

MONITORING REPORT: WOMEN'S TIME SAVINGS FROM BIOGAS IN NEPAL

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Summary:

The W+ standard is a unique certification label developed by WOCAN that endorses projects that create increased social and economic benefits for women participating in economic development or environment projects, including those that provide renewable energy technologies, time and labor saving devices, forest and agriculture activities, and employment opportunities.

The W+ measures women's empowerment in six domains: Time, Income & Assets, Health, Leadership, Education & Knowledge and Food Security. It produces quantified women-benefit units that contribute towards post 2015 Sustainability Goals (SDGs), Climate Financing or Corporate Social Responsibility (CSR) targets.

WOCAN selected Nepal to implement the first W+ project in partnership with the Alternative Energy Promotion Centre (AEPC) and South Pole Carbon, a leading global carbon project developer. The project was the Biogas Distribution Program of AEPC in

Kavre and Sundhuli districts, using the Time Domain; the monitoring period was May to September 2014.

Method and criteria used: the W+ Time method was based on the following anticipated results:

- Increased discretionary time for women
- Reduced drudgery
- Increased sharing of household work– men take on work that is normally considered that of women
- Increased perception of well being among women

The following Do No Harm indicator (s) was applied:

Not less than 97% of both women and men report that the project has not caused any unwelcome and non-remunerated increase of time spent or either productive on reproductive activities (on daily activities excluding leisure time).

Results from the application of the W+ Time method show that biogas technology has the greatest impact on women in terms of time savings. A survey questionnaire conducted with a sample size of bio gas users and non-users as comparison shows a net savings of 136 minutes or 2.26 hours of time saved for women who use biogas.

In terms of the total time savings generated for all the project beneficiaries, it differed for biogas users of less than 2 years and more than 2 years. For biogas users of less than 2 years, the total savings generated over this period amounts to 286,508,222 minutes or 4,775,135 hours. For biogas users of more than 2 years the total savings generated over this period amounts to 2,539,304,737 minutes or 423,217, 45.61 hours of time saved

The time savings for bio gas users occurred mainly for cooking for the family, cleaning utensils, water collection, firewood collection, and preparing organic manure from livestock.

The percentage of change is calculated based on a comparison between women's time used per day on reproductive activities affected by the introduction of biogas. The percentage of change between baseline and measurement is – 31.12 %, demonstrating a decrease in women's time spent on activities listed in the table above, as a result of the introduction of biogas.

1 W+ unit = 1 % change per woman. The number of W+ units generated is = number of women x 31.12= 7200 x 31.12 = **224,064** (details of calculation page 14).

Introduction

1.1 Objective

Purpose:

The main purpose of the project is to apply the W+ Time Method on an existing biogas project in villages across two districts of Nepal, enabling women to release time previously spent collecting fuel wood, cooking and other activities.

1.2 Scope and Criteria of Methodology

The W+ Time Method measured employed the following indicators to measure time savings for women biogas users:

RESULTS CHAIN	INDICATORS
Outputs	Increased discretionary time
Immediate Outcomes	Reduced drudgery
Intermediate Outcomes	Increased sharing of household work– men take on work that is normally considered that
End Outcomes	Increased perception of well- being by women

A do no harm indicator was also employed for the Time method, followed by corresponding questions included in the survey questionnaire.

Do No Harm

Indicators for Time Domain	<ul style="list-style-type: none"> Not less than 97% of both women and men report that the project has not caused any unwelcome and non-remunerated increase of time spent or either productive or reproductive activities (on daily activities excluding leisure time) (check for risks of increased labour for children)
Questions for Time Domain	<ul style="list-style-type: none"> Has any household member suffered from a biogas-related fire accident in the last 12 months? If yes who was affected? What is the incidence of mosquitoes? What is the incidence of mosquito borne diseases? Did activities related to biogas management (extra water collection, feeding the digester, maintenance and

	<p>managing bio-slurry etc) prevent you from participating in a training or extension activity that was important for you?</p> <ul style="list-style-type: none"> • Has biogas, increased the time you spend on domestic tasks(fuelwood collection, feeding the biogas plant, managing the bioslurry, cooking and cleaning) Are you unhappy about this increase?
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1.3 Level of Assurance Sample Size and Method

Sample Size

The sample size for the survey was determined using stratified random sampling consistent with the “Guidelines for sampling and surveys for CDM project activities and programme of activities, Version 02.0 (EB 69 Annex 5)”. The sampling was performed within the level of precision of 10% and a confidence level of 90%, which gives the sample size as 65. Table xx below shows the sampling frame in line with the sampling guideline for CDM. According to which a total 67 samples were drawn. However the sampling size was increased to 251 for the biogas users to represent the WOCAN working VDCs in both the districts. This was done using thumb rule of at least 10 percent of the total population (10% of the total biogas installed HHs)

Similarly, for biogas non user households samples were taken in equal proportion to the biogas user households.

Sampling Frame

Population size (biogas <2 years)	1078
Assumed proportion	0.5
Level of acceptable error (10%)	0.1
Level of Significance (90%)	0.10
Required sample	65

The W+ Time method was applied to measure time saved for 1078 women who constitute bio gas users of 2 years or less, from a total of 6132 biogas users in Kavre and Sindhuli districts of Nepal.

From the total number of women biogas users of less than 2 years, a sample size of 251 was selected. Since there was no baseline data on time savings, a control group of 290 women non users was selected from the same villages of the study.

The survey was carried out in 10 villages of Kavre and Sindhuli districts of Nepal.

Table: Respondents by geographical distribution

District	Biogas Users	Non Biogas Users
Kavre	126	148
Sindhuli	125	142
Total	251	290

Selection of Districts and Primary Sampling Units

Districts were selected purposively in WOCAN working areas viz Kavre and Sindhuli for this pilot phase. A Village Development Committee (VDC) is considered a primary sampling unit. In order to determine the sample PSU (VDC) in both districts PSUs were first identified randomly.

