International Journal of Business and Management Invention
ISSN (Online): 2319 – 8028, ISSN (Print): 2319 – 801X
www.ijbmi.org || Volume 6 Issue 2 || February. 2017 || PP—01-08

Skill Gaps at the Hydro-Mechanical Stage of Small Hydro Power Projects in the State of Uttrakhand: An Analysis

Neetika Sharma Mehta[1], Dr. Atul Razdan[2], Dr. R. Jayaraj[3]
[1]*Research Scholar University of Petroleum and Energy Studies Dehradun*
[2]*Senior Professor, UPES, Dehradun*
[3]*Associate Professor, UPES, Dehradun*

ABSTRACT: *India is progressing towards being one of the largest producers of clean energy in the world.With a potential of more than 3300 MWin the state of Uttrakhand it has been looked upon as a major contributor to the pool of hydro power energy generation in India. In spite of the huge potential the state has not been able to realize it. An analysis of the reasons responsible for underrealisation of potential indicates that difficulty in sourcing of skilled manpower as the major reason. The study attempts towards analyzing and identifying the significant skill gapprevalent at the activity of hydro mechanicalfor the small hydro power projects of Uttrakhand. The study identifies technical skill gaps pertaining to welding and electrical as the most significant ones. Since the literatureindicates that retention of skilled manpower due to difficult hilly terrain and inadequate infrastructure has been a challenge for the hydropower projects, the social inclusion for skilled manpower sourcing may work as a better employee sourcing and retention strategy. The study also indicates towards a study identifying strategies that will create a mutual benefit scenario for the generators and the local community for ensuring optimum realization of the potential.*

Keywords: *Manpower, Hydro Power, Social Inclusion*

I. INTRODUCTION

India is focusing on green energy and encouraging renewable energy sources. One of the country's most efficient sources of clean energy is Hydropower. With many rivers flowing from the Himalayas the country has a huge potential to tap the sector.Table 1 below tells us the potential of each river basin and its achievements. The total capacity of renewable energy projects expanded to 42,850 megawatts, overtaking hydropower that stood at 42,783 mw, out of the country's total capacity of about 3 lakh mw, as per the latest assessment of Central Electricity Authority. India is slowly progressing towards obtains the position of being one of the largest producers of clean energy and leaves many developed nations behind in the quest. Three states with maximum potential are Uttrakhand with potential of 20,000 MW (plus), Arunachal Pradesh and Sikkim respectively. Hydropower capacity has increased only marginally — from 40,531.41 mw in March 2014 to 41,267.42 mw in March 2015, to 42,783.43 mw at present. (Chandrasekaran, 2016)

In India, hydro power projects with a station capacity of up to 25 megawatt (MW) each fall under the category of small hydro power (SHP). The total installed capacity of small hydro power projects (up to 25 MW) is 2429.77 MW from 674 projects and 188 projects with aggregate capacity of 483.23 MW are under construction. According to a new study, small hydropower projects (SHPs) (projects up to 25 MW) are considered safer than big dams in India. While India's total installed capacity for small hydro power (SHP) units reported a significant increase from 1,909 MW as in March 2006 to 4,055 MW (as of May 2015) thereby taking up SHP's share of the country's total installed renewable energy (RE) capacity to almost 12%, considerable potential still remains untapped across states with favorable SHP potential.The low utilization of the country's SHP potential is attributable to several factors including challenges in setting up plants in difficult and remote terrain, sourcing and retaining the required manpower in difficult terrain, delays in acquiring land and obtaining statutory clearances, inadequate grid connectivity and Unavailability of skilled labor. Table 1 shows the Hydro power potential of each river basin.

