

**EXPLORING KEY OBSTACLES IN DEVELOPING  
WASTE TO ENERGY POWER PLANT IN THAILAND**

The image features a large, faint watermark of the Mahidol University logo in the background. The logo is circular, with a blue center containing a golden emblem of a traditional Thai stupa. The outer ring of the logo contains Thai text. Overlaid on this watermark is the author's name.

**THAYAKORN PLOOKCHAREON**

**A THEMATIC PAPER SUBMITTED IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF MANAGEMENT  
COLLEGE OF MANAGEMENT  
MAHIDOL UNIVERSITY  
2020**

**COPYRIGHT OF MAHIDOL UNIVERSITY**

## ACKNOWLEDGEMENTS

First of all, I would like to show my gratitude to my advisor, Assoc. Prof. Dr. Nathasit Gedsri that has been with me throughout this journey of my thematic paper project. He has been giving me inspiration, support and very useful advice which helped me a lot with my final report and presentation.

Besides my advisor, I would like to thank my friends for their understanding and helped me with my writing techniques and structures. Without them, I would not have accomplished my masters this far.

Finally, my sincere thanks goes to the rest of my Thematic committee, Assoc. Prof. Dr. Nathasit Gedsri, Asst. Prof. Prattana Punnakitikashem, Ph.D. and Assoc. Prof. Randall Shannon, Ph.D.

Thyakorn Plookchareon

## **EXPLORING KEY OBSTACLES IN DEVELOPING WASTE TO ENERGY POWER PLANT IN THAILAND**

THAYAKORN PLOOKCHAREON 6149188

M.M. (GENERAL MANAGEMENT)

THEMATIC PAPER ADVISORY COMMITTEE: ASSOC. PROF. NATHASIT GERDSRI, Ph.D., ASSOC. PROF. RANDALL SHANNON, Ph.D., SARINYA LAISAWAT SUTTHARATTANAGUL, Ph.D.

### **ABSTRACT**

The objective of this report is to explore the obstacles in developing a Waste to Energy Power Plant in Thailand to identify what are the problems to unsuccessful business and to create a better understanding not only from the waste to energy power plant owners but also the government sectors and to deliver both the positive and negative sides of the industry.

After the interview, the results indicate that there are several issues that both sectors agree and disagree on the obstacles in building a power plant. Those main issues are Mutual benefit, Misinterpret of waste, people's perception, Investment, Suitable technology, Government process and Competitor.

In conclusion, the main obstacles are as mentioned above but the most important one is the miscommunication between both sides of the business. If the private and public sector discuss each other more to the point of mutual understanding, the Waste to Energy power plant business would be easier to accomplish and more effective than today.

**KEY WORDS:** Renewable Energy / Power Plant / Waste / Government

53 pages

## CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENT</b>	ii
<b>ABSTRACT</b>	iii
<b>CHAPTER I INTRODUCTION</b>	<b>1</b>
1.1 Research Background	1
1.2 Research Objective and Questions	2
<b>CHAPTER II LITERATURE REVIEW</b>	<b>4</b>
2.1 The importance of Renewable Energy	4
2.2 The policy to help push Waste to Energy Power Plant forward	4
2.3 The Perfect Waste to Energy Power Plant	5
2.4 Why local people always protest to Waste to Energy Power Plant	6
<b>CHAPTER III METHODOLOGY</b>	<b>7</b>
3.1 Introduction	7
3.2 Data collection	7
3.3 Stakeholders analysis	8
<b>CHAPTER IV FINDINGS</b>	<b>9</b>
4.1 Qualitative in-depth interview with Private Sectors	9
4.2 Qualitative in-depth interview with Public Sectors	10
<b>CHAPTER V CONCLUSION AND RECOMMENDATION</b>	<b>13</b>
5.1 Conclusion	13
5.2 Recommendation	15
<b>REFERENCES</b>	<b>16</b>
<b>APPENDICES</b>	<b>17</b>
Appendix A: Interview Questions - WTE PP Owner	18
Appendix B: Interview Transcript - WTE PP Owner 1	20

## CONTENTS (cont.)

	<b>Page</b>
Appendix C: Interview Transcript - WTE PP Owner 2	23
Appendix D: Interview Transcript - WTE PP Owner 3	26
Appendix E: Interview Questions - PEA & VSPP	30
Appendix F: Interview Questions - DIW	32
Appendix G: Interview Questions - DLA	34
Appendix H: Interview Questions - ERC	36
Appendix I: Interview Transcript - PEA	38
Appendix J: Interview Transcript - VSPP	40
Appendix K: Interview Transcript - DIW	42
Appendix L: Interview Transcript - DLA	45
Appendix M: Interview Transcript - ERC 1	48
Appendix N: Interview Transcript - ERC 2	50
<b>BIOGRAPHY</b>	<b>53</b>

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
3.1 Waste to Energy Power Plant Stakeholders	8
4.1 Responses from Private sectors	9
4.2 Responses from Public sectors	11
5.1 Key obstacles	13



## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1.1 The amount of waste in Thailand	1
1.2 The process of Waste to Energy Power Plant	2



## CHAPTER I

### INTRODUCTION

#### 1.1 Research Background

I would like to start with the idea of what a Waste to Energy Power Plant is. As you may know, the amount of waste in Thailand is increasing every year, especially municipal waste in major tourism cities. But there's no hygienic way to dispose of those cumulative waste, there are countless mountains of landfills in almost every province of the country, this is where Waste to Energy Power Plant (WTE Power Plant) comes in. WTE Power Plant is the most effective way to dispose those wastes by using environmental friendly technology which means almost no emission was released from the process where those cumulative wastes are directly incinerated and the waste water that came from the process was treated hygienically through the system in the stage where the water could be reusable. While efficiently disposing of the waste, the energy was generated in the process which means the Power Plant owners get to help reduce waste for the local people and also help produce the electricity for the Provincial electricity authority (PEA).

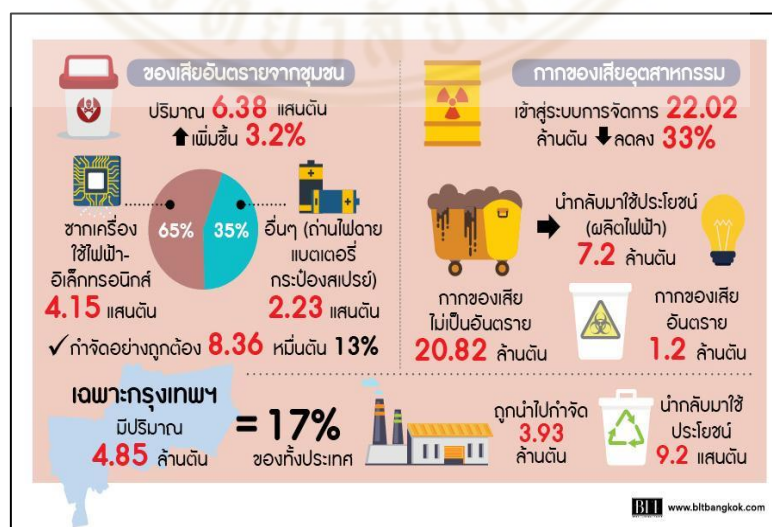
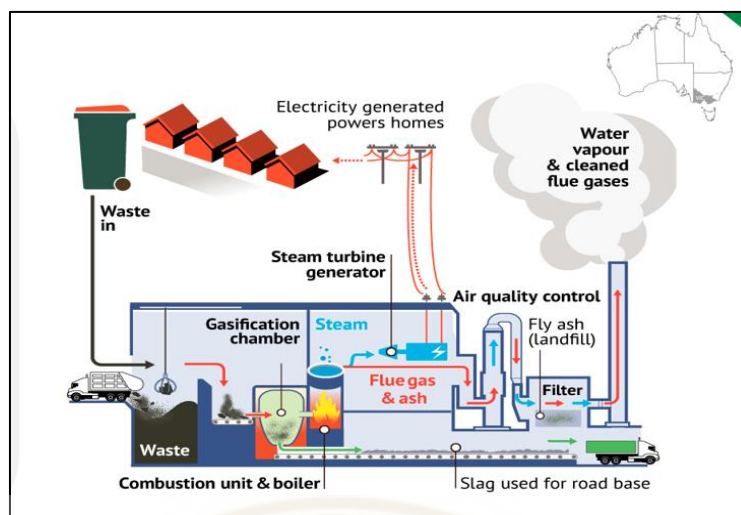


