



FIBREGY

Introduction to FIBREGY project

Prof. Julio García-Espinosa

CIMNE

E. julio@cimne.upc.edu



FIBREGY

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Development, engineering, production and life-cycle management of improved FIBRE-based material solutions for structure and functional components of large offshore wind enerGY and tidal power platform

CALL: H2020-LC-NMBP-31-2020

INTRUMENT: Innovation Action

STARTING DATE: 01/01/2021

PROJECT DURATION: 36 mos.

SOME FACTS

8.0 M€

TOTAL BUDGET

6.5 M€

MAX GRANT AMOUNT

12 PARTNERS FROM
7 COUNTRIES

> 40

RESEARCHERS

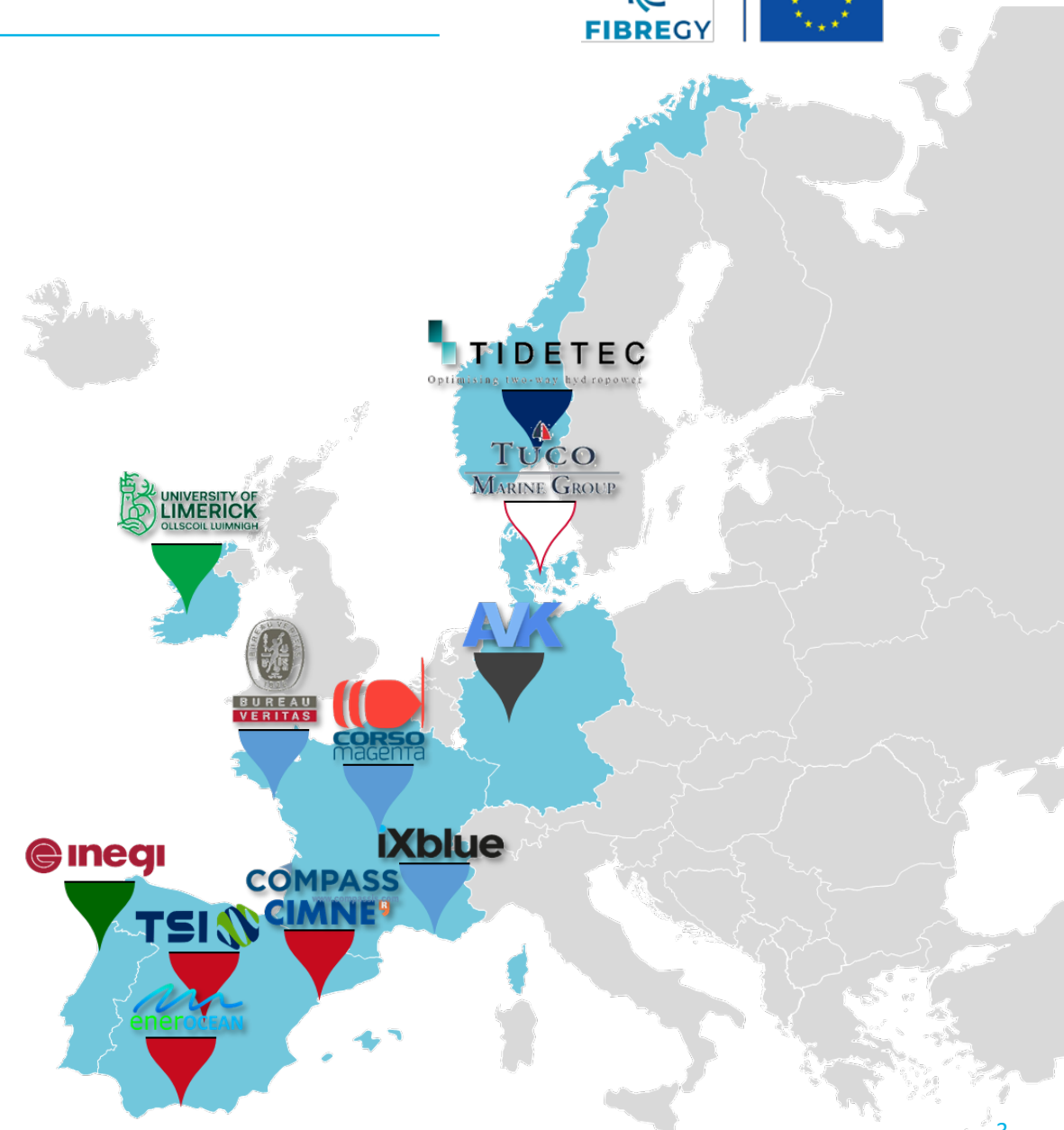
> 900 PM

TOTAL EFFORT

80%

OF TOTAL EFFORT DEVOTED TO
ENGINEERING, DEVELOPMENT,
BUILDING AND TESTING

Participant Organisation Name	Short name	Country
Centre Internacional de Mètodes Numèrics en Enginyeria	CIMNE	SP
Bureau Veritas	BV	FR
EnerOcean S.L.	ENEROCEAN	SP
IXBLUE	IXBLUE	FR
University of Limerick - Irish Centre for Composites Research	ULIM	IE
Compass Ingeniería y Sistemas	COMPASSIS	SP
Técnicas y Servicios de Ingeniería	TSI	SP
INEGI - Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial	INEGI	PT
Tidetec AS	TIDETEC	NO
Curso Magenta	CORSO	FR
TUCO Yacht Vaerft APS	TUCO	DK
AVK – Industrievereinigung Verstärkte Kunststoffe e.V.	AVK	GE