Table 1

Basin	Identified capacity as per assessment study		Capacity Under Operation		Capacity under construction		Capacity under operation + under construction		Capacity yet to be taken up under Construction	
	Total (MW)	Above 25 MW (MW)	(MW)	(%)	(MW)	(%)	(MW)	(%)	(MW)	(%)
Indus	33832	33028	11124.3	33.68	4686.0	14.19	15810.3	47.87	17217.7	52.13
Ganga	20711	20252	4987.2	24.63	1307.0	6.45	6294.2	31.08	13957.6	68.92
Central Indian Rivers	4152	3868	3147.5	81.37	400.0	10.34	3547.5	91.71	320.5	8.29
West Flowing Rivers	9430	8997	5660.7	62.92	100.0	1.11	5760.7	64.03	3236.3	35.97
East Flowing Rivers	14511	13775	7798.2	56.61	455.0	3.30	8253.2	59.91	5521.9	40.09
Brahmaputra Basin	66065	65400	2120.0	3.24	5292.0	8.09	7412.0	11.33	57988.0	88.67
All India	148701	145320	34837.8	23.97	12240.0	8.42	47077.8	32.40	98242.2	67.60

In addition to above 9 PSS (4785.6 MW) are under operation and 2 PSS (1080 MW) are under construction.

(DEVELOPMENT OF HYDRO SECTOR, 2013-14)

The state of Uttrakhand has been divided in three categories. First being completely hilly region falling in the Himalayan range, 8 districts fall under this category. Second category comprises of partly hilly region and partly plain area, 4 districts fall under this category. The third category comprises of only plain area, while just one district 'Haridwar' fall under this category. The state is home to origin of ice-fed rivers, which are Gori, Alaknanda, Yamuna, Bhagirathi, Tons, Kaliganga, and Ganga. As the state is home to many rivers, it has a huge potential of generating energy through hydro power sources. The state has a potential to generate approximately 27039.705 MW capacities, but unfortunately it has only been able to achieve 3972.83 MW until now. As per table 4- Details of Hydro Power Projects/Potential in Uttarakhand, If we see the ability of small hydropower alone, it has a potential to achieve approximately 3300 MW but has only been able to achieve 169.6 MW so far which is only 5% of its ability. Large Hydro power's potential in the state is approximately considered to be 23701.95 MW but its achieved status is 3782.15 MW which is 16% of its potential. Interestingly the Micro/mini projects has been considerably been doing well according to its potential. The potential of Mini/Micro projects is considered to be approximately 37.755 MW and it has been able to achieve 21.11 MW so far, which is 56% of its ability (table 3). Table 2- Under Developmentand table 3 - Potential been achieved are graphical representation of table 4.

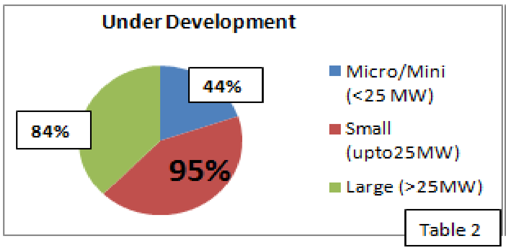

Table 2

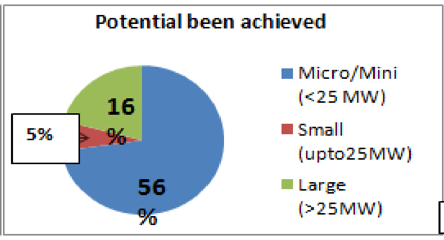

Table 3

Table 4

Details of Hydro Power Projects/Potential in Uttarakhand (Nos/MW)					
	Particular of Projects		Micro/Mini (<25 MW)	Small (upto25MW)	Large (>25MW)
Potential been achieved	Under Operation	Nos	58	19	16
		Capacity	21.11	169.6	3782.15
	Total potential been achieved	**Capacity**	21.11	169.6	3782.15
			56%	**5%**	**16%**
Under Development	Under Construction	Nos	15	14	7
		Capacity	2.78	102.3	2430
	DPR Approved, Clearances Obtained/ Under Process	Nos	0	28	12
		Capacity	0	286.15	3433
	Projects for which DPR Prepared	Nos	0	12	11
		Capacity	0	171	8582
	Under S&I Stage	Nos	44	177	37
		Capacity	13.87	2570.95	5474.8
	Total under Development	Nos	59	231	67
		Capacity	16.65	3130.4	19919.8
			44%	**95%**	**84%**
Total Potential		**Nos**	**117**	**250**	**83**
		Capacity	**37.755**	**3300**	**23701.95**

(UJVNL, 2015)

We have been talking on the fact that hydro power is having huge potential but not been achieving up to it. Reasons of this loss of potential must be analyzed. Reports by economic times have conclude that **"Cost over-runs due to delayed execution of 551 projects run up to over Rs 1.6 lakh crore, as per an estimate by the ministry, which monitors investments of over Rs 150 crore. Some projects have been stalled for over a decade, with finance minister recently pegging the investments held up in red tape at Rs 10.5 lakh crore."** (Dhoot, 2013)

