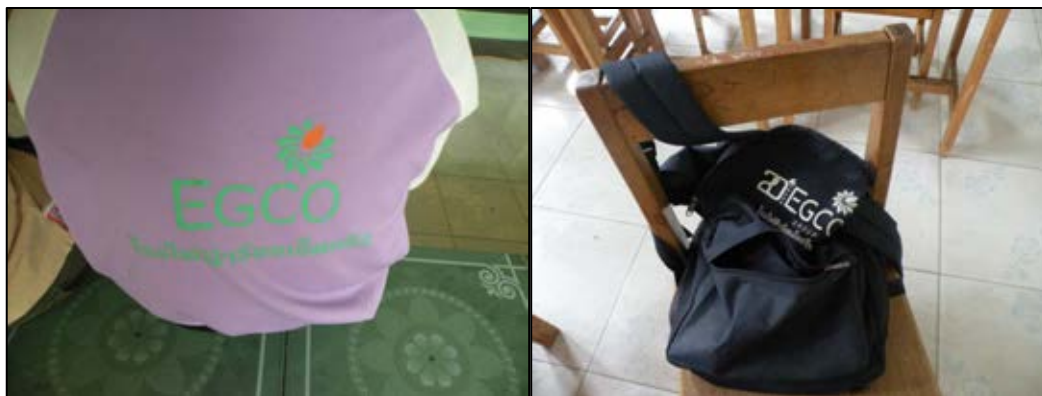
Both Buasomma and EGCO companies have Corporate Social Responsibility (CSR) programs. According to the World Business Council for Sustainable Development, CSR is defined as *"the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large"* (Holme and Watts, 2000). Therefore, CSR is a concept that in principle links companies to the communities within which they are based.

School teachers said that Buasomma Company provided scholarships of 10,000 Baht per year to the elementary school, so the school distributed 500 Baht each to twenty students with economic need as well as those who excelled. Buasomma also installed concrete road over what used to be soil road on the way to the school from the outside (school staff #2 and #3, personal communications, June 12, 2013).

Nevertheless, the school staff seemed more satisfied with the CSR program which provided by Roi-Et Green biomass power plant. At the school, students were

wearing sports school uniforms and using bags with the EGCO Group's logo which were donated by Roi-Et Green (see Photograph 3). In addition, the Roi-Et Green provided scholarships of 60,000 Baht and 30,000 Baht per year paid twice, to the school and financial support for several school activities which were suggested by the school. For instance, school staff asked for books for students and for instruments and materials needed for school activities, and the Roi-Et Green decided to support the school (school staff #2 and #3, personal communications, June 12, 2013).

Photograph 3 Sports school uniforms and bags donated by the EGCO Group



©Yeji Yoo, 2013

Not only providing financial support, Roi-Et Green also visited the school and villages with doctors and nurses to check villagers' and students' health conditions (school staff #1, personal communication, June 11, 2013). Also, Roi-Et Green provided some training courses, like workshops for teachers and school staff to learn about climate change and solutions to reduce CO₂ emissions with other schools' staff, officers from the Department of Education, several environmental institutes and EGCO Group staff (school staff #2 and #3, personal communications, June 12, 2013).

3.2.1.2.Harms and Risks

What are the costs villagers have to pay? The main and most serious problems caused by the Buasommai biomass power plants are smoke from the two stacks and dust from the rice husk ware house and transportation n which carries rice husk to the plants, resulting in air pollution in the villages during the winter season (see

Photograph 4). Most households in Moo 10, 12, and 13 and the elementary school have experienced black ash problems from the smoke, which covers everything including the roofs of the houses, grounds of the school, rice paddies, and trees.

Photograph 4 Black smoke from the stack of the 9.9 MW Buasomma biomass power plant on June 28, 2013



©Roi-Et Green, 2013

“The first thing to do when I arrive in the school is to clean the school. But, during winter season, 15-20 minutes later, everywhere becomes dirty again with the dust and ashes blowing from the biomass power plant. So we have no choice but to clean many times every day.” (school staff #2 and #3, personal communications, June 12, 2013)

As the school staff mentioned, cleaning the school is a new burden for the teachers and students. Before having lunch, they have to clean the canteen with water to protect students from environmental risks. Also, they mentioned that during the winter season, they cover windows with plastic wrappers and let students wear masks to protect their health. Even in mid-June when the fieldwork was conducted, ash on the school water system was observed. It is expected that during winter season, more

ash from smoke will blow to the school and villages.

The situation of villagers is similar. Villagers of the three villages responded that during the winter season, their houses are covered by black ash from the stacks of Buasommai biomass power plants. They also start every day by cleaning their houses because of the ash and dust. Actually, women participants of the focus group meeting said they have environmental and health impacts similar to those of the men, but the different burden was that women had to clean more often than before (focus group meeting, June 12, 2013).

“Our school and houses are dirty after the biomass power plant came here. We have skin allergy; it is itchy. When I run from there to here, I am feeling like difficult to breathe easily and not healthy.” (Student #1 and #2, personal communications, June 12, 2013)

In addition, villagers are suffering from health problems. Villagers said they cannot sleep well at nighttime because of the noise from the biomass power plants and the smoke. They added that the noise was louder at night because the surroundings are very quiet compared to the daytime, so they often wake up from the noise. Usually, villagers of Moo 10 and Moo 12 experience noise problems because their villages are closer to the biomass power plants than Moo 13. Also, they felt that they could not breathe well because of the smoke while they slept at night. Villagers as well as students have skin allergy, so their skin is itchy. Even worse, the ashes and rice husks on the road sometimes go into people’s eyes. One woman said she was not aware about the impact so she rubbed her left eye when the ash came into her eyes (Villager #R13, personal communication, June 12, 2013). This, she said, made her go blind in her left eye.

Additional environmental harm has been caused by rice husks. In the process of transportation to the biomass power plants, rice husks can be dispersed by the wind from trucks that are not properly covered. As a result, it is common to see rice husks on the main road in front of the biomass power plant complex in Roi-Et (see

Photograph 5). A villager said rice husk particles sometimes flew into her eyes when she rode a motorcycle on the main road (Villager #R1, personal communication, June 11, 2013). Also, villagers, especially those living in Moo 10 next to the Buasomma biomass power plants, mentioned the increase of flies because rice husks are decaying in the warehouse (Villager #R1, #R2, #R3, #R4 and #R5, personal communications, June 11, 2013; Villager #R10, personal communication, June 12, 2013). Decaying rice husks at the ware house created bad odor problem as well (focus group meeting, June 12, 2013).

Photograph 5 Rice husks on the main road in front of biomass power plants in Roi-Et



Although Buasomma Company argued that the construction of biomass power plants would solve the odor and sanitary problems caused by “uncontrolled decay of biomass,” the problems still remain as negative impacts for villagers (Buasomma I Biomass Power Plant, 2012). Actually, when the plan to construct Roi-Et Green biomass power plant in the area was suggested, villagers accepted the plant because they expected that it would solve the dust, air pollution, and odor problems caused from improper management of rice husks from the Buasomma rice mill (focus group meeting, June 12, 2013).

There were not only environmental harms and health problems, but also

economic harm caused to villagers. Because of health problems, they have to pay extra expenditures for health checkups. If they go to the public hospitals, it is not a large burden on the households because the cost is covered by the 30 Baht Health Policy of Thailand. However, when they have to go to the private clinic in emergency cases, they have to pay for it out of pocket.

In addition, the ash affects villagers' drinking water. In rural areas, villagers still use rainwater for everyday use, such as drinking, cooking, washing, bathing, and so on. However, after the operations of the first biomass power plant in the area, they could not use rainwater anymore because ash from the biomass power plants would cover the roof and contaminate the rainwater. Therefore, they have no choice but to buy drinking water and use the public water system. But the public water system is not stable, especially during the dry season, so some villagers still use rainwater for washing (Villager #R14, personal communication, June 12, 2013).

“Harvest season is in winter season, which is when the most severe smoke blew from the biomass power plant. So, when we go to harvest rice, we should wear gloves, glasses and mask. Nevertheless, after the harvest, our clothes became dirty and the inside of nose also is black and black. Even worse, productivity of rice is reduced from 180 packs (25-30 kg per pack) as normal to 70 to 80 packs” (Villager #R8 and #R9, personal communications, June 11, 2013).

“I have a 3-rai rice paddy. Three years ago, we gave up harvesting rice from our paddy because we think we might die from the black smoke” (Villager #R4, personal communication, June 11, 2013).

“My papaya tree has not been growing well because smoke and ashes from the Buasomma power plant covered its leaves. After operation of the Roi-Et Green biomass power plant, papaya tree and chili plants were fine. But, after the Buasomma, they are not growing well. So, I gave up growing papaya tree” (Villager #R6, personal communication, June 11, 2013).

“The size of papaya and mango is smaller than before the biomass power plant started operating. Additionally, villagers could get some basic vegetables such as mushrooms and herbs from the small forest, but now 50% reduced” (focus group meeting, June 12, 2013).

“We cannot use banana leaves for cooking anymore because of the ashes on the leaves” (Villager #R5, personal communication, June 11, 2013).

In terms of economic harm, smoke and ash have affected the productivity of fruit trees and rice paddies of villagers. Also, the chances of harvesting wild vegetables in the small forest have been reduced since the biomass power plants started operating. This lowered productivity forces villagers to spend extra money to purchase fruits and rice for their livelihoods.

In summary, while biomass power plant developers receive benefits by selling electricity and receiving an adder from the Thai government, villagers living near the biomass power plants experience negative impacts, including environmental harms, health problems, and economic burdens. In other words, Buasommai biomass power plants created distributive injustice problems in Nuamuang sub-district of Roi-Et province. So, how did this problematic biomass power plant start its operation in this area?

The next section points out that there was a lack of procedural justice in the project planning and practice.

3.2.2. Procedural Justice

3.2.2.1. Access to Information

Buasommai Company did not give any information or opportunities for public hearings to affected villagers before constructing both biomass power plants. Villagers and school staff said that no one came to the villages or school to explain their plans

and ask for villagers' permission to build biomass power plants in this area. So both the biomass power plants of Buasommaï commenced without villagers' permission. Two households, one immediately next to the main gate and one immediately next to a rice husk warehouse of the Buasommaï biomass power plants, said that the company staff and managers have never visited their houses (Villager #R2, personal communication, June 11, 2013; Villager #R10, personal communication, June 12, 2013).

“Buasommaï power plant did not come to my house even though my house is located next to the plant. When the company started constructed, I asked workers about what is going on, and they told me that biomass power plant would be built here” (Villager #R10, personal communication, June 12, 2013).

According to the Thai Constitution of 2007 (Article 57), the right to receive information and explanations from state agencies before they approve or implement a project is ensured to Thai people. However, as Villager #R10 said that she herself asked to the workers about the project during construction, state agencies did not provide adequate information to villagers.

