



BELENUS

**Lowering Costs by Improving Efficiencies in Biomass
Fueled Boilers: New Materials and Coatings to Reduce
Corrosion**

Starting date of the project: 01/03/2019
Duration: 48 months + extension

Deliverable: D8.8

Young Research Training School

Due date of deliverable: 28/02/2021
Actual submission date: 15/11/2022

Responsible Workpackage Leader: Gustavo García Martín, Universidad Complutense de
Madrid
Responsible Task Leader: Gustavo García Martín, UCM
Revision: V1.0



H2020-LC-SC3-11-2018

Building a Low-Carbon, Climate Resilient Future: Secure, Clean and Efficient Energy

“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 815147”

Dissemination level		
PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

AUTHOR

Author	Institution	Contact (e-mail, phone)
Gustavo	UCM	gusgarci@ucm.es

DOCUMENT CONTROL

Document version	Date	Change
V1	15-11-2022	

VALIDATION

Reviewers		Validation date
Task Leader	Gustavo García Martín, UCM	
Work Package Leader	Gustavo García Martín, UCM	
Coordinator	Francisco Javier Pérez Trujillo, UCM	

DOCUMENT DATA

Keywords	Young Research Training
Point of Contact	Name: Gustavo García Martín Partner: UCM Address: Av. De Séneca S/N 28040 Madrid, España Phone: +34 91 3945208 E-mail: gusgarci@ucm.es
Delivery date	2022-11-09

Executive Summary

The first BELENUS Young Research Training School took place on 5th October 2022 in Helsinki (Finland), after an important delay due to the COVID pandemic.

The Young Researchers Training School aimed to disseminate project results and show up materials and processes against corrosion for different industrial applications. It was announced for energy industries, biomass companies research & investigation centers, groups, and universities, fundamentally, not only by direct contact but also using social media, web pages and LinkedIn. The most on-site young attendees were from local universities and new researchers from VTT.

It was offered to browse the Young Research Training School online to make it easier to access the event. A Microsoft Teams link was distributed for that purpose. Very high-quality lectures were prepared by the speakers, which were drawn up to students mainly.

Table of Contents

1. Content of Deliverable	5
2. First BELENUS Young Research Training	6
2.1. Location and information channels distribution	6
2.2. Agenda content	8
2.3. Young Research Training School participants	14
3. Conclusions	15
4. Degree of Progress	16
5. Dissemination Level	17
6. References	18

1. Content of Deliverable

The main aim of this deliverable is to provide an overview of the different presentations and activities carried out during the BELENUS Young Research Training School. This deliverable relies on the dissemination actions from WP8 and has been delayed 22 months from the originally planned date due to the COVID situation.

2. First BELENUS Young Research Training

2.1. Location and information channels distribution

BELENUS consortium prepared a one-day Young Research Training School within the framework of BELENUS "Lowering Costs by Improving Efficiencies in Biomass Fuelled Boilers: New Materials and Coatings to Reduce Corrosion".

The Young Research Training School was held at [VTT](#), Espoo, Finland on the 5th of October 2022. VTT, hosted the event, which is a BELENUS partner and one of Europe's leading research institutions, Figure 1.

The venue:

[*Teknologian tutkimuskeskus VTT Oy - Google Maps*](#)

