SAFeCRAFT | Horizon Europe | GA 101138411

SAFeCRAFT – Safe and efficient use of sustainable fuels in maritime transport applications

Alexandros Giannakis[1], Ana Mesbahi[2]

[1] Hydrus Engineering SA, Athens, Greece
[2] University of Strathclyde, Glasgow, UK

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Agenda of SAFeCRAFT

- Project Outline
- Project Overview
- WP breakdown of SAFeCRAFT
- Gantt chart
- Next steps

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Project Outline

SAFeCRAFT - "Safe and Efficient Use of Sustainable Fuels in Maritime Transport Applications"

Scope:

Development and demonstration at full scale of a fuel replacement for main propulsion system, towards meeting the goals of EU for 2040.

Numbers:

- Type of action: HORIZON-IA → TRL7-8
- Project starting date: December 2023
- Project duration: 48 months
- Project budget: 12,477,375.00€
- Funded budget: 9,389,662.50€
- Number of partners: 11

Key Project objectives:

- Combination of a H2 Genset and a PTI/PTO solution for compliance with fuel EU maritime 2040 targets
- Detailed engineering, retrofitting design and demonstration of the solutions onboard a cape size bulk carrier
- Alternative solutions (NH3, LOHC / FCs, ICEs) examination through desktop studies
- Safety and Environmental compliance evaluation
- Approval in Principle for both demo and desktop cases
- Digital platform and tools development

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Partners Overview

Technology providers

MOTOR OIL

metacon

academic institutions

National Technical University of Athens

University of Strathclyde Glasgow

TECHNISCHE UNIVERSITÄT DRESDEN

Service Providers

seanergy

HYDRUS

classification societies

RINA

ABS

Associations

WEGEMT

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WP breakdown of SAFeCRAFT

WP1 — HYDRUS — Project Management

WP2 — RINA — Demonstration Implementation Plan

WP3 — National Technical University of Athens — Analysis and comparison of alternative systems for desktop studies

WP4 — HYDRUS — Engineering design for the demonstrator and the desktop studies

WP5 — Smart digitalization process for monitoring and operations

WP6 — HYDRUS — Demonstrator installation and testing

WP7 — University of Strathclyde Glasgow — Safety evaluation on risk-based designs and demonstrations

WP8 — National Technical University of Athens — Technical and economic assessment of KPIs and LCA

WP9 — WEGEMT — Dissemination, Exploitation and Communication

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SAFeCRAFT core technologies

Core technology	Way forward
H_2 genset and PTI-PTO system retrofit **(TRL 2)**	Definition of requirements and assessment of concept of using H_2 either as fuel in GenSets or integrated with fuel cells for PTI (**TRL 8**)
LH_2 or CGH_2 on-board storage **(TRL 6)**	Definition of requirements and assessment of concept of bunkering and storing H_2 on-board an in compliance with the marine regulations (**TRL 8**)
On-board NH_3 cracking to H_2 **(TRL 5)**	Definition of the requirements and assessment of the concept of producing H_2 from NH_3 cracking on-board and in compliance with the marine regulations (**TRL 6**)
On-board storage of LOHC and H_2 releasing **(TRL 4)**	Assessment of vital aspects on application of LOHC technology in maritime applications and in compliance with the respective marine regulatory framework for various vessel types (**TRL 6**)
Smart digitalization **(TRL 4)**	Smart digitalization and demonstration and verification via desktop studies of the fuel system and the monitoring subsystems (**TRL 7**)