3.2.2.2. Public Participation

According to a report about the Buasommaï 9.9 MW biomass power plant submitted by the company to the CDM Executive Board, there were no public hearings to explain the development project and listen to villagers' opinions before the signing of the construction contract. Instead, the company held a stakeholder's meeting while the 9.9 MW biomass power plant was already under construction. However, the village headman criticized that the objective of that meeting was not to ask villagers' permission to construct or operate the biomass power plant, but to inform and explain the company's plan to villagers (Moo 10 village headman, personal communication, June 11, 2013). In summary, affected villagers have not received sufficient information to understand what was going on near their houses, nor given proper opportunities to express their concerns and opinion.

While the construction of the Buasomma 9.9 MW biomass power plant started in October 2007, Buasomma Company organized the stakeholder's meeting on September 19, 2008. The objectives of the meeting were "(a) to inform the participants about the project's objectives, design, activities, and potential social, environmental and economic impacts, (b) to obtain comments/recommendations from the participants regarding the project's compliance with sustainable development principles and (c) to develop mechanism for sustainable development monitoring" (Buasomma I Biomass Power Plant, 2012). At this meeting, the company explained the project as a grid-connected electricity generating power plant that used rice husk as a fuel. However, when the company mentioned the impacts of the project, it only explained the positive impacts such as the reduction of GHG emissions, the creation of job opportunities for local people, and the reduction of national dependency on imported fossil fuel. The company did not provide negative impacts which were likely to happen after the operation of the biomass power plant.

Villagers also pointed out the limitations of the stakeholder's meeting for the 9.9 MW power plant. At the meeting, the company showed favorable pictures and positive impacts of the biomass power plant. However, villagers did not believe the explanation because the first 6.4 MW Buasomma biomass power plant had created problems. Also, the village headman mentioned that the purpose of the meeting was not to ask villagers' permission or agreement on the project, but just to inform villagers about their plan (Moo 10 village headman, personal communication, June 11, 2013).

Even though stakeholders expressed their concerns about negative impacts such as air pollution and health problems from ash and dust during the meeting for the 9.9 MW Buasomma plant and the project owner agreed with their comments, the company did not improve its planned system, so negative impacts have been created by the 9.9 MW biomass power plant as well (Buasomma I Biomass Power Plant, 2012, pp.65-67). Not only during this time, but whenever villagers raised questions about the negative impacts and requested improvements to the company after operations started, the company always agreed but changed nothing (focus group

meeting and Villager #R10, personal communication, June 12, 2013; see Section 3.2.3).

When the other biomass power plant operated by EGCO Group, Roi-Et Green biomass power plant, was planned for construction and operation in Roi-Et in 2003, they invited villagers for a field trip in 2000 to observe a situation in another province where the EGCO Group operated power plants and showed that there was no serious problems with villagers and no environmental impacts in 2000. This field trip with villagers was conducted before plant construction, and afterwards, villagers agreed with the construction of Roi-Et Green power plant in their area (Moo 10 village headman, personal communication, June 10, 2013; focus group meeting, June 12, 2013).

The president and vice president of the elementary school also mentioned that EGCO staff visited the school to explain their plans to build a biomass power plant near the school, and president and other vice president were invited on the field trip. After coming back from the field trip, school staff who attended the trip shared their observations and opinions, and then they gave their permission to build the biomass power plant. However, villagers and school staff pointed out that in the case of the 6.4 MW Buasomma biomass power plant, there was no chance to listen to the company's plan, but they only knew about it when the company started construction in 2003 (see Table 6).

Table 6 Major events for operation of Buasomma 9.9 MW biomass power plant

Date	Event/Action
September 2007	Signing of construction contract
October 2007	Start of Construction
September 2008	Stakeholder meeting at Petcharat Garden Hotel, Roi-Et
November 2008	Stakeholder feedback consultation at the project site, Roi-Et
December 2008	Construction completed
February 2009	Going into full operation

3.2.2.3. Access to Justice

The Administrative Court of Thailand was established in 1999 under the “Act on Establishment of Administrative Court and Administrative Court Procedure, B.E. 2542.” The missions of the Administrative Court are firstly, “to try and adjudicate administrative cases impartially and swiftly, in order to assure the protection of rights, liberties, and administer justice to the parties in dispute,” and secondly, “to set precedents in the area of administrative law as the guidelines for good practice in public administration for State agencies and officials” (Act on Establishment of Administrative Court and Administrative Court Procedure, B.E. 2542).

After the Administrative Court of Thailand was inaugurated in 2001, villagers who faced problems caused by development projects of the government or private companies started to use the legal system to solve disputes, even despite the difficulty of fighting with administrative agencies. Filing a lawsuit to the Administrative Court is easier than filing a civil suit because the administrative law asks state officers to investigate the case, while the civil suit requires people who raise claims to prove how they are affected by the project (Permpongsacharoen, personal communication, July 15, 2013)⁷.

Villagers of Roi-Et also filed a lawsuit to the Regional Administrative Court in Ubon Ratchathani province. When the villagers sent a letter to the court the first time, the court rejected the claim because the letter was not written in proper legal terms (Moo 10 villager headman, personal communication, June 12, 2013). After revising it, they re-sent the letter and argued that the provincial government of Roi-Et had not paid much attention to the people’s problems with the biomass power plants and did

⁷ As an example, Thai villagers have filed a lawsuit to the Central Administrative Court against Thai governmental bodies including EGAT in order to ask the court to suspend Xayaburi dam project in Laos on August 7, 2012 (Deetes, 2012, August 8). Another example is that the Anti-Global Warming Association and 45 individual members filed a lawsuit to the court against the government’s mega-water management project in Thailand on May 1, 2013 (Unknown, 2013, June 25). Regardless of results, the right of Thai people to file a lawsuit against administrative agent is guaranteed by the Act and the Constitution.

not take responsibility to solve the problems (Moo 10 village headman, personal communication, June 12, 2013).

After the second claim was accepted, the court asked for the provincial government officers to check and review the Buasomma biomass power plants. Two months later, villagers went to the court to hear the result, but the decision was to first give enough time to the company to solve the problem by itself and to observe any improvements (Moo 10 village headman, personal communication, June 12, 2013; former Moo 13 village headman, personal communication, June 29, 2013). Therefore, villagers were very disappointed with the result because they felt that even the court was not on their side (former Moo 13 village headman, personal communication, June 29, 2013).

“I went to the regional administrative court in Ubon to get the result together with villagers by renting one big bus. But we lost. Villagers were disappointed and I felt very sorry for them. I will not claim to the court again because I feel their consideration is not fair. The court just considers owner’s interest!” (former Moo 13 village headman, personal communication, June 29, 2013).

Although there was an opportunity for villagers to claim their rights in court in Thailand and they attempted to do so, their claim was not recognized by the legal system. In other words, their access to justice was not genuinely realized in this case.

3.2.3. Informal Procedural Justice: Local Protest and Response

“For the poor, environmentalism is not a fashion or a form of idealism, but it is a defense of their livelihood” (Jumbala and Mitprasat, 1997, p.195).

Villagers living near the Buasomma biomass power plants started their own movement to protect their livelihoods and improve the situation by organizing a sub-district level network in 2006, namely the Network for Watching Environmental Impacts of Biomass Power Plants in Roi-Et, after Buasomma Company’s first 6.4 MW biomass power plant was operating.

“When only the rice mill was operated nearby the villages, rice husk problems just annoyed villagers; it was not dangerous. But after the Buasomma biomass power plant start operating, the problems are getting worse. So we decided to organize our own network” (former Moo 13 village headman, personal communication, June 29, 2013).

The network is comprised of seven representatives – one village headman, two vice headmen, two TAO officers, one President of Local Health Clinic, and one member from the Committee of Village Fund – from each of the twenty-three affected villages in Nuamuang sub-district. Among twenty-three villages, eight villages including Moo 10, 12, and 13 have participated actively in this network’s activities (former Moo 13 village headman, personal communication, June 29, 2013). The network’s main activity is to monitor the impacts in Nuamuang sub-district.

Villagers have used diverse strategies to raise questions about the negative impacts of the Buasomma biomass power plants. They have sent letters to related government offices and organized demonstrations. Their activities are directed towards several actors such as Buasomma Company, the provincial government, the central government and parliament, and the Administrative Court.

Villagers seek accountability of Buasomma Company

Villagers’ local protest started against Buasomma Company because the company has been operating its rice mill since 1980, extended the size of rice mill several times and started the new business of biomass power plants in 2006 and 2009, and as a result, villagers suffered from the impacts of the company’s business in Roi-Et. After the rice mill’s extension was finished in 1994, air pollution from the rice mill grew more serious, and the affected area of villages became larger. Therefore, villagers started a movement against the Buasomma rice mill. Villagers talked about the problems and asked the owner of Buasomma Company to improve the burning system for the rice husk, which was created from the rice mill as a residue. But the company did not improve anything and even started building the first biomass power plant in 2003 without villagers’ agreement.

“They [Buasomma Company] always say yes, yes, but problems are never solved” (villager #R10, personal communication, June 12, 2013).

“We don’t believe the Buasomma biomass power plant company will improve the system, because they always talk a lot but never act” (Villager #R4 and #R5, personal communications, June 11, 2013).

“Buasomma Company is only interested in money. Politicians support the company and company provided money to them but no money to affected villagers. The company talks and talks, but problems are never solved” (Villager #R6, personal communication, June 11, 2013).

At that time, even though villagers submitted letters and complaints to the provincial government, the company owner just said the company would try to improve the system. Around 2003, the villagers protested strongly by burning something in front of Buasomma Company (Villager #R6, #R8 and #R9, personal communications, June 11, 2013). However, the company has never taken any responsibility to solve the problems caused by its business.

Villagers seek accountability of Provincial Government in Roi-Et

Villagers sought accountability from the provincial government of Roi-Et. This is because Buasomma Company is very closed in terms of communication with villagers. Although the provincial government is the highest public institute in Roi-Et province, it seems to lack the authority or the will to push the company to improve its system and to solve the negative impacts from the perspective of villagers.

“When a newly appointed provincial governor came to the Roi-Et, the governor arranged a meeting with TAO members and village headmen. At the meeting, I went onto the stage and talked about the biomass power plant issue to the new provincial governor. He was interested in this issue and came to the area in order to check the problems. He tried to make an action plan at

the provincial level to solve the problems. However, no later than four months, he was forced to move to other province, and a former provincial governor who is close to the Buasommai Company was reappointed and came back to Roi-Et. We suspected that the company asked for changing the provincial governor who tried to engage in this issue” (Moo 10 village headman, June 29, 2013).

In fact, as the village headman pointed out, the provincial governor had just worked at Roi-Et for about five months since April 29, 2012 and moved to Nakhon Pathom province as a provincial governor on October 1, 2012 (Roi-Et Provincial Office website; Nakhon Pathom Provincial Office website). The former provincial governor who had governed Roi-Et from 2010 to April 2012 came back to Roi-Et in October 2012, and he is working as the current provincial governor.