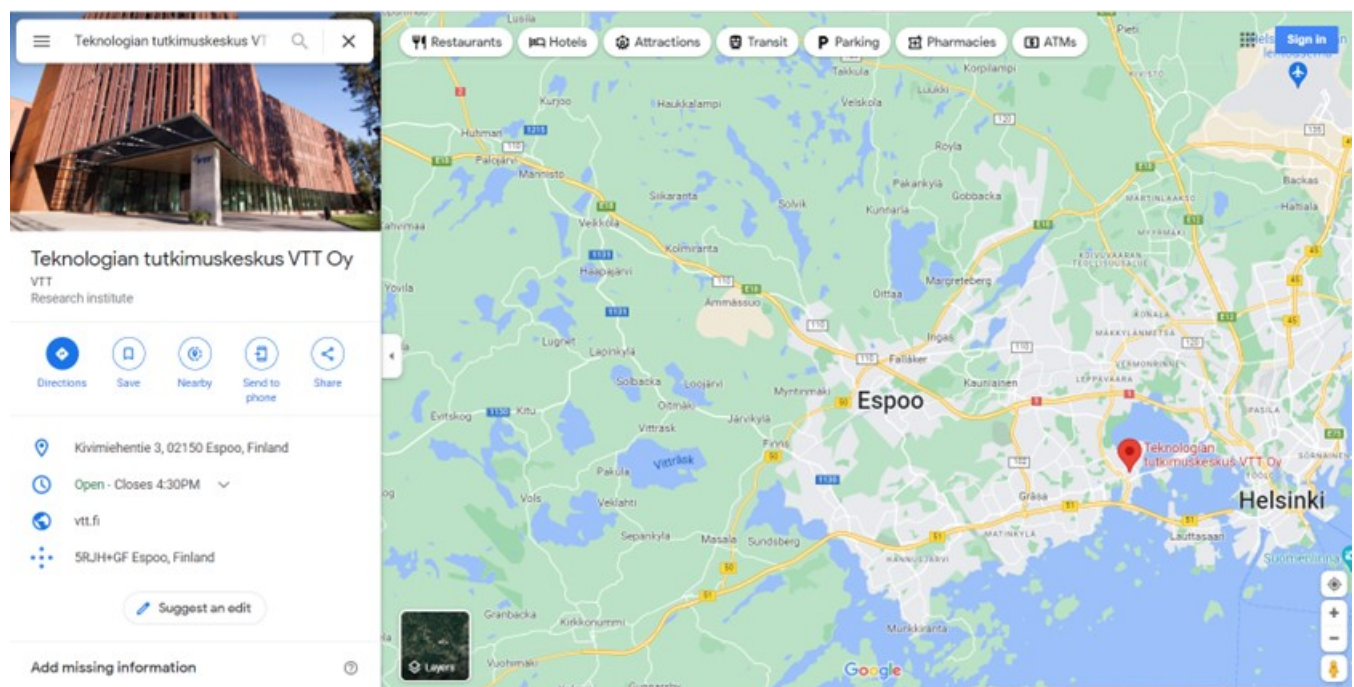


Figure 1: The venue: Kivimiehentie 3, 02150 Espoo, Finland. Teknologian Tutkimuskeskus VTT Oy. [*Teknologian tutkimuskeskus VTT Oy - Google Maps*](#)

The agenda and MTeams link invitation, figures 2 and 3, were shared with companies, universities, research centres, etc. by email. All partners collaborated on its distribution, automatically forwarding emails to other potential participants in the event.

It was also posted on social media, the project web page and LinkedIn. BELENUS LinkedIn with more than 500 connections was also a worldwide showcase, Figure 4.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 815147.



Young Scientist Training School Programme: "Materials and Coatings against High-Temperature Corrosion"

Young Scientist Training School: 5th of October 2022

We are delighted to offer you the opportunity to attend a one-day workshop and a one-day young school within the framework of the European Project of "Lowering Costs by Improving Efficiencies in Biomass Fueled Boilers: New Materials and Coatings to Reduce Corrosion".

The workshop and young school will be held at VTT, Espoo, Finland on the 4th and 5th of October 2022, respectively.

The BELENUS project <https://belenus-project.eu/> was funded by the EU Horizon 2020 program and started in April 2019. BELENUS brings novel corrosion prevention approaches to achieve cost-effectiveness for biomass plants involving the whole value chain. The ambitious goal proposed by BELENUS is sustained by the achievement of 3 technological breakthroughs which constitute the technological pillars, focused on preventing corrosion and increasing in performance and reliability of small and medium combined heat and power (CHP) biomass plants: [1] biomass highly-corrosion resistant coatings and lower base materials presently under development; [2] strategies of welding and bending for improving quality and efficiency of boiler components; [3] online corrosion monitoring.

