

*Experiences in the Mediterranean Sea (Pobla de Farnals, Valencia)
to obtain electricity from the waves of the sea*



Rotary Wave

marine energy



UNIÓN EUROPEA
"Una manera de hacer Europa"

TECHNOLOGICAL START UP

DEVELOPMENT OF INNOVATIVE SOLUTIONS FOR SUSTAINABLE DEVELOPMENT OF RENEWABLE ENERGY GENERATION, OBTAINING ELECTRICITY AND DESALINATED WATER FROM WAVES AND WATER CURRENTS

Electricity Generation

Creating devices for the collection of water energy



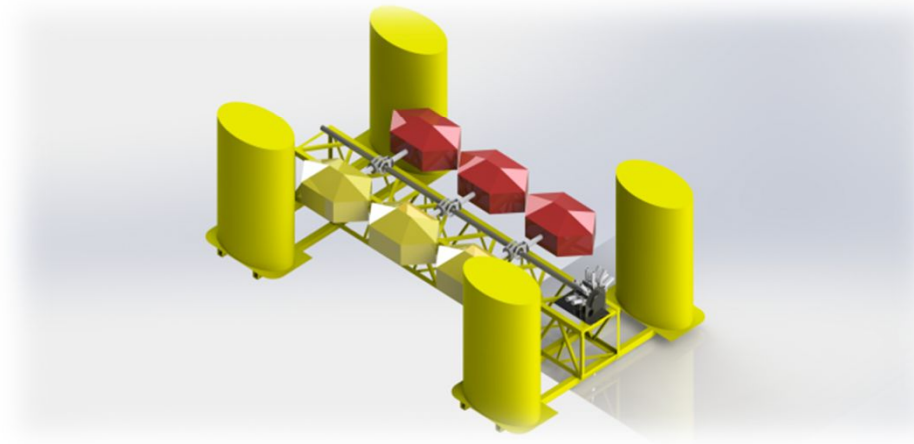
Sea Water Desalination

Non external energy cost in the environment where it is produced





“Sustainable and affordable energy”

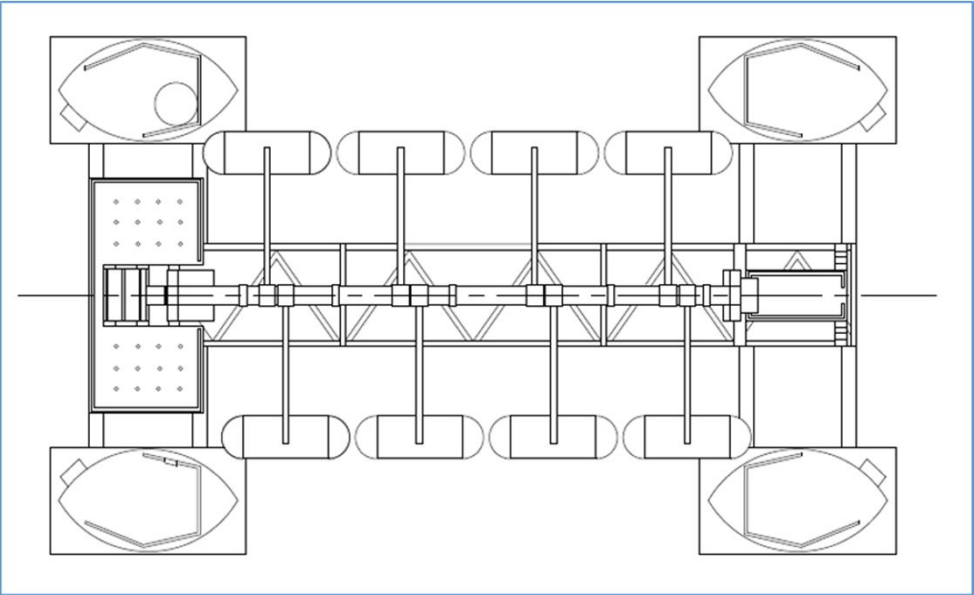
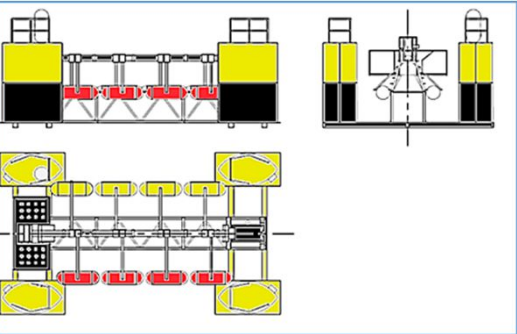