A government commissioned study based on projects which are facing the problems of time over-run and cost over –run worth lakhs of crores of rupees, highlights the critical shortage of skilled professionals as one of the major reason causing the delays. More entrants and competitors are entering the market but they are not having skilled workforce. It is getting extremely difficult for 80% developers to find blue collar employees to work and execute projects in the far tough geographical terrain areas. This fact was highlighted by a study conducted by the ministry of statistics and programme implementation. Lack of infrastructure such as schools, hospitals and difficult access to sites often become blocks to moving skilled manpower to difficult project sites. **Further,** to understand the Challenges in **sourcing skilled Man power** extensive review was done with an outlook to understand the impact of challenges faced in sourcing skilled manpower in Hydro Power Sector

II. LITERATURE REVIEW

S□ur□ingski□□□dmnp□w□r

Various studies have concluded the fact of scarce availability of skilled labour and unskilled technical labour was supplied abundantly. Many factors were brought to light which were prevalent in the industry:

a) ɑ) With the entrance of many new players in the industry finding appropriate experienced employees has become a challenge for each of them. These offer very high monetary benefits than what they have been offered until now, therefore creating a situation where experienced employees are available only to a handful.
b) ƅ) These new entrants not only offer high monetary benefits but also higher positions as compared to earlier. Therefore, these handfuls of experienced employees are lured by few of the new competitors.
c) c) Before the new competitors, there were a handful of organisations in this sector, therefore the employees were more concerned for their job security and hence were reluctant to change.

Over the past years the renewable energy sector has grown significantly. It been widely accepted as a clean source of energy and has opened scope for employment on a wide range with various employment benefits. The sector is witnessing large scale investment by the government as well as many private players. (Mulugetta, 1/22/2007)At present the hydro power sector's growth is estimated to be approximately 12% and is expected to increase by 40% by 2020 towards fulfilment of the national target of increasing renewable energy sources. Renewable energy is a clean energy form; it helps in improving the environmental concerns when it comes to energy. The overall economic development can be seen with the enhancement of quality of energy forms and its contribution towards development of job opportunities in the sector. It is assumed that the related expenditures made by the government to avoid unemployment were made in forms of subsidies and various other governmental programs.

It is difficult to estimate a very clear method to determine the positive or negative effects on employment with respect to renewable energy. Though it is estimated that encouragement of renewable energy sources in area in the country will definitely boost the job opportunities in that area but to determine the impact caused on the energy generation in the same way cannot be determined. However, Job ratio cannot be considered as evidence of job creation except if the study is very specific to analysis the region and technology in accordance to its compatibility. It has widely been studies that the ratio of job may vary owing to the difference of regions, technology and methodology (KumarKundu & Mishra, 3/9/2012)

According to the study conducted by the researcher, the trends in future is likely to focus on the encouragement on developing renewable energy sources thus having a high positive impact on job related to the construction and infrastructure area. Most of the countries are focusing on renewable energy sources construction and expecting a good inflow of skilled workforce hence creating a high demand for skilled workers. With the pace of industry growth there is a high of risk of facing shortage of required professionals in future. The much needed energy professionals are required to maintain profiles with respect to the policies of energy efficiency and create jobs in the sector. For two types of specialization are required to fulfil the job in the renewable energy sector. First being the pool of highly technically skilled people who would be the actual planning brain of the project and ensure the right execution of the planned projects. The second kind of profile required is for the ground site area where, technicians with master in the mechanical and electro-technical field. Both the profile sets must comply with basic economics, management and administration knowledge. (Tourkolias, Mirasgedis, & Damigos, 6/3/2009)

The calculations made by the researcher in his study, he took in account the income induced effects of direct and indirect expenses which ensured roughly 30,000 jobs per year for the constructions phase in the industry and roughly 500 profiles in the operational phase. Approximately half of the effect is the result of the multiplier effect as the outcome of an increased income phase. (Rustico & Sperotti, 2012) The effects of having low labour productivity there is likely to have relative high growth with respect to the employment the sector. This will reflect gross impact on the Indian economy but the cost of financing cannot be considered. (Tourkoliasa & Mirasgedis, 2/22/2011)

