

*World Bank-financed Hebei Rural Renewable
Energy Development Demonstration Project*

Social Assessment
of the World Bank-financed Hebei Rural
Renewable Energy Development
Demonstration Project

Hebei Rural New Energy Development Project Management Office(PMO)

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ABBREVIATIONS

AH	-	Affected Household
AP	-	Affected Person
FGD	-	Focus Group Discussion
HD	-	House Demolition
IA	-	Implementing Agency
LA	-	Land Acquisition
M&E	-	Monitoring and Evaluation
MLS	-	Minimum Living Security
PMO	-	Project Management Office
RAP	-	Resettlement Action Plan
RIB	-	Resettlement Information Booklet
SA	-	Social Assessment

Units

Currency unit	=	Yuan (RMB)
US\$1.00	=	RMB6.33
1 hectare	=	15 mu

1 Overview of the Project and SA

1.1 Overview of the Project

The first batch of Hebei Rural Renewable Energy Development Demonstration Project (hereinafter, the “Project”) consists of 6 subprojects in 6 counties/districts in Tangshan, Hengshui, Handan and Chengde Cities, which are the Anping, Yutian, Zunhua, Linzhang, Chengde, Laoting Subprojects (see Appendix 3 for details).

After the completion of the Project, biogas generation capacity will reach 128,600 m³ per day or 42.8297 million m³, annual stalk consumption 229,400 tons and annual animal waste consumption 241,600 tons. Biogas generated will be used for cooking and heating by 96,100 rural households.

The gross investment in the Project is USD 212 million, including a Bank loan of USD 100 million, with the remainder from domestic counterpart funds and self-raised funds.

In the project, crop stalks and animal waste will be turned into biogas, which will be refined, treated and delivered to rural households. The Project will improve their production and living quality, and generate significant social, environmental and economic benefits by supplying high-quality biogas fertilizer, increasing output and income, and inhibiting stalk burning effectively.

1.2 Tasks of SA

This SA aims to identify the primary stakeholders and learn their needs through extensive public participation, incorporate their needs into the project design, identify social risks, with focus on willingness and ability to pay, awareness of new energy sources, and impacts on traditional energy industries (especially CNG) and women, and propose a social action plan on this basis.

1.3 Scope of SA

This SA includes current situation analysis, stakeholder analysis, poverty analysis, gender analysis, ethnic minority analysis, public participation and grievance redress, and social management plan and implementation.

1. Current situation analysis: learning the socioeconomic profile of the project area, mainly including key economic and social development indicators, income and expenditure of urban and rural residents, main livelihoods and existing issues, social and gender development, urban and rural poverty, etc.

2. Stakeholder analysis: identifying primary stakeholders, including those benefiting and suffering from the Project, and learning their needs, and the Project’s positive and negative impacts on them, especially vulnerable groups (e.g., the poor, women, laid-off workers and casual laborers)

3. Social impact analysis: learning the Project’s potential social impacts, including direct and indirect impacts, and potential social risks, with focus on the following:

- Negative impacts on livelihoods of CNG workers, irregular employees, female employees, etc.;
- Ability and willingness to pay for biogas facility construction, and domestic waste collection and transport, as well as preferential policies for the poor;

- Impacts of biogas raw material collection and transport, including willingness of rural residents to sell and transport biogas raw materials (e.g., stalks, animal waste), acceptable prices, treatment process, etc.;
- Health impacts arising from rural environmental conditions and energy use;
- Risks of vulnerable groups in the payment of initial pipeline installation charges and biogas charges; and
- Analyzing the satisfaction and livelihood restoration of persons affected by LA

4. Information disclosure and public participation: improving the public awareness of new energy sources and their waste disposal habits through extensive publicity, information disclosure and public participation

1.4 Methods of SA

The methods of literature review, questionnaire survey, FGD, in-depth interview, key informant interview and participatory observation were used in the SA mainly.

Literature review

1) Collecting domestic and overseas experience and practices on rural new energy development and utilization, learning public perceptions and attitudes in this respect, measures and suggestions for improvement, etc.;

2) Background literatures related to the project area were collected, including statistical yearbooks and bulletins, literatures on ethnic minorities, rural environmental management, LA, etc., and policy documents.

Questionnaire survey

The affected area of the Project includes: a) area affected by LA for biogas plants; b) biogas supply area; and c) raw material supply area, i.e., within a radius of 20km around biogas plants. This SA covers both suffering (LA) and beneficiary areas.

The questionnaire survey was conducted in 10 villages/communities in 4 project counties/districts among all the 12 villages/communities in all the 6 project counties/districts, with 830 copies of the questionnaire distributed and 797 valid copies recovered, accounting for 96.02%, (see Table 1-1). The questionnaire survey covers: 1) basic personal and household information; 2) residents' attitudes to and perceptions of domestic waste treatment; 3) information disclosure and grievance redress; 4) positive and negative impacts of the Project; 5) local domestic waste management services; 6) LA compensation, and production and livelihood restoration of the AHs; and 7) suggestions on information disclosure and public participation.

The questionnaire database was established and analyzed using the SPSS19.0 software. See Table 1-1.

Table 1-1 Information on Valid Samples

Indicator	Values
Gender	555 males, 69.6%; 242 females, 30.4%
Age	Average 49 years, ranging from 17 to 88
Local/nonlocal	Local, 99.9%; nonlocal, 0.1%
Urban/rural	Rural, 98.7%; urban, 1.3%

Educational level	Illiterate, 8.9%; primary school, 30.7%; junior high school, 43.7%; senior high school, 13.6%; secondary technical school, 13.6%; junior college or above, 0.9%
Occupation	Civil servant, 1.3%; enterprise employee, 1.7%; other employee, 25.3%; farmer, 50.5%; student, 0.2%; freelancer, 3.1%; housewife (househusband), 11.4%; unemployed, 2.3%; retired, 2.8%; other, 1.4%
MLS household	Yes, 33, 4.1%; no, 794, 95.9%

FGD

26 organizational FGDs were held with the owners, IAs, agriculture bureaus and other agencies concerned, with 130 participants in total, to learn their attitudes, potential social impacts and countermeasures; 33 FGDs were held with 330 APs and local residents (including 160 women, accounting for 48%) to learn project impacts, expectations for information disclosure and public participation, and suggestions on the Project.

In-depth interview

Personal in-depth interviews were conducted to further learn production and living conditions, project impacts and potential risks, attitudes to, suggestions on and expectations for the Project. 768 men-times of in-depth interviews (including 383 women, accounting for 49.86%) were held in 12 villages/communities in 6 counties/districts.

Key informant interview

Heads of local statistics bureaus, civil affairs bureaus, poverty reduction offices, environmental protection bureaus, labor and social security bureaus, civil affairs bureaus, ethnic and religious affairs bureaus, women's federations, sanitation offices, land and resources bureaus, agriculture bureaus, etc., staff members of village committees, and heads of enterprises were interviewed to learn their comments and suggestions, with focus on the optimization of the social action plan. 20 key informant interviews were conducted in each project county/district.

Participatory observation

Participatory observation aims to learn local socioeconomic profile, energy use, waste disposal and other daily behavior, potential project impacts, etc. to provide an objective basis for optimizing the project design. See Table 1-2.

Table 1-2 Summary of SA Methods

Stakeholder	Method	Key points
IAs and government agencies concerned	- Literature review - FGD - In-depth interview	Local socioeconomic data and energy mix; Experience and lessons in management and implementation; Awareness of project needs and impacts; Supporting policies and strategy for community participation
Enterprises, markets, CNG operators	- In-depth interview	Energy sources, consumption habits and minds, management institutions; Recognition of new energy sources; Objective and subjective needs for new energy sources; Suggestions on the use and management of new energy sources; Attitudes to potential impacts of the Project on traditional energy industries;

		Comments and suggestions on the Project
Employees in traditional energy industries (CNG workers)	<ul style="list-style-type: none"> - In-depth interview - FGD 	Household information; Current jobs, awareness of project impacts and risks; Awareness of unemployment, social security and other risks; Comments and suggestions on the Project
Local residents	<ul style="list-style-type: none"> - Observation - Questionnaire survey - FGD (MLS households, women, ordinary residents) 	Energy sources, consumption habits and minds, management institutions; Recognition of new energy sources; Objective and subjective needs for new energy sources; Suggestions on the use and management of new energy sources; Objective and subjective obstacles in the use of new energy sources; Ability and willingness to pay potential charges in the use of new energy sources

2 Socioeconomic Profile of the Project Area

2.1 Overview of the Project Area

Hebei Province is located between north latitude 36°05′-42°37′ and east longitude 113°11′-119°45′, and in the Northern China Plain, surrounding Beijing City (China's capital) and Tianjin City, bordered by the Bohai Sea on the east. In 2012, Hebei's GDD was 2.6575 trillion yuan, ranking 6th among all provinces, autonomous regions and municipalities directly under the central government of China.

As a major agricultural province of China, Hebei abounds with agricultural biomass resources. There is an annual surplus of over 13 million tons of stalks, and the annual discharge of animal and domestic waste is 120 million tons in Hebei. With the progress of urbanization, and the rapid development of crop cultivation and stockbreeding, the ecological environment and human health are threatened by animal and domestic waste. Since Hebei is in northern China with a long winter, most of rural residents rely on coal for heating and cooking, with an annual coal consumption of about 22.55 million tons, resulting in serious pollution and health problems.

2.2 Socioeconomic Profile

1. Demographics

Hebei governs 11 prefecture-level cities, 22 county-level cities, 108 counties and 6 autonomous counties, with a land area of 188,800 km², a resident population of 72.8751 million and a floating population of 6,7699 million. See Table 2-1.

Table 2-1 Administrative Divisions and Population of the Project Area in 2012

County /district	Population (0,000)	Land area (km ²)	Township/village
Linzhang	65		Luocun Village
Laoting	49.3	1308	Industrial cluster zone of the Laoting county town
Chengde	42	3648	Sangou Town, Chengde County
Yutian	67.3	1165	Guojiatun Xiang
Zunhua	73	1521	Baozidian Town
Anping	32.98	493	Xishuangwa Xiang

2. Economy

In 2012, Hebei's GDP was 2.6575 trillion yuan, a year-on-year growth of 9.6%, in which the added value of primary industries was 318.67 billion yuan, up 4.0% and accounting for 12.0%; that of secondary industries 1.4001 trillion yuan, up 11.5% and accounting for 52.7%; and that of tertiary industries 938.73 billion yuan, up 8.4% and accounting for 35.3%. In 2012, the per capita net income of urban residents was 20,543 yuan, up 12.3%, and the per capita net income of rural residents 8,081 yuan, up 13.5%; the per capita nonproductive expenditure of urban residents was 12,531 yuan, up 7.9%, and that of rural residents 5,364 yuan, up 13.9%; the Engel's coefficient of urban residents was 33.6%, down 0.2 percentage point, and that of rural residents 33.9%, up 0.4 percentage point; the per capita housing size of urban residents was 32.5 m², up 0.9%, and that of rural residents 36.4 m², up 2.6%. See Table 2-2.