This story shows that even though the provincial governor had the will to respond to local people’s request, it was difficult to realize the will to solve the social issue that happened in this administrative area. This is because 76 provincial governors, except for that of Bangkok Metropolitan, are not elected by the people of the province, and the term of office is not guaranteed for a particular number of years. This means that provincial offices are not independent and are still under the political, administrative, and financial control of central bureaucrats from the Ministry of Interior (Dufhues, Theesfeld, Buchenrieder and Munkung, 2011). Some villagers suspected a political connection between the company and government officers or politicians at the provincial and national level in Thailand.

“The reason why villagers’ movement had failed many times is that there is a connection between government and the Buasommai biomass power plant. We don’t know who the black guy behind the power plant is, but it is obvious that there are some powerful people backing the company in the provincial and national level” (Villager #R6, personal communication, June 11, 2013)

“When governmental officers visit the company to check the condition of air

pollution, Buasommai Company already knew the plan in advance and then they stopped operating the system. So, the officers proved that the plant is operating well. But after the officers went back, the company started operating again” (School Staff #1, personal communication, June 11, 2013).

The decentralization of Thailand started as a national program since the 1990s. The Thai Constitution of 1997 stated that decentralization is the national basic policy, and the Decentralization Act in 1999 provided the specific structure for decentralization. As a result, through the decentralization program, Provincial Administrative Organizations (PAOs) and Tambon Administrative Organizations (TAOs) are installed in the local administration to distribute central political, administrative, and financial power to the local level. In other words, two structures of administration coexist in Thailand (see Table 7). One is the state administrative structure, which is organized under the central government, and the other is the Local Administrative Organization (LAO), which has autonomy as the result of decentralization (Nagai, Funatsu and Kagoya, 2008).

Table 7 Central and Local Administrative Bodies in Thailand

Territorial levels	State administrative structure – Central Government Line	Local Administrative Organization (LAO) – Autonomy Line
Nation – central administration	Cabinet, 20 Ministries and related departments	
Province (<i>Chang-wat</i>)	Provincial Branch Offices - Provincial governor (appointed by MOI)	Provincial Administrative Organization (PAO)
District (<i>Amphur</i>)	Chief district officer	
Sub-District (<i>Tambon</i>)	Sub-district headman (<i>Kam-nan</i>)	Tambon Administrative Organization (TAO)
Village (<i>Mooban</i>)	Village headman (<i>Phuyaiban</i>)	

However, bureaucrats of the Ministry of Interior, who enjoy the right to appoint provincial governors, were strong forces against political decentralization in Thailand (Dufhues, Theesfeld, Buchenrieder and Munkung, 2011, p.5). At the

beginning of the reform process, the bureaucrats opposed the election of provincial governors. As a result, the favorably considered plan to elect provincial governors by the public was deleted in the final version of the Constitution (Nagai, 2001). So provincial governors are appointed by the Ministry of Interior, and their terms are not set. In the case of Roi-Et, provincial governors did not take the responsibility or accountability to solve local issues, and worse, a provincial governor who tried to engage with the biomass power plant issue had no choice but to move to another province after not realizing his plan. Villagers believe that the reason why their movement and the provincial governor who tried to take the villagers' side failed is that there was an unknown connection between Buasomma Company and the provincial and national governments (Villager #R6, personal communication, June 11, 2013).

Villagers protested many times in front of the provincial government office, and the latest protest was held on November 13, 2013. Their main placard emphasized that the provincial government had no accountability for its people (see Photograph 6). It reads in English, *“The power plant is getting richer, and people are getting sick. What are you doing, government sector?”* Another small placard held by students of the elementary school also points out the irresponsibility of provincial government using words like *“The provincial office is blind. Ten years later, we will die. We cannot live longer with biomass power plants,”* and *“If you powerful people do nothing to solve the problem, we will surely die. Stop destroying right now!”*

Photograph 6 Placards students holding of the latest protest in front of the Provincial Government Office in Roi-Et



Villagers are supported by the less influential Tambon Administrative Organization (TAO)

Only one public administration is working with the network of affected villagers in Roi-Et province and that is the TAO of Nuamuang sub-district. When the Network for Watching Environmental Impacts of Biomass Power Plants in Roi-Et was organized in 2006, TAO officers also joined this network to find a solution for the villagers' problems, and since then, TAO members have been working with villagers closely. TAO members who attended the stakeholder's meeting in 2008 at the Buasommai biomass power plant shared their information with villagers who did not have a chance to attend the meeting. At the focus group meeting which was organized during fieldwork, the former vice president of TAO presented an overview of the biomass power plant issue in Roi-Et and the villagers' movement against the provincial government and the company (focus group meeting, June 12, 2013). In addition, at the meeting of a three-party committee⁸ composed of provincial officers, TAO officers, and community representatives of affected villagers, TAO members took the villagers' side and raised questions to the company, and after the meeting, TAO members joined the follow-up meeting to discuss strategies to deal with the issue.

TAOs were installed and gained an autonomous status as one of the decentralization programs under the Tambon Council and Tambon Administrative Authority Act in 1994 (Dufhues, Theesfeld, Buchenrieder and Munkung, 2011, p.4).⁹ The main tasks of TAOs are defined as below.

1. *Local and community planning and development;*
2. *Promotion of local economic development, investment, employment, trade and tourism;*

⁸ The three-Party Committee is discussed in detail in the following section of *Outcome of villagers' movement: three-party committee in Roi-Et* (p.56).

⁹ The Tambon Councils were abolished under the revised Act of 2003 (Nagai, Funatsu and Kagoya, 2008, p.6).

3. *Local public services provision;*
4. *Social welfare services, including education, primary health care, housing, arts and cultures; and*
5. *Promotion of democratic values, civil rights, public participation, law and order, conflict resolution (Krueathep, 2004).*

Nevertheless, the problem is that the TAO does not have enough power to force biomass power plant operators to solve the problems because it is a small public administrative unit in the local area. Therefore, the TAO has been unable to solve the problem, even though it has joined with the villagers' movement since 2006. During the fieldwork, the PAO, another decentralized organization, was not mentioned by villagers, and PAO officers did not attend the three-party committee meetings. The PAO has not been engaged in this issue, so its influence in local politics is unable to be analyzed in this thesis.

The local movement submitted their requests to the central government, the parliament, and the court. Since the provincial government has not engaged with the biomass power plant issue and scarcely responded to people's complaints and requests and the TAO is too weak to solve the problems, the villagers' movement has targeted diverse organizations.

The Minister of Natural Resources and Environment's visit to Roi-Et was part of plans to attend to the launch of an underground water tank system on August 19, 2012 (Moo 10 village headman, June 29, 2013). Setting a protest schedule for his visit, around 1,000 villagers gathered in one high school. The Minister and Member of Parliament (MP) of Roi-Et Area 1 came to the protest and received a letter from the village headmen. After that, they came to check the area in February 2013. Also, villagers sent a letter to the President and MPs belonging to the Sub-Committee of Natural Resources and Environment in parliament to ask to deny the extension of permission for the Buasomma biomass power plant on May 18, 2013 (former Moo 13 village headman, personal communication, June 29, 2013). The letter resulted in an officer of the Pollution Control Department (PCD) in Bangkok arriving to join the

three-party committee meeting in June 2013 (Moo 10 village headman, personal communication, June 29, 2013). Villagers feel that the Thai parliament and the central government take greater responsibility than does the provincial government.

Lastly, the villagers have used the legal system of Thailand to seek justice. They filed a lawsuit with the Regional Administrative Court in Ubon Rachathani. As mentioned in Section 3.2.2.3, the resulting decision was to give time for Buasomma Company to solve the problem by itself, to the frustration of villagers.

Fortunately, the villagers' movement has continued for more than ten years and received a meaningful outcome from the latest and the biggest protest on November 13, 2012. After this protest held in front of the Provincial Government Office of Roi-Et, the provincial government decided to form a three-party committee and to have regular meetings with the Buasomma biomass power plant as well as Roi-Et Green biomass power plant.

Outcome of villagers' movement: three-party committee in Roi-Et

As the outcome of the villagers' latest protest, a three-party committee, composed of provincial government officers, TAO officers, and representatives of affected villagers, was formed to discuss the problems with biomass power plant operators – Buasomma and Roi-Et Green biomass power plants – in Nuamuang sub-district in Roi-Et province. On November 14, one day after the villagers' movement, villagers and TAO officers gathered at the elementary school located near the biomass power plants to have a meeting with a Buasomma owner. In this meeting, they agreed for four things to be improved in the Buasomma biomass power plants, as below:

1. To build walls in the warehouse (there are two buildings) for rice husks;
2. To cover the rice husk conveyer belt;
3. To cover the trucks which transfer burnt husk and bury ashes right away;
4. To improve the system for containing wastewater and not prevent leaking from the biomass power plant.

Even though smoke pollution from the power plant stack is the most serious problem that results in environmental and economic harms to nearby villagers, it is not officially recognized as one of the problems to be addressed by Buasomma Company. As discussed in Section 3.2.3, whenever the Provincial Office of Industry (POI) came to check the pollution levels of the stack, Buasomma Company stopped the operation of the biomass power plants, so there appeared to be no problems. Additionally, the head of POI presented the results of the smoke check of both Buasomma biomass power plants as being under the reference value during the three-party meeting at Buasomma Company on June 27, 2013.

That is why smoke pollution is not agreed upon as one of the problems that should be addressed in the three-party meetings. However, it does not mean that the three-party committee members do not think this problem is significant. During the committee meeting with Roi-Et Green Company on June 28, 2013, members discussed how to push the Buasomma biomass power plants to follow the Roi-Et Green Company's standards, such as the program of bimonthly checking and system maintenance.

To check whether the Buasomma Company follows these recommendations, the three-party committee convenes monthly meetings since January 2013. At the meeting, a head of POI presents the result of air pollution checks, the company submits a report to show the process of improving the problems, and the representatives of affected villages and officers from environment-related departments ask the companies for further improvement. In addition, after the discussion, the committee members themselves look around the power plants to check for the improvement of system.

When committee members visited the biomass power plants for observation after the meetings, the two companies' attitudes towards the committee were totally different. While the Roi-Et Green biomass power plant prepared safety helmets and masks for participants, the Buasomma did not provide any items for safety, although there was massive amounts of dust blowing from the warehouse of rice husks and soil

on the ground (see Photographs 7 and 8).

Photograph 7 Three-party committee members observing the warehouse of rice husks in the Buasommai biomass power plants



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Photograph 8 Three-party committee members observing the warehouse of rice husks in Roi-Et Green biomass power plant



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The 6th three-party committee meeting was held on June 27-28, 2013, and the committee visited two biomass power plant companies, Buasomma and Roi-Et Green biomass power plant on each day (see Photographs 9 and 10). Through the meetings with the different biomass power plant developers, the lack of accountability on the part of Buasomma Company was observed, and the two companies showed different attitudes in dealing with the issue. While the company owner's daughter attended the meeting as a representative of Buasomma Company, two plant managers came to the meeting as representatives of Roi-Et Green biomass power plant. When the representative of Buasomma Company came into the meeting room, she asked "*Why are you still talking about this issue? Isn't it already solved?*" This shows that Buasomma Company considers the meeting unnecessary or unimportant. While the Buasomma representative did not provide a presentation at the meeting, the managers of Roi-Et Green biomass power plant prepared a PowerPoint presentation to show their management of plant systems. The manager explained that they fixed and improved the ESP system and the boiler, the amount of dust was measured by POI, and the power plant passed the checking process.