In the area of renewable energy sector for generating job opportunities, conditions must be made complimentary to the sector. The skill sets that are required to fulfil a certain job requirements must be in accordance with the profile and desirable by project managers. A school which focuses on technical ability of the person must be encouraged. Polytechnic schools can offer an option of special courses which can be aimed to impart knowledge and skills to bring out the desired result. (Lambert & PereiraSilva, 6/27/2012)

The researchers must be encouraged to contribute towards generating innovative ideas for the industry based on their observations and study so that the problem of procuring the required skilled workforce to match the exact required profile, and also suggesting solutions for the same. Further research would also be required to study the ways to ensure the ideas into practise in the industry. As any transition can only happen if the right person to perform the activities in the job is meet. Only by enhancing the employment and giving due benefits to the employees it might not be sufficient to curb the negative impacts borne by the employees in the non-renewable energy sector. (Moreno & Jesu´s Lo´ pez, 10/31/2006)

It is expected in the industry that the skilled employee must be well equipped with sound knowledge of the work that needs to be executed, the employee must understand the organizational goals, treat them as a common aim, and he must be efficient in resource management and have good interpersonal and communication skills. An efficient employee is crucial understanding the competitiveness in the industry. One critical challenge faced by the industry is that there are no definite degree course in renewable energy sector, there could be post graduate course or a short term specialized course but available in niche.

Secondly, women can be motivated by spreading awareness about social dialogue such as tackling organisational hurdles, in terms of working hours, childcare services and the culture of organisation. (García-Álvarez & Mariz-Pére, 8/1/2012)

One conducting an extensive review of literature Gap identified is -"**Researcher do not find any study identifying unskilled workforce or measuring capacity of present work force"**

Hence, the aim of the study is to identify activity wise significant skill gaps in the execution stage of Hydro Mechanical works in Hydro Power Projects in Uttrakhand.In-depth Identification of critical job roles where major skill gaps exist and plan for future skill development initiatives to focus on addressing the gaps. Specifically in Hydro Mechanical stage, it is relating to a branch of mechanics that deals with the equilibrium and motion of fluids and of solid bodies immersed in them

III. METHODOLOGY

Descriptive research which is conclusive in nature was used as it gathers quantifiable information that can be used for statistical inference on the target audience through data analysis. Closed-ended questions were used for inquiry to define and measure the significance of the subject being researched with a group of respondents and the population they represent. Quantitative research methodology was chosen for analysis.

Sampling methodology

Target population

This survey covered organization or any individual who are employees with Hydro Power organization and also contractors who deal with workforce during the construction phase of Hydro Power projects.

Sampling frame

The stakeholder's of small hydro power projects in Uttrakhand were identified as part of the sampling frame. The stakeholders include manpower, labour contractors, and employees at supervisory level of small hydro power projects which have involvement during construction phase of the small hydro power project.

Sampling Technique

Proportionate stratified sampling was the method used. The population was divided into various strata based on the functions of the stakeholders.With proportionate stratification, the sample size of each stratum is proportionate to the population size of the stratum ensuring that each stratum has the same sampling fraction.

Sample size

The questionnaire was administered to 600 respondents who are the stakeholders and 425 responses were received (70%). Hence the sample size considered for this study was 425.

Questionnaire design
All the variables found in the literature review were included in the questionnaire in the form of 18 questions. The questions were set on a 5 point Likert scale ranging from Highly Significant (5) to Not Significant (1).

Factor analysis
Factor analysis using SPSS version 21 was applied on the 425 responses**.** The extraction method used is principal component analysis. To ensure suitability for using factor analysis, this study used the Kaiser–Mayer–Olkin (KMO) test and Bartlett's test of sphericity. The KMO test is done to measure the sample adequacy in terms of the distribution of values for performing the factor analysis (Geourge D, SPSS for windows step by step: a simple guide and reference, 1999). The acceptable values should be greater than 0.5 (Geourge D and Mallery P, 1999, Field A, 1996). Bartlett's test of sphericity is used to test the null hypothesis that the correlation matrix is an identity matrix. If the R-matrix is not an identity matrix, there are some relationships between the variables. Hence, if the Bartlett's test is significant, the results of factor analysis will be appropriate.Cronbach alpha is used for testing the internal consistency of the data. A reliability co efficient of 0.70 or higher is considered "Acceptable "in most of the research studies.