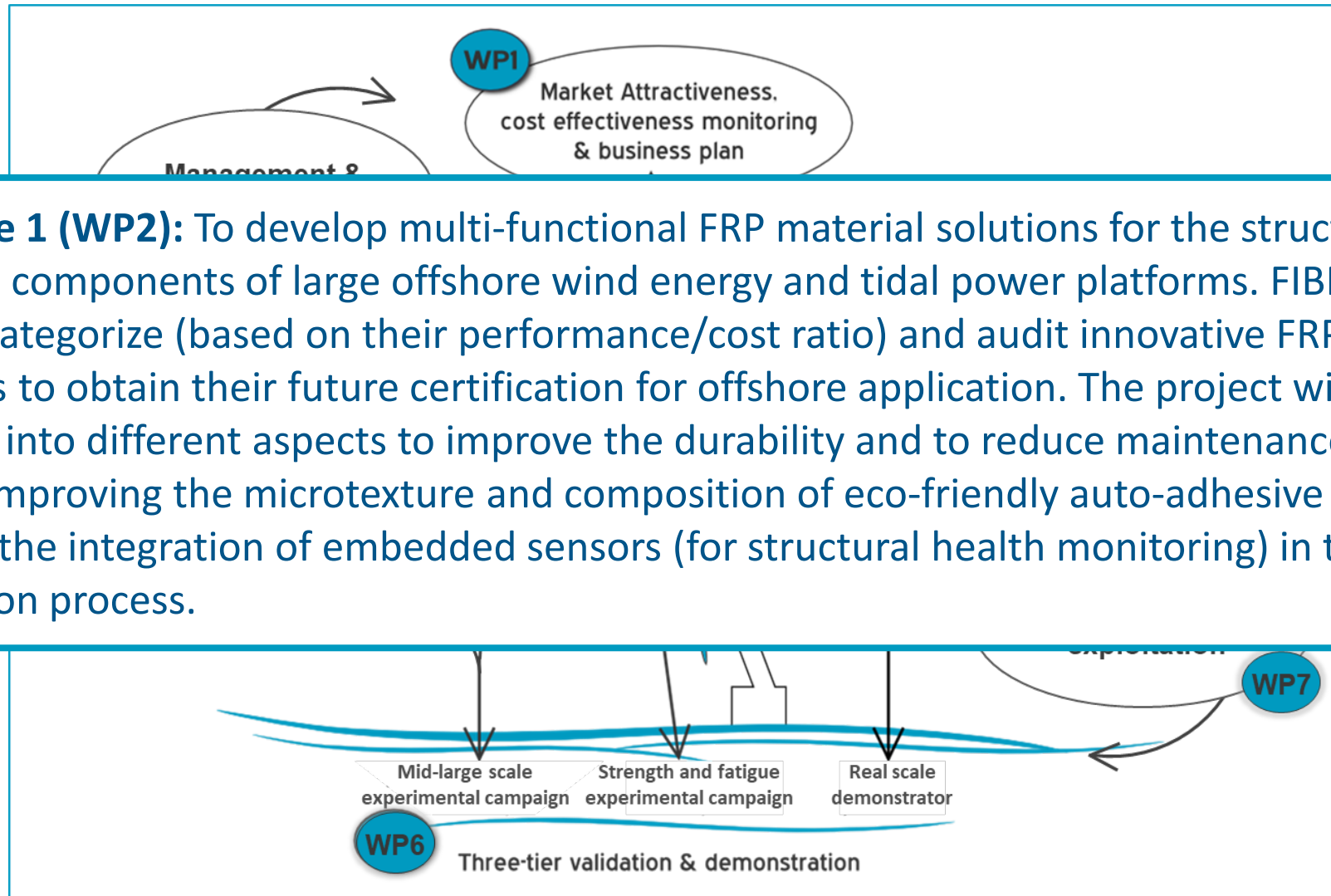


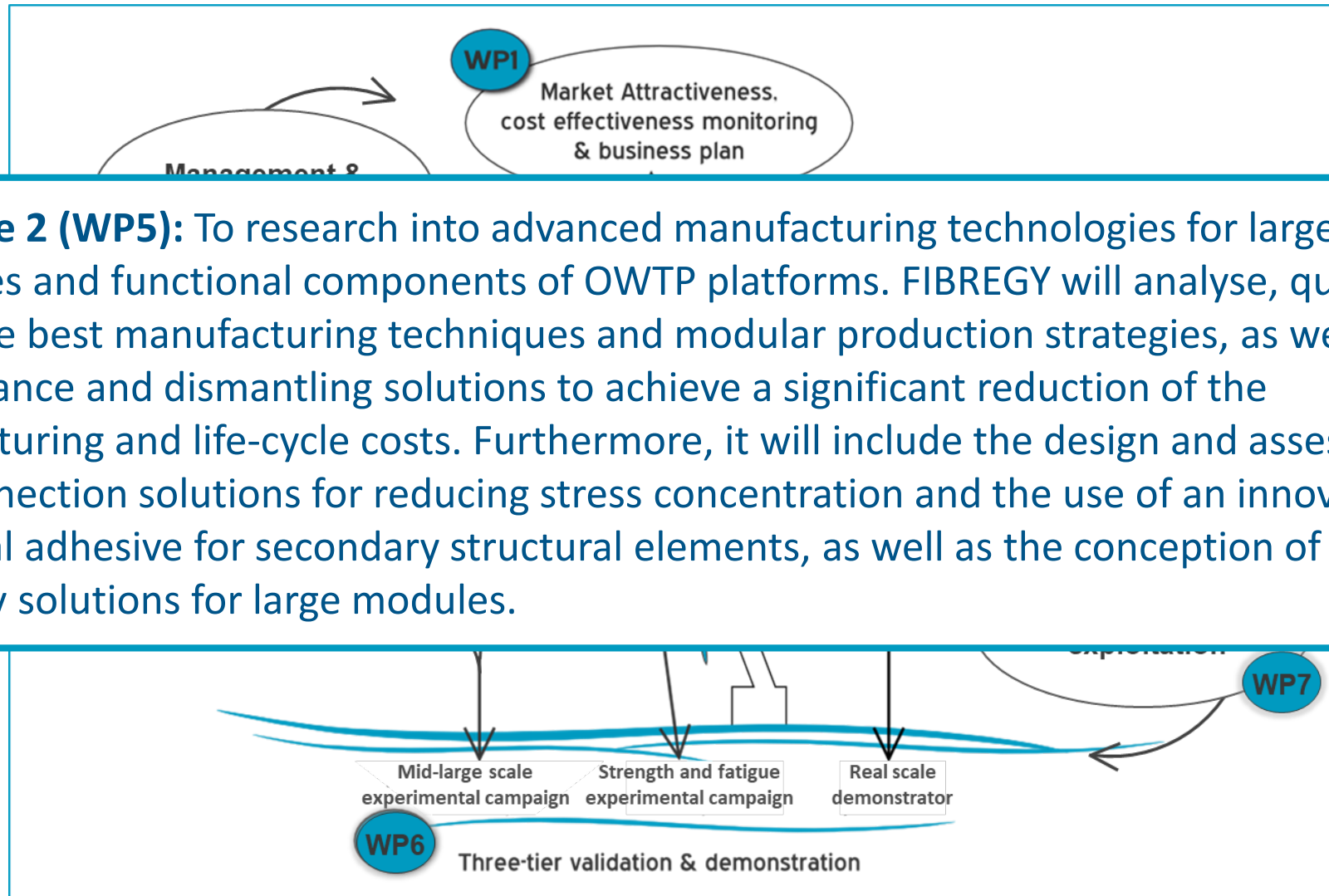
PROJECT'S OVERALL OBJECTIVE

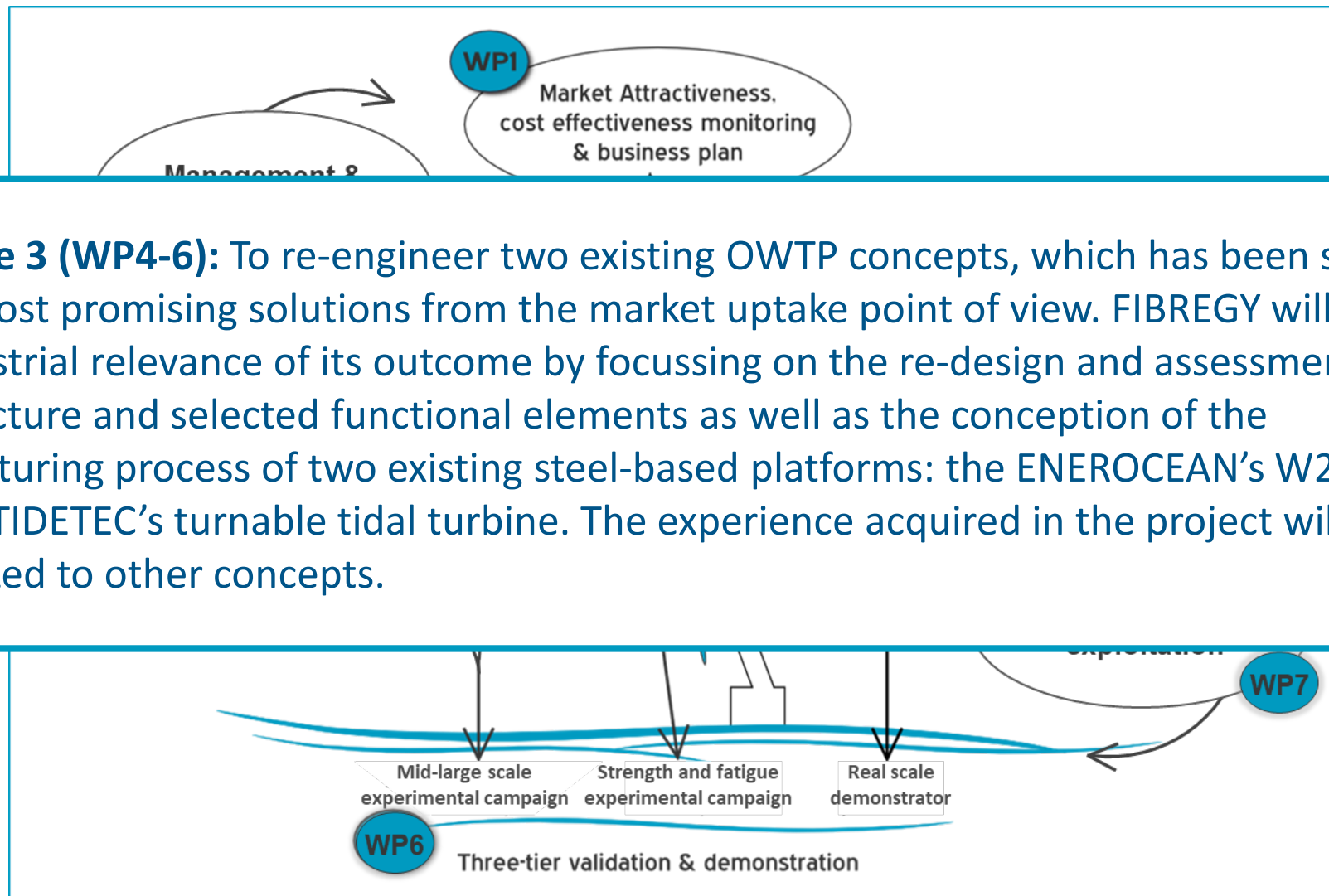


- The open sea is a very aggressive environment, which largely affect the maintenance costs of the offshore installations.
- A massive amount of steel goes into offshore assets, which explains why corrosion accounts for approximately 60% of offshore maintenance costs.
- Despite the convenient immunity to corrosion and superior fatigue performance of FRP, none of the structures of the Floating Offshore Wind Turbine concepts that have reached a high TRL are based on composites.
- If we look at the field of tidal power generators, the use of FRP materials for rotor blades is common but, with rare exceptions, the platform structure - the major cost item- is made of steel.
