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**The Impact of Structural Gender Differences
and its Consequences
on
Access to Energy in Rural Bangladesh**

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List of Abbreviations

ASTAE	Asia Sustainable and Alternative Energy
BBS	Bangladesh Bureau of Statistics
BPDB	Bangladesh Power Development Board
BRAC	Bangladesh Rural Advancement Committee
CEWDC	Coastal Electrification and Women's Development Cooperative
DESA	Dhaka Electric Supply Authority
ENPOGEN	Energy Poverty and Gender (ASTAE Project)
ESMAP	(UNDP/World Bank) Energy Sector Management Assistance Programme
GEF	Global Environment Facility
GoB	Government of Bangladesh
GS	Grameen Shakti
HDRC	Human Development Research Centre
IDA	International Development Association
IDCOL	Infrastructure Development Company Limited
IEA	International Energy Agency
ITDG	Intermediate Technology Development Group
LGED	Local Government Engineering Department
MFI	Micro Finance Institution
NGO	Non Government Organization
PBS	Palli Bidyut Samity (rural electricity cooperative)
PDB	Power Development Board
PSL	Prokaushali Shangshad Limited
REB	Rural Electrification Board
REP	Rural electrification Program
REREDP	Rural Electrification and Renewable Energy Development Programme
SDNP	Sustainable Development Networking Programme
SE	Solar Energy
SHS	Solar Home System
UNDP	United Nation Development Programme
USAID	United States Agency for International Development

Executive Summary

It is well known that in Bangladesh, like in many developing nations, the socio-cultural and religious constitution imposes a number of constraints on women, thus hampering their access to various goods and services. Access to modern energy services is one such example. In light of these conditions, this report aims to study the impact these structural gender differences has on access to energy and the consequences of these impacts based on review of recent literature on the matter. This study will serve as a preliminary basis for building on the methodologies developed under the Asia Sustainable and Alternative Energy (ASTAE) coordinated ENPOGEN project and addressing the issues identified in the study through concrete pilot projects in Bangladesh.

Households in rural Bangladesh rely primarily on biomass fuels - twigs, leaves and virtually all components of agricultural residues (e.g. cow dung, jute sticks, rice straw, rice husks) and natural resources (e.g. firewood) for energy, though seasonal and economic factors may determine the choice of fuel consumed. Women are the major collectors and users of fuel. However, structural gender differences within the society such as unequal access to land and property, expectation to fulfil all household chores including collection and use of fuel, restricted mobility outside the household and inaccessibility to economic, social and legal institutions all affect their access to modern energy services. Some of the most significant impacts that arise from these constraints include, among others, the difficulty of access to collateral for loans and energy services, inability to cope with increasing shortages in fuel supply, prolonged hours spent collecting fuel, cooking, working and spending hours within confined households while breathing in the air contaminated by burning fuel, difficulty in accessing the market and lower opportunity of being employed in influential positions in energy planning bodies.

The consequent implications of these barriers on the lives of women include adverse effects on their health, such as spinal column damage, eye diseases, acute respiratory infections (ARI) and lung diseases, including cancer. Other consequences are

environmental degradation, which in turn can worsen poverty situations, small number of women representatives within energy institutions leading to inadequate gender need assessment in energy planning and possible economic consequences such as lower levels of education, employment and income for women.

A final finding that has been pointed out in conclusion is the lack of sex disaggregated data in the existing literature on energy in Bangladesh, which leads to a methodological difficulty in establishing a quantitative relationship between energy, poverty and gender. Therefore, it is important to find and document gender disaggregated information on the needs, preferences, time use, income and expenditures, decision making, access to credit and information in market surveys, benefits and impacts in monitoring and evaluation studies, etc. in order to design projects that can address the gender issues in energy projects in Bangladesh.

1. Introduction

Background

Over the last few years it has been repeatedly said by donors and development institutions that “modern energy services¹ are a powerful engine of economic and social development, and no country can grow without ensuring at least minimum access to energy services for a broad section of its population.” However, in most cases, rural energy projects have been implemented without in-depth analysis of the needs of the targeted people prior to implementation and proper impact evaluation after implementation. For example the socio-cultural setup of a community, the actual needs of the dwellers within the community, the perceptions on and implications of gender, etc. have often been overshadowed by the preconceived notions of project designers.

With respect to gender issues, until very recently, the implications of structural gender differences within a society and its consequences have been ignored while designing rural electrification projects. Even in case of post-project evaluation, most rural electricity monitoring and evaluation programs measure output oriented information, such as the number of new grid electricity connections or the number of renewable energy systems installed rather than the socioeconomic impact of the project or program (such as the impact of various institutional and promotional approaches on women in terms of actual benefits rather than number of connections installed), often masking poverty and gender specific consumer choices and perceptions. Consequently, in spite of the joint efforts of development organizations, only few of these projects have actually succeeded in addressing the expected objectives.

¹ Converting energy from one form to another has a cost (both in terms of conversion processes, such as engines, and in terms of efficiency losses). This means that the cost of “**useful energy**” can be quite different from the cost of the “primary energy” or fuel. This is why energy specialists increasingly refer to the provision of “**energy services**” rather than merely the supply of “**energy**” (“energy supply/fuel” plus “conversion equipment” equals “energy service”) [Barnett, 2001].