The aim of this workshop is to disseminate project results and to bring together the main actors of the industry, plant owners and researchers related to the topic of material and component degradation in the Biomass field. The Young Researchers Training School not only aims to disseminate project results but also to show up materials and processes against corrosion for different industrial applications. We hope that you will be able to attend and look forward to your input and views on the challenge of enhancing the lifetime of industrial plant components

Please sign up no later than 30.9.

YOUNG RESEARCHERS TRAINING SCHOOL AGENDA: 5TH OF OCTOBER

Topic	Speaker	Institution	When
• Side effects of biomass combustion- from fuel preparation till the ash management	Karol Witkowski	EIFER	9:00
• Boiler Fireside Corrosion Practical Considerations	Colin Davis	UNIPER	9:30
• Protective coatings for steel high-temperature corrosion resistance	Pauline Audigie	INTA	10:00
Coffee break			10:30
• Coatings processes for high-temperature corrosion resistance	Francisco Gonçalves	TEandM	11:00
• Analytical strategies in high-temperature corrosion research	Torbjörn Jansson	CHALMERS UNIVERSITY	11:30
• Pilot Plant Testing in hydrogen production by fuel reforming, and biomass combustion	Manuel Benito	CIEMAT	12:00
Lunch			12:30
• Materials for a fossil-free future – the importance of high-temperature corrosion	Johanna Nockert	KANTHAL	14:00
• Furnace modelling for corrosion risk assessment	J. Kapanen	VTT	14:30
Coffee break			15:00
• Social dimension of bioenergy	Leire Martiarena	ZABALA	15:30
• Practical Cases	Francisco J. Pérez	UNIVERSIDAD COMPLUTENSE DE MADRID	16:00

Closing 17 hours.

Figure 2 Programme of Belenus Young Research Training School.

Deshechar

Eliminar Copiar a Mi calendario Reenviar

Enviar a OneNote

Aceptar Provisional Rechazar Proponer una nueva hora Responder

Aviso:

Aceptada el 25/09/2022 14:04.
Esta reunión se ha ajustado para reflejar su zona horaria actual. Inicialmente, se creó en la siguiente zona horaria: (UTC+02:00) Helsinki, Kiev.

Belenus Young School - Teams link

Organizador: Pakarinen Janne <Janne.Pakarinen@vtt.fi>

Hora: miércoles, 5 de octubre de 2022 8:00-16:00

Ubicación: Microsoft Teams Meeting

Respuesta: ☒ Aceptada [Cambiar respuesta](#)

BELENUS_Young School_Agenda_updated.pdf
442 KB

Microsoft Teams meeting

Join on your computer, mobile app or room device
[Click here to join the meeting](#)

Meeting ID: 380 789 005 039
Passcode: gKByei
[Download Teams](#) | [Join on the web](#)

Or call in (audio only)
+358 9 23106506 395163895# Finland, Helsinki
Phone Conference ID: 395 163 895#
[Find a local number](#) | [Reset PIN](#)

© VTT Technical Research Centre of Finland Ltd

[Learn More](#) | [Meeting options](#) | [Legal](#)

