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USAID ENERGY POLICY PROGRAM

POST-TRAINING EVALUATION BEST PRACTICES IN THERMAL OPERATIONS AND MAINTENANCE

MAY 19 – 30, 2014

June 2014

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PARTICIPANT TRAINING PROGRAM POST-TRAINING EVALUATION

Training dates: May 19 – 30, 2014

The Energy Policy Program (EPP) successfully delivered the second of three anticipated training courses on *Best Practices in Thermal Operations and Maintenance (O&M)* from May 19 – 30, 2014 in Islamabad, Pakistan. Twenty participants (all male) from three GENCOs, including Muzaffargarh, Jamshoro, and Guddu Thermal Power stations, were in attendance. International power sector experts Dr. Ilyas Anjum and Ken Frazier from United States of America led the training course.

The first training course was held from March 31st to April 11, 2014.

The two-week course was focused on preventive maintenance, plant operation efficiency, protection, instrumentation, heat rate testing, safety, project management and financing, tariff strategies, reliability, and fuel management. The training intended to boost the GENCOs abilities and reinforce the equipment, instruments, and processes that the EPP has instilled in the GENCOs since G2G began.

Key Participant Indicators

- Number of Participants Trained: 20
- Gender Disaggregation: 100% Male

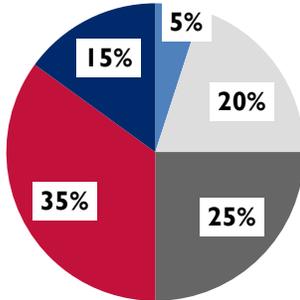
Upon conclusion of the course, post-training evaluation forms with ten questions were presented to and completed by all of the participants. The summary data from the evaluation forms is presented, below:

Please tick in appropriate box: 5 outstanding, 4 very good, 3 satisfactory, 2 needs improvement, 1 did not meet expectations

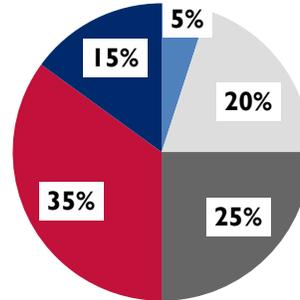
	Did not meet expectations	Needs improvement	Satisfactory	Very good	Outstanding
Relevance to your organization's work area	1	4	5	7	3
Relevance to your work within the organization	1	4	5	7	3
Structure of the program	2	1	3	12	2
Topics covered in the program	3	1	3	11	2
Quality of class room interactions	2	2	3	11	2
Quality of training and reading materials	3	3	0	8	6
Appropriateness of reading materials	3	2	1	11	3
Quality of Speakers/Trainers	2	1	1	6	8
Training Content & Relevance	3	1	2	9	5
Trainer/Speaker Effectiveness	2	2	1	9	6

According to participant responses, the below pie charts illustrate the “satisfaction rating figures” for each category:

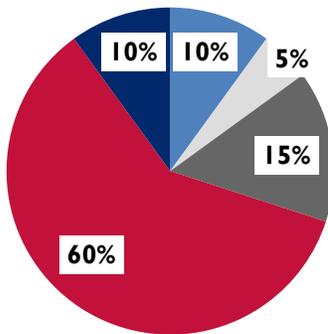
Relevance to your organization’s work area



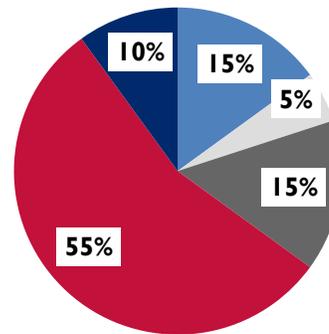
Relevance to your work within the organization