Table 2-2 Summary of Socioeconomic Indicators of the Project Area

Project county/district	GDP (00m yuan)	Per capita GDP (yuan)	Type of industries (0,000 yuan)			Per capita disposable income of urban residents (yuan)	Per capita net income of farmers (yuan)	Fiscal revenue (0,000 yuan)
			Primary	Secondary	Tertiary			
Linzhang	92.2414	26518	268041	343914	310459	21740	7864	15317
Laoting	289.65	58721	713600	1037800	1145000	22185	9492	71678
Chengde	95.7549	24609	202962	492580	262007	16459	5028	54992
Yutian	307	45616	526740	1371768	929120	22400	8920	66181
Zunhua	485.3	66557	352600	2662700	1837300	21332	8890	125375
Anping	72.8	22073	102000	368000	198000	17867	7482	21147

2.3 Local Energy Consumption

According to the second national agricultural census, among cooking energy sources of farmers, 133.18 million households use firewood or stalks mainly, accounting for 60.2%; 57.62 million households use coal mainly, accounting for 26.1%; 26.42 million households use coal gas or natural gas mainly, accounting for 11.9%; 1.45 million households use biogas mainly, accounting for 0.7%; 1.82 million households use electricity mainly, accounting for 0.8%; and 590,000 households use other energy resources mainly, accounting for 0.3%. Stalks, firewood and coal remain dominant in rural residents' lives.

In Hebei Province with a rural population of 54.12 million, most rural residents use coal, stalks and firewood for heating and cooking. In 2011, Hebei's rural domestic energy consumption was 33.2825 million tons of standard coal, including commercial energy sources of 20.563 million tons of standard coal and noncommercial energy sources of 12.7195 million tons of standard coal.

Rural productive energy consumption was 25.683 million tons of standard coal, including commercial energy sources of 25.322 million tons of standard coal and noncommercial energy sources of 361,000 tons of standard coal. Commercial energy sources include coal of 15.317 million tons of standard coal, coke of 1.362 million tons of standard coal, finished oil of 5.207 million tons of standard coal and electricity of 3.436 million tons of standard coal; noncommercial energy sources include stalks of 150,000 tons of standard coal and firewood of 211,000 tons of standard coal.

According to the questionnaire survey, the primary domestic (cooking) energy sources in the project area are CNG and electricity, accounting for 83.4% and 81.1% among the 797 samples respectively. Those using pipe gas and solar energy account for 0.1% and 0.5% respectively. Among other energy sources, those using coal account for 13.2%, those using biogas for 1.6% and those using stalks for 13.4%. See Table 2-3.

Table 2-3 Domestic Energy Sources in the Project Area

Type	Coal	Biogas	CNG	Electricity	Solar energy	Stalks	Pipe gas
N	105	13	665	646	4	107	1
Percent	13.2	1.6	83.4	81.1	0.5	13.4	0.1

2.4 Current Situation and Potential Analysis of Local New Energy Sources

2.4.1 Current Situation and Potential Analysis of Crop Stalk Utilization

1. Linzhang County

In the core area of Linzhang County, available cornstalk resource is 17,944 tons (average moisture content 10%), equivalent to a silage cornstalk resource of 46,000 tons, which is sufficient

to meet the cornstalk demand of the Linzhang Subproject of 23,100 tons. See Table 2-4.

Table 2-4 Stalk Utilization in the Core Area of Linzhang County (Unit: %)

Year	Domestic fuel	Stockbreeding	Return to fields	Other for sale
2010	12	3	50	35
2011	8	3	45	44
2012	5	3	50	42

2. Laoting County

The core area of Laoting County available cornstalk resource is 68,400 tons, equivalent to a silage cornstalk resource of 58,140 tons, which can meet 95.57% of the cornstalk demand of the Laoting Subproject of 60,800 tons, and cornstalk supply is sustainable.

3. Chengde County

In the project townships, total annual stalk output is 100,200 tons and total annual available stalk resource is 64,100 tons.

Currently, 16% of available stalks are used as a feed, 3% as a fertilizer, 1% as a fuel, while the remainder can be collected and utilized. Based on the stalk output of 0.75 ton/mu and an availability rate of 0.8, 80,100 tons of stalks can be collected in Chengde Town and 64,100 tons can be utilized. The current purchase price of stalks is about 180 yuan/ton.

4. Yutian County

In Yutian County, average daily dry stalk output is 282.83 tons, in which 40% of stalks are used as a livestock feed, 8% used as a fertilizer, 50% as a fuel, and the remainder for other purposes.

40% of stalks are used as a feed, 8% as a fertilizer and 50% as a fuel. In addition, there are 4 stalk solidification and forming bases in the county, with a total annual output of 2,000 tons.

5. Zunhua County

In the core area of Zunhua County, there is a corn cultivation area of 5,169 hectares with a total output of 29,039 tons, 31,360 tons of cornstalks, 12,090 tons of wheat stalks and 12,200 tons of peanut stalks can be collected annually, totaling 55,650 tons.

6. Anping County

In Xishuangwa Xiang where the Anping Subproject is located, there is a cultivated area of 45,000 mu, which is sufficient to meet the stalk demand of the Anping Project of 31,633 mu.

In sum, crop stalks are used as an energy source, a feed, an industrial raw material, a matrix for edible fungi or returned to fields. The development of rural renewable energy sources, especially biogas and biomass energy, can treat large quantities of crop stalks effectively and increase the income of rural residents. The use of stalks as an energy source is a future trend of stalk utilization and has an extensive prospect.

2.4.2 Current Situation and Potential Analysis of Animal Waste Utilization

1. Linzhang County

Table 2-7 Stockbreeding in the Core Area of Linzhang County

Species	Amount on hand	Daily waste (kg/head)	Annual waste (t)	Utilization mode
Pig	480	3902.4kg	1424.376t	Return to fields
Egg chicken	7000	1050kg	383.25t	Return to fields
Meat chicken	26000	1560kg	569.4t	Return to fields

2. Chengde County

The main species of livestock in Chengde County are pig, cattle, sheep and poultry, including 56,400 pigs, 16,800 heads of cattle, 15,400 heads of sheep, 335,900 chickens and 14,300 ducks, producing 193,800 tons of animal waste annually. Currently, animal waste is collected manually and used as a fertilizer mainly.

3. Yutian County

The pig and chicken farms of Yutian Yiheyuan Eco-agriculture Co., Ltd. in Yutian County produce 360 tons and 23 tons of animal waste daily, which are sufficient to meet the demand of the Yutian Subproject.

The biogas generation process based on animal waste fermentation of this company is sophisticated.

4. Zunhua County

There are 41 stockbreeding enterprises in the core area and 87 in the radiated area. All livestock farms produce 161.4 tons of wastewater and 72.17 tons of animal waste daily. Except that a small part is used for fermentation, most animal waste is applied on fields as a fertilizer. Generating biogas from animal waste fermentation will provide a fuel to rural residents, thereby improving the rural environment and increasing the income of stockbreeding households.

5. Anping County

Anping County is the largest lean pig breeding base in northern China, with 18 pig farms with over 10,000 pigs, over 30 with over 1,000 pigs, 80 major pig breeding villages, and over 6,000 pig breeding households. In 2011, 850,000 live pigs were released. Currently, animal waste produced by the pig farms is treated at self-built treatment plants and then treated at municipal wastewater treatment plants.

Animal waste produced by the pig breeding enterprises in the core area is applied on fields as a fertilizer. However, this is neither economical nor environment-friendly. Generating biogas from animal waste fermentation will provide a fuel to rural residents, thereby improving the rural environment and increasing the income of stockbreeding households.

3 Analysis of Stakeholder Needs and Social Impacts

3.1 Primary Stakeholders and Demand Analysis

3.1.1 Rural Households and Villages/Communities

The Project is expected to supply cooking biogas to 120,000 rural households in 12 townships in 6 districts/counties in 4 cities. However, Linzhang, Laoting and Chengde Counties will be affected by LA, which may reduce the APs' living standard.

For biogas users, biogas supply is a clean energy source, which can improve the safety and convenience of energy use, and eliminate the need for CNG tank transport.

The use of biogas fertilizer can improve the ecological environment and soil structure effectively. In addition, the project enterprises will sell organic fertilizer as a low-price byproduct, thereby reducing production costs of rural households, increasing land fertility and output, and also protecting the environment.

For the project villages, the Project will transfer and treat domestic waste effectively for recycling, thereby improving the local environment.

For taxis, biogas supply stations will be constructed in some subprojects to provide gas supply service, thereby supplying a clean energy source and making up the gap of energy supply.

During project implementation, needs of women, old people and the poor should be well considered in the selection and use of cooking energy. In addition, women should be involved in public affairs, and trained on the use and safety of new energy sources.

Mr. Wang in Anping County:

I have heard of but not used biogas. I will use it only if it is cheap. It is convenient for cooking and can be used for lighting. However, I am unwilling to pay 40 yuan a month for it, and can only accept 20-30 yuan.

Moreover, it should be maintained properly, otherwise I would even be unable to cook.

3.1.2 Enterprises

In the project area, CNG enterprises include Handan Gas Company, Tangshan Gas Group, Tangshan Haigang Gas Co., Ltd., Yongqiang CGN Station in Laoting County, Fangxing CGN Station in Chengde County, Lida and Hengxing CGN Stations in Yutian County, etc. After the completion of the Project, CNG demand in the project area will be reduced due to the supply of biogas, thereby affecting their profits and making CNG workers unemployed.

3.1.3 IAs

The Project has 6 IAs, which are Runze Zhimin Agro- technology Co., Ltd., Hebei Jointo Energy Investment Co., Ltd., Chengde Luneng Organic Fertilizer Co., Ltd., Yutian Yiheyuan Eco-agriculture Co., Ltd., Hebei Meikeduo Foods Group Co., Ltd., Tangshan Mingren Bio-energy Development Co., Ltd., and Yufeng Jing'an Stockbreeding Co., Ltd. They are responsible for the organization and management of project construction.

The Project aims to promote the recycling of energy sources, improve the output and quality of

farm products, mitigate rural environmental pollution, and promote benign local economic development. The IAs should endeavor to ensure the successful implementation of the Project.

For enterprises generating biogas from animal waste, the only problem to be solved is the odor of animal waste. For enterprises generating biogas from stalks, a sound stalk collection and transport should be established.

Head of Runze Zhimin Agro-technology Co., Ltd.:

We have conducted an energy survey, which shows that local residents are willing to supply stalks to us. Currently, they either return stalks to fields or burn them.

Wheat and corn are cultivated extensively here, and stalk output is very high, so there will be no problem in raw material supply. We are discussing a biogas replacement plan for the benefit of local residents.

3.1.4 Local Governments

Local development and reform commissions: The county development and reform commissions should support the construction of the Project, provide public services, assist the Hebei PMO in communicating with the local agriculture bureaus, and study supporting policies for the poor.

County PMOs: The county PMOs should assist the Hebei PMO in communicating with the owners, assist the owners in the socioeconomic survey and public participation, coordinate and supervise resettlement and internal monitoring, and handle conflicts and issues arising from project implementation.

Local land and resources bureaus: The county land and resources bureaus should carry through the state policies and regulations on construction land, review compensation rates for LA, go through the LA procedures, participate in the socioeconomic survey and resettlement, and handle conflicts and issues arising from LA.

Environmental protection bureaus: The county environmental protection bureaus should ensure the timely collection and transport of local rural waste, establish a rural waste collection and transport mechanism to promote the development and utilization of new energy sources, and supervise the implementation of the relevant environmental policies.

Director of the Laoting PMO:

Household biogas construction was started very long ago, and trials on biogas use have been very successfully. The PMO was established in 2009, and training has been conducted many times.