Household Selection

Once PSUs were selected a systematic sampling method was used to determine the sample household. First, the sampling interval was determined by dividing the number of biogas installed in the PSU by the required sample in that particular PSU. A list of households having biogas was made and then first household was selected randomly. Then subsequent household to be sampled was determined by adding the sampling interval to the random start. For the non user households the nearest household to the biogas user was taken as the sample household.

Data collection /Survey tools

Data was collected through a structured questionnaire. Two different survey tools for biogas user and non- user households were administered separately. In order to cross validate the results obtained from the household survey, discussions with the households were also conducted.

Piloting the Survey Tools

Prior to administering the survey, a pre-test was conducted in Kavre district using a first version of the questionnaire. The purpose of the pre-test was to ensure its appropriateness and effectiveness of the questionnaire and modify it accordingly.

Training Enumerators

A two-day training was conducted for 20 women enumerators from the selected communities. The training focused on how to conduct structured interviews, identifying potential responses and methods for probing for accurate responses. To ensure confidence of data, on site follow-up visits by the WOCAN W+ team were conducted in both the districts.

Data was entered into CPro (Census survey processing: a software specialized for data entry, which minimizes data entry errors.) by two data input personnel trained by a qualified statistician. The statistician provided oversight of data processing, and also tabulated the final results.

1.4 Summary Description of the Project

WOCAN selected Nepal to implement the first W+ project in partnership with the Alternative Energy Promotion Centre (AEPC), South Pole Carbon, HIMAWANTI and AASTHA (two national level federations of women's groups engaged in the forest and agriculture sectors). The project has been implemented with 7200 women who have been using biogas digesters distributed through the Biogas Distribution Program of AEPC in Kavre and Sindhuli districts.

The main objectives of the project are as follows:

- To quantify the time saved by women through the use of biogas using the W+ Time methodology and understand how women biogas have used the time saved;
- To test and refine the W+ Time methodology
- To identify mechanisms for revenue sharing with women beneficiaries
- To generate W+ Time units that can be sold, to provide a Proof of Concept for the W+ Program.

The secondary purpose of the project was to gather information that can be used to implement a Phase 2 W+ project designed to test and use other W+ domains, to capture the benefits provided through the time saved by biogas to measure benefits and generate units from the education, income/assets, health, leadership and food security domains.

Process Description

The implementation of the W+ time method following steps (see Annex 2 for description of stakeholder consultation process):

- Stakeholder consultations in the 2 districts
- Implementation of the survey with biogas users and a comparable sample of non-users to establish a baseline
- Collection and analysis of data
- Establishment of a revenue sharing mechanism
- Project validation and verification

2 RESULTS

Time savings formula

The following time formula was used to determine the total amount of time saved by women through the adoption and use of bio gas technology.

$$TS(S) = Wc,p * Ppref c,f * [\text{sum } (TS \text{ coll, c,p} + TS_{cc} c,p + TS_{subs} c, p) - \text{sum } (Tl \text{ wc c,p} + Tldca c, p)]$$

TS (S) refers to the time saved by women during project operation, that will be used for additional activities for women (termed as time savings).

Results from the application of the W+Time method show that biogas technology has the greatest impact on women in terms of time savings. The overall results show that women save 136 minutes or 2.26 hours per day as a result of using biogas technology.

For biogas users of less than 2 years, the total savings generated over this period amounts to 286,508,222 minutes or 4,775,135 hours. For biogas users of more than 2 years the total savings generated over this period amounts to 2,539,304,737 minutes or 423,217, 45.61 hours of time saved.

The largest amount of time savings was generated by reduced cooking time, followed by time reductions in cleaning utensils, water collection, firewood collection, preparation of organic manure from livestock and household waste.

Time saved per individual woman

Individual	Time saved per day
Woman biogas user	<u>136 minutes</u> or <u>2.26 hours</u>

Time saved for total project beneficiaries in Kavre and Sindhuli

	Total biogas installed (As of AEPC database)	Total Biogas of less than 2 years	Total Biogas of greater than 2 years	Average total operation days (< 2 years)	Total time saved (<2 years) minutes	Total time saved (>2 years) minutes
Kavre	51	1	10	4	145,467,315 (2,424,455)*	1,453,515,921 (24,225,265)*
Sindhuli	59	7	22	3	141,040,907 (2,350,681)*	1,085,788,816 (18,096,480)*
TOTAL					<u>286,508,222</u> Min. or <u>4,775,135</u> hrs.	<u>2,539,304,737</u> Min. or <u>423,217,45.61</u> hrs.

Wc.p: refers to the age of the biogas unit. As shown in the table above, the age of the biogas units were measured separately for those under operation for less than 2 years and those in operation for more than 2 years. The total number of biogas units operating under less than 2 years is 1078. The total number of biogas units operating for more than 2 years is 6132. The average total biogas units in operation used for the calculation is 937.

Pperf refers to the % of biogas plants in operation multiplied by the percentage of biogas usage per day.

Calculation of Pperf:

Pperf = % of biogas plant in operation * % of biogas usage per day

% of biogas plant in operation = Number of days biogas plant is in operation /365
 % of biogas usage per day = Number of hours biogas is used for cooking/(total number hours for cooking cumulative of all stoves; biogas + Mud stove + Improved cookstove)

TS coll,c,p measures the time saved as a result of reduced fuel collection times when the project is operating as designed. This is established by comparing time-use survey results of users vs. no-users within the same community and calibrated on a per-person basis. As the table below shows, the time saved on fuel wood collection by biogas users is 15 minutes per day.