Figure 3: Online invitation for the Young Research Training School

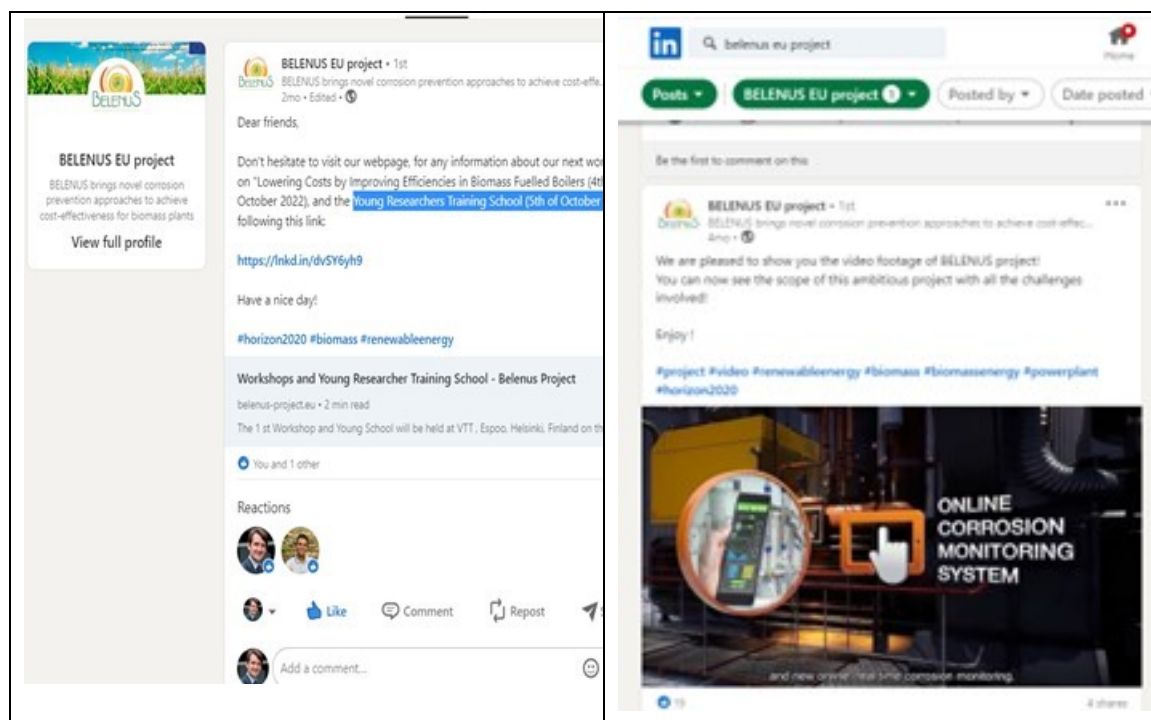


Figure 4: Belenus Young Research Training School announcement on LinkedIn

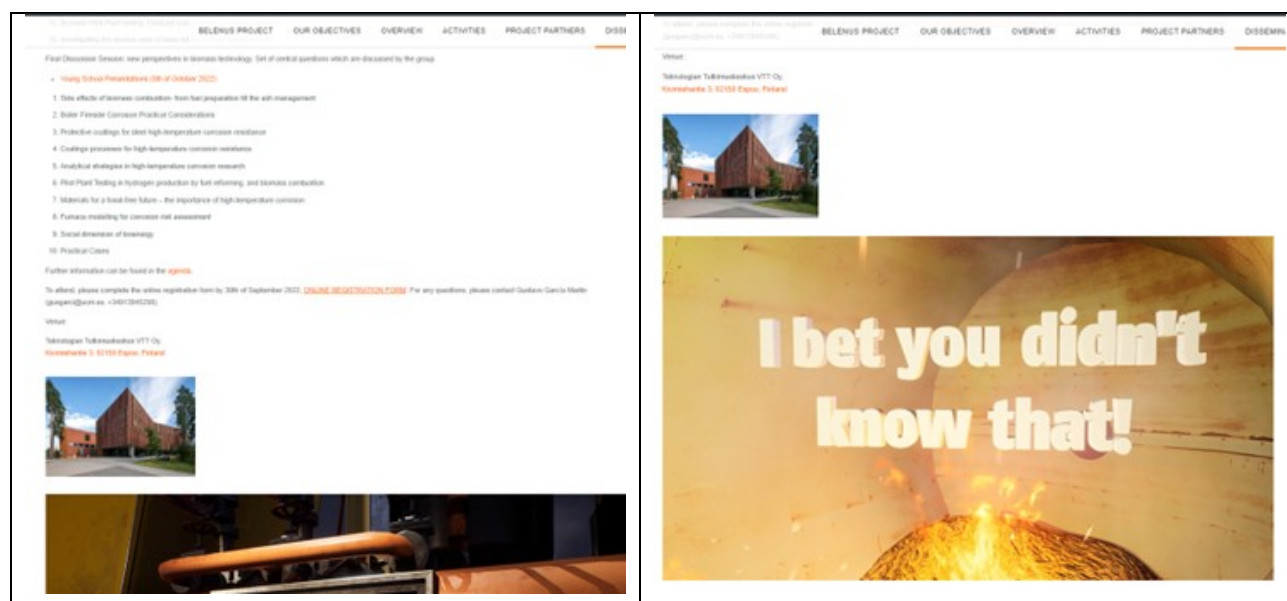


Figure 5: Belenus Young Research Training School feature on the project web page.

2.2. Agenda content

The lectures developed during the session are presented in the table below. Table 1 shows the program detail of the Young Research Training School.

Table 1: Young Research Training School programme.

YOUNG RESEARCHERS TRAINING SCHOOL AGENDA: 5TH OF OCTOBER

Topic	Speaker	Institution	When
• <i>Side effects of biomass combustion- from fuel preparation till the ash management</i>	<i>Karol Witkowski</i>	<i>EIFER</i>	<i>9:00</i>
• <i>Boiler Fireside Corrosion Practical Considerations</i>	<i>Colin Davis</i>	<i>UNIPER</i>	<i>9:30</i>
• <i>Protective coatings for steel high-temperature corrosion resistance</i>	<i>Pauline Audigie</i>	<i>INTA</i>	<i>10.00</i>
Coffee break			10.30
• <i>Coatings processes for high-temperature corrosion resistance</i>	<i>Francisco Gonçalves</i>	<i>TEandM</i>	<i>11:00</i>