3.1.5 Management Agency

Hebei PMO: In order to implement the Project, a leading group has been established, which is headed by an executive deputy governor, and composed of members from the provincial development and reform commission, finance department, agriculture department, and other provincial departments. The Hebei PMO under the leading group is responsible for project coordination, supervision, inspection and internal monitoring, and coordinating the work of the IAs and external M&E agency to ensure the successful implementation of the Project.

3.2 Social Impact Analysis

3.2.1 Positive Impacts

Among the 797 respondents in the questionnaire survey, 249 highly welcome the Project and 520 welcome the Project, accounting for 96.5% in total, while only 3.5% do not welcome the Project (see Table 3-1). The positive impacts of the Project will be described in the following aspects:

Table 3-1 Acceptance of the Project among Local Residents

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Highly welcome	249	31.2	31.2	31.2
	Welcome	520	65.2	65.2	96.5
	Neither, nor	23	2.9	2.9	99.4
	Unwelcome	5	0.6	0.6	100.0
	Total	797	100.0	100.0	

1. Economic level

Biogas is much cheaper than CNG, so the Project will reduce energy expenses of rural households directly. After project completion, pipeline biogas price will be 1.8 yuan/m³ on average, ranging from 1.2 yuan/m³ to 2.3 yuan/m³, so that local residents' energy expenditure will be reduced effectively. See Chapter 4 for details.

On the other hand, for biogas fertilizer users, the Project will improve the quality of farm products and the efficiency of agriculture, increase the income of farmers, and reduce agricultural production costs. Currently, the overuse of fertilizers and pesticides results in reduced quality of farm products and affects their market competitiveness. The use of biogas residue as a fertilizer can improve the quality of farm products and reduce their costs, thereby improving their market competitiveness.

Mr. Zhang, Houpu Village, Anping County:

Everyone is willing to use organic fertilizer, and unwilling to use chemical fertilizer because everyone knows that it is not good. We will be very happy if we can use biogas fluid in the future.

During the 12th Five-year Development Plan period, China's organic agriculture will develop rapidly, but the production of organic fertilizers cannot meet the demand of organic agriculture. Current market prices of organic fertilizers are as follows:

Table 3-2 Market Prices of Organic Fertilizers (Unit: yuan/ton)

Enterprise	Product	Form	Content	Quotation
Xiangtan Xingnong	Organic fertilizer	Powder	NPK≥4%, organic matter ≥30%	1500
Anhui Laimujia	Organic fertilizer	Particle	Organic matter 20%	1200
Shandong Jinyimeng	Organic fertilizer	Powder	NPK≥4%, organic matter≥30%	1600
Zhongke Lubao	Organic fertilizer	Powder	N:P:K=16:0:2, organic matter≥30%	1600

Organic fertilizers currently available from the market are sold at 1,500-3,000 yuan/ton, in which solid biogas fertilizers are relatively expensive and liquid biogas fertilizers cheap. See Table 3-3.

Table 3-3 Fertilizer Prices in the Project Area

No.	Subproject	Biogas (yuan/m ³)	Solid biogas fertilizers (yuan/ton)	Liquid biogas fertilizers (yuan/ton)	CNG
1	Anping	2	620	--	--
2	Yutian	1.8	480	10	--
3	Zunhua	1.2	800	--	--
4	Linzhang	2	900	1300	--
5	Chengde	1.9	1100	90	2.8 yuan/m ³
6	Laoting	2	1000	--	3.7 yuan/m ³

In the subproject area, CNG is available to taxies, buses and cars at 2.8-4.7 yuan/m³. In 2013, the price of civil natural gas was 2.6 yuan/m³ and that of vehicle natural gas 3.9 yuan/m³ in Hebei Province. With the rapid growth of natural gas demand, CNG produced in the Project will make up the gap in natural gas supply effectively. See Appendix 1 for details.

In addition, the Project will generate over 100 jobs at the construction stage and at least 20 jobs at the operation stages. 513 respondents are willing to do the jobs generated by the Project, accounting for 64.4%, while the other 35.6% of the respondents are unwilling because they already have jobs. See Table 3-4.

Table 3-4 Employment Willingness of Local Residents

Are you willing to do jobs generated by the Project?		N	Percent	Valid percent	Accumulated percent
Valid	Yes	513	64.4	64.4	64.4
	No	284	35.6	35.6	100.0
	Total	797	100.0	100.0	

2. Social level

The Project will promote rural environmental management and new countryside building greatly, and realize modern, high-quality and clean rural energy consumption. Generating biogas from stalks provides a new alternative to stalk burning, and helps improve the utilization rate of stalks, playing a crucial role in meeting rural energy demand and protecting the environment.

Through the replacement of traditional energy sources such as stalks and coal with the new energy source, the Project will improve rural hygienic conditions, and reduce diseases arising from stalk or coal burning.

In rural areas, housework is undertaken by old women mainly, who are exposed to the risk of gas or CNG leakage. In contrast, biogas appliances are safe, especially for women, children and old people.

Ms Li, Shangjie Village, Yutian County (62 years, housewife):

I'm taking care of my grandson at home alone, because my son and his wife are working outside. Although pipeline gas is available, I'm unwilling to use it for fear of any risk. Biogas equipment should be installed and training provided as long as it is cheap, safe and clean.

Third, biogas is a renewable clean energy source whose efficiency is much higher than that of stalks, firewood and coal. It can replace such biomass energy sources as stalks and firewood, and such fossil energy sources as coal, natural gas and LPG. Its development has great significance in improving rural energy structure and alleviating rural energy shortage.

3.2.2 Potential Risks

1. LA risks

LA may deprive the APs of livelihoods and jobs, and pose a series of potential, long-term social, cultural and mental impacts. If they are not resettled properly, direct conflicts may arise. 5 subprojects involve LA, with a total acquired land area of 215 mu, affecting 45 households with 203 persons in 3 counties. The main income sources of the APs are agriculture and employment. See the RAP.

2. Risk of use of new energy sources

Pipeline biogas is still a new thing for local rural areas and its awareness among rural residents is low due to inadequate publicity. Some residents think that it is inconvenient and unsafe. This risk can be evaded through extensive publicity and education.

3. Risk of unemployment of CNG workers

All CNG operators in Hebei Province are state-owned enterprises, which supply gas to urban areas mainly. Since the Project serves rural areas mainly, it will affect CNG operators slightly. For example, there are 4 CNG supply stations in Handan City, which are affiliated to Handan Gas Company, and supply CNG to nearly 300,000 public, industrial and household users.

Luanxian County Construction Investment Company: Gas companies are major state-owned enterprises with large outputs and sales volumes. The number of users involved in the Project is too small for them; besides, they serve urban areas mainly, while the Project serves rural areas mainly.

On the other hand, there are two CNG traders or so in each project county/district, who earn about 20,000 yuan per month. Since they work in urban areas mainly, their income will not be reduced due to the Project.

Mr. Li in Zunhua County: There are two CNG traders in our county, who transport CNG tanks with motor tricycles. CNG is rarely used in rural areas, so their business will be hardly affected by the Project. If they are truly unemployed, they can be trained to work at the biogas service station.



Figure 3-4 CNG Delivery Truck

4. Inadequate information disclosure

At the design and preparation stage, project information was disclosed via village committees, local TV stations and local government websites.

A feasible public participation strategy should be established to ensure that rural residents are aware of and accept new energy sources, and support the collection and transport of stalks,

domestic waste and animal waste, otherwise the objectives of the Project can hardly be realized.

The SA team has developed the Social Management Plan based on the potential risks of the Project. See Chapter 8.

4 Poverty Analysis

4.1 Poverty Analysis

1. Hebei Province

In 2012, there were 39 state-level poor counties and 17 province-level ones in Hebei Province. At the end of 2012, Hebei Province had an MLS population of 2.83 million, including an urban MLS population of 780,000 and a rural MLS population of 2.05 million. See Table 4-1. In 2012, Hebei Province had a rural poor population of 7.95 million based on the national poverty reduction standard of 2,300 yuan per capita per annum, accounting for 10.1% of rural population.

Table 4-1 Rural MLS in the Project Area (July 2013)

County	Rural MLS population	Rural MLS standard (yuan)
Laoting	15000	2900
Chengde	23450	1964
Longhua	23866	1248
Yutian	16342	2200
Zunhua	7038	2300
Anping	7619	2203

2. Project area

Although the 7 project counties/districts are relatively developed, there is still a poor population of 130,000 in the project area, with a rural poverty incidence of 5.9%.

The questionnaire survey shows that 77.5% of the sample households have income of 10,000-55,000 yuan, 9.9% have income of over 55,000 yuan, 10.1% have income of 8,050-10,000 yuan, and 1.2% have income of less than 8,050 yuan. Most local rural residents deal with transport and other sideline operations except farming, and their income is generally high.

Only 10 respondents are entitled to MLS and suffer relative poverty due to illness, labor shortage or disability.

The potential negative impacts of the Project on poor population include:

- 1) LA may result in or aggravate poverty;
- 2) Initial pipeline installation charges and biogas charges collected after the completion of the Project may increase the financial burden of poor households.

Table 4-2 Annual Income of Sample Households

Household income (2012)	N	Percent (%)
8,050 yuan or less	9	1.2
8,051-10,000 yuan	92	11.5
10,001-20,000 yuan	166	20.8
20,001-30,000 yuan	197	24.7
30,001-40,000 yuan	135	16.9
40,001-50,000 yuan	114	14.4
More than 50,000 yuan	84	10.5
Total	797	100.0

The SA team thinks that the project design has allowed for poor population to benefit equally from the Project, and the Project will neither increase the degree of poverty nor result in additional poverty. This is shown in the following:

1) Reducing household energy expenses: Stalk burning in rural areas results in environmental pollution and the waste of resources. Generating biogas from stalks provides a new alternative to stalk burning, and helps improve the utilization rate of stalks, playing a crucial role in meeting rural energy demand and protecting the environment. On the other hand, stalks can be sold for money directly to increase the income of poor population.

2) The jobs generated at the construction and operation stages will be first made available to local residents, including unskilled jobs at the construction, and stalk collectors and transporters, security guards, cleaners, landscaping workers, etc. at the operation stage.

3) The Project will promote local economic development and alleviate poverty by promoting the integrated utilization of new energy sources, capital introduction and employment.

4.2 Willingness and Ability to Pay of Local Residents

4.2.1 Ability to Pay

4.2.2.1 Project cities

Handan City: In 2012, the city's GDP was 302.37 billion yuan, the per capita disposable income of urban residents 21,740 yuan, and the per capita income of rural residents 8,447 yuan.

Chengde City: In 2012, the city's GDP was 118.09 billion yuan, the per capita disposable income of urban residents 16,832 yuan, and the per capita income of rural residents 5,546 yuan.

Tangshan City: In 2012, the city's GDP was 586.163 billion yuan, the per capita disposable income of urban residents 24,358 yuan, and the per capita income of rural residents 10,698 yuan.

Hengshui City: In 2012, the city's GDP was 101.15 billion yuan, the per capita disposable income of urban residents 18,504 yuan, and the per capita income of rural residents 6,167 yuan.

The domestic electricity rate in the project area is 0.52 yuan/kWh. Since pipeline gas is not available extensively in rural areas of Hebei Province, CNG is generally used for cooking, and CNG rates are 1.75-4 yuan/kg. See Table 4-3.

