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USAID ENERGY POLICY PROGRAM

POST-TRAINING EVALUATION BEST PRACTICES IN THERMAL OPERATIONS AND MAINTENANCE

JUNE 9 – 20, 2014

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Best Practices in Thermal Operations and Maintenance

POST-TRAINING EVALUATION

Training dates: June 9 – 20, 2014

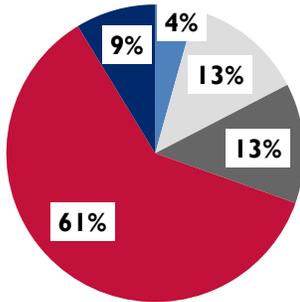
A total of twenty five participants attended the training program including included twenty GENCO staff from Guddu, Jamshoro and Muzaffargarh Thermal Power Stations and five females. Four of the five females recently completed their Bachelors in Electrical Engineering degrees from NUST – School of Electrical Engineering and Computer Science (SEECs), Islamabad. The fifth female participant was a lecturer from the Electrical Engineering Department, Air University. Twenty three of the Twenty five participants filled up the evaluation forms and returned back. The following is a summary of their responses.

The first part was related to various aspects of the training program. Participants were asked to provide ratings from 1 to 5 with 1 for “Did not meet expectations” and 5 for “Outstanding”

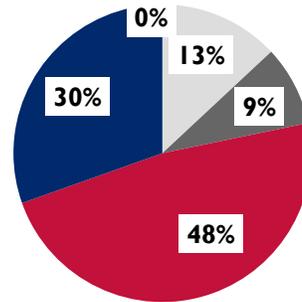
5 = Outstanding, 4 = Very good, 3 = Satisfactory, 2 = Needs Improvement, 1 = Did not meet expectations

	Did not meet expectations	Needs improvement	Satisfactory	Very good	Outstanding
Relevance to your organization’s work area	1	3	3	14	2
Relevance to your work within the organization	0	3	2	11	7
Structure of the program	1	3	3	10	5
Topics covered in the program	3	1	7	9	3
Quality of class room interactions	1	3	0	8	11
Quality of training and reading materials	2	2	0	7	11
Appropriateness of reading materials	0	4	1	10	7
Quality of Speakers/Trainers	2	3	1	6	11
Training Content & Relevance	0	3	4	11	5
Trainer/Speaker Effectiveness	0	3	1	7	12

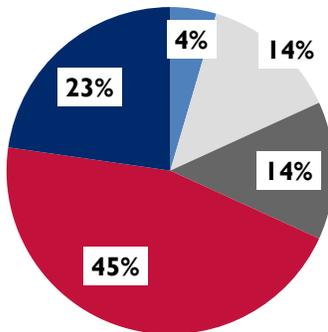
Relevance to your organization's work area



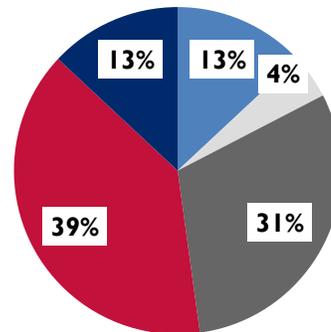
Relevance to your work within the organization



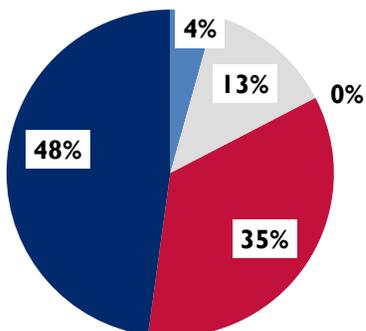
Structure of the program



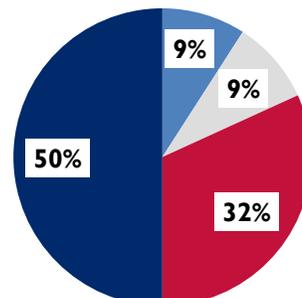
Topics covered in the program



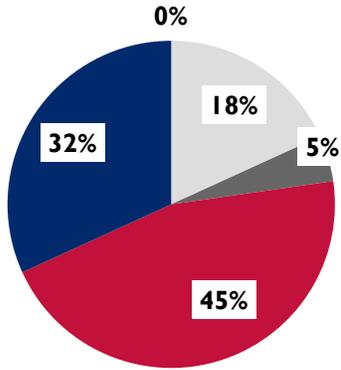
Quality of class room interactions



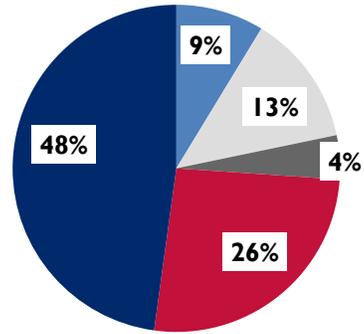
Quality of training and reading materials