- Reasons: lack of design and assessment (certification) guidelines, different technology gaps that have to be filled to demonstrate the full feasibility of using FRP materials in the offshore industry, prove a significant lower life cycle reduction.

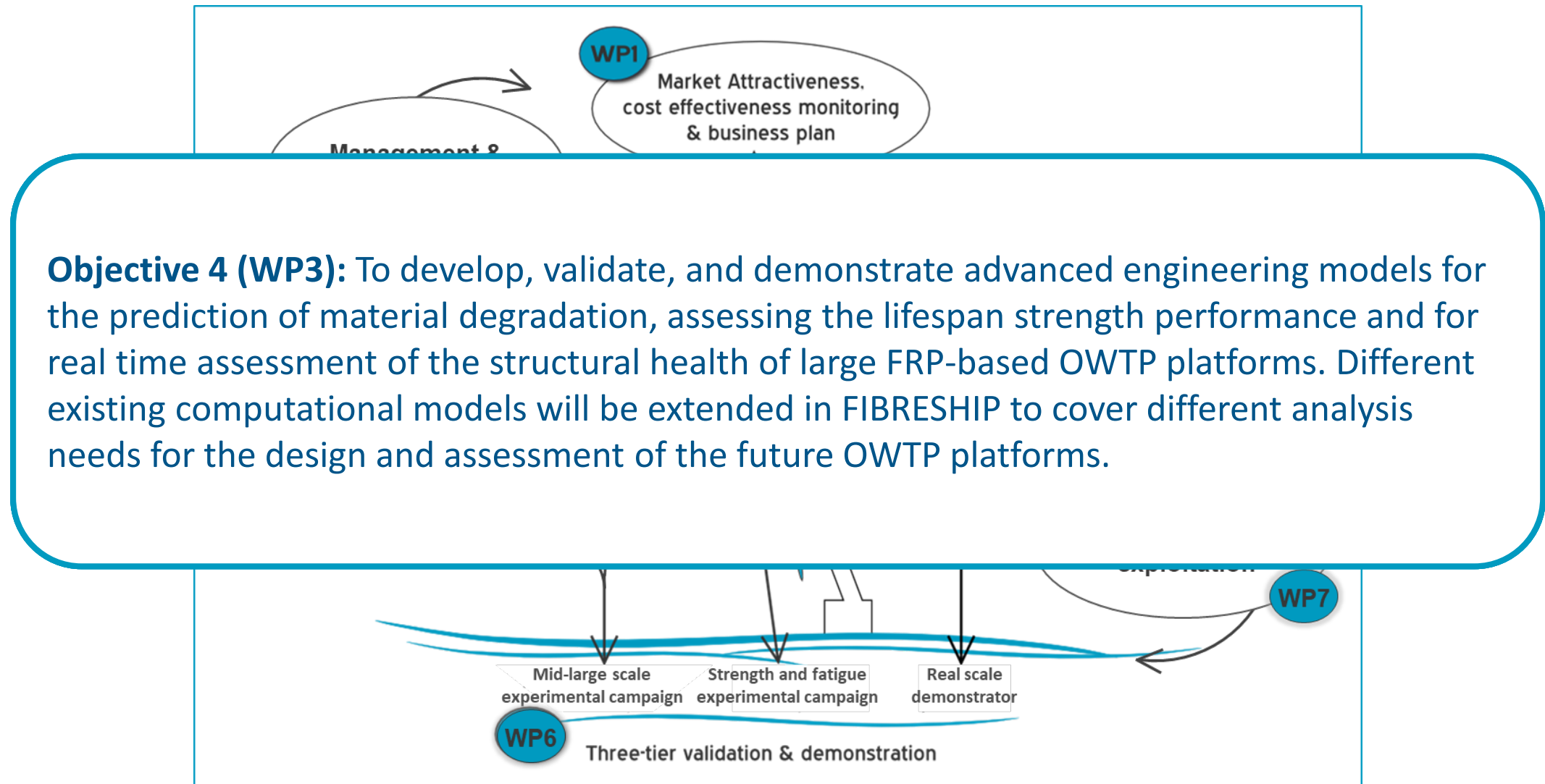
The overall objective of the FIBREGY project is to enable the extensive use of FRP materials in the structure of the next generation of large Offshore Wind and Tidal Power platforms. In order to achieve this objective, the project will develop, qualify and audit innovative FRP materials for offshore applications, elaborate new design procedures and guidelines, generate efficient production, inspection and monitoring methodologies, and validate and demonstrate advanced software analysis tools. Finally, the different developed technologies will be demonstrated by using advanced simulation techniques and building large and real-scale prototypes.