BUTTERFLY EXPERIENCE - POBLA DE FARNALS (VALENCIA)



PREPARATION

Design



Dimensions

L	9,92 m
B	6 m
D	4,07 m
Δ	10,9 t

Biomimetic → Butterfly' flight



BUTTERFLY ESCALA 1:1									
Elemento	Peso Unitario (kg)	Nº	Peso Total (kg)	X _G (m)	ML	Y _G (m)	MT	K _G (m)	MV
Grapa Br	42,25	4	169	5,5	929,5	1,5	253,5	2	338
Brazo Flotadores Br	16,3	4	65,2	5,5	358,6	0,75	48,9	2	130,4
Grapa Er	42,25	4	169	5,5	929,5	-1,5	-253,5	2	338
Brazo Flotadores Er	16,3	4	65,2	5,5	358,6	-0,75	-48,9	2	130,4
Bomba	400	1	400	1,45	580	0	0	1,88	752
Contrapeso bomba	250	1	250	10,55	2637,5	0	0	1,88	470
Abrazaderas rojas	6,94	4	27,76	4,5	31,23	0	0	2,5	69,4
Depósito de arena	375	1	375	9	3375	0	0	0	0
Viga 1	264	1	264	0,65	171,6	0	0	0,08	21,12
Viga 2	264	1	264	1,75	462	0	0	0,08	21,12
Viga 3	264	1	264	9,25	2442	0	0	0,08	21,12
Viga 4	264	1	264	10,35	2732,4	0	0	0,08	21,12
Eje	600	1	600	5,5	3300	0	0	1,88	1128
Depósito de agua	250	1	250	1,01	252,5	4	1000	4	1000
Estructura popa	150	1	150	1,375	206,25	0	0	2,54	381
Cojinete bomba	115	1	115	1,45	166,75	0	0	1,88	216,2
Cojinete 1	115	1	115	2	230	0	0	1,88	216,2
Cojinete 2	115	1	115	9,65	1109,75	0	0	1,88	216,2
Grúa	700	3	2100	4,95	3465	0	0	0,76	1596
Torre 1	1270	1	1270	1,01	1282,7	0	0	1,5	1905
Torre 2	1270	1	1270	1,01	1282,7	0	0	1,5	1905
Torre 3	1270	1	1270	9,95	12636,5	0	0	1,5	1905
Torre 4	1270	1	1270	9,95	12636,5	0	0	1,5	1905
Barandilla 1	23	1	23	1,01	23,23	0	0	3	69
Barandilla 2	23	1	23	1,01	23,23	0	0	3	69
Barandilla 3	23	1	23	9,95	228,85	0	0	3	69
Barandilla 4	23	1	23	9,95	228,85	0	0	3	69
Estructura proa	150	1	150	9	1350	0	0	2,5	375
Cornamusa 1	2	1	2	1,01	2,02	0	0	3	6
Cornamusa 2	2	1	2	1,01	2,02	0	0	3	6
Cornamusa 3	2	1	2	9,95	19,9	0	0	3	6
Cornamusa 4	2	1	2	9,95	19,9	0	0	3	6
TOTAL			11352,16		51576,58		1000		1536,128
			X _G	4,543	Y _G	0,08808896	K _G	1,353	