Photograph 9 The 6th three-party committee meeting at the Buasomma biomass power plant, November 27, 2013



Photograph 10 The 6th three-party committee meeting at the Roi-Et Green biomass power plant, November 28, 2013



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However, since companies need to follow the recommendations of the three-party committee, Buasommai Company submitted follow-up reports. According to these reports, in aiming to implement the recommendations, Buasommai installed three-sided walls at the first warehouse of rice husks, but installation of walls at the second warehouse is still in process and 50% completed. Also, Buasommai Company claimed to have buried ash under the soil. Representatives of affected villagers, however, argued that the company just buried ash on that particular day when the three-party committee meeting was held (officer of local health clinic, personal communication, June 27, 2013).

The Buasommai biomass power plant has tried to follow recommendations because the company cannot ignore the villagers' concerns anymore, because as it is monitored by the three-party committee. Nevertheless, the process to improve the system is slow, and other problems, such as smoke from the stacks, wastewater, and dust from the trucks, still exist and cause villagers concern for the winter season this year.

In summary, it took a long time for villagers to achieve the outcome of creating a committee to discuss the biomass power plant issue. This is because the provincial government office and provincial governor did not take the responsibility to listen to villagers' voices, and one governor who tried to solve the problem was forced to move to another province by unknown political pressure. Consequently, the absence of accountability by the provincial government is one of the main factors in making the problem more serious and allowing the biomass power plant developers to have autonomously manage its biomass power plants without proper supervision by local public organizations.

3.2.4. Justice as Recognition

The original concept of justice as recognition is concerned that while distributive justice and procedural justice guarantee the fair distribution of environmental benefits and harms among stakeholders and provide proper participatory mechanisms in the decision-making process, if there is no recognition of impacts on marginalized groups such as women, children, ethnic minorities or the disabled, environmental injustice problems can still happen to a particular group (Walker, 2012). This section points out that there has been a lack of recognition of the negative impacts of renewable energy and small-sized power plants, especially those under 10 MW, rather than a lack of recognition of particular groups.

According to the Enhancement and Conservation of the National Environmental Quality Act (NEQA) of 1992, any kind of thermal power plant including biomass power plants exceeding 10 MW in capacity, should submit an Environmental Impact Assessment (EIA) report to the Office of Natural Resources and Environment Policy and Planning (ONEP) while applying for project construction and operation permission. It means that VSPPs who plan to build power plants under 10 MW in capacity have no obligation to carry out the EIA process. In this sense, developers prefer to construct biomass power plants under 10 MW to circumvent the process of obtaining permission and avoiding the EIA process.

In addition, according to the “Regulation for the Purchase of Power from VSPPs (for the Generation Using Renewable Energy),” only technical regulations are mentioned to govern the synchronization of VSPPs to the system of the distribution utility, which is a power purchaser. There are no environmental regulations to prevent environmental impacts of VSPPs which might occur in the future. This is because of the common belief that small and renewable projects must be clean. In other words, people and policy-makers think that small-sized power plants using renewable energy sources are less harmful than mega-sized projects using fossil fuel. One of the main objectives of power purchasing from VSPPs is to “lessen the environmental impact” (EPPO, Unknown). One EGAT officer also has a similar opinion on small renewable energy projects in Thailand:

“In general, small renewable energy development projects have created no problems or just little impacts in Thailand. However, the problem is that villagers have not enough information on renewable energy. Local people don’t know much about it. They sometimes misunderstand that solar panel would bring more heat, or windmills would create more wind to their villages, for example. So, I think it will be important to educate or communicate with people when the renewable energy project is planned to develop in Thailand” (EGAT officer, personal communication, August 21, 2013).

Buasomma Company emphasizes that its biomass power plant projects have sustainable development benefits for the environment. The company argues that its biomass power plants will help conserve fossil fuel because the projects use biomass as one of the main sources for renewable energy (Buasomma I Biomass Power Plant, 2012). Also, the company adds that the projects can reduce the amount of rice husk as one of the agricultural wastes and prevent problems of decaying biomass at the local level. However, the problem is that both the company and the EGAT have just focused only on what energy source power plants use as fuel, but make light of the negative impacts of biomass power plants on the environment and villages in the process of generating electricity.

In particular, direct-fired technology, which is used in the Buasommaibiomass power plant, risks the release of harmful pollution, though the technology is simple to install. However, since technical standards for pollution control systems do not exist in the environmental regulatory system in Thailand, what kind pollution control system is installed depends on project developers (Juntarawijit and Juntarawijit, 2012).

Consequently, policy-makers' perception that renewable energy and very small power projects must be good for the environment has influenced the creation of insufficient regulations to prevent the negative impacts of biomass power plants.

3.3. Conclusion

In this chapter, two different cases of biomass energy projects in Roi-Et province are discussed under the conceptual framework of environmental justice by focusing on the Buasommaibiomass power plant and comparing it to the Roi-Et Green 9.9 MW biomass power plant.

In terms of distributive justice, while the Buasommaibiomass power plant developer received benefits from the biomass power plant, villagers received environmental and economic harms with few benefits from CSR programs. On the other hand, since the Roi-Et Green biomass power plant operated by EGCO Group has not created serious problems, villagers perceived Roi-Et Green project as a good case.

In terms of procedural justice, the Buasommaibiomass power plants did not provide any information to villagers before the power plants were planned and constructed in the area. Buasommaibiomass Company organized one stakeholder's meeting in the middle of construction, but villagers said it was not meaningful because the meeting was just for informing their plan, not for asking villagers' permission. On the other hand, in the case of Roi-Et Green, public participation was provided to villagers, and they were invited to observe biomass power plant and power plants operated by EGCO Group in other provinces and nearby communities. After the trip, villagers

gave permission for the construction of the plant to the company.

In terms of justice as recognition, there is a lack of recognition on negative impacts of small renewable energy projects among policy-makers in Thailand. In particular, the NEQA 1992 does not require power plant projects of less than 10 MW in capacity to follow the EIA process. Since regulations on VSPP programs also assume that VSPP projects reduce the environmental impacts, there are no proper technical and environmental regulations enforced on developers.

Therefore, to protect their villages and future generations, affected villagers in Moo 10, Moo 12 and Moo 13 organized their own movement under the leadership of village headmen and have tried to solve the problems through diverse activities targeted to different actors such as the company, central and provincial governments, local politicians, the Administrative Court, and so on. Although there have been difficulties for villagers such as the lack of accountability by the company and provincial government, their movement of over 10 years finally achieved an outcome by pushing provincial government officers to engage in this issue and creating a three-party committee to discuss the biomass power plant issue regularly.

CHAPTER IV

ENVIRONMENTAL JUSTICE OF BIOMASS POWER PLANT IN SUPHANBURI PROVINCE

The purpose of this chapter is to describe and analyze the impacts and the problems related to the biomass power plant in Suphanburi province by applying the conceptual framework of environmental justice. In Section 4.1, an overview of biomass energy development in Suphanburi is provided. Then, in Section 4.2, the biomass power plant is described and analyzed by applying the concept of environmental justice, distributive, procedural, and recognition justice. Lastly, in Section 4.3, the summary and conclusion of this chapter are provided.

4.1. Overview of Biomass Energy Development in Suphanburi Province

In Salee sub-district, Bang Pla Ma district, Suphanburi province, there is a rice mill and a biomass rice husk-fired power plant with a total production capacity of 7.5 MW (see Photograph 11). Of this, 6.5 MW is sold to PEA, and 1 MW is used inside the biomass power plant. The rice husk power plant is managed by Decha Bio Green Company Limited, and 70-80 % of the rice husk for fuel comes from the Khao-Hom Prayao rice mill, who owner also owns Decha Bio Green Company Limited. The plan of construction for the biomass power plant was submitted by Decha Bio Green Company Limited and approved by the Ministry of Industry on October 16, 2006. Construction started in March 2007, and Decha biomass power plant started operating and generating electricity in October 2009.

The rice mill is located 3 kilometers from the biomass power plant, and the biomass power plant is located in an agricultural zone. Therefore, Decha biomass power plant is in the middle of paddy field, and there are not many houses located within 3 kilometers. The nearest village from the plant is very small. The location of the biomass power plant in Suphanburi is different from the case of Roi-Et mentioned in Chapter 3. While there are 669 households in the three villages located within 3 kilometers from the biomass power plants in Roi-Et, Moo Lat Sai, which is the

nearest village to Decha biomass power plant and one of the villages in Moo 3, has only 20-25 households with a possibility of being affected by plant operations.

The case of the biomass power plant in Suphanburi has created less environmental harm and more benefits to villagers living near the biomass power plant than the cases in Roi-Et, although some villagers are concerned about negative impacts. In this context, this chapter examines the case in Suphanburi and compares it to the cases in Roi-Et in terms of environmental justice.

Photograph 11 Decha 7.5 MW biomass power plant in Suphanburi province



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4.2.Environmental Justice

4.2.1. Distributive Justice

4.2.1.1.Benefits

In general renewable energy, including biomass energy, is considered good for the environment because it reduces CO₂ emissions by replacing fossil fuel with other

sources such as agricultural residues, wind, or solar. At the global level, it is obvious that replacing fossil fuel with renewable energy sources is helpful by utilizing diverse energy sources that are renewable and by reducing CO₂ emissions which accelerate climate change.

In this sense, Decha biomass power plant also argued that the project would contribute to sustainable development in Suphanburi province through the “*use of local renewable energy resources, increased commercial activity through clean and renewable source of power, improved local environmental conditions and generation of employment*” (Decha Bio Green Company Limited, 2013). Nevertheless, it is important to examine what kind of environmental, social, and economic benefits, harms and risks are created by biomass energy development at the local level.

In terms of the benefits to the local area, Decha Company receives benefits in operating the biomass power plant by selling electricity to PEA at a higher price than normal because it is classified as a renewable energy project, like Buasomma and Roi-Et Green biomass power plants in Roi-Et (see Section 3.2.1.1). United Nations Framework Convention on Climate Change (UNFCCC) defines,

“The Clean Development Mechanism (CDM) allows emission-reduction projects in developing countries to earn Certified Emission Reduction (CER) credits, each equivalent to one ton of CO₂. These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol” (UNFCCC-CDM Website).

As a CDM Project 2934, the Decha Bio Green Rice Husk Power Generation 7.5 MW project received CER credits for the ten years from February 17, 2010 to February 16, 2020 (UNFCCC-CDM Website). It means that apart from the benefits created by selling electricity to EGAT, Decha Company also earns additional benefit from these credits, which can be traded, sold, or used by industrialized countries.