Table 4-3 Prices of Rural Domestic Energy Sources in the Project Area

County/district	Domestic electricity price (yuan/kWh)	CNG price (yuan/kg)	Coal price (yuan/ton)	Pipeline biogas price (yuan/m ³)	Per capita net income of rural residents (yuan/year)
Linzhang	0.52	1.95	1000	2	8447
Laoting	0.52	2.1	800	2	10540
Chengde	0.52	1.75	800	1.9	5608
Yutian	0.52	2	700	1.8	10122
Zunhua	0.52	1.9	800	1.2	8890
Anping	0.52	1.95	800	2	6167

4.2.2.2 Project area

1. Ordinary households

The average annual electricity expenditure of rural households in the project area is 627.72 yuan, average annual CNG expenditure 400.56 yuan, and average annual expenditure on other cooking energy sources (coal, etc.) 198.23 yuan, totaling 1,226.51 yuan, accounting for 3.53% of

average household income (34,711.42 yuan).

After the completion of the Project, average pipeline biogas price will be 1.8 yuan/m³ and annual average expenditure on pipeline biogas will be about 350 yuan, accounting for 2.82% of average household income.

Table 4-4 Ability to Pay of Local Residents

No.	Annual electricity expenditure (yuan)	Annual CNG expenditure (yuan)	Annual expenditure on other energy sources (yuan)	Annual household energy expenditure (yuan)	Rural per capita net income (yuan)	Average size per household	Rural average household income (yuan)	Percentage of household energy expenditure to household income (%)
1	627.72	400.56	198.23	1226.51	8486.9	4.09	34711.42	3.53

Based on caloric value conversion, it can be seen that the converted price of electricity is the highest and that of pipeline gas the lowest. Compared to other energy sources, only competitive prices can make biogas marketable. Since current prices of civil natural gas are 2-3 yuan/m³, biogas prices under the Project should be less than 1.9 yuan/m³ to be competitive on the market.

Table 4-5 Prices of Different Energy Sources Based on Caloric Value

Energy source	Caloric value	Coefficient	Market price	Equivalent price
Civil natural gas	31.40MJ/m ³	0.72	2.50 yuan/m ³	1.81 yuan/m ³
Artificial gas	10.00MJ/m ³	2.27	1.25 yuan/m ³	2.84 yuan/m ³
LPG	46.00MJ·kg	0.49	6.00 yuan·kg	2.96 yuan/m ³
Electricity	3.60MJ·kWh	6.31	0.62 yuan·kwh	3.89 yuan/m ³
Biogas	22.70MJ·m ³	1.00	/	/

77.7% of the respondents think domestic electricity prices are reasonable; for CNG, 66% think prices are relatively high and 19.8% think prices are reasonable; most respondents are unclear about prices of other fuels. See Table 4-6.

Table 4-6 Perceptions of Fuel Prices

Attitude	Electricity		CNG		Pipeline gas		Coal		Biogas		Other	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Too high	2	0.3	16	2.0	1	0.1	106	13.3	0	0	0	0
Relatively high	123	15.4	526	66.0	35	4.4	241	30.2	0	0	0	0
Reasonable	619	77.7	158	19.8	42	5.3	164	20.6	9	1.1	2	0.3
Relatively low	7	0.9	2	0.3	0	0	2	0.3	50	6.3	0	0
Very low	0	0	0	0	8	1.0	0	0	8	1.0	4	0.5
Don't know	46	5.8	95	11.9	711	89.2	284	35.6	730	91.6	791	99.2
Total	797	100	797	100	797	100	797	100	797	100	797	100

2. MLS households

In the project area, there is no preferential policy on biogas installation and use charges for MLS households yet. Since CNG prices are too high, they use stalks and corn kernels for cooking mainly. Since the ability to pay of MLS households is lower than that of ordinary households, the impact of energy price on them is higher than that on ordinary households.

Aunt Li, Weifengshan Village, Tangshan City:

My family cooks with electricity, coal and stalks. A tank of CNG costs 70 yuan and two tanks are used annually. Electricity price is acceptable, but CNG is too expensive. My family receives

an MLS subsidy, because my husband is mentally handicapped and my son disabled. I'm willing to use biogas as long as its price is acceptable.

4.2.2 Willingness to Pay

1. Willingness to pay initial pipeline installation charges

605 respondents are willing to pay initial biogas pipeline installation charges, accounting for 75.9%, 21.5% unwilling and 2.3% unclear. See Table 4-7.

Table 4-7 Willingness to Pay Initial Pipeline Installation Charges

		N	Percent	Valid percent	Accumulated percent
Valid	Yes	605	75.9	76.2	76.2
	No	171	21.5	21.5	97.7
	Unclear	18	2.3	2.3	100.0
	Total	794	99.6	100.0	
Missing	System	3	0.4		
Total		797	100.0		

The questionnaire survey shows that 389 respondents are willing to pay initial pipeline installation charges of less than 300 yuan, accounting for 65.2%; 145 are willing to pay 300-500 yuan, accounting for 24.5%; and 62 are willing to pay over 500 yuan, accounting for 10.3%. It can be seen that initial pipeline installation charges are still the greatest concern of local residents. See Table 4-8.

Table 4-8 Willingness to Pay Initial Pipeline Installation Charges

Amount paid	N	Percent	Valid percent	Accumulated percent
300 yuan or less	389	48.8	65.2	65.2
300-500 yuan	146	/	24.5	/
500-800 yuan	54	6.8	9.0	98.7
800-1000 yuan	8	1.0	1.3	100.0
Total	597	74.9	100.0	

2. Willingness to pay biogas charges

97.3% of the respondents are willing to pay biogas charges of 10 yuan per month, 93.3% are willing to pay 20 yuan per month, 85.2% are willing to pay 30 yuan per month, 66.1% are willing to pay 40 yuan per month, 45.9% are willing to pay 50 yuan per month, 32.1% are willing to pay 80 yuan per month and 23.8% are willing to pay 100 yuan per month. See Table 4-9.

Table 4-9 Willingness to Pay Biogas Charges

Amount paid	Willing		Unwilling	
	N	Percent (%)	N	Percent (%)
10	109	97.3	3	2.7
20	98	93.3	7	6.7
30	115	85.2	20	14.8
40	80	66.1	41	33.9
50	62	45.9	73	54.1
80	35	32.1	74	67.9
100	19	23.8	61	76.2
Total	518	65.0	279	35.0

3. Willingness to pay waste treatment charges

44.5% of the respondents say that rural waste is collected and transported in their villages, usually by village committees, 54.0% say that rural waste is not collected and transported in their villages, and 1.4% are unclear. See Table 4-10.

Table 4-10 Collection and Transport of Rural Waste

	Collected and transported?	N	Percent	Valid percent	Accumulated percent
Valid	Yes	355	44.5	44.6	44.6
	No	430	54.0	54.0	98.6
	Unclear	11	1.4	1.4	100.0
	Total	796	99.9	100.0	

Only 22 respondents pay waste treatment charges, accounting for 2.8%, and amounts paid range from 1.5 yuan to 10 yuan per month, 759 do not pay waste treatment charges, accounting for 95.2%, and 1.9% are unclear. It can be seen that only a small proportion of rural residents pay waste treatment charges. It is learned that waste treatment charges are mostly borne by village committees from fiscal subsidies. See Table 4-11.

Table 4-11 Payment of Waste Treatment Charges

	Do you pay waste treatment charges?	N	Percent	Valid percent	Accumulated percent
Valid	Yes	22	2.8	2.8	2.8
	No	759	95.2	95.4	98.1
	Unclear	15	1.9	1.9	100.0
	Total	796	99.9	100.0	

303 respondents are willing to pay more waste treatment charges if someone agrees to collect and transport waste, accounting for 38.0%, 45.4% are unwilling, and 8.8% don't know. Willingness to pay waste treatment charges is proportional to educational level and household income.

Table 4-12 Willingness to Pay Waste Treatment Charges

	Are you willing to pay waste treatment charges?	N	Percent	Valid percent	Accumulated percent
Valid	Yes	303	38.0	41.2	41.2
	No	362	45.4	49.3	90.5
	Don't know	70	8.8	9.5	100.0
	Total	735	92.2	100.0	

92.9% of the respondents are willing to pay waste treatment charges of 10 yuan or less per month, in which 34.2% are willing to pay less than 5 yuan, 6.2% are willing to pay 20 yuan per month, 0.6% are willing to pay 30 yuan per month and only 0.3% are willing to pay 40 yuan per month. See 4-13.

Table 4-13 Willingness to Pay Waste Treatment Charges

Amount (yuan)	40	30	20	10	5	<5	Total
N	1	2	22	118	90	121	354
Percent	0.3%	0.6%	6.2%	33.3%	25.4%	34.2%	100%

4.2.3 Collection and Transport of Raw Materials

4.2.3.1 Willingness to provide raw materials

761 respondents are willing to sell stalks to biogas enterprises, accounting for 95.5%. They are willing to do this because stalks are useless or can be sold for money, accounting for 44.9% and 58.1% respectively. The other respondents are unwilling to sell stalks to biogas enterprises because stalks can be used as a fuel or feed. See Table 4-14.

Table 4-14 Reasons for Stalk Transfer

Cause	Useless	Sold for money	Saving space	Other
N	342	442	77	8
Percent%	44.9	58.1	10.1	1.1

98.4% of the respondents are willing to provide kitchen waste to biogas enterprises because they think that stalks and leftovers are useless, and their collection can save spaces.

Mr. Jiang in Guojiatun Xiang, Yutian County, Tangshan City:

I have heard of biogas but have not used it because it is troublesome. It is quite good, because it is both cheap and green, and my only concern is unstable supply. I'm willing to sell stalks for money and pay initial pipeline installation charges of 300-400 yuan.

4.2.3.2 Modes of raw material collection and transport

Most local residents are willing to stalks to biogas enterprises. 51.3% of the respondents think that stalks should be collected and transported by enterprises, thereby saving their collection costs and time, 20.2% think that stalks should be collected by themselves and purchased by enterprises at market price, 24.1% are willing to exchange stalks for organic fertilizers or biogas, and 4.1% think any mode is acceptable as long as they do not suffer losses. See Table 4-15.

Ms Ma in Anping County, Hengshui City:

I'm willing to sell stalks, but initial pipeline installation charges should be exempted. I support the Project and am willing to do any job offered by it. It will be convenient for cooking after its completion. I have also heard that it is cheap.

Table 4-15 Modes of Stalk Collection and Transport

	Mode of collection and transport	N	Percent	Valid percent	Accumulated percent
Valid	By enterprises	396	49.7	51.3	51.3
	Collected by households and purchased by enterprises	156	19.6	20.2	71.5
	Exchange for organic fertilizers or biogas	186	23.3	24.1	95.6
	Whatever	32	4.0	4.1	99.7

	Other	2	0.3	0.3	100.0
	Total	772	96.9	100.0	
Missing	System	25	3.1		
	Total	797	100.0		

74.9% of the respondents are unwilling to transport stalks or kitchen waste to biogas enterprises themselves, and only 24.7% are willing, provided that they have vehicles and time. Most respondents are willing to provide stalks or kitchen waste but do not have time or are unable to transport themselves. See Table 4-16.