Figure 1.1 The amount of waste in Thailand





**Figure 1.2** The process of Waste to Energy Power Plant

The age-long inclination in the problems with operating power plants in Thailand has been the primary rationale for conducting this study. Though, this thematic will mainly focus on the question of why it is so hard to initiate the power plant in Thailand and even harder for the waste to energy power plant. Moreover, operating waste to energy power plants is probably the toughest part of the industry. This report will be exploring the circumstances of the industry. Furthermore, the report will be qualitative based, applying interviews as a method to collect the data. The selected interviewees will come from both private and public sectors. This is to prevent any bias which might occur as a consequence from the interview result and to reduce the gap of this particular report.

## 1.2 Research objective and Questions

The aim of this report is to create the understanding not only among the waste to energy power plant owners but also those bystanders. To deliver both the positive and negative sides of the industry. To create the universal understanding for the locals that the WTE power plants create more positive impacts than the negative impacts. Moreover, to develop the regulations which have been set by the government uncomfortable to the reality of our country. The amount of waste in Thailand is increasing every year despite the fact that several new wastes to energy power plants

are initiated every month. The wider range of understanding about this particular industry must be created and it is impossible without the help of those who are in power to do so, whether the central government itself or even the local government.



## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 The importance of Renewable Energy**

Thailand relies primarily on energy imports from abroad, according to 2011 data. In the past, it was found that more than 60% of commercial energy demand initially came from other countries. The proportion of oil imports is up to 80% of the total oil consumption in the country and it is likely to be higher because it cannot increase domestic petroleum production in line with demand for use.

The radical development of renewable energy will reduce dependence on import of fuel and other energy. It also helps diversify the risk of procuring fuel for production country electricity. Formerly, more than 70 percent of which relied on natural gas was renewable energy, one of the target fuels expected to be used in power generation can significantly replace natural gas. Especially solar energy, wind power, small hydro, biomass, biogas and waste.

If these renewable energy technologies are cheaper and widely accepted, they could be developed into the main power generation for electricity in Thailand in the future.

#### **2.2 The policy to help push Waste to Energy Power Plant forward**

At this time, the Department of Alternative Energy Development and Efficiency (DEDE) is in the process of revising plans of the development of renewable energy and alternative energy 2018-2037 (AEDP2018) to be in line with the country's power development plan for the year 2018-2037 (PDP2018), it is expected to be completed soon. Initially, the plan will accelerate the push for new electricity generation from municipal waste to 400 megawatts (MW) to supply electricity to the system from 2020-2022. Addressing the overflowing of the city, which is the main problem of the country.

The community of waste power plants has to be coordinated with the local government organization (Local Administration Organization) and the Ministry of Interior which is the main host. As for the price of purchasing electricity from community waste, we still have to wait for the relevant departments to consider in detail first.

## **2.3 The Perfect Waste to Energy Power Plant**

Waste to Energy Power Plant is one of the concepts of waste disposal that is gaining a lot of attention. From the overflowing garbage problem that has caused everyone to focus on and seen as something that should be addressed urgently. Data from the Pollution Control Department indicates that in 2017, Thailand has a situation of community solid waste that occurs about 75,000 tons per day and it is expected that the amount of municipal solid waste tends to increase every year.

As such, the destination of the waste that is disposed of by pouring into a landfill is no longer the solution. Therefore, another alternative to waste disposal is to use waste as a fuel to generate electricity.

This is one of the interesting case studies in building an environmentally friendly waste power plant. There is no pollution affecting the community which is the Municipal Waste Power Plant Project (VSPP-MSW), Khon Kaen Province. Which is operated by Absolute Clean Energy Public Company Limited (ACE).

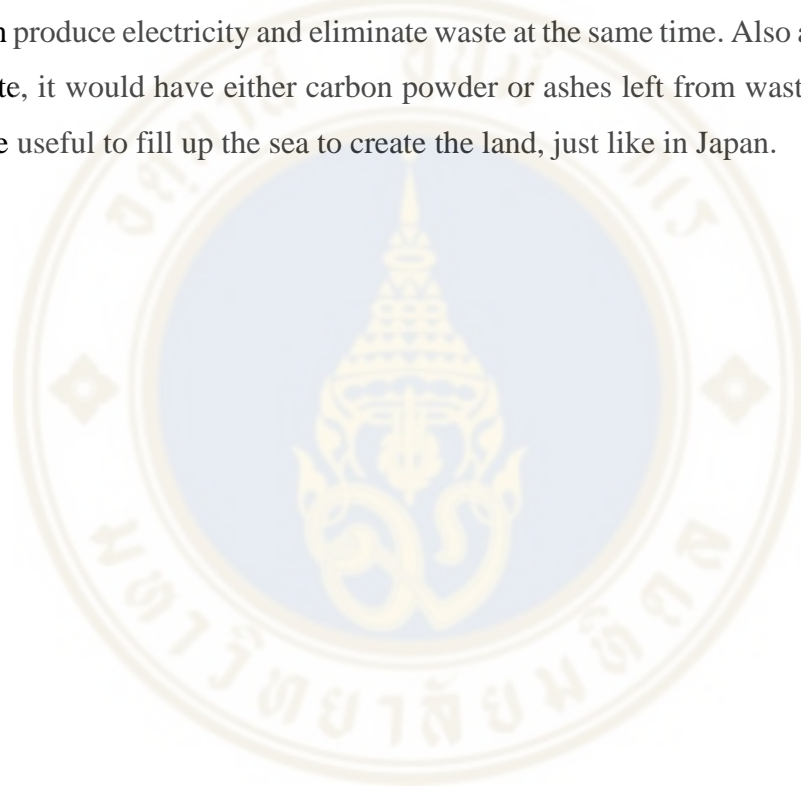
'Theerawut Songmetta', Chief of Technology and Innovation Officer who is one of the key drivers of the project described that the concept of this project began with the problem of waste disposal in Thailand that most landfill disposal is not up to standard. This causes pollution in the form of 'leachate' caused by the deposition and accumulation of waste flowing into the ground and in the end, it will be mixed up with groundwater that people use in their households. Therefore, we have studied to find a solution that will answer this question by exploring how to build a waste power plant in many countries and adapt it to be the most suitable solution in Thailand.

## **2.4 Why local people always protest to Waste to Energy Power Plant**

When the investor would invest in a waste-to-energy power plant just like Japan, there are always groups of villagers coming out to protest because they fear that the power plant would cause pollution that would be toxic to the community.

But they are ok to leave a pile of waste as big as a mountain as is and would not let anybody do anything with it. The pile of garbage started to ignite itself and it was often on the news that the waste creates more pollution, more dangerous.

Think about if Bangkok has a waste to energy power plant like in Japan, we can both produce electricity and eliminate waste at the same time. Also after incinerating the waste, it would have either carbon powder or ashes left from waste incineration, it could be useful to fill up the sea to create the land, just like in Japan.