Bangladesh is one such country where there has been only a handful of studies on the socio-cultural background with respect to gender (such as social perceptions on gender) and the impact it has on rural energy projects (such as gender barriers to receiving energy services) which could help projects address the actual problem rather than what seems theoretically sound.

Objective

It is well known that in Bangladesh, like in many developing nations, the socio-cultural and religious constitution imposes a number of constraints on women, thus hampering their access to various goods and services. Access to modern energy services is one such example. In light of these conditions, this report aims to study the impact these structural gender differences has on access to energy and energy services and the consequences of these impacts based on review of recent literature on the matter.

This study will serve as a preliminary basis for building on the methodologies developed under the Asia Sustainable and Alternative Energy (ASTAE) coordinated ENPOGEN project and addressing the gender inequality related to access to modern energy services in Bangladesh through concrete pilot projects that can address the issues identified in the study.

2. Country Background: Bangladesh

Socio Economic Background

Bangladesh is a developing country with the current population estimated at 144,319,628, (Bangladesh Bureau of Statistics: 2005 est.) and population density is above 900 people per square km (BBS: 2002 est.). 22% of the total population live in urban areas, while the rest is concentrated in over 86,000 villages throughout the country. The current population growth rate is 1.48 percent (BBS: 2002). The male: female ratio is 105.4:100 (BBS: 2005 est.) but according to studies, there are more female-headed households among the poor. The vast majority of the population comprises of Muslims.

Energy Consumption Facts

Basic Statistics

The per capita consumption of energy is about 108 kWh (IEA Energy Statistics: 2002), which is among the lowest in the world. 68.5% of the population, especially those living in rural areas, is deprived of electricity (Census: 2001). Even in the 21st century kerosene lamps (known as *kupis*²) and hurricane lanterns (glass enclosed kerosene lamps) are the only source of light in many villages. Other sources include candles and an insignificant but growing number of households (usually the relatively better-off ones) have been using solar home systems (SHS) recently.

“Due to limited alternative sources of energy the rural people are mainly dependent on fuelwood for cooking and other household activities. About 20 percent of biomass is used for small-scale industries, while other 80 percent for the household. Presently, due to acute shortage of green coverage, fuelwood energy is losing ground to other sources of

² *Kupis* are small, inexpensive cans of kerosene with wicks stuck into them.

energy in the rural Bangladesh, although actual biomass consumption is rising tremendously” [Billah, M, BIDS].

Overview of Energy Sector

The rural electrification system consists of 67 rural energy cooperatives known as Palli Bidyut Samities (PBS) which are independent, consumer-owned cooperatives financed and managed by the autonomous state agency, the Rural Electrification Board (REB) established in 1977 to provide electricity to the rural areas of Bangladesh. “Although PBSs connect about 350,000 to 400,000 households per year in the rural areas, only one household of four has access to the grid” [ESMAP, 2004].

According to REB figures of early 2005, REB has electrified almost 43,000 villages and 5.8 million people in Bangladesh. However, given the high population of the country this figure is a very small proportion of the total number of people without access to electricity which can be better established with the REB figures of early 2004 which stated that even after electrifying almost 40,000 villages, “there remained 55% of villages to be electrified including 78% of rural households, including 79% of poor households in electrified villages and 95% of all rural poor; and a total of 400,000 km of new distribution lines to be installed [World Bank, 2004]. On top of that in many communities, distributing grid lines is either economically unviable due to the scattered nature of household distribution in conjunction with the low rate of daily energy consumption³ or technically infeasible due factors such as geographical areas outside the grid electrification master plan of REB or islands disconnected from the mainland. As a result, most households and micro enterprises are dependent on traditional fuels for their energy supply.

³ Most rural households connected to the grid use less than 40kW per month, usually only for lighting.

Source of Energy (Household or Enterprise Fuel Consumption)

Households in rural Bangladesh rely primarily on biomass fuels - twigs, leaves and virtually all components of agricultural residues (e.g. cow dung, jute sticks, rice straw, rice husks) and natural resources (e.g. firewood) for energy⁴, though seasonal and economic factors may determine the choice of fuel consumed. ‘For more efficient use, women often make ‘cow dung cakes’ by combining agricultural wastes and drying them in the sun on jute sticks or twigs. This enables them for earlier storage of energy for rainy seasons when dry biomass fuel becomes a major problem’ [Rahman, et all, 2002]. In North Bangladesh some people use wooden dust and *ghota* (jute stick and cow dung). However, many residues have competing uses in Bangladesh - rice straw for animal feed, compost and fuel, jute sticks for construction material and fuel; and cow dung for fertilizer and fuel which often leads to a resource trade-off within a household or village that limits residue availabilities for fuel.