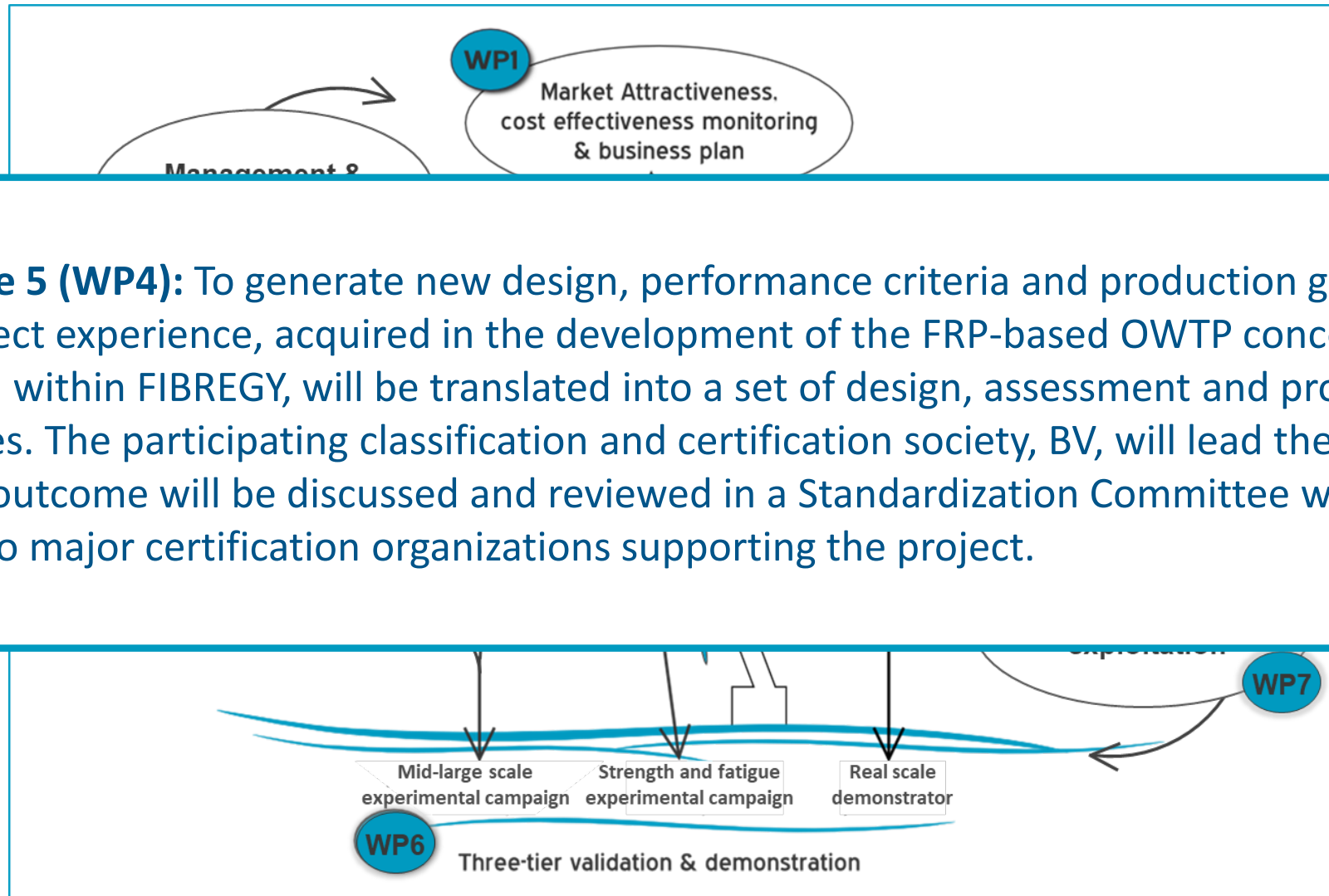






Objective 3 (WP4-6): To re-engineer two existing OWTP concepts, which has been selected as the most promising solutions from the market uptake point of view. FIBREGY will ensure the industrial relevance of its outcome by focussing on the re-design and assessment of the FRP structure and selected functional elements as well as the conception of the manufacturing process of two existing steel-based platforms: the ENEROCEAN's W2POWER and the TIDETEC's turnable tidal turbine. The experience acquired in the project will be generalized to other concepts.

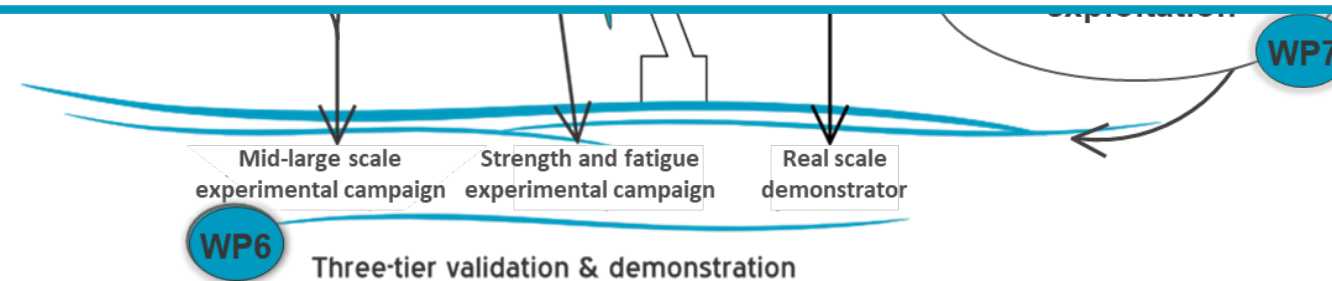


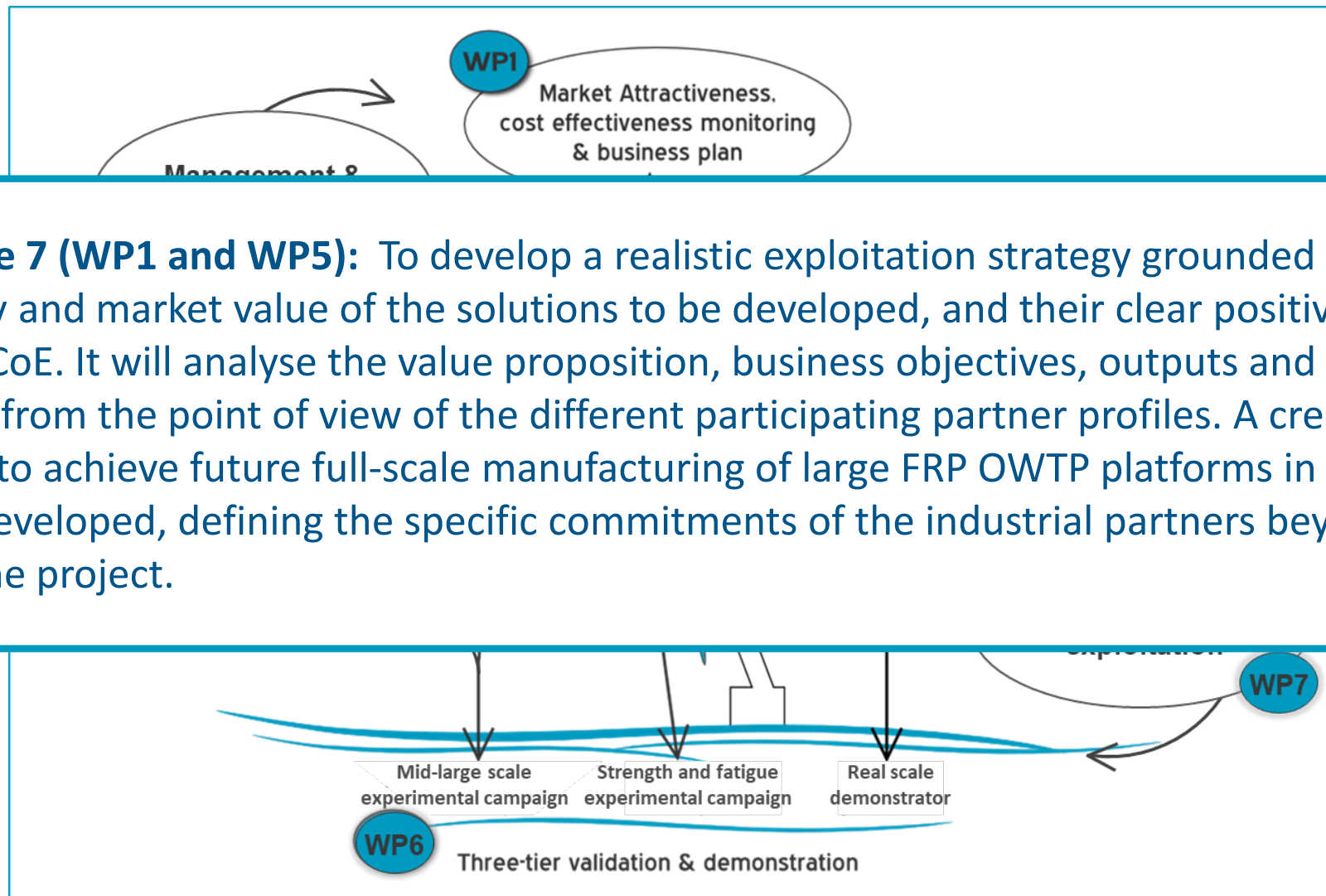


Objective 5 (WP4): To generate new design, performance criteria and production guidelines. The project experience, acquired in the development of the FRP-based OWTP concepts to be designed within FIBREGY, will be translated into a set of design, assessment and production guidelines. The participating classification and certification society, BV, will lead these tasks, and the outcome will be discussed and reviewed in a Standardization Committee with the other two major certification organizations supporting the project.