• <i>Analytical strategies in high-temperature corrosion research.</i>	<i>Torbjörn Jonsson</i>	<i>CHALMERS UNIVERSITY</i>	<i>11:30</i>
• <i>Pilot Plant Testing in hydrogen production by fuel reforming, and biomass combustion</i>	<i>Manuel Benito</i>	<i>CIEMAT</i>	<i>12:00</i>
Lunch			12.30
• <i>Materials for a fossil-free future – the importance of high-temperature corrosion</i>	<i>Johanna Nockert</i>	<i>KANTHAL</i>	<i>14.00</i>
• <i>Furnace modelling for corrosion risk assessment</i>	<i>J. Kapanen</i>	<i>VTT</i>	<i>14.30</i>
Coffee break			15.00
• <i>Social dimension of bioenergy</i>	<i>Leire Martiarena</i>	<i>ZABALA</i>	<i>15.30</i>
• <i>Practical Cases</i>	<i>Francisco J. Pérez</i>	<i>UNIVERSIDAD COMPLUTENSE DE MADRID</i>	<i>16.00</i>

The following photographs are illustrating different moments of the Young Research School lectures. In figure 6, Dr Karol Witkowski from EIFER opened the session.



Figure 6: Presentation entitled *Side effects of biomass combustion- from fuel preparation till the ash management*, Dr Karol Witkowski from EIFER.

