

# NEW Technologies

## **UNFLOP**

**Unsinkable-Stable Unaffected from  
Waves Floating Truss Platforms**

## **WWT - PWT**

**Wing Wheel Turbines-Paddle Wheel Turbines  
Wind - River - Wave - Tidal Generators**

- Themistoklis Andreas Andrikopoulos, the inventor
- Physics & Electronic Engineering, Manchester University
- [www.atioltd.com](http://www.atioltd.com)

*ADAPTtoCLIMATE Conference 27/28 March 2014*



**The PROBLEM with existing technologies is the large volume units and the large water-tight compartments, from the classic hull-boat, like *TITANIK* and *EXXON VALDEZ*, to the *DEEPWATER HORIZON* and *Alexander Kielland* types (column stabilized semi-submersibles)**



**This floating structure with the 4 huge “legs” is not unsinkable or unaffected from waves, and must be abandoned by personnel when weather is forecasted to exceed its endurance-safety limit, reducing its operationality time. IT IS NOT ALL WEATHER!**  
**(With UNFLOP technology they can be converted to ALL WEATHER!!)**



**The second day instructions from control center to the fire fighting vessels were to direct all the water low to the legs not high from above....They had understood but it was too late!**

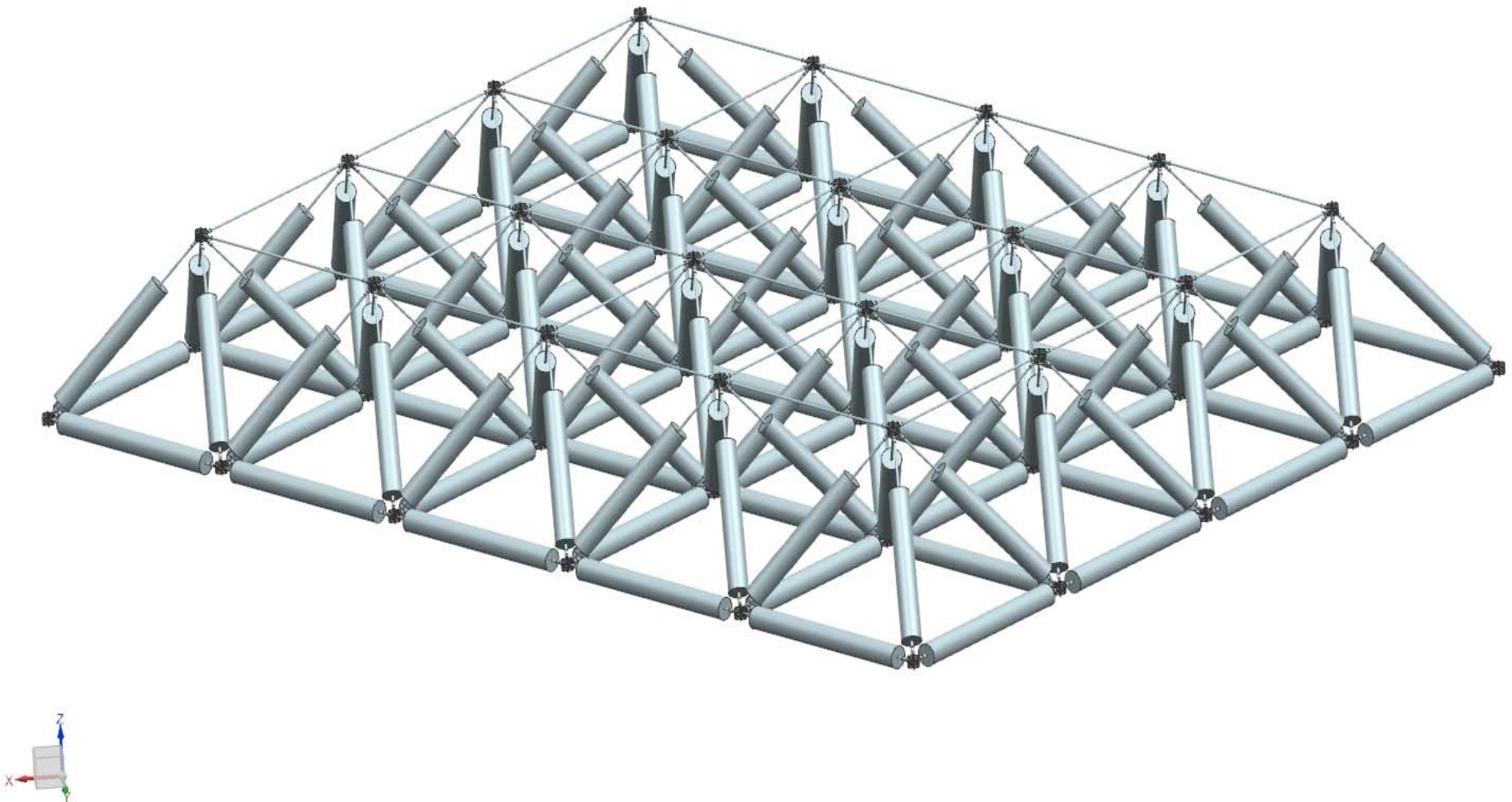


***Deepwater Horizon* sunk, killed people and destroyed the riser because it lost 2 of its 4 “legs” in the fire (just one would have been enough, as for the 5 leg *Alexander Kielland* that took 123 people down with it within 20min, March 1980 at the North Sea**

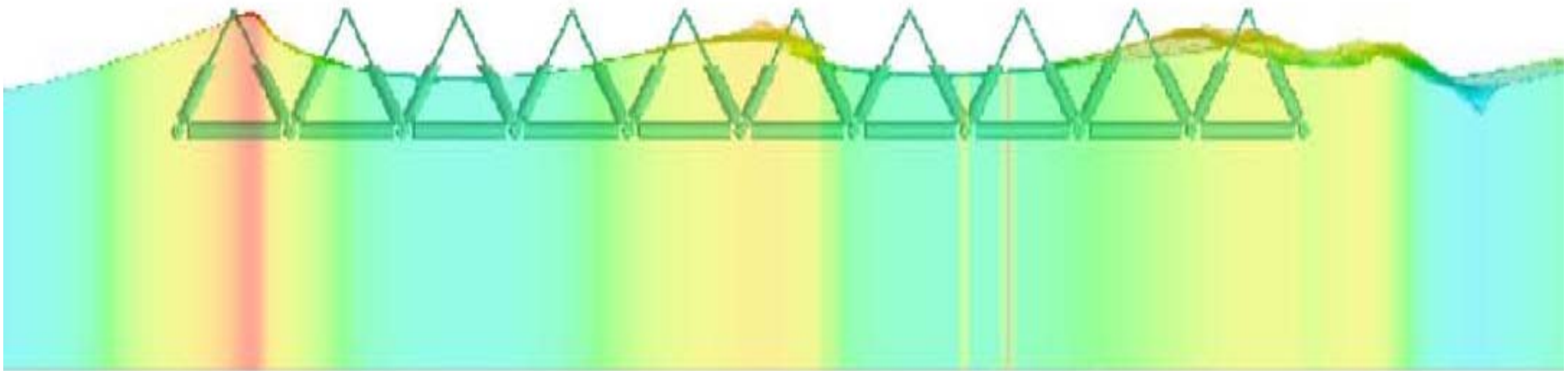




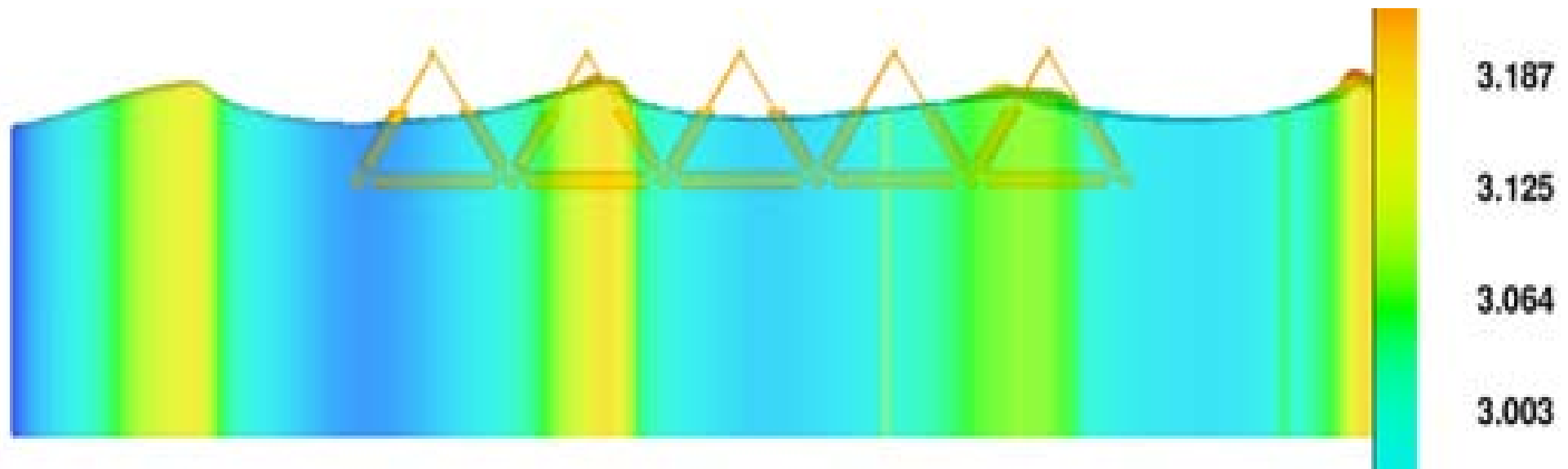
Experimental **UNFLOP** scale model-prototype with pyramid elements. The draft under full load will normally be about 60% of the height of the platform



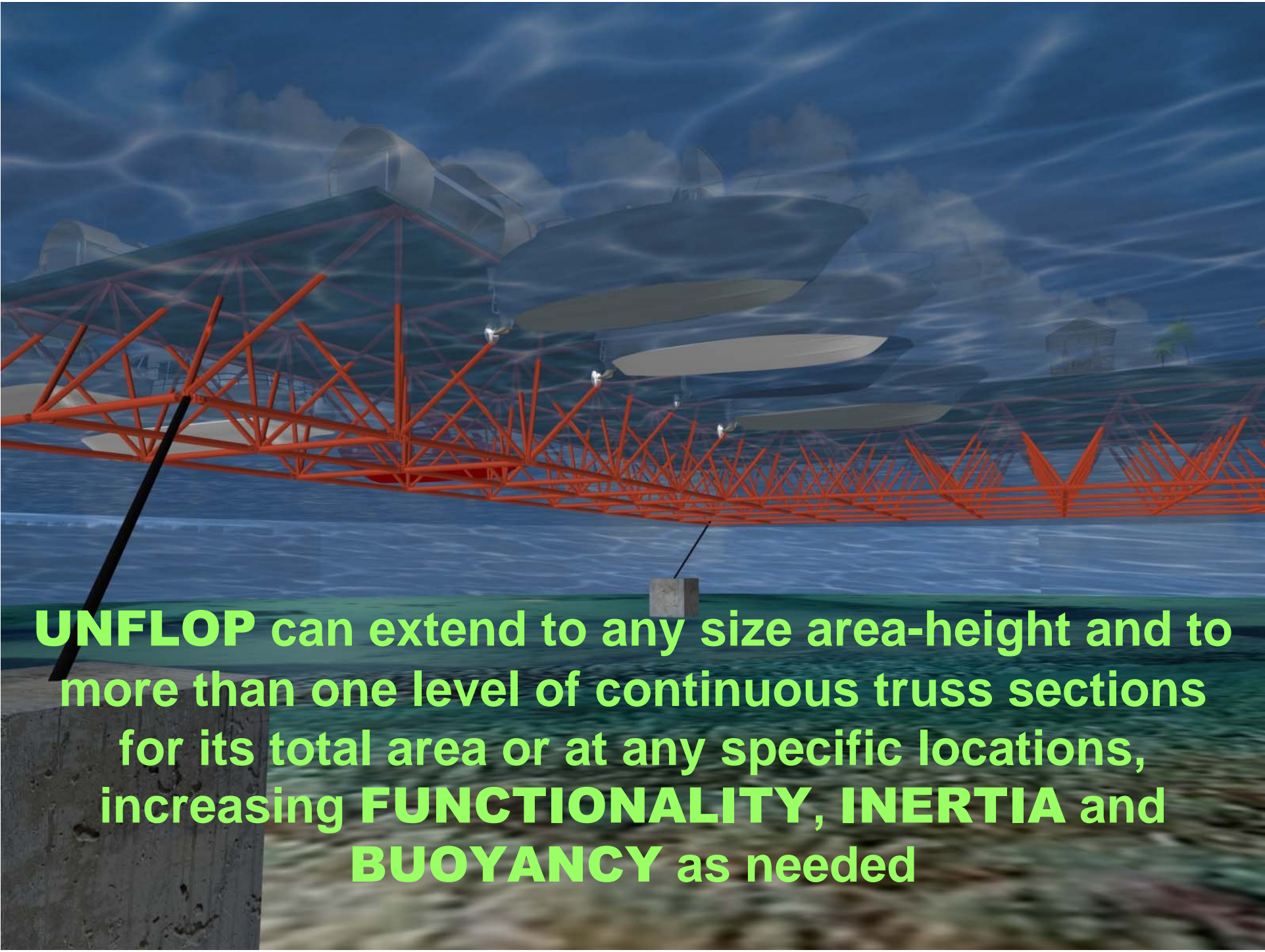
**UNFLOP** comprises pyramid and/or orthogonal basic truss-elements formed by **individually buoyant, water-tight** and/or **solid truss-members with lower specific weight than water**, which are interconnected through fixed or articulated jointing systems, either of which facilitates fast, easy and safe assembly-disassembly of individual truss-members, without disturbing near-by members or the complete truss structure-system, even inside the water.



