



ENERGY COOPERATION BETWEEN THE EU, THE LITTORAL STATES OF THE BLACK & CASPIAN SEAS AND THEIR NEIGHBOURING COUNTRIES



# **Report, Capacity Building: Industrial Energy Audit Analysis for Bankable Projects**

**Task MD-47, Chisinau, Republic of Moldova**

**Financed by: EU- INOGATE Programme,  
Project: New ITS Project**

**The content of this report is the sole responsibility of the contractor and can in no way be taken as reflecting the views of the European Union**

**March 11-22, 2013**

## **Authors**

**Larry Good, CEA, CEM, Key Sustainable Energy Expert**

**Ali Korakan, CEA, Senior Sustainable Energy Expert**

**Vahan Babajanyan, Senior Finance Expert**

**Igor Zanoaga, Local Sustainable Energy Expert**

# Contents

1. SUMMARY .....	1
2. METHODOLOGY .....	2
3. ACTIVITIES.....	3
4. QUIZ.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
5. TTT .....	8
6. PARTICIPANTS .....	8
7. PARTICIPANT QUESTIONNAIRE.....	9

## APPENDICES (Separate electronic documents)

- Appendix 1:** List of seminar participants  
(Excel document in English)
- Appendix 2:** Agenda  
(Word document in English)
- Appendix 3:** Finance Lecture: “10 Steps to Determine Feasibility of EE Projects”  
(Power Point presentation in English and Russian)
- Appendix 4:** EE Lecture: “District Heating Pipe Insulation”  
(Excel document in English and Russian)
- Appendix 5:** Method Lecture “Reports & Presentations”  
(PowerPoint presentation in English and Russian)
- Appendix 6:** RES Lecture: “Solar Hot Water ECM”  
(Excel document in English and Russian)
- Appendix 7:** EE Exercise & Solution: “District Heating Pumps”  
(Excel document in English and Russian)
- Appendix 8:** RES Exercise & Solution: “Biogas”  
(Excel document in English and Russian)
- Appendix 9:** Participant Questionnaire  
(Word document in English and Russian)

## 1. SUMMARY

From March 12 to 14, 2013, and March 18 to 20, the team of New ITS Project experts conducted two workshops on industrial energy audit analysis for bankable projects in Chisinau, Republic of Moldova. In short, both events were extremely successful. These workshops were prepared based on the application submitted by the Agency for Energy Efficiency (AEE) of Moldova, for technical assistance under the INOGATE – New ITS Project Ad Hoc Expert Facility (AHEF).

The main objectives of this capacity building were

- To teach sound business practice using life cycle cost analysis in development of EE/RES projects;
- To teach how to optimize energy conservation measures (ECMs) for maximum benefit and avoid life cycle losses;
- To teach realistic analysis, free of hypothetical input, through rigorous reality checks.

AEE invited 30 participants for the first seminar and 33 participants for the second. Participants of the first seminar comprised:

### First Seminar:

10% (3) - Teachers from institutions capable of delivering training themselves (educational institutions, associations, chambers, consulting companies)

70% (21) - Energy auditors, designers and engineers

20% (6) - Authorities and municipalities

100% (30) - Total

Twenty two participants attended all three days and received certificates.



*Class of the first seminar*

Participants of the second seminar comprised:

6% (2) - Teachers from institutions capable of delivering training themselves (educational institutions, associations, chambers, consulting companies)

67% (22) - Energy auditors, designers and engineers

27% (9) - Authorities and municipalities

100% (33) - Total

Twenty three participants attended all three days and received certificates.



*Class of the second seminar*

All participants in the seminars received the training materials electronically, including the workshop exercises and all spread sheet tools that had been developed by the New ITS Project experts.

## **2. METHODOLOGY**

The seminars were designed and conducted in a workshop format where participants learned by doing. After introductory lectures, participants performed actual exercises with the New ITS Project analysis tool. Specifically, the work of the seminars had four different activities:

- General lectures
- Working group exercises
- Team presentations, discussion of exercise assignments
- Final quiz

The seminar achieved all intended results:

- Training participants to apply life cycle cost analysis to development of EE/RES projects
- Developing the training material, including lecture slides and workshop exercises
- Designating qualified trainers to further perpetuate teaching of the seminar skills
- Training trainers to teach other Moldovans in the future

All ITS recipients of technical assistance are required to contribute something toward the effort. In this case, the beneficiary, AEE, contributed the venue. The first workshop was conducted in a university lecture room, and the second in a modern business center conference room.