## **CHAPTER III**

### **METHODOLOGY**

#### **3.1 Introduction**

The main reason for this report is to find out why Waste to Energy Power Plant businesses are most likely to fail rather than succeed in Thailand. Without some connections to the authority it would be impossible to smoothly operate the power plant. When it comes to WTE power plants (waste to energy), it is much harder compared to the typical power plant. Therefore, the aim of this report is to examine the reason behind all the challenges related to the industry. The approach of this research will be mainly based on primary sources, through interviews to collect the raw information then further develop and analyse. However, not only primary sources will be used but the secondary sources as well. The report aims to collect the data related to the obstacles of the power plants industry and the exploitation from the authorities both local and central. The previous studies related to the topic and its objective will be examined. This is to enhance the understanding of myself as a research conductor.

#### **3.2 Data collection**

This research will be qualitative based. Therefore, the chosen data collection method will be conducting an individual in-depth interview. Through the interview method, me as a researcher aims to gain the insight of the interviewee's opinion, thoughts and knowledge regarding the concern related to the research objective, so, the main idea for the interview questions will be based on each sector's knowledge and experiences on developing a power plant. Furthermore, the data received from the interviews will be analyzed in order to understand the rationale of their answers and how the majority of the interviewees respond to the idea that Thai's government is the reason why it is so hard to initiate and operate a power plant in Thailand.

### 3.3 Stakeholders analysis

The reason why this research needs a Stakeholders analysis is to provide the idea for the reader who are the stakeholders to the activities caused by the power plant industry. Furthermore, for the scholar as well to easily indicate who to conduct the interview with as a data collection process.

**Table 3.1 Waste to Energy Power Plant Stakeholders**

WTE PP Stakeholders analysis							
No.	Stakeholders	Impact	Social Influence	Stakeholder's needs	Supportive Roles	Destructive Roles	Engagement Strategies
<b>Regulator</b>							
1	Provincial electricity authority	high	high	Performance Indicator	Authorize License	Confiscate License	Strictly follow the regulation / Submit required report on time
2	Energy regulatory commission	high	high	Performance Indicator	Authorize License	Confiscate License	Strictly follow the regulation / Submit required report on time
3	Department of industrial works	high	high	Performance Indicator	Authorize License	Confiscate License	Strictly follow the regulation / Submit required report on time
<b>Government Sector</b>							
4	Ministry of energy	Medium	Medium	Performance Indicator	Agree in the project	Refuse to support the project	Submit required report on time
5	Department of local administration	Medium	Medium	Performance Indicator	Agree in the project	Refuse to support the project	Submit required report on time
6	Ministry of interior	Medium	Medium	Performance Indicator	Agree in the project	Refuse to support the project	Submit required report on time
7	Board of Investment	Medium	Medium	Performance Indicator	Authorize License	Confiscate License	Strictly follow the regulation / Submit required report on time
<b>Power Plant</b>							
12	Local government authority	Medium	High	Performance Indicator	Agree in the project	Reject/Terminate local license request	Support local project and community
13	Employees	High	Low	Income / Welfare	Participation in the project	Going on strike	Develop labour relationship
14	Suppliers	High	Low	Income	Support the project	Supply to the competitor instead	Provide them appropriate credit term
15	Villagers	High	Medium	Income	Support the project	Going on protest	Develop trustworthy relation / CSR
16	NGO	High	High	Income	Support the project	Going on protest	Develop trustworthy relation / CSR
<b>Head Office</b>							
17	Shareholders	High	High	Dividend	Give the financial support	Withdraw the investment	Provide updated on company status frequently and ask for opinions
18	Board of director members	High	Medium	Performance Indicator	Supervise Management	Commit fraud	Held BOD meeting every quarter
19	Management team	High	Low	Profit / Performance	Supervise and direct staff	Commit fraud	Provide sufficient and reasonable compensation / Routinely conduct internal audit
<b>Competitor</b>							
20	Other owners	High	High				

## CHAPTER IV

### FINDINGS

This section will focus on identifying why Waste to energy power plant business in Thailand is not very successful and has faced a lot of problems by using the data gathered by in-depth interviews both private and public sectors.

#### 4.1 Qualitative in-depth interview with Private Sectors

For the private sectors, I selected to interview 3 companies in the industry both successful and not, for different points of view and the wider range of knowledge.

**Table 4.1 Responses from Private Sectors**

Dimension	Respondent
Cumulative Waste Problem	<p>Company #1: Cumulative municipal waste that has been with Thai society for a very long time and no solution for the problem.</p> <p>Company #2: The waste problem in Thailand has become a National agenda due to the fact that in the near future, there will be no space to dump the daily collected municipal solid waste and nowhere near solving the issue.</p>



**Table 4.1 Responses from Private Sectors (cont.)**

Dimension	Respondent
	Company #3: The only way to effectively turn waste into zero waste is to incinerate them, otherwise, the waste problem would remain the problem in Thailand.
Public sector's role in initiating WTE power plant projects	<p>Company #1: In my opinion, the government sector's role in this business is only the concession. In other processes, I don't think that public sectors involve that much.</p> <p>Company #2: Government sectors involved in every process of initiating a Power plant, so it is quite hard for the investors to develop projects without any connection.</p> <p>Company #3: Once we have done with the permission process, the government does not have much influence on our business but we still need their support regularly.</p>
Knowledge and financial support of owners	<p>Company #1:</p> <p>Company #2: } Every company agrees that their knowledge and financial support are more than ready.</p> <p>Company #3:</p>

## 4.2 Qualitative in-depth interview with Public Sectors

For the public sectors, the chosen ones are only the related ones to help fulfill only the aspects needed to develop and initiate Waste to energy power plant

projects. Therefore, I selected to interview 6 people in total, 1 person from Provincial electricity authority (PEA), 1 person from Alternative energy encouragement division (VSPP), 1 person from Department of Industrial works (DIW), 1 person from Department of Local administration (DLA) and 2 persons from Energy regulatory commission (ERC). After the interview, the results are in the tables as follows.

**Table 4.2 Responses from Public Sectors**

Dimension	Respondent
Energy Shortage in Thailand	PEA: ERC: } Every sector agrees that there is not sure thing as energy shortage in Thailand, there is always reserved energy DLA: DIW:
Cumulative Waste Problem	PEA: ERC: } Every sector agrees that the waste problem is a national matter which needs to be solve urgently by WTE power plant DLA: DIW:
Public sector's role in initiating WTE power plant projects	PEA: ERC: } Every sector agrees that they are willing to help as much as they could for the investors to succeed and reach their goals DLA: DIW:

**Table 4.2 Responses from Public Sectors (cont.)**

<b>Dimension</b>	<b>Respondent</b>
Knowledge and financial support of owners	PEA: ERC: } Every sector agrees that investors do not have enough knowledge and lack of fund management DLA: DIW:



## CHAPTER V

### CONCLUSION AND RECOMMENDATION

#### 5.1 Conclusion

Municipal waste problem has been with the Thai society for many decades without having an effective solution to fix the problem from the Government. There have been many action plans to help solve the issues, such as 3Rs but that is not enough for mountains of waste to disappear. The way every province does to dispose of municipal waste after the garbage truck collects them is to dump them in a landfill provided, which some landfill is sanitary and some is not. The old ways of fixing the waste problem are clearly not working, therefore, there is a new way to efficiently solve the remaining issue which is also environmentally friendly due to the new and advanced technology that has been accepted and used around the world. Thailand has just been introduced to Waste to Energy Power Plant a few years back which is quite slow compared to other countries that have known this technology for many decades. This proves that this technology is considered the most effective way to solve the waste issues around the world and most importantly in Thailand.