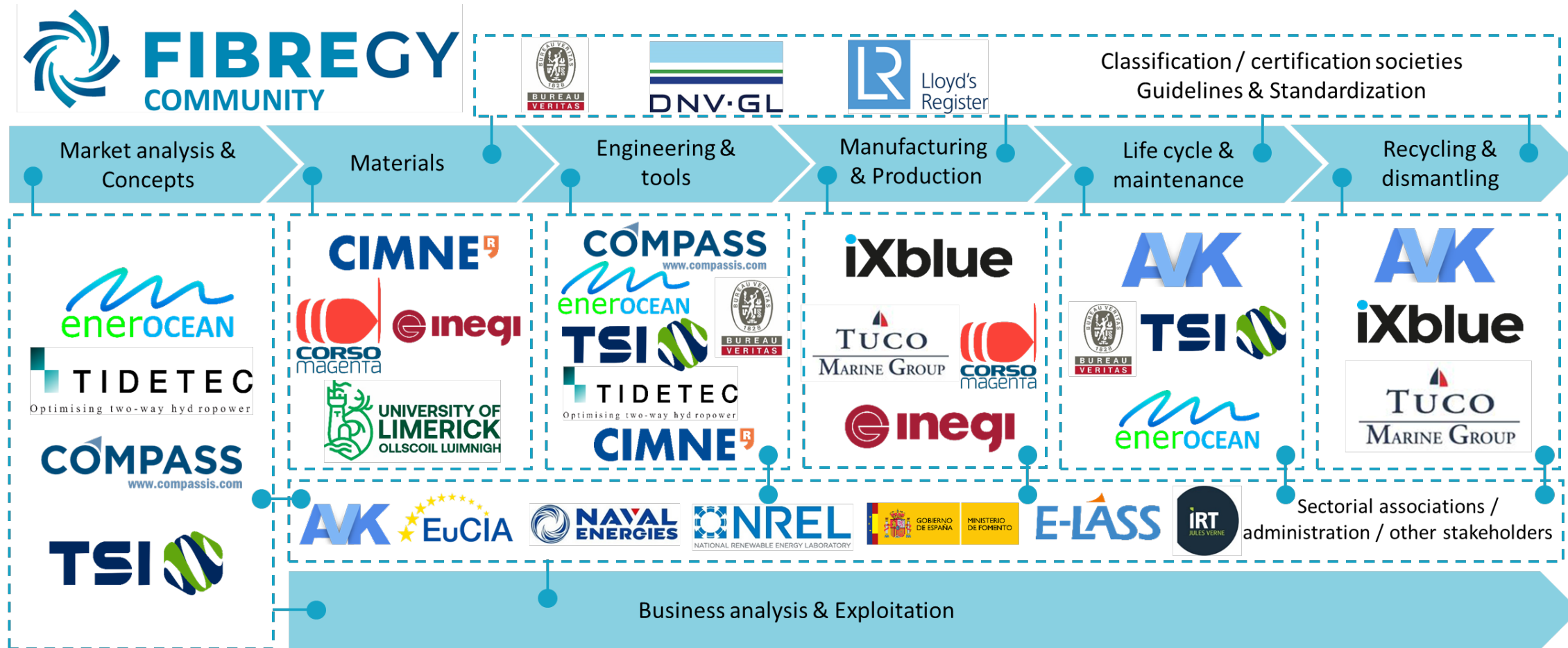


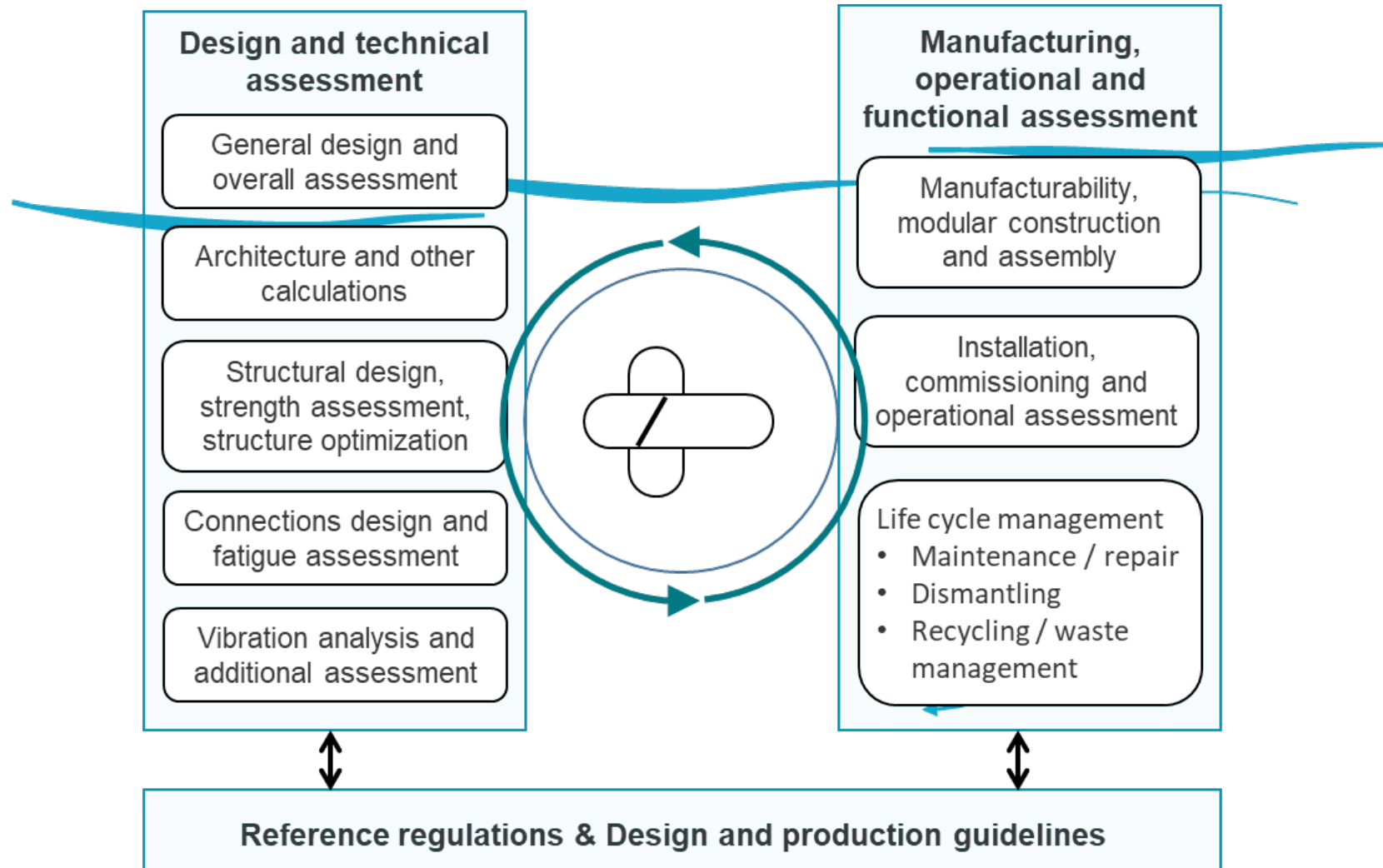
Objective 6 (WP6): To validate, assess, and demonstrate the different developments of the project. FIBREGY's technology demonstration and validation activities will follow a three-tier approach, including an extensive experimental campaign at coupon and medium-large scale, the building of one real scale demonstrator –a representative module of the FRP-based W2POWER platform - and advanced computational simulations of the whole FRP structures in realistic operational environments.



