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INTEGRATING WOMEN INTO GRAMEEN SHAKTI'S RENEWABLE ENERGY VALUE CHAIN IN BANGLADESH

A STUDY OF THE PROJECT AND LESSONS LEARNED

November 2014

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DISCLAIMER

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACRONYMS

dTS	Development & Training Services
E3	USAID's Bureau for Economic Growth, Education and Environment
GEF	Global Environment Facility
GTC	Grameen Technology Center
GS	Grameen Shakti
ICS	Improved Cook Stove
RET	Renewable Energy Technology
SHS	Solar Home Systems
Tk	Taka (Approx. 77.5 Taka = 1.00 USD)
USAID	U.S. Agency for International Development
USD	United States Dollar

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EXECUTIVE SUMMARY

USAID has long been supportive of gender equality and women's empowerment. On its website USAID specifically cites the situation of women in Bangladesh: "Gender inequality is a cross-cutting issue that affects the long-term development of Bangladesh and hinders economic growth."

The purpose of this study was to determine whether the USAID-funded Rural Empowerment through Renewable Energy project—which included 15-day technological training for rural women in Bangladesh at the Grameen Technology Centers (GTCs)—resulted in the integration of women into the Grameen Shakti (GS) renewable energy value chain and benefited the trainees through employment or income. The study aimed to answer three key research questions:

1. Did the USAID funding of the Grameen Shakti GTC rural renewable energy strategy, which involved training, integration, and support, result in the women trainees learning skills that generated employment, entrepreneurship, and income?
2. What is the status of the women trainees who were integrated into the project? How were the workers and entrepreneurs integrated into the GS value chain and the renewable energy technology (RET) sector at large?
3. What lessons were learned from the Grameen Shakti GTC experience in training rural women for work in the RET sector that can be applied in future USAID programming to better integrate women into the renewable energy value chain?

These research questions were addressed primarily through structured interviews with the women trainees—i.e., trainees hired by GS as "GS technicians" and trainees who were not hired by GS (non-working trainees)—women engineers, and regional managers at 46 GTCs. In addition, the research team interviewed key informants and reviewed available administrative data and literature on GS and the RET sector.

From 2005 to 2010, USAID supported an intervention in Bangladesh with two objectives: 1) the large-scale expansion of Renewable Energy Technology (RET) in rural communities, and 2) the economic empowerment of rural women who assemble, repair, and maintain this technology. To this end, USAID funded the Rural Empowerment through Renewable Energy Project through Grameen Shakti (GS), the leading renewable energy company in the country. The project was designed to implement decentralized technology transfer from urban areas (mainly Dhaka) to rural areas, through, 1) construction of Grameen Technology Centers (GTCs) throughout Bangladesh, 2) recruitment of women engineers to lead the GTCs, and 3) training hundreds of rural women from poor households in RET. This was part of a larger effort, supported by the World Bank and international agencies, to extend solar house systems throughout Bangladesh by supporting the implementing companies. The intention was that the RET sector as a whole would benefit from the project even though the training would be conducted by Grameen Shakti alone. The trained women would be integrated into the RET sector and contribute to the GS target of installing 1 million Solar Housing Systems (SHS) by 2012. Grameen Shakti, a not-for-profit subsidiary of the Grameen Bank, stood to benefit from the total of \$2.3 million grant over the two phases of the project, which funded expanded physical infrastructure (in the form of the GTCs), salaries, and equipment. The sector stood to benefit from an influx of trained technicians and sharply increased production.

The women trainees would benefit by gaining income and economic independence through integration into the renewable energy sector. Additionally, this initiative could help rural communities, which have little

expectation of being reached, or reliably serviced, by the under-resourced Bangladesh electricity grid. These rural households, women particularly, would benefit from access to renewable energy for operating solar-powered lamps and accessing modern sources of communication such as television sets and cell phones.

In two phases, from 2005 to 2010, the project established 35 Grameen Technology Centers to provide 15 days of training to a total of 2,797 rural women in the technical skills required to assemble components, install, and maintain SHSs. The trainees also learned to promote SHSs to the public and to train users, often rural women in their homes. This technical training took place in small rural towns across all seven of Bangladesh's administrative divisions, with an added focus on GTCs in the cyclone-vulnerable coastal areas.

Research insight was gained through a survey that interviewed a sample of women trained by the project, including all those subsequently employed by Grameen Shakti. Interviews were also conducted with GS regional and high-level management. It was found that, as a result of the project, 35 GTCs had been established and more than 100 women engineers were employed and trained to be trainers in solar technology. The women engineers then trained almost 3,000 rural women as GS technicians. Overall, the trainees themselves, engineers, and managers rate the training as "good" or "excellent."

Although the project outputs—i.e., number of SHSs installed and number of women trained—were achieved, the outcomes with respect to the training program were not fully realized. Although the supply market of SHS components was not considered in the research questions, it turned out that a key assumption of the project was massive in-country assembly of components (by the women technicians). It appears that imported components became cheaper over time and, with the growth in imported components, the market for in-country assembly never materialized. This explains why the trainees were not hired in larger numbers. In project reports written near the end of the first phase, Grameen Shakti noted that there was difficulty in providing trainees with employment and promised to take remedial measures to address the problem.

Despite the impressive training achievement carried out by the GTCs and the women engineers, very few of the trainees—86 women, or just 3% of the women trained—are employed by GS and none were found to be engaged as entrepreneurs in the renewable energy sector post-training. Those 86 GS employees benefited from their training; many come from poorer families, in comparison to other trainees, and fewer had graduated from high school. As a result of the project, these trainees now have work in rural areas that would not have been available otherwise. These women employees earn income, are able to contribute to their household income, and are not faced with demanding work hours. Additionally, they have gained in self-confidence, civic participation, and positive attitudes about the future.

The trainees who gained employment at GS could be considered as working in "green jobs," that is, involved in environmentally beneficial work. While there are not long working hours, as the work at GTCs is irregular (14 days per month, on average), pay per day is above that in alternative sectors. The women technicians are paid by piece and earnings are reported to be uneven and dependent on the demand for components; no additional benefits, such as health care, are provided. The reported average daily earnings of 141 taka per day (\$1.80 at the current rate of exchange) are below the international norm for poverty at the personal income level, which is \$2 a day. Despite their monthly earnings being below that in other sectors, the women earn more daily, work considerably fewer hours, and express satisfaction with their work.

Aside from opportunity for direct employment at GS, it was intended that trainees would engage in the RET sector as entrepreneurs, assembling SHS components outsourced from GTCs or other solar providers

and providing maintenance services in their communities. Although past project reports provide evidence of trainees engaged as RET entrepreneurs, over the course of the study, no evidence of such entrepreneurship was found. Interviews with regional managers confirm that outsourcing of SHS assembly is not being practiced on any scale by GS. In addition, the niche activity defined for women entrepreneurs—servicing, maintaining, and repairing SHSs after installation—was not found. Grameen Shakti branches provide warranties on products and undertake servicing and repairs through branch field assistants (all men) rather than engaging women entrepreneurs in this activity. While a high proportion of trainees who were not employed by GS have promoted and serviced SHSs at one time or another, this is seen as a public service and there is little evidence that they have earned income from this activity. No women trainees were found to have gained employment in the RET sector with any company other than GS.

The construction of the 35 rural-based GTCs has benefited the communities in which they were constructed because they provide easier access to RET technical services and products. GS found the GTCs to be so important to their objective of installing 1 million SHSs by 2012 that they constructed an additional 11 GTCs with their own funding (after the USAID project was completed). Additional beneficiaries of the construction of the GTCs are the 99 women engineers currently employed by GS as managers of the GTCs and supervisors of the women technicians. Overwhelmingly, the women engineers, who are employed fulltime, are satisfied with the employment opportunities the GTCs have provided them and their families. They say they are eager to continue to grow and take on more responsibility in the sector.

This study is not intended to evaluate Grameen Shakti or the project itself, but to understand and draw lessons from the experience. Since the purpose of the project was to integrate the trainees into the renewable energy technology (RET) sector, the study aims to answer the overarching research question of why there were low levels of integration. Because most of the human capital formed through the project has not been put to use, there has been considerable skill loss to trainees, the sector, and to Bangladesh. While senior management feels that all trainees will eventually be employed in the sector, the study shows a decline in the amount of work available for those few trainees who are currently employed. It is unlikely that the sharply rising sales of SHSs will lead to employment for the majority of GS trainees in the value chain because technological changes have occurred in the sector. Visits to the GTCs indicate that fully assembled imported parts are replacing components that used to require labor-intensive assembly.

The study found the following reasons for the low level of integration of women trainees into the renewable energy technology (RET) sector in Bangladesh:

- Stakeholders did not agree on a plan for integration of trainees prior to implementation.
- The path to the key outcome of integration, either as “employee” or “entrepreneur,” was not defined.
- Indicators to monitor employment and entrepreneurship were not included in the work plans and there was no systematic reporting to document trainee integration.
- Since the evolving low level of integration was not apparent during the life of the project, no corrective action was taken when it was possible to do so.
- Despite record levels of installation, the GTC strategy of decentralized technological transfer appears to have declined over time; evidence from interviews with engineers and managers indicates that fewer components are now assembled at the GTCs.
- The Grameen Shakti board and management are composed largely of men, and no company gender-equity policies—which would have increased the integration of women—were evident. While

some 300 employees are hired each month, none of those additional hires appear to be the trained women.

- The Grameen Shakti SHS supply chain is gender segmented and the women trainees were integrated at the weakest point (assembly). The women trainees are not included in the growing activity of installation, which is dominated by men.

The study identified the following as lessons that may be learned from the Rural Empowerment through Renewable Energy project in Bangladesh and its outcomes:

- Comprehensive understanding and agreement should be reached between funder, implementer, and potential employers in the sector on all aspects of post-training integration.
- Gender segmentation in supply chains or production lines should be identified prior to human capital formation projects and plans made to address this constraint.
- Training should be appropriate to the context and apply to multiple outcomes; for example, the low level of employment of women in the assembly and repair of SHS components could have led to consideration of the need for broader training for women technicians to enable them to repair radios, cellphones, and television sets.
- Training alone does not guarantee entrance and integration into renewable energy value chains, or in any other sector. Complementary or even alternative strategies such as apprenticeship or enforceable targets for women's employment should be considered as options.
- Future initiatives in this field should incorporate robust reporting systems and sufficient flexibility to assure receipt of timely feedback, so that remedial corrective action can be taken to respond to unanticipated changes such as unfavorable market conditions.

I INTRODUCTION AND BACKGROUND

1.1 PURPOSE OF THE STUDY

The purpose of this study was to determine whether the USAID-funded Rural Empowerment through Renewable Energy project—which included 15-day technological training for rural women in Bangladesh at the Grameen Technology Centers (GTCs)—resulted in the integration of women into the Grameen Shakti (GS) renewable energy value chain and benefited the trainees through employment or income. The study aimed to answer three key research questions:

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3. What lessons were learned from the Grameen Shakti GTC experience in training rural women for work in the RET sector that can be applied in future USAID programming to better integrate women into the renewable energy value chain?

1.2 PROJECT BACKGROUND

USAID provided funding to Grameen Shakti (GS) from 2005 to 2010 under the Rural Empowerment through Renewable Energy project (the project) with the objective of improving the lives of rural women in Bangladesh by training them to become Renewable Energy Technology (RET) technicians and entrepreneurs. The project also aimed to accelerate household access to renewable energy technologies in rural communities and among people living in economically and ecologically vulnerable areas, i.e., the Cyclone Sidr¹ affected areas.

The project initially ran from August 23, 2005 to August 31, 2008 (Phase 1) and was extended from October 1, 2008 to September 30, 2010 (Phase 2). Altogether, over the two phases, the project established 35 Grameen Technology Centers (GTCs) to provide training and technical support in rural areas for the rapidly expanding GS renewable energy business. Once the GTCs were constructed and equipped, the main activity of the project was to offer a 15-day technical training to young women—18 to 28 years of age—from poor rural families. The training was conducted at the GTCs by women engineers who had been trained by the project to carry out the training. The bulk of the training focused on teaching the women how to assemble solar home system (SHS) components and accessories.² The training also included modules related to the installation and maintenance of SHSs as well as sessions covering biogas and improved cook stove (ICS) technologies. The program consisted of a combination of lectures and practical

¹ Cyclone Sidr struck Bangladesh in November 2007, causing large-scale evacuations, physical damage, and deaths.

² Components include the electrical circuits, electrical ballast, and charge controller; SHS accessories include lamp shades and mobile phone chargers.

exercises and trainees were expected to pass written, practical, and oral tests to complete the training program. Trainees who performed at a high level received commendations. The trainees received a transportation stipend for the duration of the training.

The project trained a total of 2,797 women: 1,190 in Phase I and 1,607 in Phase 2. After the project was completed in 2010, GS established 11 additional GTCs (Phase III) with its own funds.

The project also included training targeted for women customers on basic use and maintenance of SHSs and included a school program that introduced children to RET and GS. This research study did not examine these two project activities.

1.3 GRAMEEN SHAKTI'S RURAL NETWORK MODEL

Grameen Shakti, founded in 1996, is the largest installer of solar home systems, improved cook stoves, and biogas plants in Bangladesh. Its mission is to promote and deliver “renewable energy technology services to people of remote and rural areas of Bangladesh, at affordable cost, to reduce poverty, and improve the quality of life”.³ GS is a full-service RET company that, in addition to manufacturing and sales, provides installation, maintenance, and repair of the systems they sell as well as customer financing and training. This model is designed to achieve sustainability and to expand employment in the sector through the effective marketing of renewable energy products to create “high demand”.

Although Grameen Shakti has a high profile in its own right, as evidenced by the awards it has received and because it is a component of the internationally recognized Grameen Bank complex of companies, it is only one of many participants in the solar home sector. Grameen Shakti, as a not-for-profit company, does not utilize funds from within the Grameen Bank complex; instead, it accesses loans and credits from the banking system, particularly the Bangladesh Infrastructure Development Company (IDCOL).⁴ IDCOL initially received credit and grant support from the World Bank and the Global Environment Facility (GEF) to start the program. Later, additional financial support for expansion of the SHS program came from a number of international agencies. IDCOL started the SHS program in 2003 to ensure access to renewable electricity for the off-grid rural areas of Bangladesh and sees itself as supplementing the government’s vision of ensuring ‘Access to Electricity for All’ by 2021.⁵

The IDCOL program activities include selection of implementing agencies that will be eligible for initial business set-up assistance and providing loans and GEF grants. The project uses a dealer credit model: customers use donor-supported credit to purchase the SHSs from implementing agencies and IDCOL is reimbursed for the funds through the World Bank, the Asian Development Bank, and other banking institutions.⁶

Grameen Shakti sees itself as pioneering one of the first successful market-based models to bring renewable energy technologies to rural populations. By the end of 2013, Grameen Shakti, with over 11,000 regular staff, had created a rural network of over 1,300 branch offices and 46 GTCs. Branch offices and GTCs are overseen by 166 regional offices (see Figure 1). Each branch office covers approximately 30 villages and

³ Md. Ahsan Ullah Bhuiyan, Assistant General Manager, Grameen Shakti, “Paving the Way for a Green and Sustainable Future” (presentation, Asian Social Entrepreneurs Summit, November 30, 2010, http://www.asiases.org/contents/sub259_2.htm).

⁴ “Case Study: Bangladesh – Solar Home Programme on Credit Sales”. https://energypedia.info/images/c/c3/Bangladesh_-_Solar_Home_Programme_on_Credit_Sales.pdf

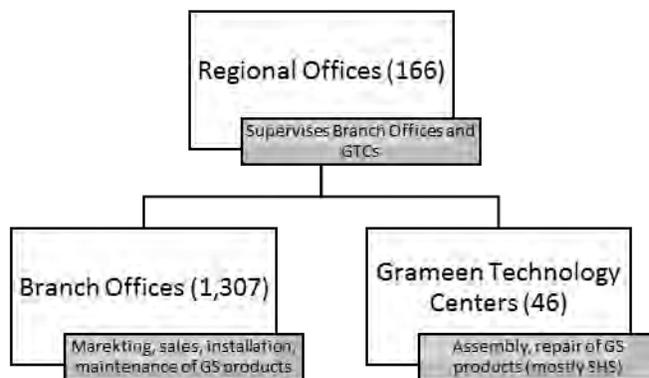
⁵ Infrastructure Development Company Limited, “Solar Home System Program”. <http://www.idcol.org/home/solar>

⁶ Geeta Kumar and Zubair Sadeque, “Output-Based Aid in Bangladesh: Solar Home Systems for Rural Households”. <http://www.gpoba.org/sites/gpoba/files/OBA%20No.42%20Bangladesh%204-24-12-web.pdf>

installs all three of the renewable energy systems (SHS, ICS, and biogas plants). Each branch office is led by a branch manager who is an engineer; the majority of branch managers are men. The branch manager's main responsibility is to market and sell the SHSs. Sales of renewable energy systems come with a three-year service agreement with GS.

Each branch office hires local employees as field assistants to install and maintain SHS, ICS, and biogas plants. The field assistants typically specialize in one of the three renewable energy systems; they receive on-the-job training by shadowing a colleague for two or three months. The field assistants are employees of GS and almost all are men. Typically, one field assistant at a branch office can look after 120 customers, travelling up to 20 km to and from the customer—using local transport (van, rickshaw or bus)—to install and maintain the SHSs and to collect monthly installments for the systems.

Figure 1: Reporting structure of GS rural network in Bangladesh



Aside from the branch offices, GTCs are set up in every GS operating division in the country, usually adjacent to a branch office. GTCs serve primarily to produce and repair solar accessories. The GTCs are innovative because they transfer technology to rural communities through women engineers and trainees. Each GTC is supervised by two or three women engineers; the Engineer-in-Charge reports directly to the GS Regional Manager. GTCs are staffed by women technicians who assemble and repair SHSs. The SHSs use compact fluorescent lights that were assembled at the GTCs from a total of 76 components; however, now most fluorescent lights arrive at the GTCs pre-assembled. Technicians also assemble components to recharge cellphones. The SHS electrical circuit requires inverters—which convert direct current into alternating current—and charge controllers or battery regulators—which control the current to prevent overcharging. GTC women technicians are trained to assemble and repair these solar components under the supervision of the women engineers. GTC women engineers and technicians are not typically involved in the marketing, installation, or maintenance of SHSs. Strictly speaking the GTC technicians are not regarded as “employees” of GS but instead are contractors paid by the number of components (pieces) they produce; thus their income is irregular. The regularity of their attendance does, however, lead to the term “employee” being widely used.

The Grameen Shakti rural network model has resulted in success and growth for the company. From the time GS was founded in 1996 through the end of 2013 GS installed 1,312,478 SHSs. In 2013, about 23,000

SHSs are installed per month, on average, with 30,000 SHSs installed per month during the peak season, May to August.⁷

1.4 GTC STRATEGIC PERSPECTIVE

Bangladesh's electricity grid has limited ability to provide energy access to much of the rural population of the country. Renewable energy technologies, including the products sold by GS, have served as an alternative to grid-produced electricity and the sector has grown rapidly as it seeks to satisfy the demand for energy access in rural Bangladesh. GS high-level management speaks frequently of an "energy crisis" in Bangladesh that has negative environmental effects and bears heavily on women.

The organization sees itself as providing a market-based response to this energy crisis, aiming particularly to alleviate the burden on women. The former Managing Director, Dipal Barua, who managed the project's implementation in both the first and second phases, captured its mission in the statement below:

"Women are the main victims of the energy crisis. They are the ones who suffer most from indoor air pollution, drudgery, and other negative impacts of the energy crisis most rural communities face around the world. We at Grameen Shakti believe that women should be transformed from passive victims into active forces of good to bring changes in their lives and the communities in which they live."

He explained that this understanding is what drove the idea of a technology center.

"That is why the concept of Grameen Technology Centers (GTCs) came about – the concept of transferring technology and knowledge to rural communities through their women. These GTCs would train rural women to be technicians who would promote, install, and repair Solar Home Systems and other renewable energy technologies on behalf of Grameen Shakti."⁸

Women can benefit as consumers of RET products but the GTCs aimed to further engage rural women as technicians and entrepreneurs in their communities, providing them an opportunity to gain self-confidence and income.

With funding from USAID through the Rural Empowerment through Renewable Energy project, GS began establishing its GTCs in 2005. Prior to GTCs, this work was done at a central production center in Dhaka. The GTCs were designed to decentralize the assembly and repair of SHSs. The goal in establishing GTCs was to scale up and increase local assembly of SHSs and enable more efficient repair and maintenance options. At the time of the initial project planning and design stage, GS anticipated a major shift to/and growth of rural-based, in-country assembly of solar components. Grameen Shakti Managing Director, Absar Kamal, explained the need for GTCs as rural platforms for assembly and repair as follows:

"The GTCs were part of a plan to decentralize. In the beginning, all personnel were [sic] centralized in Dhaka and batteries are very heavy and weighed 30kg, and were difficult to transport to remote areas. We had to think of ways of reducing dependence on the Dhaka center. We needed to have production in the GTCs, which are spread throughout the country."⁹

The project linked women's empowerment to decentralizing technology transfer by establishing GTCs to train rural young women to assemble components and construct SHSs. Following installation they would

⁷ "Grameen Shakti at a Glance," December 2013.