Calculation of fuel-wood collection time
 Per day fuel-wood collection time is calculated as:

Per day fuel-wood collection time= (frequency of per month fuel-wood collection*time for each trip)/30

The Table below also shows the total time to collect fuel-wood for both biogas user and non-user households. The time required to collect fire wood also varied between bio gas Users and Non Users (22 and 37 minutes respectively, figures obtained by calculating a daily average taking into account stated collection time per week or month). The time allocation for fuel wood collection was determined by the frequency of collection in a month and the average time spent in a single collection trip, which was then converted into time allocated per day.

Table 4.6: Time for fuel-wood collection

Activities	Biogas user		Biogas non user		Difference (minutes)
	(minutes)		(minutes)		
Fuel-wood	Per month	Per day	Per month	Per day	Per day
		674	22	1120	37

TScc c,p measures the time savings as a result of reduction in cooking time, post clean up time, biodigester maintenance, organic fertilizer preparation, water collection when project is operating as designed. Established by comparing time-use survey results of users vs. non-users within the same community and calibrated on a per-person basis. As the table below shows, the time saved on cooking is 146 minutes per day.

Time saved on cooking

Results show that the total time used for cooking (breakfast, lunch, tea and dinner) is 145 and 206 minutes for bio gas Users and Non Users respectively. This demonstrates

that non bio gas users allocate 61 minutes more than Users to cooking activities per day. The additional time required by bio gas non Users is due to the preparation time for lighting the firewood and maintaining the burn temperature.

Time saved on cleaning utensils

Considerable time savings was also reported by female Biogas Users in cleaning household utensils. This was due primarily to cleaner fuel burn of the Biogas unit as compared to the charring effect of firewood on cooking utensils, which subsequently require more time for cleaning. Female bio gas Users spent 63 minutes a day as compared to non Users who spent 94 minutes a day on cleaning utensils. This resulted in a time savings of 31 minutes for bio gas users

Time saved on organic fertilizer production

Organic fertilizer is produced through bio slurry by bio gas Users and the collection of organic waste and livestock dung collection by non-Users. Both procedures require depositing the waste material in a pit, which for Users is connected to the digester through a pipe, while Non-Users deposit the waste and dung manually. These different operations for Users and Non Users require different amount (s) of time. Ensuring the passage of bio slurry from the digester to the pit requires about 10 minutes per day for Users, while manually depositing organic waste and livestock urine for non Users requires at least 58 minutes per day. The difference in time use between Users and Non Users amounts to 48 minutes per day in favour of the former.

Table: Time savings on TSc c,p

Activities	Biogas Users (minutes)	Non-users (in minutes)	Difference (in minutes)
Cooking	145	206	61
Cleaning utensils	63	94	31
Preparing organic	10	58	48
Water collection	36	42	6
TOTAL			146

TSubs c, p; refers to the time saved from substitution activities, such as the shifting of activities traditionally performed by women to men. These activities can be cooking, cleaning, fetching water and so on. It could also refer to shifting responsibilities for activities from women to men on project maintenance/technology application/training as a result of project implementation and when the project is operating as designed. This is established by comparing the Time survey results of Users and Non-Users (note: if there is no shift of work then the TS Sub can be taken as 0).

Tl wc c,p: refers to the time increase in collection of water after biogas installation, when the project is operating as designed. The time saving is established by comparing the Time User survey results of Users with that of Non-Users. There was a time savings for biogas Users of 6 minutes per day.

Tldca c,p: refers to the time increased in the collection of dung and application of manure after the installation of the biogas unit when the project is operating as designed. The time was established by comparing the Time User survey results of Users with Non Users. This resulted in a time difference of 25 minutes, which is subtracted from the total time savings for biogas users (see below).

Summary:

$$(TS_{coll, c,p} + TS_{cc, c,p} + TS_{subs, c, p}) - (Tl_{wc, c,p} + Tldca_{c, p}) = 136 \text{ minutes per day per household}$$

The table below lists the various activities for women biogas users and non-users and the amount of time spent on each activity. Biogas users spend 301 minutes compared to 437 minutes for non-users on these same activities. The time difference of 136 minutes is the time saved by women biogas users.

Comparing time use for reproductive activities

Activities	Time used per day for users (in minutes)	Time used per day for non- users (in minutes)	Difference (in minutes)
Collecting water	36	42	6
Putting bio-slurry/manure into pit	10	58	48
Putting dung into bio-digester	14	0	(-14)
Stirring the bio-digester	11	0	(-11)
Firewood collection	22	37	15
Cooking for family	145	206	61
Cleaning utensils	63	94	31
Total	301 (5.01)*	437 (7.2)*	136 (2.26)*

Reallocation of saved time

The time saved by women biogas users are reallocated to other activities. Women biogas users reallocated comparatively more saved time to productive activities (e.g labor, crop and livestock, home-based income generation) though only 18% reported increased productivity. Relatively less time (saved) was reallocated to household activities such as cleaning the house, leisure and rest, caring for children, etc.

Women's (time use for productive, social and leisure activities)

Activities	Bio-Gas User Time in minutes per day	Non Bio-Gas User Time in minutes per day	Difference in minutes per day
Productive activities(P ¹)	250	184	66
Un-remunerated community activities (C)	58	52	6
Cleaning stable and collecting dung (C)	25	28	-3
Cooking for animal (R)	29	27	2
Cleaning in and around the house(R)	39	30	9
Caring for children (R)	43	37	6
Washing clothes(R)	39	39	0
Washing self (R)	33	31	2
Leisure (R)	75	67	8
Total	591 (9.85)*	495 (8.25)*	96 (1.6)*

Do no harm assessment

A large percentage of respondents said that the time saved had freed up more time for them to attend group activities such as meetings and trainings. A similarly large percentage of respondents reported no biogas related fire accidents had occurred, though those that did said that the accidents were related to burning from hot water spills and touching hot utensils. Many respondents said that there has been a dramatic rise in mosquito incidence generally in the last decade. They attribute this rise to a combination of rising temperatures and the open digester that contains bio-slurry which attracts mosquitos. The association of mosquitos with disease (s) is largely determined by the skin rash associated with mosquito bites, not resulting in fever usually associated with other mosquito born disease such as malaria.