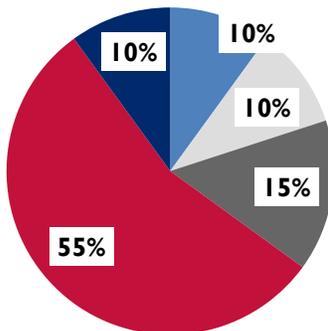
Structure of the program



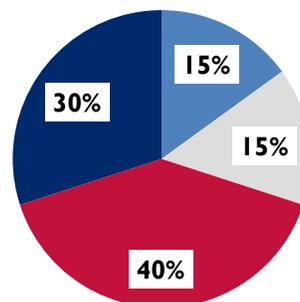
Topics covered in the program



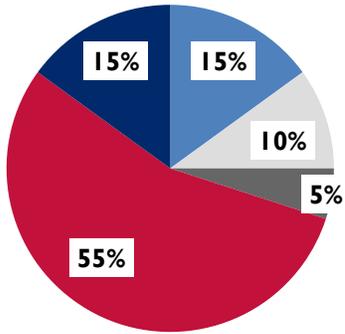
Quality of class room interactions



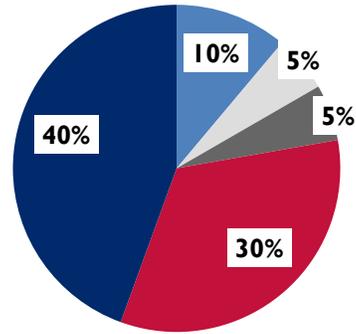
Quality of training and reading materials



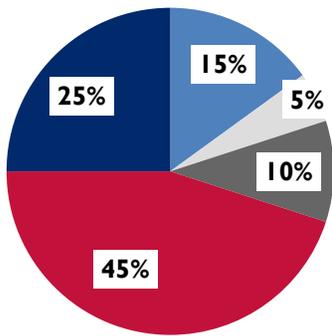
Appropriateness of reading materials



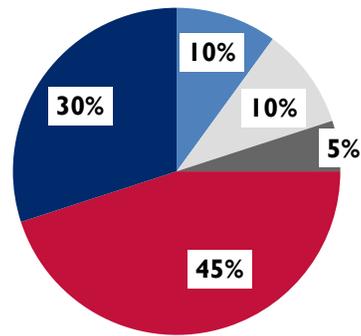
Quality of Speakers/Trainers



Training Content & Relevance



Trainer/Speaker Effectiveness



Did not meet expectations Needs improvement Satisfactory Very good Outstanding

SPECIFIC PARTICIPANT FEEDBACK

Please share any other observation or comments regarding the trainer/training program/logistics:

Sixteen participants recorded their responses to this question. A significant number of participants mentioned that the training program was very interesting and detailed; the trainer delivered the course in an excellent manner and provided very useful techniques which can be beneficial for their organization too. They shared:

- *“The training program was indeed beneficial and motivating”*
- *“The trainers were very cooperative”*
- *“The program is beneficial for the improvement of the organization's output. The trainer(s) were the persons who have knowledge and they tried their best with respect to time”*
- *“The trainers were outstanding, hardworking, they taught us in friendly environment, their knowledge regarding course was very good. I am totally satisfied and feeling happy to learn from them”*
- *“The training program was indeed beneficial and motivating”*
- *“The learned skills will definitely contribute to increase the efficiency of the overall power plant and it will help creating a conducive the atmosphere in the organization.”*

From the above responses it seemed that participants would definitely take back to their own workplaces a better understanding and new techniques of operation & maintenance systems for efficiency of thermal power plants.

Some of the participants had following observation that could have been made training better:

- *“Everything is good except seating arrangement during class it is really difficult for last seater to see power point slides”*
- *“15 days training period was less, it may be extended up to one month to cover on simulator program”*
- *“Field video program should be shown related to O&M”*
- *“Trainer and training was very good, but it should be on site training at any power plant of developed country, it will more beneficial, it has been learned from training that the culture of GENCOs should be changed hence it is only possible to show the culture of developed countries and their organization, the logistics need improvement keeping in view the actual requirements of trainers”*

Before you received this training, how would you describe your knowledge of operation and maintenance systems and procedures required for thermal power?

The above question was placed in the form to find the participant's level of knowledge that what participants knew about O&M systems and procedure before this training program. Many of the participants believed that before attending the training program they have had basic and limited knowledge of O&M systems and procedures. They stated:

- *“Before this program, I had basic knowledge of O&M systems and procedures but through this training I gained knowledge of latest techniques”*
- *“Before this training I was only aware from old systems and method regarding power plant operation and maintenance. Now I am aware from modern techniques of power plant operation and maintenance”*
- *“After receiving this program my knowledge of operation and maintenance system enhanced and it is useful for my plant and for me”*

- *“I worked in operation and maintenance both of thermal power plants I possess appreciable knowledge about Operation and I&C/ Electrical maintenance but this training enhanced my knowledge and it will help In applying the knowledge effectively”*
- *“By this training, I learned/gained technical knowledge what's going on in developed countries, how they run/operate their plants and what's the latest technologies they are using”*
- *“Before the training my knowledge was sufficient for operation & maintenance systems depending on the experience this training improved my knowledge sufficiently”*
- *“My knowledge had certainly increased during this training session, it was more than a refresher for technical point of view for managerial and administrative skills and course new things have been learned”*
- *“I knew satisfactory level regarding knowledge of O&M but this program has given me best information and I obtained and gained more knowledge regarding to the question asked”*

What specific skill (s) did you gain as a result of this training?