⁸ Dipal Bura, "The Right Livelihood Award Interview", October 25, 2007.
http://www.rightlivelihood.org/grameen_shakti_interview.html

⁹ Absar Kamal, Managing Director of GS, Interview by David Hemson, Dhaka, Bangladesh, May 30, 2013.

service, maintain, and repair the SHS. The GTCs and associated trainees would provide rural communities with locally produced, assembled SHS components, with low transport costs. The logic was strong: 1) the expansion of the SHSs would be demand-driven; 2) trained rural women would promote SHSs; 3) the rising demand would be met by GS engaging trained women as entrepreneurs or employees; and 4) increased visibility would stimulate further demand in the rural communities.

2 METHODOLOGY AND SAMPLING

2.1 GROUPS INTERVIEWED FOR THE STUDY

The study carried out extensive data collection to answer the three main research questions (see chapter 1 Introduction and Background). The questionnaires were designed to capture the opinions and experiences of respondents in five main groups: 1) working trainees, 2) non-working trainees, 3) working non-trainees, 4) women engineers, and 5) regional managers (see Table 1). The results were compared and analyzed.

Table 1: Description of groups interviewed for the study

Group	Number of Respondents Interviewed	Description of Activities and Responsibilities of Groups
Working Trainees	86	Women who participated in the 15-day training and are currently working at GTC facilities (80) or GS branches (6) as technicians
Non-Working Trainees	252	Women who participated in the 15-day training and are currently <u>not</u> working at GTC facilities or GS branches
Working Non-Trainees	18	Women who did <u>not</u> participate in the 15-day training and are currently working as technicians at GTCs or GS branches
Women Engineers	99	Women who are qualified engineers, employed at the GTCs, who supervise the work of the technicians and report to the Regional Managers
Regional Managers	45	Managers (all men) responsible for the oversight of GTCs within their region (regions have from one to twelve GTCs)

The trainees are the most important group of respondents because their opinions and perceptions of the outcomes of the training—i.e., imparting technological skills in the RET sector, empowering them in the area of family and society, leading them to income generation opportunities, and developing positive attitudes toward renewable energy—are central to answering the research questions posed by the study. These perceptions were validated through interviews with the supervisors (women engineers and regional managers) who were involved in selecting the trainees for training and were instrumental in recruiting the trainees into the GTCs and the GS branches.

An evaluation exploratory trip to Bangladesh was undertaken to refine the research questions, speak with project staff, and assess the feasibility of data collection for a study of outcomes. The determination to interview five key groups of respondents was the result of multiple conversations with the USAID/Bangladesh project manager, USAID/E3 technical experts, and Grameen Shakti executives. It was not possible to identify a control group. The non-working trainees and working non-trainees were selected

in order to make comparisons of the effects of the project. For key characteristics and indicators, tests of statistical significance were run to see if there were statistically significant differences between the working trainee group and the non-working trainee group. Statistically significant differences are noted in the tables with asterisks. Appendix C includes a list of key informants and meetings.

2.2 SURVEY INSTRUMENTS

A quantitative survey instrument was designed for the trainees and a combination of quantitative and qualitative modules were designed for the women engineers and regional managers. The three survey instruments shared many of the same questions to enable comparison of responses across the groups. All questionnaires contained questions about the quality and usefulness of the training; the GS work environment; knowledge and attitudes about climate change; and opinions on women's empowerment issues. The trainee questionnaire also contained detailed sections on socioeconomic conditions and employment history.

The draft trainee questionnaire was pre-tested at a GTC near Dhaka and revised. Twelve experienced field enumerators went through a three-day training and pilot-tested all three survey instruments at Mawna GTC in Gazipur district. Based on the feedback from the pilot testing and enumerator training the survey instruments were finalized and translated into Bengali (the language of the survey respondents). The survey instruments as well as the research protocol for the study were approved by an independent Institutional Review Board before field data collection began. The final versions of the survey instruments are included in Appendix D.

2.3 SAMPLING AND FIELDWORK

Before the development of a sample design and data collection plan, Grameen Shakti provided administrative data to the research team including a list of all 46 GTCs, their locations and dates of establishment. They also provided spreadsheets containing the names of trainees, their training locations and dates, and the current GS employment status of all 2,797 women who received the 15-day training. A list of the contact information for all engineers and regional managers was also provided to the research team. These data were used to develop the study sample, which was composed of women and men in five key groups with relationships with Grameen Shakti. Appendix A includes a full list of the number of trainees, women engineers, and regional managers interviewed at each GTC.



An enumerator interviews a GS employed trainee.
Photo: David Hemson

The data collection covered 46 GTCs located in 36 administrative districts and took place from May to June 2013. Unfortunately, during this time, Bangladesh was experiencing major civil unrest and frequent mass protests—sometimes violent—across the country. In response to these difficult working conditions, the research team devised a strategic plan to safely and efficiently carry out the fieldwork. The GTCs were grouped in nine geographic clusters of four to seven GTCs each, which eased the travel burden on enumerators. GS regional managers and GTC supervisors were informed of the schedules before enumerators deployed to the field. GS officials were helpful in ensuring that members of key groups were

present and available for interviews. Supervisors maintained frequent contact with the enumerators during the data collection in the field.

2.4 STUDY DESIGN STRENGTHS AND WEAKNESSES

One of the main challenges to the data collection stage of the study was locating non-working trainees. The project was completed two to three years before the study was implemented, which made it difficult to locate many of the non-working trainees. A number of the trainees had moved away from the area where they received the training mainly because of marriage or other family considerations. Also, the administrative database used to locate the non-working trainees contained some out-of-date contact information.

Overall, the data collection efforts achieved high quality, with low non-response rates and minimal missing data. There was zero non-response among the groups associated with GS (aside from the non-working trainees). This is credited to the experience of the enumerators, good training, and thorough planning before initiation of fieldwork, as well as the cooperation of GS management.

3 GRAMEEN SHAKTI TECHNICIAN TRAINING AND BARRIERS TO INTEGRATION

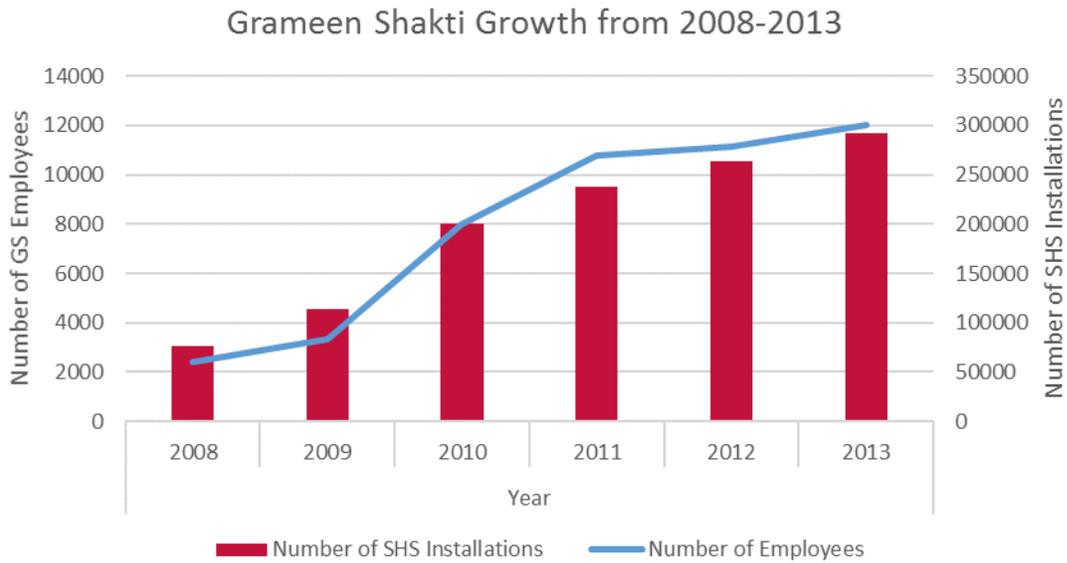
3.1 CONTEXT

At the time the training was conceived, Grameen Shakti and USAID were anticipating tremendous growth in the SHS market in rural Bangladesh. Figure 2 shows the upward trajectory of Grameen Shakti's SHS installations, with installations sharply rising from 2008 onward. As of mid-2013, GS reported installing more than 25,000 SHSs per month. In 2013, GS had achieved its target of installing over 1 million SHSs, with 1.3 million installed by the end of 2013.

Along with this remarkable growth in business, the number of GS employees increased substantially. GS had around 2,400 employees in 2008 and that number grew consistently each year; as of December 2013, GS employed just over 12,000 workers. In the same year, 300 additional workers were being recruited monthly.¹⁰ Production and employment at GS have both expanded almost six-fold since 2008.

¹⁰ Grameen Shakti At a Glance, May 2013.

Figure 2: Increase in the number of Grameen Shakti employees and SHS installations (2008-2013)¹¹



The women technician trainees were expected to be direct beneficiaries of the growing demand for RET, particularly SHS products. Corresponding to the growth in SHS sales and installations, Grameen Shakti expected growth in in-country assembly of SHS components that would provide income generating opportunities for the women trainees—trainees would work in the RET sector as either employees or entrepreneurs. However, as this study found, the anticipated employment generation that was supposed to accompany the large increases in SHS sales and installations simply did not occur. This phenomenon was identified as a problem in a report in 2008, near the end of the first phase. Most of the trained women technicians were reported to be interested in working but were finding it difficult to obtain full employment. The report was reassuring however, stating that Grameen Shakti had “already taken steps to solve this problem and create an enabling environment for the women technicians”.¹²

Table 2 presents the breakdown by division of key statistics from the study: number of GTCs established (46), number of trainees (2,797), number of trainees working (86), number of women engineers working at GTCs (99), and total number of SHSs installed (1,275,605).

¹¹ Figures from archived Grameen Shakti website, “Grameen Shakti Programs at a Glance”, May 2008, January 2009, July 2010, October 2011, September 2012, and September 2013.

¹² See Grameen Shakti, 2008, Semi Annual Report on the Project, Rural Empowerment Through Renewable Energy, Period September 2007 to March 2008 p13.

Table 2: Number of GTCs, trainees, working trainees, women engineers, and SHS installations by division

Division	Number of GTCs Established	Number of Trainees	Number of Working Trainees (as of June 2013)	Number of Women Engineers Working at GTCs (as of June 2013)	Number of SHS Installed (2006 to mid-2013)
Barisal	9	859	23	19	238,314
Chittagong	9	195	13	23	219,036
Dhaka	12	766	25	21	286,337
Khulna	5	542	10	8	174,803
Rajshahi	5	235	3	10	86,205
Rangpur	1	25	2	8	64,768
Sylhet	5	175	10	10	206,142
Total	46	2,797	86	99	1,275,605

3.2 BARRIERS TO INTEGRATION

Despite the large number of women successfully trained under the project, the low level of integration of these trainees into the work force indicates the presence of barriers to women’s employment along the GS value chain (see section 7). The question whether trainees chosen for employment at GS were selected on the basis of merit or because they belonged to an “inner circle” of GS-related individuals is important and should be considered. Likewise, the question whether trainees selected for employment at GS were poorly chosen, resulting in a negative impact on integration, is also important. Comparison of the demographic, motivational, and situational characteristics of working and non-working trainees informs these questions as well as the larger question of why the level of integration of women trainees is low. To better understand these issues it is useful to examine the differences between trainee groups. (A full discussion is presented in Appendix B.)

Comparing demographic, motivational, and situational characteristics of working and non-working trainees yields some interesting and somewhat contradictory findings. It is clear that the GTCs played an important role in recruiting potential trainees and in reaching the target demographic—poor rural women. However, there were significant motivational and situational differences between trainees who went on to work for GS post-training and those who did not. It is suggested that specific characteristics are associated with the trainees who performed best during training and were selected to work for GS. Also, it appears that there was an implicit or explicit “pro-poor” hiring environment at GS. Finally, there is one other consideration; probably not all of the trainees were equally motivated—based on family, economic factors, or other variables—to gain full-time employment immediately after completing their training, which could influence integration rates.

The demographic profiles of the two groups of trainees—those who were working at GS and those who were not—indicate that, in general, the groups were similar, with significant differences only in marital status and education (see Table 1, Appendix B). All of the trainees come from low-income situations, with 89 percent of working trainees and 82 percent of non-working trainees reporting household per capita incomes of less than \$2 per day, and 32 percent and 37 percent, respectively, reporting household per

capita income of less than \$1 per day (see Table 5, Appendix B). These figures indicate that the project succeeded in attracting poorer women to participate in the training. The working trainees were more likely to be married and less likely to have completed secondary education than those in the non-working group. The two groups were similar in other respects: age at the time of training, age at marriage, number of children, economic wellbeing, and income.

Trainees working for GS were more likely to have heard about the training from a GS-related institution, to have been motivated prior to training to work in the RET sector, and to have been unemployed or helping at home prior to training (see Tables 7, 8, and 9, Appendix B). Income data suggest that working trainees come from less affluent households than non-working trainees (see Table 2, Appendix B). Overall, most of the trainees passed the training course (Table 3 below) but the working trainees were more likely to have achieved commendations for performance than non-working trainees. Whereas 58 percent of those employed by GS passed with a commendation only 43 percent of non-working trainees passed with a commendation. This indicates that GS is more likely to offer employment to those who did better in the training course.

Table 3: Grades received by trainees

Grade/Result of Training	Working Trainees (n=86)	Non-Working Trainees (n=252)
Passed with commendation	58.1%*	43.3%*
Passed	40.7%	56.4%
Did not complete	1.2%	0.4%

* Differences statistically significant at the p=0.05 level

On average, the women working at GS live in less affluent households and there are indications that employment of trainees by Grameen Shakti has been “pro-poor”. About 30 percent of the non-working trainees were involved in income generating activities post-training and their monthly earnings were considerably higher than those of working trainees. However, working trainees earned more for the time worked and contributed more, proportionally, to their households’ total income. In many ways the working trainees appear to be “dedicated achievers” who have made the most of their training opportunity and shared their gains with their household (see Section 6.1.3).

It is interesting to note that the working trainees appeared to be 1) less motivated by short-term financial gain, 2) less likely to take the training to increase social status (see Table 8, Appendix B), and 3) less likely to be continuing with their education compared with non-working trainees. The vast majority of trainees in both groups (more than 80 percent) said they were motivated to take the training in order to get a better job; over half said they were specifically motivated to work in the RET sector. (The percentage is slightly higher for working trainees.) At the same time, twice as many non-working trainees said they took the training to receive the training allowance and, as previously noted, non-working trainees are more likely to have completed secondary education. At the risk of over-simplification, some portion of the non-working trainees can be thought of as “comfortable achievers,” less driven by the need to obtain immediate employment.

Generally, it seems that working trainees are more focused on, and more motivated by, the goal of getting a job at GS, as demonstrated by their greater interest prior to training in being employed and their lesser interest in the financial stipend for training. Working trainees were also less affluent, had less education,

were more likely to be married, and were more likely to be associated in some way with GS prior to training. Their socioeconomic status is indicative of a pro-poor hiring policy, which is in part further substantiated by the practice (however limited) of hiring untrained employees who are perceived to be poorer than some of the trained employees (see Section 5.1.1 Trained vs. Untrained workers, p. 15).

The data on hiring practices are somewhat contradictory so it is difficult to determine whether employees were chosen on the basis of merit, association with GS, or a combination of factors. The working trainees were more likely to have received commendations in training than non-working trainees, but they were also more likely to have heard about the training through various GS sources. Therefore, a definitive statement about the selection process cannot be made and it is likely that employees were selected on the basis of several factors, some merit based and some association based.

The relationship between motivation and integration is complex. It appears that the working trainees were more motivated to obtain a job at GS from the outset. The non-working trainees—who were more likely to be students, less likely to be married, and more likely to say they took the training to receive the stipend—were not as invested as the working trainees. Situational factors associated with the non-working trainees such as marital status, educational level, and interest in the training stipend, may be seen as indicators of lower levels of investment in employment, which in turn may negatively impact integration. Thus, while it cannot be determined that trainees were poorly chosen, some trainee characteristics—e.g., being motivated to specifically work in the RET sector—may have predictive value regarding integration of women trainees. These predictive characteristics regarding the “propensity to integrate” are most associated with motivation and investment in training.

4 TRAINEE INTEGRATION

In seeking an explanation for the low level of integration of women trainees into the RET value chain, the interviews examined the transition from training to employment, the trainees' identification of their role within the value chain, and their perceptions of the environment relating to women's aspirations in Grameen Shakti. Since integration into the GS value chain is a key concept that was not defined in the project documents, an interpretation is provided here.

Integration in relation to a value chain refers to the complex network of relationships that organizations maintain with trading partners to procure, manufacture, and deliver a product. From the perspective of the RET sector and trainees this would involve continuing economic relationships leading to their incorporation in activities leading to the sale and installation of SHSs. In the SHS value chain and the context of the project, a high level of integration would be characterized by stability (in the form of full-time employment or an on-going contractual entrepreneurial relationship), a rapid shift from training to employment or a stable business contract, and regularity in all relationships. Its opposite



The SHS network without showing the solar panel on the roof and the lights. Note the charge controller at the center and the cellphone charger below on the right.
Photo: David Hemson

would be either low or no participation in activities leading to the installation of SHS either by Grameen Shakti or any other implementing agency in the RET sector.

Many respondents indicated that there are issues with integrating trainees into the value chain. They reported delays in employment, underutilization of women’s skills, uncertainty about the future and prospects for job advancement, and problems with employee turnover. These findings are discussed in detail below.

4.1 HIRING TRAINEES

The unexpected problem associated with integration of trainees into the GS value chain was the delay in time between the completion of training and the beginning of work at GS/GTCs. Table 4 shows the length of time between the end of training and beginning of employment at GS for the 80 trainees who were offered work at GTCs. On average, trainees waited almost 10 months before beginning work at the GTCs. Those who underwent training in the first phase of the project waited the longest, almost 13 months.

Table 4: Time between training and employment at GTC by phase

Phase	Number of Trainees Working at GTCs	Average Gap (in months) Between Training and Employment
Phase 1	40	12.9 (n=37)
Phase 2	36	7.0 (n=33)
Phase 3	10	5.9 (n=10)
All Phases	80	9.6 (n=80)

In successive phases, the gap declined gradually. The decline in the gap between training and hiring by GS may indicate that training was initially seen as something separate from production, or that planning for the GTCs was not well synchronized with the training schedule. The persistence of this gap is problematic in terms of trainee integration.



Solar panel on the roof of a household served by the Mawna GTC in Gazipur district. Photo: David Hemson

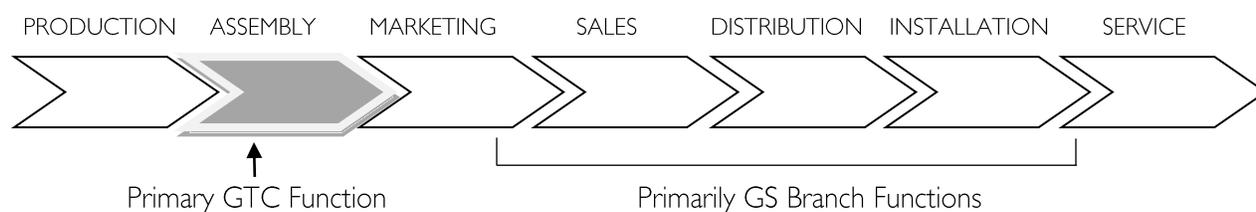
The majority of trainees expected to continue to engage with Grameen Shakti (or the RET sector in general) in one form or another after completing the course. Those trainees who are currently employed or earning income outside of GS were asked if they sought work with GS after the training. Of the women currently earning income outside of the sector, 57 (or 77 percent) applied to work for GS but were not hired. The majority of these trainees believe they were not hired because there were few vacancies at the GTCs and too many trainees applied for the available positions. The women who did not seek employment at GS after training mostly stated family priorities as the reason for not applying for a job at GS. The data were reviewed to

identify trainees who may have sought and found employment with other companies in the RET sector, but none were found.

4.2 TRAINEES IN THE GS VALUE CHAIN

The trainees working as technicians in GTCs almost exclusively assemble SHSs (94 percent), with a small percentage working on improved cook stoves (6 percent). The few trainees who are working at GS branches are all working on improved cook stoves. While the 15-day training largely focused on teaching women how to assemble SHSs, training was also provided on other parts of the GS RET value chain in the maintenance, installation, and promotion of SHSs. Figure 3, which shows the GS RET value chain, indicates that women trainee’s skills have not been utilized in other parts of the SHS value chain; the women trainees are involved almost exclusively in SHS assembly. After assembly, each segment of the value chain—from marketing to service of RETs—is dominated (entirely or almost entirely) by men who are GS employees.

Figure 3: Grameen Shakti Renewable Energy Technology Value Chain



4.3 CONDITIONS OF WORKING TRAINEES

To examine women’s experiences working at GS the researchers looked at perceptions of the work environment held by three groups: employed trainees, women engineers, and regional managers. Overall, the engineers and regional managers and almost all of the working trainees agreed that the integration of women into renewable energy technology is a priority at GS (Table 5). However, it appears that integration of women is not taking place at the higher levels of management; all of the regional managers interviewed for the study were men. When respondents were asked if they felt having more women managers would lead to more advancement for women in general at GS, 99 percent of the working trainees and 95 percent of the women engineers agreed with the statement. The male regional managers did not feel as strongly, although 76 percent were in agreement. Despite some divergent opinions, there appears to be strong agreement among middle management that women managers at a higher level would make an important difference.