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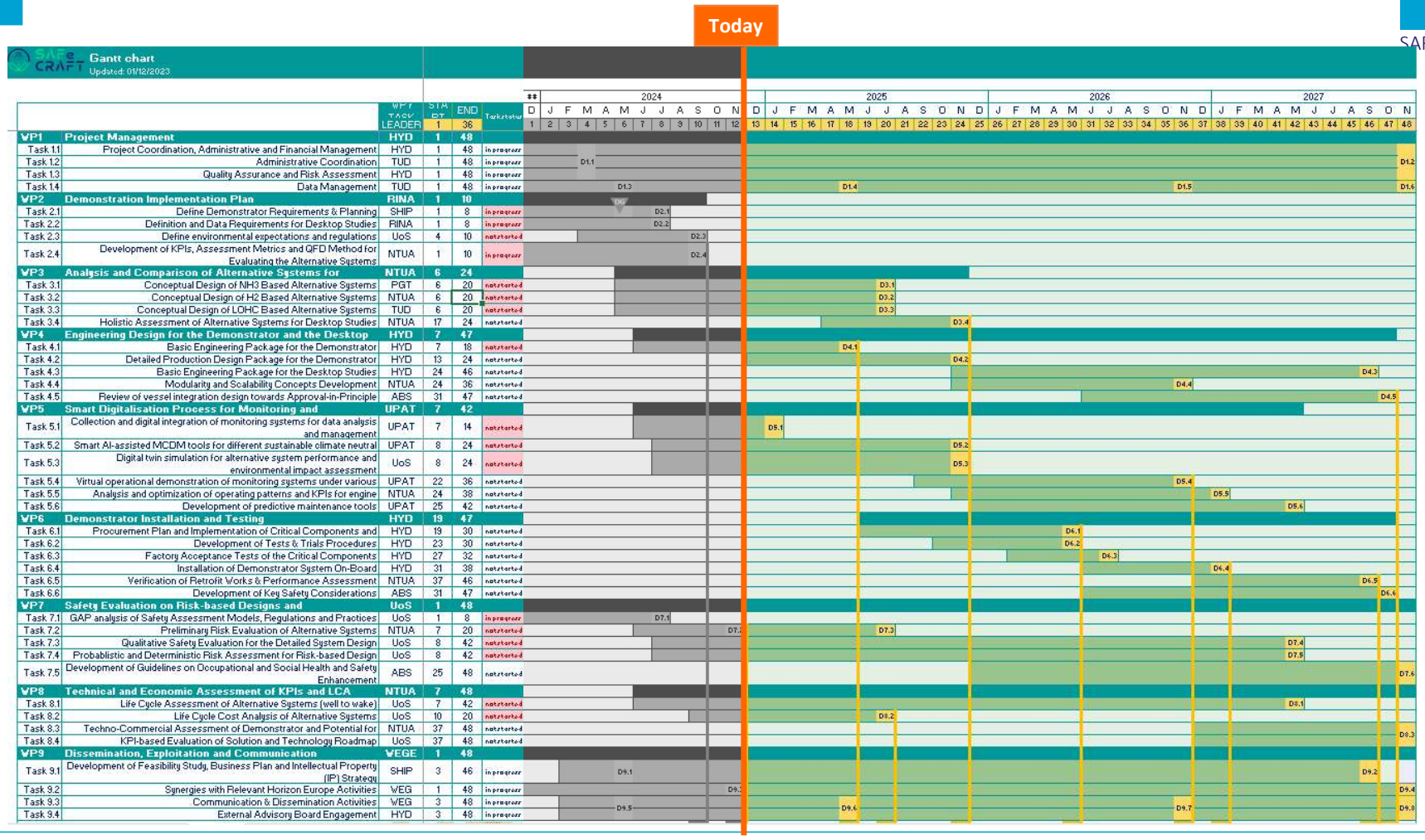
Gantt chart of the project



