

A.4.3 IMPLEMENTATION OF LLL COURSES

REPORT ON THE IMPLEMENTATION OF THE COURSE "MONITORING THE CONDITION OF UNDERGROUND THERMAL INFRASTRUCTURE"

Course overview: The course was successfully implemented with the aim of educating participants on the assessment of the condition of thermal pipe networks used in heating systems. During the course, various detection methods are covered, including the use of sensors and tracking technologies, with an emphasis on efficient operation and identification of potential problems.

Date and time of the event:

- **Date:** 10.10.2024
- **Duration:** 10 hours
- UNI Maribor

Number of participants: There were **9 students** of the Master's degree program present at the course

Course Objectives

The objectives of the course are achieved through a variety of interactive learning methods, including lectures, practical exercises, and discussions.

- **Improving knowledge of thermal system management:** Participants gained a deeper understanding of the process of managing thermal systems.
- **Developing skills in the use of modern detection technologies:** Participants were introduced to the latest technologies for monitoring and data analysis.
- **Promotion of energy efficiency and sustainability:** Discussions on sustainable practices in heating systems were particularly helpful.

Course Outcomes

At the end of the course, participants demonstrated the ability to:

- **Implementation of detection techniques** for monitoring the condition of thermal pipes.
 - **Data analysis** to identify leaks and inefficiencies in the system.
 - **Proposing maintenance strategies** to improve the performance of the thermal network.
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The importance of digital aspects

Digital technologies have made it possible to efficiently monitor and analyze data in real time. Online collaboration platforms among participants were used, which provided access to a wealth of resources and case studies. The digital simulations also provided practical insights into different detection methods and maintenance strategies, thus enriching the learning experience.

Participant satisfaction survey

The survey was conducted to collect feedback on the satisfaction of the course participants. The results of the survey are shown in the table below:

Question	Average Rating (1-5)
The quality of the information presented	4.7
The usefulness of practical exercises	4.6
Understanding Topics and Concepts	4.8
Quality of instructors	4.9
Overall satisfaction with the course.	4.8

Conclusion: Participants were generally very satisfied with the content of the course, the quality of the lectures and the practical exercises. We recommend further development of the course with the inclusion of more practical simulations and opportunities for interactive discussions.

Recommendations for future courses:

- Include more practical applications and case studies.
- Develop a module on the latest technologies in monitoring systems.
- Relate the course to real-life projects in local communities.

Conclusion

The course "Monitoring the Condition of Underground Hot Water Infrastructure" was a successful and useful education for the participants. Their satisfaction and the achieved outcomes show that the goal of the course has been achieved, and the feedback reveals opportunities for further development and improvement of future courses.

Course Instructor

Prof. Filip Kokalj



**QUESTIONNAIRE ON THE SATISFACTION OF PARTICIPANTS OF THE
COURSE "MONITORING THE CONDITION OF UNDERGROUND THERMAL
INFRASTRUCTURE"**

Instructions: Please answer the following questions in order to improve the quality of future courses. Ratings range from 1 to 5, where 1 is very dissatisfied and 5 is very satisfied.

1. The quality of the information presented:

- How would you rate the quality of the information presented during the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

2. The usefulness of practical exercises:

- How useful were the practical exercises for you to understand the topic?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

3. Understanding Topics and Concepts:

- Did you feel qualified enough to understand the topics after the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

4. Quality of instructors:

- How would you rate the quality of the instructor during the course?
- 1 (very dissatisfied)

- 2
- 3
- 4
- 5 (very satisfied)

5. Overall satisfaction with the course:

- How would you rate your overall satisfaction with the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

6. Course content:

- Did the course content meet your expectations?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

7. Digital Tools and Platforms:

- How would you rate the use of digital tools and platforms during the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

8. Evaluation of the applied tools PIX4D and UAV:

- How would you rate the usefulness and effectiveness of the PIX4D and UAV tools during the course?
- 1 (very dissatisfied)

- 2
- 3
- 4
- 5 (very satisfied)

9. Interactivity and discussions:

- How useful were the interactive discussions and exchange of opinions to you?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

10. Recommendations for improvement:

- What would you recommend to improve the course? (*Open question*)

11. Additional comments:

- Do you have any additional comments or suggestions? (*Open question*)

REPORT ON THE IMPLEMENTATION OF THE COURSE "CALCULATION OF THE CARBON FOOTPRINT OF INSTITUTIONS"

Course overview: The course has been successfully implemented with the aim of providing participants with the knowledge and tools needed to assess the carbon footprint of various economic entities. It includes methodologies for data collection, calculations of greenhouse gas emissions, and the identification of strategies to reduce them.