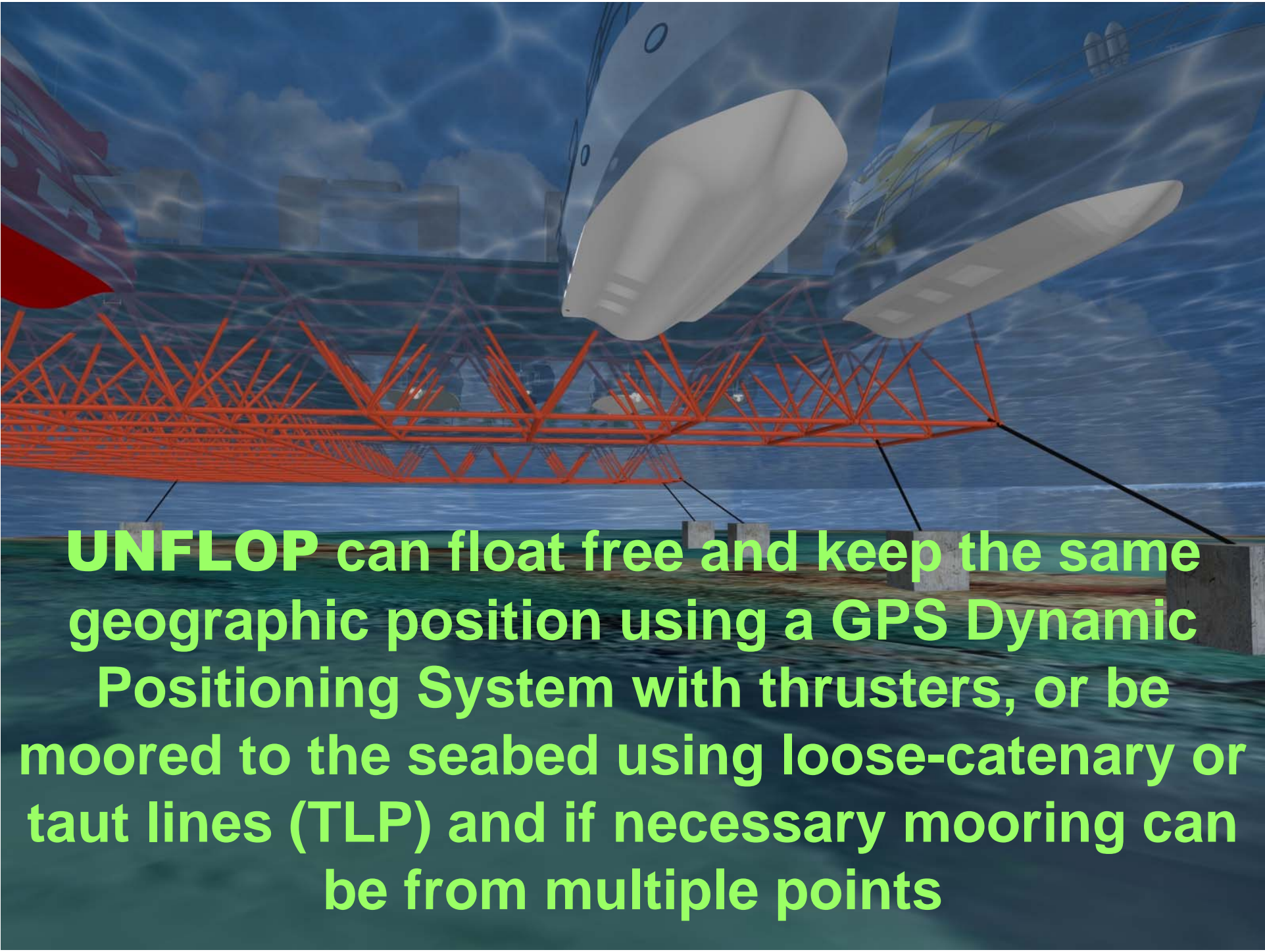
**UNFLOP** is truly unsinkable because most of its members cannot be flooded to lose buoyancy and in any case, because a very large number of individually buoyant truss-members must lose their buoyancy at the same time for any risk of sinking, and it is **stable-  
unaffected by waves** because they have small and fast buoyancy and thrust effects on truss-members, that cancel each other out over the total **UNFLOP** area, without influencing the overall system **INERTIA**







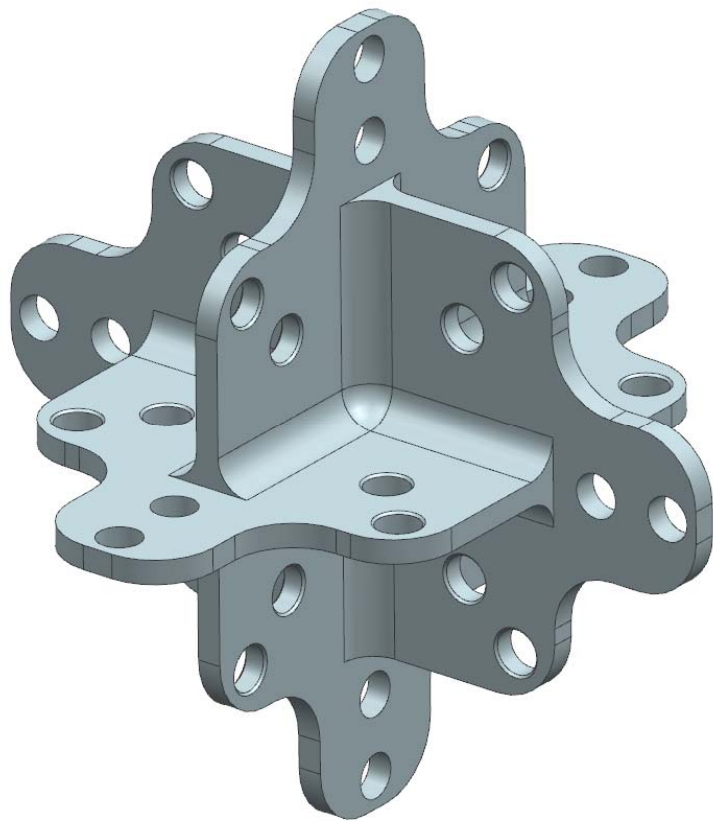
**UNFLOP** can extend to any size area-height and to more than one level of continuous truss sections for its total area or at any specific locations, increasing **FUNCTIONALITY, INERTIA** and **BUOYANCY** as needed



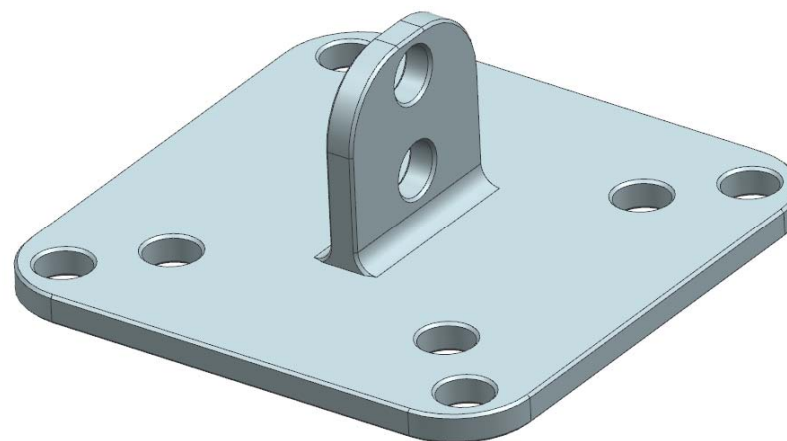
**UNFLOP** can float free and keep the same geographic position using a GPS Dynamic Positioning System with thrusters, or be moored to the seabed using loose-catenary or taut lines (TLP) and if necessary mooring can be from multiple points



**Joint N1**



**Joint N1a**



First “successful” testing in swimming pool of a section of the scale-model UNFLOP prototype 4,20 x 4,20m, designed only with pyramid truss-elements-24 May 2013

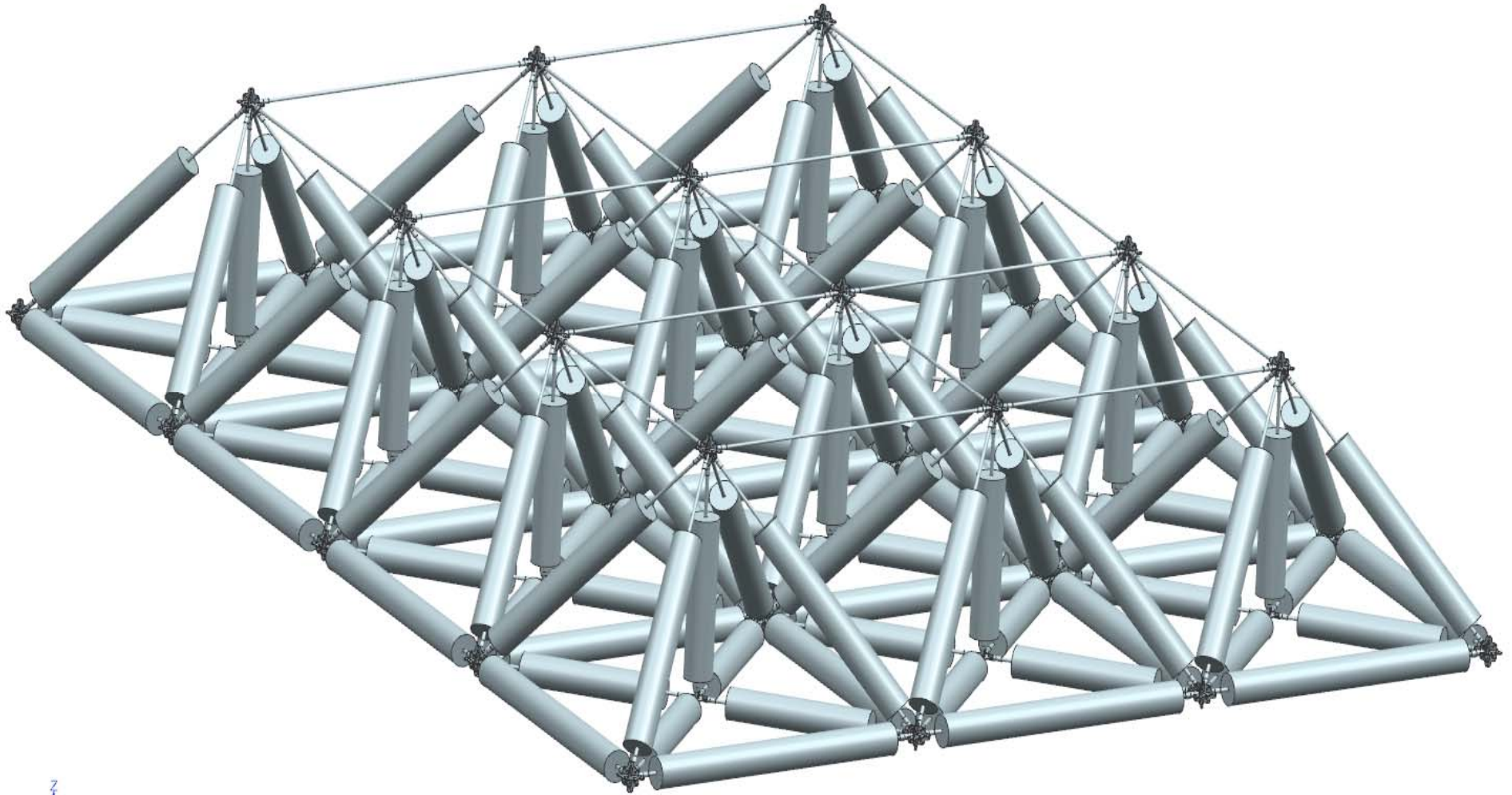
Test video <http://www.youtube.com/watch?v=B4JepSCnXy4>