		WP / Task LEADER	START	END	Task status
WP1	Project Management	HYD	1	48	
Task 1.1	Project Coordination, Administrative and Financial Management	HYD	1	48	in progress
Task 1.2	Administrative Coordination	TUD	1	48	in progress
Task 1.3	Quality Assurance and Risk Assessment	HYD	1	48	in progress
Task 1.4	Data Management	TUD	1	48	in progress
WP2	Demonstration Implementation Plan	RINA	1	10	
Task 2.1	Define Demonstrator Requirements & Planning	SHIP	1	8	in progress
Task 2.2	Definition and Data Requirements for Desktop Studies	RINA	1	8	in progress
Task 2.3	Define environmental expectations and regulations	UoS	4	10	not started
Task 2.4	Development of KPIs, Assessment Metrics and QFD Method for Evaluating the Alternative Systems	NTUA	1	10	in progress
WP3	Analysis and Comparison of Alternative Systems for	NTUA	6	24	
Task 3.1	Conceptual Design of NH3 Based Alternative Systems	PGT	6	20	not started
Task 3.2	Conceptual Design of H2 Based Alternative Systems	NTUA	6	20	not started
Task 3.3	Conceptual Design of LOHC Based Alternative Systems	TUD	6	20	not started
Task 3.4	Holistic Assessment of Alternative Systems for Desktop Studies	NTUA	17	24	not started
WP4	Engineering Design for the Demonstrator and the Desktop	HYD	7	47	
Task 4.1	Basic Engineering Package for the Demonstrator	HYD	7	18	not started
Task 4.2	Detailed Production Design Package for the Demonstrator	HYD	13	24	not started
Task 4.3	Basic Engineering Package for the Desktop Studies	HYD	24	46	not started
Task 4.4	Modularity and Scalability Concepts Development	NTUA	24	36	not started
Task 4.5	Review of vessel integration design towards Approval-in-Principle	ABS	31	47	not started
WP5	Smart Digitalisation Process for Monitoring and	UPAT	7	42	
Task 5.1	Collection and digital integration of monitoring systems for data analysis and management	UPAT	7	14	not started
Task 5.2	Smart AI-assisted MCDM tools for different sustainable climate neutral	UPAT	8	24	not started
Task 5.3	Digital twin simulation for alternative system performance and environmental impact assessment	UoS	8	24	not started
Task 5.4	Virtual operational demonstration of monitoring systems under various	UPAT	22	36	not started
Task 5.5	Analysis and optimization of operating patterns and KPIs for engine	NTUA	24	38	not started
Task 5.6	Development of predictive maintenance tools	UPAT	25	42	not started
WP6	Demonstrator Installation and Testing	HYD	19	47	
Task 6.1	Procurement Plan and Implementation of Critical Components and	HYD	19	30	not started
Task 6.2	Development of Tests & Trials Procedures	HYD	23	30	not started
Task 6.3	Factory Acceptance Tests of the Critical Components	HYD	27	32	not started
Task 6.4	Installation of Demonstrator System On-Board	HYD	31	38	not started
Task 6.5	Verification of Retrofit Works & Performance Assessment	NTUA	37	46	not started
Task 6.6	Development of Key Safety Considerations	ABS	31	47	not started
WP7	Safety Evaluation on Risk-based Designs and	UoS	1	48	
Task 7.1	GAP analysis of Safety Assessment Models, Regulations and Practices	UoS	1	8	in progress
Task 7.2	Preliminary Risk Evaluation of Alternative Systems	NTUA	7	20	not started
Task 7.3	Qualitative Safety Evaluation for the Detailed System Design	UoS	8	42	not started
Task 7.4	Probabilistic and Deterministic Risk Assessment for Risk-based Design	UoS	8	42	not started
Task 7.5	Development of Guidelines on Occupational and Social Health and Safety Enhancement	ABS	25	48	not started
WP8	Technical and Economic Assessment of KPIs and LCA	NTUA	7	48	
Task 8.1	Life Cycle Assessment of Alternative Systems (well to wake)	UoS	7	42	not started
Task 8.2	Life Cycle Cost Analysis of Alternative Systems	UoS	10	20	not started
Task 8.3	Techno-Commercial Assessment of Demonstrator and Potential for	NTUA	37	48	not started
Task 8.4	KPI-based Evaluation of Solution and Technology Roadmap	UoS	37	48	not started
WP9	Dissemination, Exploitation and Communication	WEGE	1	48	
Task 9.1	Development of Feasibility Study, Business Plan and Intellectual Property (IP) Strategy	SHIP	3	46	in progress
Task 9.2	Synergies with Relevant Horizon Europe Activities	WEG	1	48	in progress
Task 9.3	Communication & Dissemination Activities	WEG	3	48	in progress
Task 9.4	External Advisory Board Engagement	HYD	3	48	in progress