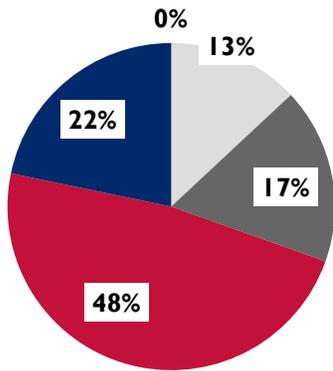
Appropriateness of reading materials



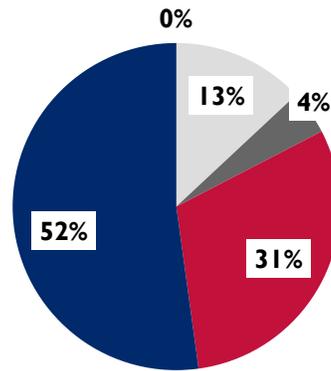
Quality of Speakers/Trainers



Training Content & Relevance



Trainer/Speaker Effectiveness



Did not meet expectations Needs improvement Satisfactory Very good Outstanding

PARTICIPANT'S FEEDBACK

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

Twenty three participants responded to this question. Many of the participants seemed quite satisfied with the training environment and trainers, they especially appreciated the knowledge and experience of Mr. Ken, They said:

- *“Trainers and training program was observed very effective, I gained and refresh my experience and knowledge even more than ever”*
- *“Both trainers provided information on their lectures were very good and we gained lot of technical knowledge”*
- *“Practically Mr. Ken was very good and has practical experience While Mr. Ilyas Anjum does have practical experience.”*
- *“Overall it was great, the instructors were very helpful and they answered all our questions and explained everything in detail”*
- *“Training was effective and quite useful, Trainers were very nice & experienced persons. I have learnt a lot , It would have been better if we have 2, 3 hour lecture on basics of plant on 1st day”*
- *“Logistics very well managed up to the mark, Trainer Mr. Ken from abroad having well experience of plants and shared a lot, However Mr. Ilyas Anjum has no practical experience at all his PHD is also in plant mechanics, he did not touch the topic of electrical and instrumentation maintenance, all attention was on simulator”*

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

- *“The duration compared to material was short, Need more trainings of simulator”*
- *“There should be more time and topics to be covered”*
- *“This training could become more beneficial, if all fields especially electrical side should be covered and length also.”*
- *“The problems we are facing in our plants are totally different, we do not have necessary resources (Finance, Managerial & Human) at our plant. Trainer always takes about ideal conditions. The gap between the real situation & ideal one minimized. It was not discussed here”*
- *“Training received was good but needs to improve as period was too short it must be one month and with laptops arrangement for special simulator purpose please”*
- *“Due to shortage of time, Electrical related and Instrumentation & control related sections could not explained in depth”*
- *“The program was for a good cause, but due to shortage of time so many things were not discussed deeply”*
- *“Time duration for this is short as compared to training material, the training of simulator need more time individual participants on separate PC provided”*

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

The participants were asked the above question to know the level of their knowledge that what participants knew about O&M systems and procedure before this training program. According to the responses it showed that the participants have strong positive impacts from the program they learned, they stated:

- *“My experience in operation is 21 years so most concepts of gas turbine and combined cycle knowledge has improved”*
- *“Now I can do better in the area of operation and maintenance of power plant”*