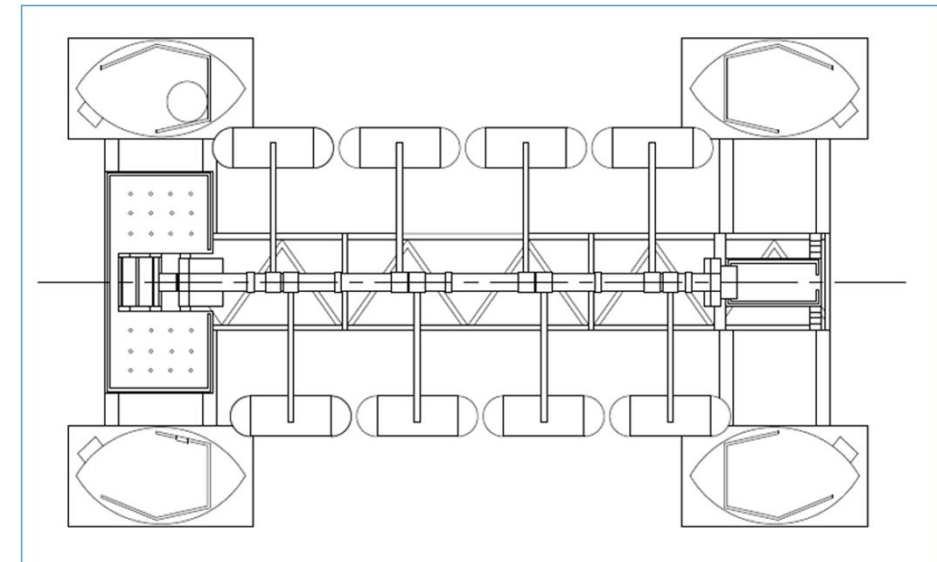
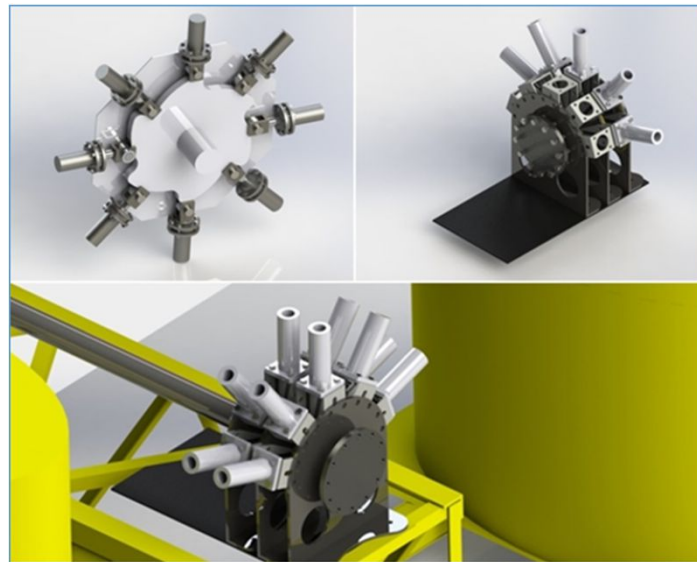
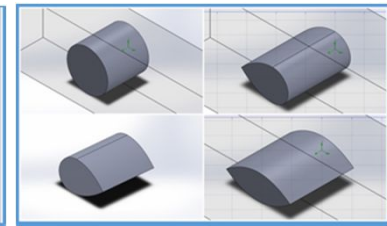
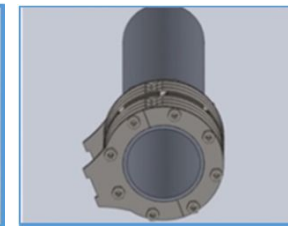
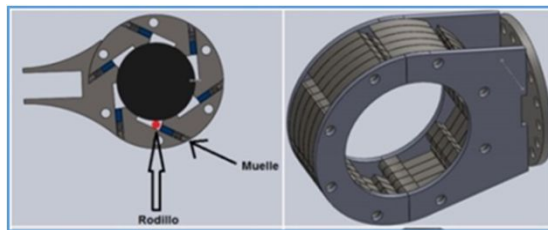
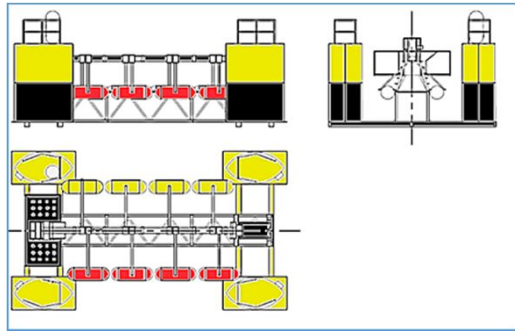
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PREPARATION