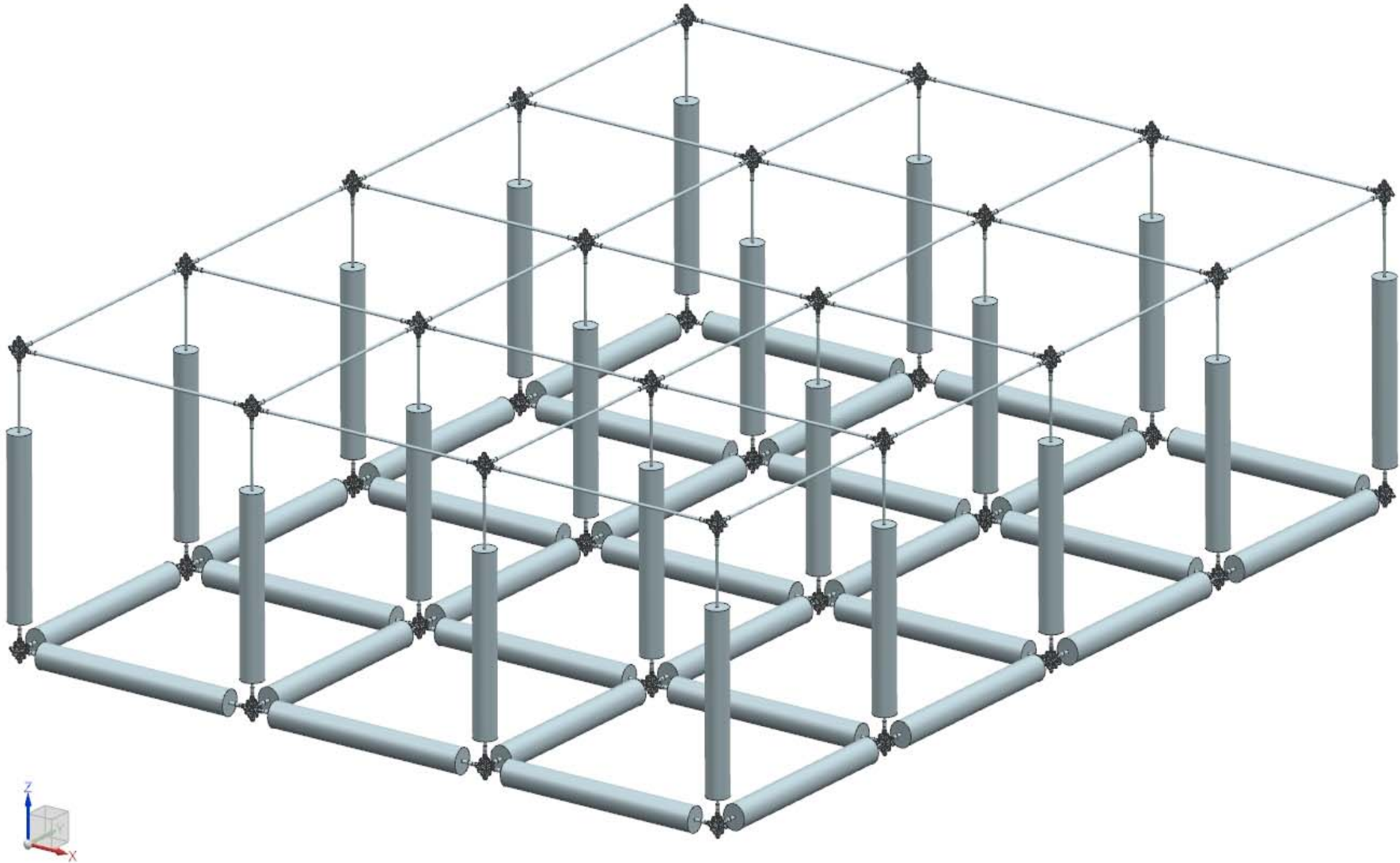
UNFLOP Test pisina 256.MTS



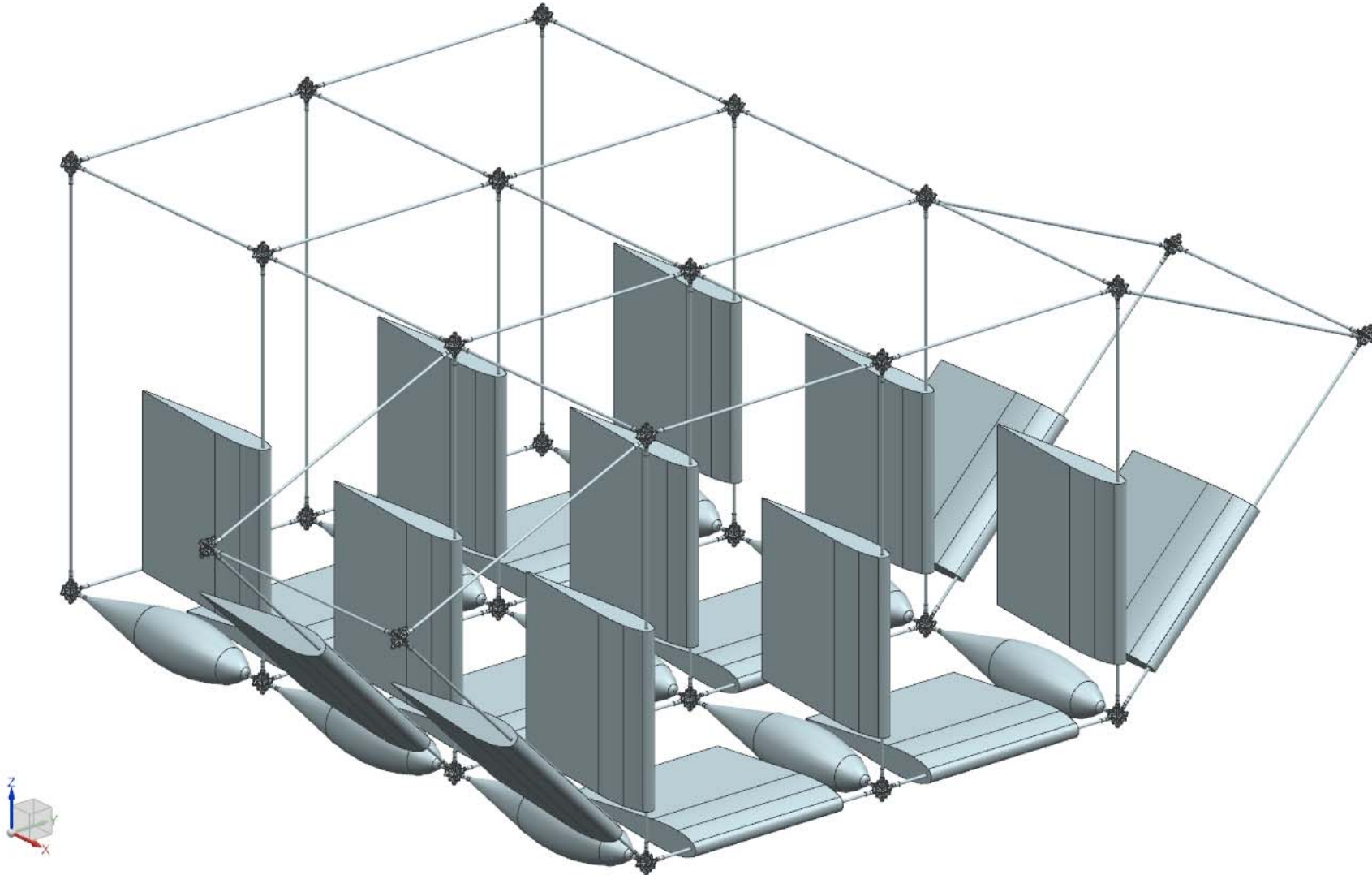
**UNFLOP** design that includes both pyramid AND orthogonal truss-elements, with vertical and fully submerged horizontal truss-members added to the pyramid-only structure, to increase floatability & load capability



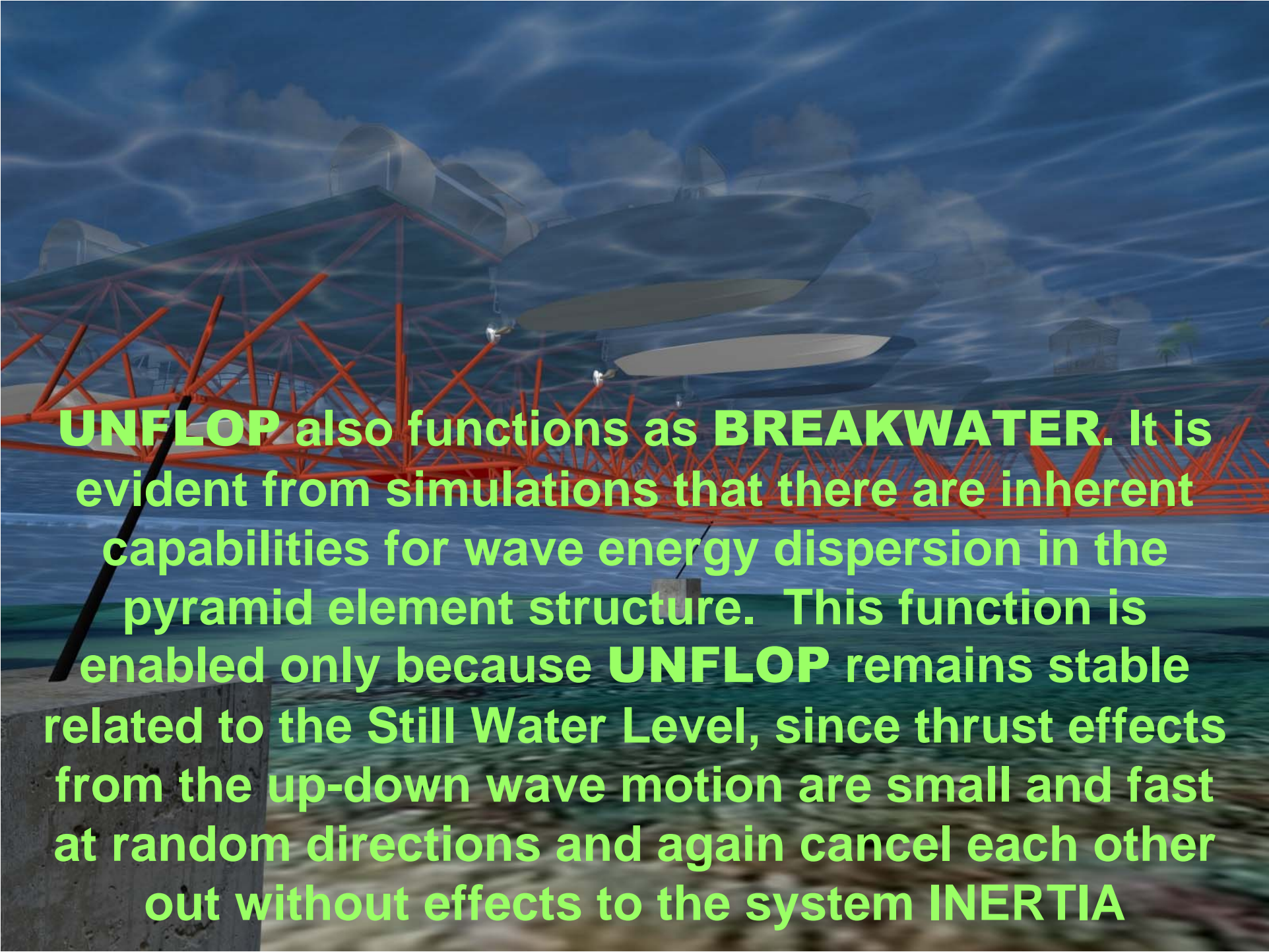
**UNFLOP** model only with orthogonal elements for cost-effective low load simple applications



