



Chiang Mai J. Sci. 2008; 35(1) : 51-55

www.science.cmu.ac.th/journal-science/josci.html

Contributed Paper

Feasibility Survey of Fuel Briquette Demands in Roasting Food Restaurants in Chiang Mai Province, Thailand

Suparin Chaiklangmuang*, Yaowaluck Chotchaitanakorn and Sanguansak Sri-phalang

Department of Industrial Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand.

*Author for correspondence; e-mail: suparin@chiangmai.ac.th

Received : 18 September 2007

Accepted : 5 October 2007

ABSTRACT

This research is to survey the feasibility of fuel briquette demands in roasting food restaurants in the district area of Chiang Mai province, Thailand. The 50 roasting food restaurants were selected randomly and then divided to two groups: permanent and temporary restaurants. The paper presented surveying research on the behavior of fuel briquette consumptions, dealer demands and problems of using fuel briquettes. The research results can be applied to develop alternative fuels. The recorded data can be aimed to project images of briquette production and consumption in macro organizations and the private sector for the survey area.

Keywords: fuel briquette, roasting food, demands.

1. INTRODUCTION

The energy scene in Thailand can be divided in two parts: the rural part which encompasses most of the country and 70% of the total population of 50 million and the urban and industrialized part which is mainly concentrated in Bangkok and its immediate surroundings. Wood and charcoal still remain the major cooking fuel for the low-income urban dwellers, as well as for restaurants and small food industries [1-4]. For the roast and grill restaurants, charcoal is the main fuel, which can be made from various materials, e.g. coconut shell, rice husk and wood. Coconut shell briquettes are well-known as fuel in roast and grill restaurants in the district area (Amphur Muang) of Chiang Mai province,

Thailand. The number of factories increases, following the fuel briquette demands. Basically, the screw-designed die extruder type is widely used by these local manufacturers for producing fuel briquettes. However, the consumption behavior of roast and grill restaurants and the problems of fuel briquettes using are still significant parameters on fuel briquette demands. This survey provided information of various aspects of consumption behaviors and conducted a survey to identify local demands for briquetting. Therefore, the objective of this study was to investigate demands of fuel briquettes of roasting food restaurants in Amphur Muang, Chiang Mai province, Thailand. The 50

roasting food restaurants were chosen randomly and were then divided into two groups: permanent restaurants (i.e. fixed location) and temporary restaurants (i.e. wheelbarrow or booth). The research also surveyed the behavior of fuel briquette consumption, dealer demands and problems of using fuel briquettes.

2. MATERIALS AND METHODS

The subjects of this exploration are roast and grill restaurants in the district area (Amphur Muang) of Chiang Mai province, Thailand. The data acquisition was interrogated from two kinds of restaurant: permanent and temporary restaurants. There are 20 permanent restaurants and 30 temporary restaurants which are accounted for 40% and 60% of the total number of samples, respectively. In this survey, the public-opinion poll was utilized to evaluate the fuel briquettes consumption behavior of these restaurants. The topic in the poll was divided into 4 phases:

Part 1: This part is composed of 4 open ended questions which defined the basic information of the respondents; namely first name, family name, position or rank, and restaurant's name and location.

Part 2: This part is consisted of 15 questions which combined of check-list and scale-rating questions. These questions concerned the fuel briquettes consumption behavior of roast and grill restaurants in such aspects as the period of office hours, type, cost, and source of fuel used, expenses, life-time of fuel, and shape of fuel briquettes.

Part 3: The questions of this part are categorized into 2 kinds; check-list and open-ended questions. They focused on the solid-compressed fuel requirements of the restaurateurs; for instances; characteristic, shape, heating value, heating-time range, type of raw material, smoke, and ashes, cost per unit consumption, and including the general

expectation of the restaurateurs.

Part 4: In the final part, there are 6-open ended questions which are intended to illustrate the problems of fuel briquettes used such as heating value, heating-time range, net consumption quantity, amount of smoke, smell, and the general problems caused by fuel briquettes used.

This survey was favorably participated by these restaurants in the district area of Chiang Mai province during November 2004 to March 2005 (5 months). The question forms were organized and handed out to the responders by the researchers. The forms were completely returned to the researchers at the rate of 100 %. The survey results were analyzed using Statistical Package for Social Science/Personal Computer, SPSS/PC, to calculate mean, standard deviation and interpretation.