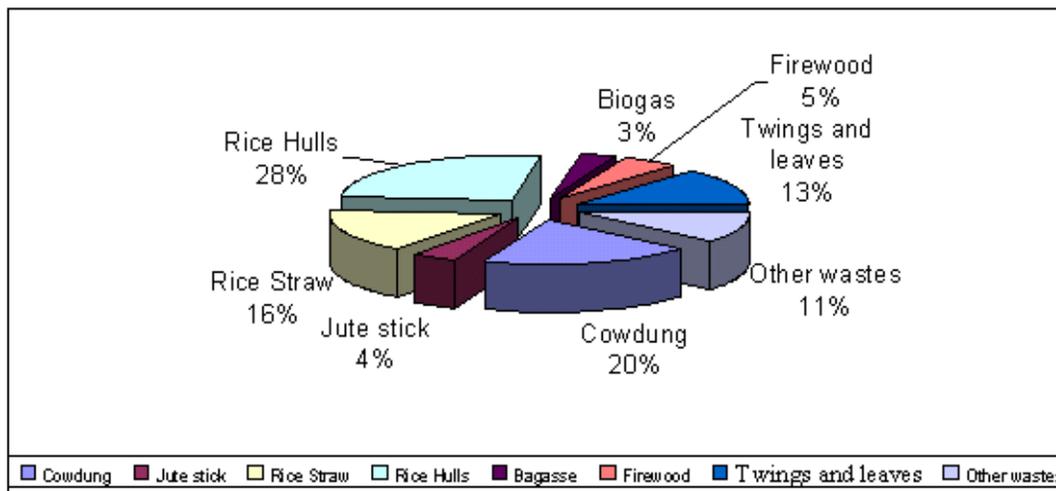


Figure 2: Percentage of Fuel Used by Source
Source: [Billah, M., BIDS]

Sex-disaggregated data on the use of fuel sources, i.e. women-headed households versus male-headed households have not yet been established though at present the Bangladesh

⁴ These energy sources are often referred to as “traditional energy” sources, as opposed to “modern energy” sources such as electricity, coal, oil and gas.

Institute of Development Studies (BIDS) is conducting a study, sponsored by ESMAP, on household energy usage patterns to analyze women's time with respect to energy collection and usage.

Usually these fuels are collected by women and children but with the increase in the demand for and subsequently the price of fuels, combined with the growing scarcity, many households that previously collected these 'free' resources often have to buy them from better-off land owners who usually possess more natural resources and produce more agricultural residues. "Unfortunately, about 58% people of Bangladesh are functionally landless and over 20% are absolutely landless. Among the landholders, 80% are small farmers, 18% are medium farmers and only 2% are large farmers" (SDNP, 2002).

Structural Constraints on Gender in Bangladesh

The highly patriarchal social structure of Bangladesh imposes different cultural and religious constraints on women, the extent of which depends on class, creed, age, geographical location, etc. Women's access to social, economic, political and legal institutions is largely dictated by men who exercise control over women's labour, sexuality, choice of marriage partner, access to labour and other markets and their income and assets. Throughout their lives women are dependent on men - fathers before marriage, husbands after marriage and sons at old age.

Within the religious arena, "The Islamic social institution of purdah (veil) defines separate spaces for men and women. Purdah restricts women's mobility outside the homestead and thus the range of women's economic activities and their involvement in public office and decision-making; it allows male authorities to exercise control over all women in the public sphere. Purdah is the means by which a rigid functional and spatial gender division of labour is upheld" ['Adnan, 1989' as quoted in IDS, 1994].

Islamic inheritance laws specify that daughters receive less than sons and widows must share their husband's property with children leaving women with lesser chances of ownership and access to land and property.

3. Impacts on Access to Energy Services:

The difficulties faced by Bangladeshi women in accessing energy services stem from the socio-cultural and religious constraints imposed on them, as discussed earlier. Furthermore, given that women are the major collectors, users and managers of energy within rural households it becomes all the more important to study what role gender plays in determining access to energy and its consequent impacts on women in particular.

Impacts of Structural Gender Differences on Access to Energy Services

“One of the few detailed studies with gender-disaggregated data on rural electrification reported that women in rural Bangladesh felt that while electricity had not brought a real reduction in their workload it had given them greater flexibility (through electric lighting) in the organisation of their work patterns related to household chores and income generation” [HDRC, 2002]. Conversely, the lack of access to energy in the household or enterprise or factors related to it can cause several negative impacts on women, the most frequent or significant of which have been identified below, based on recent and available literature review, and causality has been established to the structural gender differences that exist within the Bangladeshi society.

Unequal Access to Land & Property Rights

As a result of Islamic inheritance laws stating that daughters should receive less property than sons and widows must share their assets with children, women end up owning fewer assets such as land compared to their male counterparts. On top of that, access to whatever land they have is often controlled by the male members of the household. This leads to the following impacts and consequences regarding access to energy:

- *Difficulty of access to collateral for 'energy' loans:* Women do not have the necessary collateral to apply for loans either to buy energy supply (such as fuel wood) or a device that uses energy⁵. For example, most women in rural Bangladesh still need their fathers or husbands to sign for loans to finance Solar PVs. The situation becomes more demanding given that “even if people have access to an energy supply and, indeed, can afford to pay for it, they still may not be able to afford the cost of the device that makes the energy useful (for instance, a gas stove, a radio, a light bulb, or a motor)” [Barnett, 2001] As a result, even when they can afford energy services, they may still not be able to afford devices that can utilize the energy (e.g. sewing machine, T.V., etc.) and unless they are eligible to apply for loans affording such devices may remain a far fetched dream.
- *Difficulty of access to energy services:* Women’s lack of land ownership also makes them ineligible for membership, services, leadership and voting rights within some organizations, including the PBS cooperatives” [USAID, 2005]. The members of the PBS cooperatives are predominantly male. Although membership is open to all, it is usually the head of the household who registers as the member. This can lead to insufficient representatives in energy planning bodies and the consequent threats associated with it as discussed in the next section.
- *Inability to cope with increasing shortages in wood supply:* Depending on agro-ecological zones and seasons many poor households face biomass shortage. The increasing gap between demand and supply also lead to an increasing shortage of fuels and because of their lack of access to land, it becomes more difficult for women to plant trees than men which only increase their endless search for fuel. Therefore, to meet daily fuel needs women now have to travel longer distances in search of fuels and often have to shift to lower grade fuels. The use of lower quality fuels can also be attributed to the increase in price of fuels as a result of the shortage in supply. “Women in poor, rural households are affected more than others, leading to an increase in the amount of labour

⁵ Energy is known to have a “derived-demand” since people want it not for itself but for the services it can provide them.

they devote to collecting wood fuel from longer distances; and there is a diversion (and eventual scarcity) of organic materials, like cow dung, dry leaves, and crop residues, from other uses, such as fertilizing fields, with possible adverse consequences on agricultural fertility” [Clancy and Dutta, 2005].

Expectation to fulfil all Household Chores, including Fuel Collection

Though some literature suggests that in Bangladesh it is often men who collect fuels for household needs, it is also true that in many areas it is usually women and children who are assigned the task of collecting fuels or preparing biomass. An USAID (2005) report refers to ongoing study by BIDS which suggests that “Women and children have primary responsibility for biomass collection for cooking. Similarly, women are generally responsible for construction and maintenance of clay stoves on a weekly basis. The study estimates that the average amount of time spent by a woman on preparing biomass for cooking fuel is approximately 36 person-days per year.” The impacts associated with fuel preparation and collection and their subsequent implications are:

- *Long distances travelled:* As mentioned above, women’s access to land makes it more difficult for them to plant their own trees to collect fuels from nearby areas and often poor households do not own sufficient animals or crops to meet their daily biomass needs. As a result, women and children often have to travel long distances in search of biomass. To make matters worse, the distance that needs to be travelled is proportionately increasing with the growing scarcity of fuels. The scarcity has also led some households to substitute fuelwood with lower-grade fuels (e.g. crop residues) that tend to burn more inefficiently resulting in prolonged time spent cooking daily meals as well as greater quantities of fuel collection to cook each meal.
- *Opportunity cost of time spent:* The opportunity cost associated with the time spent in collecting and processing fuels, especially when it is farther away from home, is the time that could otherwise be spent on household chores (thereby decreasing working hours), leisure or in income-generating activities. Some studies also suggest that “Fuel collection

also reduces the time women have available for contributing to other aspects of livelihood strategies, and girls are frequently kept away from school to assist their mothers” [DFID, 2003].

- *Security issues:* Literature suggests that since women and young girls often travel to remote areas in search of fuel, they become occasional victims of physical and sexual harassment which consequently makes them more vulnerable to domestic violence and societal abuse⁶.

Restricted Mobility outside the Household

As discussed earlier (section 2) cultural and religious constraints prohibit women from public spheres. This combined with the fact that women do most of the housework results in them being confined within the domain of the kitchen and household in general, the short and long term impacts of which are discussed below:

- *Subject to indoor pollution:* Previous studies have identified several potential determinants of exposure to indoor air pollution: fuel type, time spent in cooking, structural characteristics and household ventilation practices. All of these factors may be important in Bangladeshi households, “which exhibit significant diversity in cooking fuel, stove types, cooking locations and quality of ventilation” [Dasgupta, 2004]. Since women and young children spend most of their time indoors become the victims of indoor air contamination from burning fuels.

A study on Bangladesh by Dasgupta (2004) concludes, “Young children and poorly-educated women in poor households face pollution exposures that are four times those for men in higher-income households organized by more highly educated women.”

⁶ In a society such as Bangladesh, if a woman is raped it is considered her fault and she is often punished for it by her family (often to the extent of being disowned) and society in general.

The following figure from the study by Dasgupta on indoor air pollution in Bangladesh compares the level of contamination due to burning fuel between the kitchen and living room in rural Bangladesh.

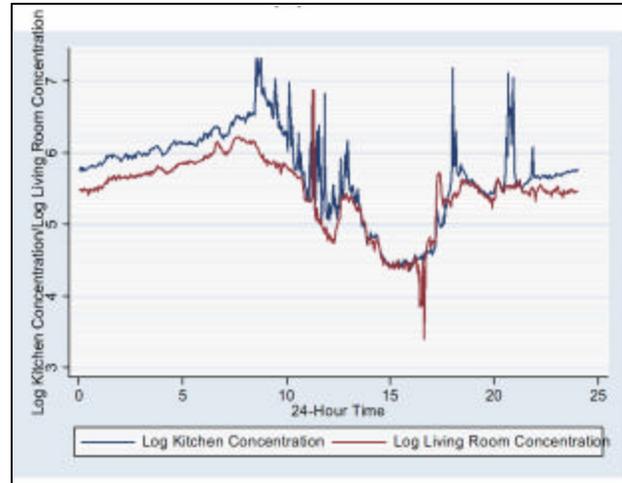


Figure 3: Comparative PM₁₀ Concentrations in Kitchen & Living Room in a Rural Household

