

# THE MANAGEMENT OF BIOGAS POWER PLANTS FROM ENERGY CROPS TO COMMUNITY BENEFITS.

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## ABSTRACT

The research objectives represented 1) to study the management on biogas power plants from energy crops at the present 2) to examine factors influenced the management of biogas power plants from energy crops. The qualitative research methodology approached with in-depth and focus the group interviewing. The purposive sampling of 30 participants were divided into two groups 1) the energy crops farmer 2) the officers in energy sectors, the biogas power plants' executive.

The research finding found that the energy situation in Thailand and worldwide represented increasing trend every year. Therefore, renewable energy would be solved the energy crisis that contributed to reduce the import of fuel, natural gas and other energy. Napier grass remained an alternative in transformation to renewable energy for electricity generation. Thailand represented an agricultural country and high potential of Napier grass cultivation in Maetaeng district, moreover, Napier grass was a high potential raw material to generate electricity with environmentally friendly to the community. If the government supported the plantation area and developed Napier grass to be a renewable energy crops that contributed to alleviate the country's energy crisis in the future.

The crucial variables of Napier grass power plants represented the policies and governmental supporting because the crucial roles of government sectors contributed to the sustainability of community and bio-energy producers. If the official policies changed and discontinued, that affected with the investment and energy crops farmers, because the entrepreneurs and farmers lacked of confidence to further investment. Therefore, government sectors should promote the distinct policies and strike the private investment.

**Keywords:** Biogas from energy crops, management in biogas power plants, biogas power plants

## INTRODUCTION

The renewable energy arose from the natural source that generated from the biological process and geothermal energy and contributed to substitute the original energy as the alternative energy. The renewable from plants, animals and humans unaffected in permanent waste of resources or even fossil fuels which could be theoretical recycle for a long time and utilized in the decreasing rate in the near future. Therefore, natural energy sources could be renewable to be directly utilized or in term of other renewable energies. The growth of renewable energy provided the necessary and importance in forecasting in electricity demand and information development that contributed three electrical agencies such as Electricity Generating Authority of Thailand, The Provincial Electricity Authority and The Metropolitan Electricity Authority to expand the capacity, transmission line, distribution grid, improving in Thailand electrical system and meet the future needs because electricity was considered a crucial utility, the economy driven and developing the country. (Keawthong, 2013; Unnamed, 2015).

However, the electricity generating process caused air pollution and affected with alternative cleaning and natural energy had a role in electricity generating in Thailand. Many renewable electricity producers including industrial sectors and communities began to understand and be aware of the fuel shortage. Therefore, the alternative energy was generated by themselves with cleanliness, non-environmental impact and local generating. The biomass energy represented fuel from living organisms such as firewood, bagasse, rice husk, wood waste, grass scraps and agricultural waste including manure and waste from agricultural processing plants by fermentation and production to become biogas. (Laoprasert, 2013; Nulaong et al., 2016).

### **Research questions**

1. How did the management of the biogas power plants from energy crops at the present?
2. What were factors that influencing the management of biogas power plants from energy crops?

### **Research objectives**

- 1 To study the management of the biogas power plants from energy crops at the present.
- 2 To study factors that influencing the management of biogas power plants from energy crops.

## **LITERATURE REVIEW**

### **Biogas from energy crops**

The biogas or digester gas represented an alternative energy source because it was natural gas that produced from animal feces or degradation of oxygen-free organic matter, methane occurred with the fermentation of organic substances. This process occurred in dung, garbage and sewage, whenever organic substances accumulated for a long time, it might cause the biogas. This oxygen-free fermentation reduced the amount of contained organic matter in the fermenter by 50-70%, which was a method to treat wastewater and reduce pollution with biogas technology.

Thailand was an agricultural country and produced agricultural products throughout the year with a large amount sufficient for domestic consumption, generated income to the country and reduced energy importing from foreign countries as mentioned above. Therefore lead to develop of an alternative energy source within the country as well as seriously promoting the use of alternative energy through production promotion and renewable energy policies especially the community in the aspects of sufficient demanding, income from energy crops and better living. (Laoprasert, 2013; Gunha et al., 2015; Nulaong et al., 2016).

The study of the potential of energy crops in the country was necessary in Thailand contributed an alternative raw material source that provided the domestic energy sources and production of biogas in the future.

Thailand was located in the geographical area that was ready to grow many potential energy crops that contributed to develop as a renewable energy, the potential plants that were likely developed for produce renewable energy and classified into 4 groups consisting of 1) oil-based plants, 2) starch-based plants, 3) sugar-producing plants and 4) fiber-producing plants.

### **Energy crops**

Napier grass was an energy crops that provides powder and substituted for the corn for biogas production as well, Napier grass originated on the tropics in Africa. The trunk was like sugar cane with large, thick and wide leaves. Thailand introduced Napier grass from

Malaysia and continuously imported seed it in the year 1929, the Department of Livestock Development imported hybrids from India (Napier grass/Napier grass Pakchong1: Benefits and cultivation of Napier grass, 2016). Napier grass was very popular because it produced immense nutritional value, high yield per rai and non-seeded grass, therefore, was not a problem of being a weed. Farmers expanded it for animals feeding, the yield per rai was up to 40-80 live trees per year. Napier was a heliophyte grass in loam, no flood and soil preparation was like sugarcane planting, harvested for 6-7 years per life cycle and classified three species as following.