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Slide 7

AG0 Possibly not useful, due to slide 8

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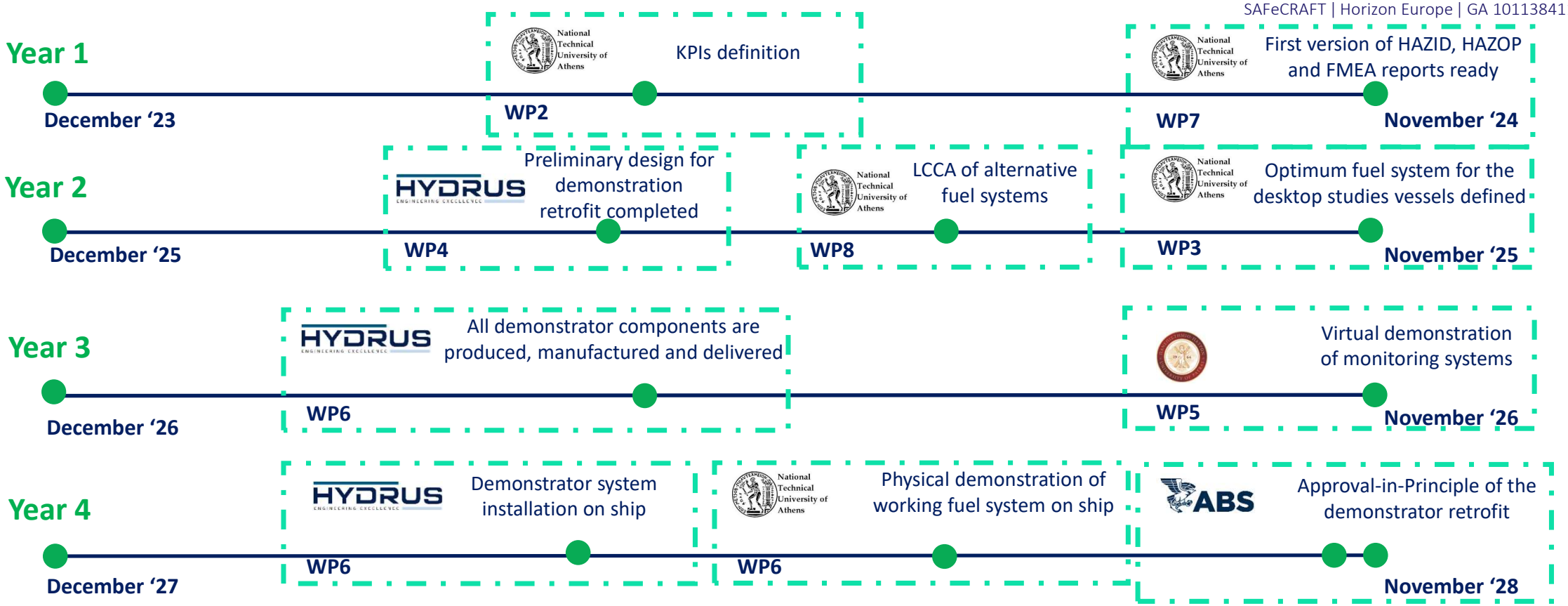
Gantt chart of the project



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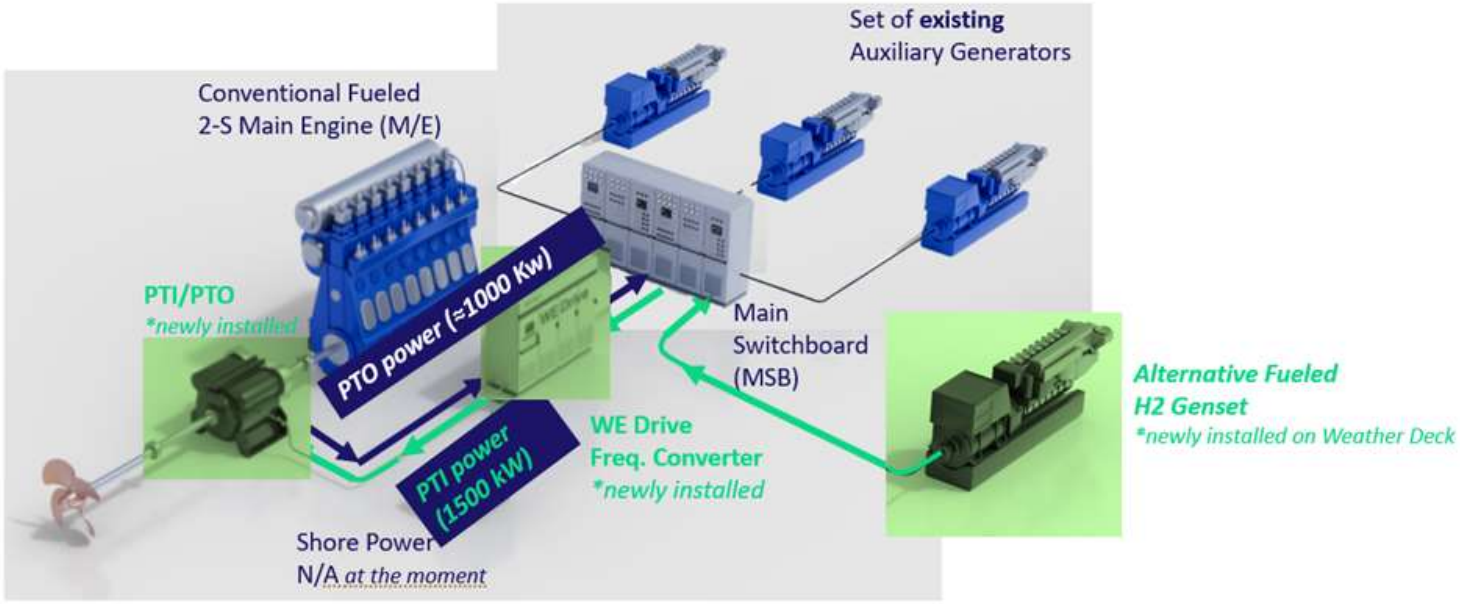
WP2 status

