Guidelines in Local Alternative Energy Management of Communities in Thailand's Central and Eastern Regions

Wisakha Phoochinda and Boonchong Khoasitthiwong

ABSTRACT

This qualitative study aims to assess the implementation of alternative energy in Thailand's Central and Eastern Regions (TCERs). Thus, a CIPP-I (Context Input Process Product-Impact) Model was applied to establish the guidelines in local alternative energy management. In-depth interviews were carried out with the regional administration of the Ministry of Energy. Questionnaires were used to collected data from the local people. Results of this study revealed that the implementation of local energy management of communities in TCERs was at a moderate level. However, there was no continuation in the implementation in some communities due to lack of relevant support. This study has proposed guidelines in local alternative energy management for these regions.

Key Words: appropriate technology, CIPP-Model, domestic energy needs, local alternative energy planning.

INTRODUCTION

Thailand's energy import has been rising constantly to meet the domestic energy demand, which is at the rate of approximately 1,400 megawatt per year. Increasing energy production by SPP (Small Power Producers) and VSPP (Very Small Power Producers) is not effective because the number and the production capacity of those producers are negligible. Thus, Thailand is heavily dependent on the import of high-price fossil fuel. The problem is the price of crude oil per barrel in the Dubai market continuing its upward trend [1].

In the past, Thailand's search for more energy sources usually focused on the generation of energy that was derived from fossil fuels such as coal-fired power plant. This type of power plant causes air pollution and worry about possible exhaustion in the future. A policy on nuclear power plant could not implemented because certain conflicts of interest among the government, private sectors and the local people which stemmed from lack of active involvement of local people in the area in the local energy management.

With intention to minimize undesirable impacts to the acceptable level of local people and to promote a better standard of living, the government has launched certain policy in energy planning so called 'the Local Energy Planning Project.' In this project, the local community participation is actively promoted by the Ministry of Energy. All the relevant data of the community must be collected and analyzed to evaluate and anticipate the various impacts of the local energy project to be implemented. Access to those information makes the local people to be able to decide and to cooperatively plan for implementation of the local energy project.

The beginning of Thailand's local energy planning was in the year 2000. In 2003 the Appropriate Technology Association (ATA) was granted funds from the Ministry of energy to implement the project on local use of alternative energy in a sustainable manner in five communities in Nakorn Ratchasrima province. In 2005, The Ministry of Energy cooperated with the Government of Denmark in capacity building of regional energy office's personal in formulating a local energy plan as well as of the local people's in learning and planning in alternative energy project. The local energy production, project management and evaluation were then carried out [2].

Nevas and Leal [3] stated that it was necessary for a local energy planning project to promote active and continuous people participation in the production and management of alternative energy. Hence, the guidelines in alternative energy management of local energy planning projects will be very useful in formulating policies and strategies to promote each community's self-management of alternative energy, which is an efficient and sustainable way in energy planning. In addition, this will lead to an environmentally friendly way of alternative use. The research question of this study was how effective implementation of alternative energy management in communities in Thailand's central and eastern regions and how guidelines of these management should be?

OBJECTIVE

The objective of this study is twofold:

1) To assess the implementation of alternative energy management in communities in Thailand's central and eastern regions by CIPP-I model;

2) To create guidelines in alternative energy management in Thailand's central and eastern regions.

RESEARCH METHODOLOGY

Study Framework

In order to be able to formulate the guidelines in alternative energy planning based on the local energy planning projects in Thailand's central and eastern regions (see Fig. 1), the local management of alternative energy was studied and assessed using the CIPP-I model [4][5]. The factors involves in the assessment include: Context, Input, Process, Product and Impact - CIPP-I (see Fig. 2).

Population and Samples

Population of this study were 213 communities in the central and eastern regions which participated in the project during 2006 to 2010. Total 26 communities were samples according to systematic sampling proposed by Chase and Bown [6]. This means 1 out of 8 communities was selected (see Table I). Then, the lottery method were employed to select the first sample, which happened to be Community No. 3, so the other subjects to be chosen at the interval of 8 were communities No. 11,19,27,35,43 and 51, respectively.