IV. RESULTS AND DISCUSSIONS

The results of the factor analysis are given in Table 5.

Table 5

Descriptive Statistics			
	Mean	Std. Deviation	Analysis N
Lineman Skills	3.52	1.330	425
Wireman Skills	3.24	1.154	425
Plumbing Skills	2.95	1.399	425
Foundry man	3.08	1.399	425
Carpenters Skills	3.40	1.127	425
Sheet Metal Works	2.67	1.192	425
Welding Skills	2.86	1.344	425
Masonry	2.94	1.443	425
Gas Cutter	3.40	1.327	425
Electrician	2.96	1.441	425
Draughtsman (Civil) Skills	3.54	1.205	425
Surveyor's Skills	2.59	1.350	425
Fitter's Skills	3.38	1.194	425
Turner Skills	3.30	1.326	425
Crane Mechanic	3.58	1.228	425
Draughtsman (Mechanical)	3.01	1.329	425
Crane Operating Skills	3.18	1.288	425
Welding Skills (Pipes & Pressure Vessels)	3.16	1.300	425

The mean value indicates the means of the variables used in the factor analysis. The standard deviation provides an indication of how far the responses to the questions deviate from the mean. The variable "Crane Mechanic" ranks the highest and the variable "Surveyor's skills" ranks the lowest in terms of means.
Correlation matrix: Pearson correlationtest has been conducted to check the pattern of relationships of the variables. The determinant of correlation matrix for the data is 0.457 which is greater than the necessary value of 0.00001. Therefore there is no multicollinearity problem in the data used.
Validity test: As per the results of KMO test (Table: 6), the achieved value is 0.543 which is greater than 0.5 and confirms the adequacy of the sample. As per the results of Bartlett's test, it is inferred that the Bartlett's test is significant at 1% .Hence the results of factor analysis is appropriate.

Table 6

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.543
Bartlett's Test of Sphericity	Approx. Chi-Square	326.329
	df	153
	Sig.	.000

Extraction and after rotation is given in Table 7.Before the extraction 18 variables were identified. The eigenvalues associated with each factor represents the variance explained by that particular linear component. The results show that the eigenvalue in terms of percentage of variance 56.436% of the total variance.

Table 7

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.737	9.649	9.649	1.737	9.649	9.649	1.626	9.035	9.035
2	1.497	8.318	17.967	1.497	8.318	17.967	1.296	7.202	16.236
3	1.291	7.169	25.136	1.291	7.169	25.136	1.267	7.039	23.276
4	1.227	6.819	31.955	1.227	6.819	31.955	1.266	7.035	30.310
5	1.172	6.509	38.464	1.172	6.509	38.464	1.242	6.898	37.208
6	1.115	6.194	44.658	1.115	6.194	44.658	1.220	6.778	43.986
7	1.087	6.037	50.695	1.087	6.037	50.695	1.161	6.450	50.435
8	1.033	5.741	56.436	1.033	5.741	56.436	1.080	6.001	56.436
9	.990	5.501	61.937						
10	.962	5.346	67.283						
11	.880	4.890	72.173						
12	.857	4.763	76.936						
13	.787	4.372	81.308						
14	.731	4.059	85.367						
15	.725	4.028	89.395						
16	.717	3.984	93.379						
17	.650	3.609	96.989						
18	.542	3.011	100.000						
Extraction Method: Principal Component Analysis.									

Table 8 tells us the reliability statistics in our study. Table 7

Table 8

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.001	.003	18

Communalities: The communalities which are the proportion of each variable's variance that can be explained by the principal components are given in Table 9.
The communalities explain the common variance in the data structure.

