



CALA Occasional Paper Series

Making Our Communities Greener: A Case Study of Promoting Biogas Energy by Tongwei Evergreen Libraries in China

By

Wenjie Zhou

Technology Manager, China Evergreen Rural Library Service Center;
Administrative Director, Lanzhou Foreign Language High School

Email: wj_lp@sina.com

Tel: 86-931-8510750

Lanzhou Foreign Language High School, Lanzhou, China 730010

Tim J. Zou

Head of Access Services, Associate Librarian, University of Arkansas Libraries
Consultant for China Evergreen Rural library Service Center

Email: tzou@uark.edu

Tel: 479-575-3201

365 N. McIlroy Ave., Fayetteville, AR 72701

Elaine X. Dong*

Special Formats Cataloging Librarian, University of Arkansas Libraries;
Consultant for China Evergreen Rural library Service Center

Email: edong@uark.edu

Tel: 479-575-4810

365 N. McIlroy Ave., Fayetteville, AR 72701

* Correspondence concerning this article should be addressed to Elaine X. Dong.

Abstract

Promoting the consumption of new energies, particularly of biogas, in rural areas is a strategic initiative of the Chinese government. The government has incorporated this initiative into many of its rural development plans. Likewise, Tongwei Evergreen Libraries (TEL, 通渭青树图书馆) has also integrated ideas of the initiative into its library services. This paper describes the Biogas Promotion Program (BPP) that TEL implemented, discusses the BPP model and roles of TEL in the program, and analyzes the initial results of the program through surveying local farmers. A survey was developed for this assessment study. The survey results show that the government biogas program has helped save local residents in cutting down fuel costs and improving the efficiency of agricultural processes. The results indicate that more than 50% of biogas users were influenced by the promotional activities held by TEL. The paper recognizes the success of the BPP, explains the limitations of the survey and TEL's activities, and offers suggestions for future promotional activities.

Keywords: biogas, library services, rural development, promotional activities, Chinese government

1. Background

Recently, recyclable energy makes up 7% of China's energy consumption. The goal is to increase this number to 15% by 2020 (National Development and Reform Committee of China, 2007). By that time, the European Union also hopes to increase its own recyclable energy consumption to 20%. In order to achieve this goal, the biogas initiative has been built into many of China's development plans. According to *the Eleventh Five-Year-Plan for 2006-2010* issued by the National Agricultural Ministry, 30% of all rural families will become consumers of biogas (Xinhua News Agency, 2006), which means approximately 23 million families in rural China are expected to enroll in the government program between 2006 and 2010. An additional 4,000 middle to large-scale breeding farms are also expected to switch to biogas consumption. By 2010, then, the total projected number of biogas consumers will be 40 million rural families, which is only 30% of all potential biogas candidates. It is projected that a total of 4,700 middle to large-scale breeding farms will be running on biogas by 2010 as well, which is about 39% of all possible candidates in this category. This project is expected to save the equivalent of 24.2 million tons of coal and almost a billion acres of woodlands. By using biogas dregs, there will be more than a 20% decrease in the usage of chemical fertilizer and in turn this will cause a 1% decrease in residual pesticides on farm produce. More than 8.24 million acres of farmlands will be improved and such measure will

save farmers more than 20 billion Yuan annually (Agriculture Ministry of China, 2006). This biogas initiative will help in the fight against pollution as it turns farm byproduct into usable energy efficiently.

Since 2002, Tongwei No. 1 High School has been receiving subsidies from the Evergreen Education Foundation (EEF). With this support, the school was able to modernize its library. Situated in one of the poorest counties in Gansu Province of China, Tongwei No. 1 High School is one of the earliest Evergreen libraries to build a local library cluster based on the school library centered model of library resource sharing (Zhou, Dong, & Zou, 2008). Also known as Tongwei Evergreen Libraries, the TEL cluster consists of one high school library, two middle school libraries, the county public library, and a rural book station. TEL with its combined resources and facilities serves a population of 420,000 in Tongwei County. Local residents who have a library card issued by any of TEL libraries can borrow from all the libraries in the network. Cultural lecture series and open training courses on information literacy and life skills have been held regularly through the year.