Source: Dasgupta, et. all, 2004

Poverty and scarcity pushes women to use even lower grade fuels (e.g. wood, straw); “excessive use of the low quality biomass fuels in inefficient traditional cooking stoves with no flue or chimney generates smoke, particulates, carbon monoxide, methane and hundreds of organic compounds, including several carcinogens” [Islam, 2002]. The following figure compares the level of indoor air pollution (in PM₁₀ concentrations) by fuel in rural households:

Fuel	Mean (ug/m ³)	Households
Dung	291	95
Firewood	263	159
Sawdust	237	7
LPG/LNG	206	8
Straw	197	29
Jute	190	68
Twigs, Branches	173	46
Kerosene	134	18
Piped Nat Gas	101	20

Table 2: Mean Household PM₁₀ Concentrations (ug/m³) by Fuel Source

Source: Dasgupta, et. all, 2004

- *Potential of fire from kerosene lamps:* In many rural households kerosene lanterns or *kupi* are used for lighting purposes. “Culturally, in Bangladesh, rural women are barred from the public markets, hence they and their children mostly spend the evening hours around kerosene lamps or in partial darkness” [UNDP, 2001]. Thus, they are subjected to toxic fume inhalation as well as the potential hazards from open flames.
- *Women-headed enterprises are frequently located in the home & therefore overlooked by energy agencies:* Another interesting impact pointed out by Clancy and Dutta (2005) is “Women-headed enterprises are frequently located in the home, and these “cottage industries” tend to be overlooked by agencies because they can be indistinguishable from other household activities. When women do generate income, they operate mostly in the informal sectors, with less access to technical training, financial resources, credit and equipment than men, and less of a voice in household, or community level decision-making”.

Inaccessibility to Social, Economic & Legal Institutions

- *Fewer women involved in influential roles within energy institutions:* Women do not have direct access to informal power structure and to many local committees. As for instance, a study conducted by HDRC (2002) on the Rural Electrification Program (REP) in Bangladesh observes, “In PBS committees, only that person can participate against whose name the electricity connection has been taken; and it is always men who take electricity as they are the main breadwinners of the household. Although women are the *defacto* managers of the households, they are usually bypassed from membership in various committees.”
- *Fewer women employed in energy projects in general:* As women’s mobility is restricted and many activities are frowned upon when undertaken by women (such as climbing, interacting with males outside family or even cycling as a means of transportation), their employment in many fields are also restricted. For e.g. if an energy project requires them

to climb a pole to install wires or to interact with a number of males in say a customer service post, it may not be well accepted by senior members of the family or society.

- *Difficulty in accessing the market:* Given that religion and society impose a constraint on women's access to public places like markets, it comes as no surprise that fewer women than men are engaged in income generating activities. Even if women have access to energy services, such as a sewing machine or the option of weaving after dark when she can manage some free time from household chores, unless she has proper access to markets the incentive to engage in these activities will automatically be low. This is especially true for female-headed households.

4. Consequences:

The long hours spent in collecting and preparing fuels, prolonged smoke exposure within the household, lack of access to efficient energy services, inability to afford sufficient quality fuels and often switching to lower grade ones, etc. have significant interlinked consequences on the lives of young girls and women.

Consequences on Health

The most severe consequences that arise from the impact of gender differences on women are the adverse effects on their health caused by various factors.

- *Gathering fuel for hours & often in remote areas:* Long distances travelled (usually on foot) to gather fuels, frequent bending to gather fuels and prolonged period of strenuous work without sufficient recuperation time have been linked to spinal column damage, sprains and strains which can pose a threat to health in the long run. “Lack of cheap, easily available, fuel forces women to spend large amounts of time gathering fuel, and restricts the boiling of water and in some cases the adequate cooking of food resulting in ill health (threatens well-being, increases vulnerability) as well as limiting time available for other enterprises” [Clancy, J. and Dutta, S., 2005]. Though not a direct impact, harassment while collecting fuels in remote areas can cause a sense of insecurity, fear of humiliation and turbulence within the family (since in rural Bangladesh the blame is still placed on women even when they are the victims) leading to mental stress.
- *Cooking & spending time in unventilated indoors:* Women are also exposed to a variety of health hazards from cooking over poorly ventilated indoor fires, including chronic lung diseases such as cancer, acute respiratory infections and low birth weights for children, headaches, fatigue, cataracts and other eye diseases. Smoke from poorly ventilated indoor fires accounts for close to 2 million premature deaths per year. [UNDP, 2001].

- *Switching to low quality fuels:* Deforestation and increasing fuel costs force women in households and small enterprises to resort to inferior fuels which emit carbon monoxide and ‘inhalable’ smoke particles, thus increasing the chances of the adverse health impacts described above. Lower grade fuels also burn more inefficiently which increases the time spent on cooking and quantity of fuel needed to cook. More fuel collection implies that women must spend more time gathering fuels which is again associated with spinal column damage, etc. discussed above.