# UNFLOP-SHIP the BIG GAMECHANGER REVOLUTION in Waterborne Transport



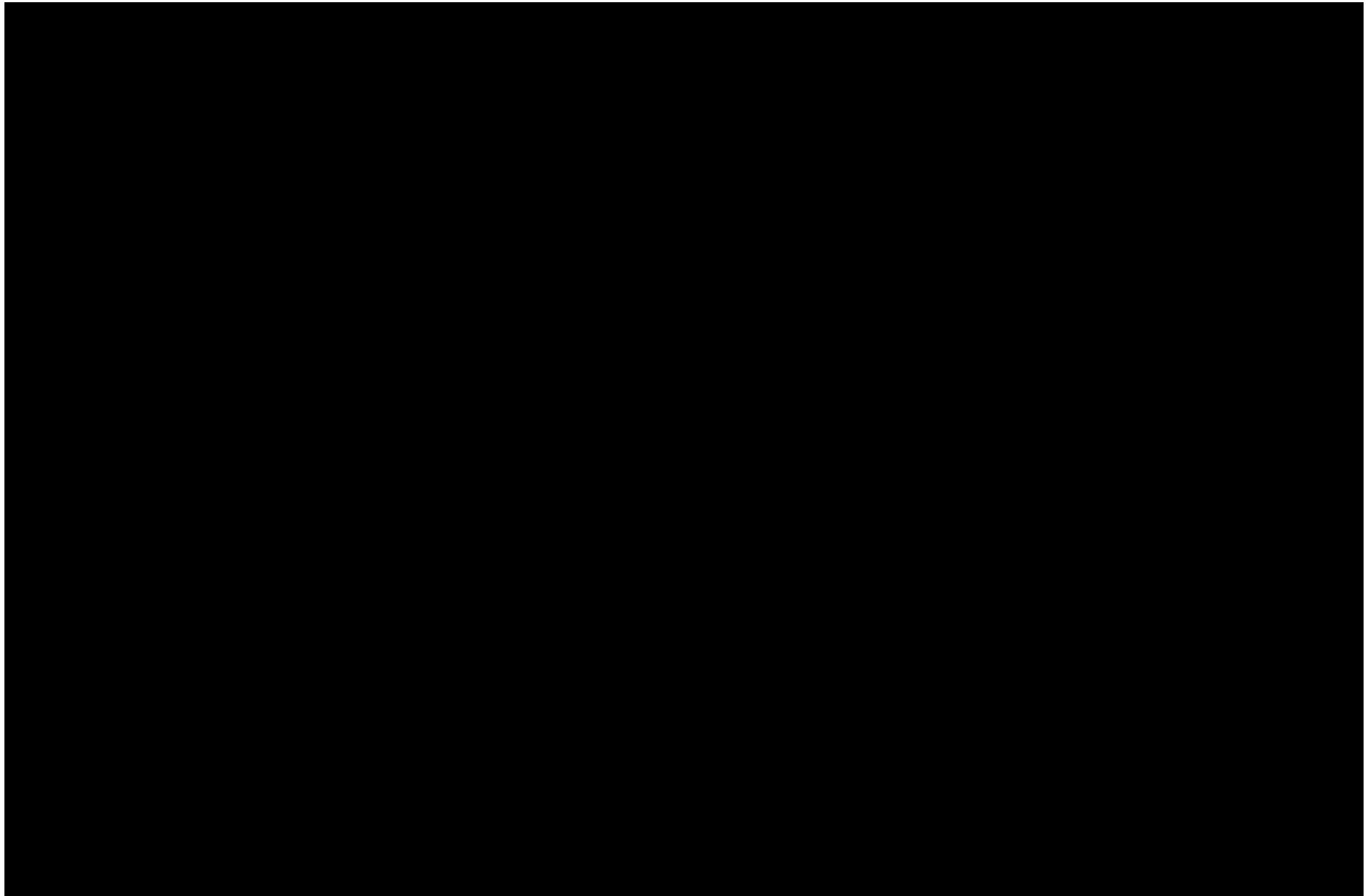





**UNFLOP** also functions as **BREAKWATER**. It is evident from simulations that there are inherent capabilities for wave energy dispersion in the pyramid element structure. This function is enabled only because **UNFLOP** remains stable related to the Still Water Level, since thrust effects from the up-down wave motion are small and fast at random directions and again cancel each other out without effects to the system **INERTIA**



**CFD UNFLOP 5x4 model – wave 0.4m – period 1sec – wavelength ~2m**





**UNFLOP** can find many applications in many Commercial-Industrial-Military sectors, like Tourism, Shipping, Air-Transport, Urban development-Housing, Manufacturing, “Poly-Aquaculture”, Desalination, as a safe floating **EARTH-QUAKE PROOF REAL ESTATE** for any kind of installations



An aerial 3D rendering of a floating marina structure. The structure is a long, narrow platform with a green grassy surface, supported by red stilts in the water. It features a network of yellow walkways. Several boats are docked at the platform, including a large white yacht, a red speedboat, and several smaller motorboats. A white helicopter is parked on a designated helipad at one end. The platform also contains several small houses with brown roofs, a swimming pool, and other amenities. The water is a clear blue, and a sandy beach is visible in the foreground. In the bottom left corner, there is a parking lot with several cars and a row of blue and white striped awnings.

## Protected MARINA

For the tourist industry, **UNFLOP** provides options for application in all kinds of possible.....




.....or IMPOSSIBLE situations!!

**UNFLOP** will create NEW CONDITIONS and become THE GAMECHANGER for the high-end tourist market by providing UNLIMITED application options in near or far-shore locations and bring prosperity where it seems impossible (and NOT ONLY!!)







# **Marine Renewable Energy Sources Integrated Applications Platform MARESINAP**

**UNFLOP** is the ideal floating structure to support the new WWT-PWT or other existing technologies of Wind-Wave-Tidal-Current Generators and operate in open ocean conditions

With the **WWT-PWT** and **UNFLOP** technologies it is possible to design multi-purpose offshore platforms (**MARESINAP**) to generate clean energy from **FOUR** Renewable Energy Sources, **Wind – Wave – Current – Solar PV – CSP** (**Marine Renewable Energy Sources Integrated Applications Platform**)  
**Photovoltaic on the Rooftop.....** **.....Photovoltaic on the Rooftop(\*)**

**WWT-PWT** Generators can be installed at a distance of around **TWO ROTOR DIAMETERS** between them and can be combined on the same **MARESINAP**. (**HAWTs** and any other MRE converters can be installed on **MARESINAP** instead)

**WWT-Wind Generators**

**PWT-Wave Generators**

**.....UNFLOP**


**PWT-Tidal Current Generators**

If necessary, depending on the depth of the Tidal Currents, an assistant-secondary fully submerged **UNFLOP** interconnected with the “mother” semi-submerged **MARESINAP** can be used to support the Tidal Current Generators

(\*) The support structure for the top-ends of the **WWT-Wind Generator Shafts**, can also be used as the support structure for Solar Photovoltaic systems!!!



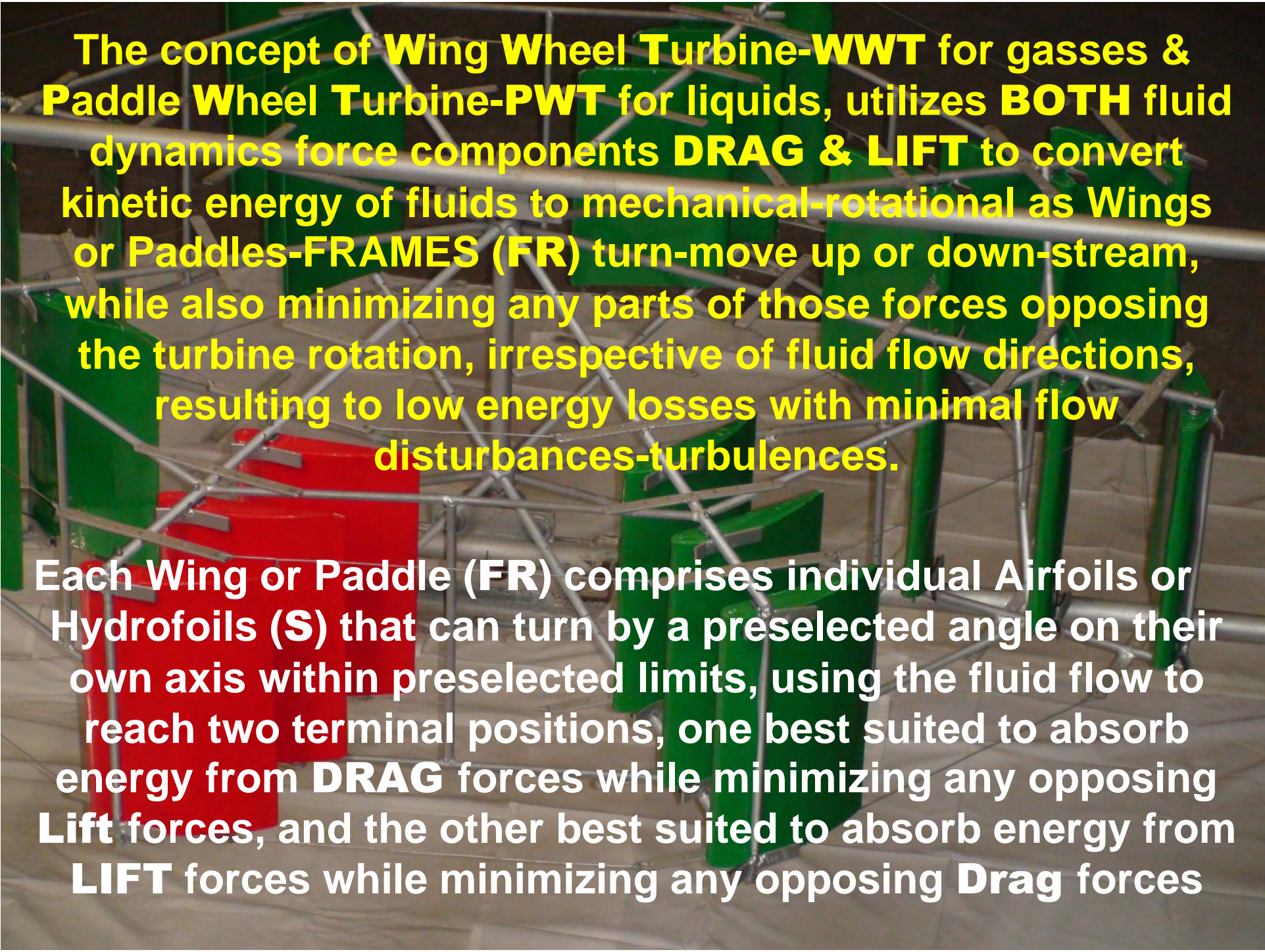
# The new technology **WWT-PWT** for Wind-River- Wave-Tidal Turbine Generators

A photograph of a hand-made experimental WWT-Wind Turbine prototype. The device is a complex, multi-bladed structure made of metal rods and plates, mounted on a central axis. It is positioned within a wind tunnel, with a large green rectangular plate visible in the foreground. The background shows the interior of the wind tunnel, including a metal frame and a large green plate.