¹ P = Productive: R= Reproductive: C= Community

Has time savings been purposed towards group	93% (yes)
Has HH member suffered from biogas related fire accident?	98% (no)
Has disease increased due to increased mosquito breeding?	61% (little): 19% (medium); 6% (high): 15% (not at all)

3 CONCLUSION

Time saved per individual woman

Individual	Time saved per day
Woman biogas user	<u>136</u> minutes or <u>2.26</u> hours

Time saved for total project beneficiaries in Kavre and Sindhuli

	Total biogas installed (As of AEPC base)	Total Biogas of less than 2 years	Total Biogas of greater than 2 years	Average total operation days (<2 years)	Totaltime saved (<2 years) minutes	Totaltime saved (>2 years) minutes
Kavre	4051		3510		467,315 (2,424,455)*	3,515,921 (24,225,265)*
Sindhuli	3159	537	2622	463	141,040,907 (2,350,681)*	1,085,788,816 (18,096,480)*

TOTAL					<u>286,508,222</u> min. OR <u>4,775,135</u> hrs.	<u>2,539,304,737</u> min. OR <u>423,217,45.61</u> hrs.
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Calculation of the number of W+ units based on a percentage of change:

1) Calculation of the percentage of change

The percentage of change is calculated based on a comparison between women's time used per day on reproductive activities affected by the introduction of biogas (see table below).

Activities	Time used per day in minutes (hours)* biogas users	Time used per day in minutes (hours)* non-users	Difference in minutes (hours)*
Collecting water	36	42	6
Putting bio-slurry/manure into pit	10	58	48
Putting dung into bio-digester	14	0	(-14)
Stirring the bio-digester	11	0	(-11)
Firewood collection	22	37	15
Cooking for family	145	206	61
Cleaning utensils	63	94	31
Total	301 (5.01)*	437 (7.2)*	136 (2.26)*

$$\begin{aligned} \text{Percentage of change} &= \left[\frac{\text{Result} - \text{Baseline}}{\text{Baseline}} \right] \times 100 \\ &= \left[\frac{301 - 437}{437} \right] \times 100 = -31.12 \% \end{aligned}$$

The percentage of change between baseline and measurement is – 31.12 % demonstrating a decrease in women's time spent on activities listed in the table above, as a result of the introduction of biogas.

Calculation of the number of W+ units:

1 W+ unit = 1 % change per woman

31.12 % = 31.12 units per woman

Number of women x 31.12 = 7200 x 31.12 = **224,064 units**

Expenditures for W+ pilot Feb-Sept.2014

Date	Activity	Budget breakdown	Expenses USD	People Involved	# Days
1 May	Questionnaire – Coding	Rs.7000/day*4 days Total- Rs.28,000/-	\$290	Indu Raj Joshi	4 days
2 – 5 May	Questionnaire – Translation into Nepali	Rs.10,000 lump sum for 19 pages	\$104	Sunil Shakya	2 days
4 May 10 – 14.30	Preparation and Consultation Meeting in Kathmandu with key Partners (HIMAWANTI and ASTHA)	DSA for field partners: Rs.2500/day*2Pax*2 nights=10,000/- Transportation: Rs.2250/- Food, tea/coffee/drinks during the meeting: 340/- Stationary: 1130/- Total- Rs.13,720/-	\$142	W+ Team DG, BG and ST	1 day
				Participants RM, SK and NG	2 days
8-11 May	Women Beneficiaries Stakeholder Consultation in Sindhuli	Transportation: (6000/day*5 days = Rs.30,000/-) Consultation Meeting (16Pax*Rs.844 + Rs.1500 Hall)= 15,004/- Sindhuli	\$311 \$155	W+ Team DG, BG and ST **16 participants	1 day
	Training of Enumerators in Sindhuli	(Rs.958*9Pax + 1500 Hall)= 10,122/- Sindhuli Facilitators 500/day*3 days= 1,500/-	\$105 \$16	W+ Team DG, BG and ST 10 Enumerators	1 day

	Women Beneficiaries Stakeholder Consultation in Kavre	(6000/day*3 days= 18,000/-) Consultation Meeting (12Pax*Rs.834 + Rs.2000 Hall)= 12,008/- Kavre Stationary: Rs.4040/-	\$186 \$124 \$42	W+ Team DG, BG and ST 16 participants	1 day
13-16 May	Training of Enumerators in Kavre	Questionnaire photocopy=16,515/- (Rs.909*11Pax + 2000 Hall)= 11,999/- Kavre Facilitators 500/day*3 days= 1,500/- Stationary: Rs.4677/- Refreshments: Rs.500/-	\$124 \$16 \$54	W+ Team DG, BG and ST	1 day
16 – 29 May	Coaching and guiding of enumerators in the field We also used the supervisor from Sindhuli (Shova) to coach the enumerators in Kavre.	(DSA 1000/day*4 days + 2000)= Rs.6000/- (Rs.560*11Pax = 6160/-) + 1500 Hall Transportation= Rs.3,000/-	\$189	W+ Team DG and ST Field Supervisor SK	1 day 4 days

APPENDIX 1: TIME AND LABOUR SAVINGS

Chapter 4 – Time and Labour savings

Biogas technology has the greatest positive impact on women in terms of labour and time savings for women primarily because of the reduced time required to perform reproductive or household activities that are largely the domain of women. (see table below):

Table 4.1: Gender Division of Labour

	BIOGAS USERS % responses						NON-USERS % responses					
	W only	M only	WWW	W=M	MMM	No spec	W only 1	M only	WWW	W=M	MMW	No spec
1.1 Paid work (external, include salaried work and crafts)	8	40	9	18	22	4	8	31	6	14	33	6
1.2 Crop production (own land)	31	4	26	35	4	0	28	10	27	31	4	1
1.3 Rearing own livestock	48	3	27	20	1	1	39	7	25	23	2	4
1.4 Selling (crops, milk, home-produced handicrafts or processed foods)	29	17	9	13	6	25	20	15	8	20	8	30
1.5 Home based income-generation (crafts, processed foods, etc)	28	11	18	13	4	27	21	15	14	16	6	28

Also, it is primarily women who manage the bio-digester (collection of dung, feeding the bio-digester, adding water and stirring).