To prepare for this workshop, the ITS instructors developed new teaching material for Moldova. Bio-energy is very popular in Moldova. As evidence, Moldova had the biggest delegation with the most co-funding in the ITS bio-energy study tour last year in Slovakia. Therefore, this year ITS developed a workshop exercise to determine feasibility of a biogas cogeneration plant, similar to the subject of the study tour in Slovakia. ITS also developed two new modules on subjects of district heating, which receives a lot of attention in Moldova.

### 3. ACTIVITIES

#### 1st day

- a) Introduction to effective analysis of industrial energy audits
- b) EE lecture
- c) EE exercise



*New ITS Project key expert Larry Good delivering his lecture*

In the first half of the day the New ITS Project experts introduced the audience, the 10 steps of life cycle cost analysis for bankable projects and delivered a lecture on analysing an energy efficiency project. In the afternoon the participants were divided into groups to develop a district heating pumping energy conservation measure (ECM) based on given data.



*New ITS Project banking expert Vahan Babajanyan delivering his lecture*

2nd day

- a) Participant groups EE presentations of the results
- b) Discussion of ECM, its problems and ways to solve them
- c) Effective Reports & Presentations for Energy Audits lecture
- d) RES lecture, solar hot water for system
- e) RES exercise Biogas system



*Participants following a lecture*





*Energy audit expert Ali Korakan answering questions during working group presentations*



*Participant working in groups during workshop*



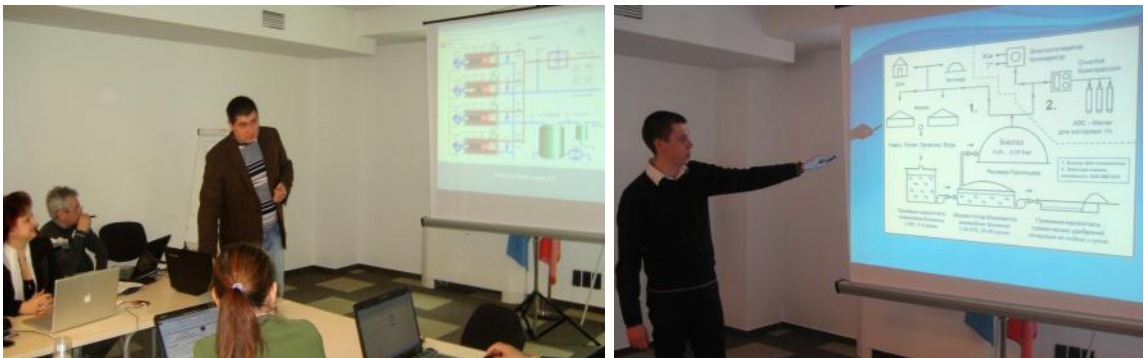
*Participant group solving the workshop exercise.*

3rd day

- a) Participant groups RES presentations
- b) Discussion, recommendations



*Participants presenting their work during workshop*



*Presentation of exercise by a group representative*

After their presentations the participants discussed their recommendations and problems they faced while analysing the biogas system. Alternative approaches and local conditions were discussed. Information delivered about UNFCCC CDM and Certified Emission Reduction credits.

- c) Quiz & discussion
- d) Certificate ceremony
- e) Train-the-trainers



*New ITS Project local energy expert Igor Zanoaga assisting participants*



#### 4. TESTING

At the beginning of the first day, the instructors gave participants a short pre-test. Questions were actual samples from the final quiz. Goals of the pre-test were

- To identify qualifications of participants
- To obtain a basis of comparison for improvement of participants' knowledge and skills at the end of workshop.

Pretest results were 54% for both groups. During the third and final day of the workshops, the New ITS Project experts summarized the results of the Seminar. Then the students, remaining in their working groups, took a 10-question quiz.

Quiz results for 1st seminar: Average 78% (1.44 times as high as pre-test)

Group 1 – 80%

Group 2 – 70%

Group 3 – 80%

Group 4 – 70%

Group 5 – 80%

Quiz results for 2nd seminar: Average 85% (1.57 times as high as pre-test)

Group 1 – 100%

Group 2 – 70%

Group 3 – 90%

Group 4 – 80%

Group 5 – 90%

Group 6 – 80%

After the quiz, the instructors discussed the answers at length with the class. All groups got the right answer for the last question, which involved calculation.



