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

Edition: October 2022

Dear Readers,

Every 4 months a newsletter is shared with all stakeholders and the scientific community that are involved and or interested in the field of bioenergy, including plant developers, plant operators, and technology suppliers, as well as governmental bodies. Furthermore, members of the public who are interested in one or more of the topics related to BELENUS, such as bioenergy and materials engineering, will also gain from these newsletters.

They cover the overall project progress, special topics, news, relevant impacts, information and where to meet us in person at important events. In this edition, you will learn about the bioenergy impact on the global energy mix, its evolution towards the Net Zero Scenario and BELENUS project advances.

We invite you to visit our website and get in touch, through the information available at the end of this document. Enjoy reading!

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Introduction of the topic:

European Green Deal aims to reach a climate stability by 2050, being possible if the energy production stemming from renewable power plants holds more than a third of the shares in the energy mix. Indeed, the raw materials of bioenergy need to be carefully managed to avoid any environmental or societal negative effect during the production up-scaling, including no expansion of cropland nor use of forested. 2030 60% of bioenergy supply comes from waste and residues that do not require land use.

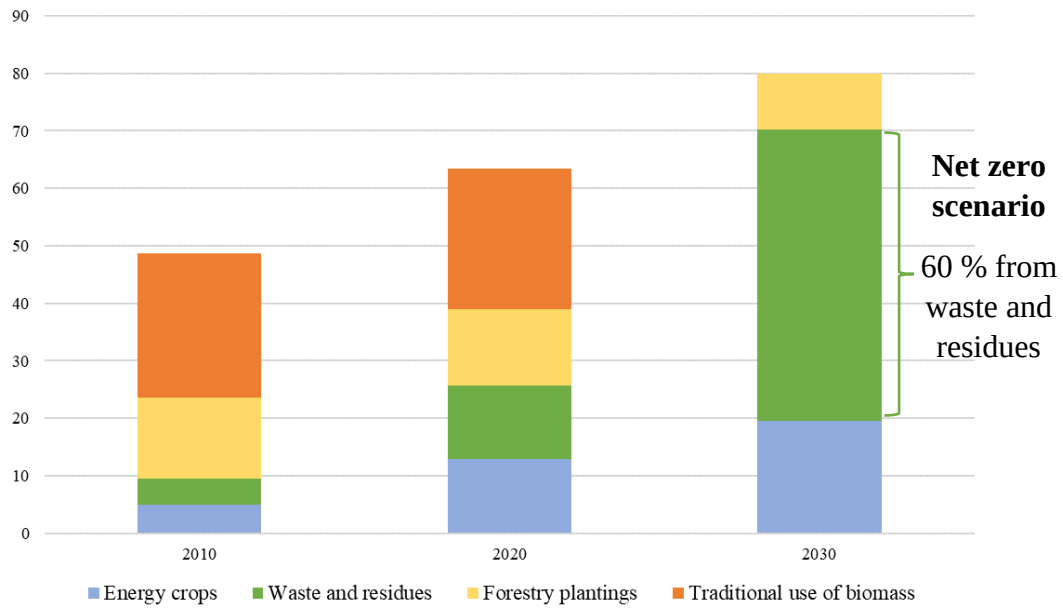

Figure 1 – Global bioenergy supply in the Net Zero Scenario (Arranged from Ref : IEA [https://www.iea.org/reports/bioenergy] License: CC BY 4.0)

The continuous operation of biomass power plant makes it difficult to operate and monitor trail tubes for characterization of the materials behaviour and lifespan, as their insertion and removal happen scarcely.

