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INTRODUCTION & OBJECTIVES

Climate change is posing unprecedented challenges to our generation. Spearheading the shift to renewable sources in the heavy industry requires the wide availability of high-performing materials, able to withstand extreme and harsh production conditions. Such materials, potentially able to resist very corrosive environments and still keep excellent thermo-mechanical properties, already exist. However, they are currently used only in highly specialized sectors, like aerospace, due to their high production costs. We are talking about Ceramic Matrix Composites (CMCs). In the EU-funded CEM-WAVE project, we aim at introducing an innovative production process for CMCs, based on the Microwave-assisted Chemical Vapour Infiltration (MW-CVI) technology, exploiting fully controllable microwave solid-state sources, thus widening the range of application for CMCs within energy-intensive industries.

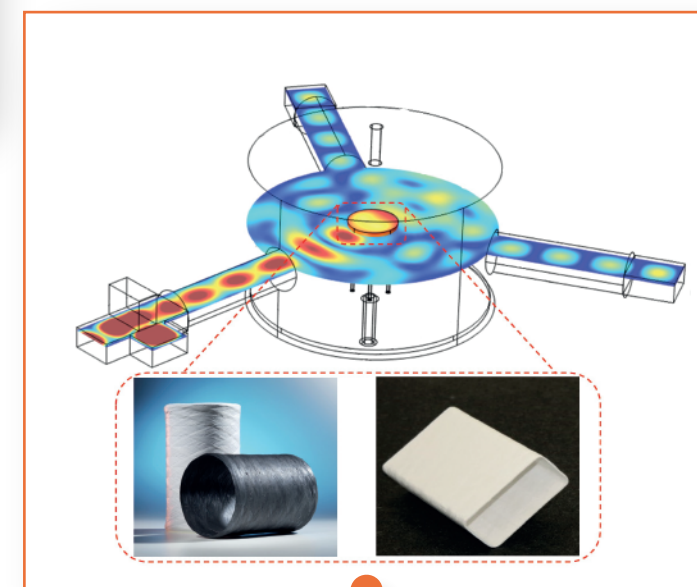
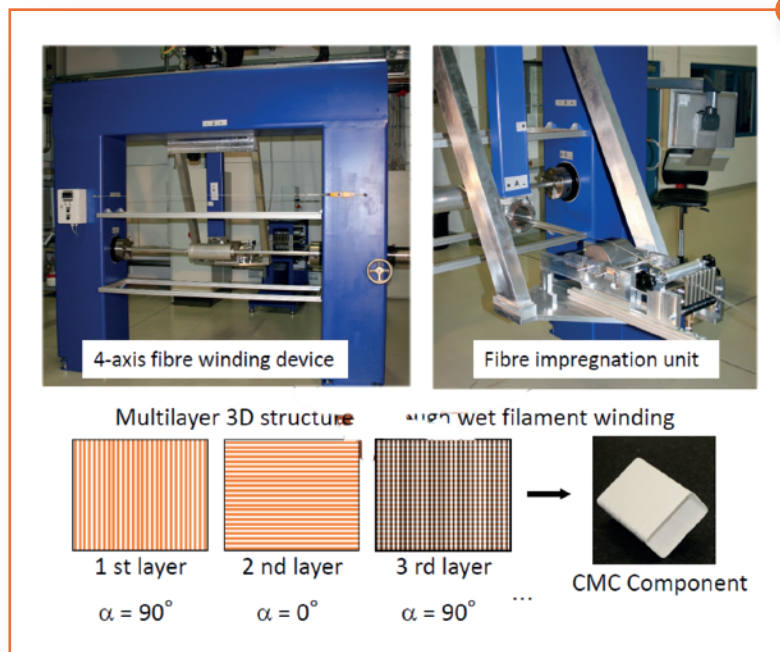