2. The Biogas Promotion Program (BPP)

China started to promote biogas in 1970 and has gone through several phases of development. Since 2000, the attention to the environmental deterioration caused by rapid industrialization and

the huge demand for energy resources to sustain the fast economic growth have compelled the Chinese government to become more determined in seeking an environmentally sound and cost-competitive energy source for rural area development. The push for using biogas for cooking and heating was immediately practical and easily acceptable by low income farmers. Reviewing biogas in China, J. M. Li pointed out several conditions indispensable for the success of a biogas program: (1) favorable and enforceable policies set forth by the central and local government; (2) sustainable government financial support; (3) broad and effective information network to deliver needed technological information to farmers; and, (4) adequate training and promotion.

The BPP was one of the creative programs that TEL implemented to support local economic and community development. TEL did not settle on a traditional library role of collecting books and providing online resources only for their students. TEL set as one of its missions to become a community information service center, and to reach out to the community to assist local residents' cultural and economic life as one of its goals. From the very beginning of the government's new energy initiative in Tongwei, TEL became a supporter through advertisements. In 2006, a few specialists from TEL compiled a handbook *An Illustration of the Biogas Promotion Program in the Rural Area of Tongwei*. That book now has become the manual for the BPP in Tongwei.

TEL, through a joint effort with the local government agency, and with biogas program trainers and promoters, contributed directly toward the creation of the third and fourth condition

mentioned above. TEL specifically contributed in promotion and training through disseminating training manuals, promotional handouts, and organizing workshops to ensure that the promotional information be delivered to all the households.

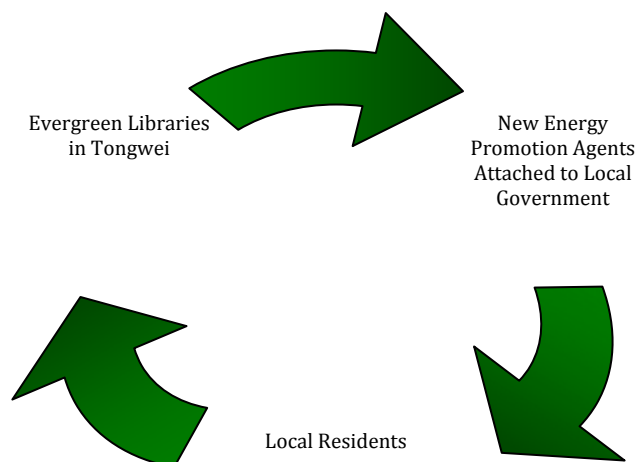
Publications on biogas and bio-energy are abundant, but documentation on a rural library's role and its programs in promoting bioenergy is almost non-existent. A direct explanation is that traditionally a library collects and disseminates agricultural information, but it does not teach the content of the subject. TEL, being in a resource-depleted area, had to step out of the traditional role with a daring and creative program to meet local needs for services. Although it was the first time for TEL to offer a program on biogas, teaching practical agricultural skills and knowledge to local residents was not new for Evergreen libraries. The Evergreen Library cluster in Tianzhu has done training on growing cotton and mushrooms, and conducting soil tests. Librarians in Karnataka, India, also have emulated similar programs to train farmers on how to test soil, select seeds, apply fertilizers, and maintain irrigation facility (Sangam, 2008). TEL program thus may well serve as a useful case study for developing library programs applicable to reach out to poor rural communities in underdeveloped areas in China.