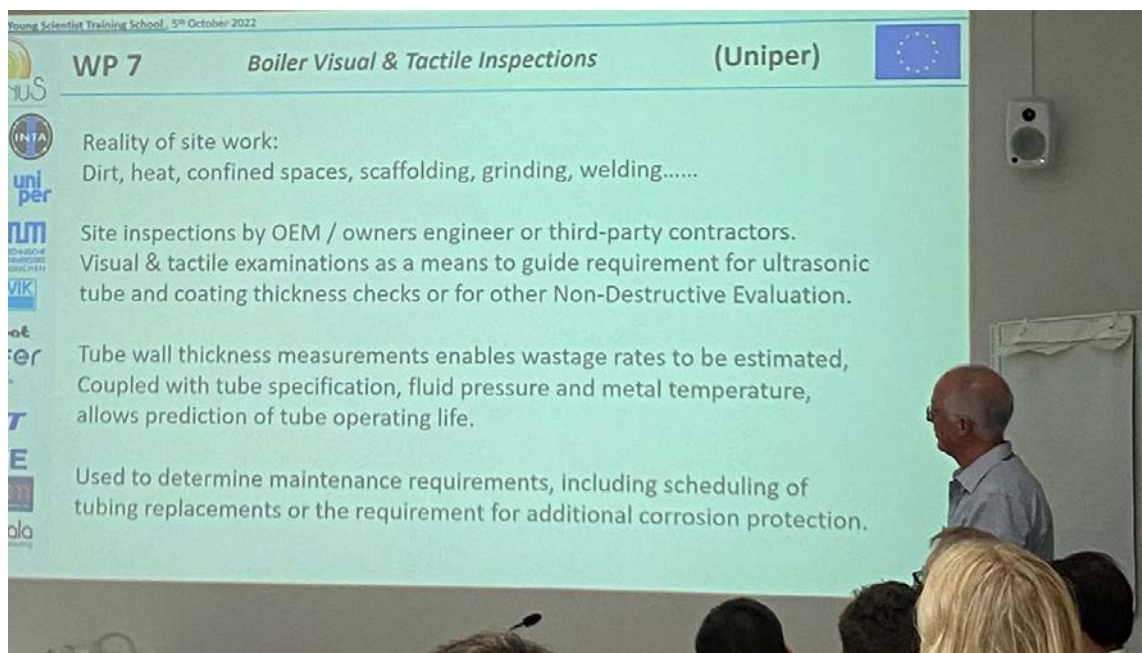


Figure 7: Presentation entitled *Boiler Fireside Corrosion Practical Considerations*, Dr Colin Davis from UNIPER.



Figure 8: Presentation entitled *Coatings processes for high-temperature corrosion resistance* Francisco Gonçalves, Dr Francisco Gonçalves, from TEandM.



Figure 9: Presentation entitled *Materials for a fossil-free future – the importance of high-temperature corrosion*, Dr Johanna Nockert, Kanthal-SMT, Sweden.