3. RESULTS AND DISCUSSION

The analysis results as summarized in Table 1 indicated that the requirement of fuel briquettes of the two groups of roasting food restaurants were similar, those were emphasized on the good qualities of fuel briquettes i.e. high heating value, long combustion time, inexpensive cost and low smoke. Measuring scale of behavior of fuel briquette consumptions is shown in Table 1.

Based on the survey, Table 2 illustrates percent of restaurant demands depending on the type of raw materials, consequently, it could be concluded that biomass was the most demand of raw material for fuel briquettes as green fuel in the area. This may be because the concern of the adverse effect of coal combustion on the environment or the surrounding ambient.

Table 1. Measuring scales of behavior of fuel briquette consumptions.

Questions	Behavior												Average mark	S.D.	Behavior level		
	Most extreme			extreme			medium		fair		low						
	number	mark		number	mark		number	mark	number	mark	number	mark					
1. Cost	38	190		4	16		8	24		0	0		0	0	4.60	0.75	most extreme
2. Shape of fuel briquettes	1	5		7	28		14	42		14	28		14	14	2.34	1.09	fair
3. heat quantity	27	135		16	64		7	21		0	0		0	0	4.40	0.72	most extreme
4. Life –time of fuel combustion	22	110		19	38		9	27		0	0		0	0	4.26	0.75	most extreme
5. Smoke quantity	8	40		13	52		19	57		7	14		3	3	3.32	1.09	medium
6. Odor	4	20		14	56		18	54		10	20		4	4	3.08	1.06	medium

Note: 1. Number means number of restaurants.

2. Behavior defines as following: most extreme is equal to 5 marks; extreme is equal to 4 marks; medium is equal to 3 marks; fair is equal to 2 marks; low is equal to 1 mark.

3. Behavior level referred to average mark means: in the range of 4.21-5.00 = most extreme; 3.41-4.20 = extreme; 2.61-3.40 = medium; 1.81-2.60 = fair; 1.00-1.80 = low.

Table 2. Type of raw materials.

Raw materials	Number of restaurants/(percent)
Biomass	48 / (96.00)
Coal	2 / (4.00)
Total	50 / (100.00)

Figure 1 illustrates that the consumption demands depended on business scales, basically a large business is non-moving location meaning permanent restaurant. The demands of permanent and temporary

restaurants were ca. >300 kg/month and of 50-100 kg/month respectively. The users indicated some problems that occurred during combustion such as low heat, high smoke and difficulty of ignition.