1. King Napier grass, the first import from Indonesia occurred in 1990.
2. Mott Dwarf Elephant Napier grass imported from Florida State University, United States in November 1989.

3. Pakchong1, Napier grass, the hybrid Napier was modified the Nakhonratchasima Animal Feed Research and Development Center, Department of Livestock Development, using for animal feed such as beef cattle, dairy cows and buffaloes because they grow accelerated, with immense nutritional value including the ability to make silage.

The study indicated that more than 20 species of Napier grass came from Pakchong1 Napier grass, had a higher methane yield rate more than other grasses and a high nutritional value at the age of 45-60 days. The amount of 100 grams of grass produced high protein to 7.32%; the nutrient structure of Napier grass was suitable for the growth of microbes that caused gas, especially wastewater from various agricultural industries such as wastewater from cassava modified plants and found that the Napier grass responded well in removing waste water.

The government measure on energy crops

The ministerial order of the Ministry of Energy No. 25/2016 on the policy of the Ministry of Energy (2016-2020), formulated energy policies, plans, and measures to retain sufficient energy for the demanding and national security with regard to energy conservation, sustainable development, environmental friendly and effectively carry out the mission of the Ministry of Energy in accordance with the current energy situation of the country (Strategy, Ministry of Energy 2016-2020, 2016)

From these measures, the private biogas power plants adopted these measures to manage energy in the sub-district on communities through technology application. The renewable energy development represented the examination, demonstration including promotion and dissemination to produce and promote the energy crops for effective and community benefits.

## **RESEARCH METHODOLOGY**

The research methodology represented the qualitative research through the in-depth and group focus interviewing. The purposive sampling of 30 participants were divided into two groups 1) the energy crops farmer 2) the officers in energy sectors, the biogas power plants' executive. The data collection was made through the making the appointment by individual and group and after that record the interviewing data and synthesis the specified relevant with the research questions.

## **CONCLUSION**

The research finding found that the energy situation in Thailand and worldwide represented increasing trend every year. Therefore, renewable energy would be solved the energy crisis that contributed to reduce the import of fuel, natural gas and other energy.

Napier grass represented an alternative in transformation to renewable energy for electricity generation. Thailand represented an agricultural country and high potential of Napier grass cultivation in Maetaeng district, moreover, Napier grass was a high potential raw material to generate electricity with environmentally friendly to the community. If the government supported the plantation area and developing Napier grass to be a renewable energy crops that contributed to alleviate the country's energy crisis in the future.

The crucial variables of Napier grass power plants represented the policies and governmental supporting because the crucial roles of government sectors contributed to the sustainability of community and bio-energy producers. If the official policies changed and discontinued, that affected with the investment and energy crops farmers, because the entrepreneurs and farmers lacked of confidence to further investment. Therefore, government sectors should promote the distinct policies and strike the private investment.

In addition, the policy would contribute entrepreneurs and farmers to continually expand on other projects including agencies and participants in all sectors should establish cooperation in research, technology development, financing source and specified areas for planting Napier grass to produce energy crops so that there were not be problems in the future with farmers and entrepreneurs including the investment in various projects to create careers and income to farmers in Maetang district. Therefore, Napier grass was a crucial alternative energy plant for alternative energy generating or alternative energy in the future and creating sustainable energy security for the country.

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### **REFERENCES**

- [1] Chalao Pitaksinsuk, Jariya Booncharatcha, Cherapatana Vongpipatana. (2010). Collection and database establishment on nutritive values of forage crops. Feed and Forage Analysis Section, Animal Nutrition Division, Department of Livestock Development, Ministry of Agriculture.
- [2] Jarunee Nulaong, Abdulrahim Pahetae and Imron Aleemana.(2016).Effect of Fertilizer on Yield and Chemical Compositions of Napier Grass. Journal of Science and Technology. Yala Rajabhat University, 1. (2): 23-30.
- [3] Kailard Keawthong.(2013). Handbook of Napier grass Pakchong1 plantation. Online [http://milkforthai.org/pdf/grass\\_2012l.pdf](http://milkforthai.org/pdf/grass_2012l.pdf). Accessed June 28, 2017.
- [4] Thanasith Laoprasert.(2013). Napier grass for the future, animals feeding and energy. Folk Technology 25(555):86
- [5] Thidarat Gunha, Ittipon Powpaisal and Kritapon Sommart. (2015).Influences of Napier grass (Pennisetum purpureum x Pennisetumglaucum ‘Pakchong 1’) cutting aged on chemical composition,digestibility, metabolizable energy and enteric methane emissions in beef cattle. 43(3):555-572.
- [6] Unnamed.(2015) Napier grass Pakchong1, grass for animals feeding. Webboard Sufficient Farmers Club. Economic Livestock.[online] <http://www.kasetporpeangclub.com>. Accessed June 28, 2017.