Table 9

Communalities		
	Initial	Extraction
Lineman Skills	1.000	.572
Wireman Skills	1.000	.531
Plumbing Skills	1.000	.585
Foundry man	1.000	.608
Carpenters Skills	1.000	.481
Sheet Metal Works	1.000	.455
Welding Skills	1.000	.605
Masonry	1.000	.664
Gas Cutter	1.000	.630
Electrician	1.000	.589
Draughtsman (Civil) Skills	1.000	.634
Surveyor's Skills	1.000	.481
Fitter's Skills	1.000	.456
Turner Skills	1.000	.619
Crane Mechanic	1.000	.635
Draughtsman (Mechanical)	1.000	.478
Crane Operating Skills	1.000	.466
Welding Skills (Pipes & Pressure Vessels)	1.000	.668
Extraction Method: Principal Component Analysis.		

Component matrix: The component matrix values are given in Table10 before the rotation. The component matrix values less than 0.4 are not useful for the inference and hence they are suppressed

Table 10

Component Matrix[a]								
	Component							
	1	2	3	4	5	6	7	8
Welding Skills (Pipes & Pressure Vessels)	.735							
Welding Skills	.639							
Crane Operating Skills	.540							
Gas Cutter		.545						
Electrician		-.464	-.419					
Wireman Skills			-.518					
Lineman Skills			.502					
Draughtsman (Mechanical)								
Fitter's Skills	-.409			.486				
Foundry man				-.472				
Surveyor's Skills				-.444				
Plumbing Skills					-.675			
Sheet Metal Works					.417			
Crane Mechanic				-.454		.468		
Draughtsman (Civil) Skills						-.466	.565	
Carpenters Skills							.451	
Turner Skills								-.602
Masonry							-.435	.535
Extraction Method: Principal Component Analysis.								
a. 8 components extracted.								

Rotated component matrix: The loadings given in the first stage of the factor analysis are rotated to get another set of loadings in order to have a best fit between observed variances and co variances. The rotated component matrix values are given in Table 11.

Table 11

Rotated Component Matrix[a]								
	Component							
	1	2	3	4	5	6	7	8
Welding Skills (Pipes & Pressure Vessels)	.803							
Welding Skills	.729							
Crane Operating Skills								
Plumbing Skills		-.642						
Sheet Metal Works		.573						
Lineman Skills		.510						
Surveyor's Skills			-.673					
Fitter's Skills			.485					
Foundry man				-.756				
Electrician				.702				
Wireman Skills					-.673			
Draughtsman (Mechanical)					.661			
Gas Cutter						.689		
Carpenters Skills						.642		
Draughtsman (Civil) Skills							.743	
Crane Mechanic							-.604	
Masonry								.707
Turner Skills								-.646
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]								
a. Rotation converged in 10 iterations.								

Table 11Since the objective of activity was to identify the skill gaps hence, the significance was determined as per hair Etall 1998, Comrey and lee (1992). Hair Etall 1998 give rules of thumb for accessing the practical significance of standardized factor loadings as denoted by either the component coefficients in the case of principal components, the factor matrix (in a single factor model or an uncorrelated multiple factor model or the pattern matrix (in a correlated multiple factor model) as per hair Etall, for a sample size of more than 120 factor loading of 0.50 may be treated as practically significant. Comrey and lee 1992 suggest a more stringent cutoffs as 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good) or 0.71 (excellent). The present study considered the cut-off of 0.63 (very good) as the practical significance cut-off for identifying activity wise significant skill gap.

V. INTERPRETATION

As per the table (rotated component matrix) the identified significant skill gaps are welding skills (pipes & pressure vessels) 0.803, welding skills 0.729, electrician 0.702, Draughtsman (mechanical) 0.661, gas cutter 0.689, carpenters skill 0.642, draughtsman (civil) 0.743, Masonry 0.707. In the electro- mechanical stage of small hydro power construction projects.