Date and time of the event:

- **Date:** 21.09.2023
- **Duration:** 16 hours
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Number of participants: There were **11 participants** in the course.

Course Objectives

The objectives of the course are achieved through interactive and hands-on learning methods, including lectures, group work and case study analysis.

- **Understanding the importance and process of carbon footprint assessment:** Participants gained a clear understanding of how the carbon footprint is calculated and its importance for environmental protection.
 - **Acquiring digital skills:** Participants were introduced to tools that facilitate the collection and analysis of data.
 - **Fostering a culture of sustainability:** Through group discussions and activities, participants developed an awareness of the importance of sustainability in their institutions.
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Course Outcomes

At the end of the course, participants demonstrated the ability to:

- **Accurately measure and analyze the carbon emission factors** of their institutions.
 - **Develop and implement strategies** to reduce their carbon footprint.
 - **Creating and analysing reports** as well as providing sets of recommendations for reducing the carbon footprint of institutions.
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The importance of digital aspects

Digital tools have significantly facilitated data collection and analysis, enabling real-time monitoring of emissions. Online platforms were used for collaboration among participants, which provided access to a variety of resources. Interactive simulations provided hands-on experience in calculating emissions and evaluating reduction strategies.

Participant satisfaction survey

A survey was conducted to collect feedback on the satisfaction of the course participants. The results of the survey are shown in the table below:

Question	Average Rating (1-5)
The quality of the information presented	4
The usefulness of practical exercises	4.2
Understanding Topics and Concepts	4.0
Quality of instructors	4.5
Overall satisfaction with the course.	4.2

Conclusion: The participants expressed high satisfaction with the content of the course, the quality of the lectures and practical exercises. Some participants emphasized the usefulness of practical examples and interactive simulations.

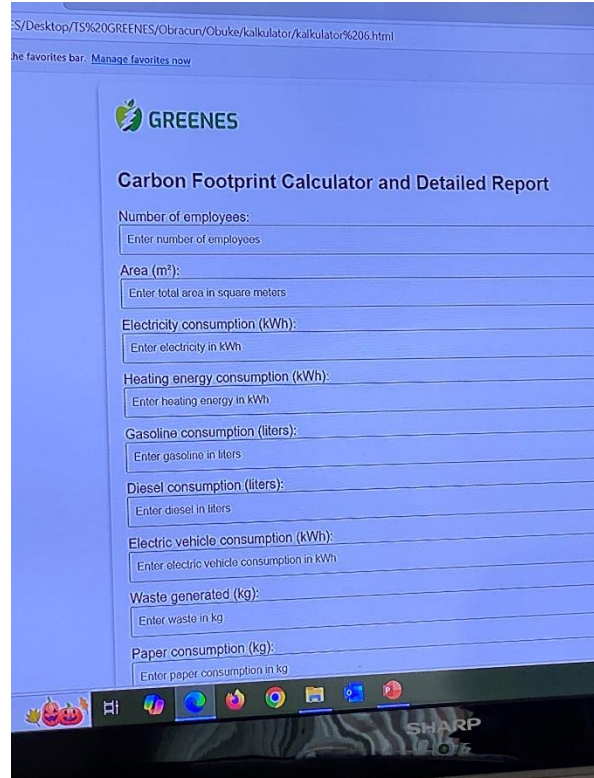
Recommendations for future courses:

- Include more case studies from practice.
 - Develop modules on the latest trends in carbon footprint reduction.
 - Relate the course to real projects or initiatives in local communities.
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Conclusion

The course "Calculating the Carbon Footprint of Institutions" was very successful, with positive outcomes for the participants. Their satisfaction and acquired knowledge show that the goal of the course has been achieved, and the feedback offers opportunities for further development and improvement of future courses.