Table 4-16 Willingness to Transport Stalks/Kitchen Waste

Are you willing to carry to production bases yourself?		Frequency	Percent	Valid percent	Accumulated percent
Valid	Yes	197	24.7	24.8	24.8
	No	597	74.9	75.2	100.0
	Total	794	99.6	100.0	
Missing	System	3	0.4		
Total		797	100.0		

5 Social Gender Analysis

5.1 General Situation of Local Women

Hebei Province has a resident population of 71.85 million, including 36.43 million males, accounting for 50.7%, and 35.42 million, accounting for 49.3%, with a gender ratio of 102.84:100. The resident female population of Handan City is 4.55 million, accounting for 49.67%, that of Tangshan City 3.7 million, accounting for 48.91%, that of Chengde City 1.69 million, accounting for 48.67%, and that of Hengshui City 2.15 million, accounting for 49.52%. With the progress of society, women have improved greatly in educational level, business startup, employment and political participation.

In 2011, the Hebei Provincial Women's Development Plan (2011-2020) was promulgated, which aims to include social and gender awareness in the legal system and public policies, promote the comprehensive development of women, and protect women's rights in medical care, education, employment, political participation and other aspects.

In Tangshan City, assistance for women's development is offered in many aspects, including small-amount business startup loans for women, vocational and continuing training, and skills training for women. In Chengde County, 10 women's business startup and employment bases have been established, helping over 1,000 women get employed and offering startup loans totaling 4.22 million yuan to 57 women in 2012. In Anping County, two training courses for female officials and 40 training courses for rural women were conducted in 2012, training over 6,000 persons in total.

Local campaigns for women have improved women's knowledge and skill levels, and social and family status significantly.

5.2 Survey on Local Women

A questionnaire survey and interviews were conducted on women during the fieldwork, covering 242 women, accounting for 30.4% of all samples.

1. Age structure

The samples in the group of 31-65 years are the most, including 469 males, accounting for 84.5% of all male samples, and 206 females, accounting for 85.1% of all female samples.

Table 5-1 Ages by Gender

Age	Male		Female	
	N	Percent (%)	N	Percent (%)
30 years or below	40	7.2	24	9.9
31-65 years	469	84.5	206	85.1
65 years or above	46	8.3	12	5.0
Total	555	100.0	242	100.0

2. Educational levels

The female and males respondents having received primary school or junior high school education account for 69.42% and 65.94% of all female and male respondents respectively; the female respondents having received senior high school, secondary technical school, and junior college or above education account for 12.81%, 2.06 and 0.41% of all female respondents respectively, while these percentages are 13.92%, 2.35% and 1.08% among the male respondents. It can be seen that there is no significant difference between males and females in educational level.

See Table 5-2.

Table 5-2 Educational Levels by Gender

Educational level \ Gender	Male		Female		Total	
	N	Percent (%)	N	Percent (%)	N	Percent (%)
Illiterate	33	5.96	37	15.2	71	8.9
Primary school	170	30.74	75	30.99	245	30.7
Junior high school	254	45.9	93	38.43	348	43.7
Senior high school	77	13.93	31	12.81	108	13.6
Secondary technical school	13	2.39	5	2.06	18	2.3
Junior college or above	8	1.08	1	0.41	7	0.8
Total	555	100.0	242	100.0	797	100.0

3. Occupations

By occupation, the percentages of farmers and housewives (househusbands) among the female respondents are higher than those among the male respondents, while the percentages of employees and self-employers among the female respondents are lower than those among the male respondents, showing a clear division of labor between the two genders. Most interviewees say that women do farm work or take care of children mainly, and female employees mostly work in the same counties.

Table 5-3 Occupations by Gender

Occupation \ Gender	Male		Female	
	N	Percent (%)	N	Percent (%)
Civil servant	7	1.3	3	1.2
Enterprise employee	9	1.7	5	2.0
Working outside	158	28.4	44	5.5
Farmer	311	56.1	92	18.2
Student	1	0.1	1	0.4
Freelancer	21	3.7	4	1.7
Housewife	11	1.9	80	33.1
Unemployed	15	2.8	3	1.2
Retired	14	2.5	8	3.3
Other	8	1.4	2	0.8
Total	555	100.0	242	100.0

4. Income

78.6% of the male respondents and 90.5% of the males earn 5,000-20,000 yuan per annum, 43.1% of the male respondents earn 10,001-20,000 yuan per annum, higher than the percentage of 31.0% among the females, and the percentage of female respondents earning 5,000 yuan or less per annum is slightly higher than that of the males.

Table 5-4 Annual Income by Gender

Annual income \ Gender	Male		Female	
	N	Percent (%)	N	Percent (%)
5000 yuan or less	58	10.5	73	30.2
5001-10000 yuan	139	25.0	71	29.3
10001-20000 yuan	239	43.1	75	31.0
20001-30000 yuan	84	15.1	16	6.6
30001 yuan or more	35	6.3	7	2.9
Total	555	100.0	242	100.0

5. Willingness for public participation

The survey shows that both men and women in the project area are highly willing to participate in public affairs, and those who attend village meetings are mostly old women and men. In 46.0% of the sample households, whoever is free would attend village meetings, without any significant gender difference. Young men and women rarely attend village meetings because they mostly work outside, but are still concerned about village affairs by other means.

Table 5-5 Public Participation by Gender

		Frequency	Percent	Valid percent	Accumulated percent
Who attends village meetings?	Young woman	14	1.8	1.8	1.8
	Young man	103	12.9	12.9	14.7
	Old woman	98	12.3	12.3	27.0
	Old man	212	26.6	26.6	53.6
	Child	3	0.4	0.4	54.0
	Whoever is free	367	46.0	46.0	100.0
	Total	797	100.0	100.0	

5.3 Project Impacts on Women

5.3.1 Positive Impacts

1. Providing a clean, safety new energy source to improve women's health level

The Project will provide clean and safe biogas to protect women from pollution, and improve their health and safety levels. In addition, their labor intensity in coal or CNG handling will be reduced with the completion of biogas pipelines.

2. Improving the living and production environment

Based on participatory observation, cooking is still undertaken by women mainly in the project area, especially old women. Fuel price and efficiency will affect their choices of fuels. In addition, women have a greater exposure to waste. The Project will provide clean, safe and cheap biogas to improve the rural environment greatly and reduce energy expenditure.

3. Generating more job opportunities for women to increase their income

All unskilled jobs generated at the construction and operation stages will be first made available to women, the poor and other vulnerable groups, such as cleaning, landscaping, cooking and raw material collection, thereby increasing their income. For example, most employees of Meikeduo Company are local rural women, who deal with chestnut peeling and sorting.

4. Encouraging women's participation and promoting their development

Women's participation is encouraged, and the protection of their rights and interests promoted in the Project. The public participation mechanism established under the Project will involve more women in the Project and let them have their own voice, so that they will obtain more development opportunities. In addition, women will participate in public consultation and information disclosure, which will improve their awareness of new energy sources, develop their environmental awareness, and promote their long-term development.

5.3.2 Potential Risks

Although women will benefit from the Project, such benefits might be reduced or women

affected adversely if there is no social and gender sensitivity, or women's needs and suggestions are ignored in project design, implementation and management. The Project's potential negative impacts on women include:

1. LA in the Project may affect the living standard of women in land-expropriated households directly. If they are not employed or resettled properly, their income and living standard will be reduced.

2. Initial pipeline installation charges may increase household burden. Some poor or old women may elect not to install biogas pipelines, thereby being excluded from the benefits of the Project.

3. Biogas charges may increase household burden if higher than current household energy expenditure.

4. Women are likely to be ignored in the Project. For traditional and economic reasons, local residents (including women themselves) often think that their ability to participate in household and public affairs is low. Due to such perception, women's needs and suggestions are often ignored at the design, implementation and operation stages. However, the survey shows that local women's educational levels and willingness for public participation differ slightly from those of men. Therefore, women's needs and suggestions should be fully considered in public participation.

5. Pipeline biogas is still a new thing for local rural areas and its awareness among rural residents is low due to inadequate publicity. Most rural women think that it is inconvenient and unsafe.

In order to protect women from social risks arising from the Project, measures should be taken to protect their rights and interests, and a women's action plan proposed in consultation with the local governments, PMOs and owners.

6 Ethnic Minority Analysis

6.1 Overview of Ethnic Minorities in Hebei Province

There are 53 ethnic minorities in Hebei Province although the majority of its population is Han people. These ethnic minority groups include Man, Hui, Mongolian, Zhuang, Korean, Miao, Tujia, Buyi, Yi, Yao and Bai. At the end of 2011, Hebei Province had a minority population of 2.63 million, accounting for 3.9% of its resident population of 72.4051 million.

Hebei Rural Renewable Energy Development Demonstration Project is mainly located in pre-urban areas of counties in Plain areas of Hebei province, in the project area, the minority population has the following characteristics:

1. Language: Minority people have no minority language, speak mandarin Chinese and write in Chinese;
2. Customs: Minority people have no distinctive customs which are very different from those of Han people's;
3. Clothing: Minority people wear the same modern clothing as Han people do;
4. Diet and food: Minority people have the same diet and food as Han people, i.e., eating rice and pasta mainly.

In sum, there is no concentrated area of ethnic nationality in the project area, and the ethnic minority people live scattered in all residential areas, they have no minority language, no distinctive cultures or customs, no special clothing or food and diet. These ethnic minorities do not fit the definition of the World Bank IP term,, OP4.10 is therefore not applicable in this province under the project.

In addition , since the first batch (six subprojects) of Hebei Rural Renewable Energy Development Demonstration Project is decided, a social assessment was conducted, including intensive consultation and survey in the six subproject areas, the main finding are presented in the following sections.

Table 6-1 Population of Hebei Province and the Project Area(Batch 1)

Division	Population (0,000)	Gender (0,000)		Registered population (0,000)		Ethnic minorities		Natural growth rate (‰)
		Male	Female	Agricultural population	Non-agricultural population	Population (0,000)	%	
Hebei Province	7240.51	3742.62	3497.89	3938.84	3301.67	263	3.9	6.5
Handan City	923.92	463.94	455.70	793.92	130	0.0288	0.22	8.30
Tangshan City	762.74	388.24	370.59	489.86	247.21	30.02	4.07	3.32
Chengde City	348.91	179.07	169.02	245.71	103.2	130	37.2	6.49
Hengshui City	436.39	221.99	214.96	340.2	102.2	0.51	0.12	6.78

6.2 Overview of Ethnic Minorities in the Project Area

The project area has a small minority population, and the main ethnic minorities are Man, Mongolian and Hui.

1. Handan City

Linzhang County governs 5 towns, 9 Xiangs and 425 villages, with a population of 594,626, including a rural population of 560,375 and an urban population of 34,251. The county has a

minority population of 366, accounting for 0.06% only.

The Linzhang Subproject is located in Luocun Village, Linzhang Town. Luocun Village has 554 households with 2,089 villagers, and no minority population.

2. Hengshui City

Hengshui City is located in southeastern Hebei Province and has a minority population of 5,123, accounting for 0.12% of the city's population.

Anping County is located in the Central Hebei Plan, and governs 3 towns, 5 Xiangs and 230 villages. The county has a registered population of 329,800, including a nonagricultural population of 103,300 and no minority population.

3. Tangshan City

Tangshan City has a registered population of 7.4178 million, including 3.7605 million males and 3.6573 million females, and a minority population of 300,296, accounting for 4.07% of the city's population.