Table 4.2: Principal Biogas Operator

	Women	Men
Principal operator of the biogas	89%	11%

With the adoption of bio gas technology, 97% of women respondents agree that time savings occur: 15% state significant time savings, 31% stated only a little, while 54% state that time savings vary by season.

Table 4.3: Women's perception of time saved by introduction of bio gas

Time Saved	%	How much time saved		
Yes	97	A lot	A little	Varies by Season
No	2	15	31	54
Don't know	1			

Actual time savings for women were determined by the difference between the time spent on different activities (productive, reproductive, bio-gas operation or dung management, social/community activities and leisure, see Tables 4.5), during the preceding day (24-hour recall) for activities that are generally performed on a daily

Time saved on reproductive activities

Considerable time savings occur for women bio gas Users as compared to Non Users on reproductive activities such as water collection, manure production, fire wood collection, cooking for the family and cleaning household utensils. Ninety-eight percent (98%) of women report time savings on cooking and fuel wood collection.

Table 4.4: Reduction on time used for fuel wood collection and cooking

Saved time on collection fuel wood					
Men		Women		Children	
Yes	No	Yes	No	Yes	No
25	75	98	2	8	92
Saved time on cooking					
Men		Women		Children	
Yes	No	Yes	No	Yes	No
18	82	98	2	8	92

The time spent on these activities was only reported for the summer months when the survey was conducted and information was derived largely from adult women who are responsible for these reproductive roles.

Time saved on cooking

Results show that the total time used for cooking (breakfast, lunch, tea and dinner) is 145 and 206 minutes for bio gas Users and Non Users respectively. This demonstrates that non bio gas users allocate 61 minutes more than Users to cooking activities per day. The additional time required by bio gas non Users is due to the preparation time for lighting the firewood and maintaining the burn temperature.

Time saved on cleaning utensils

Table 4.5 shows that considerable time savings was also reported by female Biogas Users in cleaning household utensils. This was due primarily to cleaner fuel burn of the Biogas unit as compared to the charring effect of firewood on cooking utensils, which subsequently require more time for cleaning. Female bio gas Users spent 63 minutes a day as compared to non Users who spent 94 minutes a day on cleaning utensils. This resulted in a time savings of 31 minutes for bio gas users

Time saved on organic fertilizer production

Organic fertilizer is produced through bio slurry by bio gas Users and the collection of organic waste and livestock dung collection by non-Users. Both procedures require depositing the waste material in a pit, which for Users is connected to the digester through a pipe, while Non-Users deposit the waste and dung manually. These different operations for Users and Non Users require different amount (s) of time. Ensuring the passage of bio slurry from the digester to the pit requires about 10 minutes per day for Users, while manually depositing organic waste and livestock urine for non Users requires at least 58 minutes per day. The difference is time use between Users and Non Users amounts to 48 minutes per day in favour of the former.

Additional time requirements for bio gas Users

Bio gas Users require spending additional time (compared to non Users) on management of the bio gas unit. These include putting dung into the digester and stirring the digester, which require 11 and 14 minutes respectively for a total of 25 minutes per day.

A table 4.5 compares time spent by women users and non-users on reproductive activities.

Table 4.5: Women's time use for reproductive activities

Activities	Time used per day (in minutes)	Time used per day (in minutes)	Difference (in minutes)
Collecting water	36	42	6
Putting bio-slurry/manure into pit	10	58	48
Putting dung into bio-digester	14	0	(-14)
Stirring the bio-digester	11	0	(-11)
Firewood collection	22	37	15

Cooking for family	145	206	61
Cleaning utensils	63	94	31
Total	301 (5.01)*	437 (7.2)*	136 (2.26)*

Summary of total time saving for women bio gas Users

The total time saved by the Biogas Users is determined by the difference between the total time used by Biogas Users per day (301 minutes) and the total time used by Non-Users per day (437 minutes) which totals to 136 minutes of time saved per day.

Calculation of fuel-wood collection time

Per day fuel-wood collection time is calculated as:

Per day fuel-wood collection time= (frequency of per month fuel-wood collection*time for each trip)/30

The Table 4.6 below also shows the total time to collect fuel-wood for both biogas user and non-user households. The time required to collect fire wood also varied between bio gas Users and Non Users (22 and 37 minutes respectively, figures obtained by calculating a daily average taking into account stated collection time per week or month). The time allocation for fuel wood collection was determined by the frequency of collection in a month and the average time spent in a single collection trip, which was then converted into time allocated per day.

Table 4.6: Time for fuel-wood collection

Activities	Biogas user (minutes)		Biogas non user (minutes)		Difference (minutes)
	Per month	Per day	Per month	Per day	
Fuel-wood collection	674	22	1120	37	15

Allocation of saved time

Differences in time allocation to different activities by women from biogas users and non-users that relate to productive and social activities and leisure suggest how women biogas users may allocate the time saved. Women bio gas Users allocate comparatively more time to productive activities (e.g labor, crop and livestock, home-based income generation although only 18% report increased productivity). This is followed by relatively less time allocations directed towards cleaning the house, leisure and rest, caring for children and others respectively.