3. The BPP Model and the Roles of TEL

3.1 The BPP Model

Subsidized by EEF, TEL developed a model of community library cluster serving the rural biogas promotion program in 2006 in the following manner:

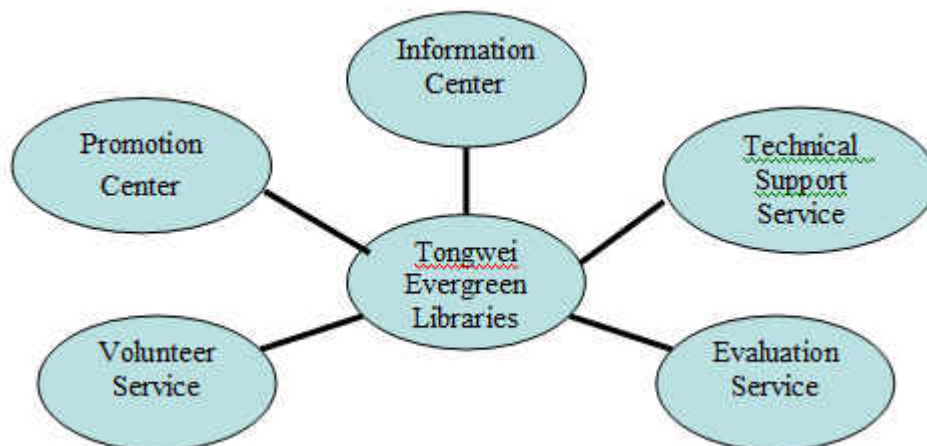
Chart 1 – The BPP Model



3.2 The Roles of TEL

Chart 2 illustrates the roles of TEL in the BPP.

Chart 2 – Roles of TEL in the BPP



For the BPP model to work, TEL has expended a lot of effort to acquire related books and information, and has accumulated a large collection of resources regarding the new energy promotion program. The collection includes not only information about the program itself but also government plans and the future of the biogas promotion program. By providing free access to these resources, TEL helps local residents realize the great value of the biogas program and understand how to participate in the government program.

Once farmers become interested in the program, TEL will then help by introducing them to local energy promotion agents, and showing them how to carry out such a program. Another way in which TEL promotes the biogas program is through the mobilization of librarians, teachers, and students to persuade farmers to choose the biogas program, apply for funding, and receive technical support. In some remote rural areas, EEF provides direct funding for farmers.

In rural areas of western China, schools are the cultural and technological centers of the community. Based on this concept, TEL mobilized physics and chemistry teachers as volunteers to help farmers solve their technical problems. Additionally, TEL set up a consulting group consisting of the principal and teachers from the Tongwei No. 1 High School with the purpose of improving the ability of TEL to serve the BPP.

Volunteers are a crucial part of the BPP. About 200 students in Tongwei No. 1 High School have participated in the volunteer group. These volunteers play an important role in promoting the biogas program. They also assist the biogas promotion experts from the local government in selecting suitable farmers, in installing and maintaining the biogas systems. In 2006, as soon as the first batch of biogas systems were built in Tongwei, these volunteers contacted farmers from different parts of Tongwei to show them how to use the biogas system and what the advantages of such a system are. Most of these volunteers are going to be part of farming families in the near future after their high school graduation, and it is very advantageous for these volunteers to become involved in the BPP at an early stage.

Evaluation helps measure the effectiveness of the BPP. TEL has taken the nontraditional role in assessing the program. It not only helps the further expansion of the biogas program, but also helps TEL improve its future promotional activities.

4. Survey Design

A survey was designed by a specialist from EEF for this study. EEF funded the study and TEL administered the survey. The survey covers the farmer’s basic background information, the reason(s) that farmers enroll in the government biogas program, government support, and benefits

Table 1 – Factors Affected Farmers’ Decision to Enroll in Government Program

Items	Percent
Savings on utilities	93.8
Biogas dregs as free fertilizer	52.6
Promotional activities by TEL	52.5
Government financial aids	47.4
Clean energy	25.8
Influence from other biogas users	17.5

of the program, etc. The main purposes of the survey are to assess the effectiveness of the BPP and TEL’s promotional activities. One hundred questionnaires were sent out to selected farmers who are identified as the head of a household. Their families have installed the biogas system. Ninety seven questionnaires were completed and returned for analysis. To make sure all data collected were reliable, researchers from TEL contacted local government officials, asking them to check and certify the questionnaires.