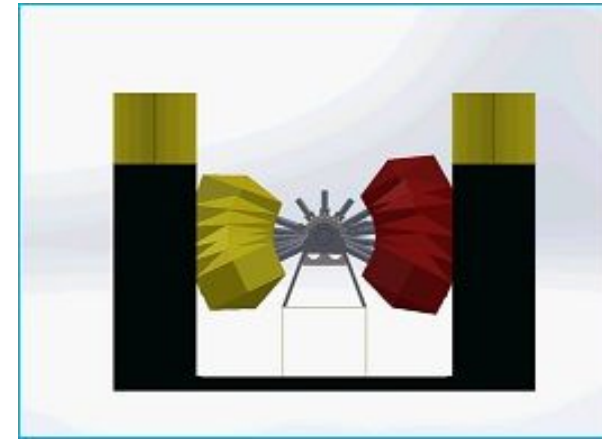
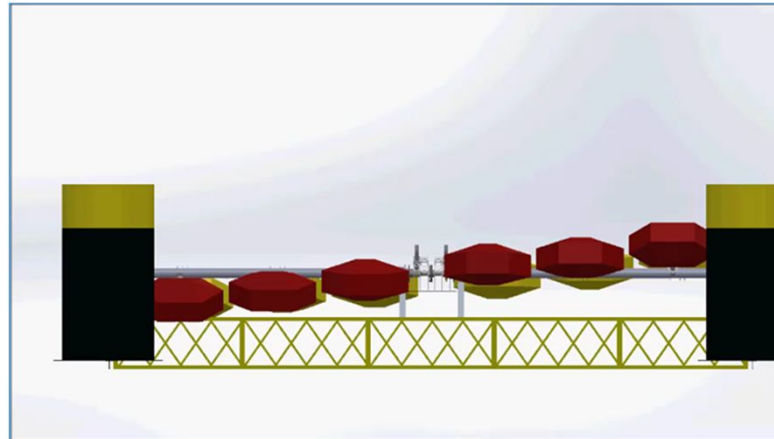
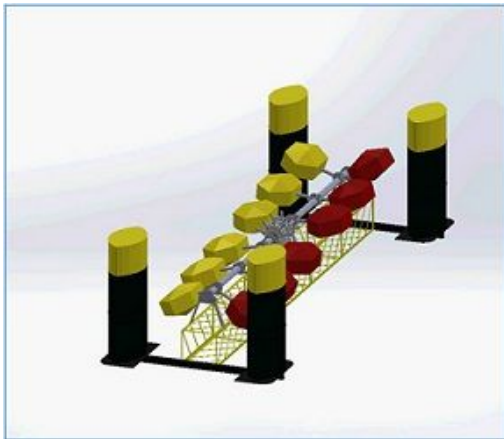
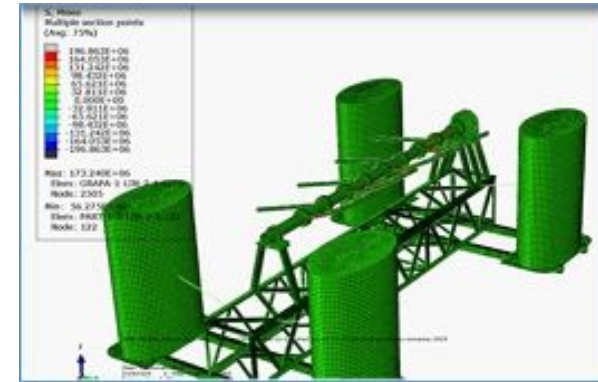
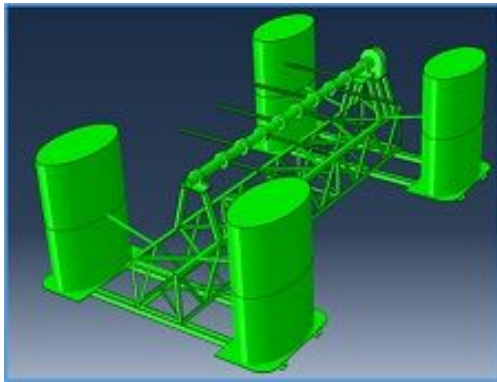
Design

