//EU HYDROGEN RESEARCH DAYS 15-16 NOVEMBER

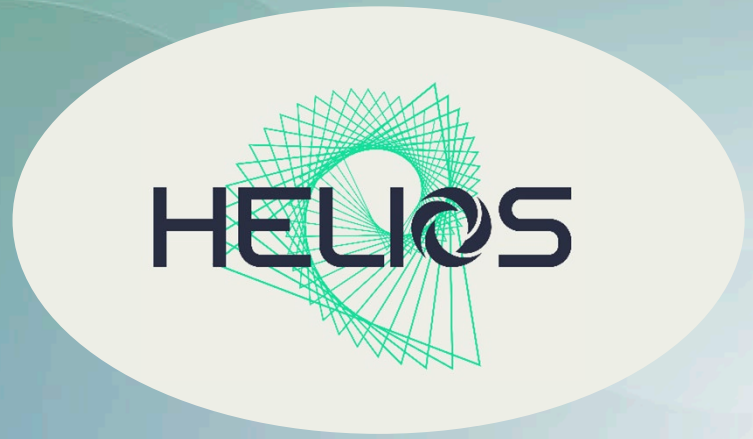
HELIOS

Stable high hydrogen low NOx combustion in full scale gas turbine combustor at high firing temperatures

Roy Hermanns

Eindhoven University of Technology

Email: r.t.e.hermanns@tue.nl



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Project Overview

- Call year: 2022
- Call topic: HORIZON-JTI-CLEANH2-2022-04-04 –

  Dry Low NOx combustion of hydrogen-enriched fuels at high-pressure conditions for gas turbine applications
- Project dates: 01/03/2023 – 28/02/2027
- % stage of implementation 01/11/2023: 10%
- Total project budget: 4M€
- Clean Hydrogen Partnership max. contribution: 4M€
- Other financial contribution: -
- Partners: TU/e, Thomassen Energy a Hanwha company, CCA Centro Combustione Ambiente, DLR, TU Delft Delft University of Technology

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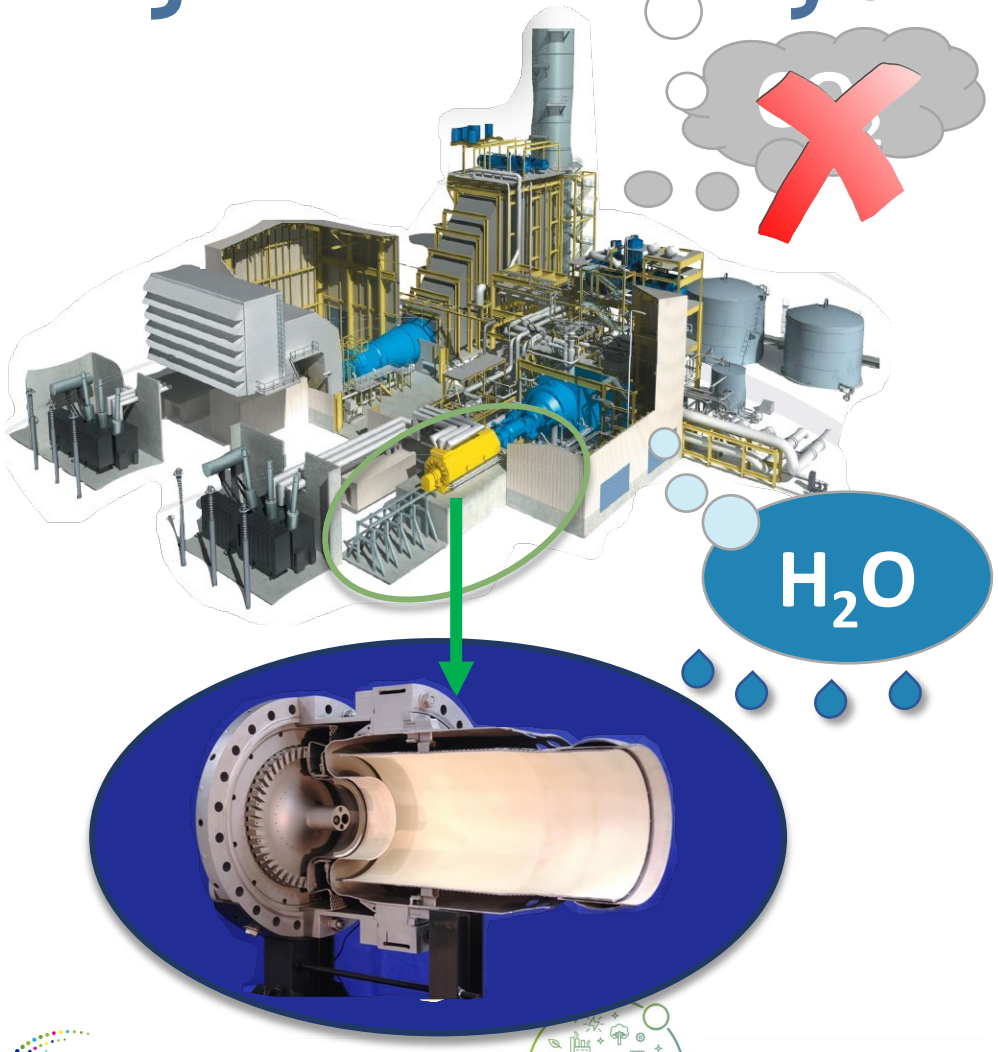
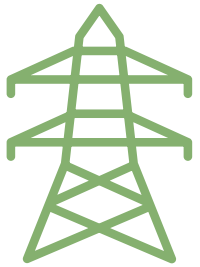
Project Summary