**Table 5.1 Key obstacles**

Issue	Private Sector			Public Sector			
	#1	#2	#3	PEA	ERC	DLA	DIW
Misinterpret of Waste	/	/	/	×	/	×	×
Mutual benefit	/	/	/	/	/	/	/
Local people perception	/	/	/	/	/	/	/
Investment	×	×	×	/	/	/	/
Suitable Technology	/	/	/	/	/	/	/
Government process in developing a Power plant	×	/	/	×	×	/	×
Competitor	/	/	/	×	×	×	×

/ = Obstacle    × = Non-obstacle

According to the table, it comes to a conclusion that both the public and private sector do not have a mutual understanding between each other. Based on the interview results provided above, the results indicate that there are several issues that both sectors agree and disagree on the obstacles in building a power plant. They totally agreed on the issue of the benefit, people's perception and technology that these reasons are the main obstacles of developing a Waste to Energy power plant but how come not a single one of them came up with a solution to solve the existing issues. For the disagreeable issues, as stated in the interview transcripts, shows that most of those sectors are self-bias and some of them are holding the truth.

In conclusion, the main obstacles are as mentioned above but the most important one is the miscommunication between both sides of the business. If the private and public sector discuss each other more to the point of mutual understanding, the Waste to Energy power plant business would be easier to accomplish and more effective than today.

The aim of this report is as I mentioned in the beginning which is to create a better understanding about the WTE Power plant business to deliver both the positive and negative sides of the industry and why WTE Power plant is not successful as it should be due to the fact that the amount of waste in Thailand is increasing every year despite the fact that several new wastes to energy power plants are initiated every month. Moreover, it is impossible to survive in this industry without the help of those who are in power, both the central and the local government and also other related sectors.

After many literature reviews and data analysis from in-depth interviews, I would divide the conclusion into 2 aspects from the Public sectors and private sectors. Let's start with the public sectors, their opinion go in the same direction, the majority of them said that the reason why WTE Power plant is not very successful is because the investor failed to deliver thorough feasibility study and their investment shortage. I find these reasons quite interesting due to the fact that most of the investors are foreigners who want to invest in this industry which has to partner up with Thai companies in order to develop the projects. These are only a few companies who are an expert in renewable energy business, so the majority of these Thai companies are not professional in this field and might miss some important information in order for the project to be successful.

For the private sector part, the majority of them said that the main problem is the issue between local governments getting benefits equally. There is no denying that this issue has been occurring in Thailand for ages and everyone in every industry who has to be involved with the local government would truly understand this situation. Dividing benefits between sectors is very delicate, so the business owners should be aware of how you would do your best to arrange those benefits to satisfy everyone involved, so there would be no problem later on to affect your business.

## **5.2 Recommendation**

For my recommendation, after I went through the collected data, I would suggest the business owners who are interested in this industry to invest in the project with the public sector, in this case the Provincial electricity authority or PEA. In other words, if the investor partnered up with the government would make the process easier and faster and also would not miss the important information needed. Moreover, the local people would trust the people from the government more than the people from private companies when developing projects, local people would have no doubt in the government, they would think that the government would bring only the best thing to their neighborhood and would make that area prosper.

## REFERENCES

- Blt. (2019, May 22). ไทยติดกลุ่มผู้นำเข้าขยะพลาสติกสูงสุดในโลก เผยแต่ละปีคนไทยทิ้งขยะกว่า 27 ล้านตัน.  
Retrieved from <https://www.bltbangkok.com/news/4878/>
- MHC Insights. (2019). Retrieved from <http://www.marchmenthill.com/psi-online/2019-06-18/perfect-storm-waste-energy/>
- ถอดแนวคิด Waste to Energy ต้นแบบโรงไฟฟ้าขยะชุมชนไร้มลพิษ แห่งแรกในไทย. (2020). Retrieved from <https://techsauce.co/tech-and-biz/waste-to-energy-ace-electricity>
- นโยบายพลังงานทดแทน เพื่อความมั่นคงของชาติ SECURITY ... (2020). Retrieved from [http://www.thaindc.org/images/pulldown\\_1485785805/NDC\\_SR\\_January\\_2017\\_Complete.pdf](http://www.thaindc.org/images/pulldown_1485785805/NDC_SR_January_2017_Complete.pdf)
- ปัญหาโรงไฟฟ้าจากขยะและโรงไฟฟ้าชีวมวล ที่ทำให้คนไทยไม่ยอมรับ. (2018, February 28). Retrieved from <https://mgronline.com/greeninnovation/detail/9610000020619>
- อินโฟเควสท์ โดย อตฤ/วิลาวัลย์/ศศิธร โทร.02-2535000 ต่อ 345 อีเมลล์: sasithorn@infoquest.co.th-- รมว.  
พลังงาน ปรับแผน AEDP2018 ให้สอดคล้อง PDP พร้อมดันโรงไฟฟ้าขยะชุมชน 400 MW เริ่ม COD  
เร็วขึ้น. (2020). รมว.พลังงาน ปรับแผน AEDP2018 ให้สอดคล้อง PDP พร้อมดันโรงไฟฟ้าขยะชุมชน  
400 MW เริ่ม COD. Retrieved August 20, 2020, from <https://www.ryt9.com/s/iq03/3056404>





## **Appendix A: Interview Questions - WTE Power Plant Owners**

**Topic:** What makes Waste to Energy Power Plant unsuccessful in Thailand

**Interviewees:** Related Government and Private sectors, and Waste to Energy Power Plant owners who are both successful and unsuccessful in this business.

### **Part 1: General questions**

1. Company / sector
2. Name
3. Gender
4. Age
5. Current job position
6. Work experiences
  - 6.1. In which field and for how long?

### **Part 2: In-depth interview questions for WTE PP owners**

1. What was your goal in the beginning of owning a PP?
2. Have accomplished any of the goals you have set?
3. In your opinion, which step was the most challenging from the entire process of building a power plant?
4. Were there any issues along the way, if so, how did you deal with it?
5. In your opinion how much does your business rely on the government sectors?
6. How much influence does the public sectors have upon your business?
7. What are your thoughts in terms of working with the government sectors? Were there any problems? Please further elaborate
8. When problems occurred, do you consider government sector's helpful or not, were they willingly to help you with those issues? How?
9. Were the locals in your area protests when they heard about your project? Were they ok with it?
10. What was your strategy dealing with the local people?

11. Do you consider your business successful? Why or why not (what are the main reason behind it)
12. In your opinion, should the public sectors reduce its influence on the power plants business?
13. Do you have any suggestions for the investors who are interested in being part of this industry?



## **Appendix B: Interview Transcript - WTE Power Plant Owners #1**

### **Part 1: General Information**

- Confidential -

### **Part 2: In-depth interview part for WTE Power Plant Owner #1**

<b>Questions</b>	<b>Respondents</b>
<p>What was your goal in the beginning of owning a PP?</p>	<p>The main purpose is to solve the waste problems in Thailand that appears to become national issue which no one could solve and electricity becomes the second.</p>
<p>Have accomplished any of the goals you have set?</p>	<p>Company's goal is divided into 2 aspects which are the profit part and environment part. For the profit, we have not reached our goal yet because we have to shut down the power plant for maintenance for around 40 days a year, so this aspect affects our income. But in terms of the environment, the result of the disposal of waste is actually very productive, we have been disposing of both cumulative and fresh municipal waste for 5 years since we started operating and still going smoothly.</p>
<p>In your opinion, which step was the most challenging from the entire process of building a power plant?</p>	<p>In my opinion, "E-bidding" is the most challenging step from the government process because we need to compete with other big firms to win the concession. Therefore, we need to show the government that if we are chosen, there would be no problem in the future due to our prepared manpower, we have experts in every aspect of developing a WTE power plant, such as Factory engineer, Electrical engineer and also Environmental academic.</p>

Questions	Respondents
Were there any issues along the way, if so, how did you deal with it?	There were no issues along the way because we were very well prepared and we frequently consult with the comptroller general's department to make sure that our information is correct.
In your opinion how much does your business rely on the government sectors?	Not that much, only the concession that we need from the government.
How much influence does the public sectors have upon your business?	N/A
What are your thoughts in terms of working with the government sectors? Were there any problems? Please further elaborate	N/A
When problems occurred, do you consider government sector's helpful or not, were they willingly to help you with those issues? How	N/A
Were the locals in your area protests when they heard about your project? Were they ok with it?	The local people in the area are very open-minded, they have never protested once since we started the construction until today.