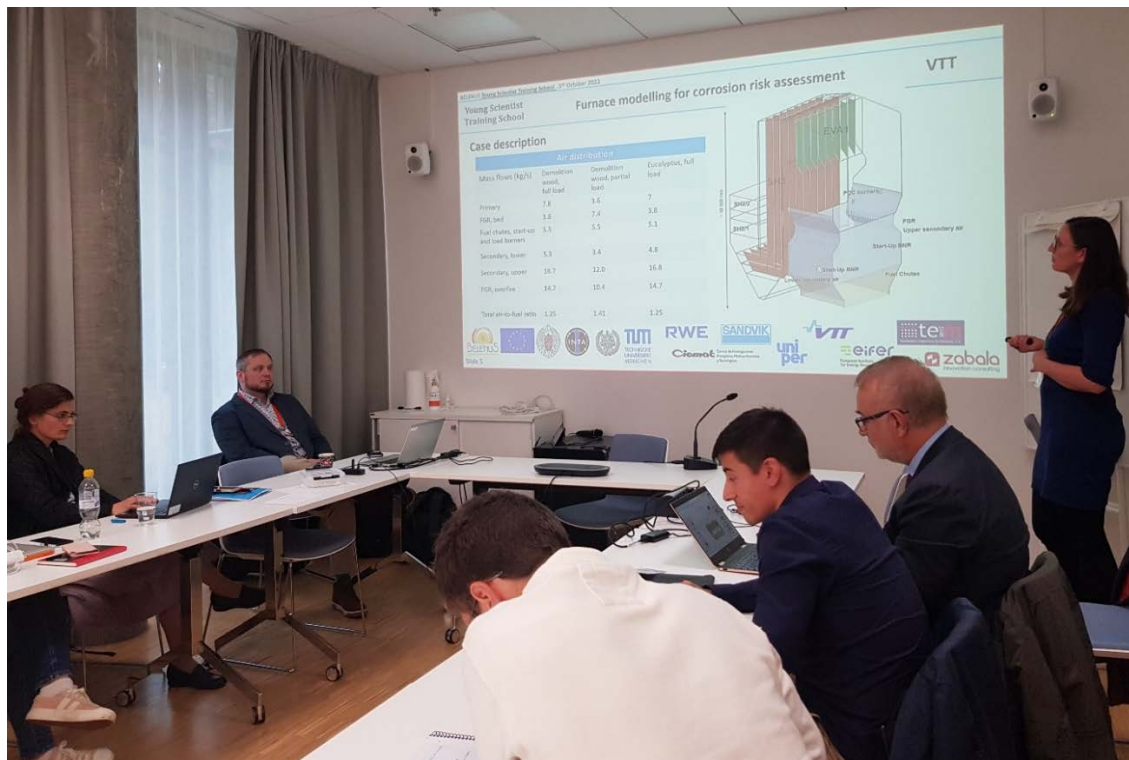


Figure 10: Presentation entitled *Furnace modelling for corrosion risk assessment* (Dr Johanna Nockert, VTT, Spain).



Figure 11: Presentation entitled *Protective coatings for steel high-temperature corrosion resistance*, Dr Pauline Audigie, INTA, Spain.

Only one presentation was conducted online. Leire Martiarena from Zabala gave her speech by MTeams.

4. Social impact assessment - frameworks

Global Bioenergy Partnership (GBEP)
Sustainability Indicators for Bioenergy

Environmental pillar	Social pillar	Economic pillar
1. Life-cycle GHG emissions	9. Allocation and tenure of land for new bioenergy production	17. Productivity
2. Soil quality	10. Price and supply of a national food basket	18. Net energy balance
3. Harvest levels of wood resources	11. Change in income	19. Gross value added
4. Emissions of non-GHG air pollutants, including air toxics	12. Jobs in the bioenergy sector	20. Change in consumption of fossil fuels and traditional use of biomass
5. Water use and efficiency	13. Change in unpaid time spent by women and children collecting biomass	21. Training and re-qualification of the workforce
6. Water quality	14. Bioenergy used to expand access to modern energy services	22. Energy diversity
7. Biological diversity in the landscape	15. Change in mortality and burden of disease attributable to indoor	23. Infrastructure and logistics for distribution of bioenergy

Figure 12: Presentation entitled Social dimension of bioenergy, Dr Leire Martiarena, Zabala, Spain.

Before closing the event, Dr. Francisco Javier Perez Trujillo gave an interactive talk based on different practical cases.