5. Survey Results

5.1 Effectiveness of the BPP

Table 1 shows that 52.5% of surveyed residents thought the promotional activities held by TEL, such as advertising and training, had a positive effect on their decision to enroll in the government program. This implies TEL’s promotional activities were successful in encouraging farmers to join the government program. Two other major benefits that drew farmers to use biogas energy were the savings on utilities and getting biogas dregs as free fertilizer.

Table 2 shows that TEL helped each family save an average of 1,037 Yuan (roughly \$148). Each farmer only pays a one-time fee of \$2,444 Yuan (\$349) for the biogas system, which means that on the third year, the farmers are receiving clean energy at no cost. The data show that the BPP is improving farmers’ financial situations.

Table 2 – Savings and Expenditures on Biogas Energy

Savings per Year/Family (Yuan)	Minimum	Maximum	Mean
Savings on utilities	100	1600	698
Savings on chemical fertilizer	100	800	296
Total savings	250	2000	1037
Expenditure per Year/Family (Yuan)			
Installation (paid by government)	1200		
Other expenditures (paid by farmers)	2140	2850	2444

5.2 Agricultural and Livestock Structure, and Technical Standard and Function of Biogas System

The agricultural structure is a key reference index of the biogas program. Table 3 shows that

grains (95%), especially wheat and corn, were the main farming products of Tongwei. Ninety-eight percent of the surveyed farmers breed pigs and more than 47.5% of them breed more than 2 pigs, which mean that pig excrement has been the main source for producing biogas energy.

Table 3 – Agricultural and Livestock Structure

Agricultural Structure		
	Percent	
Wheat	100	
Corn	68.8	
Pens	7.2	
Rapeseed	6.2	
Potato	5.2	
Fruit trees	4	
Other crops	1	
Livestock Structure		
	Number	Percent
Pigs	1	50.5
	2	45.5
	3	2
	Total	98
Cows	1	29.3
	2	44.4
	3	10.1
	Total	83.8
Donkeys	1	1
	2	4
	Total	5.1
Sheep	50	1
	Total	1

Table 4 – Size of Biogas Pools Built in Tongwei

Volume of Biogas Pools (cubic meters)		
Minimum	Maximum	Mean
6	36	14
Volume Distribution		
Volume of Pools (cubic meters)	Percent	Cumulative Percent
6	2.1	2.2
7	4.1	6.5
8	17.5	24.7
10	16.5	41.9
11	1.0	43
12	9.3	52.7
13	1.0	53.8
14	3.1	57
15	6.2	63.4
16	8.2	72
17	1.0	73.1
18	12.4	86
20	4.1	90.3
21	1.0	91.4
22	1.0	92.5
23	1.0	93.5
28	1.0	94.6
30	1.0	95.7
36	4.1	100

Table 4 shows that the size of the biogas pools built in Tongwei ranges from 6 to 36 cubic meters. About 78% of surveyed farmers choose to build

pools that hold 8 to 18 cubic meters. This range has become the benchmark for developing biogas programs in this area.

Chart 3 – Function of Biogas Energy

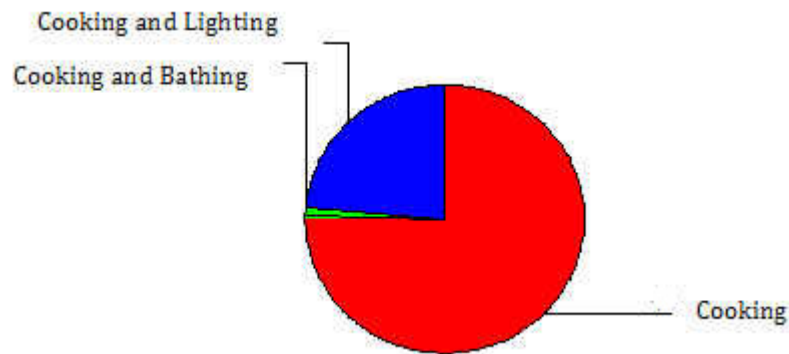


Chart 3 shows that 75.3% of surveyed farmers use the biogas energy for cooking, 23.7% of the respondents for both lighting and cooking, and only 1% for both cooking and bathing. The result shows that the biogas energy in Tongwei is used in a very limited capacity. For future promotional programs, additional information may be used to educate farmers on the other uses of the biogas.