Although women are, at times, pictured as undertaking roof installations most trainees report that they are limited to assembly work. Photo: Grameen Shakti

Some respondents feel that women are not suited for the work of installing SHSs because, they say, the systems are too heavy for women to lift. When asked if SHS installation is work that is too heavy for women to undertake, only 15 percent of the working trainees agreed with the statement; a slightly larger proportion of women engineers (25 percent) and regional managers (29 percent) said they feel SHS installation work is too heavy for women (Table 5). Overall, it appears that the women trainees working at GS, who would be directly involved in the installation process, are more confident in their ability to perform the installation work than those in supervisory positions (women engineers and regional managers).

The respondents working at GS also responded to statements about their future prospects and opportunity for professional growth in the RET sector in general and at GS in particular. Twenty-three percent of the working trainees feel that they have reached the limit of progress at GS and 20 percent of women engineers feel the same way. The regional managers appeared to be more optimistic about the working trainees' prospects at GS, with only 11 percent saying they feel the technicians cannot progress further. When asked about their perceptions of future opportunities in the RET sector, the working trainees were also less hopeful—66 percent compared with 93 percent among women engineers and 89 percent among managers. Those in the lowest positions seem to have less confidence in their future.

Table 5: Attitudes toward women working in the renewable energy technology (RET) sector

Attitude Toward Women Employed in RET Sector	Percentage Who Agree with Statement About Women Employed in RET Sector		
	Working Trainees (n=86)	Women Engineers (n=99)	Regional Managers (n=45)
Integration of women into RET is a priority for Grameen Shakti	98.8%	100.0%	100.0%
More women managers would lead to women advancing further at GS	98.8%	94.9%	75.6%
Installation of the SHS is too heavy work for women to undertake	15.1%	25.2%	28.9%
I (the women technicians) have now reached the limit of progress at work	23.3%	20.2%	11.1%
I (the women technicians) have a good future working in renewable energy technologies	66.3%	92.9%	88.9%
The turnover of women technicians is a problem at work	47.7%	61.6%	48.9%

Another indication of the low level of integration of women trainees into the RET sector and GS specifically is the perception by all three groups of respondents that “the turnover of women technicians is a problem at work.” A low level of turnover would show stable integration; a high level of turnover could indicate uncertainty and possible dissatisfaction with work at the GTCs. Almost half of the trainees and regional managers and more than half of the women engineers feel that the turnover of women technicians is a problem at work. When asked to provide reasons for why women technicians have a tendency to leave the work at the GTCs, all three groups noted low compensation and marriage as the two main reasons. The working trainees and women engineers also noted that family problems and finding a better job elsewhere play a part in the turnover of women technicians.

5 TRAINING: VALUE AND OUTCOMES

Asking the question why integration levels are not higher, one consideration is that certain aspects of the GS training program may be impediments to integration rather than facilitating integration. In fact, analysis of the

data on the value of training and outcomes provides some interesting findings. Although management said that trained technicians are much higher quality employees than untrained technicians, it appears that they sometimes hire *untrained technicians*—i.e. women who have not completed the GS training course—presumably because they are poorer. This hiring pattern, taken in conjunction with the finding that working trainees are less affluent than non-working trainees (see Benefits of Training—Income, p. 24) suggests that there is a hiring bias toward poorer applicants at GS.

When managers and supervisors were asked how the training program could be modified to improve outcomes the main suggestion was that the women trainees should participate more actively during the training. Other suggestions included 1) longer training, 2) follow-up post-training, 3) assurance of employment, and 4) more publicity about the availability of training. It is interesting that when asked to assess the quality and usefulness of training, respondents overwhelmingly indicated that they thought the training program was useful and of good quality. An issue of concern was that the training focused primarily on the assembly of SHSs; as a result, there was little training or financial support to encourage the development of entrepreneurial activities. When asked how the program could be improved the most common response was that the program needed to be longer.

While respondents overwhelmingly said that the training was beneficial and that the women were the appropriate demographic to receive the training, they reported less frequently that trainees were involved in promoting or repairing SHSs in their communities. Even rarer was the occurrence of trainees being paid for SHS-related activities. Respondents said although the training program focused on SHS assembly, it also included training in SHS repair, promotion, and installation. These data indicate there is a disjunction between the content of the training program and the post-training activities—with the exception of assembly of SHSs, which was the primary focus of the training and is the primary activity of the women trainees working at GS.

5.1 MANAGEMENT VIEWS

5.1.1 MANAGEMENT: TRAINED VS. UNTRAINED TECHNICIANS

During the course of this study it was revealed that several GTCs had chosen to hire women technicians who had not participated in the project training (non-project-trained technicians). These untrained technicians were hired instead of women who had undergone the formal 15-day training. They were hired even though managers indicate that training had a positive impact on women's ability to perform their jobs. Compared with working trainees, untrained technicians are involved in more diverse activities such as repair of SHSs, improved cook stoves, and biogas technology. Working trainees primarily work on SHS assembly. At the same time, the working trainees are viewed on all measures as providing considerably higher quality work than the untrained technicians.

While the number of non-project-trained technicians is small—18 were found across seven GTCs and two GS branches during the course of the study—women engineers and managers who supervise both types of women were asked to comment on the characteristics of the two groups of employees. Managers and women engineers were asked to assess the quality of work done by the project-trained technicians and non-project-trained technicians and to explain why their branches may have hired untrained women when formally trained women remained unemployed in the sector.

Table 6 shows a sharp difference in the supervisors' opinions of project-trained technicians versus untrained technicians. The GS training had a very positive impact on the women's ability to successfully perform the duties of their job.

Overwhelmingly, the branches prefer to hire trained technicians, with 96 percent of branches reporting hiring trained women technicians. Only 9 to 13 percent of women engineers and regional managers reported that their branches had hired untrained women as GTC technicians. When asked why the untrained women technicians were hired, the poverty status of the women candidates appeared to be a major hiring consideration. Women engineers and regional managers said that these women were relatively poorer than other candidates. Additional reasons cited by the women engineers and regional managers for hiring the non-project-trained technicians were that some of the women candidates had received training elsewhere and some were perceived to be older, more reliable women for the job. Overall, however, the women engineers and regional managers feel strongly that the trained technicians perform their work better than the non-project-trained technicians.

The untrained technicians appear to be involved in more diverse activities at GS. More than half of the women engineers and regional managers reported that the untrained technicians work on repairs of SHSs and on other GS products like improved cook stoves and biogas technology, whereas the trained technicians work almost exclusively work on assembly of SHSs. Table 6 presents the opinions of the women engineers and regional managers regarding the quality of the work done by the trained and untrained technicians. Almost all the women engineers and regional managers feel that the working trainees have sufficient knowledge of assembly, are excellent at time-keeping, produce high-quality work, and display teamwork skills. In contrast, less than one-third of women engineers and regional managers find these qualities to be present among the working non-trainees.

Table 6: Perception of the quality of work of GS women technicians according to technicians who received project training and technicians who did not receive project training

Quality of Work Measures	Percentage Who Agree that GS Women Technicians Display Fair, Very Good, or Excellent Quality of Work Regarding Four Measures of Quality of Work			
	Technicians Who Received Project Training		Technicians Who Did Not Receive Project Training	
	Women Engineers (n=95)	Regional Managers (n=43)	Women Engineers (n=35)	Regional Managers (n=15)
Knowledge of RET	98.9%	100.0%	25.7%	26.7%
Time-keeping	98.9%	100.0%	28.6%	26.7%
Quality of work	98.9%	100.0%	28.6%	20.0%
Team work	97.7%	100.0%	31.4%	30.8%

5.1.2 MANAGEMENT: OUTCOMES OF TRAINING

GS Regional Mangers and GTC Engineers provided their thoughts on the value of the training and performance of the trainees who were offered work at GS. In general, the women engineers and regional managers (82 percent) believe that formal training is essential for SHS assembly technicians. Women engineers and regional managers commonly reported that 1) formal training for technicians resulted in greater efficiency; 2) the presence of the GTCs improved sales and customer service for GS; and 3) women have more opportunity to earn income. The women engineers were more vocal in noting that additional training in marketing, installation, repair, and business would benefit the technicians. Some of the women engineers (over 14 percent) specifically noted that the training would help the women get a job, but outside of the GS organization.

A stated goal of the training—in addition to employment at GS GTCs—was the creation of women entrepreneurs. Women engineers and regional managers reported their opinions on how the 15-day training led to women’s entrepreneurship. Almost a third of the women engineers and regional managers specifically said that they were not aware of any trainees going on to become entrepreneurs or that entrepreneurs were not created because the women did not receive the necessary financial support.

However, the women engineers and regional managers had strong positive views about the outcome of the training, with respect to the assembly of SHSs. Between 98 and 100 percent said that the training was essential to GS scaling up the production of SHSs and that the training led to success for their branch. The majority of the women engineers and regional managers noted that publicity, demand, awareness, and sales of SHSs all increased after the establishment of the GTCs. Around a quarter of the group mentioned that the investment in training led to employment opportunities.

“I think one of the problems was no follow-up after training.”
 –Quote from interview with Regional Manager in the Tangail Division, May 22, 2013

The women engineers and regional managers explained how they thought the training could have been more successful in integrating women into the RET sector. Table 7 presents a summary of their suggestions for improving the training so that more women trainees can enter the RET sector post-training. The majority of respondents said that the training should have been more participatory and hands-on for the trainees. Around a third of the women engineers and regional managers said there needed to be a more direct link between training and employment.

Table 7: Improving training outcomes for better integration of women into the RET sector

Suggestions for Improving Training Outcomes	Percentage Who Agree with Suggestions for Improved Training Outcomes to Better Integrate Women into the RET Sector	
	Women Engineers	Regional Managers
Training should involve more participation of the women	58.6%	66.7%
Conduct follow-up training on similar topics	10.1%	20.0%
Longer training	28.3%	24.4%
Assurance of employment after training	31.3%	33.3%
Modernize training	22.2%	6.7%
Include more awareness building of renewable energy technologies	27.2%	24.4%

5.2 TRAINING ASSESSMENT: PERCEIVED USEFULNESS AND QUALITY

The trainees, women engineers, and regional managers assessed the quality and usefulness of the training. There is considerable discrepancy between respondent perceptions of the usefulness of training and the extent to which economic benefits have been realized. Overall, the quality of the training was highly rated across all respondent groups. Almost all of the trainees felt that new skills and knowledge were gained, that the trainers were qualified, and the materials were sufficient. However, while trainees reported that they

had used the skills they gained in training, there was little evidence that this had resulted in economic benefits.

The focus of training was consistently reported to be on assembling and servicing SHSs rather than on promotion and installation. Most of the trainees working at GS are engaged in SHS assembly rather than installation, even though installation has more growth potential than assembly. Interestingly, while about half of the trainees have gone on to promote SHSs in their communities they have generally not been integrated into the sales and marketing aspects of the value chain.

Opinions among the respondent groups differ about receipt of training to set up a small business. Women engineers and regional managers reported that the trainees received relatively more training on how to set up a small business, while the trainees reported that they received relatively less training on setting up a small business. However, contrary to expectations, very few trainees have gone on to install or repair SHSs as entrepreneurs.



Trainees installing the charge controller. Women technicians report that they are not generally involved in home installations as this is regarded as heavy work. Photo: Grameen Shakti

Satisfied with the training program, overall, the women engineers and regional managers did recommend that if changes were to be made in the training program, the program should be longer and offer follow-up support post-training.

In general, although respondents said they were quite satisfied with the quality and usefulness of the training, anticipated economic benefits and integration of women into the value chain were not realized.

Tables 8 and 9 summarize the type of training women said they received, which was mostly technical (79 and 84 percent). Only 15 and 19 percent of trainees said they received entrepreneurial training; a very small percentage (less than 3 percent) reported receiving both technical and entrepreneurial training. As mentioned previously, the content of the training mostly focused on construction/assembly and service, maintenance, or repair of SHSs.

Table 8: Type of training received by women trainees

Type of Training Received	Working Trainees (n=86)	Non-Working Trainees (n=252)
Technical	79.1%	84.1%
Entrepreneurial	18.6%	14.7%
Both technical & entrepreneurial	2.3%	1.2%

Table 9: Content of the training received by women trainees

Content of Training	Percentage Who Agree That Trainees Received Specific Training Content			
	Working Trainees (n=86)	Non-Working Trainees (n=252)	Women Engineers (n=99)	Regional Managers (n=45)
Construct SHS	100.0%	97.6%	100.0%	100.0%
Install SHS	36.1%	19.1%	20.2%	24.4%
Service, maintain or repair SHS	86.1%	91.3%	95.0%	95.6%
Promote and sell SHS	37.2%	33.3%	30.3%	22.2%
Set up a small business	64.0%	50.0%	78.8%	84.4%

Those in supervisory roles—women engineers and regional managers—were asked to recommend changes to the training program if it were repeated. Their responses are summarized in Table 10. The most common recommendations from both women engineers and regional managers was that the training program be longer and that follow-up support be offered post-training. Both groups felt that the selection of candidates for training was appropriate.

Table 10: Recommended changes to the training program from engineers and managers

Recommended Changes to the Training Program	Percentage Who Agree with Recommended Changes to the Training Program	
	Women Engineers (n=99)	Regional Managers (n=45)
More careful selection of trainees	22.2%	20.0%
Longer training	58.6%	48.9%
More business training	25.3%	20.0%
Better methods of teaching	24.2%	26.7%
Follow-up support after training	28.3%	44.4%
Follow-up training in micro-enterprises	3.0%	4.4%

Note: More than one response option was possible, so percentages may add up to more than 100 percent.

The groups of respondents reported their views on the usefulness of the training and whether trainees had gone on to use any of the skills gained in promoting and repairing SHSs (Table 11). A number of the trainees have gone on to use the skills acquired in training to benefit their communities by spreading knowledge of SHSs. However, there is little evidence of direct benefit to the trainees in the form of income, especially the trainees not currently working for GS.

A large majority of respondents said they felt that the training benefitted the trainees, although the percentage is lower among the non-working trainees. The women engineers and regional managers responded differently from the trainees when asked if they felt the appropriate types of women were recruited for the training; 79 percent of women engineers and 80 percent of regional managers agreed with

the statement while 92 and 98 percent of trainees said they felt that the most appropriate women were selected for training.

It was expected that the trainees would promote, repair, and maintain SHSs in their communities post-training. Around half of the trainees say they have promoted SHSs but a smaller proportion report being involved in the repair and maintenance of SHSs in their communities (22 percent of working trainees and 10 percent of non-working trainees). Of the women who have promoted and repaired SHSs, few have actually received any income directly from performing these services (5 and 13 percent of trainees). It is interesting to note that women engineers and regional managers think that higher percentages of the trainees are participating in these activities in their communities.

Table 11: Evaluation of the usefulness of the training

Perceived Usefulness of SHS Training for Women	Percentage Who Agree with Statement Regarding Usefulness of SHS Training for Women			
	Working Trainees (n=86)	Non-Working Trainees (n=252)	Women Engineers (n=99)	Regional Managers (n=45)
The training benefited the trainees	98.8%	88.9%	92.9%	91.1%
The most appropriate demographic (types of women) were selected for the training	97.7%	91.7%	78.8%	80.0%
Women have promoted SHSs in their communities	64.0%	41.7%	81.8%	68.9%
Women have repaired SHSs in their communities	22.1%	9.5%	29.3%	37.8%
Women were paid for the SHSs-related work in their communities	12.8%	4.7%	18.2%	24.4%

6 BENEFITS FROM TRAINING

6.1 GENERATION OF EMPLOYMENT, ENTREPRENEURSHIP, AND INCOME

The Rural Empowerment through Energy Renewal project had two related objectives: first, to increase access to renewable energy technologies (RET) in rural communities, in economically and ecologically vulnerable areas and, second, to train poor women in these rural communities for integration into the RET sector.

The optimal result of the training would be for most of the trainees to be integrated into the work force, using their acquired skills in the RET sector, and earning income as employees or from providing entrepreneurial services. There are three ways in which training could provide economic benefits to the women trainees: 1) through employment at GTCs/GS; 2) as entrepreneurs engaged with the GTCs in assembling SHS components and providing related services in their communities; and 3) by contributing to the employability of women who are economically active outside the RET sector.

The training resulted in some benefits to the trainees but in many ways the expected benefits were not realized. For the women hired to work at GS the training provided an opportunity for stable employment, recognition of worth, and use for skills in ways not generally available to rural women in Bangladesh. Additionally, they benefited from lower time demands, the opportunity to live with their families, and better employment than they had previously. However, it is notable that earnings in this sector are lower than in other sectors that employ women, such as the garment industry.

Importantly, however, the training did not result in income-producing entrepreneurial activities or employment in the RTC sector outside of GS, both of which were expected alternatives for trainees not offered employment at GS. In addition to lack of employment of women in the RET sector overall, the researchers found no evidence that entrepreneurial work was being undertaken. While the primary focus of the training was SHS assembly not business management and development, additional entrepreneurial training was given to around 500 of the trainees and some of the best-performing trainees were given SHS assembly and construction tools as an incentive to engage in entrepreneurial activities.

The absence of women entrepreneurs as a project outcome was unexpected because training in entrepreneurship and incentives for entrepreneurial activities were provided and explicitly stated as desired outcomes from the training. In addition, while trainees promoted SHSs informally in their communities, this activity has not resulted in income generation because there is no strategy to integrate trainees into the sales and marketing aspects of the GS value chain.

While the GS training benefited trainees by making them more employable, it has not benefited the RET sector. Outside of GS hiring, no trainees were employed in the RET sector. It is interesting to note however that the trainees who did find employment post-training earned more on a monthly basis than the trainees hired by GS.

Considering these results, it appears that for some women the GS training provided income benefits through employment at GS; for others, the training provided technical skills and experience that increased employability outside of GS and the RET sector. Overall, however, these employment rates are lower than expected and did not result in income-producing entrepreneurial activities or integration of trainees into diverse aspects of the value chain. A detailed discussion of these points follows.

6.1.1 EMPLOYMENT AT GRAMEEN SHAKTI

The research examines trainees' economic activities including their contributions to family income. The responses are discussed in the following sections.

For the 86 trainees employed by GS the training provided the opportunity for stable employment and the resulting recognition of their worth, marked by their contribution to family income. These women are able to use their acquired skills to earn income in a way that is not generally available for women in rural areas of Bangladesh. However, the earnings of the women working at GS are relatively low when compared to earnings in other sectors employing women.

“My greatest concern is that the work for my team is in decline. Initially, many supported the training program and we had a lot of work to do but now we have less because the circuits are all imported.”

—Quote from interview with an engineer at a GTC in the Tangail Division, May 23, 2013

Compared to a typical worker in the garment industry—a sector that commonly employs large numbers of women in Bangladesh—the work offered at the GTCs demands far fewer hours from the women workers, but the GTC workers correspondingly earn less per day than garment workers. The minimum wage of a garment worker—which was raised to 5,300 taka (\$68) a month in December 2013¹³—is higher than the reported monthly earnings of the women working at GTCs, which is 2,154 taka. However, the number of days women work at GS in a given month (14.3 on average) is considerably less than the 26 days a month of work for an average garment worker. On this basis, the GTC employee earns an average of 151 taka per day while the garment worker earns a minimum of 204 taka per day—equivalent to \$1.94¹⁴ per day for the GTC employee compared with \$2.85 per day for the garment workers. However, there are important differences between employment in urban and rural areas which need to be taken into consideration; women employees in rural areas have relatively short distances to go to work and have the benefit of living at home with their family.

While the working trainees' earnings are low, there is compensation in two areas: first, the employees are able to live with their families and earn some income in rural areas, and second, these earnings are better than previous employment alternatives. Most of the working trainees did not have any previous employment or income earning experience but 8 of the women did have an employment history. Table 12 shows the marked improvement in earnings these women found in comparison to previous earnings.

Table 12: Employment conditions of working trainees

Employment Condition	Working Trainees' Previous Employment (n=8) ¹	Working Trainees at Grameen Shakti (n=86)
Average payment (including payment in kind) per month, in Tk	Tk 1,632	Tk 2,154
Average number of days worked per month	21.5	14.3
Average rate per day (including payment in kind), in Tk	Tk 74.2	Tk 141.2
Average distance from home to work place, km	1.2 km	4.2 km
Average number of months worked at previous employer or with Grameen Shakti	20.8	31.9

1. 8 of 86 working trainees reported previous employment.

Compared with the alternative of previous employment, GTC work is less demanding in time and pays twice as much as previous employment (151 taka/day compared with 76 taka/day). Higher earnings for less time working is an attractive option, although there are disadvantages in having to travel further to work. It appears that this higher income encourages women trainees to work for GS even though distance to the work place has increased several times. Employees generally commute to the work place on foot or by rickshaws. Understandably, these women have now logged more months of employment with Grameen Shakti than in their previous employment.