Demonstrator vessel – Cape size bulk carrier



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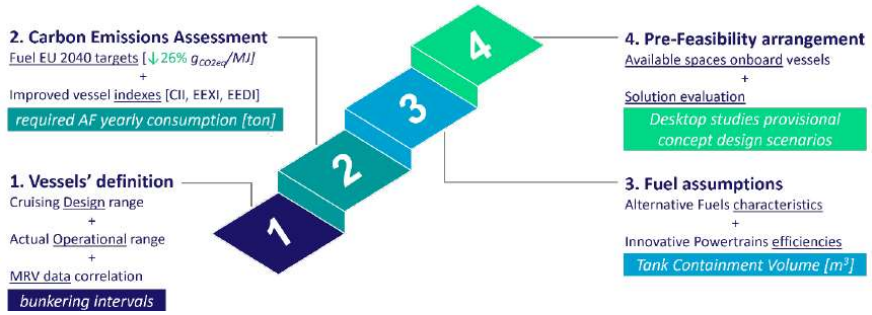
WP2 status

Desktop studies assessment

Approach	Powertrain option	Fuel	Vessel type: Bulk Carrier 180,000 dwt	Container 2,700 TEU	Tanker 6,700dwt	RoPax 1,500 pas.	Cruise ship Mid-size
Retrofit	AF GenSet + PTI	LH2	Demonstration				
		CGH2					
		NH3		1	2	3	4
		LOHC					
	FCs & marine type batteries	LH2					
		CGH2					
		NH3					
		LOHC					
New Building	AF ICE M/E propulsion	LH2					
		CGH2					
		NH3		5	6		
		LOHC					
	H2 fed system of FCs + batteries	LH2					
		CGH2					
		NH3					
		LOHC					



