HIA and Biomass Energy Development in Thailand

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Introduction

In Thailand, a wide variety of agricultural residues are available for energy resource including bagasse, rice husk, wood waste, corn cob, rice straw and residue from oil palm, sugarcane and cassava (Table 1). The bulk of them are from sugarcane and rice, which are the most important agricultural crop in the country. The aggregate power generation potential from all residues is estimated to be about 3,070 MW for Thailand.

Table 1. Power generation potential of agricultural residues in Thailand.

Fuel type	**Power potential (MW)**
Bagasse	900
Rice husk	700
Rice straw	650
Sugarcane residue	570
Oil palm residues	70
Corncob	70
Cassava residue	70
Wood waste	40
Total	**3,070**

Source: Energy Policy and Planning Office (EPPO), Ministry of Energy, 2009.

Agricultural residues are an abundant energy resource in Thailand. However, this biomass is currently under-utilized. In this paper, problems of biomass energy development and the roles of health impact assessment (HIA) in Thailand are presented.

Situation of biomass energy in Thailand

To increase energy security and to reduce energy imports and net greenhouse gas emissions, the concept of biomass power plants is being promoted in Thailand. The promotion program began in 1992, using several measures including provision of top-up money for power generation using biomass fuel; guarantee of purchase; and the provision of soft loans for the implementation of the projects (Barz & Delivand, 2011). Rate of top-up or adder varies with the installed capacity, project with less than 1 MW

receive a subsidy in premium of 0.5 THB/kWh and those above 1 MW receive 0.3 THB/kWh. In a 15-year plan (2008-2022), the Alternative Energy Development Plan (AEDP) set an ambitious target to have about 20% of country's total energy from renewable resources. To meet that target, Thailand must have a total installed capacity of biomass power plants of 3,700 MW by the year 2022.

Until September, 2011, despite those supporting policies, there were only 84 biomass power plants, with the total installed capacity of 1,397 MW, in the country (Table 2). This included 24 plants with 783 MW registered as very small power producers (VSPP) and 60 plants with 614 MW as small power producers (SPP). The capacity from these two types of power plants accounted only about 5.6 % of the total electricity produced from all resources and less than half of the target set by AEDP.

Table 2. Status and installed capacity of small and very small biomass power producers in Thailand, in 2011.

Status of project	**SPP**[a]			**VSPP**[b]		
	Number	Installed capacity (MW)	Sold to grid (MW)	Number	Installed capacity (MW)	Sold to grid (MW)
Installed, selling to grid	24.0	613.6	375.2	60.0	783.3	329.0
Planned	8.0	370.8	280.5	301.0	2,525.8	1,990.3
- Under consideration	4.0	120.0	118.0	32.0	191.2	146.4
- Waiting for PPA [c]	3.0	246.0	158.5	46.0	321.4	248.2
- Waiting for COD [d]	1.0	4.8	4.0	223.0	2,013.2	1,595.7
Projects withdrawn	78	1,068.9	649.8	-	-	-
- Rejected by EGAT	1.0	70.0	65.0	-	-	-
- Changed from SPP to VSPP	41.0	608.4	294.1	-	-	-
- Abandoned	36.0	390.5	290.7	-	-	-
Total	110.0	2,053.3	1,305.5	361.0	3,309.1	2,319.3

Source: Energy Policy and Planning Office (EPPO), Ministry of Energy, 2011.
[a]SPP: Small power producer, selling more than 10 MW to grid
[b]VSPP: Very small power producer, selling less than 10 MW to grid
[c]PPA: Power Purchase Agreement
[d]COP: Commercial Operation Date

There were also a large number of SPP projects that were withdrawn, 41 moved to VSPP and 36 abandoned (Table 2). Only 24 projects were successful and able to sell electricity to the grid. For VSPP project, only 60 projects with 783 MW installed capacity are currently productive while the majority of them, 301 projects with 2,526 MW, were still in the planning.

Figure 1 shows a declining trend in the years 2005-2011of VSPP project (EPPO, 2011). The number of projects and installed capacity peaked in 2008 and steadily declined after that. Recently, there were only a few new projects that will sell electricity to the grid.

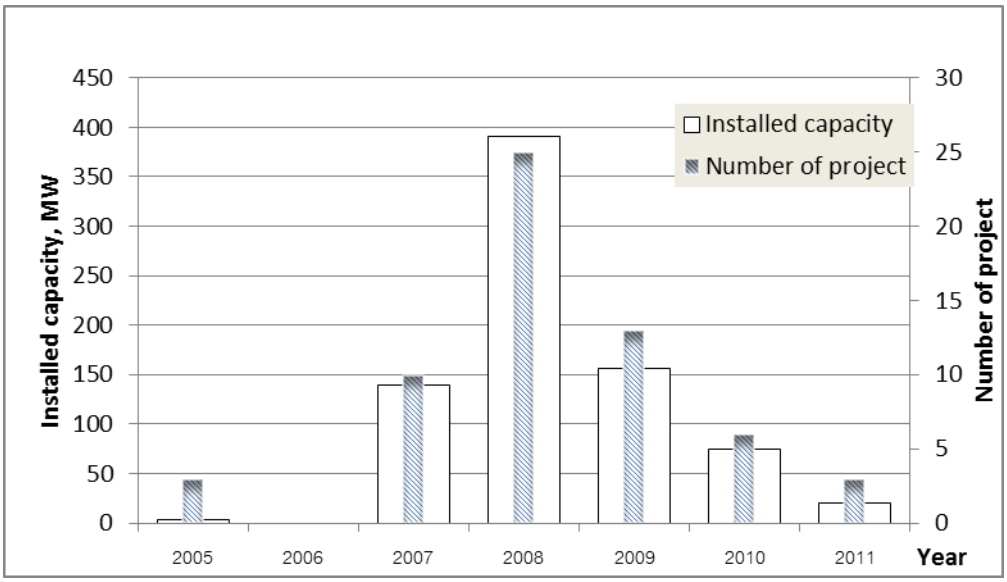

Figure 1. Installed capacity and number of new VSPP, selling electricity to the grid in 2005-2011.