Environmental Friendly Design

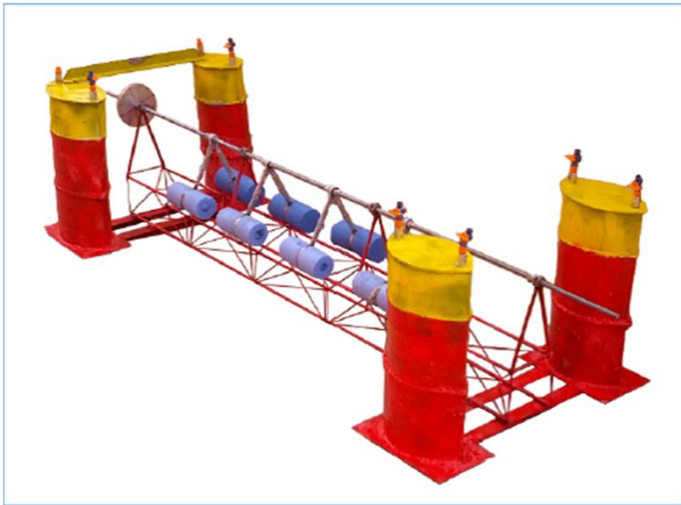
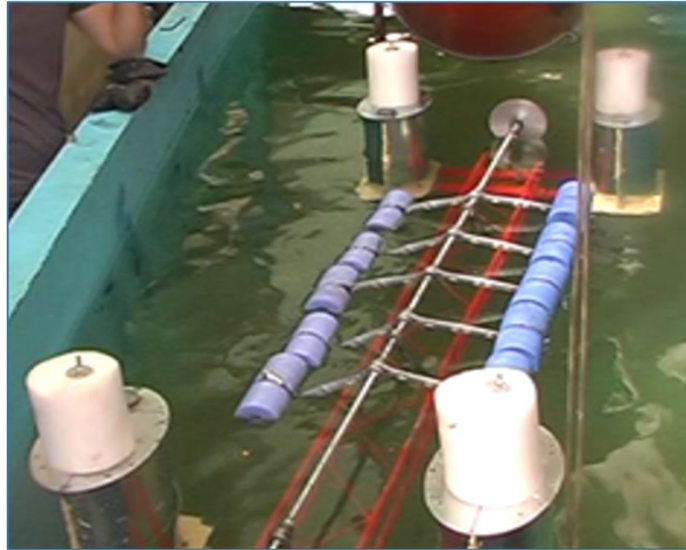