Questions	Respondents
<p>What was your strategy dealing with the local people?</p>	<p>We give our priority to the local community by frequently doing and participating in CSR (corporate social responsibility) activities and also giving and explaining information of what we are doing to help the local people truly understand. Our company has a CSR department to directly deal with this issue, in the developing phase, our CSR officers explore the area and hand out leaflets about our project to enlighten the people why WTE power plant is needed in Thai society including announcement about the project on community radio. After giving out the information, our company is also doing surveys to get people's feedback whether they really understand what we are trying to say. If the result is not satisfactory enough, we are sending the CSR team to explain more about the projects. After the construction is complete and the power plant starts operating, we invite the local people to visit our plant and the learning center to show them around how things work.</p>
<p>Do you consider your business successful? Why or why not (what are the main reason behind it)</p>	<p>Yes, we are because we have reached our environmental goal and our profit is increasing every year. The most important reason behind the success is precaution.</p>
<p>In your opinion, should the public sectors reduce its influence on the power plants business?</p>	<p>N/A</p>
<p>Do you have any suggestions for the investors who are interested in being part of this industry?</p>	<p>I would suggest the investor to be well prepared and be ready for any obstacles that might come. And also this industry is not an easy task, you need an expert to help you plan and guide every step you take because if you miss anything, you might lose before the game even started.</p>

## Appendix C: Interview Transcript - WTE Power Plant Owners #2

### Part 1: General Information

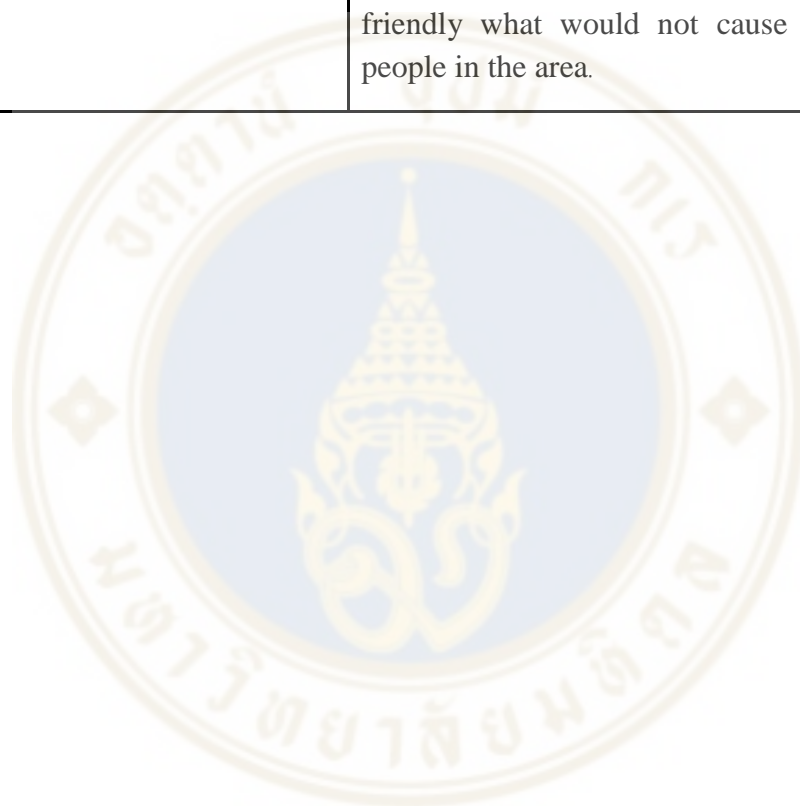
- Confidential -

### Part 2: In-depth interview part for WTE Power Plant Owner #2

Questions	Respondents
What was your goal in the beginning of owning a PP?	The main purpose of developing a WTE power plant is to help fix the waste problem that has become the national issue which the government cannot solve and the electricity from the waste become indirect profit.
Have accomplished any of the goals you have set?	Our company has not accomplished any of the goals due the errors in the construction phase which took a lot of time to resolve those issues and also there are some mutual benefit problems in the area that caused our waste from the local district to be a lot fewer than what we have planned.
In your opinion, which step was the most challenging from the entire process of building a power plant?	The most challenging one is dealing with the government sector both local and central. You need to have good connections with them to be able to work smoothly and effectively.
Were there any issues along the way, if so, how did you deal with it?	There was a bit of difficulty in the process of issuing licenses, the process was quite slow in each step which consumed a lot more time than what was planned and there is nothing we can do.
In your opinion how much does your business rely on the government sectors?	Our business mainly relies on the public sectors during the license process.
How much influence does the public sectors have upon your business?	N/A

Questions	Respondents
What are your thoughts in terms of working with the government sectors? Were there any problems? Please further elaborate	There were problems during the process of developing, each step was very complex and the instruction was not very clear and as I mentioned earlier, each step consumed a lot of time, like the factory permission, this step took almost 2 years which in my opinion is too slow because our document is quite complete.
When problems occurred, do you consider government sectors helpful or not, were they willingly to help you with those issues? How	N/A
Were the locals in your area protests when they heard about your project? Were they ok with it?	In the beginning the locals disagreed with our project but we sent in our CSR team to give very detailed information about everything related to the project. After they understood what we were trying to do, they were very ok with the company.
What was your strategy dealing with the local people?	We sent in our CSR team to often visit local people and we also hired a company who are experts in this field to help persuade people to agree with the project.
Do you consider your business successful? Why or why not (what are the main reason behind it)	Not yet, just like the reason I mentioned earlier, disagreement of the mutual benefit in the area.
In your opinion, should the public sectors reduce its influence on the power plants business?	N/A

<b>Questions</b>	<b>Respondents</b>
Do you have any suggestions for the investors who are interested in being part of this industry?	I would suggest the investor thoroughly check your own preparation that it is absolutely ready in these following aspects. I would suggest you to well manage your funds, double the property that you are building the power plant whether it is in the restricted area or not, get local people to truly understand what you are doing and the last one is suitable technology and must be environmental friendly what would not cause pollution to the people in the area.





## Appendix D: Interview Transcript - WTE Power Plant Owners #3

### Part 1: General Information

- Confidential -

### Part 2: In-depth interview part for WTE Power Plant Owner #3

Questions	Respondents
<p>What was your goal in the beginning of owning a PP?</p>	<p>To earn money and produce electricity. To increase the supply of electricity in the southern provinces of Thailand. One of the major problems in the most southern part of Thailand is electricity shortage. It is normal that we have power down two or three times a month. This has been the agelong issue for people within the area.</p>
<p>Have accomplished any of the goals you have set?</p>	<p>I have achieved my personal goals which are to earn money or to run the business as a cost-efficient company etc. However, in terms of goals for the greater good, the area mentioned above has not improved so much within the last decade concerning the supply of electricity.</p>
<p>In your opinion, which step was the most challenging from the entire process of building a power plant?</p>	<p>Dealing with government sectors is the worst part of initiating and running a power plant. Despite all the knowledge and ability, you need connections as well. In my opinion, you need to be well connected to the responsible authorities. With that, your WTE power plant will be just fine. Added to that, dealing with them allows me to perceive the gist of corruption. Depending on them usually leads to complexity of process which eventually results in bribery.</p>