Participants were asked the above question to know what specific skills they acquired after attending this training program. A significant number of participants have shared the new skills they gained from this training and that would be also useful for them at their work. They mentioned:

- *“I got the skills of proper utilization of the resources especially for preventive maintenance program”*
- *“I have learned many things about the operations of different power plants and their frames designs. As this training has little part of I&E, so I was expecting more in this field”*
- *“As a result of this training I got much knowledge about to improve the efficiency and heat rate of power plant and their method of improvement to learn about management was a specific skill which I gain here in this training”*
- *“Following skills I gained during this training: 1) Different types of culture, 2) Now ways to carrying out different maintenance program. 3) Calculate the heat rate & efficiency of power plant through heat balance sheet”*
- *“I gained knowledge in computing heat rate and heat balancing of thermal power plant, I also gained knowledge in I & C and operations of power plant effectively”*
- *“I have gained very much knowledge i.e. culture management (how to manage people in order to get work from them) also I have learned technical knowledge”*
- *“I gained the different specific skills from the training such as how to improve the efficiency of the power plant how to measure as well as decrease the best rate of the power plant etc.”*
- *“I did really know that energy oriented persists anywhere through the globe except few”*
- *“As a result of training, this has increased the specific skill regarding heat rate efficiency importance in plant and also importance of heat balance also”*

In the future, how will you apply what you have learned? Please detail how you will leverage and deploy any knowledge you have gained

The above question was placed in the form to know that how the participants will apply in future at their respective power plants what they have learned from this training program. Most of the participants shared that they planned to contaminate the knowledge they gained as a result of this training to their subordinates and other co-workers. Following are the responses

- *“As I am working in Maintenance Management Department, I will apply the maintenance approaches and techniques that I have learned”*
- *“I believe that the knowledge I have got from this training will be shared among all those who could not attend the training with the help of discussion”*
- *“As we have learned in this training about change in culture, work with safety principles and best practices in O & M. I shall try my best to work in my section accordingly as I have learned in this training.”*
- *“I will try my best to implement whatever I got from here. I will try to change the old maintenance system with new modern techniques and will try to adapt the procedure of maintenance which I learned here”*
- *“I will deliver this training program to my subordinate regarding operation & maintenance procedure. I will try to introduce detail oriented culture as I think it is best for any power plant/industry to proceed further”*
- *“I am electrical engineer unit no.4, I will use by the techniques of maintenance management for maintenance of implementing electrical equipment”*
- *“I tried my best to implement the technical skill in my plant which I gained from training also I motivate the people and will like to change the culture”*
- *“I will apply the gained knowledge to my work place to optimize the whole culture of thermal generation”*
- *“As an engineer I am responsible for my sub-ordinates to let them know what I have learned during the course, I will implement and improve culture of development under my justification”*

How will your organization benefit from Thermal Operation and Maintenance (O&M) Training in both the short-term and long-term?

All the participants responded to this question, with a variety of answers. A significant number of participants highlighted the value of the heat rate efficiency. As they mentioned:

- *“In short, I will try to carryout calculation regarding heat/energy loss, heat rate & efficiency of different equipment. In long term, I will try to carryout maintenance of different equipment as international standards”*
- *“The skills learned here will be very beneficial for my organization, to bring my plant economical I shall help the people involve in calculation of heat rate efficiency of the plant by utilizing heat energy fully”*
- *“The organization will benefit as by running the power plant on high efficiency and low heat rate by applying the techniques given in the thermal O&M training”*
- *“The benefit of this O&M training is the heat rate efficiency and overcome the additional losses, we can make the plant better by proper heat rate calculation and saving our extra auxiliary power consumption this is very good training for thermal plant structure”*
- *“In short term, we may point out easily the areas that are affecting heat rate and efficiency and for the long term I can at least inform the management about necessary considerations before going for any replacement, rehabilitation or procurement of spare and equipment”*

Few of the participants mentioned the change of organizational culture, as they said:

- *“In short term I would first try to improve myself and my team, I would try to adopt the practices learned here, In long term I would try to influence my high ups and staff on our organizational culture change”*
- *“Until and unless the culture of organization is not changed, any training will not be more beneficial”*
- *“Thermal O&M training was very essential for our organization so that culture/environment met with developed countries and latest technologies implement in our plant”*

What was missing in the Thermal Operation and Maintenance Training?