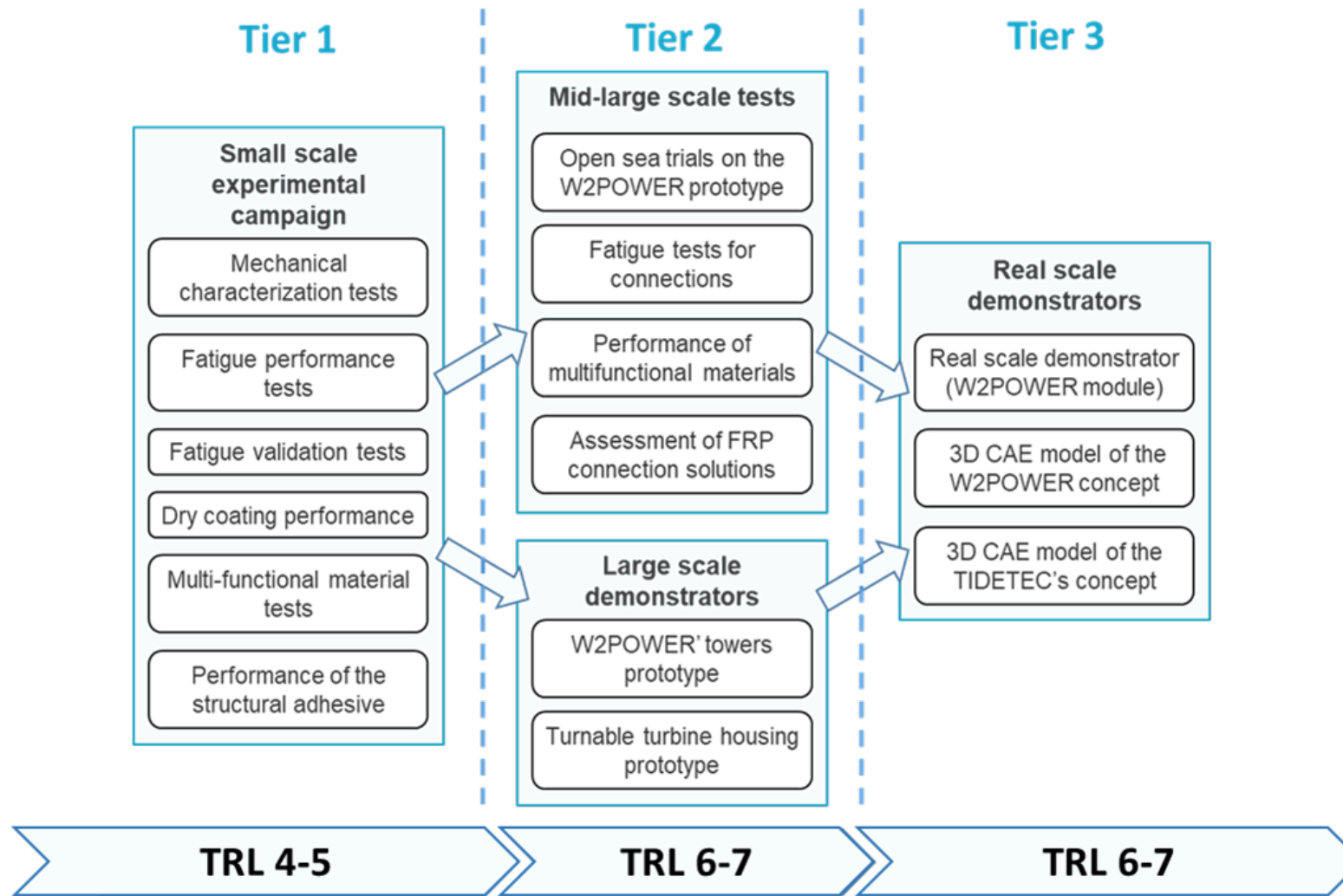


CONTRIBUTIONS ALONG THE VALUE CHAIN





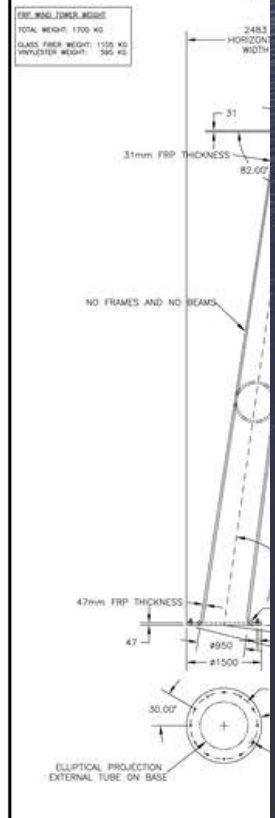
FIBREGY's three-tier validation and demonstration plan



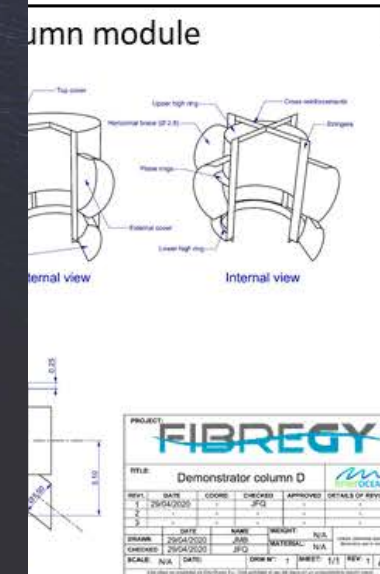
VALIDACION AND DEMONSTRATION ON W2POWER



Large-scale 1:6 de
Embedded SHM sys



W2Power



VALIDACION AND DEMONSTRATION ON W2POWER



Large-scale 1:6 demonstrator: Towers
Embedded SHM system / open sea tests

Dwg. #W2POWER_TOWERS
 TOTAL WEIGHT: 1700 KG
 GLASS FIBER WEIGHT: 1100 KG
 VINYLESTER WEIGHT: 590 KG

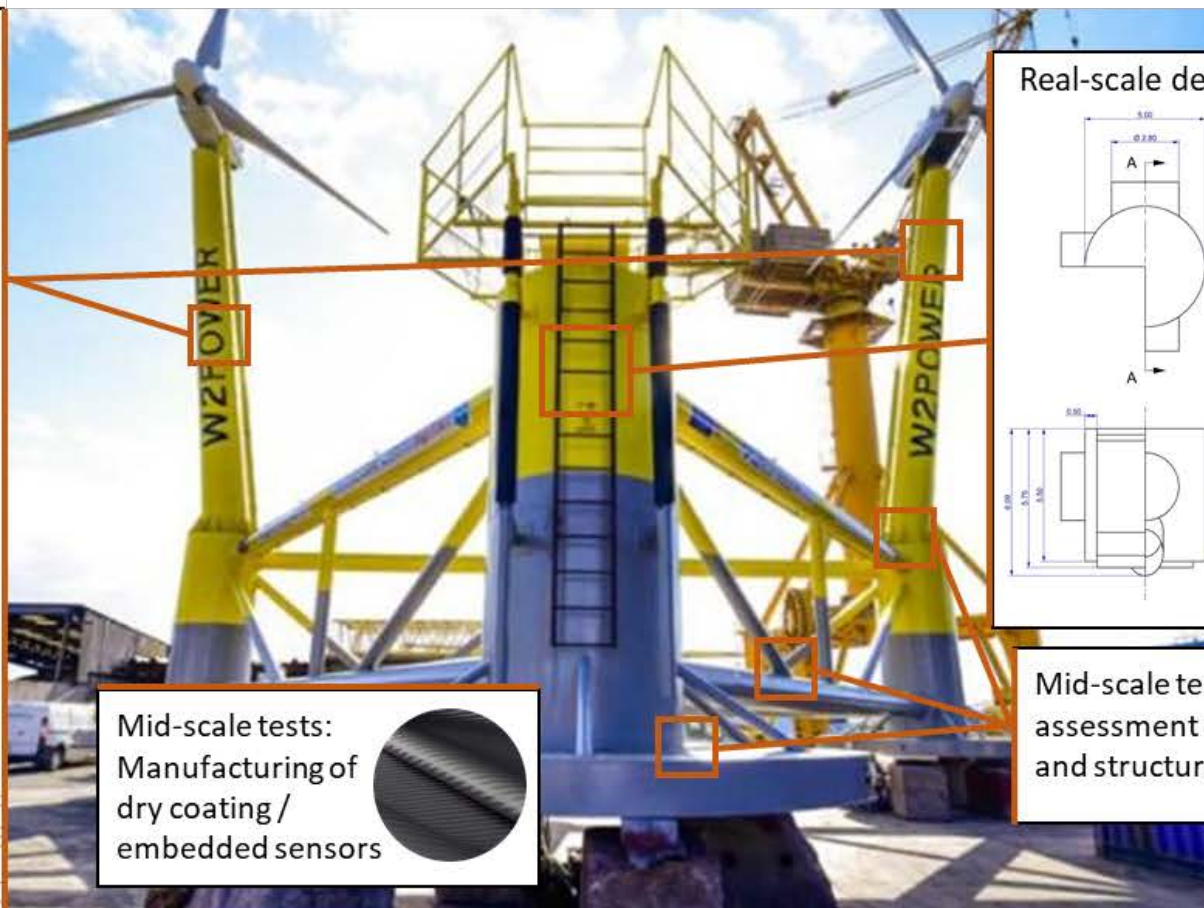
Dwg. #W2POWER_LAYOUTS
 FIBRE: UNIDIRECTIONAL GLASS E
 RESIN: VINYLESTER (50% ON MASS)
 LAYOUT: 0°-90° / 90° - 90° / 90° - 135°
 NON ACCEPTED FILAMENT WINDING PROCESS