Tools of This Study

In-depth interviews and questionnaire were carried out in data collection. People involved in local energy planning were interviewed, which include the directors of the Provincial Energy Office (26 persons), members of each community's local energy broad (5 persons), representatives from the local administrative of the area where the project was implemented (20 persons) per community.

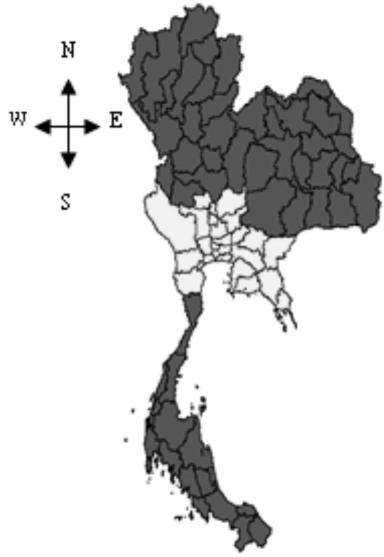

Figure 1. Area under Stu (The Thailand's Central Eastern regions)

Table 1. Number of communities' participation in the projects and number of samples

Year	Number of communities in which participated in the project	Number of sample groups to be used in the data collection
2006	8	1
2007	26	3
2008	54	7
2009	100	12
2010	25	3
total	**213**	**26**

Assessment Criteria

The weight in the assessment of the implementation of the local energy planning project was proportioned in the way that every aspect was deemed equally important, thus 20% each for each of five (5) CIPP-I factors detailed in Figure 2. The full score in the assessment was 2 points.