CONCEPT & METHODOLOGY

WP1

Set-up preform materials for MW-CVI processes

Fraunhofer



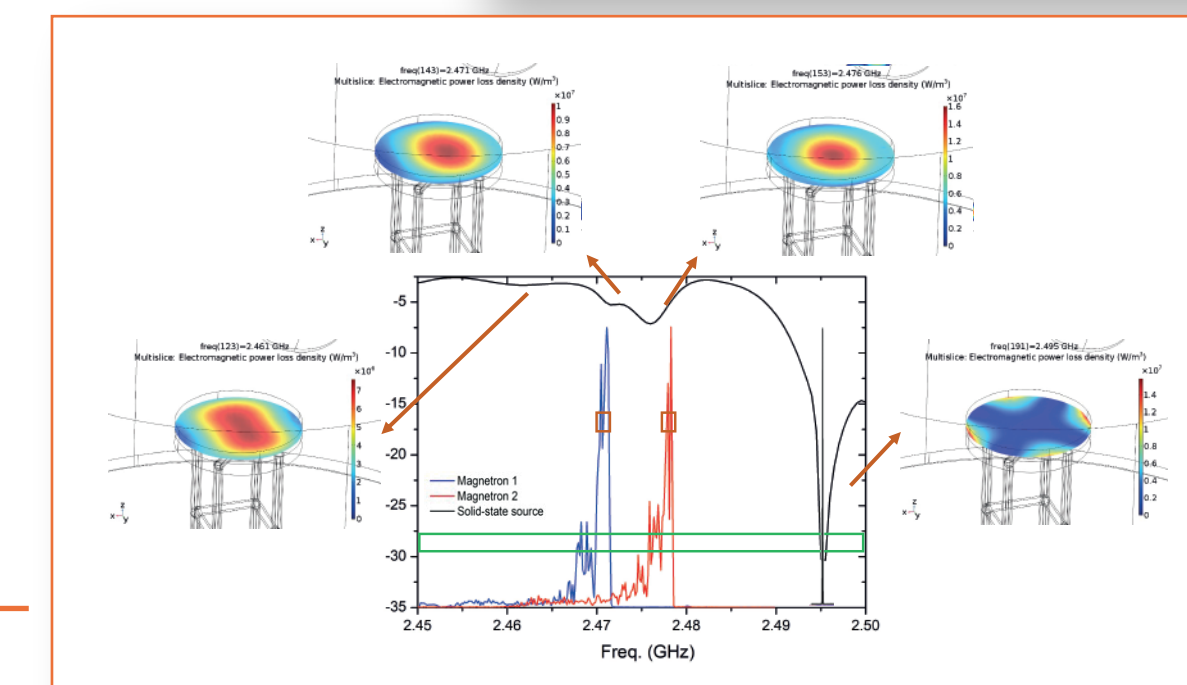
WP3

Optimization of the MW-CVI process for non-oxide and oxide CMCs



WP2

MW-CVI processing of CMCs based on solid-state sources



WP4

Microstructural, thermomechanical and thermophysical characterisations of CMCs and their joints