On the BELENUS project:

Trial coated tube were tested for long term laboratory and pilot scale corrosion testing, in the Steven's Croft Tertiary Superheater during November 2020 and was removed in April 2022, having been successfully exposed for a total operating period of 10,786 hours. Laboratory characterizations showed minor corrosion damage associated with the deposition of a predominantly sulphatic ash. Moreover, fireside corrosion of the Tertiary Superheater would not be considered as a critical mechanism in its lifespan, with an estimated tube life of approximately 800khrs.
Then, all the trial coatings suffered at least some corrosion damage, being like that of raw HR3C alloy tubing used to form the Tertiary Superheater, and as such, none of the coatings would be recommended as a retrofit installation in this application. Furthermore, some of the trial coatings might be used to protect low alloy tubing such as 10CrMo910, T91 or VM12, but would not compensate the economic aspect of HR3C. Several of the coatings suffered complete penetration / loss to at least part of the tube circumference within the trial operating period and would therefore be considered unsuitable for use in this or similar applications. Additionally, the slurry aluminide coatings performed particularly poorly with complete coating loss to varying extents and subsequent substrate corrosion.

Moreover, weld overlays were also characterized. The FeCrAl type weld overlays corrosion performance was potentially compromised by suboptimal application leading to excessive dilution by the substrate tube material and therefore reduced aluminium content in the applied coating. Their commercial use would

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require optimisation of the welding parameters to improve the coating quality and performance, potentially through partnership with an experienced commercial weld overlay applicator company.
The best performing trial coating was the High Hardness Steel with additional aluminium (ihHHS+Al) which suffered almost no discernible surface recession, with internal / subsurface oxidation essentially limited to aluminium oxidation which filled the subsurface voids in the as sprayed coating.

Sectorial Breaking News

Date	Headline	Source
5th July 2022	World's first blockchain-backed biomass project	Bioenergy-news
15th July 2022	Bioenergy Europe welcomes adoption of the ITRE REDIII Report	Bioenergy-news
18th August 2022	Cranfield University awarded funding to research clean hydrogen generation from biomass	Bioenergy-news
3rd September 2022	Food waste to become biomass under new deal signed by Warwickshire County Council	Bioenergy-news
6th September 2022	Enviva to supply biomass for Alder Fuels' SAF production	Renewables now
16th September 2022	Hill's Panel Products invests £1m in biomass burner	Bioenergy-news
5th October 2022	FFI invests in Tree Energy Solutions to form green gas import team	Bioenergy-news

Remarkable Upcoming Events.

1. **RNG Forum 2023**

- 04-06 April 2023
- Drummondville, Quebec

The RNG Forum is the largest event entirely dedicated to the renewable natural gas (RNG) industry in Canada. For this second edition, a wide variety of conferences and networking activities will be offered to participants whether to exchange, reacquaint or discover newly available technologies on the market, in addition to the exhibition hall.

2. **Value of Biogas East**

- 25-26 April 2023
- Toronto, ON

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The Value of Biogas Conferences are Canada's premier biogas and renewable natural gas (RNG) conferences, covering key topics affecting our industry across the country and beyond, while also offering the best opportunities for networking among peers and industry representatives. Don't miss this chance to hear from biogas experts presenting on key industry issues, view the exhibitor showcase featuring the latest products and services in the industry, and network with key stakeholders in the biogas & RNG sector.

3. WasteExpo 2023

- 1-4 May 2023
- New Orleans, Louisiana

From connecting with 14,000 of your peers to doing business with 600+ exhibitors, it's one event that pays dividends all year long. Preview the latest vehicles, tune in to the latest technology and learn the latest curriculum to improve the environment. For 50+ years, WasteExpo has been driven to give you the best event experience in the solid waste, recycling, and organics industry. Join us in NOLA and move in the fast lane of business success.

Stay in contact with us. Visit our website.

BELENUS website www.BELENUS-project.eu is available since the early beginning of the project. It shows the scope and objectives of the project along with outstanding results. You can find out more interesting information about the project and the impact of the results achieved, including all dissemination activities carried out.

If you have any question, feel free to drop us a line at *contact@BELENUS-project.eu* or on social medias *LinkedIn* and *Twitter*

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