Environmental Degradation & its Consequences on Poverty & Gender

As demand for fire wood in rural areas exceeds supply, prices increase causing the poor households to switch to alternative sources, often forcing them to burn branches and fruit bearing and immature trees and uproot plant residuals⁷, leading to environmental degradation such as soil erosion and deterioration in soil fertility in the long run. This has adverse effects on agricultural fertility of soil which in turn can further worsen the condition of poor women who are usually dependent on agriculture for their food and income. Theoretically at least, this is known to cause a vicious circle as poverty forces people to resort to any means available in a struggle to survive, thereby burning down crop residues, small plants and even immature trees which in turn degrades the environment and worsens poverty situations. Since women are the major collectors and users of fuel they end up as both the major causers and sufferers as a result of this circle.

Inadequate Energy Interventions & Women’s Need Assessment in Energy Planning

“The whole issue of women’s time and effort saving (reduction of drudgery) seems not to receive the attention it deserves. This might be attributed to the fact that decision-makers and planners are not fully aware of the situation regarding women’s physical labour” [DFID, 2003]. One major cause of this can be attributed to the insignificant number of

⁷ The most commonly used residues include straw (tender stems from paddy plants) and *kher* (the tougher residue)

women representatives in energy planning bodies. There is no channel for women to convey their needs and problems to planning agencies.

Each PBS Board of Directors has a maximum of 15 elected members where a maximum of 3 lady advisors are nominated to represent the interests of women in PBS activities. However, as pointed out by a study by ESMAP (2004), “They are, however, nonvoting members, and it is unclear how much influence they actually have on predominantly male boards.”

Also, as the HDRC study (2002) observes, “Three women are usually taken as the advisers in the committees, but other women from electrified households are not taken in as general members. Therefore, it is required to involve more women in the top-level management, and in the implementation stage, to formulate more gender-sensitive policies”.

Another reason why energy agencies have often overlooked women-based enterprises is, as earlier mentioned, these ‘cottage industries’ often being located within the home causes energy agencies to mistake them for other household activities and no special attention is given to these enterprises.

Possible Economic Consequences

“Improved access to energy services has multidimensional economic impacts in general and impacts on economic poverty reduction specifically, though this may not be immediately visible. There are a handful of innovative projects that demonstrate the potential of using energy as a medium for reducing time spent performing existing economic activities while providing opportunities for new productive activities” [ESMAP, 2004].

- *Lower levels of employment opportunities:* Besides having representatives to harbour their interests in energy institutions, another consequence of the difficulty faced by

women in accessing economic and social institutions is the lower level of employment of females in general which can lead to increased dependence on male counterparts, lower income etc. “Government and non-governmental agencies in the energy field are dominated by male professionals and do not always have family-friendly policies nor are recruitment, hiring and retention practices tailored by sex” [USAID, 2005].

The fact that in a society such as Bangladesh, women moving around as freely as men is frowned upon also hampers their employment in some areas, as pointed out in a study by ESMAP (2004) regarding employment opportunities in SHS installation programs, “Many individuals interviewed during this study attribute the lack of female energy professionals to the idea that it is improper for a woman to climb poles or roofs, install or repair SHSs, or travel outside the immediate vicinity of her home.”

Another economic implication to keep in mind is the severe effect rising energy costs, fuel shortages and deforestation can have on women-owned small or micro enterprises, given that fuel is a significant cost factor in small businesses.

- *Lesser scope of income-generating activities:* The opportunity cost of the time spent collecting fuels implies that this time cannot be spent on other productive or income-generating activities. Besides, as pointed out in section 3 (*Difficulty in accessing the market*) if the lack of access to markets decreases the incentive to utilize energy for productive uses, income generation for women is automatically hampered.
- *Lower levels of education in females:* As mentioned earlier some studies suggest that the prolonged hours spent by young girls to assist their mothers in fuel collection often keeps them away from school thus hampering their education in the long run.

The table below is a summary of the consequences discussed so far with the gender constraints mapped to the corresponding impacts on access to energy services and its consequences.

Constraint on Women due to Structural Gender Differences	Impact on Access to Energy Services by Women	Consequences
Unequal rights and access to land and property	Difficulty of access to collateral for loans	Hampers engaging in 'productive uses of energy' and may lead to lower income
	Difficulty of access to energy services	Ineligible for membership, services, leadership and voting rights within some organizations including PBS leading to lower level of employment
	Inability to cope with increasing shortages in fuel supply	Environmental degradation which decreases agricultural fertility & can increase poverty in turn
Collection of fuels for household use by women & young girls	Long distances travelled in search of fuels	Spinal column damage, sprains and strains
	Opportunity cost of time spent	Less time for income-generating activities & schooling (in young girls) leading to low levels of income & education respectively
	Security issues (e.g. harassment in remote areas)	Feeling of insecurity & fear of humiliation & turbulence within the family
Restricted mobility outside the household	Subject to indoor pollution	Lung diseases such as cancer, acute respiratory infections and low birth weights for children, headaches, fatigue, cataracts and other eye diseases
	Potential of fire from kerosene lamps	Higher risk of being subjected to minor or major accidents that can even lead to death
	Women-headed enterprises frequently have to be located in the home & are therefore overlooked by energy agencies	Difficulty of providing energy services to women-owned enterprises
Inaccessibility to Social, Economic & Legal Institutions	Fewer women involved in influential roles within energy institutions	Inadequate energy interventions & women's need assessment in energy planning