2483 HORIZONTAL WIDTH
 2116 MINIMUM WIDTH
 31
 6675
 9903 VERTICAL LENGTH

CONFIDENTIAL

47
 30.00
 #950
 #1500
 #1338
 #1500
 #42
 #42
 ELLIPTICAL PROJECTION EXTERNAL TUBE ON BASE

QUANTITY: 2 UNITS
 FIBREGY COMPASS
 FRP WIND TOWER



Real-scale demonstrator: D column module

External view

Internal view

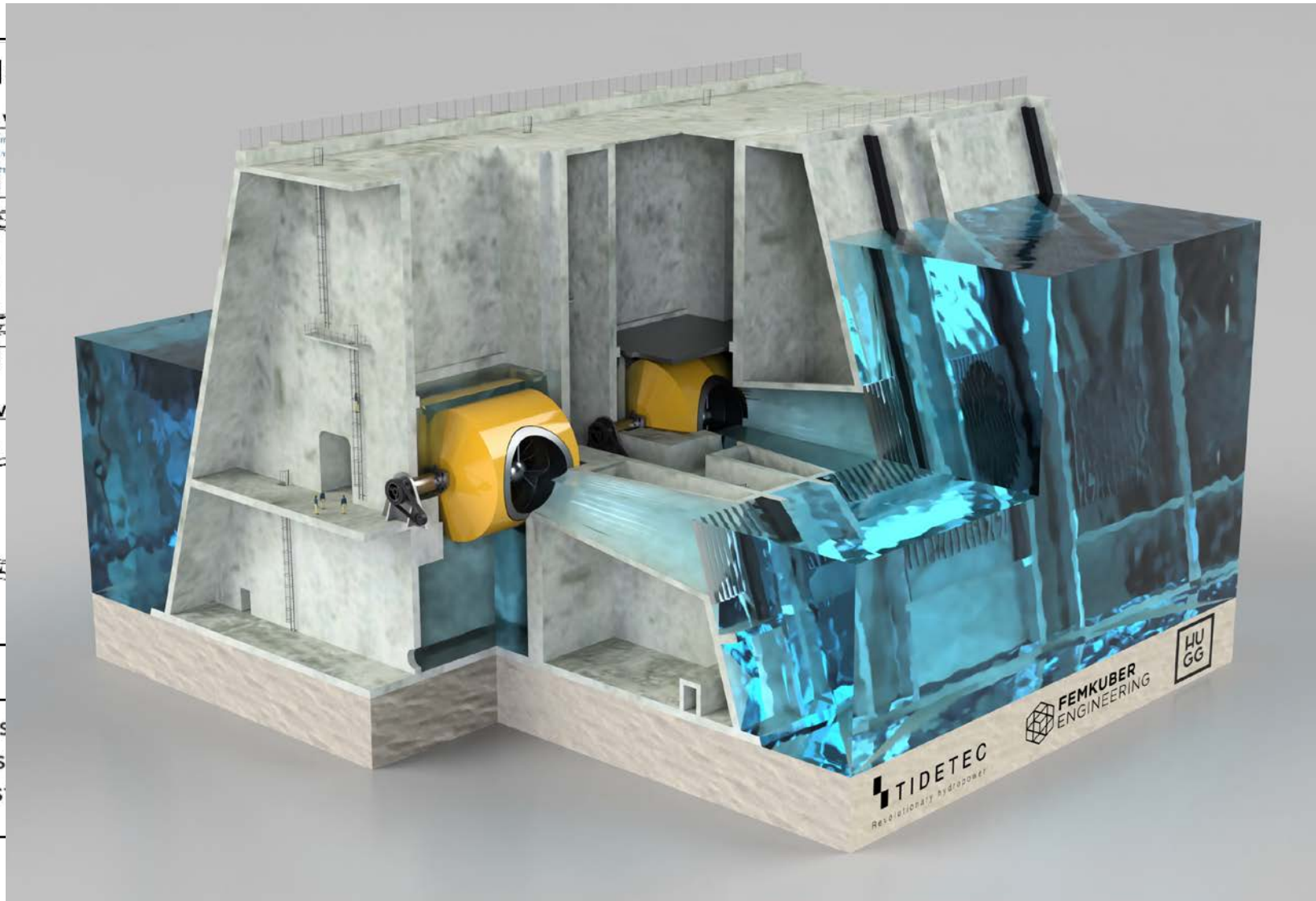
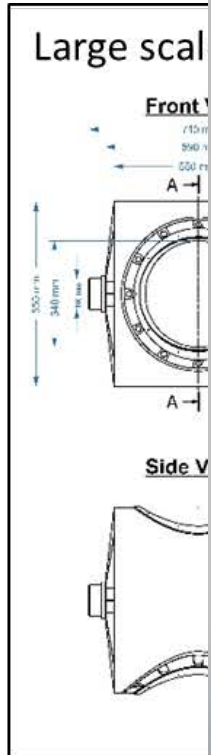
Section A-A

PROJECT		FIBREGY		m OCEAN	
TITLE: Demonstrator column D					
REV#	DATE	CODE	CHECKED	APPROVED	DETAILS OF REVISION
1	2024/02/05		JFC		
DESIGN	DATE	NAME	WEIGHT	N/C	
CHECKED	2024/02/05	JFC	MATERIAL	N/A	
SCALE	N/A	DATE	DRW#	1	SHEET: 1/1 REV: 1 A3

Mid-scale tests:
 Manufacturing of
 dry coating /
 embedded sensors

Mid-scale tests: fatigue/strength
 assessment of connections/hot-spots
 and structural (reversible) adhesive