- *“My knowledge of O&M prior to this training was not up to date, I learned the new and advance O&M practices”*
- *“After receiving the training of operation and maintenance I have improved my knowledge and refresh the previous experience”*
- *“Before this training my knowledge about O&M systems was good but this training made our knowledge very good and my concept become clearer”*
- *“Though I had field experience since long but got additional knowledge from this training”*
- *“I had good knowledge but there were so many topics from which we can increase the plant efficiency, those we learned here”*
- *“I would say my knowledge was 5% approximately before attending this workshop but now I would say more than 50%”*
- *“Before this training my knowledge about thermal O&M systems was good but this training made our knowledge very good”*
- *“Before receiving this training our knowledge of operation and maintenance was not sufficient and after receiving this training we are now able to perform well”*
- *“Before this training my knowledge was not up to date about the latest power plants as we have the CCPP, but with single boiler, In training we become familiar to power the efficiency of power plant”*
- *“Before, the training we have the basics knowledge and skills much effective as we have now after this training we were unaware of these latest techniques for operation and maintenance, which are presently used in developed countries, we were taught here all latest plant operation and maintenance techniques by trainers”*

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

Participants expressed that they had learnt new knowledge, skills and experience from this course. In particular, they found “Efficiency of plant”, “Heat rate”, “Turbine”, “Simulator Operation” and “Tariff” specific skills which they gained from this training, they mentioned:

- *“Efficiency of each victim i.e. Turbine, condenser, super heater individual can be analyzed so caused for improvement”*
- *“I learned how to change the organizational culture to implement the best practices of O&M”*
- *“Heat rate, evaluation of focusing on proper maintenance of the equipment's for max, availability and achieving improved efficiency”*
- *“We learned theoretically and practically these things through which we can increase the efficiency by decreasing the heat rate of the plant.”*
- *“The best thing that I have learned during the training is that this training session was that can increase plant efficiency without any expenditure and also by proper planning and plant run-time can be increased”*
- *“I learned a lot about power plants, its operation and maintenance. I learnt about practical problems in plants Also I have learned that if I am determined to do something, I will make impact.”*
- *“We gain skills regarding the operation and maintenance world of the power plant, specially we learn more about heat rate etc.”*
- *“Though I have learned many skills about O&M to improve power plant efficiency, the topic which is most important for me: how to improve power efficiency and heat rate”*
- *“Much more gained in this training majority things through which we can improve the efficiency of plant, reliability of availability be ensured learn in this training, May latest plants comes into over knowledge as in CCPP about banner improve”*

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

To know that how the participants will apply in future what they have learned from this training program, the above question was asked. Many of the participants identified that the training was very useful and beneficial to their current work/assignment in the organization. They responded that this training was very useful for both the future and the present work. They committed to apply the knowledge, skills, and experiences they learned from this course to share, exchange, and transfer to their employees and workmates in the organization, they shared:

- *“I will share the knowledge with all concerned in order to do better for power plant and make Roshan Pakistan”*
- *“I will discuss with my fellows and seniors about how beneficial is the use of best practices of O&M and will try to implement as much as I can”*
- *“Try our best to apply on real, every cycle of power plant”*
- *“After this training, I will try to work in those areas of my plant which has losses & try to minimize those losses by applying best practices”*
- *“I will try my level best to utilize this information or knowledge which I have gained here, specially try to improve heat rate and minimizing the leakages of steam and improves the availability of material”*
- *“I will try my best knowledge to improve the maintenance systems for upgrading the I&C systems with the latest DCS systems”*
- *“In future I cannot apply this totally because there was no corporate culture but I will apply in public sector so to follow the organization's rules”*
- *“When we will return back at our plant we will try best to enhance the capacity, improve the efficiency by these best practices”*
- *“If I got a job in power sector then first I would implement "best practices" and would also guide my fellows over there”*
- *“In future at my plant I will trained in this way to sub-ordinate & motive above how to improve the plant through taking some minimum efforts”*
- *“The knowledge and skills which I have gained during this training will apply in field at thermal power plant to improve efficiency and performance of power plant”*

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

One of the most important benefits of training for an organization is that, it provides skills inside the organization which reduces overall cost of an organization's operations. This Training increased an employer commitment to their job and their organization, below results of the training showed that the participants have strong positive impacts from the training. This training added more value for the participants in their work. They said:

- *“Trainings are always beneficial for organization and trainees”*
- *“By using thermal O&M, plant productivity and performance will increase and in long term it will be very useful for the country”*
- *“Such type of training programs should be arranged at thermal O&M training center, it can become more beneficial for power house employees also”*
- *“In this training we learned a lot new techniques of operation & maintenance was given to us, hopefully by using all it will be benefit for the organization and it will help to improve our organization's productivity”*
- *“In short term the operation of plant will become smooth and in long term, as best practices rules will be employed in maintenance, I will improve plant reliability”*
- *“In this training we learned a lot about new technologies of O&M systems, I will further transfer these technologies to my organization”*
- *“The training will help in improving methods and culture in organization, better ways of doing things and also some new technologies has been introduced, it help me doing things in better ways and it will help people working under me, do things in better way”*
- *“The O&M training was good unique and easy to understand, Our GENCO definitely benefit from this training by utilizing skills which we gained from this training”*
- *“Our organization facing a very severe problems many times we face emergency situations and it away cause damages, however by using our skills and knowledge which we gain in this training we will be able avoid any mishaps and will get max out”*

What was missing in the Thermal Operation and Maintenance Training?