Natural gas

hydrogen





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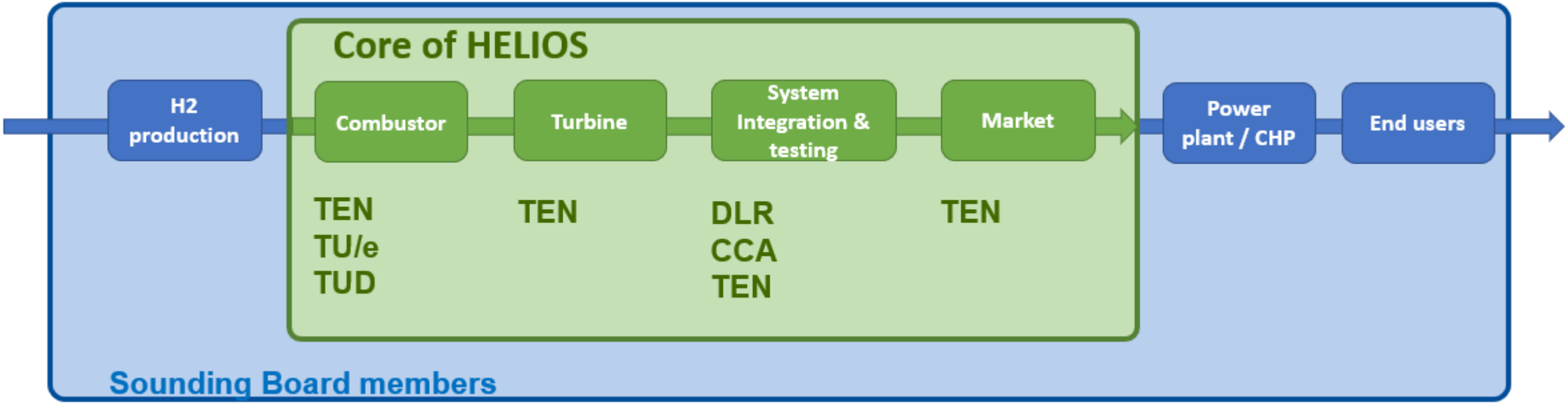
HELIOS - Ambition

HELIOS - Ambition is to enable dry Low NOx combustion of hydrogen-enriched fuels in gas turbines capable of operating the system from 100% natural up to 100% hydrogen and any mixture in between with dry low NOx emissions.



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HELIOS - Objectives

- Enable Low NOx combustion of hydrogen-enriched fuels in gas turbines
- Low NOx emissions (sub 9ppmv)
- Operating the system at any mixture between 100% natural gas and 100% hydrogen
- Modify an existing combustor to operate (safely) on 100% H2 at high firing temperatures
- Based on the FlameSheet™ technology that has been developed in recent years by Thomassen Energy
- The combustor can be used as a newly built or retrofit option for existing gas turbine systems on the market ranging from 1MW to 500MW
- The combustor will be applicable to all industrial and heavy systems of MHI, GE, Siemens, as well as industrial scale OPRA gas turbines.

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Project Progress/Actions - Aspects

Achievement to-date

PROJECT START VALUE → 25% → 50% → 75% → PROJECT TARGET VALUE

#	Parameter	Unit	State of the Art 2020	Target 2024	Target 2030
1	**H_2 range in gas turbine fuel**	% mass	0 - 5	0 - 23	0 - 100
		% vol.	0 - 30	0 - 70	0 - 100
2	**NO_x emissions**		(30% vol H_2)	(70% vol H_2)	(100% vol H_2)
		NO_x ppmv @ 15%O_2/dry	<25	<25	<25
		NO_x mg/MJ fuel	31	29	24
3	**Max. H_2 fuel content during start-up**	% mass	0.7	3	100
		% vol.	5	20	100
4	**Max. efficiency reduction in H_2 operation**	% points	10@30% H_2	10@70% H_2	10@100% H_2
5	**Minimum ramp rate**	% load / min	10@30% H_2	10@70% H_2	10@100% H_2
6	**Ability to handle H_2 content fluctuations**	% mass / min	±1.4	±2.21	±5.11
		% vol. /min	±10	±15	±30

Targets 2024-2030 according SRIA

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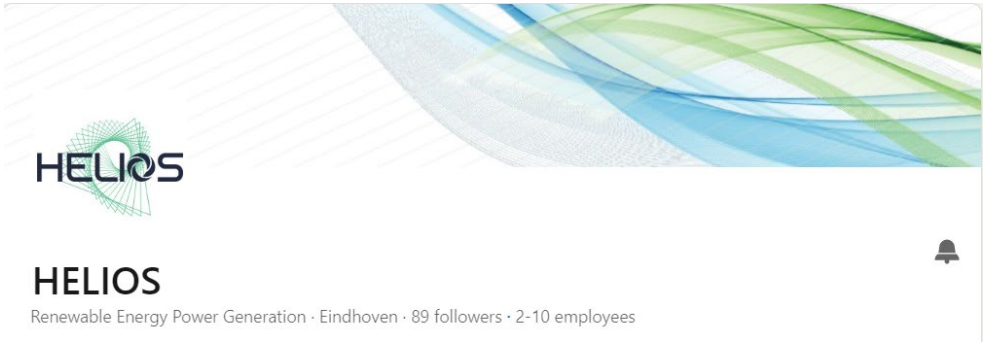
Communications Activities

- Website http://H2gt-helios.eu (under construction)
- LinkedIn https://www.linkedin.com/company/eu-project-helios
- HELIOS is presented as showcase to members of the European Parliament Committee on Industry, Research and Energy (ITRE)



Thank you!

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