This is one of the first hand-made experimental **WWT**-Wind Turbine prototypes in Wind Tunnel tests at the National Technical University of Athens (NTUA) fluid mechanics labs

View test videos at:  
<http://youtube.com/watch?v=yH4IfyUt9D0>  
[http://youtu.be/8Z28\\_9qjIMs](http://youtu.be/8Z28_9qjIMs)





The concept of **Wing Wheel Turbine-WWT** for gasses & **Paddle Wheel Turbine-PWT** for liquids, utilizes **BOTH** fluid dynamics force components **DRAG & LIFT** to convert kinetic energy of fluids to mechanical-rotational as Wings or Paddles-FRAMES (FR) turn-move up or down-stream, while also minimizing any parts of those forces opposing the turbine rotation, irrespective of fluid flow directions, resulting to low energy losses with minimal flow disturbances-turbulences.

Each Wing or Paddle (FR) comprises individual Airfoils or Hydrofoils (S) that can turn by a preselected angle on their own axis within preselected limits, using the fluid flow to reach two terminal positions, one best suited to absorb energy from **DRAG** forces while minimizing any opposing **Lift** forces, and the other best suited to absorb energy from **LIFT** forces while minimizing any opposing **Drag** forces



**WWT-PWT** turbines are based on modular multi-section design. For each “power output product range” a basic **Lowest Power Output Section (LPOS)** is designed with specific Rotor Diameter and number of **FR** and **S** with specific dimensions and turning angles. Models of multiple power outputs are designed by adding respective **LPOS** on the same Shaft that extends in length normally vertically for **WWT-Wind** turbines and **PWT-Tidal/River** turbines, and horizontally for **PWT-Wave** turbines. The rendering below illustrates two **WWT-Wind** turbines, each comprising four **LPOS** on the common vertical Shaft, with eight Wings-FRAMES and three airfoils-S in each **FR**



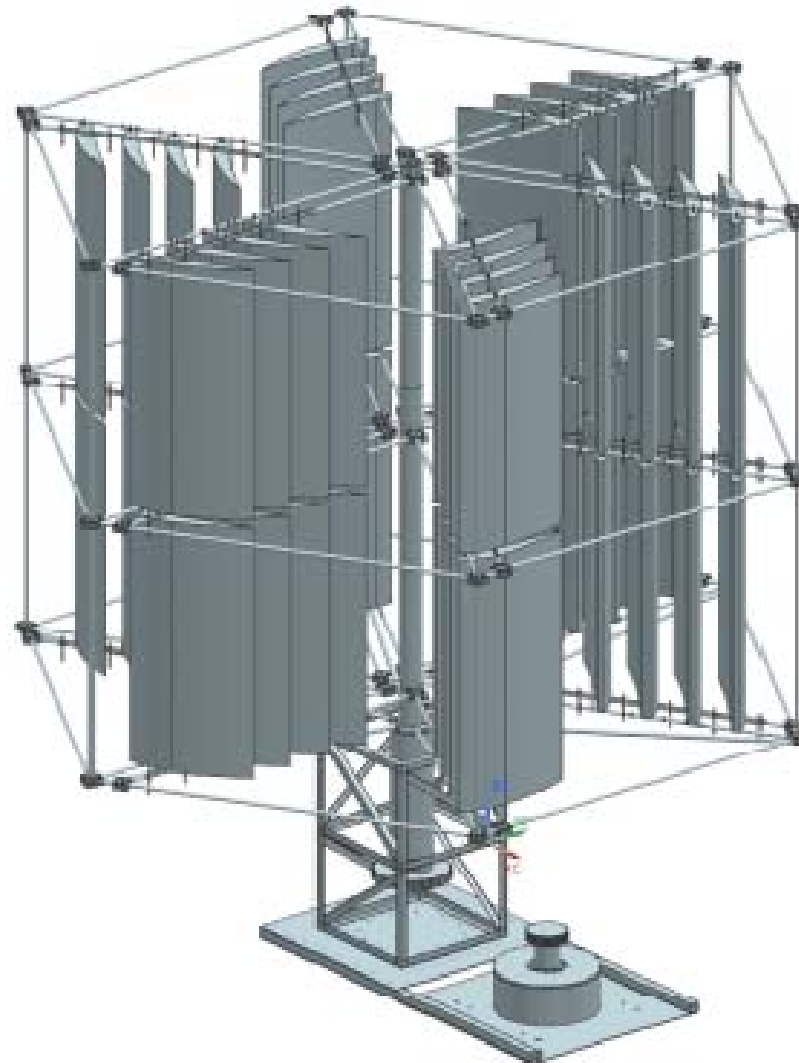
**WWT-Wind Turbines**

# **JUST LIKE BIRDS FLY AND FISH SWIM**

**WWT-PWT** are friendly, respectful and cooperative with the moving fluid molecules, similarly to the way birds fly and fish swim by continuously moving-rotating their wings-fins to best interact with fluid molecules to achieve **efficient** flying-swimming! **WWT-PWT** absorb kinetic energy from moving molecules by allowing them **to hit and push**, at small or large angles of attack, surfaces that **always yield to the push** converting nearly all the kinetic energy to mechanical-rotational-torque on the shaft, always in the same turning direction. Nearly all the velocity molecules loose passing through the rotor plane is converted to torque-electricity, while they suffer minor turbulence effects at airfoil-hydrofoil edges and can regain their original velocity very fast  
..... This is **BIOMIMICRY** from 3.8 billion years of expertise .....

# **WWT-Wind Generator fully engineered Test Prototype.**

**Image from the design program**





**The WWT-Wind Generator fully engineered Test Prototype exhibited at the “Greek Innovation Expo May 16-19 2013”**

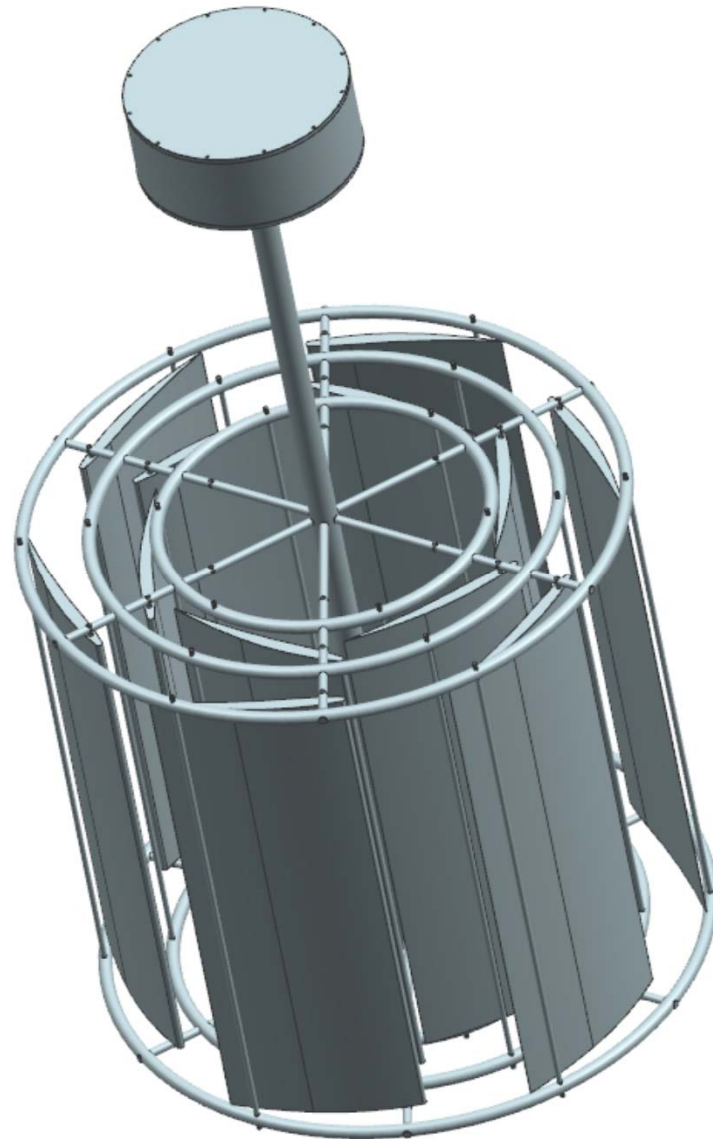




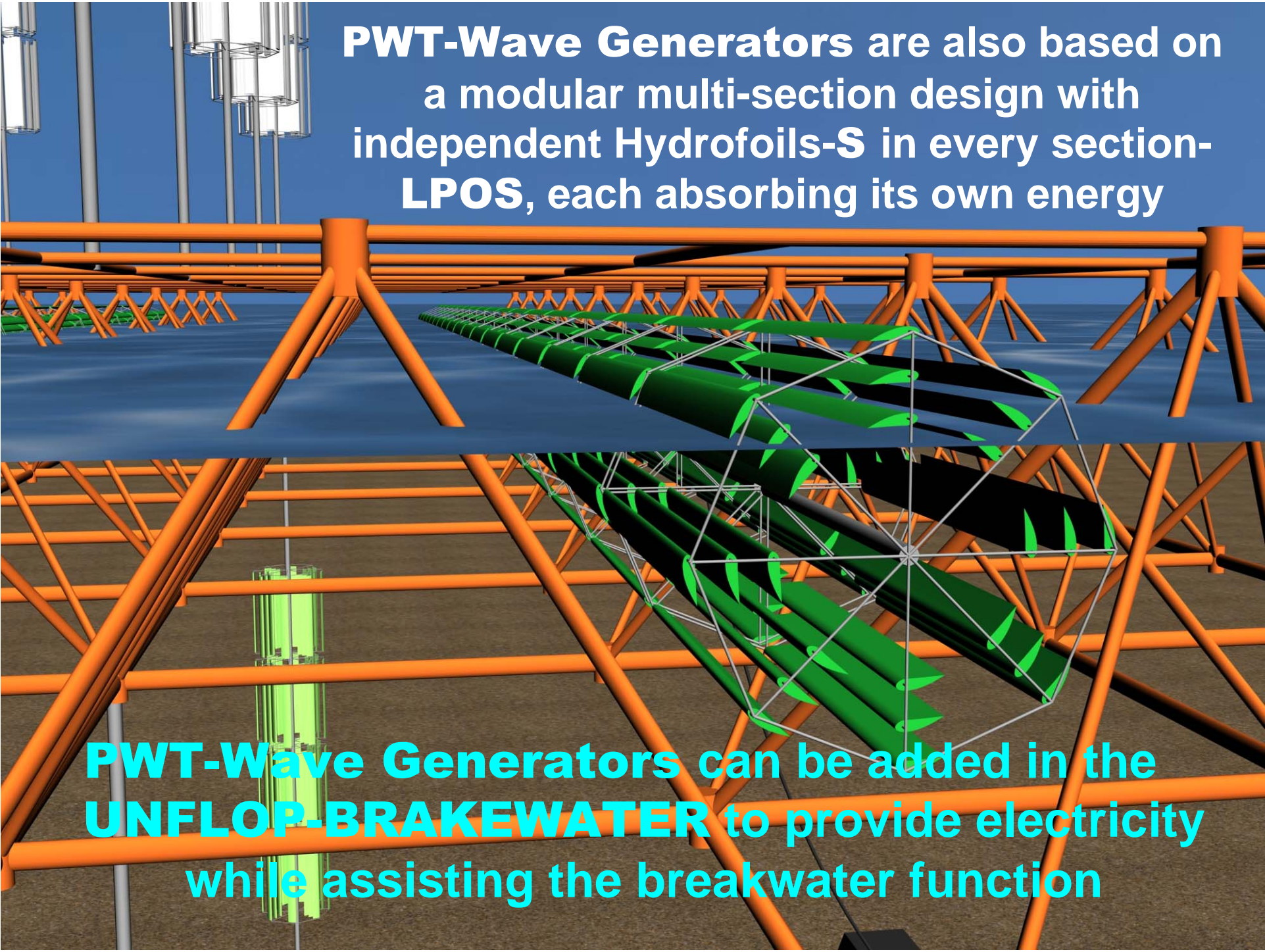
The **WWT-Wind Generator** and **UNFLOP** test prototypes are since 17 July 2013 on display at the site of NCSR - National Center for Scientific Research "DEMOKRITOS" in Athens, following invitation by NCSR President and Board