To find out the missing contents of the training, the above question was asked to the participants to know whether the training contents fulfilled the requirements or not. Two of the participants have complained that the duration of the training was short. They shared that:

- *“I think nothing was missing but the time was too short to go through the course material in depth”*
- *“Total days were less therefore many topics could not be covered in detail so there should be more days and more topics”*

Five of the participants highlighted that there were few other topics which were not included in the training program. They believed it could have been better if those topics could be added to the course contents, they commented:

- *“The complete course specially in the electrical field was not covered because of short period of time”*
- *“Unfortunately most of the topics belong to operation side and mechanical side. Maintenance issues specially electrical side not discussed as it was expected”*
- *“Electrical section & I&C section were missing”*
- *“All things covered in this training except electrical, Electrical need improvement in this training program”*
- *“This training mainly covered electrical, instrumental, mechanical and operation side but did not cover power plant chemistry that how can we improve power plant performance by best water particle”*

Four of the participants showed their interest in field visit to any power plant. Following are their responses against missing part of the training program:

- *“There is a huge culture difference, so I believe, training would be much better if its arranged in field in thermal plant with real life problems, as students trainees it would be more effective if we had small trip to any thermal power plant”*
- *“Practical experience at the power plants, Visit to power plant, if included in the next training program will benefit the student trainees”*
- *“Visits of IPPS power station and its related advance DCS systems”*
- *“Visit of latest CCPP(power plants in developed countries (like USA, Japan) to observe practically their operation and maintenance activities and latest technologies”*

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. Total of Twenty three participants responded to this. Following are the suggestions and feedbacks raised by the participants to improve future courses.

- *“Should provide material in hand form so that individual can have facility to read at any time”*
- *“In future plant control, Instrumentation and protection should have more portions”*
- *“Good program, you may continue so that other persons can also participate”*
- *“Along with theoretical training, visits of IPP's power station and its related advance systems for control system may also be included this should even strengthen trainees knowledge for best applications at their respective stations”*
- *“One thing above which I have discussed other there may be insufficient electrical topics & in future there may be an electrical trainer and electrical topics may be discussed to improve the efficiency”*
- *“Please improve it by providing detail knowledge of all section and by providing video lectures”*
- *“If the time period of training could increase, it will be good so that everything should be discussed in deep and also those plants should be visited where they used these best practices”*
- *“The training material provides in hard form, If it could be in Tablet/PC laptop so that individual can have facility to read at any time and discussed in class as well, so that a better communication can be establish, Needs some physical switch gear, much gears or models so that, participants can have complete knowledge of this physical visit of good plants local foreign for comparison”*
- *“Yes, as explained earlier time spam should be increased and number of training hours per day be decreased so to get proper attention of the participants”*
- *“Theoretically cover most of the thing except technical tours which may improve the practical knowledge, also need more about the practice and technical visits of the other plant”*
- *“Thermal O&M training can be improve if it also includes the training about power plant chemistry, to avoid scaling in boiler part.”*
- *“I will suggest to make a visit of developed countries power house to see their productive of O&M and their culture to adopt this thing in real at our power plant”*
- *“Theoretical part of the training must be minimized, although not concentrated a practical plant like Mr.Ken, Expert trainers in their own field can be more fruitful, Trainings for high-up officers, who are having decision power”*

Conclusion:

Overall, the program format worked well for participants and met the planned learning outcomes. Participants particularly enjoyed learning the training method. They could see relevance of the skills taught for their work. Participants believed that within the confines of the time constraints the course covers only useful material as some of the participants found the time duration was less, yet many other participants found it helpful to think further about applying course learnings directly to their situations.

However, participants expressed a desire to increase 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, was the more practical work and field visit to any power plant for practical experience.

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