To identify the missing contents of the training, the above question was placed in the form to know whether the training contents fulfilled the requirements or not. Two participant specifically commented that they were satisfied with the course and they do not think that any major part was missing in this training mostly things covered in this course. They commented:

- *“I don't think any major part missing in this training. Most of things completed in this course in my point of view”*
- *“All are involved in this training that we need, this type of training will be continue in future”*

Whilst another two would have liked to learn more as they complained that the duration of the training was short. They shared that:

- *“We were short of time if we had been provided with more time so it would have been more knowledgeable for us”*
- *“Everything is Okay but time is too short if time period will increased then its more beneficial for personal and organization”*

The majority participants highlighted the need for practical and field visits, they believed it could have been better if the training was delivered on-job at their power plant. They commented:

- *“On job training or visit to a model plant for understanding of Plant's culture”*
- *“The training although covers almost all the areas but if "on Job training" possible, it will be even more beneficial. More time should be allocated for the demonstration our simulator”*
- *“The training topics covered mostly areas of power system but the one thing that I found missing is that there was nothing about electrical field like protection, electrical control relays etc. If these topics are covered then this thing will make the training more marvelous and beneficial”*
- *“There should be visit of nearest power plant so that we can compare the IPPs with GENCOs and make but change culture in our plant”*
- *“In the thermal O&M training everything is cleared in my opinion it could be better if the training would be given on job for few days long, this training was beneficial”*
- *“This training would be very much effective if conducted an job in USA, as we can see the culture/environment in which these practices are adopt”*
- *“There was a need of on job training”*

Do you have any suggestions for how we could improve future Thermal Operation and Maintenance trainings?

In order to improve the training course, the above question was asked to the participants to know what they suggest for the improvement of Thermal Operational and Maintenance training course. All the participants responded to this. Following are the suggestions and views expressed by the participants to improve future courses.

- *“I am satisfied with the present status. I any how think if more technical data about electrical protection system is covered in course content then it will be very helpful for us.”*
- *“By continuing this training for almost of the employees up to the extent possible. Also if possible the simulator (s) may be supplied in each power plant (s) as they newly and existing employees may be trained properly”*
- *“As we learned about improvement in our culture in our organization. We must aware and watch this culture live. In this regard it is suggested that please visit to culture oriented organization may be arranged. This shall help us to watch this culture ourselves.”*
- *“The instructor spent whole day on mechanical seal leakage which is not justified. Instead of above mentioned topic brief description of importance of chemical section (what chemicals are being used in thermal plant and what they do) and operation and maintenance of switch yard with safety be included please”*
- *“Thermal operation and maintenance training could be improved by increasing the training duration two weeks training was not sufficient for such type of training.”*
- *“This training was very much helpful if we built the atmosphere/culture of best practices in our plants it will be good if people see the environment at which they are adopted so it is suggested that training must be conducted in these countries, where culture is present”*
- *“These trainings may be arranged outside the Pakistan by showing the on job best practice of developed county's power plant practically, as the engineers of DISCOS have already been trained from Thailand, The practical on site experience will be fruit full”*
- *“What we have studied its only on paper, almost all the things about plant culture, safety, management are aliens to us, so far in future trainings at least one plant/organization must be seen as an example for trainee so that they have a set reference”*
- *“It need study on realistic way basically it's time to change the old culture of GENCOs so that need to collect new ideas and compete it for better improve future thermal O&M training”*
- *“There should be a video package regarding practical process of steam thermal power as well as Gas turbine power station and combine cycle power plant also.”*

Conclusion:

The overall feedback confirms that this training program was a great success. The trainers, their teaching methodology and environment were highly rated, and the course met all participants' expectations, providing them with useful knowledge and techniques to take back to their own power plants. The above comments clearly demonstrate the value of their learning. No doubt, the course content and trainers received high praise as well. Though participants expressed a desire for more duration of the training program, they seemed unsatisfied with the two weeks duration of the program. Another issue, which requires refinement in future iterations of this course, is the more practical work and visit to any power plant to see their culture of organization as well or they would be happy if the training, was held on-job at their own power plant.

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