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COMPUTER SIMULATIONS



MODELS CONTRUCTION & WAVE TANK TESTS

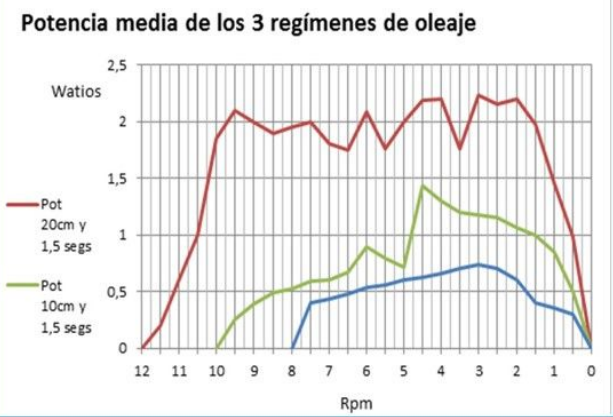
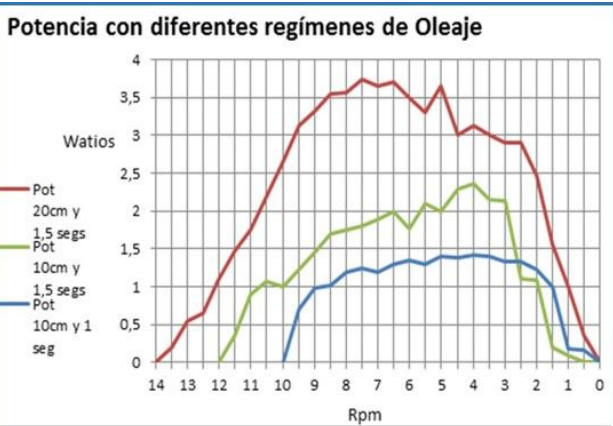
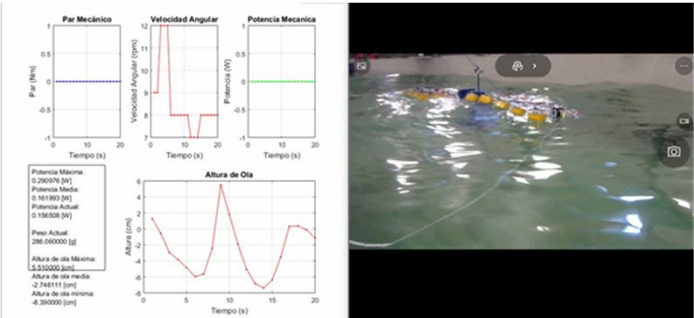
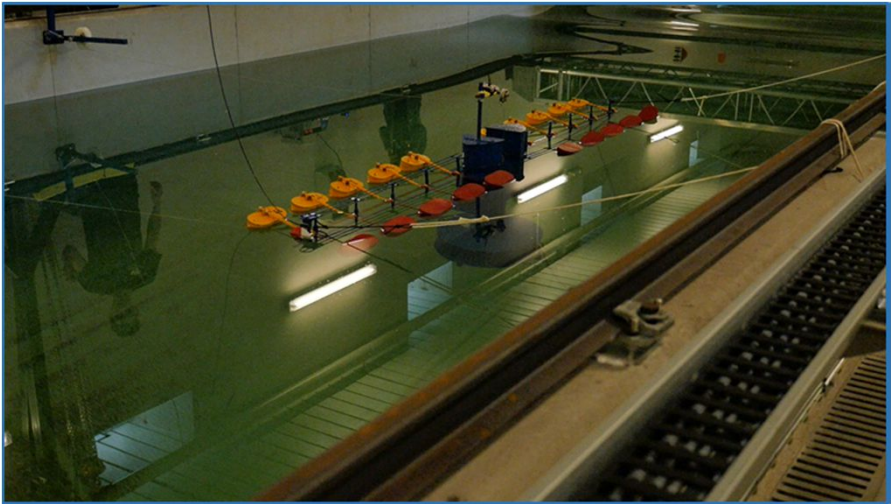
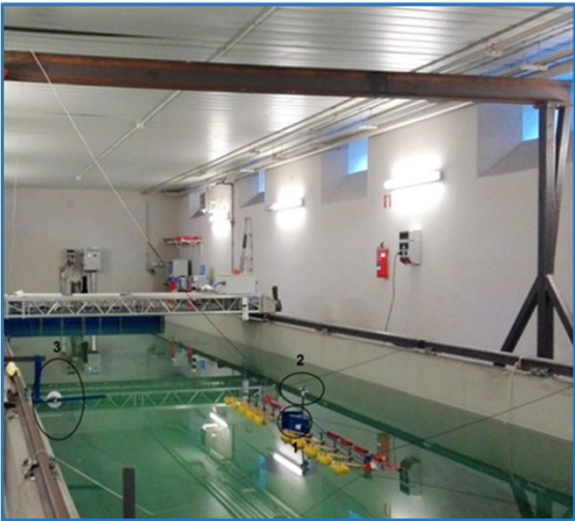