Barrier for biomass energy development and suggested roles of HIA

Public opposition may be the biggest barrier for biomass energy development in Thailand. At present, it is hard to find a biomass power project without conflict. A bad image of biomass power plant has been created by adverse health and environmental impacts from poor-planned projects. A study by Juntarawijit (2010) found that people living near a biomass power plant have bad attitudes toward it. People believe that power plants will not benefit themselves or their community. They feared and did not trust the company or the government to protect them from harmful effects. The study identified several adverse environmental and health impacts associated with operation of biomass power plants, including air pollution, transport accidents, depletion or contamination of community water supply, noise pollution, nuisance from falling dust and odor. There was also a link between respiratory illness symptoms and living distance from the power plant.

Environmental and health impacts of biomass power plants are due to several factors. One is the use of poor technology to covert biomass fuel to energy. In Thailand, almost all of the biomass power plants employed direct-fired technology, with boilers and associated stream turbines (Juntarawijit &

Juntarawijit, 2012). This system is relatively simple in operation but has low conversion efficiency and produces a lot of harmful pollutants, including airborne particulate matter, oxides of nitrogen and carbon monoxide. An effective pollution control system is needed to reduce air emissions from the biomass power plant. However, currently, in the Thai environmental regulation system, there is no system to enforce or guarantee the best practice use. Without proper law enforcement, project owners tend to choose a cheaper and less efficient control technology.

In Thailand, gasification is not supported well enough. Almost all gasification power plants failed after a short period of operation. At this time, there is only one commercial-scale gasification plant, a 160 kW plant using corn cob as a fuel. Several problems were identified, including the high tar content of fuel, lack of research data and technology development, and lack of trained operators (Salam, Kumar & Siriwardhana, 2010).

Another problem comes from the Thai environmental law which favors small plants which often use poor technology and create more impact. Currently, biomass power plants with installed capacity less than 10 MW were not subject to any regulatory control. For those with 10 MW or more, an EIA report is required and for those with 150 MW or more there must be both HIA and EIA reports. This regulation favors small biomass power plants over the bigger ones and creates an opportunity to avoid regulation. Data from EPPO (2011) showed that, for very small power plants that sold electricity to the grid up to Sep 2011, 35 out of 61 projects had installed capacity of less than 10 MW (Table 2). It was also found that in 2011, 41 planned SPP projects requested to move to VSPP. However, because small projects cannot afford high technology, sometimes they can produce the same or even more pollution than the bigger ones.

Under the current situation, there are several roles that HIAs can play in biomass energy development. Firstly, HIA can be used to tackle inequalities in health and getting the public involved in public policy, projects and plans. HIA is relatively new in Thai society but there are high expectations. In Thailand, HIA operates through two platforms (Phoolcharoen, Sukkumnoed & Kessomboon, 2003). The first one is as a part of the Environmental Impact Assessment (EIA) process and, thus, applies mainly at project level under the umbrella of the EIA process. The second platform aims to use HIA as a participatory learning process rather than an approval mechanism. In this platform, HIA was a tool for tackling inequalities in health and getting the public involved in public policy, projects and plans. It is

through this platform that HIAs are involved in biomass energy projects with less than 10 MW that were otherwise not controlled by law.

Secondly, HIAs can be used to identify health impacts and their severity and magnitude. As mentioned before, health and environmental impacts were the root causes of many conflicts and thus, to improve the situation, all problems need to be identified and properly managed.

Thirdly, under the concept of learning processes and public participation, HIA can be an effective tool to reduce conflict, and create trust in a cooperative atmosphere. HIA can be used to build trust between stakeholders, i.e., the affected community, governmental authority and business investor. However, the HIA process needs to be involved at the very beginning and in every step of decision process. Study protocols are transparency, reliability and accuracy. At the same time, HIA can be used to educate the public and improve their understanding of power plant processes, and related health and environmental impacts, both negative and positive.

The fourth role is to develop healthy public policy. Many biomass conversion technologies are available and others are in development stage. Direct burning has drawbacks of low efficiency and pollution, and might be replaced by more efficient and environmentally friendly technology. HIA can be used to predict and to compare health impacts, both negative and positive for these technologies.

The last role is to build a knowledge-based society. HIA can be used as a tool to bring all stakeholders together to decide what best for the community and the nation as the whole. It is possible that power plants and communities can live together in peace in win – win situations. HIA can educate the public and create a rational society. Project investors should have more responsibility to society and do business for longer term prosperity rather than short term unsustainable gains. The government has to use regulatory and administrative processes to take care of the public interest.

Final remarks

Thailand is a tropical country with plenty of biomass fuel. However, currently biomass fuels were under-utilized because public fear of health impacts from biomass power plants. To solve the problem, there are several roles that HIA can play. HIA can be used to identify health impacts from the power plant, to bring all stakeholders to work together for reduction of conflict and creating trust in a cooperative atmosphere, to promote efficiency and environmental friendly technology and to build a knowledge-based society. If it is failed, biomass power plant will not be accepted and Thailand will lose opportunities to use this abundant energy resource.

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