The course was carried out
Ljiljana Kostić Despotović
YugoImpex D.O.O. Niš



QUESTIONNAIRE ON SATISFACTION WITH THE COURSE "CALCULATING THE CARBON FOOTPRINT OF INSTITUTIONS"

Instructions: Please answer the following questions in order to improve the quality of future courses. Ratings range from 1 to 5, where 1 is very dissatisfied and 5 is very satisfied.

1. The quality of the information presented:

- How would you rate the quality of the information presented during the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

2. The usefulness of practical exercises:

- How useful were the practical exercises for you to understand the topic?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

3. Understanding Topics and Concepts:

- Did you feel qualified enough to understand the topics after the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)
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4. Quality of instructors:

- How would you rate the quality of the instructor during the course?
- 1 (very dissatisfied)

- 2
- 3
- 4
- 5 (very satisfied)

5. Overall satisfaction with the course:

- How would you rate your overall satisfaction with the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

6. Course content:

- Did the course content meet your expectations?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

7. Digital Tools and Platforms:

- How would you rate the use of digital tools and platforms during the course?
- 1 (very dissatisfied)
- 2
- 3
- 4
- 5 (very satisfied)

8. Recommendations for improvement:

- What would you recommend to improve the course? (*Open question*)

9. Additional comments:

- Do you have any additional comments or suggestions? (*Open question*)

REPORT ON THE IMPLEMENTATION OF THE COURSE "MONITORING THE CONDITION OF UNDERGROUND HOT WATER INFRASTRUCTURE"

Course overview: The course was successfully implemented with the aim of educating participants on the assessment of the condition of thermal pipe networks used in heating systems. During the course, various detection methods are covered, including the use of sensors and tracking technologies, with an emphasis on efficient operation and identification of potential problems.

Date and time of the event:

- **Date:** 29.05.2023
- **Duration:** 10 hours
- TOPS Conference Zlatibor

Number of participants: The course was attended by **20 participants** - employees in companies for the supply of heat energy in Serbia

Course Objectives

The objectives of the course are achieved through a variety of interactive learning methods, including lectures, practical exercises, and discussions.

- **Improving knowledge of thermal system management:** Participants gained a deeper understanding of the process of managing thermal systems.
 - **Developing skills in the use of modern detection technologies:** Participants were introduced to the latest technologies for monitoring and data analysis.
 - **Promotion of energy efficiency and sustainability:** Discussions on sustainable practices in heating systems were particularly helpful.
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Course Outcomes

At the end of the course, participants demonstrated the ability to:

- for monitoring the condition of thermal pipes using the thermal imaging method
 - for analysis to identify leaks and inefficiencies in the system.
 - to improve the performance of the thermal network.
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The importance of digital aspects

Digital technologies have made it possible to efficiently monitor and analyze data in real time. Online collaboration platforms among participants were used, which provided access to a wealth of resources and case studies. The digital simulations also provided practical insights into different detection methods and maintenance strategies, thus enriching the learning experience.

Participant satisfaction survey

The survey was conducted to collect feedback on the satisfaction of the course participants. The results of the survey are shown in the table below:

Question	Average Rating (1-5)
The quality of the information presented	4,0
The usefulness of practical exercises	4,1
Understanding Topics and Concepts	4
Quality of instructors	4.5
Overall satisfaction with the course.	4.5

Conclusion: Participants were generally very satisfied with the content of the course, the quality of the lectures and the practical exercises. We recommend further development of the course with the inclusion of more practical simulations and opportunities for interactive discussions.

Recommendations for future courses:

- Include more practical applications and case studies.
- Develop a module on the latest technologies in monitoring systems.
- Relate the course to real-life projects in local communities.

Conclusion

The course "Monitoring the Condition of Underground Hot Water Infrastructure" was a successful and useful education for the participants. Their satisfaction and the achieved outcomes show that the goal of the course has been achieved, and the feedback reveals opportunities for further development and improvement of future courses.

Course Instructor

Prof. Dejan Blagojević