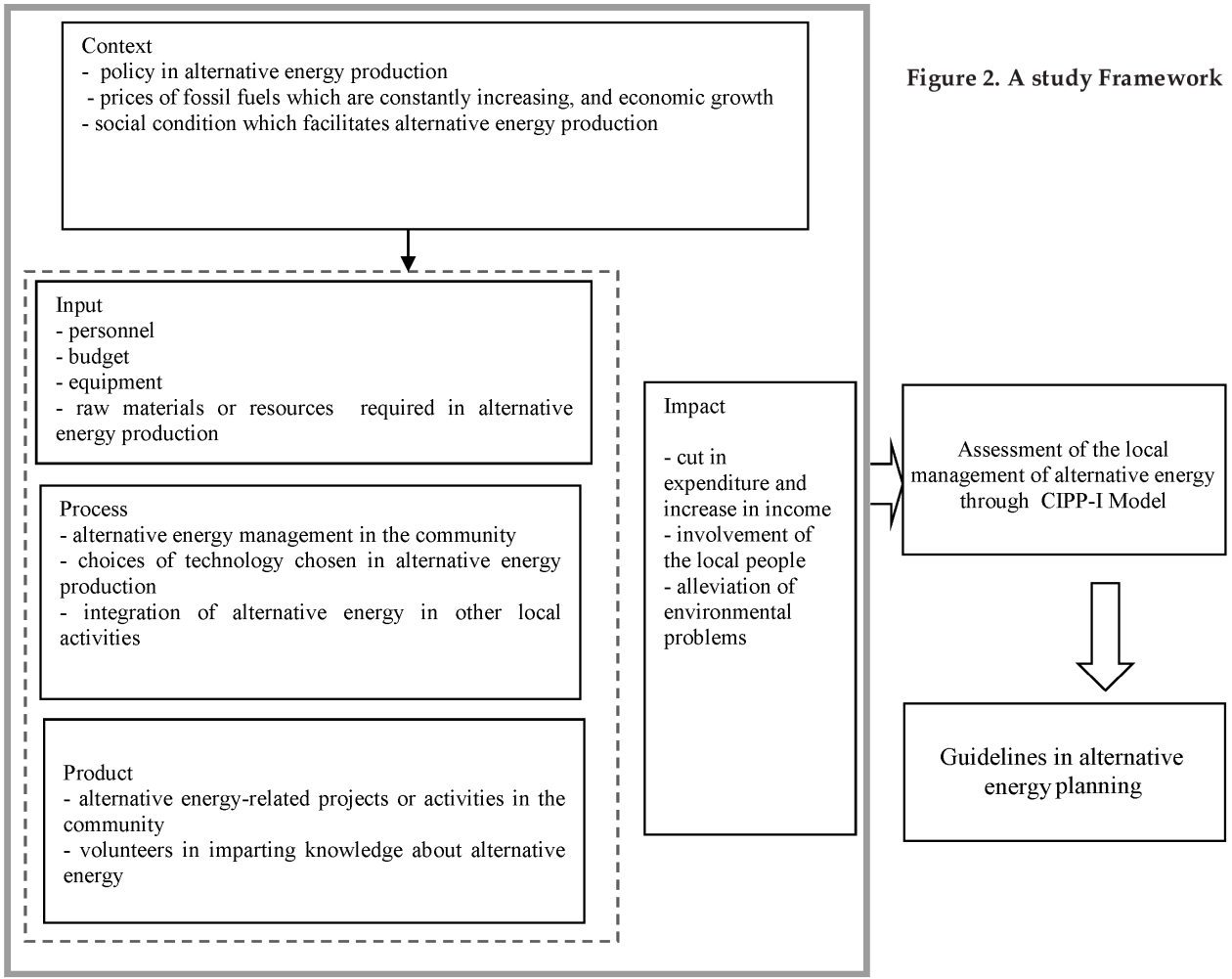

Figure 2. A study Framework

The maximum was 2 points and the minimum was 0 point. The score from the assessment was to be used in comparison with the criteria in the overall assessment, which were: lower that 1 means low level in local energy management, 1-1.49 means moderate level in local energy management, and from 1.50 up means high level in local energy management.

RESULTS

After data were collected though in-depth interviews to probe on the local energy management in the local energy planning project in 26 communities in Thailand's central and eastern regions, the results thereof were assessed using the CIPP-I Model as following:

Context

As a result of government policy on alternative energy development, alternative energy consumption grows up continuously up to 15 percent in 2012. This leads to invest continually on alternative energy projects by private sectors. In 2012, investment on alternative energy by government and private sectors was 89,354 million Bath. Solar energy investment played a major role of alternative energy investment, followed by biomass, biofuels, wind, municipal solid waste (MSW), biogas and small hydro power, respectively (see Table 2).

Table 2. Government Policy in Alternative Energy Investment in 2012 [7]

Alternative Energy Investment	Solar Energy	Wind Energy	Small Hydro power	Biomass	Biogas	MSW	Biofuels	Total
Investment (million bath)	51,705	5,033	405	16,769	1,623	4,908	8,911	89,354

From the assessment of the context of the area under the project, it has found that domestic production of alternative energy in the community is the best policy in supporting the community to make use of locally available resources in energy production. With constantly increasing prices of petroleum products (see Fig. 3) people in the community have become aware of the importance of domestic production of alternative energy in community. Most of the communities under the project are rural agricultural communities and are keen about the alternative energy