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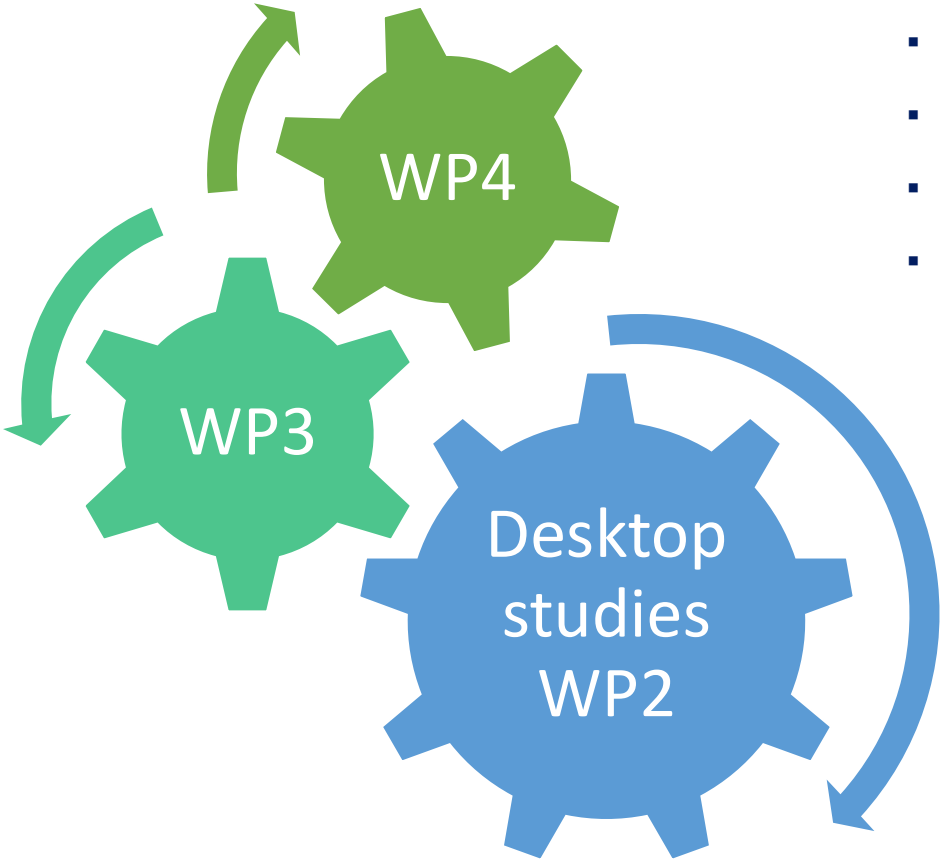
WP3/WP4 Roadmap



- Development of the basic engineering design package for the demonstrator.
- Development of the 3D detailed and production design package for the demonstrator.
- Development of the basic engineering design package for the desktop studies.
- Development of realistic modular solutions of the proposed systems.

- Establishing a robust methodology to analyse the alternative concepts for the operational profile of each vessel.
- Defining preliminary arrangement and operational restrictions of each concept, based on the results of WP7.
- Defining operational, inspection, maintenance and emission control procedures for each proposed solution.
- Detailed KPI-based assessment of the considered alternative solutions with respect to energy efficiency, environmental performance, complexity, and operational flexibility.

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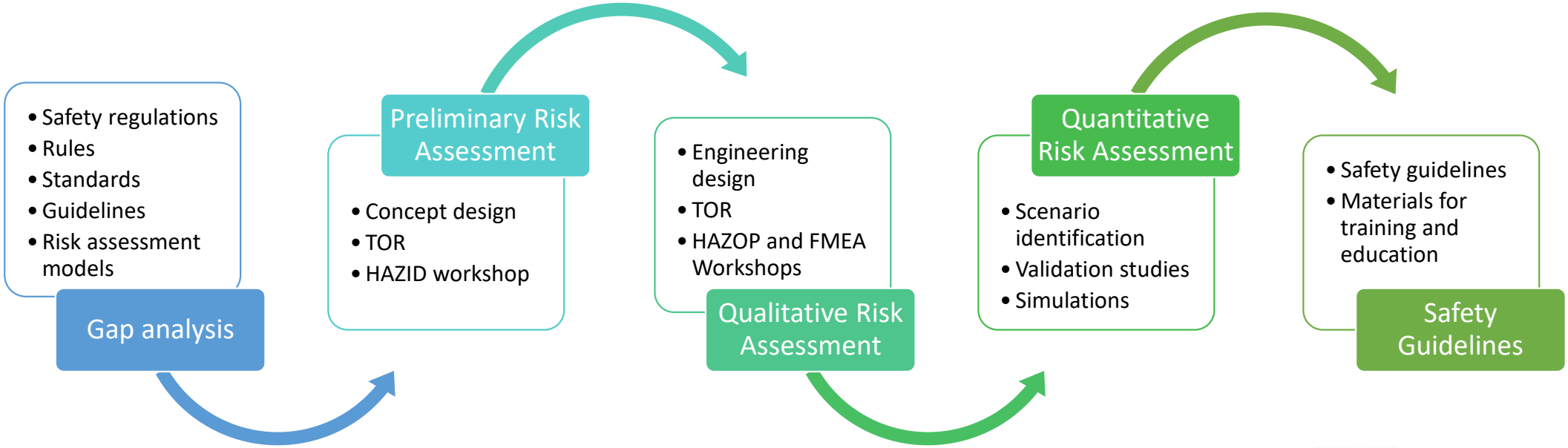
WP7 status

Through a comprehensive risk assessment process, the proposed solutions will be designed, constructed, and operated in a safe manner, and all potential risks associated with SAFs are properly identified and mitigated.