¹³ "Bangladesh Raises Minimum Wage for Garment Workers After Unrest." Arun Devnath, Bloomberg, November 24, 2013. <http://www.bloomberg.com/news/2013-11-13/bangladesh-garment-factories-to-stay-shut-amid-worker-protests.html>

"Bangladesh garment workers set for 77% raise." Jason Burke, The Guardian, November 14, 2013. <http://www.theguardian.com/world/2013/nov/14/bangladesh-garment-workers-pay-rise>

¹⁴ \$1 USD= 77.5 Taka (Tk)

6.1.2 ENTREPRENEURIAL ACTIVITIES

A stated goal of the project was to create a group of trainees operating as entrepreneurs who would take in work from the GTCs, promote SHS technology, and repair and maintain the units.¹⁵ The award of SHS tools and equipment to trainees who performed well was designed to reinforce this strategy. These entrepreneurs would benefit from the GTC model and participate in the RET market by using their acquired skills and equipment provided by Grameen Shakti to build home-based enterprises. Researchers sought evidence for the development of entrepreneurship among women trainees in a number of questions regarding post-training activities. The data gathered indicate that there has been no material presence of entrepreneurship by trainees in the SHS sector. Specifically, there is no evidence of trainees servicing, maintaining, and repairing SHSs on any systematic basis, as entrepreneurs or in any other capacity, except as employees of GS.

It was expected that at least some of the trainees would develop as entrepreneurs, assembling, servicing, repairing, and maintaining SHSs; they would be granted space by Grameen Shakti branches and be supported to undertake this activity.¹⁶ High-level management mentioned that such entrepreneurship would logically follow from the increased SHS sales, giving rise to widespread independent servicing activities in rural areas. Despite statements that this was the primary expected result of training, researchers who carried out exploratory, data collection trips, found little evidence that these plans had matured. In interviews with high-level management, regional managers, and women engineers, responses focused on employment rather than entrepreneurship and outsourcing.

The survey data were analyzed to determine if the trainees who were not working at GS were earning income as entrepreneurs or otherwise engaged in the RET sector, with or without compensation. The number of trainees reporting involvement in such activities was very low. Only a small fraction of trainees who were not employed by Grameen Shakti were found to have been paid for maintaining or repairing SHSs in their communities (12 of 252, or 5 percent). The few trainees not employed by Grameen Shakti who are paid to repair or maintain SHS do not seem to earn their livelihoods primarily as entrepreneurs because they reported being salaried employees for an average of 23.6 days per month. Engagement with the RET sector appears to be a secondary and part-time activity.

Clearly, the GS training did not lead to the expected level of entrepreneurship for the women trainees. A large proportion (42 percent) of the trainees who were not employed by Grameen Shakti reported promoting SHSs in their communities on a voluntary basis after training; however, this activity did not lead to income generation for the women, and GS missed an opportunity to integrate these women into the value chain. GS never developed a strategy for systematically involving the women trainees in promotion, marketing or sales.

Grameen Shakti did provide selected trainees with one important incentive for entrepreneurship—tools to construct and repair SHSs. The SHS tools, which included a soldering iron and other equipment, were awarded to those trainees who did outstandingly on the final tests—some of the women who earned their commendation also received the tools. The intention was that these trainees would be rewarded and enabled to undertake home-based assembly of SHSs.¹⁷

¹⁵ This strategy was set out in the original work plan at the inception of the project.

¹⁶ Mentioned in Scoping Trip Report and in the GS final report.

¹⁷ This intention was not necessarily matched by availability of electricity to the home. A soldering iron can be operated only if the trainee's home is connected to the grid or to the solar power of a SHS. It seems that the problem of lack of available electricity was one of the impediments to the strategy of encouraging entrepreneurship.

Table 13: Possession of SHS construction tools by trainees and earnings of trainees with tools

Possession of SHS Construction Tools by Household/Trainee and Average Monthly Earnings of Trainees Who Have SHS Construction Tools	Working Trainees	Non-Working Trainees
Household has tools to construct SHS	52.3% (n=86)	15.5% (n=252)
Household has tools to construct SHS and trainee has promoted SHS in the community	77.8% (n=45)	84.6% (n=39)
Average monthly earnings of trainees who have tools to construct SHS, in Tk	Tk 2,305 (n=45)	Tk 3,531 (n=14)

Table 13 shows the results of this initiative. A much smaller proportion of trainees not employed at GS had SHS tools than the working trainees—16 and 52 percent, respectively. Of the 39 non-GS employed trainees who have tools for SHS construction, a high proportion (85 percent) have at one time or another promoted SHSs. While these women have promoted SHSs, none of the trainees have used the tools to develop an enterprise because none reported being self-employed or working in the RET sector. Most importantly, it appears that ownership of tools for construction and repair of SHSs is concentrated among the trainees working for GS who already have access to the tools at the GTCs where they work. This constitutes an unfortunate redundancy in the reward because the trainees not working at GS might have used the tools to better advantage at home in their communities.

6.1.3 TRAINEE EARNINGS

It has been seen that few benefits accrued to women trainees in the form of entrepreneurship, however the training may have conferred benefits to trainees by increasing income through employment in other companies in the RET sector or in other sectors. Table 14 shows that about 30 percent of trainees not working for GS are earning some kind of income. On average, their daily earnings are lower and none of the women reported earning income in the RET sector.

Table 14: Post-Training Earnings of Trainees

Earning Characteristics of Trainees Post-Training ¹	Working Trainees (n=86)	Trainees Earning Income Outside of Grameen Shakti
Generating post-training income	100.0%	29.4% (n=252)
Employed AND work at least 15 days per month	54.7%	98.6% (n=74)
Average earnings per month	Tk 2,154	Tk 2,961 (n=74)
Earn > Tk 60 per day	90.7% (Average= Tk 141.2/day)	69% (n=74) (Average= Tk 123/day)
Contribute > Tk 1,000 per month to the household income	67.4%	65.8% (n=79)
Contribute > 12% of total monthly household income	74.4%	40.1% (n=79)
Earn income in RET sector	100.0%	0.0% (n=79)

1. Trainee earnings are based on a 22-day work month, 5-day work week, 260-day work year.

Table 14 presents the data on post-training employment and compares the trainees working for GS with the trainees working outside GS. A total of 74 of the 252 trainees (29 percent) found income-generating activities outside of GS. Of these, 99 percent were fully employed, i.e., working more than 15 days a month. This can be compared with trainees working at GS, 55 percent of whom worked fewer days per month. The monthly earnings of trainees not working at GS are almost 40 percent higher than the earnings of the GS trainees. However, considered as daily earnings, the GS employees earned more for their time—Tk. 141 per day for the GS trainees versus Tk. 123 per day for the trainees not working at GS.

Just over 65 percent of both groups of women trainees contribute more than 1,000 taka per month to their households. However, the GS employees contribute a larger proportion to their total household monthly earnings; 74 percent of GS employees contributed more than 12 percent of their household's total monthly income. Among the trainees not working at GS, 40 percent contribute more than 12 percent of their household's total monthly income.

No trainees reported employment in the RET sector apart from those employed by Grameen Shakti. This indicates that despite program efforts and women engineers who worked hard as trainers to impart specific skills, the vast majority of the women trainees did not benefit from integration into the RET sector. It does appear that the training did benefit a number of trainees by broadly improving their profile and making them more employable. Those who have benefited in this way have earned more monthly than GS employees and their households have been rewarded with greater income.

6.2 EMPOWERMENT OF WOMEN TRAINEES

6.2.1 MOBILITY AND PERSONAL AUTONOMY

Although the great majority of women trainees did not benefit from their training by gaining employment, it appears that they have gained from the experience in other ways. Overall, the study shows that, post-training, the trainees reported greater freedom of mobility, more personal autonomy in decision-making, and increased self-confidence. In general, the working trainees who performed better in the training and benefited by gaining employment showed changes that indicate greater confidence and sense of wellbeing.

Additionally, trainees reported increased civic participation and voting, more positive attitudes and perceptions about the future, and positive changes in time allocation; the latter greater for working trainees.

The following analysis examines the basic awareness and attitudes of women trainees toward women's empowerment. Current attitudes are contrasted with those prior to training (for non-working trainees) and prior to training and work (for working trainees). The analysis also explores differences, measured before and after training, in trainees' confidence, freedom of mobility, and changes in the home-work life balance. While a causal relationship cannot be definitively established between these differences and the training, there is a relationship between them.

Table 15: Changes in empowerment indicators: decision-making, mobility and public participation

Women's Empowerment Indicators (Woman Decides by Herself or Jointly with Others)	Percentage of Change from Before Training/Employment to After	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Visiting friends and relatives in the village	+11.9%	+4.0%
Going outside the village	-3.6%	0.0%
Voting in the elections	+18.5%	+19.5%
Participation in civic/women's organization	+7.0%	+3.6%

In the case of women's freedom of mobility, expressed as visiting friends and relatives in the village and going outside the village, all trainees reported greater independence in making visits within the village (see Table 15). Neither group reported an increase in trainees being able to participate in decisions to travel outside the village. The negative change for working trainees may be associated with a larger percentage of these women being married; married women in Bangladesh are assumed to have somewhat less autonomy than unmarried women. The trainees also showed a substantial gain in independence as indicated by participation in elections, and increased ability to be involved in decisions about participation in civic organization; although gains in the latter were not as large as those in voting. Overall, the trainees appeared to have achieved greater control in making decisions for themselves regarding activities outside of the home.

Table 16: Changes in time allocation in a typical day

Activity	Change in Daily Time Allocation from Before Training/Employment to After (Time Increase/Decrease Shown as Hours and Minutes)	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Domestic activities	-1:38	-0:45
At work and travel to work	+6:39	+1:02
Sleeping	-0:42	-0:22
All other activities	-4:23	-1:25

Table 16 explores changes in the women trainees' time use before and after training. This is a concrete measure of changing priorities in daily life. The table shows the amount and direction of change in time allocation during a typical day, for different types of activities, before and after the training. After training, all women reported an increased allocation of time spent working. The trainees working for Grameen Shakti reported spending an average of 6.39 additional hours a day working. This figure is much lower for the non-working trainees because only 29 percent of these women reported current work. Both groups reported spending less time on activities in the domestic sphere, with the working trainees spending an average of almost an hour less than the non-working trainees.

6.2.2 SELF-CONFIDENCE

Attention is given to the relationship between the women's training, work status, and their views and opinions about themselves and how they are perceived by others within the family and in the community.

Table 17: Changes in attitudes toward women's empowerment

Attitude Toward Women's Empowerment	Percentage of Change in Attitude Toward Women's Empowerment from Before Training/Employment to After	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
I am hopeful that the future will be better for women like me (agree/strongly agree)	+27.9%	+7.2%
I have control over the key choices in my life (agree/strongly agree)	+11.6%	+9.9%

Table 17 shows that the GS training produced positive results with respect to the trainees' attitudes and perceptions about the future. All the trainees reported increased feelings of hopefulness that the future will be better for women like themselves, with the working trainees reporting an almost 30 percent increase in agreement with this sentiment. Trainees also said that since the training they have had more control over key choices in their lives.

While the technical training did not expressly aim at empowering women in spheres not directly related to the RET sector, there is evidence that the training is associated with changes in attitudes, civic and community participation, and in time allocation. The data indicate that among working trainees, there is a lasting decline in time spent on domestic activities; these women spend considerably more time at work and sacrifice allocated to "other activities," including recreation.

Overall, the working trainees have somewhat greater mobility and participation in public life and women's affairs; differences between working and non-working trainees are most marked by stronger expression of hope in the future among working trainees and, to a lesser extent, confidence in control over key choices in life.

7 ASSESSING THE GRAMEEN SHAKTI GTC STRATEGY

7.1 LOW LEVEL OF INTEGRATION OF WOMEN AND GENDER-SEGMENTED VALUE CHAIN

The Rural Empowerment through Renewable Energy project accelerated the development of a significant innovation in technological transfer of solar home systems (SHS) to poor rural communities. However, even as installation of SHSs increased dramatically during this time, employment of women trainees remained stagnant or declined. There are indications that this low level of integration of women into the Renewable

Energy Technology (RET) sector in Bangladesh resulted from both a decline in available work and a gender-segmented RET value chain within Grameen Shakti (GS).

The Grameen Technology Centers (GTCs) were the focus of the technical training and integration of rural women into the SHS value chain. From these technology platforms the assembly of components was ramped up and SHS installations increased six-fold after construction of the GTCs, beginning in 2008. GTCs were integral to recruitment of trainees, but were less effective in terms of integration of women into the value chain.

The expansion of the GTCs achieved the target of training women to work in the RET sector and supported the GS target of installing 1 million SHSs. However, while SHS installations have increased to more than 1.3 million, the employment of women trainees has remained stagnant and even declined.¹⁸ This contradiction between rising sales and installations and declining work opportunities for women trainees goes against expectations. The senior management of GS argues that the upward trend in installations will eventually lead to the employment of all the trainees¹⁹, but in visits to the GTCs and in interviews with women engineers and regional managers it was apparent that there was a decline in available work for women trainees; a major factor was technological change.

While it was not possible to get data on the sourcing of pre-assembled components to reach a definitive conclusion on the decline in GTC assembly of SHSs, this was apparent from GTC visits. The SHSs are assembled using 6 major components: the solar panels, batteries, inverters, charge controllers, solar lamps, and cellphone chargers. Increasingly, it was explained, these components are being delivered in final form rather than being assembled in the GTCs. The solar panels are imported, the batteries manufactured in Dhaka, and the other components either imported or manufactured elsewhere. In a visit to a GTC within the Tangail Division, a woman engineer demonstrated how the previous solar lamp was constructed and then presented the new pre-assembled, more efficient solar lamp. The women engineers and regional manager mentioned that this was also the trend with the other components. Less work was available at the GTCs, even as more SHSs were being installed. The task of the women engineers and women trainees (technicians) is now primarily testing the components before installation.

Clearly, this technological trend away from GTC assembly to the use of pre-assembled components undermines the strategy of home-based, small-scale assembly of the SHS parts and puts the GTC strategy to the test. This trend may not be as evident in all GTCs as in those observed, but it does help explain the contradiction of low levels of employment of women trainees at the same time that sales and installations of SHSs are flourishing. The reduction in assembly activities within the GS RET value chain has simultaneously reduced the demand for women trainees because the GS value chain is gender segmented and assembly activities are, in general, the only part of the value chain open to women. There is little opportunity for women to move into other aspects of the value chain, such as sales and SHS installation (both of which offer growth opportunities) because men typically hold those jobs.

Interviews with GS women engineers, regional managers, and working trainees indicate that the RET value chain is fairly rigidly segmented by roles and gender (Table 18). Women heavily dominate the assembly of SHS components, with some involvement in training users of SHS, service, and repairs. Installation is mostly done by men, and men appear to most heavily dominate the marketing of SHSs.

¹⁸ The project reports do not provide numbers of women trainees employed since 2006 and in the years following. Despite requests, the historical data on their employment and the gender breakdown of annual employment have not been made available, although exhaustive detail on trainees and engineers by GTC has been provided.

¹⁹ Absar Kamal, Managing Director of GS, Interview by David Hemson, Dhaka, Bangladesh, May 30, 2013.

Table 18: Perception of gender segmentation at Grameen Shakti

Type of SHS Work	Percentage Who Agree that Specific Types of SHS Work Are Done by Women		
	Working Trainees (n=86)	Women Engineers (n=99)	Regional Managers (n=45)
Assembly of SHS components	95.3%	90.9%	88.9%
Marketing of SHS	2.3%	3.0%	4.4%
Installation of SHS	14.0%	9.1%	13.3%
Training users of SHS	12.8%	22.2%	11.1%
Service, repairs, etc., of SHS	17.4%	13.1%	6.7%

When asked about the perception that women are being treated differently than men within Grameen Shakti, the women engineers were the only group of respondents who reported there is some gender discrimination—16 percent said they feel that women are treated differently from men at GS. Of the women engineers who reported discrimination, more than half attributed this view to the observation that men are preferred over women for promotion. Other areas of discrimination mentioned by a smaller portion women engineers included salary, harassment, and a lack of understanding of women’s family commitments.

Those working at GS were asked if they felt women were discouraged from undertaking certain types of work. Of these 248 respondents (86 working trainees, 18 working non-trainees, 99 women engineers, and 45 regional managers), only 8 percent said that they felt this was the case at GS; heavy manual labor was the type of work most commonly discouraged for women. Again, women engineers were more likely to agree that women are discouraged from performing certain tasks.

While the women trainees do not express themselves clearly on the subject of women’s empowerment, it is apparent that technological trends in combination with the Grameen Shakti gender-segmented value chain have limited the roles that women technicians can fill at GS and thwarted the efforts of the majority of trainees to obtain employment at GS or within the RET sector.

8 CONCLUSIONS

Despite establishment of 35 Grameen Technology Centers (GTCs) and the successful technical training of 2,797 rural women, the market-driven Grameen Shakti (GS) model implemented in Bangladesh has mostly not succeeded in integrating these trainees into the Renewable Energy Technology (RET) value chain. At the time of the project’s launch, the GTC model of decentralized home-based production appeared logical and practical: that training of rural women in Bangladesh would lead to promotion of Solar Home Systems (SHSs) and accelerated assembly of the SHS components. The GTCs reinforced the GS branches and sped acceptance of the new technology in surrounding rural communities. However, GS’s ambitious target of installing 1 million SHSs was met without anticipated widespread gain in women’s employment and entrepreneurship. The key conclusions from the study findings are summarized below.

Benefits to Grameen Shakti and the women employed there.

While the majority of trainees did not benefit from the training by gaining employment at GS, the 185 women technicians and engineers working there, and GS as an organization, greatly benefited from the project.

The project provided GS with the startup capital to open 35 Grameen Technology Centers in remote rural areas, which opened new markets for the organization and expanded its technical rural network.

The women engineers who gained employment at GTCs provide the technical backbone for the rapid expansion of SHS assembly and installation activities. They served as trainers of the women who were brought into the program for training as technicians in the RET sector. The increased capacity of the women engineers was a positive benefit to the organization.

The women trainees gained knowledge in assembling SHS components and testing the equipment before installation. They were equipped to take their new knowledge and skills to their communities and many of the trainees promoting SHSs there. This represents a visible technical transfer to rural communities.

While the number of women integrated into the value chain was quite small compared with the total number of women trained, the project created a space—where virtually none had existed previously—for women to earn income in the RET sector in a systematic way through the GTCs.

The intention of the training was for women to gain employment, but training also had other benefits.

In addition to the trainees employed at the GTCs, about a third of the trainees benefit from engaging in income generating activities post-training, although these activities were not in the RET sector. The training they received provided skills in a challenging technological field in which women were almost completely absent, but also prepared them for gainful employment.

The trainers were well prepared and qualified, the training set-up and materials were sufficient, and the participants reported that they gained new skills and knowledge. The overwhelming majority of women trainees welcomed the training and reported that they benefited considerably from participation. Although not a great deal can be expected in terms of women's empowerment from 15 days of technical training, the trainees reported positive changes in self-confidence, mobility, autonomy in decision-making, and enhanced public participation.

The participants in the training were mostly young women of broadly similar rural backgrounds who were either helping at home or were students prior to training. The training helped them to move out of the domestic sphere and, on average, trainees spend less time on household activities post-training.

Skill loss through non-integration into the RET value chain.

Although trainees who were not employed by GS did not express a noticeable level of dissatisfaction with the training and many may have benefited from income generation in other sectors, the 97 percent of trainees who are not incorporated in the RET sector marks a considerable skill loss.

For this majority of trainees, who were not offered work at Grameen Shakti or elsewhere in the RET sector, the lack of employment constitutes a depreciation in human capital that was created by the technical training. In accounting, it is assumed that investment in education and training depreciates to the employer on a straight-line basis over a 30-year life; in each year in which this training is not used it can be assumed

that the stock of knowledge decays. Unlike equipment, human capital improves with use and loses value when not in use.

Trainees who gained employment at GS experienced a gap of many months between completing the training and beginning work. While this lag gradually declined with each training phase, it persisted and probably affected the level of integration. With each month that passed after training, the women's newly acquired skills would have degenerated somewhat.

While Grameen Shakti has expressed the opinion that these women will eventually be engaged as RET entrepreneurs, as the demand for SHS's continues, this does not appear likely. Many years have passed since their training; most of the trainees are now married and have new horizons. It is likely they would need refresher training in order to engage successfully in the RET sector.

Reasons for the low level of integration.

Although Grameen Shakti fulfilled the training goals with regard to the number of women trained, the expectation that the overwhelming majority of these women would be incorporated into the RET sector has not been met. The interviews with GS management and supervisors aimed to answer the important question of why there was such a low level of integration of the women trainees.

Below a number of issues are considered, assessed, and resolved. They are followed by another set of issues which, based on the results of the study, are considered to be the primary causes of low integration of women trainees into the RET sector.

Changes in leadership. Because Grameen Shakti experienced a change in leadership during the second phase²⁰, it could be assumed that because the project was conceived of under previous management that incoming leadership might not have had the same priorities or interests. Although the issue of leadership priorities was not specifically raised with the new Managing Director, Abser Kamal, it does not appear to have been the determining factor thwarting trainee integration. There does not seem to have been a decisive loss in experience and capability within senior management; Mr. Kamal served as General Manager under the previous Managing Director and must have been closely involved in policy and administration.

Quality of training. Although the quality of training was not independently assessed by this study, the consistent, very high levels of satisfaction with the training and the quality of work of the trainees who were employed indicates that the project achieved good quality of instruction. In interviews, the regional managers and women engineers particularly felt that well-rounded training, including technical and work skills, was achieved.

The GS women technicians who were not trained by the project do not fare as well in comparison to trained technicians. Because there was an abundance of non-working trainees available in each area, it is unclear why untrained women were hired. Although these women constituted a relatively small number of employees at GS, their employment tends to undermine the purpose of the project, i.e., integrating trainees into GS and the RET sector.