*New ITS Project Key expert Larry Good awarding certificates*

## **5. TTT**

In the afternoon of the last day, the New ITS Project experts conducted a train-the-trainers (TTT) session and worked with future instructors. Sixteen out of 22 participants of the first seminar and 21 participants of the second stayed for TTT. Interest in TTT sessions was very high.

## **6. PARTICIPANTS**

Thirty participants were invited to the first seminar. Twenty five participants participated. Twenty two participated in the seminar every day and received certificates. This indicated strong interest in perpetuating the seminar's knowledge in Moldova.

Thirty-three participants were invited to the second seminar. Twenty eight participants participated. Twenty three participated in the seminar every day and received certificates.

## 7. PARTICIPANT QUESTIONNAIRE

At the end, participants answered a questionnaire (see appendix) about the seminar. Twenty two participants in the first seminar and twenty three in the second responded. The general consensus was a desire for more.

Not all responders answered all questions, so some answers are missing. However, some participants gave multiple answers to the same question, causing overlap. All answers are summarized below.

Results for the first seminar:

1. Was the seminar useful?  
18 Yes
2. Reasons for attending:  
14 To learn something interesting and new
3. Most relevant features of seminar:  
11 Economic evaluation of energy audit results  
16 Feasibility in investments and communication with banks  
9 New and important information  
8 Importance of practical skills and discussions  
10 Financial calculations  
8 Skills to find alternative solutions  
10 International experience
4. Is EU experience in this area applicable in your country?  
19 Yes  
0 Not sure
5. Do you recommend including this topic in university courses?  
18 Yes  
1 Not sure  
1 Already used
6. Most interesting seminar activity:  
18 Individual Work and discussions of the results and problems  
5 Lectures
7. a) Will you apply the new knowledge to your work in the future?

- 18 Yes
- 1 Probably in the future

b) How?

- 12 Create template for developing future projects
- 5 Working with and training students,
- 13 Convincing investors and clients

8. Do you intend to continue learning this topic?

- 18 Yes
- 1 Not sure

9. Suggested improvements (some overlap)

- 2 No improvement necessary
- 9 Longer seminars
- 0 More focus on other technological solutions
- 11 More importance for other technological solutions

10. Seminar quality (scale: 0 = worst, 5 = best)

Item	Ave score	Ave % score
Venue	3.88	78%
Meals	4.83	97%
Help and guidance	4.77	95%
Lecturers	4.89	98%
Discussions	4.67	93%
Technical Equipment	4.33	87%
Interpretation	4.22	84%

Results for the second seminar:

1. Was the seminar useful?  
23 Yes
  
2. Reasons for attending:  
22 To learn something interesting and new
  
3. Most relevant features of seminar:  
20 Economic evaluation of energy audit results  
17 Feasibility in investments and communication with banks  
13 New and important information  
11 Importance of practical skills and discussions  
15 Financial calculations  
7 Skills to find alternative solutions  
15 International experience
  
4. Is EU experience in this area applicable in your country?  
23 Yes  
0 Not sure
  
5. Do you recommend including this topic in university courses?  
21 Yes  
0 Not sure  
4 Already used
  
6. Most interesting seminar activity:  
29 Individual Work and discussions of the results and problems  
11 Lectures
  
7. a) Will you apply the new knowledge to your work in the future?  
22 Yes  
1 Probably in the future  
b) How?  
21 Create template for developing future projects  
5 Working with and training students,  
13 Convincing investors and clients
  
8. Do you intend to continue learning this topic?  
21 Yes



2 Not sure

9. Suggested improvements (some overlap)

3 No improvement necessary

11 Longer seminars

0 More focus on other technological solutions

16 More importance for other technological solutions

10. Seminar quality (scale: 0 = worst, 5 = best)

Item	Ave score	Ave % score
Venue	4.96	99%
Meals	4.78	96%
Help and guidance	4.54	91%
Lecturers	4.95	99%
Discussions	4.65	93%
Technical Equipment	4.60	92%
Interpretation	4.66	93%