Questions	Respondents
Were there any issues along the way, if so, how did you deal with it?	For my case, there were no significant issues affecting the operation of the factory. However, there were some complexities in the initiative steps. We talked to some people to get things moving and faster. Though, we did everything according to the process.
In your opinion how much does your business rely on the government sectors?	Once we have done with the permission process, the government does not have much influence on our business but we still need their support regularly. It is impossible to operate such a factory without any support from them. On a scale of 1-10, I would give 8/10 on how much my business relies on them.
How much influence does the public sectors have upon your business?	Like I have mentioned earlier, public sectors in Thailand play a major role in nearly all aspects in our country. They tend to visit my factory every 2 or 3 months to check whether we follow the rules and regulations or not. That's where the complexity comes in, this kind of checking process could lead to unwanted situations such as bribery etc.
What are your thoughts in terms of working with the government sectors? Were there any problems? Please further elaborate	Working with them is fine. It is not fine when they are unreasonable. And most of them tend to be unreasonable, not as a person but rather lack common sense. There seems to be a lack of judgment for reality among them, what's important and what to exclude for the very moment.
When problems occurred, do you consider government sectors helpful or not, were they willingly to help you with those issues? How	Yes, if you are well connected. Absolutely no if you don't know the right person.

Questions	Respondents
Were the locals in your area protests when they heard about your project? Were they ok with it?	No, there were no protests from the locals within the area. We give them knowledge and help them understand not only the positive but the negative impacts as well. Allow them to think for their own, think of what is the best for their community.
What was your strategy dealing with the local people?	Heavily CSR and talk to the local leaders. Through local leaders, we will be able to communicate with people within the area easier and more effectively.
Do you consider your business successful? Why or why not (what are the main reason behind it)	Yes. It is fair to say that my company is successful. We are able to operate while many other factories within this industry are unable to operate. Moreover, the goal is to utilize the resource as much as we can with being cost effective and we are able to do that since the beginning.
In your opinion, should the public sectors reduce its influence on the power plants business?	Not reduce but reform. I strongly believe that we must work together both in the public and private sectors. Both must cooperate for the greater good. Government must stop making things too complex and business owners must stop offering anything in return to make the process smoother.

Questions	Respondents
<p>Do you have any suggestions for the investors who are interested in being part of this industry?</p>	<p>I guess they just have to be prepared for the unexpected situations. Anything could happen when you are dealing with so many departments of the government. They could come up with the smallest detail that you might have forgotten and affected your business as a whole. In other words, make sure you are a well connected person and connect to the right people as well. Otherwise, you will be struggling every step you take in your business. To conclude, I think the toughest part of this industry is to get permission from the authority. Some say they have to pay bribes which cost millions to get things going and still unable to operate. The core of the issues are there in the plain sight but there is no one to tackle them. This kind of situation can be stopped by both the public and private sectors. The government must set rules and regulations to control their own people and prevent them from causing any further issues to the industry. Meanwhile, as an entrepreneur, we must prove ourselves that we respect and obey the law even if there is no one to monitor us.</p>

## **Appendix E: Interview Questions - Provincial Electricity Authority (PEA) & Alternative Energy Encouragement Division (VSPP)**

**Topic:** What makes Waste to Energy Power Plant unsuccessful in Thailand

**Interviewees:** Related Government and Private sectors, and Waste to Energy Power Plant owners who are both successful and unsuccessful in this business.

### **Part 1: General questions**

1. Company / sector
2. Name
3. Gender
4. Age
5. Current job position
6. Work experiences
  - 6.1. In which field and for how long?

### **Part 2: In-depth interview questions for Provincial Electricity Authority & Alternative Energy Encouragement Division**

1. Supply & demand of energy in Thailand.
2. PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?
3. In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.
4. In your opinion, do you think that the energy from WTE PP is considered as an alternative source of power? Would it be able to substitute the energy shortage issues in Thailand? why?
5. If you agree, would you willing to help push forward the initiative of WTE PP, how? Please give examples

6. How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?
7. Would you please suggest some solutions to fix those problems?



## **Appendix F: Interview Questions - Department of Industrial Works (DIW)**

**Topic:** What makes Waste to Energy Power Plant unsuccessful in Thailand

**Interviewees:** Related Government and Private sectors, and Waste to Energy Power Plant owners who are both successful and unsuccessful in this business.

### **Part 1: General questions**

1. Company / sector
2. Name
3. Gender
4. Age
5. Current job position
6. Work experiences
  - 6.1. In which field and for how long?

### **Part 2: In-depth interview questions for Department of Industrial Works**

1. Please describe the responsibility of your organization. How is it related to the Power Plants industry?
2. How much does the power plants industry rely on your cooperation during the initiating stage?
3. Do you consider your organization crucial to the energy industry?
4. In the approval stage, are there any differences in terms of criteria between normal factories and power plants? How?
5. To your knowledge, how many companies that acquired the PPA but unable to operate the power plant and how many are forced to be shut down after a few months of operating?
6. In your opinion, what do you think are the reasons?
7. What is your opinion concerning the supply and demand of electricity in Thailand? Is it at the equilibrium point?

8. In your opinion, do you think that the energy from WTE PP is considered as an alternative source of power? Would it be able to substitute the energy shortage issues in Thailand? why?
9. In your opinion, what recommendation would you suggest for the Power Plant owners to be successful?





## **Appendix G: Interview Questions - Department of Local**

### **Administration (DLA)**

**Topic:** What makes Waste to Energy Power Plant unsuccessful in Thailand

**Interviewees:** Related Government and Private sectors, and Waste to Energy Power Plant owners who are both successful and unsuccessful in this business.

#### **Part 1: General questions**

1. Company / sector
2. Name
3. Gender
4. Age
5. Current job position
6. Work experiences
  - 6.1. In which field and for how long?

#### **Part 2: In-depth interview questions for Department of Local Administration**

1. Please describe the responsibility of your organization. How is it related to the Power Plants industry?
2. In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.
3. How do you feel about the WTE power plant? Do you think it could efficiently help fix the waste problem that has been with the Thai people for many decades? If compare to the old ways of handling waste problems, such as Open dump (landfill).
4. In your opinion, the Ministry of Interior has been releasing many regulations helping the private sector to invest in WTE power plant projects to help fixing the waste problems but there are many projects that are unable to operate the power plant or are forced to shut down after a few months of operating? What do you think are the reasons?

5. Why do you think local people always protest when power plant is building near their neighborhood which heavily affect the owners?
6. What do you think is the best way to convince the local people to agree with the project and truly understand what WTE power plant really is?
7. In your opinion, in the future, if demand for energy is over the supply, do you think that the energy from WTE PP is considered as an alternative source of power to help substitute the energy shortage issues in Thailand? why?
8. If you agree, would you be willing to help push forward the initiative of WTE PP if you have the power to do so, how?



## **Appendix H: Interview Questions - Energy Regulatory Commission (ERC)**

**Topic:** What makes Waste to Energy Power Plant unsuccessful in Thailand

**Interviewees:** Related Government and Private sectors, and Waste to Energy Power Plant owners who are both successful and unsuccessful in this business.

### **Part 1: General questions**

1. Company / sector
2. Name
3. Gender
4. Age
5. Current job position
6. Work experiences
  - 6.1. In which field and for how long?

### **Part 2: In-depth interview questions for Energy Regulatory Commission**

1. Supply & demand of energy in Thailand.
2. PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?
3. Please describe the responsibility of your organization. How is it related to the Power Plants industry?
4. In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.
5. Do you think that the regulations that came out to support the power plant owners are effective? Why or why not
6. Do you agree that WTE power plants are the most effective way to fix the waste problems in Thailand in the long run? Why or why not

7. How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?
8. In your opinion, in the future, if demand for energy is over the supply, do you think that the energy from WTE PP is considered as an alternative source of power to help substitute the energy shortage issues in Thailand? Why?
9. If you agree, would you be willing to help push forward the initiative of WTE PP if you have the power to do so, how?