	Fewer women employed in energy projects in general	Lower levels of employment for women leading to lower income, greater dependence on male members of the family, etc.
	Difficulty in accessing the market	Lesser involvement in income-generating activities & lower levels of employment

Table 3: Summary of Gender Constraints, Impacts & Consequences on Access to Energy Services

5. Review of Existing Projects in Bangladesh:

Incorporating gender issues into energy projects is relatively new in Bangladesh and therefore not many projects exist currently that have successfully done so. The few that do exist are briefly mentioned below since a few studies, namely “Integrating Gender in Energy Provision: Case Study of Bangladesh” by ESMAP in 2004 and “Gender Analysis and Recommendations for a Gender Plan of Action: Rural Energy Portfolio of USAID/Bangladesh” by USAID in 2005 have reviewed the projects and the underlying gender issues in sufficient details.

- **Coastal Electrification and Women’s Development Cooperative (CEWDC)**

The micro enterprise CEWDC is a 35 rural women owned cooperative, in an island called Char⁸ Montaz in the southern region of Bangladesh, who are engaged in off-grid power supply to several nearby islands for lighting houses, shops, fishing boats, etc. The women manufacture and sell energy appliances (e.g. fluorescent lamps and charge controllers) and operate solar-battery charging stations. “Besides lamp construction, women are learning quality control, business development and marketing. The project is also establishing a sales network among the rural markets situated on six different islands” [Khan, J. H., 2001].

Recently the project has also come up with a design for solar-run table lamps that can be used by children for educational purposes. Also, at present, plans to replicate the project and form more cooperatives in other *char* areas are underway. However, in order to achieve long term impacts, the projects will integrate other area development initiatives.

⁸ Char refers to an island isolated from the mainland.

- **Gender Energy Network**

“Gender and energy specialists emphasize the need for a strong network involving women in the energy sector to help build capacity, decrease the sense of isolation that women feel in a male-dominated industry, exchange information, and, above all, lobby the government to promote gender-sensitive programs” [Cecelski, 2001]. Perhaps with this goal in mind, PSL has established the Gender and Energy Network, Bangladesh where women from different fields voluntarily participate in order to share their views and ideas regarding gender and energy issues. However, according to ESMAP (2004), “There is no regular exchange of ideas, and the network remains an occasional forum without any consistent follow-up or communication and interaction between its members. The Gender and Energy Network has no regular interaction with other existing networks and organizations within the Bangladesh renewable energy sector (BRAC, Grameen Shakti, or the Renewable Energy Information Network).”

- **Rural Electrification and Renewable Energy Program (REREDP)**

The Infrastructure Development Company Limited (IDCOL), an autonomous government agency, with support from IDA of the World Bank Group and GEF, is channeling both grant and refinancing to renewable energy projects in rural areas under the Rural Electrification and Renewable Energy Program (REREDP). IDCOL has been selected to finance 2.44 MWp⁹ or an estimated 50,000 SHS over a period of five and a half years (October 2002-June 2008) [IDCOL, 2004]. Till June 2005, it has already successfully installed 45,185 systems, a figure that is way ahead of its target. IDCOL implements the project through NGOs and MFIs such as Grameen Shakti, BRAC, etc. However, not much attention has been paid to the gender issues and implications of solar electrification.

⁹ MWp: Megawatt peak (1 Wp of PV module capacity produces 1 W of electrical power in ‘peak’ sunshine of strength 1000 W/m²)

For instance Grameen Shakti (GS), unlike the Grameen Bank is not particularly targeted towards women yet and according to a study, “Grameen, for example, has sold 12,303 SHSs, but only 1,046 have been sold to women. This is not to say that women are not benefiting from the remaining 11,257 Grameen systems. However, it does clearly indicate that the prices and payment plans are still outside the reach of the very poor, who are mostly women and children” [ESMAP, 2004]. However the organization plans to increase the number of female staff – engineers, technicians and marketers. Though there is some resistance to the concept of female engineers this is believed to change with the increasing entry of women in the field. At present GS employs 5 women in their solar component manufacturing and assembling factory in Dhaka but it is planning to train 1000 women technicians within the next 3 years to take care of after-sales maintenance of the SHS.

6. Concluding Remarks:

In conclusion it can be summarized that the structural gender differences that arise from various cultural and religious norms can lead to various impacts in access to energy services which in turn can have long term consequences on women and all these factors must be considered while designing rural energy-gender projects.

However, having said that cultural considerations must be borne in mind while designing energy projects, it is also important to note that “interfering in socio-cultural practices in the process of ‘empowering’ women may lead to positive values being lost from the culture. Some societies are much more willing to make fundamental changes as regards women's position than others and the energy planner will have to be very sensitive to the realities and the potential for change. In some cases it is a big step even to accept that women have practical needs which are different from men's, and need to be consulted concerning what these needs are” [FAO, 1995].