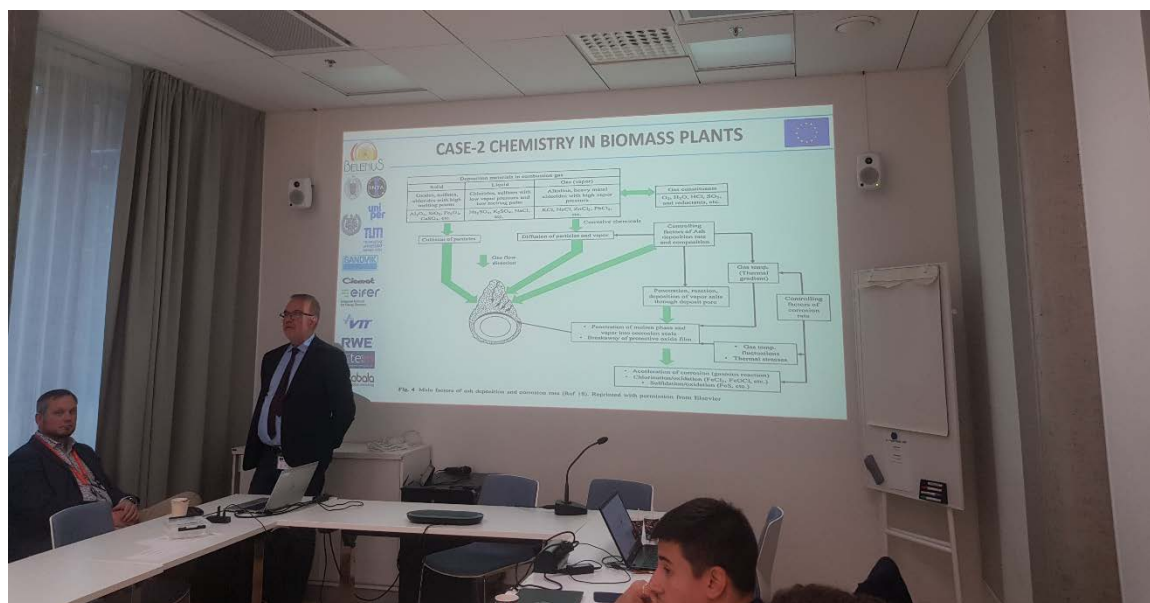


Figure 13: Presentation of different practical cases, Dr , RWE, Germany

2.3. Young Research Training School participants

An online registration form was created by VTT for both, Young Research Training School. It was a very efficient and convenient process to list all participants. It was available for the event few months in advance.

The screenshot shows a web form titled 'BELENUS' with a 'Thank you!' message. The form is divided into two main sections: 'Event information' and 'Your information'.

Event information:

- Event name: BELENUS Workshop & Young school
- Event organiser: Janne Pakarinen
- Event organiser's e-mail address: janne.pakarinen@vtt.fi
- Starts: 4.10.2022 0:00
- Ends: 5.10.2022 0:00
- Venue: VTT
- Address: Kivimiehentie 3, Espoo ([On the map](#))
- The registration deadline is: 1.10.2022 0:00

Your information:

- I will participate: Yes
- First name: Gustavo
- Last name: García Martín
- E-mail address: gusarci@ucm.es
- Organisation: Universidad Complutense de Madrid
- Mobile phone number: +34610466139
- I will participate: Workshop 4.10. Young school 5.10.
- Special diet: No
- Time of registration: 7.7.2022 14:36

At the bottom, there is a link to 'Edit your information' and a note about funding from the European Union's Horizon research and innovation programme under grant agreement No 8.

Figure 14: Online registration form Belenus Young Research Training.

Similar to the workshop the day before, the Young Research Training School had roughly 30 participants counting on the on-site visitors and fluctuating online participants, and most of the attendees belonged to institutions of Belenus consortium.

The screenshot shows a Teams meeting interface. The main content is a presentation slide titled 'Coating processes for high-temperature corrosion resistance' by the 'Young Scientist Training School'. The slide includes an introduction and a table comparing global GDP and corrosion costs.

Introduction:

NACE study estimates global cost of corrosion at \$2.5 trillion annually, equivalent to 3% - 4% of the global Gross Domestic Product (GDP).
NACE International, March 8, 2016

15% - 35% of this cost could be saved by implementation of corrosion prevention practices.

	WORLD
GDP (2021)	96.1 Trillion US\$
Cost of corrosion	2.8 Trillion US\$
Possible savings	420 - 980 Billion US\$

The slide also features logos of various institutions including Belenus, European Union, INTA, TUM, RWE, SANDVIK, VTT, eifer, uni per, and zabol.

Figure 15: MTeams captured during TeandM presentation in the Young Research.

3. Conclusions

The first Young Research Training School of Belenus realized in Finland was a very fruitful event. It had a very high-quality presentations, interactive sessions, and an exchange of knowledge among all participants.

4. Degree of Progress

The Young Research Training School was completed. it was heavily impacted by the Covid-19 pandemic, explaining the delay and delivering this report, D8.8, it is considered to be completed.

5. Dissemination Level

Public

6. References

NA