Laoting County is located in is located southeast of Tangshan City, and is known as a pearl on the Bohai Bay for its rich products and profound culture. The county has a land area of 1,308 km² and a population of 492,000, including an agricultural population of 403,000, a nonagricultural population of 90,000 and a minority population of 7,438 (1.47%), and governs 9 towns, 5 Xiangs and a sub-district.

Yutian County is located in the Bohai Sea Rim, with a land area of 1,165 km² and a population of 684,000, and governs 20 townships, a sub-district and 420 villages. The county has a minority population of 32,500, accounting for 5% of the county's population. Guojiatun Xiang where the Yutian Subproject is located governs 25 villages, with a land area of 86 km² and a population of 33,171, where minority population is very small, including a Zhuang person in Ruanzhuangzi Village, two Man persons and one Hui person in Shangzhuang Village, and one Man person in Guangongling Village, all moving in by marriage.

Zunhua City is a county-level city affiliated to Tangshan City, with a land of 1,521 km², and governs 13 towns, 9 Xiangs and 3 minority Xiangs, with a population of 683,662, in which minority population accounts for 12.7%. Baozidian Town where the Zunhua Subproject is located is located west of Zunhua City. The town has 32 villages, a land area of 76.8 km², a cultivated area of 65,842 mu and a population of 39,904, and the main food crops are corn, wheat and peanut.

6.3 Impacts of the Project on Ethnic Minorities

6.3.1 Overview of Chengde County

Chengde County is located in northeastern Hebei Province, has a land area of 3,648 km² and a population of 419,000, and governs 6 towns, 17 Xiangs and 378 villages. In 2012, the county's GDP was 10.52 billion yuan, and the per capita net income of rural residents 5,608 yuan. A minority population of 5 (all being Man people) in Group 5 of Beigushan Village, Sangou Town, Chengde County will be affected by LA, while the other village groups of Sangou Town will benefit from the Project. The local minority people lives together with the Han people.

6.3.2 Attitudes to the Project

The 797 respondents in the questionnaire survey include 89 minority respondents, in which 23 highly welcome the Project and 59 welcome the Project, accounting for 92.2% in total. See Table 6-2.

Table 6-2 Attitudes to the Project

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Highly welcome	23	25.9	25.9	25.9
	Welcome	59	66.3	66.3	92.2
	Neither, nor	5	5.6	5.6	97.8
	Unwelcome	2	2.2	2.2	100.0
	Total	797	100.0	100.0	

All Man people affected by LA support the Project because they do not live on land, but work outside or do business, and will receive compensation for LA while freeing from the task of land management.

6.3.3 Impacts of the Project on Ethnic Minorities

1. The Project will promote local economic development and improve the rural environment, thereby creating a favorable living environment for local minority residents.
2. The Project will increase the utilization rate of talks, reduce local residents' agricultural costs, and alleviate environmental pollution from stalk burning.
3. The Project will generate more job opportunities for local minority residents to increase their income. In the project area, agricultural income accounts for less than 30% of household income, and over 50% of population is working outside.
4. The Project will improve the quality of minority population through education and training.

6.3.4 Ethnic Minority Analysis

In batch 1 subproject areas, there is no concentrated area of nationality in the project area, and the population of ethnic minority is living scattered in all residential quarters, local minority population has no minority language, no special customs, no special clothing and no special diet. They enjoy the benefits created by the project as well as Han people, and the project will not bring any special negative effect to the ethnic minority. In sum, these ethnic minorities do not fit the definition of the World Bank IP term, OP4.10 is therefore not applicable in this province under the project.

See Appendix 2 for the identification of ethnic minorities of Batch 1 subproject areas.

7 Public Participation and Grievance Redress

7.1 Public Participation Process

In order to involve all stakeholders fully in the Project, the SA team conducted extensive public participation. For example, the socioeconomic survey was conducted during July 9-21 and August 13-21, 2013, with 797 copies of the questionnaire collected in total. In addition, 33 FGDs were held with village committee heads, residents, women, minority people, and vulnerable groups (old people, the disabled, the poor, etc.).

With the assistance of the Hebei PMO, the SA team also conducted FGDs with the local statistics bureaus, civil affairs bureaus, poverty reduction offices, environmental protection bureaus, labor and social security bureaus, civil affairs bureaus, ethnic and religious affairs bureaus, women's federations, sanitation offices, land and resources bureaus, agriculture bureaus, township governments, etc., and in-depth interviews with some residents on the Project's positive and negative impacts, and needs for and suggestions on the Project (see Table 7-1).

Table 7-1 Summary of Public Participation Activities

Type	Qty.	Participants	Description	Time	Remarks
Questionnaire survey	797	Local residents, including vulnerable groups	Learning project impacts, and their attitudes, needs and willingness to pay	Jul. 9-21; Aug. 13-22	The SA team provided opportunities of participating in the Project and sharing information to all stakeholders.
FGD	21	Village heads, representatives of local residents and APs	Learning attitudes to and needs for the Project, women's development	Jul. 9-21; Aug. 13-22	
Interview	200	APs and residents in the service range	Learning suggestions on the Project, current use of energy, ability to pay, etc.	Jul. 9-21; Aug. 13-22	
Participatory observation		SA team, PMOs	Learning local socioeconomic profile, etc.	Jul. 9-21; Aug. 13-22	

84.3% of the respondents have heard of biogas/solar energy, and only 15.7% are unaware or unclear. Those unaware or unclear are mostly elderly or poorly educated. See Table 7-2.

Table 7-2 Awareness of New Energy Sources

		N	Percent	Valid percent	Accumulated percent
Valid	Yes	672	84.3	84.3	84.3
	No	51	6.4	6.4	90.7
	Unclear	74	9.3	9.3	100.0
	Total	797	100.0	100.0	

Although the awareness of new energy sources among local residents is high, their awareness of the Project remains low. Many of them know about the Project from the fieldwork of the SA team only. Although project information is available on government websites, such websites are rarely visited, so that some residents are still unaware of the progress of the Project.



Figure 7-1 Sketch of the project of Meikeduo Company in Zunhua City



Figure 7-2 Publicity material of the agriculture bureau on the biogas project

Among all appeal channels, the top 3 are village/community committee, media exposure and appeal with special agencies, accounting for 46.1%, 18.92% and 8.43% respectively. Only 6.91% of the respondents are unaware of any appeal channel.

Table 7-3 Awareness of Different Appeal Channels

Appeal channel	Percent (%)
Suggestion box	6.08
Hotline	2.52
E-mail	1.52
Questionnaire survey	2.07
Appeal with special agencies	8.43
Judicial proceedings	3.12
Media exposure	18.92
Online posting	2.7
Personal visit	0.49
Collective visit	1.14
Don't know	6.91
Village/community committee	46.1
Other	0

7.2 Main Findings of Public Participation

249 of the respondents highly welcome the Project and 520 welcome the Project, accounting for 96.5% in total, while only 3.5% do not welcome the Project. Most of the respondents welcome the Project because biogas is easy to use, and can reduce household expenditure and improve the living environment. Some respondents unwelcome the Project because they are unaware of the benefits of the Project and will make a judgment when it is put into operation only. See Table 7-4.

Table 7-4 Attitudes to the Project

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Highly welcome	249	31.2	31.2	31.2
	Welcome	520	65.2	65.2	96.5
	Neither, nor	23	2.9	2.9	99.4
	Unwelcome	5	0.6	0.6	100.0
	Total	797	100.0	100.0	

94.0% of the respondents would file an appeal with the village/community committee, followed by the government. 1.9% would file an appeal with the construction agency, and only 0.1% choose other channel, such as the Internet and news media. It can be seen that local residents highly rely on and trust village/community committees. See Table 7-5.

Table 7-5 Sources of Information

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Government	29	3.6	3.7	3.7
	Village/community committee	749	94.0	94.3	98.0
	Construction agency	15	1.9	1.9	99.9
	Other	1	0.1	0.1	100.0
	Total	794	99.6	100.0	
Missing	System	3	0.4		
Total		797	100.0		

46% of the respondents choose “whoever is free participates in information disclosure”. It can be seen that information disclosure activities should be scheduled in consideration of the availability of local residents. See Table 7-6.

Table 7-6 Participants in Information Disclosure

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Young woman	14	1.8	1.8	1.8
	Young man	103	12.9	12.9	14.7
	Old woman	98	12.3	12.3	27.0
	Old man	212	26.6	26.6	53.6
	Child	3	0.4	0.4	54.0
	Whoever is free	367	46.0	46.0	100.0
	Total	797	100.0	100.0	

7.3 Public Participation and Grievance Redress Strategy

7.3.1 Recommended Appeal Channels

1. General appeal channel

The following grievance redress mechanism has been established for the Project:

Stage 1: If any AP is dissatisfied with resettlement or construction, he/she may file an appeal with the village committee orally or in writing, which should make a disposition within two weeks.

Stage 2: If the AP is dissatisfied with the disposition of Stage 1, he/she may file an appeal with the town government after receiving such disposition, which should make a disposition within two weeks.

Stage 3: If the AP is still dissatisfied with the disposition of Stage 2, he/she may file an appeal with the county PMO after receiving such disposition, which should make a disposition within two weeks.

Stage 4: If the AP is still dissatisfied with the disposition of Stage 3, he/she may file an appeal with the Hebei PMO after receiving such disposition, which should make a disposition within two weeks.

In addition, if any AP thinks that any right is infringed on at the construction or operation stage, he/she may file a suit in a civil court in accordance with the Civil Procedure Law of the PRC after receiving such disposition.

2. Establishing community participation teams

Each community participation team has 3-5 members, including at least one woman, and is headed by a village official.

Community participation teams are responsible for publicity and training on new energy sources, disclosing project information, supervising project construction and operation, and accepting grievances and appeals.

Community participation teams will establish appeal hotlines, give replies within 15 days, and pay particular attention to women, low-income population and other vulnerable groups.

3. Cooperative mechanism between village collectives and owners

A cooperative mechanism will be established between village collectives and owners for regular or irregular communication. The owners will disclose key project information, such as EIA and biogas price, to village committees for communication to local residents. On the other hand, village committees will collect concerns from local residents for communication with the owners, and then feed back dispositions to local residents.

7.3.2 Information Disclosure Strategy

The following information disclosure strategy has been developed based on the fieldwork. See Table 7-7.

Table 7-7 Public Participation Plan

Stage	Item	Mode	Organizer	Participants	Objective
Construction and preparation	Basic information disclosure	TV, radio, poster, leaflet, village committee, Internet	PMOs, owners	PMOs, owners, village officials, residents	Disclosing basic project information and answering questions
	EIA information disclosure	TV, radio, poster, leaflet, village committee, Internet, hearing	PMOs, owners	PMOs, owners, village officials, residents	Disclosing EIA information of biogas enterprises and collecting public comments
	Training on new energy sources	On-site training	PMOs, owners	PMOs, owners, village officials, residents	Improving public awareness of new energy sources to reduce project risks
	Grievance redress	TV, radio, poster, leaflet, village committee, Internet	PMOs	PMOs, agencies concerned	Accepting and handing grievances timely, paying special attention to vulnerable groups
	Public hearing	Public hearing involving local residents	Price bureaus	PMOs, residents	Ensuring that biogas prices are affordable
Operation	Plant visit	Plant visit	Owners	Owners, village officials, residents, NGOs	Ensuring that local residents are aware of the biogas production process
	Health impact disclosure	TV, radio, poster, leaflet, village committee, Internet	PMOs, owners	PMOs, owner, village officials	Eliminating the public concern about biogas pollution
	Maintenance	Establishing specialized maintenance teams	PMOs, owners	PMOs, PMOs, owners	Keeping biogas appliances in good condition
	Trial	Trial in some areas	Owners	Owners, village officials, residents	Ensuring that local residents experience the benefits of new energy sources, thereby ensuring successful project implementation

8 Social Management Plan

The main social risks of the Project have been identified through the fieldwork. A social action plan has been proposed on this basis to minimize the social risks, and promote the sustainability of the project objectives.