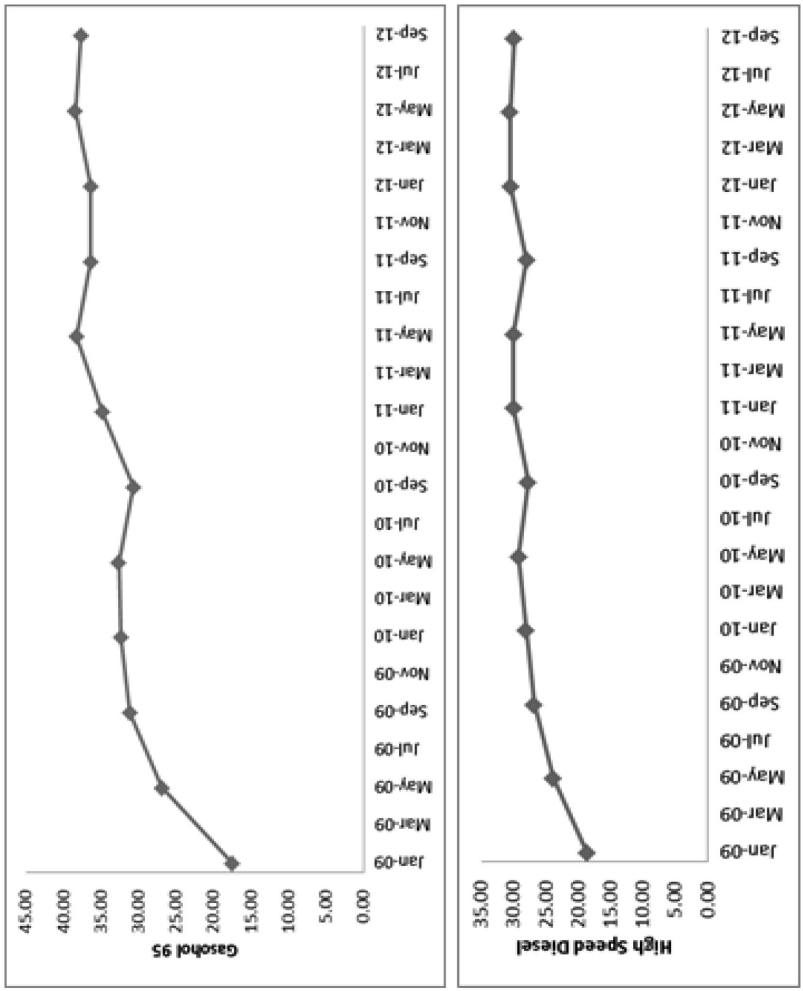

Figure 3. Retail Prices of Petroleum Products in Bangkok, Thailand [7].

production process with the aim of the cutting their household expenses. Some communities are supported by their local administration and thus are more encouraged to use locally produced alternative energy.

Input

The assessment of the input in the local energy planning project has revealed that the relevant top-level state agencies, which are the Provincial Energy Offices, are understaffed in most of the provinces studied both in the central and eastern regions. This is due to the fact that they have to be responsible for both the areas where the project has already been implemented and the new areas in the expansion plan. In terms of the budget for local energy management/planning, funding from the Ministry of Energy is in the form of 5-year step-down. That means the financial support is the highest in the first year, then in the following years the community must be involved in supporting this budget. In this way, some communities aware of the importance the local energy management list it/the project in Tambon (town)'s three-year development plan, whereby more financial support can be acquired. However, the financial support overall is not yet sufficiently extensive. Some communities have received the budget or supporting equipment, whereas some have not.

Regarding equipment necessary for local energy planning, the support thereof is found to be sufficient and suitable, for in local energy planning, the community has a say in the choice of equipment deemed most suitable for themselves as well as of raw materials, which should mainly be those locally acquired to be used in the production of alternative energy. However, some communities are found having been supported with equipment that does not really suit the context of the community.

Process

Overall, most communities have a clear structure in local energy management and delegates mainly in charge of the implementation, as well as the local energy plan in support of the management and with a meeting at least once a month. Nevertheless, there is not yet any explicit written regulation on the management nor enough follow-up and evaluation of the implementation of local energy planning. With regard to technology employed in alternative energy management in communities in Thailand's central and eastern regions, it has found that the choices thereof are appropriate and in accordance with available resources in the communities. In making the most worthwhile use of the resources avail-

able in relation to the technology, for an urban community, the focus is on energy saving or change of equipment such as the change to use high efficiency energy saving compact fluorescent lamps. For an agricultural rural community, there are more choices of technology in local energy management, for example the use of big clay firepots, chicken grillers, 200 litre charcoal burning stoves, biogas stoves, and decomposition of organic waste or animal dung in landfills to produce biogas (as shown in Fig. 4). However, in some communities, the choice of technology used induces difficulty and the equipment supported is not of any use to the community. With respect to the application of alternative energy knowledge to other activities in the community, it is integrated into the local environment management such as in biogas production from organic wastes. In addition, traditional wisdom in the exploitation of alternative energy, like the use of wind energy in salt production, can be preserved. To summarize, the study in TCERs found that total 1,303 households could currently generate alternative energy approximately 9,521.77 kilo ton oil per equivalent (ktoe) (see Table 3).