**PWT-Hydro Generator fully engineered Test Prototype with the alternator on the top. Image from the design program**

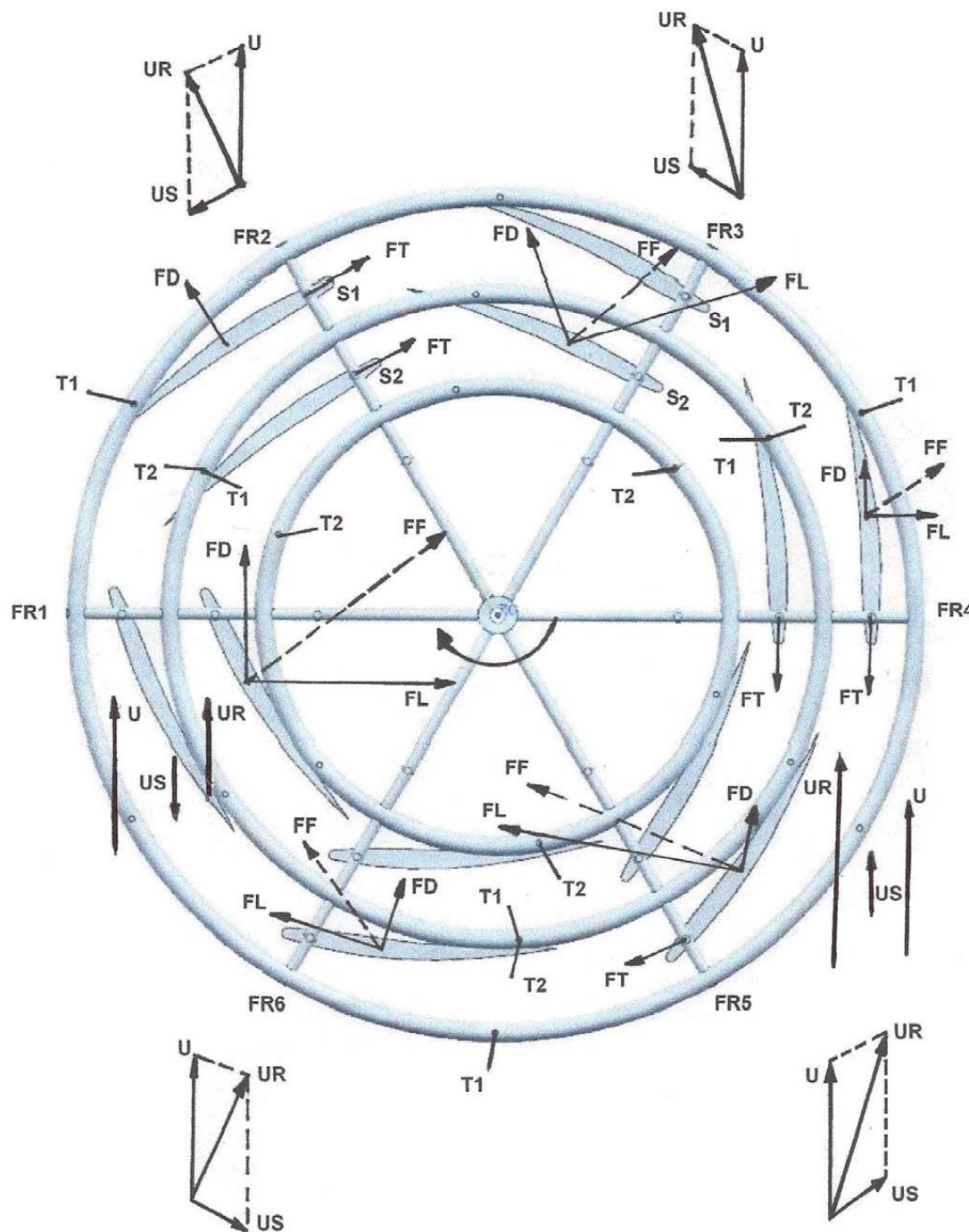




A 3D computer-generated image of a PWT-Wave Generator. The structure consists of a long, rectangular array of green, V-shaped hydrofoils (LPOS) mounted on a complex orange metal frame. The frame is supported by multiple vertical orange pillars. In the background, there are several tall, white, cylindrical structures. The entire assembly is situated in a body of blue water.

**PWT-Wave Generators** are also based on a modular multi-section design with independent Hydrofoils-S in every section-LPOS, each absorbing its own energy

**PWT-Wave Generators** can be added in the **UNFLOP-BRAKEWATER** to provide electricity while assisting the breakwater function



**Figure 1:**

$$US = \frac{1}{3} U$$

This Fig. 1 and the next 2 & 3 illustrate the operating concept of a prototype with 6 **FR**, each with 2 **S**, with positions taken by the 2 air-foils/hydro-foils (**S**) as rotational speed increases. Vectors are not to exact scale

### Abbreviations-Glossary

**U**= Fluid velocity

**US**= Fluid velocity relative to the speed of each **S** (S1, S2)

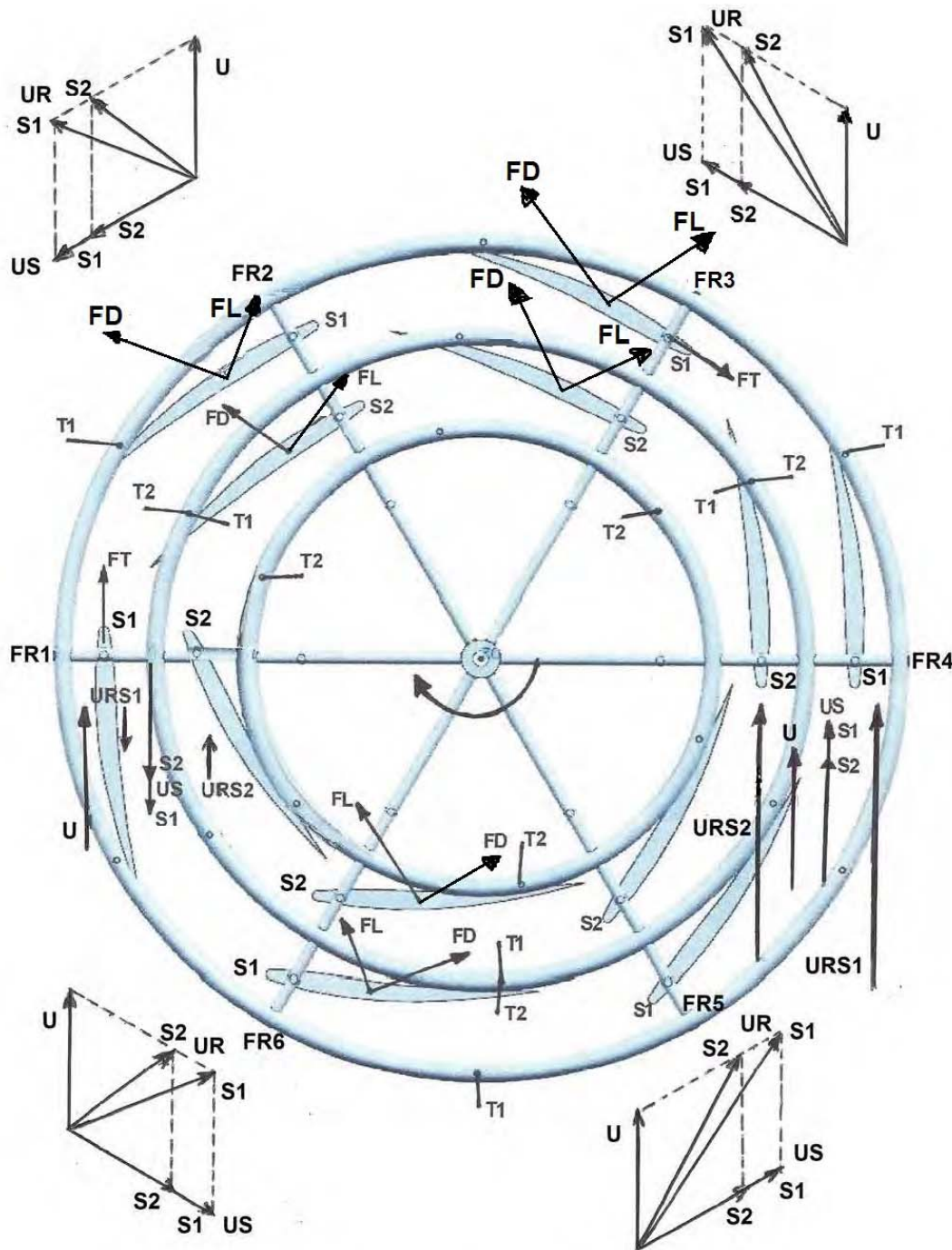
**UR**= Relative fluid velocity as experienced by each **S**

**FF**= Fluid dynamics forces

**FD**= Drag component of **FF**

**FL**= Lift component of **FF**





**Figure 2:**

$$US1 = 1.14U$$

$$US2 = 0.855U$$

### **Abbreviations-Glossary**

**U**= Fluid velocity

**US**= Fluid velocity relative to the speed of each **S** (S1, S2)

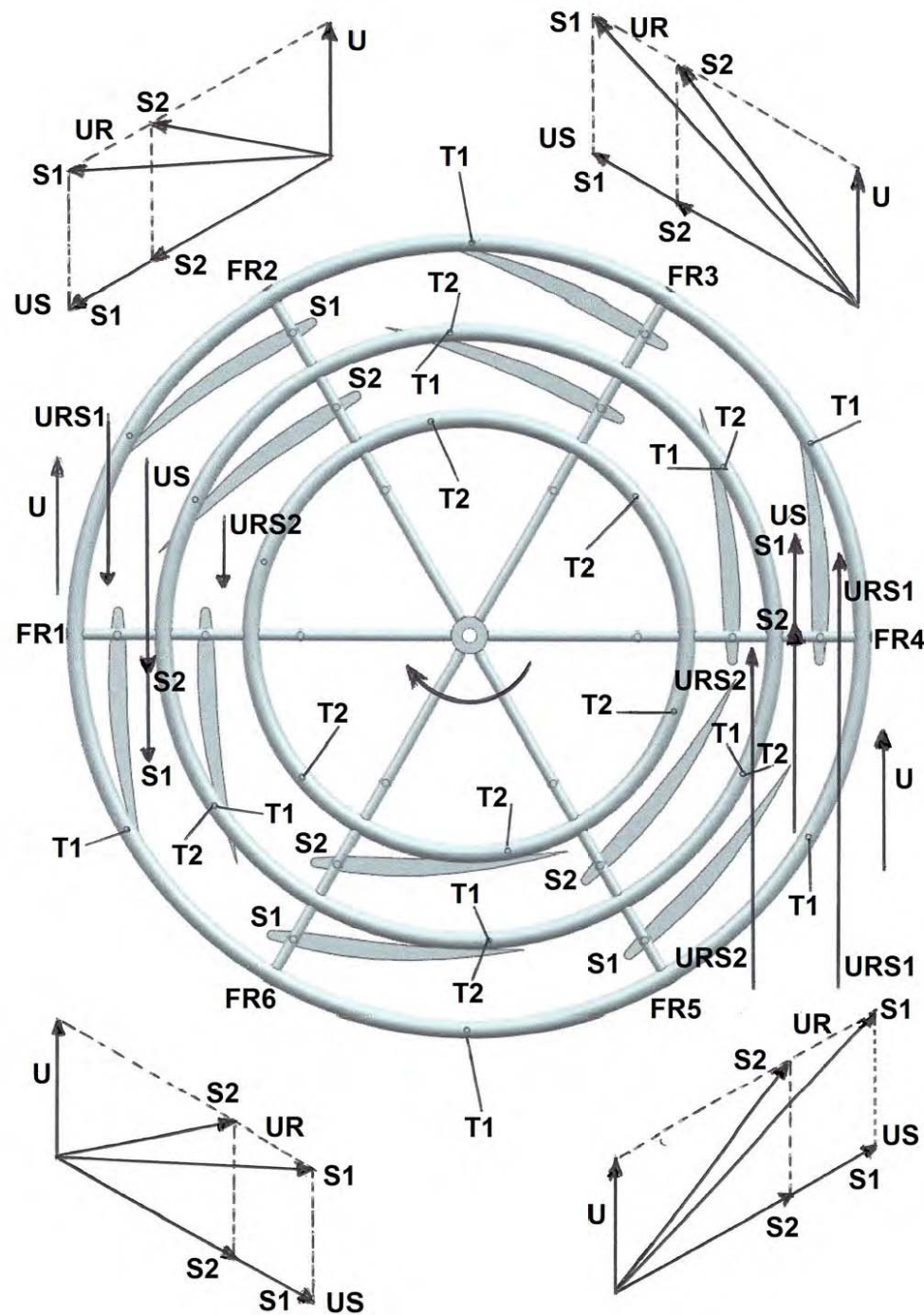
**UR**= Relative fluid velocity as experienced by each **S**