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PREVIOUS TESTS

TESTS ON HYDRODYNAMIC EXPERIENCES TANK



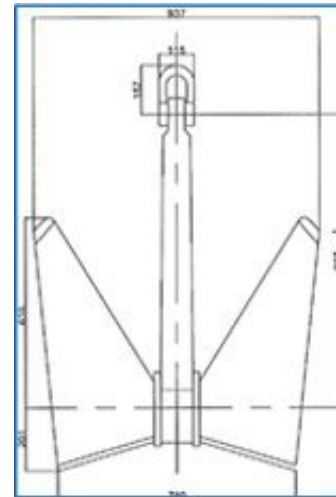
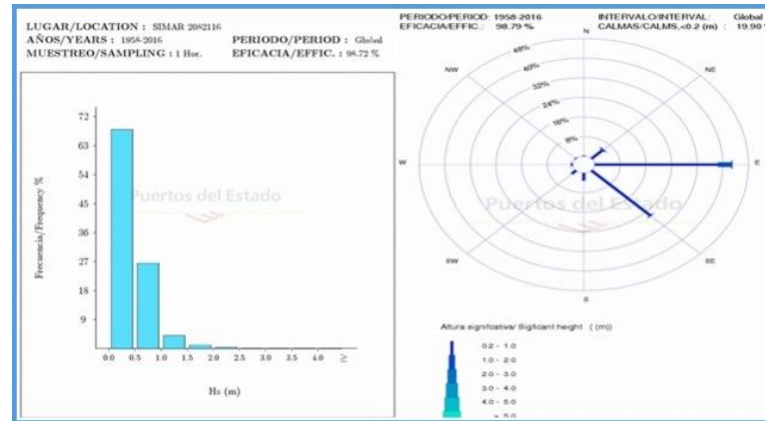
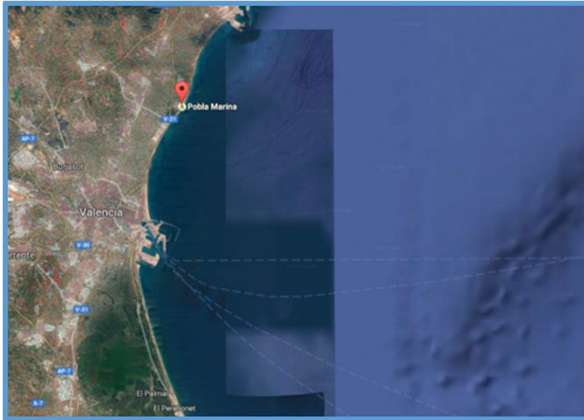
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CONSTRUCTION



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LOCATION



Licenses for anchoring the BUTTERFLY WEC

- GENERALITAT VALENCIANA

–Favorable report of the *Capitanía Marítima de Valencia* (Harbour Master Office of Valencia).

–Report to the *Instituto hidrográfico de la marina de Cádiz* (Hydrographic Institute of the Marina of Cadiz). Navigational notices and Nautical charts.