Table 4.7: Women's (time use for productive, social and leisure activities)

Activities	Bio-Gas User Time in minutes per day	Non Bio-Gas User Time in minutes per day	Difference in minutes per day
Productive activities(P)	250	184	66
Un-remunerated community activities (C)	58	52	6
Cleaning stable and collecting dung (C)	25	28	-3
Cooking for animal (R)	29	27	2
Cleaning in and around the house(R)	39	30	9
Caring for children (R)	43	37	6
Washing clothes(R)	39	39	0
Washing self (R)	33	31	2
Leisure (R)	75	67	8
Total	591 (9.85)*	495 (8.25)*	96 (1.6)*

Summary: Total time saved using the formula

The following time formula was used to determine the total amount of time saved by women through the adoption and use of bio gas technology.

$$QTTS(S) = W_{c,p} * P_{pref,c,f} * [\sum (TS_{coll,c,p} + TS_{cc,c,p} + TS_{subs,c,p}) - \sum (TI_{wc,c,p} + TI_{dca,c,p})]$$

Where:

TS(S) = Time saved by women during project operation, that will be used for additional activities for women (termed as quality time savings)

W_{c,n,p} = Number of women user/beneficiaries within a cluster of “like” projects within a verification period

P_{perf,c,p} =Project performance

TS_{coll,c,p} =Time saving as a result of reduced fuel collection times when project is operating as designed. Established by comparing time-use survey results of users vs. non-users within the same community and calibrated on a per-person basis. (15 mins)

TS_{cc,c,p} = Time saving as a result of reduction in cooking time and post-cooking clean-up times when project is operating as designed. Established by comparing time-use survey results of users vs. non-users within the same community and calibrated on a per-person basis. (146 mins)

TS_{sub,c,p} = Time saving as a result of substitution activities, such as activity shifting from women to men or time spend on project maintenance/technology application/training as result of project implementation and when project is operating as designed. Established by comparing Time User Survey results of Users Vs Non Users (note: if there is no shift of work then TS Sub can be taken as 0)

TI_{wc,c,p} = Time increased in collection of water after biogas installation, when the project is operating as designed. Established by comparing Time User Survey results of Users Vs Non-Users. (0)

TIdca_{c,p} = Time increased in collection of dung and application of manure after biogas installation, when the project in operating as designed. Established by comparing Time User Survey results of Users Vs Non-Users (25 mins)

Calculation of P_{perf}:

*P_{perf} = % of biogas plant in operation * % of biogas usage per day*

% of biogas plant in operation = Number of days biogas plant is in operation /365
 % of biogas usage per day = Number of hours biogas is used for cooking/(total number hours for cooking cumulative of all stoves; biogas + Mud stove + Improved cookstove)

W_{c,p} = Depending on the age of Biogas in Kavre and Sindhuli
 P_{pref c,f} = 99% (Only 2 Biogas were not functioning) x 3 hours (Biogas usage per day)
 TS coll, c,p = 15 mins per day
 TS_{cc c,p} = 146 mins per day TS_{subs c, p} = 0 mins per day TI_{wc c,p} = 0
 TIdca_{c, p} = 25 mins per day

The calculation is based on the above formula and values derived from the survey results.

Table 4.10: Time saved in Kavre and Sindhuli

*Denotes the time saved in hours

	Total biogas installed (As of AEPC database)	Total Biogas of less than 2 years	Total Biogas of greater than 2 years	Average total operation days (<2 years)	Total time saved (<2 years) minutes	Total time saved (>2 years) minutes

Kavre	4051	541	3510	474	145,467,315 (2,424,455)*	1,453,515,921 (24,225,265)*
Sindhuli	3159	537	2622	463	141,040,907 (2,350,681)*	1,085,788,816 (18,096,480)*
TOTAL					286,508,222*	253,930,473,7*

Appendix 2:

Report on the Implementation of the Pilot Project for W+ Standard within Biogas Project in Nepal:

Stakeholder Consultations & Enumerator Trainings

1. INTRODUCTION

This report contains the following:

- Description and analysis of the stakeholder consultation process
- Description and analysis of lessons from training community women as enumerators for the survey questionnaire
- Description and analysis of lessons for establishing a revenue sharing mechanism
- Lessons for preparation of Guidance Document on M&E System and on Gender analysis

2. BACKGROUND

The W+ Standard and its complementary Program Guidance Document were developed in 2012 and 2013 in response to the concern that women - who are often primary farmers and environmental managers in developing economies - are not compensated for benefiting from climate change adaptation and mitigation efforts. Climate and carbon financing mechanisms were identified as providing opportunities to provide benefits to women and support their empowerment, through specific project design enhancements that could improve both women's well-being and carbon project outcomes.

The W+ is a social standard that guides project developers in identifying and measuring the social and economic benefits of building women's empowerment and equality into their projects. However, as the W+ is a social standard that measures women's empowerment improvements in the six domains of food security, health, knowledge and education, time, leadership, and income and assets, further development is required to assure that each of these aligns to the procedures and protocols of carbon project development, and to develop ways to include the distribution and measurement of benefits to women. Because the six domains of the standard must be implementable, measurable and verifiable over a range of project contexts and types, and to be used in conjunction with other standards, WOCAN supported the development of methods for

measuring outcomes/impacts in each domain, to produce a set of guidance documents for W+ users.

WOCAN selected a biogas programme of the Alternative Energy Promotion Center (AEPC) in Nepal for W+ method development, field testing and the first pilot project. Based on a consultation with rural women leaders and AEPC staff of and other interested organizations held in Kathmandu, Nepal in October 2013, the TIME domain was selected for the first method development exercise. WOCAN assembled a Task Force that included carbon project developers, gender and women's empowerment experts, and others to develop a method to measure the impacts for TIME, using both quantitative and qualitative methods, including the development of formulas and survey questionnaires to guide W+ users. Questions relevant to the other five domains and related to Do No Harm assessment were also developed alongside those of TIME and tested in the field.