However, unlike Buasomma biomass power plants in Roi-Et, Decha biomass

power plant provided job opportunities for local people, even though these were somewhat limited, as the plant is mainly machine-operated and it is not a labor-intensive industry. According to the project design document, it was expected that the construction and operation of the biomass power plant would create 55 permanent jobs (Decha Bio Green Company Limited, 2009, p.3). The plan to create job opportunities was realized, as 50 workers, including 18 workers from local areas were employed in the biomass power plants (Decha plant manager, personal communication, June 24, 2013). Some villagers said that family members were working at the biomass power plant as technicians (Villager #S6 and Villager #S8, personal communications, June 23, 2013). Since Villager #S6's 23-year-old son is working at the plant, the family can afford to lease a small truck for their household.

Other villagers who do not have family members working at the plant were still familiar with many local people who worked there as a technician, engineer, or service worker (Villager #S9, #S13, and #S14, personal communications, June 23, 2013). Therefore, in this case in Suphanburi, local people received job opportunities as a benefit from the Decha biomass power plant, and they seemed happy with these benefits.

In addition, Decha Company has conducted some CSR programs. The company distributed survival kits to villagers during the flood in 2011 and organized events for villagers on Thai New Year's Day (*Songkhran*) and Mother's Day, for example (Villager #S4 and #S5, personal communications, June 22, 2013; Villager #S8 and #S9, personal communications, June 23, 2013; Decha plant manager, personal communication, June 24, 2013).

4.2.1.2.Harms and Risks

The village located closest to the Decha biomass power plant, namely Moo Lat Sai, is the only village with a possibility of being affected by the operation of the power plant. This is because the wind blows to the side of the village from the power plant for nine months of the year except for the winter season (from October to

December), and there are some sparse houses on the other side where the wind blows during the winter season (Villager #S4, personal communication, June 22, 2013; Villager #S5 and #S6, personal communications, June 23, 2013).

In fact, villagers living in the other side of Moo Lat Sai, even those living closest to it, reported no serious negative impacts caused by the biomass power plants (Villager #S3 and #S4, personal communications, June 22, 2013; Villager #S14, personal communications, June 23, 2013). The villagers feel that the biomass power plant is clean and environmentally-friendly because it uses natural resources. Also, agricultural workers who take care of the paddy fields near the biomass power plant also believe that is much better than coal-fired and nuclear power plants (Villager #S1 and #S2, personal communications, June 22, 2013).

On the other hand, villagers of Moo Lat Sai have different opinions about the biomass power plant. They have been affected by some negative impacts from the biomass power plant, although the problems are not as serious as in the cases in Roi-Et. The biggest problem is ash and dust from the power plant. Most villagers living in Moo Lat Sai who participated in interviews have observed ashes and dust blowing from the power plant that covered their houses (both roofs and floors) and clothes (Villager #S5, personal communication, June 22, 2013; Villager #S6, #S7, #S8, #S9, #S10 and #S11, personal communications, June 23, 2013). Because of the ash and dust, they have to clean the house every day and sometimes, several times a day. Although villagers are concerned about its negative health impacts, some villagers still use rainwater for drinking, bathing, or cooking when the public water system is not working, while others stopped using rainwater and buy drinking water instead.

“My family is still using rainwater, but we feel it is not safe, although the measurement system said it is safe to use” (Villager #S5, personal communication, June 22, 2013).

“We don’t use rainwater because we are worried about contamination problems. Black ashes on the roof! So, we buy drinking water” (Villager #S8,

personal communication, June 23, 2013).

“When the public water system has problems, we use rainwater for drinking, cooking, and bathing. Factory is anywhere, so we don’t think here is more serious than other areas, so we don’t buy drinking water” (Villager #S6, personal communication, June 23, 2013).

No one has suffered from health problems caused by breathing ash or dust or drinking rainwater yet. Instead, villagers are more worried about long-term health impacts. This is different from the villagers in Roi-Et who were not so concerned about risks that might happen in the near future because they faced more immediate serious health problems. However, in case in Suphanburi, villagers are more worried about risks than harms because the current problems were not serious and there was not much information about the negative impacts of the biomass power plant.

Economic harms are not serious in case of the biomass power plant in Suphanburi. Some workers and villagers who tend to rice paddies near the plant said productivity was not affected and there is no difference in the productivity between before and after the establishment of the biomass power plant (Villager #S1 and #S2, personal communications, June 22, 2013).

Compared to the case of Buasommai biomass power plants in Roi-Et (see Section 3.2.1.2), Decha biomass power plant created less environmental and economic harm to villagers living near the biomass power plant. This is because the company installed Electrostatic Precipitator (ESP) technology, which controls industrial air pollution problems by removing small particles from the stack. So the main problem of smoke and ash was controlled by the ESP system, like Roi-Et Green power plant.

4.2.2. Procedural Justice

4.2.2.1. Access to Information

Several general meetings of the Salee sub-district Administration Organization (Salee TAO) were organized to discuss Decha Bio Green Company's business plan for the biomass power plant building project. Villagers did not attend the meetings, and as this was a meeting between the TAO and the company. The first meeting was held in February 2005, and second meeting was held one year later, on February 15, 2006 and moderated by Mr. Chatchai Pornbamrung, a chairperson of the Salee TAO. At the second meeting, a representative from Decha Bio Green Company was invited to explain its business plan to construct a biomass power plant in Salee sub-district, Bang Pla Ma district, Suphanburi province. The representative presented the objectives of the biomass power plant as below:

- 1. To respond to the government policy to promote energy conservation and production of electricity from renewable sources;*
- 2. To make use of rice husk which is waste from the rice mill as a fuel for the production of electricity;*
- 3. To become a clean project (CDM) that can be a model of technological development, has less negative impact on the community, and is environmentally friendly;*
- 4. To create more employment in the community; and*
- 5. To become an alternative energy for the future (Salee TAO, 2006).*

In addition, the representative explained the scale of the biomass power plant and the technologies that would be used in the plant. The biomass power plant was planned to generate 7.5 MW of electricity, of which 6.5 MW would be sold to EGAT and 1 MW will be used within the plant itself. In terms of technology, the representative emphasized that machines would be purchased from Japan and Germany because they used high efficiency technology that maximized the amount of generated electricity per unit of fuel (Salee TAO, 2006; Decha Bio Green Company

Limited, 2009, p.7). At this short 30-minute meeting, the plan was approved unanimously by the TAO, but the representative of the company did not provide information about the possibility of negative impacts from the power plant.

However, there was another meeting held before construction started in March 2007 which invited some villagers and TAO members, but not all local people who lived near the planned biomass power plant area or lived in other villages in the Salee sub-district (Salee sub-district headman (*Kam-nan*), personal communication, June 24, 2013). Around 170 villagers attended the meeting, where the sub-district headman explained the plan. He explained only that the biomass power plant was not a coal-fired plant, so it would use rice husk as a fuel. Although he did not give information about negative impacts to villagers during his explanation, villagers still asked about dust and ash problems during the public question time. The headman explained that these problems might happen, but that the power plant would control the negative impacts. Consequently, villagers agreed with the plan unanimously. Therefore, the headman felt that he had provided adequate information to villagers before the construction started.

On the other hand, villagers living in Moo Lat Sai who experienced the dust and ash problems said they were never invited to any meetings or provided any information about the biomass power plant (Villager #S5, personal communication, June 23, 2013; Villager #S6, #S7, #S8, #S9, #S10, #S11, #S12 and #S13, personal communications, June 23, 2013). They only noticed the company's plans when the construction on the plant started. Even though Decha Company participated in the TAO meeting and the sub-district headman organized a meeting with some villagers, the villagers who lived closest to the biomass power plant were not informed about the business plan and were not invited to the meeting. The sub-district headman said that the village, Moo Lat Sai, is very small, and only around 10 villagers came from the village to attend the meeting (Salee sub-district headman, personal communication, June 24, 2013).

4.2.2.2.Public Participation

Even though Decha Company provided greater opportunities for public participation than Buasomma Company in Roi-Et, public participation was also limited in terms of participants who were invited to the public hearings or meetings. As explained above, Decha Company and the TAO tried to give information about the plan to build the biomass power plant in the area to villagers. However, since villagers from Moo Lat Sai were not invited to the sub-district level villagers' meeting, which was organized and moderated by the sub-district headman before the construction started, the villagers could not obtain information and did not have the chance to raise questions about the negative impacts of the biomass power plant.

In 2007, Decha Company organized a field trip to visit other biomass power plants with villagers (Decha plant manager, personal communication, June 24, 2013). In October 24, 2008, in the middle of construction, the company organized a stakeholder consultation meeting "*to give stakeholders an opportunity to comment on the project,*" which is as required for receiving CER from CDM (Decha Bio Green Company Limited, 2009, p.32). At the meeting, the biomass power plant developers distributed a booklet describing the Decha Bio Green Company and the summary of its business plan. Forty-four people attended the meeting, including diverse stakeholders such as local government/village headmen, farmers, local villagers, representatives of the Thailand Designated National Authority (DNA), EGAT, Siam City Bank, and police officers (Decha Bio Green Company Limited, 2009, p.32).

However, the problem was that the local villagers and the village headman were from other villages, not Moo 3 where the biomass power plant was being constructed. According to the consultation meeting attendance list, the TAO members and village headmen were from Moo 5, 6, and 7. Unlike in Roi-Et, the villages were not close to each other. Moo 5, 6, and 7 are more than 3 kilometers away from the biomass power plants meaning that there was even less potential for those villages to be affected by negative impacts from the biomass power plants. Stakeholders should have included villagers from Moo 3 and Moo Lat Sai which is the nearest village

from the biomass power plant in Moo 3. Therefore, villagers of Moo Lat Sai said they were “*never invited to any kind of meeting, and never got any information about the biomass power plant*” (Villager #S5, personal communication, June 22, 2013; Villagers #S9, #S10 and #S11, personal communications, June 23, 2013).

Two months later, after the biomass power plant was constructed and started operating, another meeting was organized to check whether it had created problems or not (Salee sub-district headman, personal communication, June 24, 2013). The manager of biomass power plant and villagers attended and villagers said the problems were not serious. In addition, the TAO officers also came to the villages to check the air quality and noise pollution levels near the biomass power plant and distributed questionnaires to ask for villagers’ opinions (see Table 8).

Table 8 Major events in the operation of Decha 7.5 MW biomass power plant

Date	Event/Action
February 15, 2006	TAO meeting to present a business plan to build a biomass power plant in Salee sub-district
October 16, 2006	Receiving construction approval
March 1, 2007	Signing of construction contract
2007	Field trip with villagers to visit a biomass power plant in other area
October 24, 2008	Stakeholder consultation meeting
October 1, 2009	Going into full operation
December, 2009	Sub-district level meeting with manager of biomass power plant to discuss its impact

In summary, Decha Company and the TAO of Salee provided several opportunities before and after the plant construction to disseminate information about the business plan to build the biomass power plant and to check the management of the biomass power plant. However, villagers of Moo Lat Sai, those who with highest potential to experience negative impacts from the biomass power plant were not

invited to those meetings and were not given enough information. Fortunately, in this case, the problems of Decha biomass power plant were not as serious as those of Buasommai biomass power plants in Roi-Et, as conflict has not erupted or a villagers' movement organized in response.