WP5

Micro and macro scale modelling of the MW-CVI processes



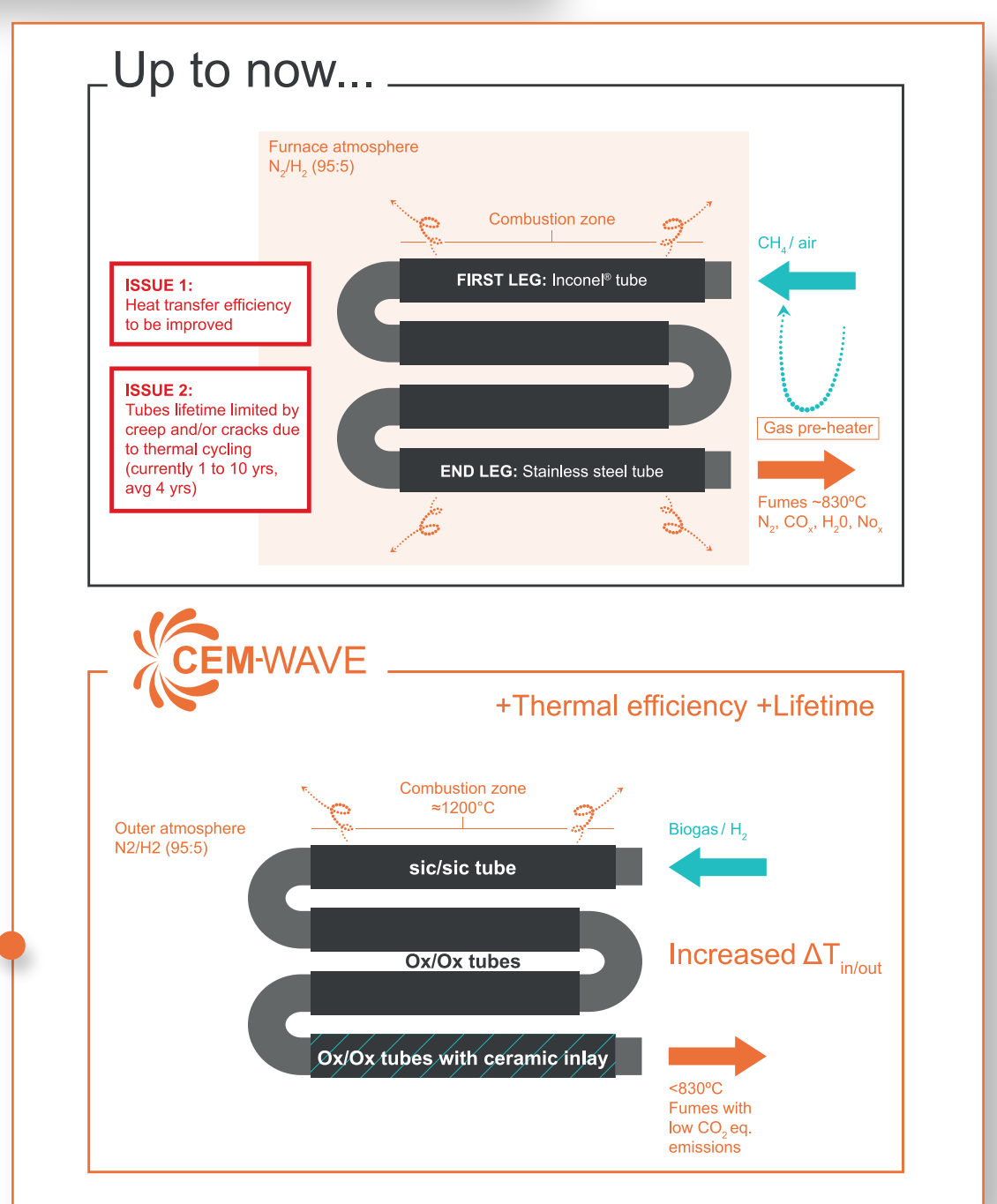
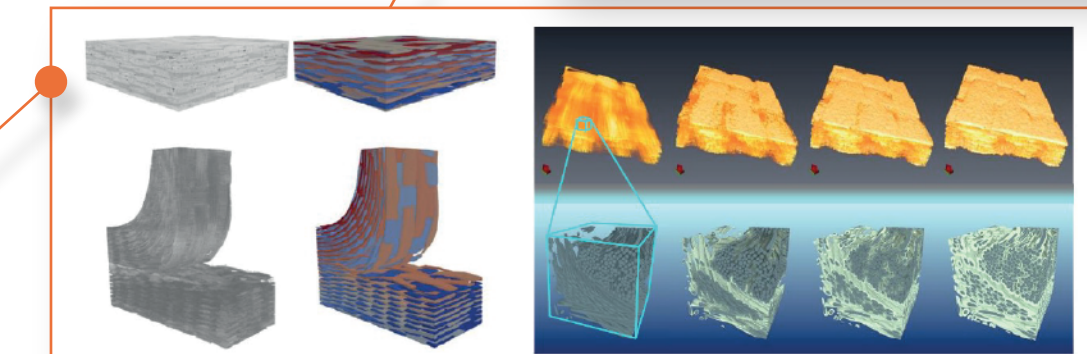
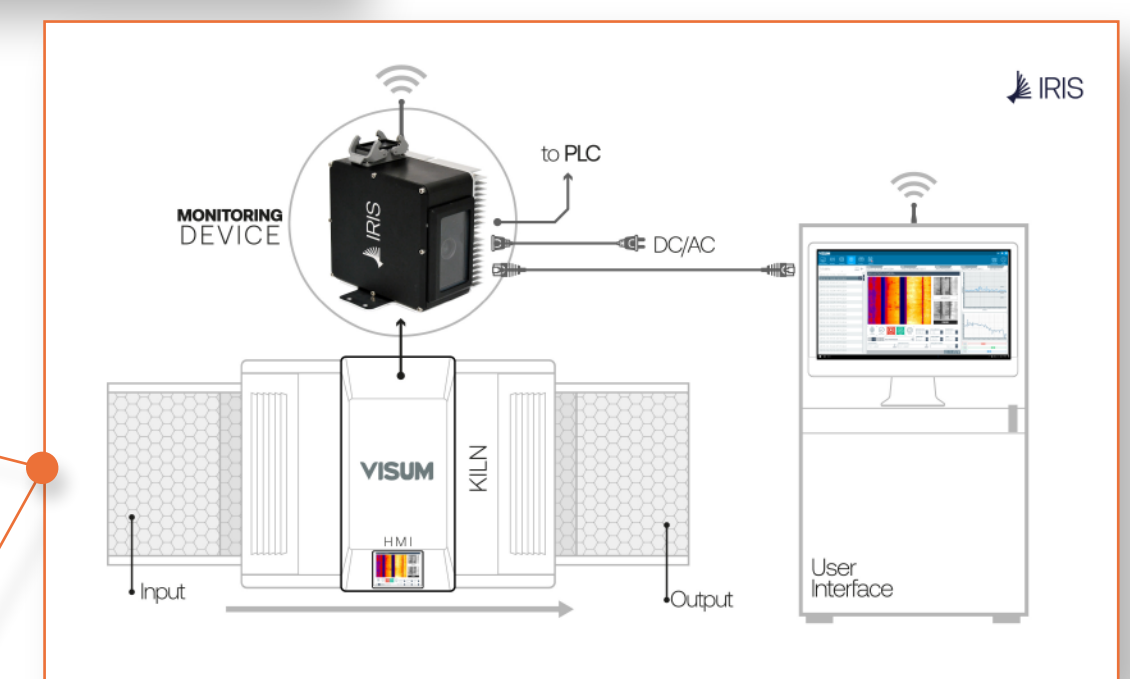
WP6

Joining and coating of the produced CMC samples



WP7

Validation of CMC in steelmaking relevant environment



WP8

LCA, LCC, Techno-economic analysis & Risk assessment



WP9

Dissemination, Communication and Exploitation



WP10

Coordination and Management



Grant Agreement No.: 958170
Programme acronym: H2020-NMBP
Topic: LC-SPIRE-08-2020 Novel high performance materials and components (RIA)
Start date: October, 1st 2020 End date: March, 31st 2024
EU contribution: 4,878,720 €
Website: www.cem-wave.eu

INDUSTRIAL VALIDATION IN RELEVANT ENVIRONMENT

The CEM-WAVE project validates a small-scale CMC-based tubes embedded with sensors, which display superior thermo-mechanical properties, improved efficiency and lifetime compared to Inconel/stainless steel alloys currently employed in radiant tube furnaces. The pilot-scale prototype will be tested in relevant environmental conditions and fuelled by different hydrogen/biomethane (H₂/CH₄) mixtures to understand its effectiveness in alignment with the expected increasing shift to renewable energy sources.