1. Livelihood restoration

215 mu of collective land will be acquired, affecting 45 households with 203 persons in 3 counties. Cash compensation, social security, skills training and employment will be conducted to realize their livelihood restoration. See the RAP for details.

2. Reducing or exempting initial pipeline installation charges

Subsidies for initial pipeline installation charges should be offered where possible for MLS and poor population to reduce their burden and promote project implementation.

The SA team thinks that price hearings should be held to collect comments from local residents, especially poor population, and initial pipeline installation charges should be reduced or exempted in consideration of the affordability of local residents.

3. Establishing a raw material collection and transport mechanism

Although the project area abounds with raw materials for biogas production, they are scattered and hard to collect.

During project implementation, a raw material collection and transport mechanism should be established in cooperation with local governments and agricultural cooperatives to secure raw material collection and transport, and reduce project risks.

4. Establishing a rural waste collection and transport mechanism

Waste treatment and utilization is a realistic challenge today, and improper treatment and utilization may result in environmental pollution. The Project should be combined with rural environmental management, and rural domestic waste should be collected for biogas production.

5. Strengthening training on safe biogas use

Education and training on safe biogas use should be conducted via news media, leaflet, poster, workshop and village meeting, especially for housewives, thereby improving the safety of biogas use and ensuring the long-term extension of biogas.

6. Establishing a maintenance mechanism for household biogas appliances

Specialized maintenance teams should be established in the project area to check and maintain household biogas appliances regularly, and ensure the safety of biogas appliances.

7. Strengthening public participation

Ongoing publicity on safe biogas use should be conducted by volunteer publicity teams in various forms and by various means, such as TV stations, radio stations, newspapers, community and school based education. Volunteer publicity teams will be established to give publicity.

8. Measures to promote gender equality

Publicity on safe biogas use for women should be conducted in various forms to improve their safety awareness.

The jobs generated at the construction and operation stages should be first made available to local women, especially cleaning and service jobs, giving priority to 40s-50s women.

See Table 8-1.

Table 8-1 Social Management Plan

Type	Actions	Targets	Agencies responsible	Funding	Stage	Monitoring indicators
1. Developing livelihood restoration programs	1) Preparing the RAP 2) Implementing the RAP 3) Conducting resettlement M&E	APs	PMOs, owners, external M&E agency	Owners	2013-	See the RAP
2. Reducing or exempting initial pipeline installation charges	Including subsidies in the project budget	Biogas users	PMOs, owners	Owners	Construction	Initial pipeline installation charges
3. Fixing biogas prices reasonably	1) Holding a public hearing 2) Offering reduction, exemption or subsidies to the poor	Local residents	PMOs, owners, PMO	Municipal finance	From design to operation	1)Time and frequency of public hearing, participants 2)Preferential policies for the poor
4. Establishing a stalk collection and transport mechanism	1) Cooperating with local agricultural cooperatives; 2) Entering into collection and transport agreements; 3) Establishing a comprehensive rural waste collection and transport system	Local residents, cooperatives	PMOs, owners, PMOs, sanitation office	Owners, public finance	From design to operation	1)Agreements; 2)Local labor employed for collection and transport; 3)Improvement of the rural environment
5. Offering jobs to women	1) Making service jobs first available to women during construction 2) Making cleaning and service jobs first available to women during operation; 3) Ensuring that women receive equal pay for equal work	Local women	PMOs, owners, labor and social security bureaus	Owners	Construction & operation	1) Number of local women employed at the construction stage; 2) Number of local women employed at the operation stage; 3) Remuneration
6. Protecting rights and interests of women	1) Considering women's needs and suggestions at the design stage; 2) Ensuring that women can sign to receive compensation fees; 3) Giving skills training to women in consideration of their needs and habits	Affected women	Design agency, RAP agency, land and resources bureau, women's federation, township governments, village committees	Public finance	Construction	1) Records of women's needs and suggestions; 2) Percentage of women signing; 3) Modes of public participation, and percentage of women; 4) Time and venue of training, and percentage of women
7. Giving publicity to new energy sources and safe biogas use	1) Giving publicity on safe biogas use at least twice a year; 2) Giving publicity to new energy sources by various means; 3) Giving publicity in consideration of women's needs and habits	Local residents	PMOs, agriculture bureau, PMOs, women's federation, township governments, village committees	Agriculture bureaus and PMOs	Construction & operation	1) Frequency of publicity, and percentage of women; 2) Quantity of publicity materials

8. Maintenance of household biogas appliances	1) Establishing specialized maintenance teams; 2) Checking and maintaining appliances regularly	Local residents	PMOs, owners	Owners	Operation	1) Establishment and staffing of teams; 2) Frequency of maintenance
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Appendix 1 Target Markets of the Subprojects

No.	Subproject	For rural residents		For vehicles		Biogas fertilizer market
		HHs (0,000)	Distribution	Amount, m ³	Buses or taxis	
1	Anping	2	Supplying cooking and heating energy to 11,000 rural households in 5 communities and 10 villages	555	740	Vegetable production base, 260,000 mu
2	Yutian	1.5	Supplying energy to 15,000 households in 17 villages in two townships			47,000 mu of farmland and 33,000 mu of garden land
3	Zunhua	1.2	Supplying energy to 10,497 households in 19 villages/communities in Baozidian Town	203.7	270	100,000 mu of vegetable land, 400,000 mu of garden land
4	Linzhang	0.7	Supplying energy to 7,000 households in 16 villages in two townships			80,000 mu of vegetable land
5	Chengde	1.7219	Supplying energy to 2,791 rural households in 3 villages in the core area; and distributing canned biogas to 14,628 rural households in 17 villages in 3 townships			105,345 mu of cultivated land
6	Laoting	1.32	Supplying energy to 6 villages	206.7	275	200,000 mu of garden land and 460,000 mu of vegetable land

Appendix 2 Identification of Ethnic Minorities

Table 1 Identification of Ethnic Minorities in Linzhang County

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
1	Handan	Linzhang	Linzhang Town	Luocun (P)	554	2089	No	None	None	No
2				Dongwuchakou (B)	498	1900	No	None	None	No
3				Xiwuchakou (B)	216	971	No	None	None	No
4				Qianzhao (B)	300	929	No	None	None	No
5				Ganglingcheng (B)	960	960	No	None	None	No
6				Houzhao (B)	400	1580	No	None	None	No
7			Xigaoyang Xiang	Qiliying (B)	263	1152	No	None	None	No
8				Duchengying (B)	448	1820	No	None	None	No
9				Zhangchao (B)	985	3224	No	None	None	No
10			Baihe Xiang	Tiancun (B)	584	2200	No	None	None	No
11				Bingmazhai (B)	433	1726	No	None	None	No
12				Daying (B)	350	1400	No	None	None	No
13			Diqiu Xiang	Beizhang (B)	370	1992	No	None	None	No
14				Beikong (B)	476	1924	No	None	None	No
15				Houzhuang (B)	298	1238	No	None	None	No
16				Dongdiqiu (B)	503	2007	No	None	None	No
17				Houyeguo (B)	305	1000	No	None	None	No
18				Xidiqiu (B)	659	2400	No	None	None	No
19				Shuangmiao (B)	390	1570	No	None	None	No
20				Dongshen (B)	256	977	No	None	None	No
21				Yuancun (B)	154	807	No	None	None	No
22				Qianyeguo (B)	307	1220	No	None	None	No
23				Haowang (B)	541	2032	No	None	None	No
24				Randian (B)	270	880	No	None	None	No
25				Wangzhuang (B)	584	1900	No	None	None	No
26				Dengzhuang (B)	462	1803	No	None	None	No
27				Jiacun (B)	304	1038	No	None	None	No
28				Xishen (B)	98	456	No	None	None	No
29				Niucun (B)	190	740	No	None	None	No
30				Beishedong (B)	486	1900	No	None	None	No
31			Beishexi (B)	370	1950	No	None	None	No	

32				Zhangcun (B)	340	1258	No	None	None	No	
33				Houcun (B)	297	1284	No	None	None	No	
34			Zhangcun Xiang	Bailongmiao (B)	233	900	No	None	None	No	
35				Xucun (B)	202	820	No	None	None	No	
36				Huangkaihe (B)	390	1350	No	None	None	No	
37				Liujiangtang (B)	97	430	No	None	None	No	
38				Xihuaotang (B)	410	1800	No	None	None	No	
39				Nankong (B)	211	920	No	None	None	No	
40				Linzhang Town	Qianzhao (B)	300	929	No	None	None	No
41					Houzhao (B)	400	1580	No	None	None	No
42			Ganglingcheng (B)		960	4000	No	None	None	No	
43			Luocun (P)		554	2089	No	None	None	No	
44			Dongwuchakou (B)		498	1900	No	None	None	No	
45			Xiwuchakou (B)		216	971	No	None	None	No	
46			Nandongfang Town	Wuxue (B)	582	1762	No	None	None	No	
Total						15776	61349				

Table 2 Identification of Ethnic Minorities in Laoting County

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
1	Tangshan	Laoting	Laoting Town	Sanchakou (P)	240	741	No	0		No
2				Sanchakou (B)	240	741	No	0		No
3				Hantuo (B)	350	1130	No	0		No
4				Qiansi (B)	206	658	No	0		No
5				Xiji (B)	386	1123	No	0		No
6				Dongdazhuang (B)	199	546	No	0		No
7				Xinzhuanghu (B)	139	418	No	0		No
8				Wantuo (B)	306	885	No	0		No
9				Miaoshang (B)	355	965	No	0		No
10				Shaozhuang (B)	372	1002	No	0		No

Table 3 Identification of Ethnic Minorities in Chengde County

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
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1	Chengde	Chengde	Sangou Town	Beigushan (P)	394	1443	No	188	Man	No	
2				Sujiaying (B)	183	653					No
3				Sangou	879	2950	No	442	Man	No	
4				Dongzhuang	287	885					No
5				Beizhangzi	584	1999	No	300	Man	No	
6				Xia'erdaohe	403	1239					No
7				Xiaozhangzi	122	440					No
8				Shang'erdaohe	193	698					No
9				Yingzhangzi	238	841					No

Table 4 Identification of Ethnic Minorities in Yutian County

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
1	Tangshan	Yutian	Guojiatun Xiang	Ruanzhuangzi (P)	210	850	No	1	Zhuang	No
2				Shangzhuang (P)	653	2016	No	3	Hui 1, Man 2	No
3				Sijiaoshan (B)	235	839	No	None		No
4				Guangongling (B)	343	1323	No	1	Man	No
5				Huangjiashan (B)	259	958	No	None		No
6				Xingshuyu (B)	86	281	No	None		No
7				Daiguantun (B)	258	970	No	None		No
8				Guluzhuang (B)	335	1332	No	None		No
9				Xiaolizhuang (B)	853	3241	No	None		No
10				Xiaolizhuang (B)	650	2535	No	None		No
11				Tiejiangzhuang (B)	698	2512	No	None		No
12				Zhuguantun (B)	765	2448	No	None		No
13				Xingjiawu (B)	523	1548	No	None		No
14				Guojiatun (B)	1280	3800	No	None		No