Product

The findings from in-depth interviews with delegates of the 26 communities where the local energy planning project has been implemented in the sample groups revealed that the activities in local energy planning are still carried on, though not necessarily have every year. Most of the activities continuously carried on are related to people's daily activities, for example the use of big clay firepots for the livelihood of people in rural areas. In terms of experts on alternative energy in the community, the number usually exceeds five. The selection thereof varies, for instance from the local representatives or from members of the local administration like members of the sub-district (township or 'Tambon' in Thai's administrative council). For the source of knowledge about alternative energy in the community, this is still in the inception process. Most communities are of the opinion that developing a source of knowledge means setting up a knowledge centre. Actually, a more sustainable source of knowledge should be a 'live' one, which means that the community has practically integrated such knowledge into their daily lives. In 2012, the expenditure for household energy consumption in the TCERs was approximately 2,273 per month. The expenditure for household alternative energy consumption was only 0.3 percent of the household monthly energy expenditure [10].

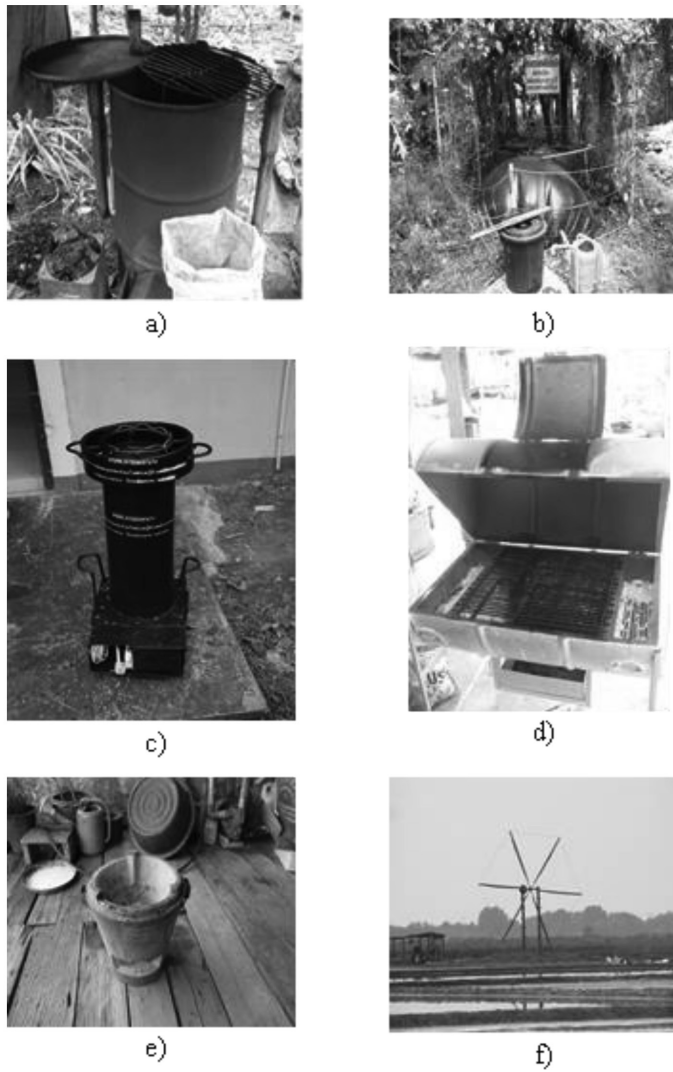

Figure 4. Choices of technology in local energy management (photo by authors)

a) 200-litre charcoal burning stove
b) landfilling of animal wastes to produce biogas
c) biomass stove
d) high-efficiency chicken griller
e) big clay firepot
f) using wind energy in the salt production

Table 3. Alternative Energy Production by Households in TCERs [9]