4.2.3. Justice as Recognition

The lack of recognition of the negative impacts of small renewable energy projects among policy-makers in Thailand is the main problem in terms of justice as recognition. This lack of recognition created loopholes for policies and regulations surrounding small renewable energy projects. More on this cross-cutting issue regarding biomass energy projects of less than 10 MW at the national level of Thailand can be found in Section 3.2.4.

4.3. Conclusion

In this chapter, the case of a biomass energy project in Suphanburi province – Decha Bio Green power plant (7.5 MW) – was discussed under the conceptual framework of environmental justice. In terms of distributive justice, the Decha Bio Green received benefits by selling the electricity to PEA and getting CERs from the CDM of UNFCCC and also provided job opportunities and CSR programs to local people and nearby villagers. On the other hand, the power plant created environmental harm to villagers in Moo Lat Sai which is located within 1 km from the plant, though the harms are not serious enough to result in health problems.

In terms of procedural justice, Decha Company organized stakeholder meetings with sub-district headman (*Kam-nan*) and villagers before the company started construction in order to explain the plan and ask for villagers' opinions. However, as most villagers of Moo Lat Sai said they were not invited to those meetings and were not informed about the plan, the public participation had a critical limitation. Nevertheless, because the company installed a high standard of technology and ESP system in the stack, rice husk warehouse and spring cooler to minimize dust

from burnt rice husks, the environmental harms were not as serious as in the case of Buasommai biomass power plants in Roi-Et.

CHAPTER V

CONCLUSION

“The environment is political as it concerns the allocation of resources in society, especially in the unequal distribution of costs and benefits associated with development” (Hirsch, 1997).

As Hirsch (1997) states above, the environment itself is a political issue because environmental problems create unequal distribution of environmental and economic benefits, harms, and risks. Compared to Decha biomass power plant in Suphanburi province, Buasomma biomass power plants have created serious environmental injustice problems for local people in Nuamuang sub-district of Roi-Et province. While the villagers living near Decha biomass power plant received only minor harms in spite of procedural injustice problems, the villagers in the Nuamuang sub-district of Roi-Et province suffered from negative impacts and paid costs caused by impacts without any benefits or compensation. So, what has made these cases different? Why is it so difficult to solve the serious problems in Roi-Et?

The purpose of this chapter is to compare the three projects, namely Buasomma, Roi-Et Green and Decha biomass power plants, to analyze which factors have made the companies manage each biomass power plant differently. Also, the main question of this thesis – *“Under what conditions do biomass energy projects in Thailand ensure environmental justice?”* – will be answered and relevant recommendations and directions for future research suggested in this chapter.

5.1. Comparative Analysis

5.1.1. Comparison of Environmental Justice of Biomass Energy Projects in Roi-Et and Suphanburi Provinces

Distributive Justice

Table 9 summarizes the impacts and problems of biomass energy projects in Roi-Et and Suphanburi provinces from the perspective of environmental justice. Firstly, in terms of distributive justice, EGCO Company, which operates Roi-Et Green biomass power plant, provides diverse CSR programs including: scholarships for students, donations to nearby communities and schools, a climate change education program for school staff, and health checking services to affected local people. Villagers and school staff are satisfied with these CSR programs, and more importantly, environmental and economic harms caused by Roi-Et Green biomass power plant are minor.

The case of Decha biomass power plant in Suphanburi province is similar to the case of Roi-Et Green. Decha Company provides job opportunities and CSR programs to local people. However, villagers living near the plant experience ash and dust problems, although the problems are not serious enough to result in acute health issues. Because of this, villagers of Moo Lat Sai are more concerned about long-term health impacts than villagers in Roi-Et province.

On the other hand, though Buasomma Company in Roi-Et province provides CSR programs such as scholarships and donations to nearby villages and schools, its programs are not sufficient to adequately compensate affected local people for environmental impacts and health damages. Because of the ash and dust from the smoke, uncontrolled rice husks, and burned rice husks, villagers of Moo 10, Moo 12, and Moo 13 suffer from environmental and economic harms and health problems.

In summary, while the three companies earn income by selling electricity to PEA and Decha Company receives extra benefits from the CER of CDM, harms and risks are transferred to the environment and nearby villagers to greater or lesser extents. In addition, the significant differences in distributive justice between these projects reveal that even though the same laws apply to all projects in Thailand, it does not necessarily follow that all projects are developed to the same standards.

Procedural Justice

In terms of procedural justice, there are big gaps among three projects. The differences between the projects also demonstrate that all projects do not necessarily follow the same procedures, even though they share same legal environment in Thailand. Roi-Et Green biomass power plant, the first biomass power plant operated in Nuamuang sub-district of Roi-Et province, provided a field trip for village leaders and school staff in order to explain its plan to build the biomass power plant and asked for villagers' approval by showing several biomass power plants operated by the same company in other provinces.

On the other hand, although there was the more positive example of Roi-Et Green biomass power plant, in the case of Buasomma biomass power plants, villagers of Moo 10, Moo 12, and Moo 13 did not receive any information related to the planned construction and potential negative impacts of the biomass power plants. In addition, there was no meaningful public participation for villagers to express their opinions and concerns about the biomass power plants to developers. As a result, Buasomma biomass power plants started their operation without villagers' agreement and created environmental harms and health problems.

Decha biomass power plant in Suphanburi provided several opportunities for public participations by villagers before construction, but villagers of Moo Lat Sai, who faced a high potential for adverse impact, were excluded from the meetings. Because the information and public participation opportunities provided by Decha Company were limited, villagers of Moo Lat Sai experienced several minor problems caused by the plant without being able to voice their concerns.

Justice as Recognition

Justice as recognition is a cross-cutting issue for the three cases. There was a lack of recognition of the negative impacts of biomass power plants, especially VSPP biomass power plants under 10 MW at the national level in Thailand. It is a

widespread belief that small and renewable energy development projects are less harmful to the environment and nearby villagers than nuclear power plants or hydropower dams, not only among policy-makers but also among local villagers in Thailand. This is because renewable energy projects are still new and in the process of development in Thailand.

Table 9 Forms of injustice articulated in three cases of biomass power plants in Thailand

	Buasommai	Roi-Et Green	Decha
Location	Residential zone		Agricultural zone
Operator	Local company	EGCO Group	Local company
Capacity	6.4 MW, 9.9 MW (Selling 8 MW to PEA)	9.9 MW (Selling 8.8 MW to PEA)	7.5 MW (Selling 6.5 MW to PEA)
ISO	None	ISO 9001: 2008 ISO 14001: 2004	ISO 9001: 2008 ISO 14001: 2004
Storage, transportation, incineration and waste infrastructure	No concrete covered road; no warehouse for rice husks (in the process of building); not working ESP; small pond not enough to contain wastewater; uncontrolled burnt rice husks.	Concrete covered road; warehouse for rice husks; ESP; spring cooler for burnt rice husks; big pond to contain wastewater.	Concrete covered road; warehouse for rice husks; ESP; big pond to contain wastewater
Company's own standards	N/A	System maintenance every two months	Informal route for communication with villagers
Distributive Justice	Harms and risks locally concentrated, but no benefits	Minor harms and risks to villagers	Minor harms and risks to villagers
- Benefits for villagers	CSR – scholarship, donation for villages and school	CSR – scholarship, donation for villages and school, education program, health check program	Job opportunity (18 workers from local area out of 50 workers); CSR – organizing events for local people
- Harms and	Ash and dust;	Rainwater	Ash and dust;

Risks	rainwater contamination; wastewater problems; health problems, economic harms	contamination; wastewater problems	wastewater problems; risks of long-term health impacts
Procedural Justice	No information given; stakeholder meeting after the construction	Stakeholder meeting before construction	Stakeholder meeting before construction (limited information and limited participants)
Justice as Recognition	Lack of policy makers' recognition on negative impacts of renewable energy		

5.1.2. Plant Design and Environmental Impacts

The second comparative analysis centers around the plant designs and operational standards of the three projects. This is significant because the different plant designs created different degrees of negative impacts for the environment and nearby villagers. Roi-Et Green biomass power plant installed an Electrostatic Precipitator (ESP) system in addition to normally used systems, including a multi-cyclone system in the stacks that traps up to 96% of dust, and the company checked whether the ESP system was functioning every 15 minutes (Roi-Et Green Co., Ltd., Unknown; three-party committee meeting, June 28, 2013). Decha biomass power plant also installed an ESP system in its stack. However, although Buasomma Company also installed an ESP system, smoke and ash still came up from the stacks. Villagers and Roi-Et Green Company suspect that the standards of the Buasomma plant's ESP system might have been lowered or may not have been maintained by the company after it was out of order (three-party committee meeting, June 28, 2013).

While the Roi-Et Green and Decha biomass power plants covered sites with concrete to prevent dust, Buasomma Company did not, choosing instead to build its biomass power plants directly on the ground soil. Also, in contrast to Roi-Et Green

and Decha biomass power plants, Buasommai did not install proper warehouses for rice husks¹⁰, did not cover conveyer belts that transferred rice husks to the incineration system, and did not adequately control the burned rice husks. As a result, dust and ash problems were caused throughout the entire process of generating electricity from rice husks. Additionally, all three biomass power plants have wastewater leakage problems, even though Roi-Et Green and Decha plants have much larger ponds to contain wastewater compared to the Buasommai biomass power plants.

In addition, both Roi-Et Green and Decha biomass power plants received ISO 9001: 2008¹¹ and ISO 14001: 2004¹² from the International Organization for Standardization (ISO). Buasommai biomass power plants, however, do not have any certification to guarantee its systems. Roi-Et Green has its own regular maintenance schedule to check the system every two months, and Decha biomass power plant uses an informal communication route via local workers: if there is a problem caused by Decha biomass power plant, local workers deliver villagers' concerns and opinions to the company. On the other hand, Buasommai Company does not have any such mechanism to listen to villagers' voices.

Of course, there are standards for air emissions from power plants, which are specified by the Ministry of Industry and Ministry of Science, Technology and Environment in Thailand (Black & Veatch, 2000). However, as regulations on specific

¹⁰ Fortunately, Buasommai already installed its first warehouse for rice husks this year, and a second warehouse is under construction as part of the implementation of recommendations from the three-party committee in Roi-Et.

¹¹ According to the ISO which is "the world's largest developer of voluntary International Standards," "ISO 9001: 2008 specifies requirements for a quality management system where an organization needs to demonstrate its ability to consistently provide product that meets customer and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements" (ISO Website).

¹² "ISO 14001: 2004 maps out a framework that a company or organization can follow to set up an effective environmental management system. Using ISO 14001:2004 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved" (ISO Website).

standards of technology do not exist, it is likely that some biomass power plants may have installed “a cheaper and less efficient control technology” and attempted to avoid regular checking by lobbying government officers for information about checkup dates in advance and by momentarily stopping systems in Buasomma biomass power plants (Juntarawijit and Juntarawijit, 2012). In this context, the disparity in distributive injustice between developers who invest more to reduce environmental and social impacts and others who do not, like Buasomma biomass power plants, should be pointed out. Investment costs for the installation of better systems and to receive ISO certificates are examples of factors that affect their profits.