## **Appendix I: Interview Transcript - Provincial Electricity Authority (PEA)**

### **Part 1: General Information**

1. Company name / Sector: Provincial Electricity Authority
2. Name: Mr. Khemmarat Sartpreecha
3. Gender: Male
4. Age: -
5. Current job position: Deputy Governor of PEA
6. Work experiences: Provincial Electricity Authority
  - 6.1. In which field and for how long?: Since graduated Bachelor degree

### **Part 2: In-depth interview part for Provincial Electricity Authority**

Questions	Respondents
Supply & demand of energy in Thailand	Supply and demand of energy in Thailand is not balanced, Supply is over demand due to the COVID-19 situation which caused the usage of energy in many factors to decrease.
PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?	Private sectors are producing more energy than E-gat but not that we rely on private sectors but because the Government encourages private sectors to produce energy through "Enhanced single buyer" policy.

<b>Questions</b>	<b>Respondents</b>
<p>In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.</p>	<p>PEA is only in charge of very small power plants or up to 10 MW (mega watt). In my opinion, PEA does not have any influence upon power plant owners but we would say that we are here to help the owners out on what is relevant to our responsibilities, such as, feeder and the Power purchase agreement (PPA).</p>
<p>How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?</p>	<p>From my knowledge, there are only a few WTE power plants that could not operate or were forced to shut down and there are many reasons for the problem. Such as, the developer developed the projects to sell to the buyers who are interested in investing in power plant business and those developers did not have enough experiences in this business, so, what they have studied is not enough to make the business successful.</p>
<p>Would you please suggest some solutions to fix those problems?</p>	<p>I would suggest those who are interested in WTE power plant business to please be very thorough with every aspect of the project, such as, choose the company who will do the feasibility study wisely, choose the one that has a lot of experiences in the same or similar business to be able to deliver the report efficiently to help drive the business into success.</p>

## **Appendix J: Interview Transcript - Alternative Energy Encouragement Division (VSPP)**

### **Part 1: General Information**

1. Company name / Sector: Alternative Energy Encouragement Division
2. Name: Mr. Supakorn Saengsrithorn
3. Gender: Male
4. Age: -
5. Current job position: Manager, Alternative Energy Encouragement Division
6. Work experiences: Private company
  - 6.1. In which field and for how long?: Energy business for about 2 years

### **Part 2: In-depth interview part for Alternative Energy Encouragement Division**

<b>Questions</b>	<b>Respondents</b>
Supply & demand of energy in Thailand	Due to the current COVID-19 crisis, Supply and Demand of energy in Thailand is not balanced, Supply is over the demand because the production of energy is still the same but the demand is decreasing, mainly in factories and industrial estate around the country.
PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?	It is a fact that Private sectors could generate more power than the EGAT does, 60% to 40% due to the help of EGAT and PEA tried pushing the private sector's project forward by strictly following the government regulations concerning the WTE power plant but it has to be balanced. Moreover, EGAT itself has planned to operate its own project by investing in the project 100%.

Questions	Respondents
<p>In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.</p>	<p>In my opinion, we do not think that we hold any power over WTE power plant owners but we only want to help as much as we can for the owners to be successful by following the government's law and regulations and also providing any help needed but within our restricted power. Such as, checking where the investors can build the substation.</p>
<p>In your opinion, do you think that the energy from WTE PP is considered as an alternative source of power? Would it be able to substitute the energy shortage issues in Thailand? why?</p>	<p>Yes, the energy from WTE power plant is considered as an important alternative source of power, as well as energy produced from other renewable energy sources.</p>
<p>If you agree, would you willing to help push forward the initiative of WTE PP, how? Please give examples</p>	<p>Our sector is willing to help whatever we can for the investors to be successful but within our boundary.</p>
<p>How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?</p>	<p>From what I acknowledge is around 10-20% of all the projects which is not that much and the reasons for that are often from the investors themselves, such as investment management problems, choosing unsuitable technologies and protests from the local people. On the other hand, we as a public sector are always here to help those investors overcome those obstacles by advising them from our knowledge and experiences.</p>
<p>Would you please suggest some solutions to fix those problems?</p>	<p>N/A</p>



## **Appendix K: Interview Transcript - Department of Industrial Works (DIW)**

### **Part 1: General Information**

1. Company name / Sector: Department of Industrial Works
2. Name: Mr. Somboon Paopinyo
3. Gender: Male
4. Age: -
5. Current job position: Director of Section 4, Industrial permit services division
6. Work experiences: -
  - 6.1. In which field and for how long?:-

### **Part 2: In-depth interview part for Department of Industrial Works**

<b>Questions</b>	<b>Respondents</b>
Please describe the responsibility of your organization. How is it related to the Power Plants industry?	Our responsibility is to issue factory permission and license to various types of factory. But for the power plant industry, we only advise and verify the details of power plant construction form that the investors submit through the governor of the province that the power plant would be located to ensure that there is no mistake. After every detail is complete, we will send those forms to the ERC (Energy regulatory commission) to recheck and issue the license.
How much does the power plants industry rely on your cooperation during the initiating stage?	As I mentioned above, we are the organization that checks every detail of the license form, so, if we disagree on something or some information is wrong, the company's form would not be approved by DIW.

Questions	Respondents
Do you consider your organization crucial to the energy industry?	Of course, during or after the company finishes building the power plant, we have a duty to regulate or check that the company is building or doing everything correctly. Such as, treating the waste water the right way or when operating, the power plant does not release any pollution above the DIW standard.
In the approval stage, are there any differences in terms of criteria between normal factories and power plants? How?	There are differences in every type of factory, the detail depends on what factory you are building. For the power plant, it is not only the details on factory construction but also on the energy production, so in this case the decision making power is all on the ERC.
To your knowledge, how many companies that acquired the PPA but unable to operate the power plant and how many are forced to be shut down after a few months of operating?	From what I know, only a few companies face those problems because the company who acquired the PPA (Power purchase agreement) must go through a very thorough process and much paperwork, so there must be very low error.
In your opinion, what do you think are the reasons?	The only reason I could think of is the company developed the project for sale. The investor who took over the power plant does not know every detail and not experienced enough to operate the power plant successfully.
What is your opinion concerning the supply and demand of electricity in Thailand? Is it at the equilibrium point?	N/A

<b>Questions</b>	<b>Respondents</b>
In your opinion, do you think that the energy from WTE PP is considered as an alternative source of power? Would it be able to substitute the energy shortage issues in Thailand? why?	N/A
In your opinion, what recommendation would you suggest for the Power Plant owners to be successful?	N/A



## **Appendix L: Interview Transcript - Department of Local Administration (DLA)**

### **Part 1: General Information**

1. Company name / Sector: Department of Local Administration
2. Name: Ms. Jarida Chitrawat
3. Gender: Female
4. Age: -
5. Current job position: Director of Local environment division
6. Work experiences: Government
  - 6.1. In which field and for how long?: Since graduated Bachelor degree

### **Part 2: In-depth interview part for Department of Local Administration**

<b>Questions</b>	<b>Respondents</b>
Please describe the responsibility of your organization. How is it related to the Power Plants industry?	DLA or Department of local administration is a department under the Ministry of interior supervision. Our main responsibility is to supervise local government organizations in every province of Thailand to follow the ministry's rules and regulations. Our department is connected to a power plant in terms of the main fuel of the machine which is municipal waste. Therefore, we have the duty to regulate local governments who are directly responsible to collect waste from the local community.