Chart 4 shows that the age of the respondents ranges from 36 to 58. About 84% of them were between 39 and 46 years old, which imply that this range of age is more likely to enroll in the government biogas program. The data seem to indicate that younger people are more receptive to biogas. It might be necessary to provide more training and financial aids to the head of the households in other age groups.

5.3 Correlation between Age/Income/Family Size/Educational Levels and the BPP

Chart 4 – Age

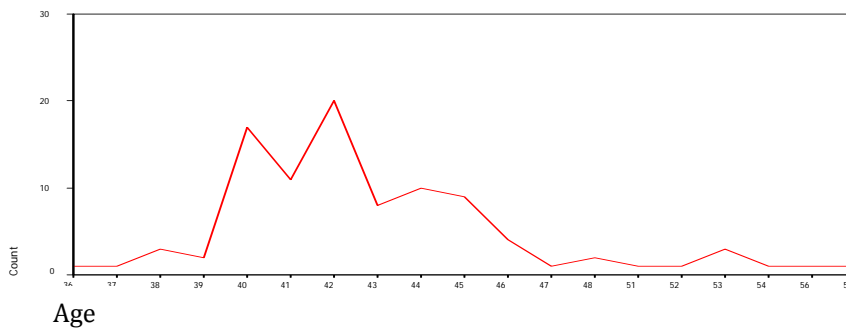


Chart 5 – Education Backgrounds

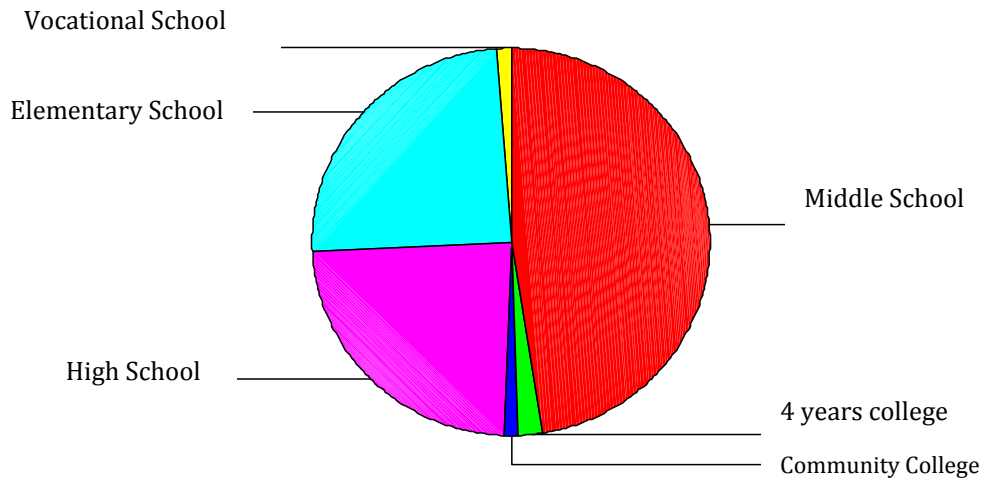


Chart 5 shows that 46% of the respondents have completed middle school and 96% have never been to college. Thus, Educational level has little impact on a farmer’s decision of joining the biogas program.