VI. RECOMMENDATIONS & CONCLUSION

Project developers should contribute to building up of skilled man power in the project area in various trades required by the project to promote better employment opportunities to local population. Existing ITI may be adopted by them to provide modern workshop facilities, arranging guest faculty to train the instructors and students. In areas where ITI is not existing, new ITI could be opened by the project developers. These activities should be taken up well before commencing the main construction activities to ensure timely availability of skilled manpower for the contractors/sub-contractors and for meeting their own requirements. (HYDRO DEVELOPMENT PLAN FOR 12TH FIVE YEAR PLAN 2012-2017, September 2008). The Secretary of Power and Minister of Power signed a mutual framework document to conceptually agree upon generating additional 15956MW capacity building. They also identifies the need to train 16225 persons at NTPI and conduct 132,000 training session per week in order to achieve the required additional capacity. (Chawla, Sep-Oct. 2012). The community must understand that the why, when and how participation will be effective than just undertaking ‘who’ in the participation process. Another important factor that can benefit the understanding is the cost/benefit approach in the social process. Both the approaches must be considered as scope for future research. Each job requirement must be thoroughly analyzed and based on the analysis each type of required skilled workforce must suggest inputs from their domain that need to be included and updated in the educational curriculum. For this an in-depth analysis must be done and sync it with the teaching and training program to help the workforce become competitive. Research suggests that renewable energy projects can become more locally divisive and controversial if benefits are not generally shared among local people. Considerations of equity and the distribution of costs and benefits have been shown to be important in local debates about many development proposals and in this respect community projects are no different—indeed labeling a project as community and then local people feeling they are getting nothing out of it will itself simply increase the scope for resentment and objection. (Walkera & Devine-Wright, 28-11-2007)

More awareness needs to be spread on understanding the deeper meaning on community and the renewable energy together. Local advises and a consultation needs to be made and education must impart to locals to understand the mutual benefit for the local community and their support to renewable energy sources. The energy awareness and ‘‘provoked’’ energy-efficient behavior must be established through repetition during the school years of project implementation and through the repetition of similar projects during the following school years or/and through more general energy information/awareness projects for youngsters or citizens. This way we ‘‘integrate’’ the energy-efficient behavior into the normal everyday behavior, even though in absence of exogenous inducement to energy saving.

BIBLIOGRAPHY

[1]. Walkera, G., & Devine-Wright, P. (28-11-2007). Community renewable energy: What should it mean?
[2]. Chandrasekaran, K. (2016, June 10). Retrieved from The Economic Times: http://economictimes.indiatimes.com/industry/energy/power/capacity-for-renewable-energy-in-india-hits-42850-mw-surpasses-capacity-of-hydel-projects/articleshow/52680042.cms
[3]. Chawla, Y. P. (Sep-Oct. 2012). (Re) Evolution in HR Strategies - Power Sector .
[4]. DEVELOPMENT OF HYDRO SECTOR, F. T. (2013-14). STANDING COMMITTEE ON ENERGY . NEW DELHI : FIFTEENTH LOK SABHA ; MINISTRY OF POWER .
[5]. Dhoot, V. (2013, July 8). Economic Times. Retrieved from http://articles.economictimes.indiatimes.com/2013-07-08/news/40443485_1_land-acquisition-projects-lakh-crore
[6]. García-Álvarez, M. T., & Mariz-Pére, R. M. (8/1/2012). Analysis Of Employment And Job Profiles Of Renewable Energy: The Case Of The European Union.
[7]. (September 2008). HYDRO DEVELOPMENT PLAN FOR 12TH FIVE YEAR PLAN 2012-2017. Central Electricity Authority HYDRO PLANNING & INVESTIGATION DIVISION .
[8]. KumarKundu, G., & Mishra, B. (3/9/2012). Impact of reform and privatisation on employees a case study of power sector reform in Orissa,India.
[9]. Lambert, R. J., & PereiraSilva, P. (6/27/2012). The challengesofdeterminingtheemploymenteffectsofrenewableenergy.
[10]. Moreno, B., & Jesu´s Lo´ pez, A. (10/31/2006). The effect of renewable energy on employment.The case of Asturias (Spain).
[11]. Mulugetta, Y. (1/22/2007). Human capacity and institutional development towards a sustainable energy future in Ethiopia .
[12]. NSDC. (2012-17). Human and Skill Requirements in the Capital Goods Sector. NSDC.
[13]. Rustico, L., & Sperotti, F. (2012). Working conditions in “green jobs”: Women in the renewable energy sector.
[14]. Tourkolias, C., Mirasgedis, S., & Damigos, D. (6/3/2009). Employmentbenefitsofelectricitygeneration:Acomparativeassessmentof lignite andnaturalgaspowerplantsinGreece.
[15]. Tourkoliasa, c., & Mirasgedis, s. (2/22/2011). Quantification and monetization of employment benefits associated with renewable energy technologies in Greece.
[16]. UJVNL. (2015). Details of Hydro Power Projects/Potential in Uttarakhand. Uttrakhand.