Questions	Respondents
<p>In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.</p>	<p>As I mentioned, we are an organization under the Ministry of interior which is directly responsible for the disposal of waste around Thailand, so, we are responsible to find a solution to the issue. Let's say that we are here to support the investors to successfully operate the power plants.</p>
<p>How do you feel about the WTE power plant? Do you think it could efficiently help fix the waste problem that has been with the Thai people for many decades? Compared to the old ways of handling waste problems, such as Open dump (landfill).</p>	<p>In my opinion, WTE power plant is the most effective way to fix the waste problem according to developed countries around the world that has been using this method for many decades and some cities located their WTE power plant in the center of their cities, indicate that WTE power plant is environmental friendly, unlike what Thai people think.</p>
<p>In your opinion, the Ministry of Interior has been releasing many regulations helping the private sector to invest in WTE power plant projects to help fixing the waste problems but there are many projects that are unable to operate the power plant or are forced to shut down after a few months of operating? What do you think are the reasons?</p>	<p>I think this problem has been occurring since the Ministry of interior is not yet responsible for the waste problem and the main purpose of WTE power plant is to produce electricity not to dispose of waste. The main reason would be wrong choice of technology and also problems with the local people, some of the companies did not work hard enough to earn trust from the community and did not give enough information for them to fully understand the purpose of a power plant.</p>
<p>Why do you think local people always protest when pp is building near their neighbourhood which heavily affect the pp owners?</p>	<p>As I mentioned, in their perception, WTE power plant is a bad factory which will release a lot of air and water pollution. They did not have enough information to make them realize that WTE power plant is built to get rid of cumulative and fresh municipal waste in their area while generating electricity for the community which the technology is also environmentally friendly.</p>

Questions	Respondents
<p>What do you think is the best way to convince the local people to agree with the project and truly understand what WTE power plant really is?</p>	<p>In my opinion, the local people protest because they do not know what the WTE power plant is, so the company has to go into the community to give them information and explain to them that the power plant is not as bad as they think and what the machine can actually do. Also, frequently visit them to earn their trust and make them feel like you will bring only the good things to their neighborhood.</p>
<p>In your opinion, in the future, if demand for energy is over the supply, do you think that the energy from WTE PP is considered as an alternative source of power to help substitute the energy shortage issues in Thailand? why?</p>	<p>Of course, the power for WTE power plants is as good as any renewable energy which is proved by many countries all over the world which is using energy produced by waste.</p>
<p>If you agree, would you be willing to help push forward the initiative of WTE PP if you have the power to do so, how?</p>	<p>Yes, the Ministry agrees that waste problem is quite a priority in the national matter, so, for WTE power plant projects nowadays, it will be developed easily because the local government in each province will be the one who starts developing the project until the finish line then each province will let the investors invest in that project through the E-bidding process. This method will decrease all the government problems in the past and would make the project success easier.</p>

## **Appendix M: Interview Transcript - Energy Regulatory Commission (ERC)**

### **Part 1: General Information**

1. Company name / Sector: Energy Regulatory Commission
2. Name: Mr. Khomgrich Tantravanich
3. Gender: Male
4. Age: -
5. Current job position: Secretary General of ERC
6. Work experiences: -
  - 6.1. In which field and for how long?:-

### **Part 2: In-depth interview part for Energy Regulatory Commission**

<b>Questions</b>	<b>Respondents</b>
Supply & demand of energy in Thailand.	Supply is always over demand because there is always 15-20% energy reserves but during COVID-19, the energy reserve is too high, around 30-40%.
PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?	PEA is producing energy to ensure the supply and reserve energy in the country. On the other hand, the private sector is producing energy in some certain areas that have a lot of demand for energy.
Please describe the responsibility of your organization. How is it related to the Power Plants industry?	ERC or Energy regulatory commission plays a major role in this industry as a regulator to supervise both private and public sectors involved in the business to get justice in all aspects. And also, an organization who issued licenses for power plant construction.

Questions	Respondents
<p>In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.</p>	<p>As mentioned, ERC is an organization who supervises every activity involving the power plant business and also is the one who issues the licenses for building the power plant. So, we do not hold any power over the owners, we are only the regulator.</p>
<p>Do you think that the regulations that came out to support the power plant owners are effective? Why or why not</p>	<p>N/A</p>
<p>Do you agree that WTE power plants are the most effective way to fix the waste problems in Thailand in the long run? Why or why not</p>	<p>Yes, I agree that it is the most effective way to solve the waste issue.</p>
<p>How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?</p>	<p>I would like to divide into two situations, the ones who shut down after a short while of operation, I presume that the profit does not reach their goal, maybe because their calculation in return on investment or profit is far too high from the reality. And the ones who finished building but unable to operate, I assume that there might be technical difficulties or errors.</p>
<p>In your opinion, in the future, if demand for energy is over the supply, do you think that the energy from WTE PP is considered as an alternative source of power to help substitute the energy shortage issues in thailand? Why?</p>	<p>In my opinion, the situation where demand will be equal to supply or over supply is not possible due to the reserved energy mentioned in the beginning.</p>
<p>If you agree, would you be willing to help push forward the initiative of WTE PP if you have the power to do so, how?</p>	<p>N/A</p>



## **Appendix N: Interview Transcript - Energy Regulatory Commission (ERC)**

### **Part 1: General Information**

1. Company name /Sector: Energy Regulatory Commission
2. Name: Mr. Kittipong Pinyotrakool
3. Gender: Male
4. Age: -
5. Current job position: Deputy Secretary General of ERC
6. Work experiences: -
  - 6.1. In which field and for how long?: -

### **Part 2: In-depth interview part for Energy Regulatory Commission**

Questions	Respondents
Supply & demand of energy in Thailand.	Supply is over supply due to 15-20% of energy reservation according to the government regulation. But due to COVID-19 crisis, the usage of energy from factories decreases while the people part increases but those two parts cannot be compared because the factory part obviously consumes a lot more energy. So, the supply is over demand more than usual.
PEA's capability of producing energy compared to private sector capability. Do you agree with the statement that PEA relies on the private sector to produce energy for the country? Why?	N/A

Questions	Respondents
Please describe the responsibility of your organization. How is it related to the Power Plants industry?	ERC or Energy regulatory commission is an organization who forecast the energy consumption in Thailand and also plays a major role in the power plant industry as a regulator and also issued licenses for power plant construction.
In your opinion, how much does your organization have influences upon WTE power plant owners? In terms of initiating and operating.	N/A
Do you think that the regulations that came out to support the power plant owners are effective? Why or why not	N/A
Do you agree that WTE power plants are the most effective way to fix the waste problems in Thailand in the long run? Why or why not	In my opinion, WTE power plants are an effective way to dispose of waste but the price of municipal waste in Thailand is more than its actual value, this could be a critical problem in the near future.
How many companies acquired the PPA but unable to operate the power plant and how many are forced to shut down after a few months of operating? What do you think are the reasons?	I presume to be only a few and the reasons are as follows. The first reason is the choice of technology, the chosen type of machine is not suitable for the type of waste in that specific area. The second is that the local people's poor perspective towards the WTE power plant, they think that the power plant would destroy their environment and contaminated their water resources. The last reason is the problems when the owners merge with the investors who want to invest in this business. The owners lose powers of decision due to less share in the company and cannot take actions to solve problems their way, when the investors step in and fix problems their way, it seems to be the wrong choice or disagree on mutual benefits.

<b>Questions</b>	<b>Respondents</b>
In your opinion, in the future, if demand for energy is over the supply, do you think that the energy from WTE PP is considered as an alternative source of power to help substitute the energy shortage issues in Thailand? Why?	N/A
If you agree, would you be willing to help push forward the initiative of WTE PP if you have the power to do so, how?	N/A