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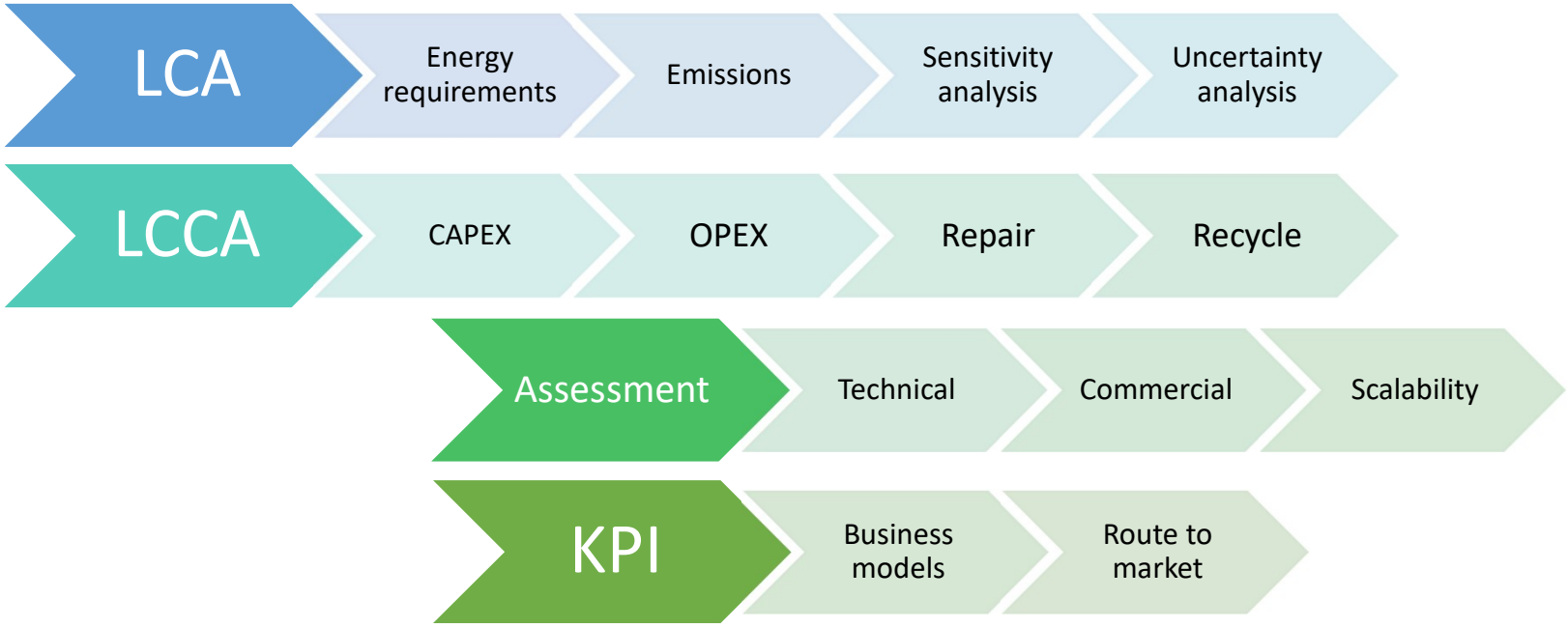
WP8 status

The objective of WP8 is to assess and evaluate the solutions developed and investigated in the project with a holistic view on their feasibility to increase confidence in their applicability and thereby facilitate industry uptake.



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Next steps

- Specification of PTI/PTO to be finalized
- HAZID, HAZOP and FMEA workshops
- Preliminary work for QRA
- Data collection for LCCA and LCA
- Preparatory works towards the actual demonstration

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Thank you!

HYDRUS ENGINEERING EXCELLENCE

LinkedIn

https://gr.linkedin.com/company/hydrus-engineering-ltd-

Email

mail@hydrus-eng.com

a.papadakis@hydrus-eng.com

a.giannakis@hydrus-eng.com

University of Strathclyde Glasgow

LinkedIn

https://www.linkedin.com/showcase/safecraft/

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