Table 5 Identification of Ethnic Minorities in Zunhua City

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
1	Tangshan	Zunhua	Baozidian	Xindianzi (P)	470	1410	No	0	-	No
2				Baozidian (B)	808	2424	No	0	-	No
3				Jiuzhai (B)	152	456	No	0	-	No

4				Xinzhai (B)	268	804	No	0	-	No
5				Beixiaozhuang (B)	113	339	No	0	-	No
6				Mengjiapu (B)	477	1431	No	0	-	No
7				Beiling (B)	232	696	No	0	-	No
8				Nanxiaozihuang (B)	266	798	No	0	-	No
9				Zhangnanwa (B)	372	1116	No	0	-	No
10				Zhangbeiwa (B)	290	870	No	0	-	No
11				Shibali (B)	339	1017	No	0	-	No
12				Nanling (B)	112	336	No	0	-	No
13				Dacaozhai (B)	424	1272	No	0	-	No
14				Xiaocaozhai (B)	367	1101	No	0	-	No
15				Wenjiazhuang (B)	266	798	No	0	-	No
19				Nonagricultural area (B)	1241	3723	No	0	-	No
20				Baozidian New Area (B)	2000	6000	No	0	-	No
22				Shibali New Area (B)	1200	3600	No	0	-	No
23				Bohai New Area	1100	3300	No	0	-	No
	Total				10497	31491				

Table 6 Identification of Ethnic Minorities in Anping County

No.	City	County	Township	Village/ community	HHs	Population	Minority village? 2	Minority population 3	Ethnic minority	Minority population lives centrally? 4
1	Hengshui	Anping	Xiliangwa Xiang	Dongzhaizi	386	1302	No	0		No
2				Xizhaizi	362	1206	No	0		No
3				Jiatun	440	1530	No	0		No
4				Houpu	353	1266	No	0		No
5				Dongliangwa	632	2145	No	0		No
6				Xiliangwa	960	3268	No	0		No

Appendix 3 SA Agenda and Scope

1. SA agenda

Date	venue	Participants	Number	Scope
2013.7.9	Luocun Village Committee, Linzhang County	PMO, agriculture bureau, village head, APs, SA team	22	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.7.10	Beizhang Village Committee	PMO, agriculture bureau, residents, SA team	18	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.7.11	Shoushansi Xiang	PMO, Shoushansi Xiang, Handan Dewangtai New Energy Development Co., Ltd., SA team	16	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.7.11	Site of Guantao Subproject	PMO, Shoushansi Xiang, Handan Dewangtai New Energy Development Co., Ltd., SA team	12	Visiting the project site and collecting relevant information
2013.7.13	Xiwang Town Government	PMO, town head, Hebei Jointo Company, SA team	26	Learning local land compensation policy, industry mix, livelihoods, preferential policies for MLS population, rural development plan, etc.
2013.7.13	Dongluokou Village Committee	PMO, town head, village officials, Hebei Jointo Company, SA team	24	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.7.13	Site of Jizhou Subproject	PMO, town head, village officials, Hebei Jointo Company, SA team	12	Visiting the project site and collecting relevant information
2013.7.15	Biogas base in Yanshan Village	Hebei Jointo Company, beneficiaries, SA team	26	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.7.19	Site of Chengde Subproject	PMO, agriculture bureau, Chengde Luneng Organic Fertilizer Co., Ltd., SA team	12	Visiting the project site and collecting relevant information
2013.7.19	Sangou Town Government, Chengde County	PMO, agriculture bureau, town head, Chengde Luneng Organic Fertilizer Co., Ltd., SA team	22	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.14	Guojiatun Xiang Government	PMO, village officials, SA team	18	Visiting the project site and collecting relevant information
2013.8.15	Xingshuyu, Huangjiashan and Daiguantun Villages	PMO, heads of Xingshuyu, Huangjiashan and Daiguantun Villages, SA team	200	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.16	Meeting room of Meikeduo Company	PMO, village officials, SA team	16	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.16	Meeting room of Meikeduo Company	Women	13	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.17	Baozidian Town	PMO, village head, SA team	200	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.19	Haiziyan, Wangzhuang and Erjie Villages	PMO, heads of Haiziyan, Wangzhuang and Erjie Villages, SA team	200	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project

2013.8.21	Qianpu and Houpu Villages, Anping County	PMO, Yufeng Jing'an Stockbreeding Company, village officials, SA team	200	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
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2. Summary of organizational FGDs

Date	venue	Participants	Number	Scope
2013.7.9	Meeting room of Runze Zhimin Company	PMO, agriculture bureau, town head, village head, chairman of Runze Zhimin Company, SA team	17	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.9	Site of Linzhang Subproject	PMO, agriculture bureau, chairman of Runze Zhimin Company, SA team	10	Visiting the project site and collecting relevant information
2013.7.9	Meeting room of the Linzhang County Government	PMO, statistics bureau, land and resources bureau, agriculture bureau, labor and social security bureau, civil affairs bureau, women's federation, environmental protection bureau, SA team	19	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.11	Guantao County Agriculture Bureau	PMO, agriculture bureau, statistics bureau, poverty reduction office, labor and social security bureau, civil affairs bureau, women's federation, environmental protection bureau, Shoushansi Xiang, Handan Dewangtai New Energy Development Co., Ltd., SA team	17	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.12	Meeting room of Jizhou Hotel in Hengshui City	PMO, agriculture bureau, statistics bureau, labor and social security bureau, civil affairs bureau, women's federation, environmental protection bureau, Hebei Jointo Company, SA team	15	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.15	Luanxian County Government	PMO, statistics bureau, civil affairs bureau, women's federation, agriculture bureau, environmental protection bureau, land and resources bureau, labor and social security bureau, Xiangtang Town, Hebei Jointo Company, SA team	18	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.15	Site of Luanxian Subproject	PMO, Xiangtang Town, Hebei Jointo Company, SA team	10	Visiting the project site and collecting relevant information
2013.7.17	Meeting room of Longhua Sunshine Holiday Hotel	PMO, statistics bureau, civil affairs bureau, women's federation, environmental protection bureau, agriculture bureau, land and resources bureau, labor and social security bureau, ethnic and religious affairs bureau, poverty reduction office, PMO, Hebei Jointo Company, SA team	20	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.17	Longhua Industrial	PMO, PMO, Hebei Jointo	11	Visiting the project site and collecting relevant

	Park	Company, SA team		information
2013.7.17	Meeting room of Longhua Town Government	PMO, agriculture bureau, PMO, town head, village head, Hebei Jointo Company, SA team	13	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.19	Chengde County Agriculture Bureau	PMO, labor and social security bureau, land and resources bureau, ethnic and religious affairs bureau, women's federation, statistics bureau, civil affairs bureau, poverty reduction office, agriculture bureau, Chengde Luneng Organic Fertilizer Co., Ltd., SA team	19	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.21	Laoting Town Government	PMO, PMO, land and resources bureau, labor and social security bureau, women's federation, agriculture bureau, environmental protection bureau, civil affairs bureau, statistics bureau, town government, Hebei Jointo Company, SA team	21	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.7.21	Laoting Town Government	PMO, PMO, Hebei Jointo Company, SA team, villagers	22	Learning local energy structure, awareness of new energy sources, ability to pay, waste collection and transport, attitude to the Project
2013.8.14	Jinyu Hotel in Yutian County	PMO, new energy source PMO, Yiheyuan Company, labor and social security bureau, civil affairs bureau, statistics bureau, women's federation, Guojiatun Xiang, SA team	18	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.8.14	Yiheyuan Company	PMO, Yiheyuan Company, SA team	10	Visiting the project site and collecting relevant information
2013.8.16-	Meeting room of Zunhua International Hotel	PMO, Meikeduo Company, labor and social security bureau, civil affairs bureau, statistics bureau, women's federation, ethnic and religious affairs bureau, environmental protection bureau, agriculture bureau, town head, SA team	19	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.
2013.8.22	Meeting room of Yufeng Jing'an Stockbreeding Company	PMO, Yufeng Jing'an Stockbreeding Company, labor and social security bureau, statistics bureau, civil affairs bureau, women's federation, agriculture bureau, environmental protection bureau, SA team	17	Learning agricultural development plan, social security policy for LEFs, supporting policy for MLS population, biogas construction, women's development, skills training, rural waste treatment, etc.

Appendix 4 FGD and Interview Minutes

1. FGD with the Laoting Town Government

Date	July 21, 2013
Venue	Meeting room of the Laoting Town Government
Organizer	Laoting PMO
Participants	Laoting PMO, land and resources bureau, labor and social security bureau, women's federation, civil affairs bureau, ethnic and religious affairs bureau, agriculture bureau, environmental protection bureau, town head, SA team
Topics	Organizational FGD on the Laoting Subproject
Key points and results	<p>1. PMO: The Laoting PMO has a workforce of 8, and over 10 training courses have been organized.</p> <p>2. Women's federation: Women's development: 2/3 of local laborers are women, who deal with crop cultivation and stockbreeding mainly.</p>
	

2. Organizational FGD in Zunhua City

Date	August 16, 2013
Venue	Meeting room
Organizer	Zunhua Municipal Government
Participants	Heads of the municipal government, PMO, statistics bureau, land and resources bureau, women's federation, labor and social security bureau, town head, Meikeduo Company, SA team
Topics	Organizational FGD
Key points and results	<p>Manager Chen of Meikeduo Company introduced project background: Biogas price is fixed at 1.8 yuan/m³, and the government will grant subsidies for pipeline installation.</p> <p>Civil affairs bureau: The urban MLS standard is 450 yuan/month and rural MLS standard 2,900 yuan/year.</p>



3. Women's FGD in Xingshuyu Village, Yutian County

Date	August 15, 2013
Venue	Village committee
Organizer	Yutian Yiheyuan Company
Participants	SA team, local women's representatives
Topics	Women's development, energy use, public participation , etc.
Key points and results	<p>1. Energy use The energy sources for cooking are CNG and electricity, which are convenient and relatively cheap. Some local households use biogas, which is unstable in supply and ineffective in use.</p> <p>2. Attitude to the Project They support the Project but are concerned about price and effectiveness. They will use biogas as long as it is convenient and cheap.</p> <p>3. Public participation They are willing to do suitable unskilled jobs offered by the Project, and attend biogas training.</p>

Appendix 5 Fieldwork Photos



FGD with a town government in Linzhang County



Interview in Dongluokou Village



Organizational FGD in Luanxian County



Personal interview in Longhua Town



Organizational FGD in Chengde County



Fieldwork in Laoting County



FGD in Guojiatun Xiang, Yutian County



Survey in Baozidian Village, Zunhua County



Minority interview in Shimen Town, Zunhua County



Questionnaire survey in Erjie Village



Women's FGD in Beijidian Xiang



Questionnaire survey in Liangwa Xiang, Anping County



Questionnaire survey in Houpu Village, Anping County



Questionnaire survey in Qianpu Village, Anping County