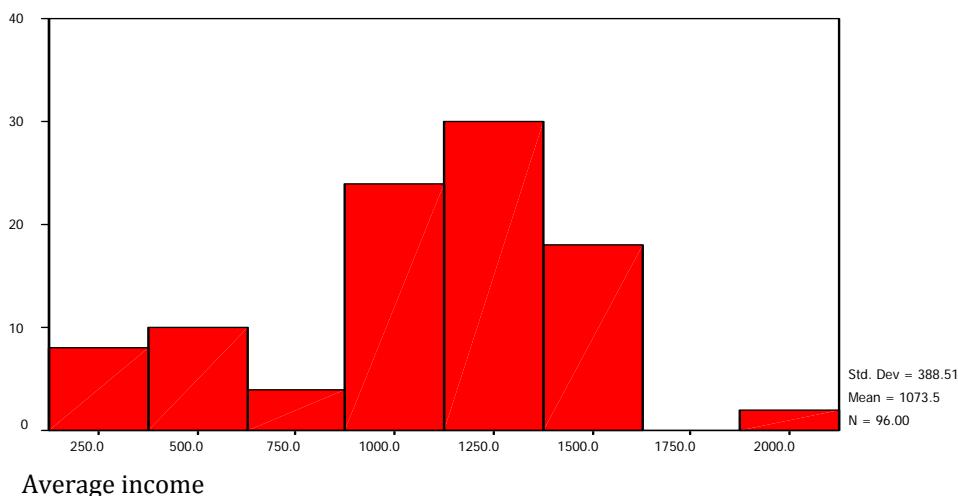
Table 5 shows that the family size of the respondents ranges from 3 to 9 people. Being a pretty wide range, this means there is no direct correlation between the family size and a farmer’s decision to enroll in the program.

The annual household incomes range from 200 to 2000 Yuan, which generally reflects the entire population of this region. The data show that the level of income did not directly affect farmers’ decisions. But Chart 6 shows that 72.9% of respondents’ annual household income is between 1,000 and 1,500 Yuan per year, which implies that these farmers are more likely to join the program. Therefore, it may be necessary to pay more attention to the families in lower income groups and provide them with financial aids.

Table 5 – Family Size and Annual Household Income

	Minimum	Maximum	Mean
Family Size	3	9	5
Annual Household Income (Yuan)	200	2000	1073

Chart 6 – Average Annual Household Income



5.4 Government Support and Benefits of the BPP

The survey result shows that 7.2% of farmers in Tongwei did not take advantage of the financial aids from the government for biogas system installation, training, technical support and maintenance. Additional financial and/or technical assistance from TEL and other nongovernment organizations would motivate more farmers to join the program.

The survey participants have listed many benefits that the BPP brought to their lives: it saved them in household fuel consumption and chemical fertilizer, improved the efficiency of agricultural processes, improved their living and health conditions by changing filth and untidiness, and relieved them from the burden of traditional cooking so that they could spend more time on other family and business activities.

6. Analysis

G. Axinn (1976) in *Non-Formal Education and Rural Development* offers a few definitions that generally describe the characteristic of a rural area:

- areas remote from concentrated urban groups
- areas where people tend to live in small and isolated groups

- areas poorly served by roads and other communications, thus limiting economic, social, and political activities
- areas low on energy generation and consumption, especially electricity and gas
- area where people are heavily dependent on the soil, and are engaged for the most part in an economy that is for self-maintenance only.

In the 1980s, a prevalent model of rural library, varyingly known as “Community Service Center,” “Information Referral Service,” or “Community Information Center,” was developed in the U.S., Great Britain, and some European countries. That service model received endorsement by both ALA and IFLA as a promising model to be used by poor, underdeveloped countries. Published studies by librarians and educators in African countries argued against direct adaptation of this model without tailoring it to address specific local needs. B. J. Mostert (2001) pointed out that the European Community Service Center model heavily relied on print based library service and pre-supposing a reading public whereas in many African countries, a large portion of the rural population is illiterate. He warned that an oversight in recognizing the specific local needs could result in implementing services “totally inappropriate and inadequate for the information needs of African people.” K. K. Kibat’s study (1990-91) contended that

“information dissemination that relies on the acquisition of printed matter [materials] will reach only a small fraction of the population because of... low income (prohibiting the purchase of expensive materials), illiteracy, and language barriers.”