Trainee Recruitment and Selection. The young women recruited for training appear to be largely undifferentiated from other rural women their age. Those who were employed, however, did not have the average level of education, came from poorer households, and lived in households that were associated

²⁰ Dibal Chandra Barua, founding Managing Director of Grameen Shakti and also the Deputy Managing Director of Grameen Bank left both companies in December 2009 and founded the competing Bright Green Energy company. <http://www.worldfuturecouncil.org/3608.html>

with the Grameen network, but they had higher achievement levels through training. In this respect, it could be said that Grameen Shakti had a “pro-poor” employment policy. A pro-poor bias has not undermined productivity at GS, if improved capability of individual trainees is the benchmark. The GTC employees were found to have significantly higher levels of commendation despite a poorer educational background.

It does not seem that misguided selection of trainees was a factor in the low level of incorporation per se. Regional managers and women engineers universally provide strong endorsement of their quality. However, there are characteristics associated with the non-working trainees that indicate this group was somewhat less invested in the expected outcome of GS or RET sector employment than the working trainees. This has implications for integration levels. So, while the statement cannot be made that the trainees were poorly selected, there are indications that some characteristics, particularly those that may be interpreted as indicators of investment in outcomes, may be predictive of the propensity of women trainees to integrate.

Based on the findings from the study, it seems that the following reasons most likely account for the low level of integration of women trainees.

First, there was no plan for systematically incorporating trainees into the work of the GTCs. Reports from Phase I mention reliance on women engineers rather than trainees for assembly at GTCs.

Second, no indicators for employment or entrepreneurship were included in the work plans and there was no systematic reporting on trainees who had been integrated into the sector. The first work plan made express provision for the possibility of “corrective action,” but because no indicators for trainee incorporation were monitored, early warnings of falling short on this key objective were not available. It would have been possible to develop a measure of progress around a number of activities including a) defining entrepreneurship and employment in the GTC context; b) reporting numbers of trainees employed or the value of work undertaken by entrepreneurs on a quarterly basis; c) setting a provisional allocation of trainees to work at GTCs; and d) reporting employment within Grameen Shakti on a gender basis. Unfortunately, the presentation of photographs and narratives of women entrepreneurs and women installing solar panels created an impression of trainee integration that was not found during visits to all the GTCs. Indeed, in recent interviews, management only mentioned employees and not entrepreneurs in relation to the assembly of SHSs.

Third, it appears that the GTC strategy of decentralized assembly and technological transfer has not succeeded. In interviews with women engineers and regional manager it was reported that virtually all components such as charge controllers, inverters, and lamps are now arriving at the GTC preassembled and that the employed trainees are now testing components rather than assembling them. It appears that the cost and organization of decentralized assembly lines cannot compete with multinational production and mass distribution. Rather than growing with the number of SHS installations, the amount of assembly work available at the GTCs seems to have declined considerably since the beginning of the project.

Although the challenge of trainees obtaining employment was mentioned prior to the second phase of the project, the promised “enabling environment” to achieve this was not found.

Fourth, there has been confusion about the key outcome of integrating trainees into the RET sector; although preference was given to the term “entrepreneur” in the first project phase, in the latter part of the second phase the term “employee” tended to dominate. In many reports and conversations the two terms are used interchangeably. An entrepreneur is a person who takes financial risks in organizing and operating a business, while an employee is a person who is governed by a work contract, undertakes set tasks, and

receives regular remuneration—quite different roles and responsibilities. When these practices are left undefined, outcomes are difficult to comprehend or measure.

Expansion of entrepreneurship was predicated on the basis of trainees being able to service and repair SHSs in their communities. However, servicing was and continues to be largely a branch function under the GS service contracts; GTC working trainees receive a fairly limited amount of repair work.

In a rural society with economic underdevelopment and gender constraints it is difficult for poor women to move into entrepreneurship that involves financial risk-taking and independent business activities. In the GTC context entrepreneurship could have taken the form of outsourcing, and this was reported in the first project phase. Outsourcing could involve a GTC ordering components from home-based, self-employed trainees. However, this concept appears to have fallen away and was replaced by employed trainees regularly reporting for work at the GTCs. Regardless, the very low levels of trainee integration became clear only after the end of the project due to conceptual confusion about outcomes and unreported problems in sustaining integration.

Finally, there is the issue of gender segmentation in the value chain. The proportion of women (15 percent) and men (85 percent) employees at GS²¹ largely reflects the gender segmentation of the RET value chain, with men dominating the bulk of the value chain. It appears that most local field assistants (men) employed at GS did not receive formal technical training, but instead learned on the job. At the same time, women trainees remain unemployed. Many men have been added to the GS staff to support the organization's rising number of sales and completed installations.

The Grameen Shakti Board of Directors has 1 woman and 7 men, a ratio that reflects the organization as a whole.²² This close association points to the need for a comprehensive gender equity policy in the organization, particularly because the customers served are predominantly women.

Installation has been the prime growth activity associated with the target of 1 million SHS installations. Women were given basic training in installation and servicing but they are largely excluded from these growth areas within the RET value chain. Although there are public gender constraints that can hinder women's participation in these activities, they express a willingness to undertake installation as well as servicing and repairs. Installation is the single area in which the women surveyed reported gender constraints and, if this is not remedied, there is no expectation of increasing women's employment. Women are not substantially involved in promotion and sales even though they promote SHSs informally in their communities. This is surprising because it can be difficult for male staff to promote and install SHSs in rural communities where women may be home alone. This would seem an ideal situation for involving women in GS sales, installation, and repair. There appear to be no plans for integrating trainees into these aspects of the value chain.

While the majority of the training focused on SHS assembly, it also covered other issues related to SHS, including theory, promotion, servicing and repair, and installation. However, regional managers, women engineers, and the trainees themselves concur that the primary employment activities of trainee are SHS assembly and user training. The trainees have been integrated into what has turned out to be one of the weakest links in the value chain.

²¹ These percentages were provided in an email from Abser Kamal, Managing Director of Grameen Shakti. Though requested, a full list of gender disaggregated employment data was not provided.

²² "Grameen Shakti Board of Directors." http://www.gshakti.org/index.php?option=com_content&view=article&id=117&Itemid=122

All these factors lead to the conclusion that the trainees who have not been integrated in the RET sector to date will remain unemployed. In an interview with GS management it was stated, “We know that we did not employ all the women, we are expecting in the future there will be some more job creation as we will be building 1 million SHSs in the next three years. All the trainees will have an opportunity; we anticipate that eventually all will be employed.”²³ Unfortunately, for the reasons discussed above, it appears that the high levels of output in the renewable energy technology sector will not be accompanied by a commensurate increase in employment of women trainees.

9 LESSONS LEARNED

In addition to training, a clear and deliberate strategy is needed for integration of women trainees to be achieved.

Training alone does not guarantee women entrance into the Renewable Energy Technology (RET) sector or integration into the Solar Home Systems (SHS) supply chain. This was the case in Bangladesh and conditions and circumstances will be similar in other sectors and in other developing countries. One of the difficulties in assessing the progress of women who were trained between 2005 and 2010 under the Rural Empowerment through Renewable Energy project was that overall goals were not set for participation of women trainees, either as employees or entrepreneurs, in Grameen Shakti (GS) or other RET organizations. Clearly, it was assumed that women trained in SHS assembly would be integrated into GS employment or somewhere else in the RET sector, but as this study shows, this was not the case.

First, it needs to be determined at the beginning if training is the appropriate mechanism for integration of women into a sector. Other factors may be more influential in achieving women’s integration, such as policies giving preference/incentives to industries that employ substantial numbers of rural women or policies that secure greater access by women (whether trained or untrained) to employment.

Second, prior to implementation of a training program, donors, supervising organizations, and potential employers need to share a comprehensive understanding of what is required to achieve integration of women into the RET sector. Gender issues in developing countries can be complex and misunderstandings arise when outcomes and quantitative objectives are not clearly defined.

Third, one of the challenges to achieving higher levels of integration for women (particularly women living in rural areas) is that training in itself does not lead directly to employment or to entrepreneurship. For example, large numbers of women in Asia and elsewhere have been incorporated into the electronic equipment sector without targeted training; they have learned on the job. Because time lags and trainee losses are anticipated between completion of training and the beginning of employment, other alternative methods of integrating women should be considered, such as apprenticeships and subsidized employment to provide incentives and ensure that women gain quality experience.

More flexible initiatives should be considered to achieve women’s integration.

All training has its specific context and range; small scale assembly of key components cannot compete with more advanced and integrated multinational manufacturers. Although it is possible that training in one sector

²³ Absar Kamal, Managing Director of GS, Interview by David Hemson, Dhaka, Bangladesh, May 30, 2013.

can carry over skills into another, this cannot be assumed, and the training curriculum should be wide enough to prepare for more than one employment opportunity.

Oversight and reporting of progress is critical.

Many of the difficulties identified in incorporating women into the renewable energy supply chain could have been understood and then remedied if they were identified in time. Future initiatives in this field will need to clearly define the pathway to achieving outcomes in the scope of work and include a plan for tracking and reporting expected outcomes. Expected outcomes may change over time and project plans should be flexible enough to allow for remedial action to be taken to achieve the objectives.

APPENDICES

APPENDIX A: LIST OF GRAMEEN TECHNOLOGY CENTERS, NUMBER OF TRAINEES AND GROUPS OF RESPONDENTS INTERVIEWED FOR THE STUDY

GTC Name	Number of Women Trainees ²⁴	Groups of Respondents Interviewed for the Study				
		Working Trainees	Non-Working Trainees	Working non-Trainees	Women Engineers	Regional Managers
Bagerhat	110	2	9		2	1
Barguna	81	1	5	5	2	1
Barisal	130	2	12		2	1
Bhola	35	3	5	1	2	1
Chakaria	70	4	6		2	1
Changerchar				2	2	1
Chhatak	70	3	7		2	1
Comilla				1	2	1
Dinajpur					2	1
Faridpur	15	6	1		2	1
Fatickchari					3	1
Galachipa	91	4	8		2	1
Gopalganj	129	3	12		2	1
Habigonj	91		7		2	1
Homna	25	2	2		2	1
Jamalpur		2			2	1
Jhalokathi	91	3	8		2	1
Kalapara	130	4	11		3	1
Kalihati	17	1	2		2	1
Khulna	130	3	11		2	1
Kishoreganj		3			2	1
Kulaura					2	1
Kurigram	25		2	2	2	1
Lakshmipur	15	4			2	1
Magura	91	2	6		2	1
Matiranga	15	1	2		3	1
Mawna	84	2	8		2	1

²⁴ GTCs with no trainees listed were established in a third phase of GTC construction that was funded by GS after the USAID-funded project had ended.

GTC Name	Number of Women Trainees ²⁴	Groups of Respondents Interviewed for the Study				
		Working Trainees	Non-Working Trainees	Working non-Trainees	Women Engineers	Regional Managers
Mongla	104		9			1
Naogaon			1		2	1
Natore	85		8		2	1
Netrokona		3			2	1
Noakhali					3	1
Paikgachha	143	3	12		2	1
Patharghata	104	2	9		2	1
Patuakhali	93	2	8	3	2	1
Phulpur	65	2	6		2	1
Pirojpur	104	2	9		2	1
Rajshahi	85	1	9		3	
Rangamati	70	2	6		2	1
Rangpur				4	2	1
Satkhira	94	3	10		2	1
Shariatpur	147	1	13		2	1
Shibchar	100	4	9		2	1
Singair	79		11		3	1
Sonatala	65	2	6		3	
Sunamganj	14	2	2		2	1
Sylhet		2			2	1
Total	2,797	86	252	18	99	45

APPENDIX B: DEMOGRAPHIC, MOTIVATIONAL, AND SITUATIONAL CHARACTERISTICS OF GS TRAINEES

I. PERSONAL CHARACTERISTICS OF TRAINEES

As mentioned, the overall goal of the project was to accelerate the access to renewable energy technologies (RET) among rural communities living in economically and ecologically vulnerable areas, i.e., Cyclone Sidr affected areas, and to improve livelihoods by developing women RET technicians and entrepreneurs. This appendix presents the demographic and social backgrounds of the trainees and their families. The characteristics of trainees who were selected to work at GS and those who were not selected are contrasted. The purpose of this appendix is to examine the typical profile of the women trainees and to identify possible differences between the group of women who went on to employment and those who did not. Statistically significant differences were found between the two groups of trainees in education level and marriage status.

A total of 2,797 women received the 15-day training. Of those, 80 women are currently working for the GTCs, and six for the GS branches. At the time of this study, the remaining 2,711 did not work for Grameen Shakti in any capacity. The USAID-funded training was arranged in two phases; in total 1,190 trainees received training in Phase I and 1,607 in Phase II.²⁵ Grameen Shakti continued the training program by implementing a third phase of training through other funding.²⁶ The second phase of the training focused on serving the regions that were affected by the Sidr cyclone that devastated parts of the country in November 2007, with 100 percent of trainees in Phase II being from the Sidr affected districts.²⁷

Table I shows the personal characteristics of all the trainees. Overall, the working and non-working trainees have similar demographic characteristics such as age, marital status, and number of children. Most trainees were 19 years of age at the time of training, although working trainees are currently slightly older as a group than the non-working trainees—24.4 percent are under 21 compared with just over 30 percent of non-working trainees. Most of the trainees are married but there are differences between the two groups. About 25 percent of working trainees are unmarried while more than 40 percent of non-working trainees are unmarried. The median age at marriage for both groups of trainees is 17 and the majority have one child. More than 70 percent of married trainees in both groups reported using contraception. There is a difference in the education level of the two groups of trainees. A much smaller percentage of working trainees completed secondary school—30 percent compared with 52 percent for the non-working trainees.

²⁵ Phase I was between August 23, 2005 and August 31, 2008 and Phase II was between October 1, 2008 and September 30, 2010.

²⁶ Ten women who were trained in Phase III are currently working as technicians at GTCs. These 10 women are included in the sample of all GS working trainees.

²⁷ Sidr cyclone zone covers the following districts: Bagerhat, Barguna, Barisal, Bhola, Cox's Bazar, Jhalokathi, Khulna, Noakhali, Patuakhali, Pirojpur, and Satkhira.

Table 1: Personal characteristics of Grameen Shakti trainees

Personal Characteristics of Trainees	Working Trainees (n=86)	Non-Working Trainees (n=252)
Received training during Phase I (2006-2008)	46.5%	43.3%
Received training during Phase II (2008-2010)	41.9%	56.3%
Live in Sidr Cyclone zone	51.2%	71.8%
Median age at time of training	19	19
Current age under 21	24.4%	30.2%
Completed secondary school	30.2%**	51.6%**
Not married	24.4%*	43.7%*
Median age at marriage	17	17
Median number of children, if married	1	1
Using contraception, if married	75.0% (n=60)	73.0% (n=142)

**Difference statistically significant at the p=0.01 level

* Difference statistically significant at the p=0.05 level

II. CHARACTERISTICS OF TRAINEE HOUSEHOLDS

Table 2 presents key characteristics of the trainees' households. The demographics of the household members can provide a context for the potential support for women's employment outside of the domestic sphere. All of the sampled trainees come from similar household backgrounds. The working trainees come from relatively larger households compared to the non-working trainees. However, none of women belong to very large families, because the median household size is five for the working trainees and four for the non-working trainees. The household members are typically young, with 60 percent under 30 years of age. The education level of the trainees' household members in general is not very high; between 22 and 27 percent of household members were reported to have completed secondary school. The majority of trainees' household members are not employed. 45 percent of working trainees and 33 percent of non-working trainees' household members are currently working.

A key indicator that could signal if the trainee has support and shares her domestic responsibilities is if she has other young single, female sisters in the household. A high percentage of all trainees have other young, single females in their households with around 72 to 74 percent for both groups of trainees. About 25 percent of working trainees and around 20 percent of non-working trainees have sisters in the household. Of the sisters in working trainees' households, 27 percent have completed secondary school. A much higher percentage of sisters in non-working trainees' households have completed secondary, at 46 percent. A higher percentage of the non-working trainees' sisters are also employed, almost 13 percent compared to 6 percent for the working trainees' sisters.

Table 2: Demographic characteristics of trainee households

Demographic Characteristics of Trainee Households	Working Trainees (n=86)	Non-Working Trainees (n=252)
Household member under 30	59.2%	59.7%
Median number household members	5	4
Household member completed secondary school	21.7%	27.4%
Household member currently employed	45.4%	33.6%
Household has woman < 25 years who is unmarried	74.4%	71.8%
Sister completed secondary school	27.3% (n=22)	46.0% (n=50)
Sister employed	6.3%	12.9%
Average monthly household earnings, in Tk	Tk 10,936	Tk 11,223

A stated goal of the GTC training program was to target women from lowest income households. Table 3 summarizes the general housing conditions of the trainees. Housing construction, access to safe drinking water, and hygienic sanitation facilities are important indicators of living standards of households. A “durable” house is defined by having a cement/brick floor, tin or cement/brick walls, and a tin, cement/brick, or terracotta roof. Between 17 and 20 percent of households have cement/brick floors. More than 90 percent of all trainees have a durable roof made of brick/cement, or corrugated iron sheet or terracotta. About 67 percent of the working trainees and 58 percent of non-working trainees have durable walls made of made of brick and cement, or corrugated iron sheet. However, when all three dimensions are considered together, a rather low percentage of trainees have durable housing; a slightly higher percentage of working trainees have durable housing at around 20 percent, with under 17 percent for non-working trainees.

Nearly all of the households of all trainees have access to safe water supply.²⁸ In case of hygienic sanitation, households of 75.6 percent of working trainees and 68.7 percent of non-working trainees have access to hygienic (World Health Organization standard²⁹) sanitation facilities. The majority of trainees’ households have access to electricity from the grid system or from solar home systems.

Quality living depends on durable housing facility, safe drinking water, and hygienic sanitation facilities. When these amenities are considered together, only 20 percent of households of the working trainees and 14 percent of the non-working trainees appear to have quality standards of living.

²⁸ Tube well, public standpipe, piped water house/yard connection

²⁹ Toilet with piped sewerage, toilet with septic tank, water sealed ring slab

Table 3: Housing structure and access to amenities and services

Housing Structure and Access to Amenities and Services	Percentage of Trainees Who Live in Durable Housing Structure and Have Access to Amenities and Services	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Live in a Durable House ³⁰	19.8%	16.7%
Quality Living Standards: Live in a Durable House and Have Access to Improved Water and Sanitation	19.8%	14.3%
Have Access to Electricity from Grid or SHS	68.6%	61.1%

Households of the trainees also possess different types of durable and non-durable assets that are indicative of their economic wellbeing (Table 4). An average trainee household appears to possess less than half of the five agricultural assets with little variations across the types of respondents.³¹ Close to 100 percent of the trainees have furniture and fixtures in their home. In contrast, the households have limited ownership of electronic goods³² with an average household having 15 to 21 percent of these assets. Similarly, few households have several types of transport equipment.³³ Very little difference is noted between working trainees and non-working trainees in ownership of these assets.

As expected, in the case of owning tools to construct the SHSs there is a substantial difference between the households of working trainees and non-working trainees, 52 percent and 16 percent, respectively. Whether working as technicians or not, the vast majority of trainees do not have SHSs in their homes. A larger proportion of homes own improved cook stoves (ICS), but the rate of ownership is still low at around 20 to 35 percent. The overall asset index reveals that, on average, trainees' households possess less than one-third of the assets listed (15 assets in total).

Table 4: Household asset indices of trainees

Household Asset Indices ¹	Percentage of Trainees Who Have Specific Household Assets	
	Working Trainees	Non-Working Trainees
Overall household assets (15)	34.5%	32.0%
Tools to construct solar home systems (1)	52.3%	15.5%
Solar home systems (1)	16.3%	14.3%
Improved cook stoves (1)	34.9%	21.4%

1. The number of assets included in a group is shown in parentheses.

³⁰ House has cement/brick floors, tin or cement/brick walls, and a tin, cement/brick or tally roof.

³¹ Agricultural assets include agricultural and non-agricultural/homestead land, agricultural equipment, cows/buffalo/horse, goat/sheep, and poultry.

³² Electronic goods include radio/ 2-in-1, VCD/DVD player, television, and computer.

³³ Transport equipment includes bicycle and motor bike.

Working and non-working trainees are very similar in terms of economic wellbeing, which was measured in several different ways. Table 5 presents a summary of these results. One frequently used qualitative indicator of subjective economic wellbeing is whether households are able to meet their needs with their income from all possible sources considered together. It is found that about one-third of the households of the working trainees state their household income does not cover their needs. A slightly smaller percentage (just under 29 percent) of non-working trainees feel the same way. Another related indirect measure of poverty and economic wellbeing is the food security situation of the households. Twenty-two percent of working trainees and 21 percent of non-working trainees stated that a household member sometimes or often has less than two full meals a day.

A third generally acceptable measure of poverty (frequently used by the multilateral development partners) is per capita income per day, with cutoff points of \$2 USD for estimating moderate poverty and \$1 USD for estimating extreme poverty. The vast majority of the households of both groups of trainees belong to the moderate poverty group, with 90 percent of working trainees and 82 percent of non-working trainees, indicating their households have less than \$2 USD per day. Of these, about one-third of both trainee groups also fall into the extreme poverty category. However, the limitations in the estimation of income in this study (such as the estimation of household income when the contribution of others may not be known) need to be recognized while taking these estimates into consideration.