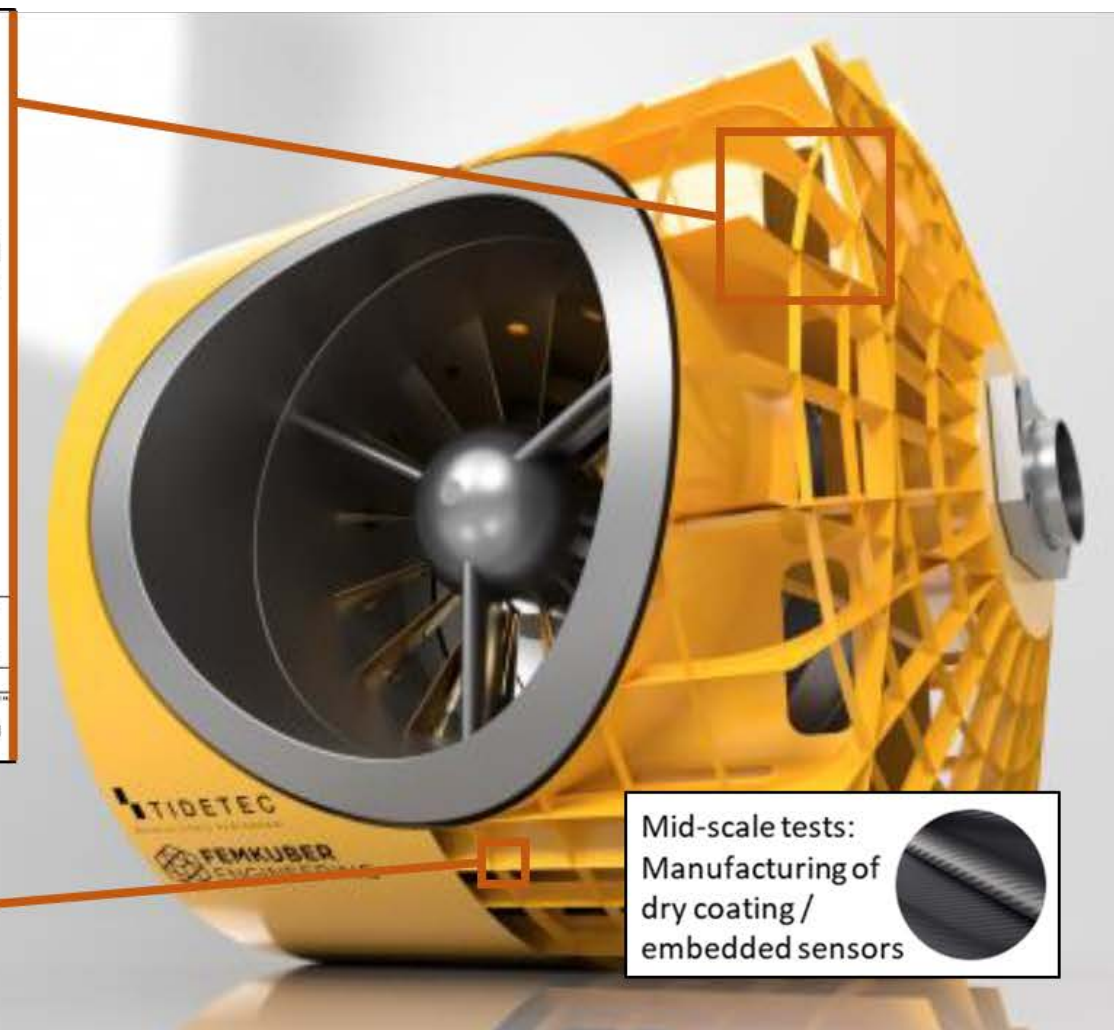
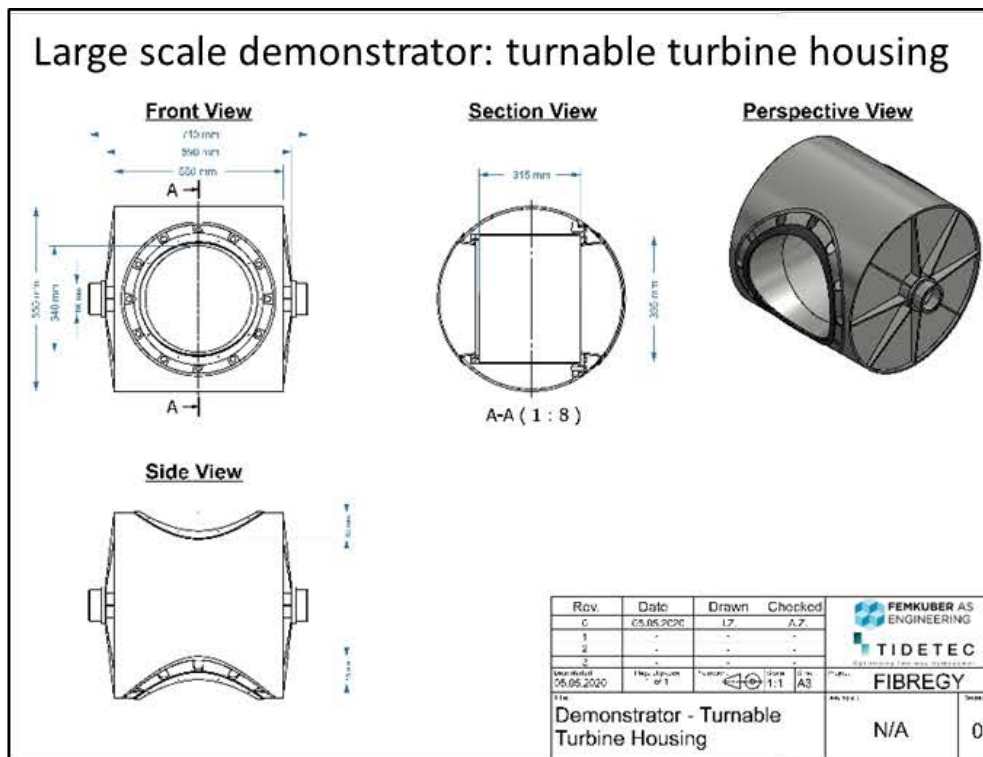
VALIDACION AND DEMONSTRATION ON TIDETEC'S TURBINE



Mid-scale
assessment
and simulation



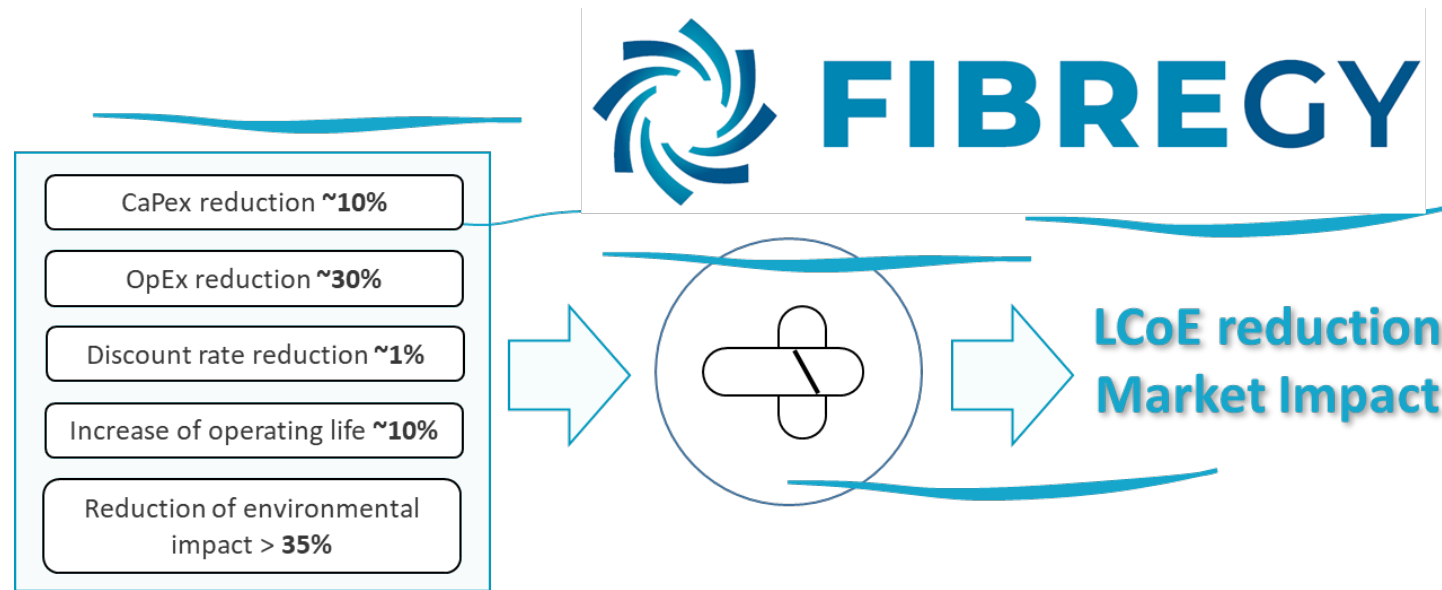
VALIDACION AND DEMONSTRATION ON TIDETEC'S TURBINE



Mid-scale tests: fatigue/strength assessment of connections/hot-spots and structural (reversible) adhesive

Mid-scale tests: Manufacturing of dry coating / embedded sensors

EXPECTED MAIN IMPACT: REDUCTION OF THE LCoE



CaPex

- Reduction of engineering, development and testing time.
- Reduction of the weight of the structure and components.
- Optimized design and manufacturing processes (modular building strategy).
- Readiness of the concepts for serial and automated production

OpEx

- Increase of reliability.
- Increase of fatigue life.
- Immunity to corrosion.
- Improved fouling release.
- Advanced predictive maintenance.

Discount rate

- Lower risks.
- Accelerate certification.

Design life and operating life

- Increase of fatigue life.
- Immunity to corrosion
- Advanced predictive maintenance.

Capacity Factor

- Improved stability.
- Improved seakeeping.
- Reduced overhauling time.



COMMUNICATION & DISSEMINATION



- Effective external communication of FIBREGY project is a priority, and a communication and dissemination plan for the project will be designed and executed in WP8.
- Communication and dissemination tools will include: website, leaflets, videos, newsletters, social networks profiles, open access repositories (<https://www.scipedia.com/institution/fibregy>), etc.
- A total of five main open events have been planned during the project execution:
 - Two Information days open to the public (+ specific workshops addressed to the Advisory Board's members): 1 within the first 12 months and 1 within the first 18 months.:
 - Two open-door Industrial days:: One in Madrid or Las Palmas (Spain) within the last 12 months of the project to present the W2POWER's open sea trials and one within the last 6 months of the project to show the demonstrator in La Ciotat (France). .
 - A specific session to present the outcome of the project will be organized at the International Conference of Computational Methods in Marine Engineering (MARINE).



FIBREGY

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