–Permit of the port of Poble Marina.

- Liability insurance covering the WEC device and damages to third parties (beaches, breakwaters, boats and port facilities).

–Permission to install land needs.

- Permission for the installation of a stand for electrical and electronic equipment.
- Permission to install pipes.
- Permission to install a converter and a power generator.

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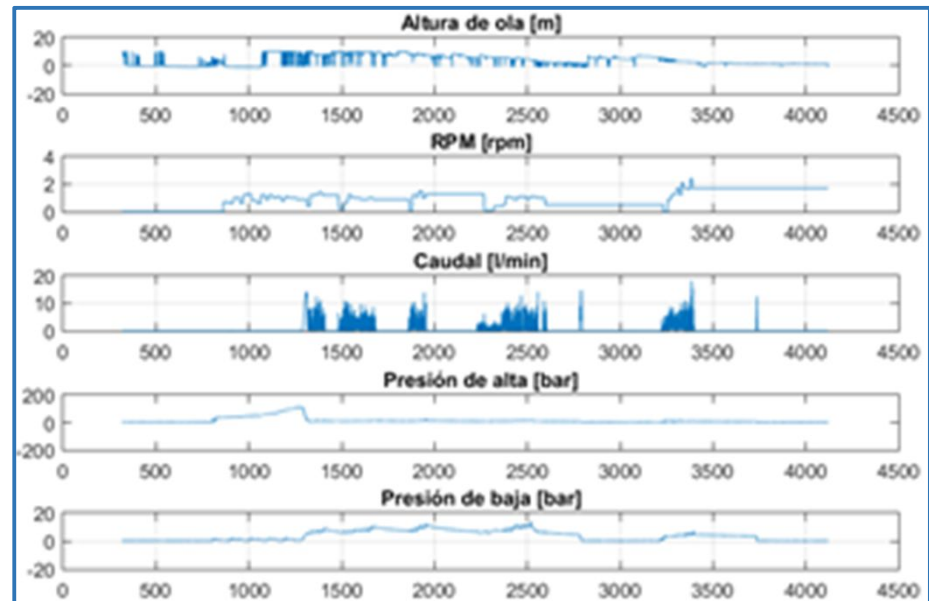
LAUNCHING & EXPERIENCES



EXPERIENCES & CONCLUSIONS

All data obtained during the tests and measurements will be analyzed in order to improve the device, performance, resistance, increasing yields and efficiency of the device:

- Water pressure generated
 - Pressure switch AP
 - Pressure switch BP
- Pressurized water flow
 - Flowmeter
- Rpm
 - SENSOR RPMs
- Height of the wave
 - Wave sensor



	Hs = 0,5m	Hs = 1m	Hs = 1,5m	Hs = 2m	Hs = 2,5m	Hs = 3m
Power (Device scale 1:4)	6 kW	12 kW	18kW	24kW	30kW	36kW

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EXPERIENCES & CONCLUSIONS

A FULL-SCALE BUTTERFLY DEVICE WILL PRODUCE, DEPENDING ON THE ENVIRONMENT, AS SHOWN IN THE CHART:

	Hs = 0,5m	Hs = 1m	Hs = 1,5m	Hs = 2m
Power	768 kW	1536 kW	2304 kW	3072 kW



ELECTRICITY COST WILL DEPEND ON ENVIRONMENTAL CONDITIONS, BUT THE ESTIMATED COST OF THE ENERGY PRODUCED WILL BE AROUND **0,10 – 0,20 €/kWh**

FUTURE PROJECTS

INSTALLATION OF A BUTTERFLY DEVICE FOR LIGHTING THE MARITIME PROMENADE AND FEEDING CHARGING POINTS FOR ELECTRIC CARS IN VALENCIA



INSTALLATION OF A BUTTERFLY DEVICE TO PROVIDE ELECTRICITY AND DESALINATED WATER TO THE PORT OF VALENCIA



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