Table 5: Household food and financial security of trainees

Indicators of Household Food Security and Financial Security	Percentage of Trainees Who Experience Specific Issues of Household Food Security and/or Financial Security	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Reports "household income does not cover our needs"	33.7%	28.6%
Consumes < two full meals/day, "often/sometimes"	22.1%	21.4%
Household per capita income below \$2 per day ¹	89.5%	82.1%
Household per capita income below \$1 per day ¹	32.6%	37.3%

1. Exchange rate: US\$ 1 = Tk. 77.50.

Along with the number of women reporting their income does not cover household needs, the low household per capita income figures reveal that all of the trainees, both those currently working and those not currently working at GS, did come from very low-income situations. The program succeeded in attracting poorer women for the training.

III. TRAINEES' PERCEIVED VULNERABILITY AND RESILIENCE TO CLIMATE CHANGE

The Grameen Shakti training, especially in Phase II, was designed to help women who lived in the Sidr cyclone impact zone. The trainees, women engineers, and regional managers were asked several questions related to their perceptions of vulnerability to climate change and natural disasters. A number of differences can be seen in respondents' perception of vulnerability, especially between Sidr and non-Sidr affected regions (Table 6).

Table 6: Knowledge and experience of climate change and natural disasters

Knowledge and Experience of Climate Change and Natural Disasters	Percentage of Trainees With Perceptions of Vulnerability Regarding Specific Knowledge/Experience of Climate Change and Natural Disasters, Residents of Sidr Zone and Non-Sidr Zone			
	Working Trainees		Non-Working trainees	
	Sidr Zone (n=44)	Non-Sidr Zone (n=42)	Sidr Zone (n=181)	Non-Sidr Zone (n=71)
Natural disaster next year "very likely"	40.9%	23.8%	38.7%	12.7%
Time taken to recover from flood longer than 3 months	61.4%	80.0%	61.1%	75.7%
Household is not prepared to deal with a natural disaster	72.7%	71.4%	64.0%	69.0%

The respondents were asked about the likelihood of extreme weather causing a natural disaster in their community in the next year. Across all respondent categories a much higher percentage of those in the Sidr affected regions felt a natural disaster is very likely. Respondents were also asked to estimate the amount of time it would take for their household to recover from a severe flood. Interestingly, those in the Sidr affected regions felt that it would on average take a shorter amount of time for their households to recover than those living in the areas not affected by Sidr. Also, generally the engineers and regional managers, who are relatively wealthy, feel less vulnerable to climate change than the trainees. For example, a much smaller percentage of engineers and regional managers feel that their household is not prepared to deal with a natural disaster when compared to trainees.

While addressing vulnerability to adverse climate change impacts was not a main goal of the GTC training program, improved livelihoods are generally linked to better resilience to climate change. The survey responses show that the training did include women who feel they and their households are quite vulnerable to climate change, in particular in the Sidr affected regions.

IV. OUTREACH TO WOMEN FOR TRAINING

The trainees were asked how they heard about the GTC training the responses are summarized in Table 7. The majority (61 percent) of those currently working at GS heard about the training from GS, GTCs, or Grameen Bank; only 46 percent of the non-working trainees heard about the training from one of these sources; the difference between the two groups is statistically significant. The second most important source of information about GTC training (for all trainees) was friends and relatives. Previous trainees informed some prospective trainees, particularly non-working trainees (45 percent).

Table 7: Source of information about training

Source of Information About GTC Training ¹	Percentage of Trainees Who Heard About the GTC Training Program from Specific Sources	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Grameen Shakti, GTCs, or microcredit borrowers of Grameen Bank	60.5%*	45.6%*
Friends and Relatives	45.4%	47.6%
Previous Trainee	31.4%*	45.2%*

1. Participants were able to select more than one answer, so cumulative % > 100

* Difference statistically significant at the p=0.05 level

Trainees were also asked about their motivation for participating in the training (Table 8). Trainees who were motivated to work specifically in the sector appear to have been more likely to go on to earn income in the sector. Most of the respondents (about 84 percent) said they participated to gain skills, as they thought this would make them more qualified to get a job. More than half of the respondents said they were particularly motivated to work for GS or in the RET sector, but this figure is higher for the trainees now working for GS, 62 percent compared to 56 percent for those not working for GS. Also, trainees were asked about their possible indifference to taking the training as represented by the responses “to use spare time” and “to receive attractive training allowance”. Over twice as many non-GS working respondents (15 percent) said they were motivated by the attractive training allowance as those now working for GS (7 percent); this difference between the two groups is statistically significant. This possibly indicates a group of trainees who were more interested in short-term welfare gains than on long-term returns to be earned from using new skills.

Table 8: Trainees' motivation for taking the training

Reasons Trainees Gave for Taking GS Training ¹	Percentage of Trainees Who Were Motivated to Take the Training for Specific Reasons	
	Working Trainees (n=86)	Non-Working Trainees (n=252)
Receive Job Qualifications	82.6%	83.7%
Work for GS/Work in RET Sector	61.6%	55.6%
Increased Social Status	2.3%*	6.8%*
Earn Better Salary	9.3%	5.6%
Use Spare Time	18.6%	16.7%
Receive Attractive Training Allowance	7.0%*	15.1%*

1. Participants were able to select more than one answer so cumulative % > 100

* Difference statistically significant at the p=0.05 level

Trainees were also asked about their day-to-day activities before applying for training (Table 9). Most of the trainees were helping at home or unemployed prior to the training. The percentage is higher for trainees working for GS (71 percent) compared with non-working trainees (48 percent). More than a third of all the trainees were students. A much higher proportion of non-working trainees were students or employed prior to training (52 percent) compared with the trainees currently working for GS (29 percent); the difference is statistically significant.

Table 9: Economic and social activities of trainees prior to training

Economic and Social Activities Prior to Training	Working Trainees (n=86)	Non-Working Trainees (n=252)
Unemployed, Helping at Home, and Other	70.9%**	48.4%**
Employed, Self-employed, or Student	29.1%**	51.6%**

** Difference statistically significant at the p=0.01 level

While training helped most of the working trainees to come out of the house and take gainful economic activities, it seems the students were less likely to go on and earn income in the RET sector. As noted previously, a higher percentage of the non-working trainees have completed secondary school, so perhaps a large number of the students who participated in the training were more motivated to continue with their schooling rather than seek employment.

APPENDIX C: LIST OF KEY INFORMANTS AND OFFICIALS INTERVIEWED

Organization	Name	Position
USAID/Bangladesh	A.K.D. Sher Mohammad Khan	Senior Energy Advisor and Country Coordinator SARI/Energy
	David Yanggen	Deputy Director, Economic Growth Office
	Aniruddha Hom Roy	Private Sector Advisor, Economic Growth Office
Grameen Shakti	Abser Kamal	Acting Managing Director
	Fazley Rabbi	Head of Administration
	S M Musa	General Manager
	Wasim Reza	Assistant General Manager (Head of IT)
	Rezaul Islam	Assistant General Manager
	Suman Chakma	Deputy Manager
	Abdullah Al Mamun	Faridpur Divisional Manager
	T.M.Razzak Hassin	Faridpur Regional Manager
	Jiban Krishna Mitra	Gopalganj Regional Manager
	Motiur Rahman	Gazipur Regional Manager
	Abdul Mamun	Singair Regional Manager
	Kamal Hossin	Faridpur Branch Manager
	Mostafizur Rahman	Mawna Branch Manager
Robiul Islam	Singair Branch Manager	
Selena Begum	Center in charge, GTC Singair	
IDCOL (Infrastructure Development Company Limited)	S.M. Formanul Islam	Director Legal Affairs and Financial Relations
Bright Green Energy Foundation (BGEF)	Dipal C. Barua,	Founder and Chairman

APPENDIX D: SURVEY INSTRUMENTS



Bangladesh Institute of Development Studies

E-17, Agargaon, Sher-e-Bangla Nagar, Dhaka-1207

Integration of Women into Grameen Shakti's Clean Energy Program in Bangladesh

QUESTIONNAIRE FOR WOMEN TRAINEES AND EMPLOYEES

Information and request for consent:

The purpose of this survey is to assess the progress made and obstacles encountered in training and empowering women in Renewable Energy Technologies. The study will serve as a learning instrument to provide lessons in future interventions in empowering women in Renewable Energy Technologies. Please understand that you are not being forced to take part in this study and the choice whether to participate or not is yours alone. However, we would really appreciate it if you do share your thoughts with us. If you choose not take part in answering these questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way. Please note that the information obtained in this survey will be treated as strictly confidential and individual responses or names will not be included in any reports or publications. Data will be used only for the research study to help direct policy improvements and assess the project impacts.

	Yes	No
Do you have any questions?	1	2
If YES, have these been satisfactorily answered	1	2
If YES, will you participate in this study?	1	2

If consent is given, the interviewer then states: Thank you for agreeing to participate, we will now make a start.

SURVEY INFORMATION

Respondent No:

Interview date:
 Day Month Year

Grameen Shakti's Division _____

District: _____

Upazila: _____

Union/Pourashava: _____

Village/Ward: _____

Mohalla/Para: _____ Important Landmark near the Household: _____

Name of the Respondent: _____ Respondent's Father/Husband name _____

Respondent Category (Code):

Codes	Category Description
1	Women technicians who received the 15 day training and work at a GTC
2	Women technicians who received the 15 day training and work for Grameen Shakti (Branch)
3	Women who received the 15 day training and are currently not working at GS/GTC
4	Women technicians who did not receive the 15 day training and work at a GTC
5	Women technicians who did not receive the 15 day training and work for Grameen Shakti (Branch)

Respondent's Mobile Phone No:

A. HOUSEHOLD ROSTER

A01	A02	A03	A04	A05	A06	A07	A08
Enter all household members							
PID	Name of the Household Members (including respondent)	Relationship with the respondent (Code)	Sex (1=Male, 2=Female)	Age (Years)	Marital Status (Code)	Schooling status (Code)	Current employment status (If engaged in more than one activity, list the one that gives the highest compensation) (Code)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Codes for Section A

A03: Relationship with Respondent		A06: Marital status		A07: Schooling status			
Self	1	Daughter-in-law/ Son-in-law	7	Unmarried	1	No schooling or incomplete primary	1
Husband/ Wife	2	Brother-in-law/ Sister-in-law	8	Married	2	Completed primary	2
Son/ Daughter	3	Grandson/Granddaughter	9	Widow	3	Started secondary but did not complete	3
Brother/ Sister	4	Niece/ Nephew	10	Separated	4	Completed secondary/higher secondary	4
Father/ Mother	5	Other relative	11	Divorced	5	Completed Graduation and above	5
Father-in-law/ Mother-in-law	6	Other non-relative	12			Completed vocational diploma/Polytechnic	6
A08: Current employment status							
Wage employment in farm sector	1	Barber					14
Wage employment in non-farm sector	2	Tailor					15
Salaried employment, regular monthly	3	Self-employed professional/specialist (doctor, nurse, spiritual healing, lawyer, tutor, religious imam/priest, etc.)					16
Self-employment in farm sector (agriculture, livestock, poultry, fishery, orchard/forestry, etc.)	4	Other self-employment					17
Self-employment in non-farm sector (owner of industry, manufacturing, processing, retail stores, trading, etc.)	5	Pensioner					18
Self-employed in RET sector	6	Interest/rent earner					19
Working in RET sector	7	Remittance earner					20
Transport owner/business	8	Housewife or help at home					21
Fisherman	9	Student					22
Skilled trades (carpentry, masonry, weavers, etc.)	10	Disable/Old age					23
Various repair work	11	Unemployed					24
Contractor	12	Child					25
Hawker	13	Any other dependent category					26

B. HOUSING, WATER, AND SANITATION

B01. How many rooms are there in the dwelling house not including the kitchen and cow shed? _____									
B02. What material is used for floor? <input type="checkbox"/>			B03. What material is used for wall? <input type="checkbox"/>			B04. What material is used for roof? <input type="checkbox"/>			
B02, B03, and B04: Codes for Materials for floor, wall, and roof									
Mud	1	Bamboo	2	Thatched/Straw	3	Jute stick	4	Timber	5
CI sheet (Tin)	6	Brick/Cement	7	Tally	8	Nothing (remain	9	Others (Please	10
B05. The type of latrine the household members use <input type="checkbox"/>					B06. What is principle source of drinking water for the household? <input type="checkbox"/>				
Toilet, piped sewerage	1	Ring slab (water sealed)	2	Tube well	1	Piped water, yard connection	5		
Toilet with septic tank	3	Ordinary pucca	4	Artisan well	2	Piped water, house connection	6		
Ring slab (water not sealed)	5	Bush/open space	6	Pond/river/canal	3	Ring well	7		
	7	Others (Please specify)	8	Public standpipe	4	Others (Please specify) _____	8		

C. HOUSEHOLD ASSETS

Asset	1 = Yes 2 = No	Asset	1 = Yes 2 = No	Asset	1 = Yes 2 = No
C01. Agricultural and non-agricultural/ Homestead land		C05. Poultry		C09. Television	
C02. Agricultural Equipments		C06. Bicycle		C10. Tools to construct SHS	
C03. Cows / buffalo/Horse		C07. Furniture: cupboard		C11. Solar Home System unit	
C04. Goat / sheep		C08. Radio/ 2-in-1		C12. VCD/DVD Player	
C13. Improved Cook Stove (ICS)		C14. Motor Cycle		C15. Computer	

D. HOUSEHOLD INCOME

Please consider all sources of *monthly* household income (wages, farm, and other activities and your contribution).

Show the Prompt Card on HH income and ask her to make a selection

	D01	D02
(Put the Card Number, A, B, C, etc.) A = < 1500, B = 1500-1999, C = 2000-2499, D = 2500-2999, E = 3000-3999, F = 4000-4999, G = 5000-5999, H = 6000-6999, I = 7000-7999, J = 8000-8999, K = 9000-9999, L = 10000-12499, M = 12500-14999, N = 15000-17499, P = 17500-19999, Q = 20000-24999, R = 25000-29999, S = 30000-34999, T = 35000+	Scale of Total HH income (Enter category)	Your Contribution (Enter category)

E. HOUSEHOLD FINANCIAL STANDING

I will now show you a few statements about your household income. Please choose the one that is closest to your situation.

E01. Financial Standing	Response
1 = Our household income covers our needs and we are able to save money regularly	
2 = Our household income covers our needs and we are able to save money occasionally	
3 = Our household income covers our needs, but by just enough, we don't save	
4 = Our household income does not cover our needs and we have some difficulties	
5 = Our household income does not cover our needs and we have great difficulties	

(PLEASE REAND CATEGORIES and CODE ONE.)

F. HOUSEHOLD FOOD SECURITY

Over the past month how often, if at all, did you or any member of your household have to go without two full meals a day?

F01. Food Security	Response
1 = Always, 2 = Often, 3 = Sometimes, 4 = Never	

(PLEASE READ CATEGORIES 01 TO 04 and CODE ONE.)

G. LIFE EXPERIENCE OF THE RESPONDENT *(For the respondent who has marital status equal to 2 in A06)*

Indicator	Response
G01. Age at first marriage (year)	
G02. Number of children born (Put zero if no child is born live or stillbirth)	
G03. Do you use any contraceptives? (1 = Yes, 2 = No)	

H. PERSONAL FINANCIAL ASSETS OF THE RESPONDENT

Do you have any of the following?
No)

(1 = Yes, 2 =

Indicator	Response
H01. Savings (Savings Deposits/Fixed Deposits) in banks	
H02. Savings in microcredit organization	
H03. Savings in deposit pension scheme	
H04. Savings in bonds/insurance scheme/wage earners' scheme/post office	
H05. Savings in informal organizations/cooperatives	
H06. Shares/stocks	
H07. Cash in hand (Tk. 500 or more)	

I. RESPONDENT'S ATTITUDE TOWARDS WOMEN'S EMPOWERMENT

How does your family decide on the following?

Indicators	Now – After Training or Employment at the current job		Before Training or Employment at the current job	
	Codes: 5 = By the respondent herself , 4 = Husband/father, 3 = Respondent jointly with husband/father, 2 = Respondent jointly with others, 1 = Others, 8 = Not Applicable			
Shopping in the market place	I011		I012	
Visiting friends and relatives in the village	I021		I022	
Going outside the village	I031		I032	
Education of children	I041		I042	
Own healthcare	I051		I052	
Marriage of sons/daughters/other dependents	I061		I062	
Purchase of personal items such as clothes, jewelry, etc.	I071		I072	
Purchase of fixed property such as land, etc.	I081		I082	
Voting in the elections	I091		I092	
Family Planning	I101		I102	
Participation in civic/women's organization	I111		I112	

J. RESPONDENT'S AWARENESS ABOUT WOMEN'S EMPOWERMENT

Please respond to the following statements:

Indicators	Now - After Training or Employment at the current job		Before Training or Employment at the current job	
	Awareness Codes: 1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly Disagree			
Women and men should have equal opportunities in society	J011		J012	
A woman's income is important for her children's development.	J021		J022	
A woman's income does not increase respect from family.	J031		J032	
A woman's income increases respect from community.	J041		J042	
I am not hopeful that the future will be better for women like me.	J051		J052	
I have control over the key choices in my life.	J061		J062	

K. PERSONAL TIME ALLOCATION OF THE RESPONDENT: 24 HOUR WEEKDAY

Activity	Now - After Training or Employment at the current job		During Training		Before Training or Employment at the current job	
Preparing/Cooking food	K011		K012		K013	
Washing clothes and bedding	K021		K022		K023	
Childcare	K031		K032		K033	
Sleeping	K041		K042		K043	
Time at work	K051		K052		K053	
Travel time for home vis-à-vis work station	K061		K062		K063	
Study time	K071		K072		K073	
Other activities, including socializing, shopping, etc.	K081		K082		K083	

Put 88 if not applicable

L. KNOWLEDGE AND ATTITUDES ABOUT CLIMATE CHANGE

Introduction to CC section (Read aloud): Climate change, also known as global warming, refers to changing global weather patterns, the phenomenon that the world’s average temperature has been increasing over the past decades, may be increasing more in the future, and that the world’s climate may change as a result. We’d like to ask you a few questions about this topic.

L01. Have you heard of climate change before today? 1 = Yes, 2 = No	
L02. In your local area in the past 5-year, have the following become more frequent, less frequent, or have they not changed compared to the past? Codes: 1 = More frequent, 2 = Less frequent, 3 = No change compared to the past, 9 = Don't know	
L021. Floods	
L022. Droughts	
L023. Number of hot days	
L024. Severe storms	
L03. In your local area, does the monsoon seem more predictable, less predictable, or has it not changed compared to the past? Codes: 1 = More predictable, 2 = Less predictable, 3 = No change from the past, 9 = Don't know	
L04. If a 1 year-long severe drought happened in your local area, how big of an impact would it have on each of the following? 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L041. Food supply of your household	
L042. Drinking water supply of your household	
L043. Income of your household	
L044. Health of the members of your household	
L045. Your house	
L046. Your community	
L05. If a severe drought happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L06. If a severe flood happened in your local area, how big of an impact would it have on each of the following? Codes: 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L061. Food supply of your household	
L062. Drinking water supply of your household	
L063. Income of your household	
L064. Health of the members of your household	
L065. Your house	
L066. Your community	

L07. If a severe flood happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L08. How likely do you think it is that extreme weather will cause a natural disaster in your community in the next year? Codes: 1 = Very likely, 2 = Somewhat likely, 3 = Somewhat unlikely, 4 = Very unlikely, 9 = Don't know	
L09. In the next five years, do you think you will need to do the following? 1 = Yes, 2 = No, 9 = Don't know	
L091. Move temporarily because of severe environmental problems	
L092. Move permanently because of severe environmental problems	
L093. Rebuild your house	
L094. Make expensive repairs of the house	
L10. Do you think you and your family are ready to deal with a natural disaster if one should happen in the area where you live? 1 = Yes, 2 = No, 9 = Don't know	

M. TRAINING AT GTC

We now want to know if you participated in Grameen Shakti's Women Technician Training offered at GTCs between 2006 and 2010.

M01. Did you hear about the 15-day training offered at the GTCs between 2006 and 2010? 1 = Yes, 2 = No

IF NO, SKIP TO SECTION ON OTHER TRAINING (M13)

M02. How did you learn about the training offered by the GTC? (Maximum two answers possible)

Codes: 1 = From GS/GTC, 2 = From micro credit borrowers of Grameen Bank, 3 = From family members, relatives or friends, 4 = From advertisements/flyers, 5 = Previous trainees, 6 = Others (Please specify) _____

M03. Did you apply for the 15-day training? 1 = Yes, 2 = No

IF YES, PROCEED TO M5

M04. If NO, why did not you apply? (Maximum two answers possible)

Codes: 1 = Was not interested, 2 = Was discouraged by my family members, 3 = Was not allowed by my employer, 4 = Was busy at home, 5 = Had alternative prospects for employment, 6 = Already knew a lot about RET, 7 = GS/GTC provided me work and on the job training rather than formal RET training alone, 8 = Others (Please specify) _____

PROCEED TO SECTION ON OTHER TRAINING (M13)

M05. Why did you want the training? (Maximum two answers possible)

Codes: 1 = To be qualified to get a job, 2 = Was motivated to work for GS/RET, 3 = To increase my social status, 4 = To earn a better salary, 5 = To use spare time, 6 = Training allowance was attractive, 7 = Others (Please specify) _____

M06. What were you doing before you applied for the training?