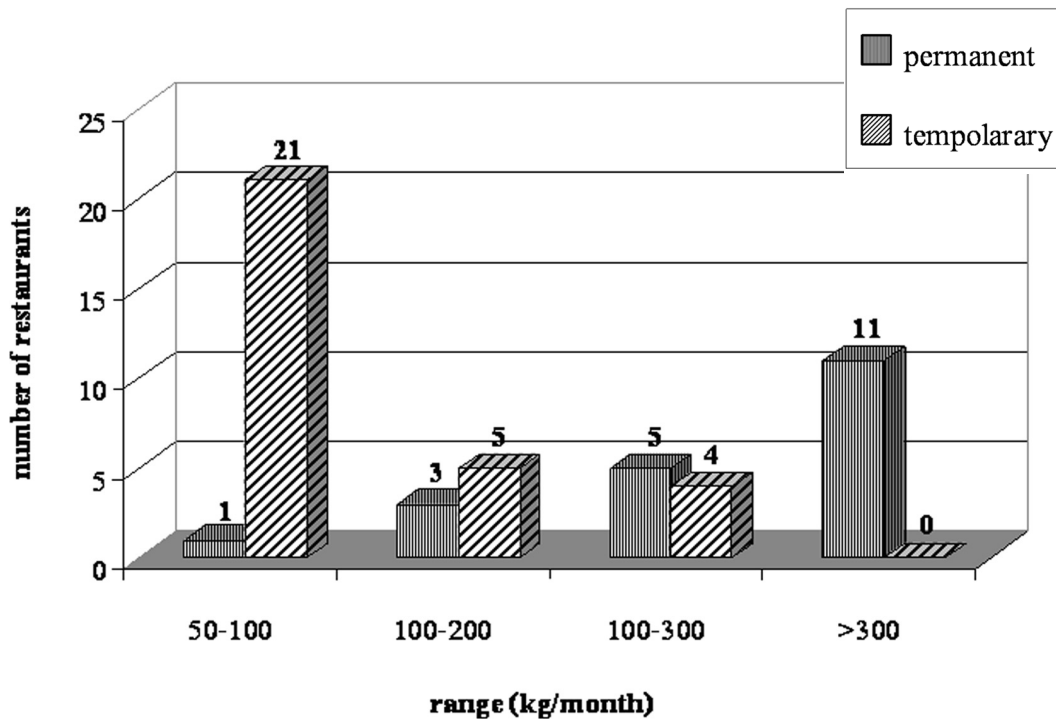


Figure 1. Demand of fuel briquette VS number of restaurants in terms of permanent and temporary restaurants.

The cost of fuel briquette used in restaurants per month was illustrated in Figure 2. However the information depends on scale of business. This research investigation focused on the specific survey region.

Therefore, it is difficult to put survey results to others. However, the survey data can be aimed to project images of briquette production and consumption.

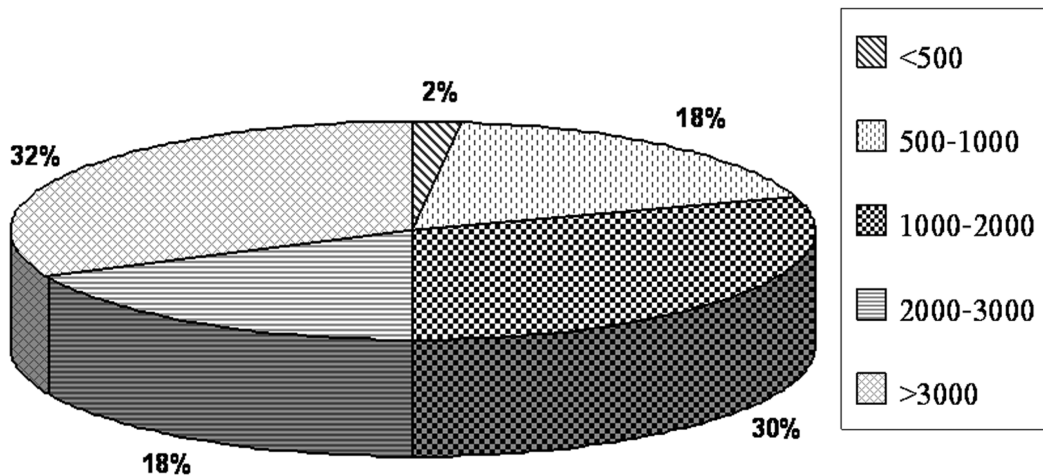


Figure 2. Data Ranges of fuel briquette cost per month (from 50 restaurants).

4. CONCLUSION

The user demands and costs of fuel briquette depended on business scales. Recycling biomass can be significantly alternative fuels. The research results can be applied to develop alternative fuels. The recorded data can be aimed to project images of briquette production and consumption in organized systems and macro scale for the study area. Extension of survey areas, like business districts or SMEs, should be conducted.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Faculty of Science, Chiang Mai University for financial support.

REFERENCE

- [1] Dumrungthai P., A study of fuel and green fuel briquette of population in Amphur Ta-Moung, Kanjanaburi province. <http://forest.go.th/research>. 2001.
- [2] Pinnium N., Production and acceptance of using of solid fuel and green fuel in rural: case study of Amphur Klonghuang, Patumtanee province, *Science and Technology Journal*, 2000; 2: 45-50.
- [3] Suntisirisomboon J., and Milintalek J., Environmental Effect from biomass energy uses, *The Energy Efficiency Journal*, 2001; 52: 22-25.
- [4] Bhattacharya S.C., Augustus L. M., and Mizanur R. M., A study on improved biomass briquetting, *Energy for Sustainable Development*, 2002; 6(2): 67-71.