5.1.3. Accountability of Project Developers

The third comparison is concerned with the accountability of project developers. As discussed in Section 3.2.3, Buasomma Company has not demonstrated its responsibility and accountability to affected villagers, even during the three-party committee meetings to discuss problems and solutions with provincial government officers, TAO members, and affected villagers. During the observation of the 6th three-party committee meeting on June 27, 2013, the daughter of the owner of the Buasomma plants, who represented the company at the meeting, did not allow observers to take pictures of the Buasomma biomass power plants.

In contrast, Decha Bio Green and Roi-Et Green biomass power plants provided brochures about their biomass power plants and were open to observation and interviews for this thesis. More importantly, the Roi-Et Green biomass power plant is operated by EGCO Group, whose activities are founded on “the philosophy to conduct the business ethically for the benefits of the stakeholders, namely shareholders, customers, suppliers, employees, communities and environment for sustainable development” (EGCO, 2005, p.2). The president of the nearby school also mentioned that because Roi-Et Green is operated by EGCO Group, which runs other power plants in Thailand, it has their own standards control system, while Buasomma Company considers only its profit (school staff #2, personal communication, June 12, 2013).

In the case of Decha Bio Green, according to the plant manager, the owner of Decha Company comes from Suphanburi province and carries personal connections to his hometown, so he wanted to inform villagers of construction plans in advance (Decha plant manager, personal communication, June 24, 2013). Also, when problems arise and villagers request changes to the system after operation, Decha Company did show some effort to solve the problems. For example, when one villager contacted a coordinator of the company about ash problems, the company installed a spring cooler next to the burnt ash. However, when she complained about smoke from the stack, there was no improvement (Villager #S5, personal communication, June 22, 2013). This shows that Decha Company demonstrates some accountability to nearby villagers, even though this is not sufficient to solve all problems.

To conclude, through the comparative analysis, the three biomass power plant developers demonstrate different extents of accountability and show different degrees of willingness to install and maintain systems properly to minimize negative impacts on the environment and villagers. Therefore, while some biomass power plants such as Decha Bio Green and Roi-Et Green have better plant designs and accountability and create only minor environmental harm, others such as Buasomma plants, without proper designs and accountability, create serious problems for the environment and nearby villagers.

5.2. Analysis

5.2.1. Creation of Problems

Whether biomass power plants operated with or without serious problems depends on the will of the business sector. This is because there are loopholes in the policies and regulations of VSPP renewable energy projects for biomass power plants of less than 10 MW capacity in Thailand. In other words, construction and design decisions, including technology utilization and operational standards, depend ultimately on the will of the project developers because current regulations are not sufficient to prevent or minimize the negative impacts of biomass power plants in

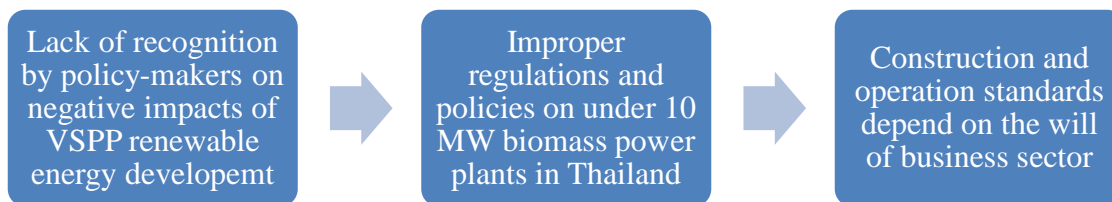
Thailand.

As VSPP projects of renewable energy plants under 10 MW in capacity are recognized mainly as projects beneficial to the environment, they are not required to implement EIA process as a minimum qualification. This is because VSPP projects are small, and renewable energy has the potential to reduce GHG emissions and dependency on imported fossil fuel in Thailand (EPPO, Unknown). Therefore, biomass energy project developers prefer designing and constructing biomass power plants of less than 10 MW capacity, such as 9.9 MW or 9.95 MW plants, in order to avoid the EIA process.

Also, there is no regulation on pollution control systems for biomass power plants in Thailand. Direct-fired technology, which is used in all three biomass power plant complexes mentioned in this thesis, runs the risk of releasing harmful pollution, though the technology features simple installation. However, since technical standards for pollution control system do not exist in the environmental regulatory system in Thailand, what kind of pollution control system is eventually installed depends on project developers in the end (Juntarawijit and Juntarawijit, 2012). Project developers are more likely to install “a cheaper and less efficient control technology” (Juntarawijit and Juntarawijit, 2012, p.4). As a result, technology utilization standards for each plant depend on the will of individual project developers.

In summary, because of policy-makers’ lack of recognition on the negative impacts of VSPP renewable energy development, regulations and policies of biomass power plants under 10 MW are not sufficient in Thailand. This results in the business sector’s autonomy in choosing whether to adopt technology with good standards, maintain the systems regularly, and consider affected villagers’ rights. As a result, while some plants such as Roi-Et Green and Decha biomass power plants operate without serious problems, some plants such as Buasommai biomass power plants have created environmental injustice problems in Thailand (see Figure 3).

Figure 3 Creation of problems



Proper policies and regulations aiming to minimize the negative impacts of biomass power plants are necessary to solve current problems and prevent negative impacts in other areas. Policies and regulations can act as good guidelines for the design and planning of renewable energy projects. Even if the problems happened due to the lack of proper regulations or policies, they can still be solved and the conflicts mediated if there is responsible local government. However, since Buasomma Company and the provincial government in Roi-Et lack in accountability, it has been difficult and time-consuming to solve environmental, economic, and health problems which villagers have criticized over ten years.

5.2.2. Addressing Problems

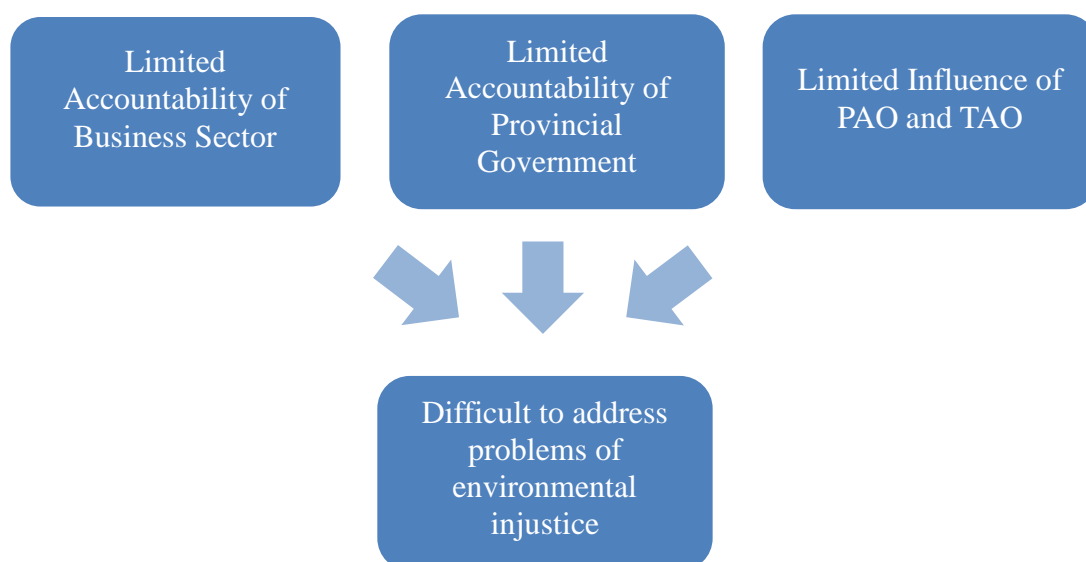
The first reason why it has been difficult and time-consuming to solve the problems in Roi-Et province is that the Buasomma biomass power plant owner and operators do not take meaningful responsibility and accountability for the affected people. Air pollution problems have occurred since the rice mill began operating in 1980. Even though environmental and economic harms and villagers' health problems increased as the company expanded the rice mill and as the three biomass power plants were built in the area, Buasomma Company did not show its accountability sufficiently in responding to affected villagers' concerns and requests.

Other main reasons for the difficulty in solving problems involve politics. As Beck (1992) argues that environmental risks raise questions about the structure of industrial society itself, newly emerging environmental problems caused by

renewable energy also provide an opportunity to rethink the political and social structure of Thailand. Not only should policies or regulations, but also the political structure, be changed in a way that ensures environmental justice in Thailand. Adding to the lack of accountability by business sector, the lack of accountability of the provincial government and the lack of influence of LAOs such as the PAO and TAO are other important factors in the Roi-Et cases, as described and analyzed in Section 3.2.3 (see Figure 4).

In this situation, villagers organized their own movement, led by the village headmen, and have protested against the local government and Buasommai Company until now. Fortunately, their movement brought a meaningful outcome in creating a three-party committee to discuss the issues with the biomass power plant operators, provincial government officers, TAO members, and affected villagers. Under this mechanism, problems are slowly solved one by one.

Figure 4 Main factors that make it difficult to address problems



5.3. Evaluating Environmental Justice Framework

This thesis applied the framework of environmental justice to analyze the

problems and impacts of biomass energy projects in Thailand. As mentioned in Section 1.4.2, the framework is composed of the three closely linked dimensions of distributional justice, procedural justice, and justice as recognition and aims to examine and analyze environmental issues in a systematic way. Without just procedure, including inclusive decision-making processes, the realization of just distribution among diverse stakeholders becomes less likely (Martin, 2013, p.98). Also, in order to attain parity of participation among stakeholders (including project developers, government officers, and local people), all groups who might be affected by development projects should be recognized. In this sense, the framework of environmental justice showed clearly how and in what contexts biomass power plants can create problems in Thailand.

The framework of environmental justice, however, has several limitations. The existing research applying the framework is mainly focused on the rights of individuals or groups which are divided along lines of gender, race, religion, or ethnicity (Walker, 2012, p.50). The research has studied the reasons why hazardous sites or harmful toxic wastes are likely to be located near communities of vulnerable social groups or exported to developing countries from more developed countries. Yet, projects which are generally perceived as less harmful, but still with the potential to create environmental problems and social conflicts, were not as thoroughly considered within the academic discussion on environmental justice. Therefore, the framework is likely to overlook the lack of recognition of the potential for new development projects to cause environmental harm. As this thesis points out, renewable energy, which is emerging as a strong alternative to alleviate energy scarcity and reduce CO₂ emissions, has the potential to create negative impacts without proper regulations and policies. To the extent that regulations and policies result from policy-makers' recognition of issues and public understanding, the discussion on justice as recognition should be expanded to reconsider diverse impacts of development projects.

5.4. Conclusion

Renewable energy is not free from impacts on the environment and nearby communities. As shown in the Roi-Et cases, biomass power plants under 10 MW using rice husk combustion systems can have the potential to create environmental harms, health problems, and economic harms to villagers, resulting in environmental injustice.