In May 2014, WOCAN will implement Phase 1 of the first pilot project for the W+ Standard, in 2 districts in Nepal, selected in collaboration with the WOCAN Nepal Coordinator, AEPC, HIMAWANTI and ASTHA. During this Phase, The W+ Team will utilize the TIME methodology, the questions for Do No Harm assessment and other guidance found in the W+ Program Guidance and Standard to implement the 'proof of concept' phase of the pilot project.

This phase will include the following steps:

- Stakeholder Consultations in the districts
- Baseline Surveys with non-users of biogas (as proxies for the users before they began use of the biogas)
- Measurement of the Results, using the same survey questionnaire with biogas users
- Analysis of Do No Harm, using Survey Questionnaire
- Establishment of revenue sharing mechanism

This work will be reviewed by the Standard Committee (including a social impact specialist and auditor) in mid- September to assure compliance with the W+ standard and protocols for similar standards.

3. THE STAKEHOLDER CONSULTATION PROCESS

The stakeholder consultation required several steps:

Step 1: Listing all the stakeholders by order of Importance and Influence. Both the influence and importance of different stakeholder groups can be ranked along simple scales and mapped against each other, as an initial step in determining appropriate strategies for their involvement. Both variables can be assessed in a preliminary manner based on the knowledge of those familiar with the stakeholders concerned. More in-depth assessments of importance and influence would require direct consultations (for instance, to ask local-level stakeholders for their reactions to a proposed intervention)

Stakeholders in order of Importance and Influence are as follows:

Stakeholders	Levels of Importance ² and Influence ³
Women's Groups Private Sector	<i>Low Influence and high Importance:</i> require special efforts to ensure that their needs are met and their participation is meaningful
AEPC Bitty Sanstham (grassroots micro finance organization)	<i>High influence and high importance:</i> should be closely involved throughout to ensure their support for the project
District Administration Ministry of Science, Technology and Environment Ministry of Women's Development	<i>High influence and low importance:</i> are not the target of the project but may oppose the intervention; therefore, they will need, as appropriate, to be kept informed and their views acknowledged to avoid disruption or conflict
ICIMOD Relevant donors	<i>Low influence and low importance:</i> are unlikely to be closely involved in the project and require no special participation strategies (beyond any information-sharing strategies aimed at the 'general public').

Step 2: At this stage, a preliminary stakeholder consultation was held with WOCAN's primary partners for the implementation of the project. The meeting was attended by senior leaders/management from HIMAWANT and AASTHA, WOCAN Board Member and WOCAN project staff.

This consultation was to deliberate on strategic ways to proceed with the subsequent stakeholder consultations that were to follow. A key issue that emerged from the discussion between WOCAN members and management of HIMAWANTI and AASTHA was that at the initial stages of the consultation process with women's groups at the community level, any discussion on sharing of monetary benefits accruing from sale of w+ units could potentially cloud other relevant discussions. It was agreed that the initial stage (s) of the discussion on benefits sharing mechanisms should be limited to generating information on existing mechanisms that are currently employed by women's groups. Such a discussion should explore gaps and opportunities of existing benefits

² Importance relates to the degree to which achievement of project goals depends on the active involvement of a given stakeholder. Stakeholders who are important to a project are generally those whose needs the project seeks to meet as well as those whose interests may converge with the objectives of the project.

³ Influence refers to the power that stakeholders have over the project. It can be exercised by controlling the decision making process directly and by facilitating or hindering the project's implementation. This control may come from a stakeholder's status of power, or from informal connections with leaders.

sharing mechanisms to provide an informed basis for a project developer to introduce monetary benefits that (may) accrue with sales of W+ credits.

Step3: Stakeholder consultations were held with representatives of women's biogas user groups: 16 participants in Sindhuli and 12 participants in Kavre. The main aim of the consultations was to introduce the w+ Standard, and generate discussions on existing benefit sharing mechanisms of resources. The consultations were conducted as follows:

A: introduction to goals and objectives of W+ standard

B: eliciting the benefits of bio gas technology for women (see annex 1)

C: eliciting information on existing resource distribution mechanisms, particularly of women's groups (see annex 2)

D: identify skills development needs to ensure more efficient access to external resources from district and national levels (see annex 3)

Step 4: Information sharing meetings were conducted with District Administration officials were held in both the Districts. Meetings were held with the following stakeholders from the public and private sectors:

- Local Development Officer (LDO): The District Administration Office is the repository of all development funds for the district and hence, an important source of resources for all local development plans. A district level representation of the AEPC is also situated in this office. Hence, it is important to register the project with the district office to ensure that project activities become part of the district development plans. It is also a potential source of funds that can be accessed by women's groups following capacity building activities designed for phase 2 of the project
- Private sector biogas plant producers: dissemination of biogas plants operate through private sector companies that build and install plants in households, and receive payments from the AEPC. While a mechanism has been created to link biogas developers and installers with local communities, the present challenge is the late payments to installers by the AEPC. As a result, many such bio gas installers have not received payments for work and materials already expended, and such a bottleneck could potentially hinder future expansion of the biogas scheme. Bio gas operators however, expressed great potential in providing training to local users on plant maintenance and repair.
- Ministry of Science, Technology and Environment. The ministry is represented in the District Administration Office and is an important stakeholder in terms of scaling out of lessons that emerge from the project.
- Ministry of Women's Development: the ministry is also represented in the District Administration. There is very little coordination between the AEPC and the local chapter of the women's ministry at present. However, future potential for
- Collaboration needs to be explored, and hence they need to be informed of developments of the project.