Alternative energy devices	Number of households	Percentage of alternative energy production
Wind energy	3	0.23
Biogas	42	4.08
High-efficiency chicken griller	119	11.55
200 litre charcoal burning stove	199	19.32
Bigclay firepot	895	86.89
Biomass stove	42	4.08
Sun energy oven	3	0.29
Total	**1,303**	**100.00**

Impact

Concerning the increase in income and cut in expenditure resulting from alternative energy production in the local energy planning project in Thailand's central and eastern regions, only some communities manage to generate more income to the local people through the production of alternative energy. The result is; nevertheless, more stressed in energy expenses, which are considerably reduced. For example, the use of cooking gas decreases from one tank per two months to one tank per three months after the implementation of the local energy planning, which encourages the local people to use locally produced energy like charcoal and biogas. In some communities where biogas is produced from animal dung, a household can save around 500-1,000 baht on energy expenses per month (1 US dollar = 30 baht). For charcoal production, people in the communities use small wood chips and agricultural residue as raw materials and so it does not affect deforestation and in case the people in some communities trim small wood from trees, according to (11), in 2009 the contribution of charcoal production to deforestation in tropical countries with the highest rates of deforestation is estimated at less than 7% and a large proportion of the areas utilized for charcoal production has the potential for rapid forest recovery especially with good post-harvest management. Though charcoal use can lead to serious health damage from indoor smoke pollution like asthma, acute respiratory infections, recent attention has focused on encouraging use of improved stoves as it results in increasing the fuel efficiency and using less charcoal which consequently lead to a decrease of pollutants emissions, thereby improving public health (12).

In terms of involvement from the people in the community, some communities are involved both in the planning and in the implementa-

tion of various activities in support of local energy planning. Whereas, some communities are only involved in the production of alternative energy, as they think that energy is not an important issue and many are also busy earning money to support their family and thus have no free time to discuss or participate in local energy planning. With respect to environmental problem, the tendency is promising thanks to the exploitation of wood waste and agricultural leftovers in energy production for consumption within the community, which yields clean and environmentally friendly energy.

The assessment results by CIPP-I Model in each criteria are as follows: 1.52 points for context, 1.32 point for the input, 1.14 point for the process, 1.25 point for the product and 1.11 point for the impact. The mean score of the assessment in all criteria is 1.27 points, which is at the moderate level. Overall, the local energy management of communities of Thailand's central and eastern regions has been implemented according to the formulated policies in the local energy management. Each community has its own energy planning project and aims to promote the use of alternative energy in the community. However, there is not much further development or application of the project nor use of alternative energy to enable sustainable success.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The assessment results of implementation of alternative energy management in the local energy planning project in Thailand's central and eastern regions is 1.27 points, which is at a moderate level. This study has proposed the seven main guidelines in local alternative energy planning, which include 1) supported for the set-up of an alternative energy local enterprise; 2) support for the set-up of a model knowledge center for alternative energy in the community; 3) support for the alternative production which is easy, convenient and suits for local way of life; 4) inculcation of awareness and enthusiasm about alternative energy in the community through a role model; 5) use of the community's need analysis as a basis for the development, management and budgeting of the energy projects; 6) development of a holistic process in alternative energy management; and 7) analysis and assessment of the alternative energy planning project on a continuous basis.

Recommendations

1. The future studies should cover all regions in the country with the aim of developing a more comprehensive process of the local alternative energy management.

2. The data used in this study were from just one project, the Local Energy Planning Project, which is only a part of the promotion of the production and use of alternative energy. Therefore, the future studies should be conducted on other projects or other promotions form relevant sectors on the use of alternative energy in the community, so as to be able to formulate more comprehensive guidelines in the local alternative energy management.

3. The guidelines proposed in this study might be applied to other areas by the agencies involved in promoting the exploitation of renewable energy in the community, so as to achieve more efficiency in local alternative energy management.

Acknowledgements

The authors wish to thank the Thailand's Ministry of Energy for funding. Special thanks to Acting. Sub.Lt. Vivat Keawdounglek for his assistance in data collections and coordinative action in this research.

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