In distributive justice terms, the benefits of biomass energy development projects mostly belong to the project developers, even though three of the companies have distributed financial support to the villagers via channels like as CSR, and Decha biomass power plant has provided job opportunities to the local people. On the other hand, villagers living near biomass power plants, especially in Roi-Et province, have been affected by air and water pollution caused by smoke, ash, dust and wastewater. As a result of environmental harms, villagers of Roi-Et have suffered from health problems including skin allergies and respiratory problems and have to pay the costs of health problems and the reduced productivity of rice and fruit by themselves.

In terms of procedural justice, while Roi-Et Green and Decha biomass power plants provided opportunities for public participation for most villagers before construction, Buasommai biomass power plant organized the meeting for public participation only during on-going construction. However, even though Decha Company held a stakeholder meeting before construction, villagers living in Moo Lat Sai, which is located very near the biomass power plant, were not invited and were excluded from the decision-making process.

In terms of justice as recognition, since Thai policy-makers did not recognize that even renewable energy and small development projects may create negative impacts, regulations and policies are not set properly. Also, local people believe that renewable energy projects must be better than other kinds of energy projects such as coal-fired and nuclear power plants or hydropower dams. These perceptions about renewable energy make it easy to start biomass energy development in Thailand.

The reason why serious environmental injustice problems happen in some projects while not in others is that construction decisions, including technology utilization and operational standards depend solely on the will of the business sector because of loopholes of policies and regulations in Thailand. In addition, problems, when they arise, were not addressed adequately in cases of Roi-Et because there is limited accountability by the business sector, limited accountability by the provincial administrative government and limited influence of Local Administrative Organizations such as PAO and TAO.

Therefore, proper regulations and policies as well as the recognition of the negative impacts of renewable energy projects, especially of biomass power plants under 10 MW, and greater accountability by the business sector and central and provincial governments are required in order to ensure environmental justice in Thailand.

5.5.Recommendations

5.5.1. Recommendations for the Policy-Makers in the ERC and ONEP in Thailand

- ❖ Recognize that small renewable energy development projects, including biomass power plants under 10 MW, have the potential to create negative impacts on the environment and on nearby villagers.
- ❖ Reform the current policies and regulations which do not require an EIA process (NEQA 1992) and do not specified technical standards for the system and environmental regulations (Regulation for the Purchase of Power from VSPPs: for the Generation Using Renewable Energy) for under 10 MW power plants.
- ❖ Change the position of provincial governors to be elected by popular vote, or at least fix the provincial governors' terms of office to increase the responsibility and accountability of their positions.

- ❖ Conduct annual or biannual audits by unbiased third parties to monitor whether companies follow the regulations and policies provided by the government to increase the accountability and transparency of the business sector in Thailand.

5.5.2. Recommendations for the Business Sector

- ❖ Establish a two-way communication mechanism to regularly explain the operations and maintenance of the biomass power plants to nearby villagers, and listen to villagers' problems and concerns caused by the power plants.
- ❖ Set a regular maintenance schedule to check whether the systems operate well.
- ❖ Create Standard Operating Procedures (SOPs) to minimize the negative impacts of biomass power plants.
 - Cover vehicles that transport rice husks from rice mills to biomass power plants, warehouses of rice husks, and conveyer belts, and convey rice husks from the warehouse to the combustion systems properly to prevent dust and particles from the rice husk from escaping.
 - Cover burnt rice husks with soil immediately, or install spring coolers in order to prevent dust and ash from the dried burnt rice husk.
 - Create ponds inside the sites of biomass power plants to prevent discharge of the wastewater from the cooling system for the boiler.

5.5.3. Recommendations for Communities

For communities where biomass energy projects are planned

- ❖ Recognize that small renewable energy development projects, including biomass power plants under 10 MW, have the potential to create negative impacts on the environment and nearby communities in order to avoid

accepting those projects without the considerations.

- ❖ Utilize the conceptual framework of environmental justice as a tool to request meaningful public participation and sufficient information about the plans of development projects before construction (procedural justice), to monitor whether environmental benefits, harms, and risks are distributed fairly among diverse stakeholders (distributive justice), and to point out developers' or local government officers' lack of recognition of negative impacts of projects and particular groups who might be affected by the projects (justice as recognition).

For communities experiencing impacts of the biomass energy projects

- ❖ Organize networks to express their concerns and affected situations to the provincial government or company, and monitor the operations and management of the company on their own.
- ❖ Share information with other villages in the same province or in other provinces where biomass power plants are located or planned.
- ❖ Utilize the conceptual framework of environmental justice as a tool to systematically point out the problems with projects and push for distributive, procedural, and recognitional justice.

5.6.Directions for Future Research

Firstly, this thesis analyzes the problems of biomass energy projects from the perspective of environmental injustice, focusing on biomass power plants using rice husks and combustion systems for generating electricity. As mentioned in Section 2.3, there are various sources of biomass including rice husk, bagasse, and wood waste. There are also different technologies for converting biomass to electricity, such as combustion – direct burning – systems and gasification systems. Different impacts, including benefits, harms, and risks to stakeholders, that are caused by different sources or technologies are not discussed in this thesis, though briefly mentioned in

Section 2.3. Therefore, future research on biomass energy development should consider the diverse impacts caused by different forms of biomass and technologies.

Additionally, in this thesis, it is pointed out that the accountability of key actors such as provincial governments and the business sector is one of the main factors with respect to environmental justice. This thesis, however, discusses just three cases in two provinces. Therefore, further research on other cases of biomass power plants in the country would be useful for a more widely generalizable argument in Thailand.

Lastly, the three-party committee was established to address negative impacts of biomass power plants upon the environment and nearby villagers in Roi-Et province. Under this mechanism, provincial administrative government officers, TAO members, and affected villagers discuss problems with biomass power plant operators, suggest solutions, and monitor impacts and improvements. In this context, it would be important to continue to focus on the challenges and successes of the committee to understand to what extent this mechanism may apply to other cases of local conflict regarding biomass power projects or other development projects in Thailand.

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APPENDICES

APPENDIX A

Participants of Focus Group Discussion in Roi-Et, June 12, 2013

No.	Village	Position	Gender	Remarks
1	Moo 10	Headman	M	
2		Vice-headman	M	
3		Vice-headman	F	
4		TAO member	M	
5		TAO member	M	
6	Moo 12	Headman	M	
7		Former headman	M	President of the Network for Watching Environmental Impacts of Biomass Power Plants in Roi-Et
8		Vice-headman	F	
9		TAO member	M	
10		TAO member	M	
11	Moo 13	Former headman	M	Vice President of the Network
12		TAO member	M	
13	Local Health Clinic	President	M	The Clinic is located in Moo 10

APPENDIX B

List of Interviewees in Roi-Et province

No.	Coding Name	Gender	Age	Occupation	Village	Date of Interviews
1	Villager #R1	F	40	Noodle shop owner	Moo 10	June 11, 2013
2	Villager #R2	F	76	N/A	Moo 10	"
3	Villager #R3	M	68	Temporary worker		"
4	Villager #R4	M	65	Farmer	Moo 10	"
5	Villager #R5	F	68	Rice paddy owner, #R4's wife	Moo 10	"
6	Villager #R6	F	52	Restaurant owner	Moo 10	"
7	Villager #R7	F	58	N/A	Moo 12	"
8	Villager #R8	F	63	N/A	Moo 12	"
9	Villager #R9	F	63	N/A	Moo 12	"
10	Villager #R10	F	47	Supermarket owner	Moo 10	June 12, 2013
11	Villager #R11	F	28	N/A	Moo 13	"
12	Villager #R12	F	69	N/A, #R11' mother	Moo 13	"
13	Villager #R13	F	44	N/A	Moo 13	"
14	Villager #R14	F	52	N/A	Moo 13	"
15	Villager #R15	F	85	N/A	Moo 13	"
16	Villager #R16	F	73	N/A	Moo 13	"
17	School staff #1	F	N/A	Teacher	Elementary School in Moo 10	June 11, 2013
18	School staff #2	M	N/A	President	"	June 12, 2013
19	School staff #3	F	N/A	Vice President	"	"
20	Student #1	F	10	Elementary Student	Moo 13	"
21	Student #2	F	9	Elementary Student	Moo 13	"

22	Moo 10 village headman	M	44	Moo 10 headman	Moo 10	June 10, 29, 2013
23	Former vice president of TAO	M	N/A	Former vice president of TAO	Moo 12	June 11, 2013
24	Former Moo 13 village headman	M	N/A	Vice president of Network	Moo 13	June 29, 2013
25	Local health center #1	F	N/A	Officer	Local health center in Moo 10	June 27, 2013
26	Local health center #2	M	N/A	Director	Local health center in Moo 10	June 29, 2013

APPENDIX C

List of Interviewees in Suphanburi province

No.	Coding Name	Gender	Age	Occupation	Village	Date of Interviews
1	Villager #S1	M	44	Farmer	Moo 4	June 22, 2013
2	Villager #S2	M	27	Farmer	Moo 3	"
3	Villager #S3	F	24	Service worker	Moo 3	"
4	Villager #S4	M	N/A	TAO member, #S3' Father	Moo 3	"
5	Villager #S5	F	36	Farmer	Moo Lat Sai in Moo 3	"
6	Villager #S6	F	53	Farmer	"	June 23, 2013
7	Villager #S7	F	73	Farmer, #6's mother	"	"
8	Villager #S8	F	43	Service worker	"	"
9	Villager #S9	F	N/A	#S8's mother	"	"
10	Villager #S10	F	40	Factory worker	"	"
11	Villager #S11	F	42	Factory worker, #S10' sister	"	"
12	Villager #S12	F	N/A	Farmer	"	"
13	Villager #S13	F	42	#S12's daughter	Bnagkok	"
14	Villager #S14	M	21	Student	Moo 3	"
15	Decha plant manager	M	N/A	Decha Bio Green Co. Ltd., Manager	N/A	June 24, 2013
16	Salee Sub-District Headman (<i>Kam-nan</i>)	M	52	Salee Sub-District Headman	Moo 3	"

APPENDIX D

List of Interviewees

No.	Coding Name	Occupation	Place of Interview	Date of Interviews
1	Chris Greacen	Palang Thai	Email	May 1, 2013
2	Bundit Chusap	Biomass Power Plant Manager, Mung Charoen Green Power Co., Ltd.	Surin province	June 8, 2013
3	Wichitra Chusakul	Manager, NET Foundation	Surin province	June 9, 2013
4	Witoon Permpongsacharoen	Director, MEE Net (Mekong Energy and Ecology Network)	Bangkok	July 15, 2013
5	EGAT Officer #1	Alternative Power Energy Resource Department, System Planning Division	Bangkok	August 21, 2013
6	EGAT Officer #2	Transmission system Planning Department, System Planning Division	Bangkok	"

BIOGRAPHY

Yeji Yoo was born in Seoul, Republic of Korea. She obtained a B.A. in Political Science and a B.A. in History from Korea University in 2009. She received a M.A. in Political Science from Sogang University in 2012. Ms. Yoo received the Korean Government Scholarship from the National Institute for International Education Development (NIIED) in Korea to study international development studies in Chulalongkorn University, Bangkok. She is interested in environmental politics and Thai and Southeast Asian politics.