Codes: 1 = Unemployed, 2 = Housewife/Helping at home, 3 = Student, 4 = Had another job, 5 = Self-employed, 6 = Others (Please specify) _____

M07. Did you receive GTC training? 1 = Yes, 2 = No

IF YES, PROCEED TO M09

M08. If you were not selected for the training, what do you think were the reasons? (Maximum two answers possible)

Codes: 1 = I was not eligible, 2 = There were too many other applicants, 3 = My home was too far from the GTC, 4 = I already knew a lot about RET, 5 = The selection method was flawed, 6 = Education level inadequate, 7 = Others (Please specify) _____, 9 = Don't know

PROCEED TO SECTION ON OTHER TRAINING (M13)

If training was received, please evaluate the training received.

M09. Description of the Training at GTC

M0901	M0902	M0903	M0904	M0905	M0906
GTC (Code)	Content of Training (Codes: Technical=1, Entrepreneurial=2, Both=3)	Venue	Total days	Days missed in training	Grade/Result of the training (Code)

Please refer to GTC List for coding. M0906 Codes: 1 = Passed with commendation, 2 = Passed, 3 = Did not complete

M10. Evaluation of the Training by the trainees

Question	Codes: 1= Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree
M101. I was trained to <i>construct</i> Solar Home System	
M102. I was not trained to <i>install</i> Solar Home System	
M103. I was trained to <i>service</i> Solar Home System	
M104. I was not trained to <i>promote</i> and <i>sell</i> Solar Home System.	
M105. I was trained to set up a small business on Solar Home System	
M106. No new knowledge and skills were gained.	
M107. I learned about climate change and why there is a need for Renewable Energy Technologies.	
M108. Trainers were not prepared and not knowledgeable on the subject matter.	
M109. Trainers' presentation skills were good.	
M1010. Written materials provided were appropriate and easy to understand.	
M1011. There was not enough time devoted to each topic for learning and understanding.	
M1012. The training was well organized.	

M11. Evaluation of the Usefulness of the training by the trainees.

Please respond to these questions about training and the use of your skills:

Question	Codes: 1 = Yes, 2 = No, 9 = Unsure
M111. Were the right kinds of women selected for training?	
M112. Did the training benefit you?	
M113. Have you promoted the SHS in your community?	
M114. Have you been asked to maintain/repair SHSs in your community (outside of your regular job responsibilities)?	
M115. If YES, have you been paid to maintain/repair a SHS in your community?	

M12. Have you had any post-school training other than the GTC training? 1 = Yes, 2 = No

If NO, proceed to EMPLOYMENT Section (N01)

OTHER TRAININGS

M13. What training have you had after leaving high school?

Formal education is that which is conducted by an authorized training body and for which trainees are tested and receive a certificate of competence rather than of attendance. Informal education refers to all other categories of training.

Training Issues	First Training		Second Training		Third Training	
Type of training (Code)	M1311		M1312		M1313	
Subject matter (Code, please specify)	M1321		M1322		M1323	
Length of training (days)	M1331		M1332		M1333	

Codes for Type of Training: 1 = Formal, 2 = Informal, 8 = None/not applicable

Codes for Subject Matter: 1 = Technical other than RET, 2 = Microfinance, 3 = Health, 4 = Others (Please specify)

Put 8 if not applicable

N. EMPLOYMENT

N01. Have you been employed after leaving high school? 1 = Yes, 2 = No

If NO: Thank you for giving of your time to participate in this study which is intended to learn and improve on women's training in renewable energy technologies.

IF YES, PLEASE COMPLETE N2.

N02. History of employment: please enter in sequence from present to past

[Enter Occupation Code from Employment Status Code of Section A.]

Occupation (Code from Section A)		Type of Organization (Code)		Number of months worked (months)		Average number of days worked per month (days)		Average number of hours worked per day (hours)		Frequency of payment (Code)		Payment (including in-kind payment (Tk.))		Distance from work place to home (km)		Mode of Transportation from home vis- à-vis work place (Code)	
N0211		N0212		N0213		N0214		N0215		N0216		N0217		N0218		N0219	
N0221		N0222		N0223		N0224		N0225		N0226		N0227		N0228		N0229	
N0231		N0232		N0233		N0234		N0235		N0236		N0237		N0238		N0239	
N0241		N0242		N0243		N0244		N0245		N0246		N0247		N0248		N0249	
N0251		N0252		N0253		N0254		N0255		N0256		N0257		N0258		N0259	

Codes for Type of Organization: 1= Government, 2 = Private, 3 = NGO, 4 = Self Employment, 5 = Others (Please specify)

Codes for Compensation Frequency: 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = Yearly, 5 = Lump sum

Codes for Transportation: 1 = On foot, 2 = Rickshaw/Van, 3 = Nosimon, 4 = Motor Cycle, 5 = Motor Car, 6 = Bus, 7 = Truck, 8 = Boat, 9 = Others

N03. Why did you decide to work for GS rather than elsewhere? (Maximum two answers possible)

(Note: please ask this question to the women who are working in RET sector only)

Codes: 1 = Higher income, 2 = Training qualified me for the job, 3 = Training motivated me to work in RET, 4 = Needed any job which was available at that time, 5 = This sector provides better opportunity for women, 6 = Others (Please specify)

N04. Did you consider starting a mini GTC at your home to own a SHS business? 1 = Yes, 2 = No

If NO, proceed to N07

N05. Have you faced barriers while starting your own SHS business? 1 = Yes, 2 = No, Not applicable = 8

N06. Please provide answers to following table: (Maximum three possible)

Type of Barriers (Code)		Ways to overcome the barriers (Code)	
N0611		N0612	
N0621		N0622	
N0631		N0632	

Codes for Types of Barriers: 1 = Prejudice against women, 2 = Lack of start-up finance, 3 = No support from GS/GTC with equipment and tools, 4 = Market not developed, 5 = Lack of skill, 6 = Others (Please specify) _____

Codes for Ways to Overcome Barriers: 1 = Unpaid assistance from parents, 2 = Unpaid help from relatives, 3 = Equipment provided by GS/GTC, 4 = Loan from bank/NGO, 5 = Loan from relatives, 6 = Loan from a person (not family), 7 = Others (Please specify) _____

N07. Do you run an integrated Polli-Phone business based on SHS? 1 = Yes, 2 = No

N08. If YES, put tick (✓) mark:

N081. Charging mobile phone	<input type="checkbox"/>
N082. Leasing lights	<input type="checkbox"/>
N083. Leasing power to run BW TV	<input type="checkbox"/>

EMPLOYMENT: AT GRAMEEN SHAKTI GTC

N09. Are you currently employed at Grameen Shakti? 1 = Yes 2 = No

If YES, PROCEED TO QUESTION N13

N10. If NO, did you ever apply to work for a GTC/GS? 1 = Yes 2 = No

If NO, PROCEED TO QUESTION N12

N11. Why do you think you were not hired? (Maximum two answers possible)

Codes: 1 = Only best trainees hired, 2 = Lacked motivation to work for a GTC, 3 = Too many other trainees available, 9 = Don't know,

4 = Others (Please specify) _____

N12. If NO, why have you never applied to work for GS/GTC? (Maximum two answers possible)

Codes: 1 = Got better paying job, 2 = Family is my priority, 3 = Family problems developed, 4 = Did not know that GTC was hiring, 5 = Too many other trained workers, 6 = Adverse social attitudes towards women technicians, 7 = Self-employed in RET sector, 8 = Self-employed (other), 9 = Others (Please specify) _____

Thank you for giving of your time to participate in this study which is intended to learn and improve on women's training in renewable energy technologies.

N13. Do you currently work at a GTC? Yes =1 2 = No

If NO, PROCEED TO SECTION ON EMPLOYMENT: GRAMEEN SHAKTI (BRANCH) at N19

N14. What is the name of the GTC? _____

N15. What specific work do you do? (Maximum two answers possible)

Codes: 1 = Assemble SHS, 2 = Cleaner, 3 = Computer operator, 4 = Inspector, 5 = Supervisor, 6 = Others (Please specify)

N16. How did you first come to hear about the GTC?

Codes: 1 = From GS/GTC itself, 2 = From micro credit borrowers of Grameen Bank, 3 = From family members, relatives or friends, 4 = From advertisements/flyers, 5 = Others (Please specify) _____

N17. What were you doing before you started working here?

Codes: 1 = Unemployed, 2 = Household chores, 3 = Student, 4 = Was in another job, 5 = Self-employed, 6 = Others (Please specify) _____

N18. What is the time gap between your graduation from the training program and when you began working at a GTC?

_____ days (if respondent provides months, multiply by 30). Put 8888 if not applicable

PROCEED TO SECTION ON WORK ENVIRONMENT (P)

EMPLOYMENT: GRAMEEN SHAKTI (BRANCH)

N19. What is the name of the GS branch? _____

N20. What specific work do you do? (Maximum two answers possible)

Codes: 1 = Assemble SHS, 2 = Cleaner, 3 = Computer operator, 4 = Inspector, 5 = Supervisor, 6 = Others (Please specify)

N21. How did you first come to hear about your job?

Codes: 1 = From GS/GTC, 2 = From micro credit borrowers of Grameen Bank, 3 = From family members, relatives or friends, 4 = From advertisements/flyers, 5 = Others (Please specify) _____

N22. What were you doing before you started working here?

Codes: 1 = Unemployed, 2 = Household chores, 3 = Student, 4 = Was in another job, 5 = Self-employed, 6 = Others (Please specify) _____

N23. Have you ever worked for a GTC? 1 = Yes 2 = No

If NO, PROCEED TO SECTION P: WORK ENVIRONMENT (P1)

N24. If YES, for how long? Months

N25. Why do you no longer work for a GTC? (Maximum three answers possible)

Codes: 1 = Got better salaried job, 2 = Got fired, 3 = Family problems, 4 = Did not like the job, 5 = The training was not adequate, 6 = Adverse social attitude towards women technicians, 7 = Others (Please specify) _____

P. WORK ENVIRONMENT: ATTITUDES AND PERCEPTIONS OF WORK AT GRAMEEN SHAKTI

P01. Do you think some types of work at GS are better done by women and men?

Supply chain	Codes: 1= Only women, 2= Mostly women, 3= Both men and women, 4= Mostly men, 5= Only men
P011. Assembly of SHS components	
P012. Marketing of SHS	
P013. Installation of SHS	
P014. Training users of SHS	
P015. Service and repairs, etc, of SHS	

P02. What have been the attitudes towards yourself at work from your colleagues?

Attitude of Colleagues	Codes: 1 = Very Positive, 2 = Positive, 3 = Neither positive nor negative, 4 = Negative, 5 = Very Negative, 8 = Not Applicable, 9 = Don't know
P021. Male Regional Managers	
P022. Female Regional Managers	
P023. Male Engineers	
P024. Female Engineers	
P025. Male Counterparts	
P026. Female Counterparts	
P027. Male Customers	
P028. Female Customers	

P03. Are women and men treated differently at your work? 1 = Yes 2 = No

P04. If YES, what obstacles relating to being a woman have been encountered by you?
 Codes: 1 = Lower salary, 2 = Harassment, 3 = Drudgery work, 4 = Lack of understanding of family commitments, 5 = Others (Please specify) _____

P05. Do you feel women technicians tend to want to leave this work? 1 = Yes 2 = No

P06. If YES, why do you think the women technicians leave? (Maximum two answers possible)

Codes: 1 = Low compensation, 2 = Family problem, 3 = Adverse work environment, 4 = Married to another location, 5 = Gave birth to child, 6 = Better job elsewhere, 7 = Others (Please specify) _____

P07. Are there any specific tasks at work that women are discouraged to do? 1 = Yes 2 = No

P08. If YES, please choose two of the following:

Codes: 1 = Heavy manual work, 2 = Supervision, 3 = Clerical / computer work, 4 = Higher paid work, 5 = Others (Please specify)

P09. Express your opinion about the following statements

Indicator	Codes: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree
P091. Integration of women into RET is a priority for Grameen Shakti.	
P092. More women managers would lead to women advancing further at GS.	
P093. Installation of the SHS is too heavy work for women to undertake.	
P094. I have now reached the limit of my progress at work.	
P095. To progress in my career I'll need to find other employment.	
P096. There is a good future for women engineers at GS.	
P097. I have a good future working in renewable energy technologies.	
P098. The turnover of women technicians is a problem at work.	

Thank you for giving of your time to participate in this study which is intended to learn and improve on women's training in renewable energy technologies.

Name of Interviewer and code _____

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Bangladesh Institute of Development Studies

E-17, Agargaon, Sher-e-Bangla Nagar, Dhaka-1207

Integration of Women into Grameen Shakti's Clean Energy Program in Bangladesh

Questionnaire for GTC Engineers and Sub-Assistant Engineers

Information and request for consent:

The purpose of this survey is to assess the progress made and obstacles encountered in training and empowering women in Renewable Energy Technologies. The study will serve as a learning instrument to provide lessons in future interventions in empowering women in this sector. Please understand that you are not being forced to take part in this study and the choice whether to participate or not is yours alone. However, we would really appreciate it if you do share your thoughts with us. If you choose not to take part in answering these questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way. Please note that the information obtained in this survey will be treated as strictly confidential and individual responses or names will not be included in any reports or publications. Data will be used only for the research study to help direct policy improvements and learn lessons for the future.

	Yes	No
Do you have any questions?	1	2
If YES, have these been satisfactorily answered	1	2
If YES, will you participate in this study?	1	2

If consent is given, the interviewer then states: Thank you for agreeing to participate, we will now begin.

SURVEY INFORMATION

Respondent No:

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Interview date:

--	--	--	--	--	--	--	--

Day Month Year

Grameen Shakti's Division _____

--	--

District: _____

--	--

 Upazila: _____

--	--

Union/Pourashava: _____

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 Village/Ward: _____

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Mohalla/Para: _____

Name of the Respondent: _____ Designation _____

Respondent Category Code:

6

Respondent's Mobile Phone No:

0	1									
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Information of the Respondent

A07. Educational degree obtained:

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Codes: 11 = SSC/HSC, 12 = Diploma Engineering, 13 = BA/BSc/B Com/BSS, 14 = BSc Engineering, 15 = Masters

G. LIFE EXPERIENCE *(For the respondent who is or has been married)*

Indicator	Response
G01. Age at first marriage (year)	
G02. Number of children born (Put zero if no child is born live or stillbirth)	

H. PERSONAL FINANCIAL ASSETS OF THE RESPONDENT

Do you have any of the following?

(1 = Yes, 2 = No)

Indicator	Response
H01. Savings (Savings Deposits/Fixed Deposits) in banks	
H02. Savings in microcredit organization	
H03. Savings in deposit pension scheme	
H04. Savings in bonds/insurance scheme/wage earners' scheme/post office	
H05. Savings in informal organizations/cooperatives	
H06. Shares/stocks	

I. RESPONDENT'S ATTITUDE TOWARDS WOMEN'S EMPOWERMENT

How does your family decide on the following?

Indicators	After Employment at the current job	
	Codes: 5= By the respondent herself, 4 = Husband/father, 3 = Respondent jointly with husband/father, 2 = Respondent jointly with others, 1 = Others, 8 = Not Applicable	
Shopping in the market place	I011	
Visiting friends and relatives in the village	I021	
Going outside the village	I031	
Education of children	I041	
Own healthcare	I051	
Marriage of sons/daughters/other dependents	I061	
Purchase of personal items such as clothes, jewelry, etc.	I071	
Purchase of fixed property such as land, etc.	I081	
Voting in the elections	I091	
Family Planning	I101	
Participation in civic/women's organization	I111	

J. RESPONDENT'S AWARENESS ABOUT WOMEN'S EMPOWERMENT

Please respond to the following statements:

Indicators	After Employment at the current job	
	Awareness: Codes: 1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly Disagree	
Women and men should have equal opportunities in society.	J011	
A woman's income is important for her children's development.	J021	
A woman's income does not increase respect from family.	J031	
A woman's income increases respect from community.	J041	
I am not hopeful that the future will be better for women like me.	J051	
I have control over the key choices in my life.	J061	

L. KNOWLEDGE AND ATTITUDES ABOUT CLIMATE CHANGE

Introduction to CC section (Read aloud): Climate change, also known as global warming, refers to changing global weather patterns, the phenomenon that the world’s average temperature has been increasing over the past decades, may be increasing more in the future, and that the world’s climate may change as a result. We’d like to ask you a few questions about this topic.

L01. Have you heard of climate change before today? 1 = Yes, 2 = No	
L02. In your local area in the past 5-year, have the following become more frequent, less frequent, or have they not changed compared to the past? Codes: 1 = More frequent, 2 = Less frequent, 3 = No change compared to the past, 9 = Don't know	
L021. Floods	
L022. Droughts	
L023. Number of hot days	
L024. Severe storms	
L03. In your local area, does the monsoon seem more predictable, less predictable, or has it not changed compared to the past? Codes: 1 = More predictable, 2 = Less predictable, 3 = No change from the past, 9 = Don't know	
L04. If a 1 year-long severe drought happened in your local area, how big of an impact would it have on each of the following? 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L041. Food supply of your household	
L042. Drinking water supply of your household	
L043. Income of your household	
L044. Health of the members of your household	
L045. Your house	
L046. Your community	
L05. If a severe drought happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L06. If a severe flood happened in your local area, how big of an impact would it have on each of the following? Codes: 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L061. Food supply of your household	
L062. Drinking water supply of your household	
L063. Income of your household	
L064. Health of the members of your household	
L065. Your house	
L066. Your community	

L07. If a severe flood happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L08. How likely do you think it is that extreme weather will cause a natural disaster in your community in the next year? Codes: 1 = Very likely, 2 = Somewhat likely, 3 = Somewhat unlikely, 4 = Very unlikely, 9 = Don't know	
L09. In the next five years, do you think you will need to do the following. 1 = Yes, 2 = No, 9 = Don't know	
L091. Move temporarily because of severe environmental problems	
L092. Move permanently because of severe environmental problems	
L093. Rebuild your house	
L094. Make expensive repairs of the house	
L10. Do you think you and your family are ready to deal with a natural disaster if one should happen in the area where you live? 1 = Yes, 2 = No, 9 = Don't know	

M. TRAINING AT GTC

M10. Evaluation of the Training by the Engineers

Question	Codes: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree, 8 = Not Applicable
M101. Trainees were trained to <i>construct</i> Solar Home System	
M102. Trainees were not trained to <i>install</i> Solar Home System	
M103. Trainees were trained to <i>service</i> Solar Home System	
M104. Trainees were not trained to <i>promote</i> and <i>sell</i> Solar Home System.	
M105. Trainees were trained to set up a small Solar Home System business.	
M106. No new knowledge and skills were gained by the trainees.	
M106. Trainees learned about climate change and why there is a need for Renewable Energy Technologies.	
M108. Trainers were not prepared and not knowledgeable on the subject matter.	
M109. Trainers' presentation skills were good.	
M1010. Written materials provided were appropriate and easy to understand.	
M1011. There was not enough time devoted to each topic for learning and understanding.	
M1012. The training was well organized.	

M11. Evaluation of the Usefulness of the training by the Engineers

Please respond to these questions about training and the use of trainees' skills:

Question	Codes: 1 = Yes, 2 = No, 8 = Not Applicable, 9 = Unsure
M111. Were the right kinds of women selected for training?	
M112. Did the training benefit the trainees personally?	
M113. To your knowledge have the trainees been used to promote SHS in their communities?	
M114. To your knowledge have the trainees been asked to maintain/repair Solar House Systems in their communities (outside of their regular job responsibilities)?	
M115. If YES, to your knowledge have the trainees been paid to maintain/repair Solar Home Systems in their communities?	

N. EMPLOYMENT (Section to be tested during the pilot for relevance to Engineers)

N02. History of employment: please enter in sequence from present to past

[Enter Occupation Code from Employment Status Code of Section A of the Questionnaire for Trainees and Employees.]

Occupation (Code from Section A)		Type of Organization (Code)		Number of months worked (months)		Average number of days worked per month (days)		Average number of hours worked per day (hours)		Frequency of payment (Code)		Payment (including in-kind payment (Tk.))		Distance from work place to home (km)		Mode of Transportation from home vis-à-vis work place (Code)	
N0211		N0212		N0213		N0214		N0215		N0216		N0217		N0218		N0219	
N0221		N0222		N0223		N0224		N0225		N0226		N0227		N0228		N0229	
N0231		N0232		N0233		N0234		N0235		N0236		N0237		N0238		N0239	
N0241		N0242		N0243		N0244		N0245		N0246		N0247		N0248		N0249	
N0251		N0252		N0253		N0254		N0255		N0256		N0257		N0258		N0259	

Codes for Type of Organization: 1= Government, 2 = Private, 3 = NGO, 4 = Others (Please specify) _____

Codes for Compensation Frequency: 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = Yearly, 5 = Lump sum

Codes for Transportation: 1 = On foot, 2 = Rickshaw, 3 = Nosimon, 4 = Motor Cycle, 5 = Van, 6 = Motor Car, 7 = Bus, 8 = Truck, 9 = Boat, 10 = Others

N03. Why did you decide to work for GS rather than elsewhere? (Maximum two answers possible)

Codes: 1 = Higher income, 2 = Training qualified me for the job, 3 = Training motivated me to work in RET, 4 = Needed any job which was available at that time, 5 = This sector provides better opportunity for women, 6 = Others (Please specify)

P. WORK ENVIRONMENT: ATTITUDES AND PERCEPTIONS OF WORK AT GRAMEEN SHAKTI

P01. Who does the kind of work listed below at Grameen Shakti?