In the rural areas of China, especially in illiteracy- and poverty-stricken areas, local residents have very practical information needs. In order for TEL programs to be viable and immediately relevant, TEL librarians have to think out of the box and design service programs that may not have been commonly qualified as library programs. Instead of waiting for farmers to come to TEL to borrow and read materials about agricultural skills and products, TEL librarians assume a more active teaching and instructional role to deliver agricultural information to the public by employing a show-and-tell method. The BPP workshops, together with other training events on growing mushrooms, cotton, and grapes, enable TEL to be more involved in educating residents and developing community. In terms of collecting and disseminating government publications on biogas, TEL functions on a small scale as a depository for government publications. Through TEL and its stations, the reading public can borrow and read information on biogas products and technology for free. Tapping physics and chemistry teachers as trainers and program technicians to provide technical support and consultation was another creative way for TEL to leverage its resources. The effectiveness of the BPP is confirmed by the fact that more than half of the respondents switched to biogas energy products because of the education and promotional activities of TEL. Survey data also confirm multiple economic benefits associated with adopting biogas energy.

However, the survey study also revealed a dilemma that TEL confronted. As most of the survey questions went beyond just asking respondents' demographic identities and their feedback on TEL educational and promotional activities, TEL found itself treading into very unfamiliar territory. The survey design and reports also show that they struggled to draw a line between studying the effectiveness of their outreach program and activities and the results of

biogas products and program. The survey questionnaire helped collect information on farmers' farming activities in relation to their economic means and conditions as well as their intention and applications for using the biogas products they chose to install in their homes. To analyze these data requires expertise in biogas products and technology. TEL currently does not have certified technicians and researchers to conduct product-specific studies. This lack of expertise may undermine the credibility and sustainability of the program. A close collaboration and partnership with government agencies may be a solution. With such a partnership, TEL can focus on assessment of its services and methods of training and information dissemination while forwarding data specifically related to product and implementation standards to experts in government agencies.

Another creative idea put into practice by TEL is to encourage participation from students as TEL's efforts of reaching out to the community mainly rely on their students. Although TEL selectively engaged student volunteers to participate in the BPP, the lack of documentation of these students' involvements and useful data to quantify their contribution made it impossible to assess the work of the 200 student volunteers. It is necessary to begin documenting activities and collect data and feedback from the student-volunteers as part of the assessment to make the program sustainable and to meaningfully promote volunteerism among TEL students.

7. Conclusion

Overall, the BPP case study indicates that TEL has achieved several of its goals as it expands from offering reading-based service into training and instructional-based outreach services. The benefits of its service to the local residents are immediate and evident. However, data used for this study are not sufficient to confirm TEL's capability to provide technical support nor can they help predict the sustainability of these programs, especially those technological- and product- specific ones. Methodical and timely assessments are essential to identify necessary refinements and enhancement of future programs.

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Appendix
Questionnaire
The Biogas Promotion Program in Tongwei

The purpose of this survey is to solicit feedbacks about the effectiveness of the Biogas Promotion Program sponsored by Tongwei Evergreen libraries. All the data from this survey is to be used for research purpose. Please complete all the questions that apply to you. Thank you.

Question 1: Basic information

Name		Age		Education Background	
Home address		Family Size		Annual Household Income	

Question 2: Why do you enroll in this program? (Circle all that apply)

- Influence from other biogas users
- Savings on utilities
- Clear energy
- Government financial aids
- Promotional activities by Tongwei Evergreen libraries
- Biogas dregs as free fertilizer
- Other_____

Question 3: What do you use the biogas energy for? (Circle all that apply)

- Cooking
- Lighting
- Bathing
- Other_____

Question 4: Agricultural and livestock structure

Types of agricultural products (grains, fruits, etc.)	
Types and numbers of livestock	

Question 5: Savings and expenditures on biogas energy

Savings per year/family	Minimum (Yuan)	Maximum (Yuan)
Savings on utilities		
Savings on chemical fertilizer		
Others (Please specify)		
Expenditure per year/family (on installation, device, maintenance, etc.)		
Installation (paid by government)		
Other expenditures (paid by farmers)		

Question 6: Did you get government financial aid for your biogas system?

Question 7: Please list the benefits of the Biogas Promotion Program to your life.



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