4. TRAINING COMMUNITY WOMEN AS ENUMERATORS TO CONDUCT THE SURVEY QUESTIONNAIRE

A total of 20 women (18 female and 2 male) were trained as enumerators to implement the survey. The surveys were coded and translated into Nepali, and the trainings were conducted in each district for a day each.

The participants were very keen and interested to become enumerators and many expressed satisfaction of actually conducting the survey by themselves rather than

acting as assistants to external survey enumerators as many had done so before this experience. In order to ensure quality of the process, the following process has been established:

- A. Each enumerator is responsible for conducting interviews with 25/26 households
- B. All the enumerators will gather in their respective district headquarters after conducting 5 initial surveys to ensure that they have understood the process and to identify and redress gaps in their knowledge if they exist
- C. Each District is coordinated by a district coordinator who will make visits to each site to ensure that the local enumerators are conducting the survey correctly
- D. The 2 District coordinators are responsible for timely collection of all survey results as well as the quality of information. The final survey data will be submitted to the WOCAN coordinator by June 14, 2014.
- E. This data will then be inputted into a software and the statistician will aggregate the data to be sent to WOCAN in Bangkok, Thailand.

5. REVENUE-SHARING MECHANISM

There are several existing mechanisms that serve as informal means to share resources within women's groups in the two project sites. While there is the need to build considerable group capacity to manage resources more effectively, the existing local mechanisms can potentially serve as a foundation for distribution of W+ benefits when they accrue. A recent SDC (Swiss Development Cooperation) funded study of local savings groups points out many gaps (e.g elite capture, exclusion of poorest families etc), several recommendations have been made to redress such gaps. A resource distribution mechanism for w+ needs to be based on the following considerations in the two project areas:

- At present, the initial consultation with the management of HIMAWANTI and AASTHA proposed that it is too premature to discuss the development for a sharing mechanism for w+ generated resources at this stage of the project implementation.
- However, it was recommended that HIMAWANTI and AASTHA can function as the main body for resource distribution through their local women's groups (bio gas users)
- Additional rules for distribution and access resources by non-user poorer households need to be established through consultation in their various constituency groups. For example, an agreed upon percentage of the total resources needs to be made available to enable poorer non-user households to access interest free loans for installation of bio gas plants
- Such a consultation process will be conducted upon the availability of funds made through the sales of w+ units Challenge (s)

The main challenge (s) for establishing a resource distribution mechanism are as follows:

- In the absence of a (larger) intermediary body like HIMAWANTI, AASTHA, MICRO FINANCE SCHEME etc), distribution of benefits to smaller, disparate user groups, or to individual households is not a realistic option
- Identification of intermediary groups may be hampered by limited numbers of women's groups or women-led groups

Recommended Actions

Discussions were conducted with the micro finance Bittyta Sanstham which is registered as “D” class company with 25 branches in Nepal. The aim of the company is to provide small loans to women and under-privileged groups in remote areas. The following options are available for distribution mechanism (s) for w+ generated funds:

- Since there are no branches in Kavre and Sindhuli, it may be possible to open a branch in these 2 districts if there are a minimum 2000 members
- HIMAWANTI and AASTHA can receive training from Bittyta Sanstha on banking mechanisms and be recruited as functionaries of the bank
- W+ funds generated from sales can be distributed through the bank’s “welfare Fund Scheme”
- The bank could function as a national body to receive the funds generated from sale of w+ units and disburse through local mechanisms described above
- Further discussions are required to establish distribution mechanisms that suit WOCAN, Bittyta Sanstham, HIMWANTI and AASTHA.

6. Monitoring and Evaluation Indicators

RESULTS	INDICATORS
<u>OUTPUTS</u>	Increased discretionary time
<u>IMMEDIATE OUTCOMES</u>	Reduced drudgery
<u>INTERMEDIATE OUTCOMES</u>	Increased sharing of reproductive activities (men assume more tasks normally considered women’s work)
<u>FINAL OUTCOMES</u>	Increased perception of well- being among women

Definition of OUTPUT and OUTCOMES

RESULTS	EGs
Activity	activity undertaken by project

Output / reach	results from project activities and who they reach
Immediate Outcome	usually behavioral changes in those directly affected by project
Intermediate Outcome	Often the shorter term success criteria
Final Outcome	Ultimate project objective

7. Activities for Stakeholders in Phase 1 and 2

Stakeholders	Levels of Importance ⁴ and Influence ⁵	Activities for phase 1 and phase 2
<ul style="list-style-type: none"> • Women's Groups • Private Sector 	<p><u>Low Influence and high Importance:</u> require special efforts to ensure that their needs are met and their participation is meaningful</p>	<p>Capacity development to enable increased access to resources (energy development funds) from District Administration and national bodies. Skills needs identified by women's groups are:</p> <ul style="list-style-type: none"> - Leadership - Planning for local organizational capacity - Biogas maintenance
<ul style="list-style-type: none"> • AEPC 	<p><u>High influence and high importance:</u> should be closely involved throughout to ensure their support for the project</p>	<p>Continual briefing/presentations of project progress Briefing/presentations on gaps identified by private sector in accessing payments Engaging APEC district staff to identify best practices for institutionalizing into national schemes of AEPC</p>

<ul style="list-style-type: none"> • District Administration • Ministry of Science, Technology and Environment • Ministry of Women's Development 	<p><u>High influence and low importance:</u> are not the target of the project but may oppose the intervention; therefore, they will need, as appropriate, to be kept informed and their views acknowledged to avoid disruption or conflict</p>	<p>Information sharing on lessons generated from project implementation to generate feedback to be incorporated into project activities for phase 2.</p>
<ul style="list-style-type: none"> • ICIMOD • Relevant donors 	<p><u>Low influence and low importance:</u> are unlikely to be closely involved in the project and require no special participation strategies (beyond any information-sharing strategies aimed at the 'general public').</p>	<p>Information sharing through presentations and publications at the end of the project</p>