**FF**= Fluid dynamics forces

**FD**= Drag component of **FF**

**FL**= Lift component of **FF**





**Figure 3:**

$$US1 = 2.2U$$

$$US2 = 1.5U$$

### Abbreviations-Glossary

**U**= Fluid velocity

**US**= Fluid velocity relative to the speed of each **S** (S1, S2)

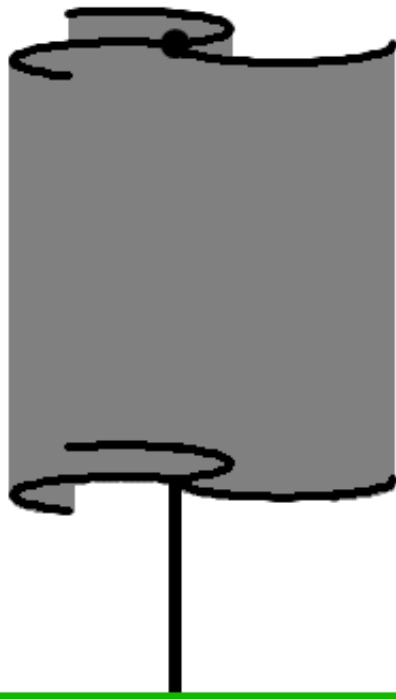
**UR**= Relative fluid velocity as experienced by each **S**

**FF**= Fluid dynamics forces

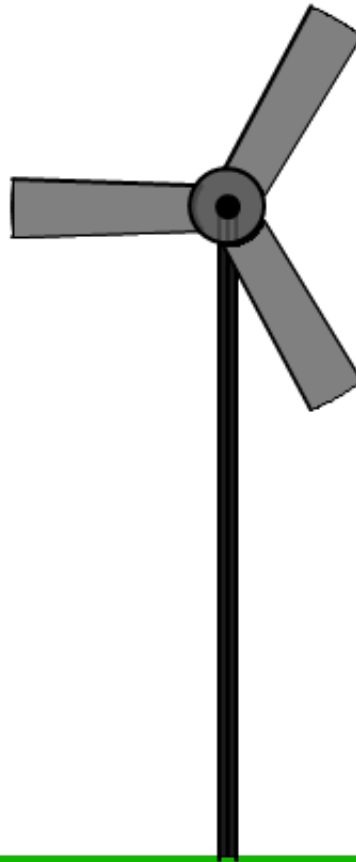
**FD**= Drag component of **FF**

**FL**= Lift component of **FF**

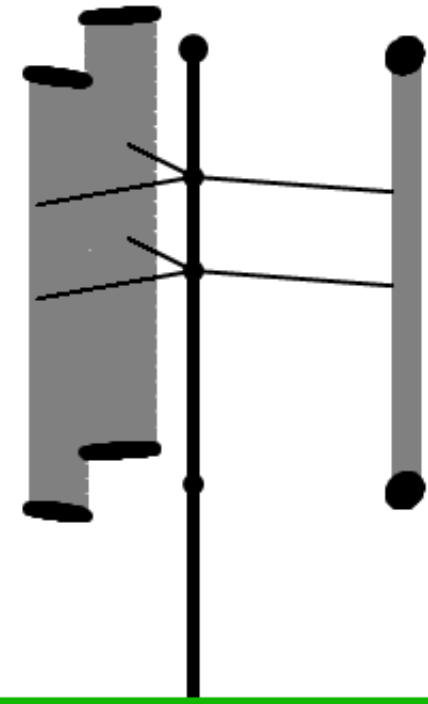
**All other technologies utilize only one of the two components to convert the kinetic energy of their fluids, while the other component mostly acts in opposition to the turbine motion. Molecules in front of the rotor plain are completely stopped and pressurized when velocity exceeds a limit and all their [lost] kinetic energy becomes deadly thrust (survival state)**