Supply chain	1 = Only women, 2 = Mostly women, 3 = Men and women, 4 = Mostly men, 5 = Only men
P011. Assembly of SHS components	
P012. Marketing of SHS	
P013. Installation of SHS	
P014. Training users of SHS	
P015. Service and repairs, etc, of SHS	

P2. What have been the attitudes towards trainees at work from your colleagues?

Attitude of Colleagues	Code: 1 = Very Positive, 2 = Positive, 3 = Neither positive nor negative, 4 = Negative, 5 = Very Negative, 6 = Don't know
P021. Male Regional Managers	
P022. Female Regional Managers	
P023. Male Engineers	
P024. Female Engineers	
P025. Male Counterparts	
P026. Female Counterparts	
P027. Male Customers	
P028. Female Customers	

P03. Are women and men treated differently at your work? 1 = Yes, 2 = No

P04. If YES, what obstacles relating to being a woman have been encountered by you?
 Codes: 1 = Lower salary, 2 = Harassment, 3 = Drudgery work, 4 = Lack of understanding of family commitments, 5 = Others
 (Please specify)_____

P05. Do you feel women technicians tend to want to leave this work? 1 = Yes 2 = No

P06. If YES, why do you think the women technicians leave? (Maximum two answers possible)
 Codes: 1 = Low compensation, 2 = Family problem, 3 = Adverse work environment, 4 = Married to another location, 5 = Gave birth to child, 6 = Better job elsewhere, 7 = Others (Please specify)_____

P07. Are there any specific tasks at work that women are discouraged to do? 1 = Yes 2 = No

P08. If YES, please choose two of the following:

Codes: 1 = Heavy manual work, 2 = Supervision, 3 = Clerical / computer work, 4 = Higher paid work, 5 = Others (Please specify)_____

P09. Do you agree with the following statements?

Indicator	Codes: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree
P091. Integration of women into RET is a priority for Grameen Shakti.	
P092. More women managers would lead to women advancing further at GS.	
P093. Installation of the Solar Home System is too heavy work for women to undertake.	
P094. Women technicians have now reached the limit of their progress at work.	
P095. To progress in their career women technicians need to find other employment.	
P096. There is a good future for women engineers at GS.	
P097. I have a good future working in renewable energy technology.	
P098. The turnover of women technicians is a problem at work.	

Q. ENGINEER'S PERSPECTIVE ON EMPLOYMENT OF TRAINEES AND LOCAL WOMEN

Q01. Did your branch hire trained women technicians? 1 = Yes, 2 = No

Q02. If YES, when did your branch first hire women technicians trained on the GTC course?

Q03. Did your branch hire local women technicians? 1 = Yes, 2 = No

If NO, PROCEED TO Q09

Q04. If YES, when did your branch first hire local women technicians?

Q05. How does GS decide which women to hire as local technicians? Please select two options
Codes: 1 = Trained elsewhere, 2 = Young women, 3 = Unmarried women, 4 = Most educated women, 5 = Older reliable women, 6 = Others (Please specify) _____

Q06. What work have untrained women employees undertaken? Up to three responses may be recorded
Codes: 1 = Assembly of SHS, 2 = Installation of SHS, 3 = Service of SHS, 4 = Repairs of SHS, 5 = Work on other GS products, 6 = Others (Please specify) _____

Q07. If both trained women technicians and local women technicians were recruited at your branch, what gap did the local/untrained women fill?
Codes: 1 = They do the similar work as the trained women technician, 2 = They do complementary/supplementary work, 3 = They do independent work

Q08. In what way were they different from the trainees? Please select two options.

Codes: 1 = Age, 2 = Educational background, 3 = Marital status, 4 = Sincerity at work, 5 = Others (Please specify)

Q09. If the training program were to be repeated, what changes would you recommend? Please select two recommendations
 Codes: 1= Careful selection of trainees, 2 = Longer training, 3 = More business training, 4 = Better methods of teaching, 5 = Follow-up training in micro-enterprises, 6 = Follow-up support after training

Q10. Do you feel it is essential for assembly pieceworkers to be formally trained? 1= Yes, 2 = No, 9 = Don't know
 Please explain your position.

Q11. Please provide your comparative assessment of women technicians on a scale of 1-5.

Criterion	Women technicians who received 15 day training by GTC		Women technicians who did not receive 15 day training by GTC	
	Q1111		Q1121	
Knowledge about RET	Q1111		Q1121	
Time keeping	Q1112		Q1122	
Quality of work	Q1113		Q1123	
Team work	Q1114		Q1124	

Codes: 1 = Very poor, 2 = Poor, 3 = Fair, 4 = Very good, 5 = Excellent, 8 = Not applicable

Q12. In a wider context how did the USAID-funded training lead to women's entrepreneurship? Please Explain

Q13. Do you feel that the training and women's participation was essential to GS in scaling up and decentralizing production of SHS? Codes: 1 = Yes, 2 = No, 9 = Do not know

Q14. Do you feel that the investment in training led to success for your branch and for GS? 1 = Yes, 2 = No
Please explain your position.

Q15. How do you feel that the training intervention would have been more successful in integrating women into the Clean Energy supply chain? Please explain.

Thank you for giving of your time to participate in this study which is intended to learn and improve on women's training in renewable energy technologies.

Name of Interviewer and code _____

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Bangladesh Institute of Development Studies

E-17, Agargaon, Sher-e-Bangla Nagar, Dhaka-1207

Integration of Women into Grameen Shakti's Clean Energy Program in Bangladesh

Questionnaire for Regional Managers

Information and request for consent:

The purpose of this survey is to assess the progress made and obstacles encountered in training and empowering women in Renewable Energy Technologies. The study will serve as a learning instrument to provide lessons in future interventions in empowering women in this sector. Please understand that you are not being forced to take part in this study and the choice whether to participate or not is yours alone. However, we would really appreciate it if you do share your thoughts with us. If you choose not to take part in answering these questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way. Please note that the information obtained in this survey will be treated as strictly confidential and individual responses or names will not be included in any reports or publications. Data will be used only for the research study to help direct policy improvements and learn lessons for the future.

	Yes	No
Do you have any questions?	1	2
If YES, have these been satisfactorily answered	1	2
If YES, will you participate in this study?	1	2

If consent is given, the interviewer then states: Thank you for agreeing to participate, we will now begin.

SURVEY INFORMATION

Respondent No:

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Interview date:

--	--	--	--	--	--	--	--

Day Month Year

Grameen Shakti's Division _____

--	--

District: _____

--	--

Upazila: _____

--	--

Union/Pourashava: _____

--	--	--

Village/Ward: _____

--	--

Mohalla/Para: _____

Name of the Respondent: _____ Designation _____

Respondent Category Code:

7

Respondent's Mobile Phone No:

0	1									
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Information of the Respondent

A07. Educational degree obtained:

Codes: 11 = SSC/HSC, 12 = Diploma Engineering, 13 = BA/BSc/B Com/BSS, 14 = BSc Engineering, 15 = Masters

J. RESPONDENT'S AWARENESS ABOUT WOMEN'S EMPOWERMENT

Please respond to the following statements:

Indicators	After Employment at the current job	
Awareness: Codes: 1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly Disagree		
Women and men should have equal opportunities in society.	J011	
A woman's income is important for her children's development.	J021	
A woman's income does not increase respect from family.	J031	
A woman's income increases respect from community.	J041	
I am not hopeful that the future will be better for women of my status.	J051	
Women of my status have control over the key choices in their lives.	J061	

L. KNOWLEDGE AND ATTITUDES ABOUT CLIMATE CHANGE

Introduction to CC section (Read aloud): Climate change, also known as global warming, refers to changing global weather patterns, the phenomenon that the world's average temperature has been increasing over the past decades, may be increasing more in the future, and that the world's climate may change as a result. We'd like to ask you a few questions about this topic.

L01. Have you heard of climate change before today? 1 = Yes, 2 = No	
L02. In your local area in the past 5-year, have the following become more frequent, less frequent, or have they not changed compared to the past? Codes: 1 = More frequent, 2 = Less frequent, 3 = No change compared to the past, 9 = Don't know	
L021. Floods	
L022. Droughts	
L023. Number of hot days	

L024. Severe storms	
L03. In your local area, does the monsoon seem more predictable, less predictable, or has it not changed compared to the past? Codes: 1 = More predictable, 2 = Less predictable, 3 = No change from the past, 9 = Don't know	
L04. If a 1 year-long severe drought happened in your local area, how big of an impact would it have on each of the following? 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L041. Food supply of your household	
L042. Drinking water supply of your household	
L043. Income of your household	
L044. Health of the members of your household	
L045. Your house	
L046. Your community	
L05. If a severe drought happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L06. If a severe flood happened in your local area, how big of an impact would it have on each of the following? Codes: 1 = Large, 2 = Small, 3 = As usual, 9 = Don't know	
L061. Food supply of your household	
L062. Drinking water supply of your household	
L063. Income of your household	
L064. Health of the members of your household	
L065. Your house	
L066. Your community	
L07. If a severe flood happened in your local area, how long do you think it would take for your household to recover? (days), 9999 = Don't know	
L08. How likely do you think it is that extreme weather will cause a natural disaster in your community in the next year? Codes: 1 = Very likely, 2 = Somewhat likely, 3 = Somewhat unlikely, 4 = Very unlikely, 9 = Don't know	
L09. In the next five years, do you think you will need to do the following. 1 = Yes, 2 = No, 9 = Don't know	
L091. Move temporarily because of severe environmental problems	
L092. Move permanently because of severe environmental problems	
L093. Rebuild your house	
L094. Make expensive repairs of the house	
L10. Do you think you and your family are ready to deal with a natural disaster if one should happen in the area where you live? 1 = Yes, 2 = No, 9 = Don't know	

M. TRAINING AT GTC

M10. Evaluation of the Training by the Managers

Question	Codes: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree, 8 = Not Applicable
M101. Trainees were trained to <i>construct</i> Solar Home System.	
M102. Trainees were not trained to <i>install</i> Solar Home System.	
M103. Trainees were trained to <i>service</i> Solar Home System.	
M104. Trainees were not trained to <i>promote</i> and <i>sell</i> Solar Home System.	
M105. Trainees were trained to set up a small Solar Home System business.	
M106. No new knowledge and skills were gained the trainees.	
M107. Trainees learned about climate change and why there is a need for Renewable Energy Technologies.	
M108. Trainers were not prepared and not knowledgeable on the subject matter.	
M109. Trainers' presentation skills were good.	
M1010. Written materials provided were appropriate and easy to understand.	
M1011. There was not enough time devoted to each topic for learning and understanding.	
M1012. The training was well organized.	

M11. Evaluation of the Usefulness of the training by the Managers

Please respond to these questions about training and the use of trainees' skills:

Question	Codes: 1 = Yes, 2 = No, 8 = Not Applicable, 9 = Unsure
M111. Were the right kinds of women selected for training?	
M112. Did the training benefit the trainees personally?	
M113. To your knowledge have the trainees been used to promote the Solar Home System in their communities?	
M114. To your knowledge have the trainees been asked to maintain/repair Solar Home System in their communities (outside of their regular job responsibilities)?	
M115. To your knowledge have the trainees been paid to maintain/repair Solar Home Systems in their communities?	

P. WORK ENVIRONMENT: ATTITUDES AND PERCEPTIONS OF WORK AT GRAMEEN SHAKTI

P01. Who does the kind of work listed below at Grameen Shakti?

Supply chain	1 = Only women, 2 = Mostly women, 3 = Men and women, 4 = Mostly men, 5 = Only men
P011. Assembly of SHS components	
P012. Marketing of SHS	
P013. Installation of SHS	
P014. Training users of SHS	
P015. Service and repairs, etc, of SHS	

P02. What have been the attitudes towards trainees at work from your colleagues?

Attitude of Colleagues	Codes: 1 = Very Positive, 2 = Positive, 3 = Neither positive nor negative, 4 = Negative, 5 = Very Negative, 8 = Not Applicable, 9 = Don't know
P021. Male Divisional Managers	
P022. Female Divisional Managers	
P023. Male Engineers	
P024. Female Engineers	
P025. Male Counterparts	
P026. Female Counterparts	
P027. Male Customers	
P028. Female Customers	

P03. Are women and men treated differently at your work? 1 = Yes 2 = No

P05. Do you feel women technicians tend to want to leave this work? 1 = Yes 2 = No

P06. If YES, why do you think the women technicians leave? (Maximum two answers possible)

Codes: 1 = Low compensation, 2 = Family problem, 3 = Adverse work environment, 4 = Married to another location, 5 = Gave birth to child,
6 = Better job elsewhere, 7 = Others (Please specify)_____

P07. Are there any specific tasks at work that women are discouraged to do? 1 = Yes 2 = No

P08. If YES, please choose two of the following: (Maximum two answers possible)

Codes: 1 = Heavy manual work, 2 = Supervision, 3 = Clerical / computer work, 4 = Higher paid work, 5 = Others (Please specify)_____

P09. Do you agree with the following statements?

Indicator	Codes: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree
P091. Integration of women into RET is a priority for Grameen Shakti.	
P092. More women managers would lead to women advancing further at GS.	
P093. Installation of the Solar Home System is too heavy work for women to undertake.	
P094. Women technicians have now reached the limit of their progress at work.	
P095. To progress in their career women technicians need to find other employment.	
P096. There is a good future for women engineers at GS.	
P097. I have a good future working in renewable energy technology.	
P098. The turnover of women technicians is a problem at work.	

Q. MANAGER'S PERSPECTIVE ON EMPLOYMENT OF TRAINEES AND LOCAL WOMEN

Q01. Did your branch hire trained women technicians? 1 = Yes, 2 = No

Q02. If YES, when did your branch first hire trained women technicians?

Q03. Did your branch hire local women technicians? 1 = Yes, 2 = No

If NO, PROCEED TO Q09

Q04. If YES, when did your branch first hire local women technicians?

Q05. How does GS decide which women to hire as local technicians? Please select two options

Codes: 1 = Trained elsewhere, 2 = Young women, 3 = Unmarried women, 4 = Most educated women, 5 = Older reliable women, 6 = Others (Please specify) _____

Q06. What work have untrained women employees undertaken? Up to three responses may be recorded

Codes: 1 = Assembly of SHS, 2 = Installation of SHS, 3 = Service of SHS, 4 = Repairs of SHS, 5 = Work on other GS products, 6 = Others (Please specify) _____

Q07. If both trained women technicians and local women technicians were recruited at your branch, what gap did the local/untrained women fill?

Codes: 1 = They do the similar work as the trained women technician, 2 = They do complementary/supplementary work, 3 = They do independent work

Q08. In what way were they different from the trainees? Please select two options.

Codes: 1 = Age, 2 = Educational background, 3 = Marital status, 4 = Sincerity at work, 5 = Others (Please specify)

Q09. If the training program were to be repeated, what changes would you recommend? Please select two recommendations

Codes: 1= Careful selection of trainees, 2 = Longer training, 3 = More business training, 4 = Better methods of teaching, 5 = Follow-up training in micro-enterprises, 6 = Follow-up support after training

Q10. Do you feel it is essential for assembly pieceworkers to be formally trained? 1= Yes, 2 = No, 9 = Do not know
Please explain your position.

Q11. Please provide your comparative assessment of women technicians on a scale of 1-5.

Criterion	Women technicians who received 15 day training by GTC		Women technicians who did not receive 15 day training by GTC	
Knowledge about RET	Q1111		Q1121	
Time keeping	Q1112		Q1122	
Quality of work	Q1113		Q1123	
Team work	Q1114		Q1124	

Codes: 1 = Very poor, 2 = Poor, 3 = Fair, 4 = Very good, 5 = Excellent, 8 = Not applicable

Q12. In a wider context how did the USAID-funded training lead to women's entrepreneurship? Please Explain

Q13. Do you feel that the training and women's participation was essential to GS in scaling up and decentralizing production of SHS? 1 = Yes, 2 = No, 9 = Do not know

Q14. Do you feel that the investment in training led to success for your branch and for GS? 1 = Yes, 2 = No
Please explain your position.

Q15. How do you feel that the training intervention would have been more successful in integrating women into the Clean Energy supply chain? Please explain.

Thank you for giving of your time to participate in this study which is intended to learn and improve on women's training in renewable energy technologies.

Name of Interviewer and code _____

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APPENDIX E: RESPONSE TO STUDY FROM GRAMEEN SHAKTI

Feedback on USAID Report on Grameen Technology Centers



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“Integrating Women into Grameen Shakti’s Renewable Energy Value Chain in Bangladesh”

1. Introduction

This intensive research work has brought up some impact issues related to Grameen Technology Centre (GTC). Through the questionnaire survey conducted among 500 respondents including 86 Working Trainees, 252 Non-Working Trainees, 18 Working Non-Trainees, 99 Women Engineers and 45 Regional Managers of Grameen Shakti. Among 500 respondents, 252 Non-Working Trainees do not work in Grameen Shakti however they had received 15-day training (Page: 5).

Grameen Shakti appreciates the in-depth research work on Grameen Technology Centers. Grameen Shakti also thanks to all parties who have done this effective work that would help in future to design, prepare and evaluate social work in developing countries.

Grameen Shakti is taking opportunity to make some comments on this report.

2. Feedback from Grameen Shakti

2.1 Income of GTC Technicians in comparison with Garments Worker

The report says: “ On a monthly basis, the minimum wage for a garment worker is BDT 21,200 compared to the BDT 2,154 of the Grameen Shakti Worker.....the GTC employee earns an average of BDT 151 per day while the Garment worker earns minimum of BDT 815 per day equivalent to USD 1.94 per day for the GTC employee (**Page: 22**) & which is below the international norm for poverty at the personal income level which is USD 2 per day (**Executive Summary page: vii**).

GS Feedback: It is requested for cross checking the information of minimum wage of a Garment Worker. Actually, the minimum wage for Garment Worker has been set as 5300 Taka for a regular month (not for a standard working week). Please find the following link as reference.

1) <http://www.bloomberg.com/news/2013-11-13/bangladesh-garment-factories-to-stay-shut-amid-worker-protests.html> (*This link has been also used in the USAID Report*)

2) <http://www.theguardian.com/world/2013/nov/14/bangladesh-garment-workers-pay-rise>

2.2 Issue of training for customers (especially women), school campaign and demonstration

The report says: The study did not focus the training for women customers and school campaign (**Project Background: page: 02**).

GS feedback: It is very important to focus on training for customers as well as school campaign. Knowledge sharing and capacity building among this group of people will make a positive difference in RET dissemination in future especially in developing countries like Bangladesh.

2.3 Recruitment Process in Grameen Shakti

The report says: “Each branch office hires Local employees as field assistant to install and maintain SHS, ICS and Biogas plants” (**Grameen Shakti’s rural network model: page: 3**).

GS feedback: But in reality, the Divisional Office under the supervision of Head office recruit the field assistant. Before any recruitment process, Job Vacancies are published in most-circulated daily newspapers as well as in job portals. Examination Committee is formed for each Division and one of the top officials from Head office chair the committee. Grameen Shakti has well structured recruitment process. Rules and regulations for recruitment process are strictly followed. All recruitment process is solely controlled by Grameen Shakti Head Office.

2.4 Issue of Integration in Grameen Shakti Value Chain

The report says: “After assembly, each segment of the value chain- from Marketing to service of RETs- is dominated (entirely or almost entirely) by men Who are GS employees” (**Trainees in the GS value chain: page: 13**)

From the report it was significantly found that “Content of Training material” has included mainly the topic of “Construct SHS” (**Table 9: Content of the Training received by women trainees; page: 19**). The response was very high (around 100%). However, the response was relatively low when they were asked about the content of training regarding Promoting and Sale of SHS.

GS feedback: Yes, it’s true that most of the Field Assistants are men. But in context to Bangladesh, low number of women is engaged in field based job. Grameen has no discrimination about the recruitment regardless man and woman. Management of Grameen Shakti does not discourage anyone (regardless man or women) to do any type of works. But experience over the long run shows that women worker do not show their interest in field based job considering social perspective. The total work of Grameen Shakti is field based work. A field assistant is assigned to visit customer house on regular basis. They travel several miles every day for their duties. They face the problem regarding transport in rural and remote place, bad weather, socio-

political problem, etc. They use different types of vehicles what they find in the particular locality. They carry heavy battery, solar panel and other equipments with them. Sometimes, they return from remote field during mid-night. Many female workers join in the Grameen Shakti and start their job in branch level. But, due to the nature of physical hard-working job in rural areas, they reduce their interest and drop the job. Furthermore, many women get marry after their jobs and stay at their husbands' house. Sometimes, their families do not allow them in field based job. Apart from these issues, some female workers do not feel better during their pregnancy period when they are engaged in field level work. But, as a leading organization in renewable energy sector in Bangladesh, the management of Grameen Shakti does its best in breaking down of these difficulties as well as barriers.

2.5 Issue of Gender-Equity

As an organization on the basis of “Not-for Profit” and working only for rural people, Grameen Shakti does not believe in gender discrimination. Grameen Shakti focuses on the beneficiary of rural people especially for women. It has also been described in the report that all the products of Grameen Shakti are dedicated for women. So, Grameen Shakti does not compromise in fulfillment of mission and vision.

3. Concluding Remark

The lessons learnt from the project are significantly important for progress any development project in future. All the stakeholders within this project require evaluating in-depth and incorporating the lessons in the upcoming projects. When we all parties focus on the findings of this research, we believe that any project to be implemented in future tenor will get promising and benchmark shape.