And speaking of different practical needs between men and women, one common problem identified through literature is the lack of sex disaggregated data in Bangladesh which becomes necessary since energy needs and end use patterns may be different for men and women. Though some data disaggregated by gender is available in the Bangladesh Bureau of Statistics, these are mostly concerned with health, employment education, etc. and not on energy. “Many rural energy end use tables do not even include some of women’s most critical end uses, such as drinking water pumping, food processing, fuel collection and crop transport, and transplanting and weeding in agriculture” [Cecelski, 2001].

This leads to a methodological difficulty in establishing a quantitative relationship between energy, poverty and gender. Therefore it is necessary to find and document sex disaggregated information on the needs, preferences, time use, income and expenditures, decision making, access to credit and information in market surveys, benefits and impacts

in monitoring and evaluation studies; staffing and employment in progress reports, etc. in order to better evaluate impacts and consequences on women and design more effective energy projects that can address the gender issues in Bangladesh.

Bibliography

1. Bangladesh Bureau of Statistics (BBS), 2000: “National Household Income and Expenditure Survey”, BBS, Dhaka.
2. Barnett, A., 2001: “Energy and the Fight against Poverty”, Sussex, U.K.
3. Barua, D. C., 2004: “Grameen Shakti – An Integrated Approach to Rural Energy Service”, published by Grameen Shakti, Grameen Bank Bhaban.
4. Billah, M., BIDS: “Energy and Environment: Demand for Wood Energy in Bangladesh”, BIDS, Dhaka.
5. Cecelski, E., 2001: “Gender Perspectives on Energy for CSD-9.” Draft position paper, Available at: <http://www.energia.org/resources/papers/csdposition.html>
6. Cecelski, E., 2003: “Enabling Equitable Access to Rural Electrification: Current Thinking on Energy, Poverty, and Gender”, the World Bank, Washington D.C.
7. Clancy, J. and Dutta, S., 2005: “Women and Productive Uses of Energy: Some light on a shadowy area”, Paper presented at the UNDP Meeting on Productive Uses of Renewable Energy, Bangkok, Thailand, May 2005.
8. Dasgupta, et all, 2004: “Indoor Air Quality for Poor Families: New Evidence from Bangladesh”, World Bank Policy Research Working Paper, September 2004.
9. DFID, 2003: “The Gender Energy Poverty Nexus: Finding the energy to address gender concerns in development”, DFID, London.
10. ESMAP (World Bank/UNDP), 2004: “The Impact of Energy on Women’s Lives in Rural India”, Joint World Bank/UNDP Programme.
11. ESMAP, 2004: “Integrating Gender in Energy Provision: Case Study of Bangladesh”, Joint World Bank/UNDP Programme
12. FAO, 1983: “Wood Fuel Surveys”. Paper commissioned by FAO for the Forestry for Local Community Development Program, Rome, 1983.
13. FAO, 1995: “The gender dimension in rural cooperatives”. Paper commissioned by FAO for the Centennial Meeting of the International Cooperative Alliance, Manchester, UK, September 1995. <http://www.fao.org/sd/rodirect/roan0008.htm>

14. Halim, S., 2005: "Gender and Rural Electrification: A Case from Bangladesh", Paper to be presented in Asian Regional Workshop on Electricity and Development, AIT, Thailand.
15. HDRC, 2002: "Economic and Social Impact Evaluation Study of the Rural Electrification Program in Bangladesh", HDRC, Dhaka.
16. IDCOL, 2004: 'IDCOL's Renewable Energy Programme', published by IDCOL, Dhaka, 2004.
17. IDS, 1994: "Background report on gender issues in Bangladesh", Brighton, U.K.
18. Islam, M., 2002: 'Impacts of Biomass Cook Stove Use on Air Pollution, Global Warming and Human Health in Rural Bangladesh', Second International Conference on Bangladesh Environment, vol. 1, 2002.
19. Khan, J.H., 2001: "Battery Operated Lamps Produced by Rural Women". Paper published in "Generating Opportunities: Case Studies on Energy and Women", UNDP, 2001.
20. Martinot, et all, 2000: "Expanding Electricity Access to Remote Areas: Off-Grid Rural Electrification in Developing Countries", the World Bank, Washington DC.
21. Prokaushali Sangsad Limited, 2002: "Opportunity for Women in Renewable Energy Technology Applications in Bangladesh" ESMAP Report, World Bank, Washington, D.C.
22. Rahman, et all, 2002: "Trends in Natural Resource Management in Bangladesh: Looking for Integration and a New Institutional Framework", BCAS, October 2002, Dhaka.
23. UNDP, 2001: "Generating Opportunities: Case Studies on Energy and Women", New York, USA.
24. UNDP, 2004: "Gender and energy for sustainable development: a toolkit and resource guide", UNDP, New York.
25. USAID, 2005: "Gender Analysis and Recommendations for a Gender Plan of Action: Rural Energy Portfolio of USAID/Bangladesh"
26. World Bank, 2003: "Energy Poverty and Gender: A review of the Evidence and Case Studies in Rural China".
27. World Bank, 2004: "Sustainable Energy: Less Poverty, More Profits", published by ASATE (Asia Sustainable and Alternative Energy), the World Bank