Savonius VAWT



Modern HAWT

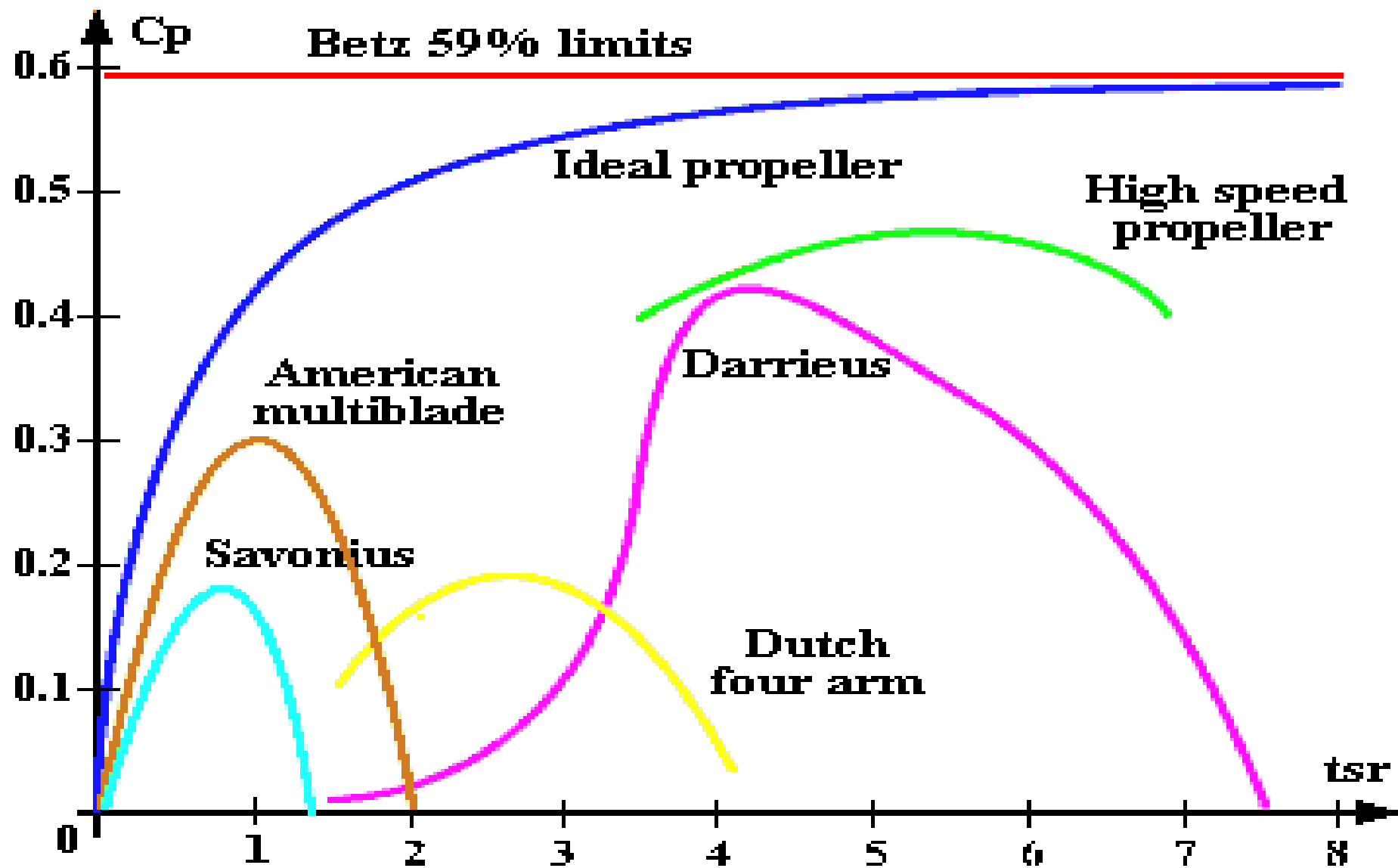


Giromill/Darrieus VAWT

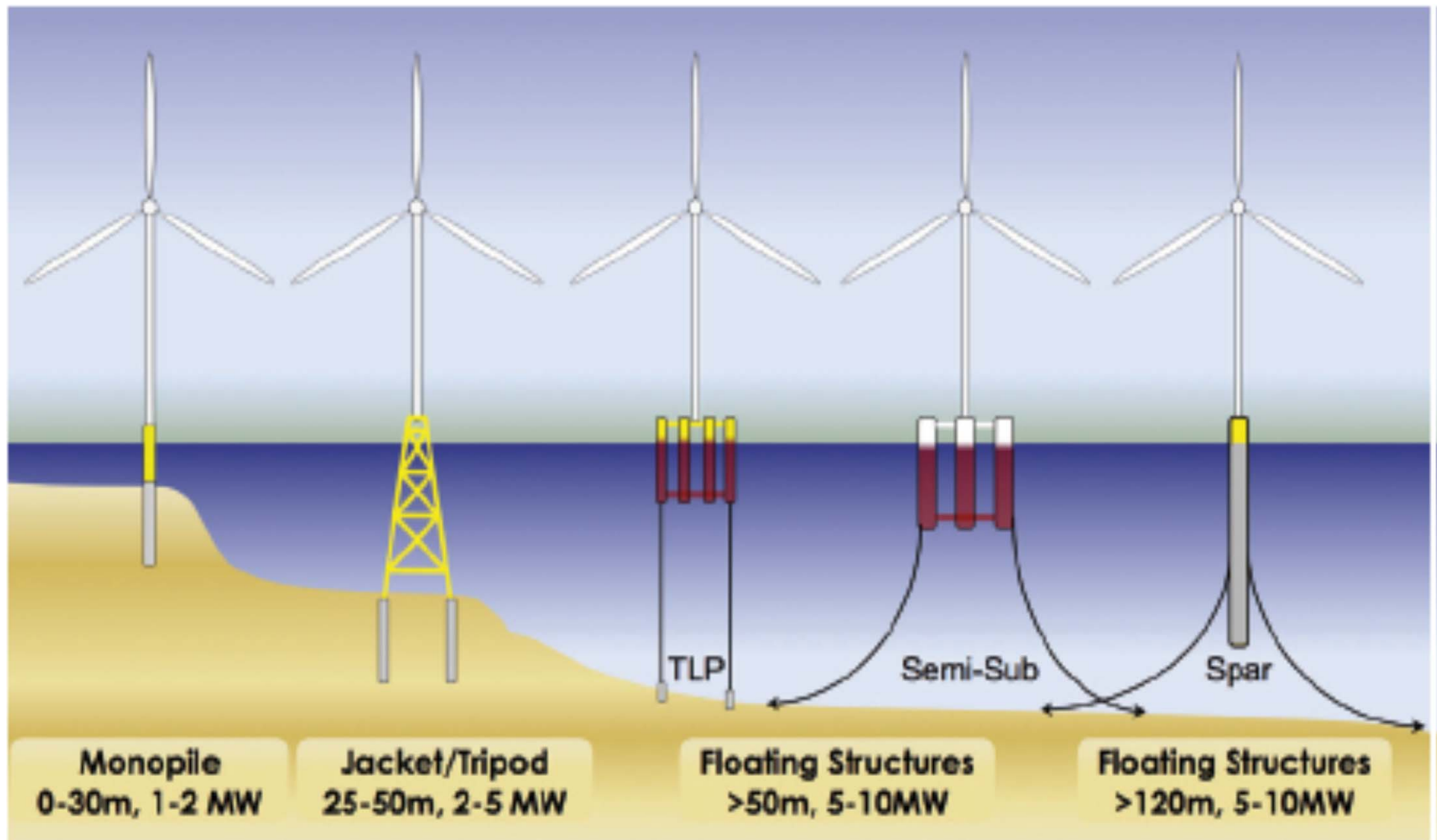


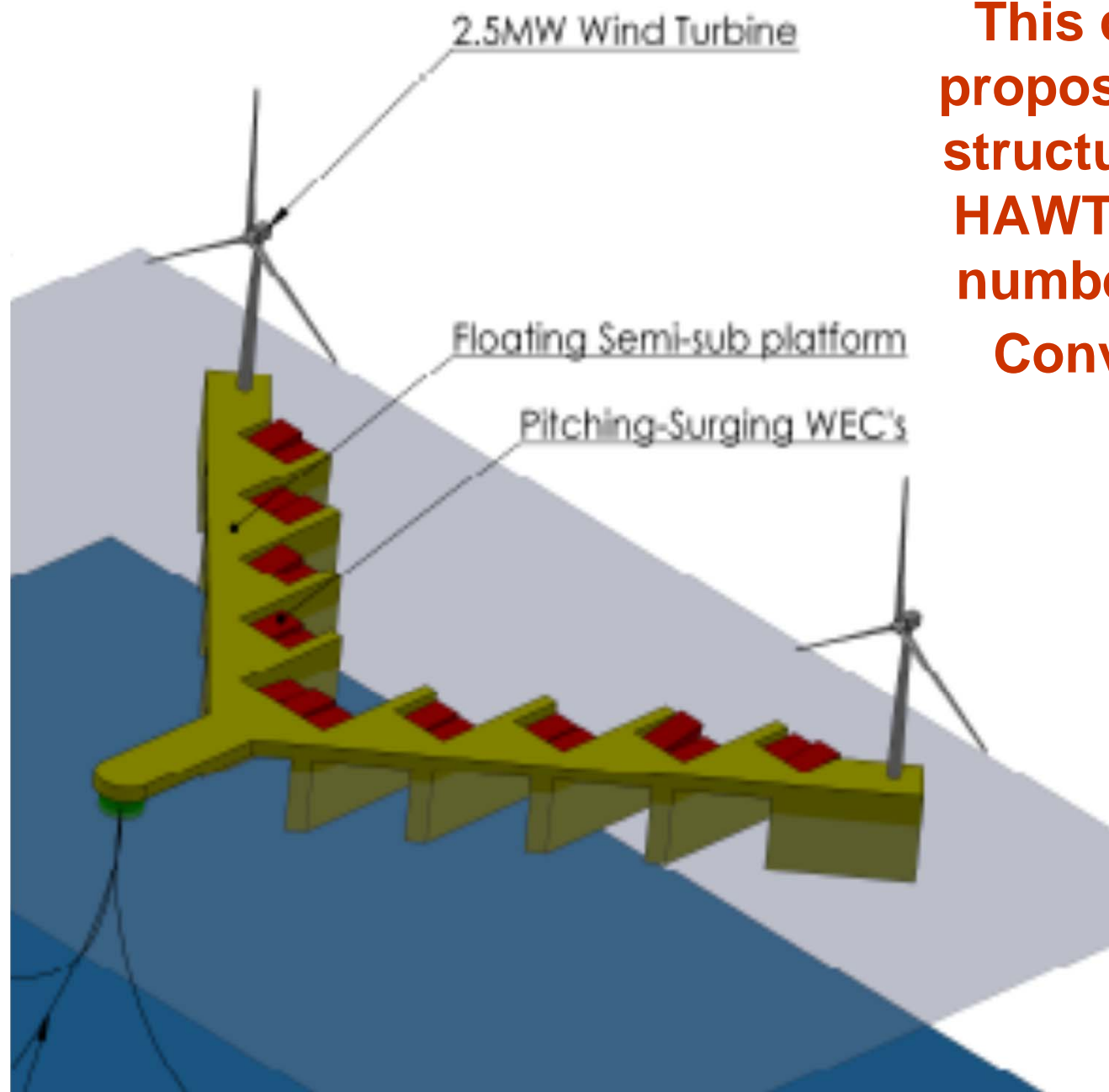
## Efficiencies-Cp of other existing technologies

Lanchester (1915)-Betz (1920)-Joukowsky (1920) limit



These are the existing or under development technologies for Offshore HAWT generators and the proposed concepts for Tidal and Wave energy converters are mostly in R & D stage

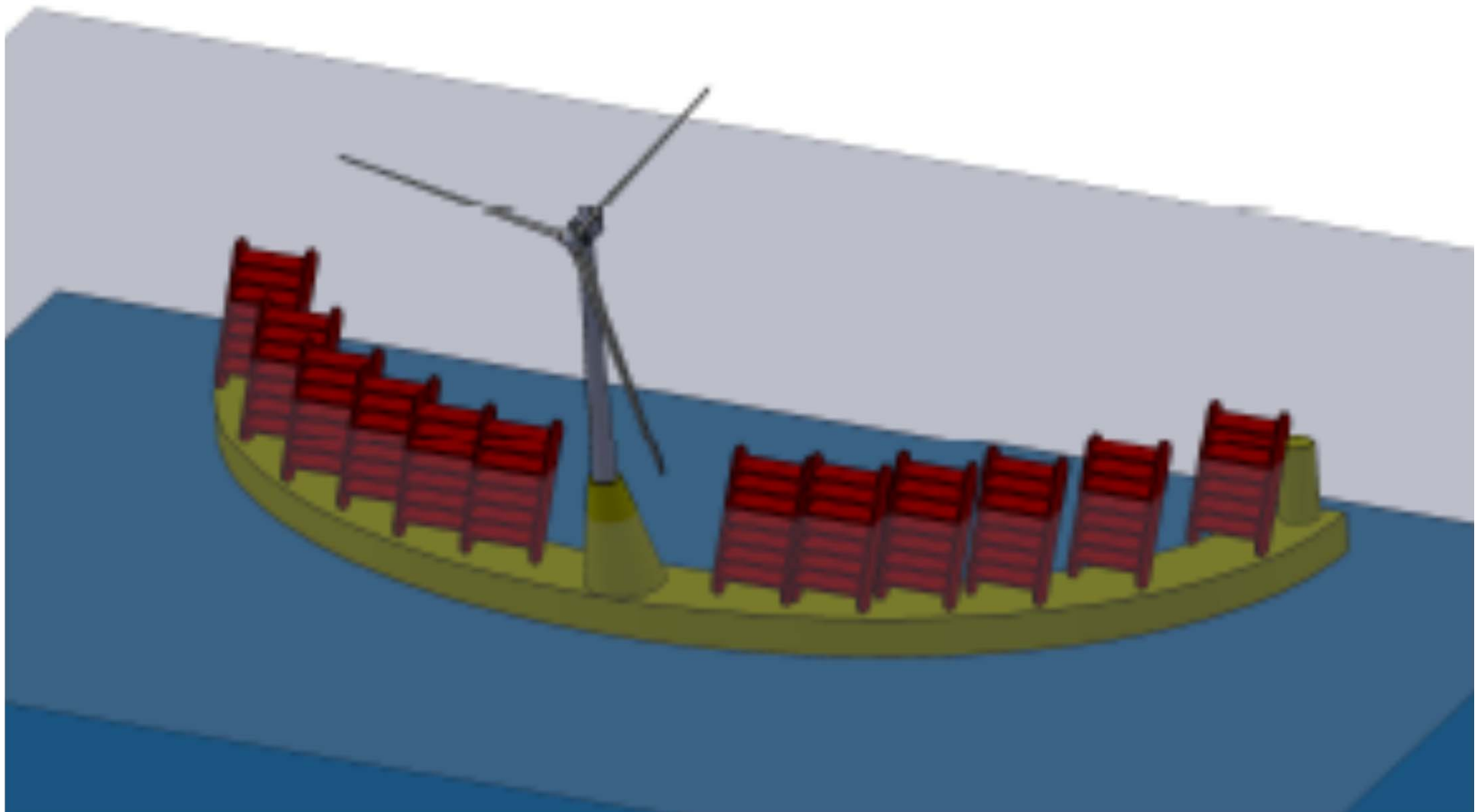




**This concept has been proposed for one floating structure to combine two HAWT generators with a number of Wave Energy Converters-WECs ....**



**... and this concept has been proposed for one floating structure to combine one HAWT generator with a number of Wave Energy Converters-WECs**



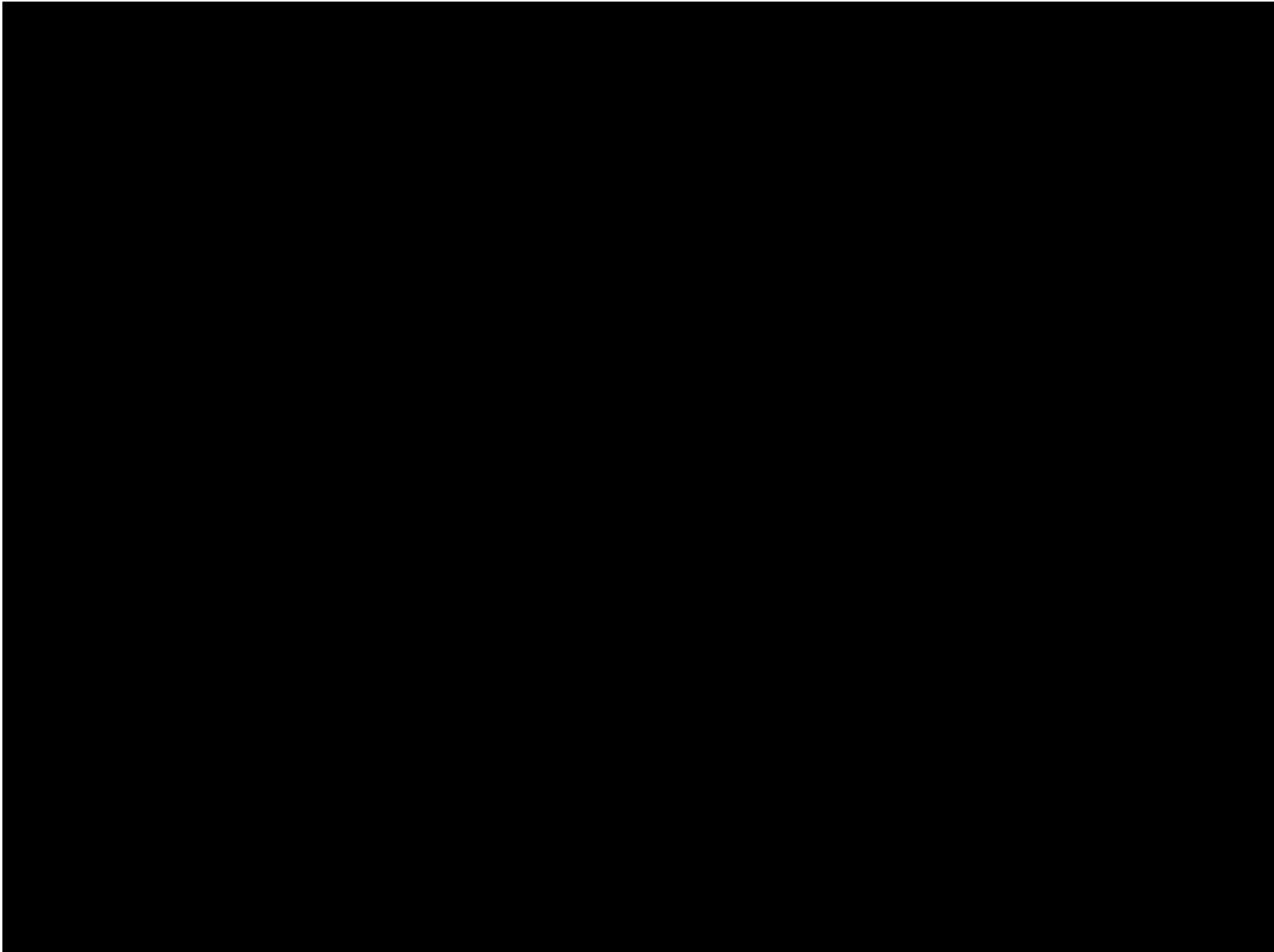


Propeller type HAWT

**UNFLOP-MARESINAP** technology, with suitable engineering designs, can also support MRE converters of any other technologies, including Oscillating Water Column-OWC Wave Energy Converters-WEC, for cost effective combination with HAWT and Solar PV - CSP

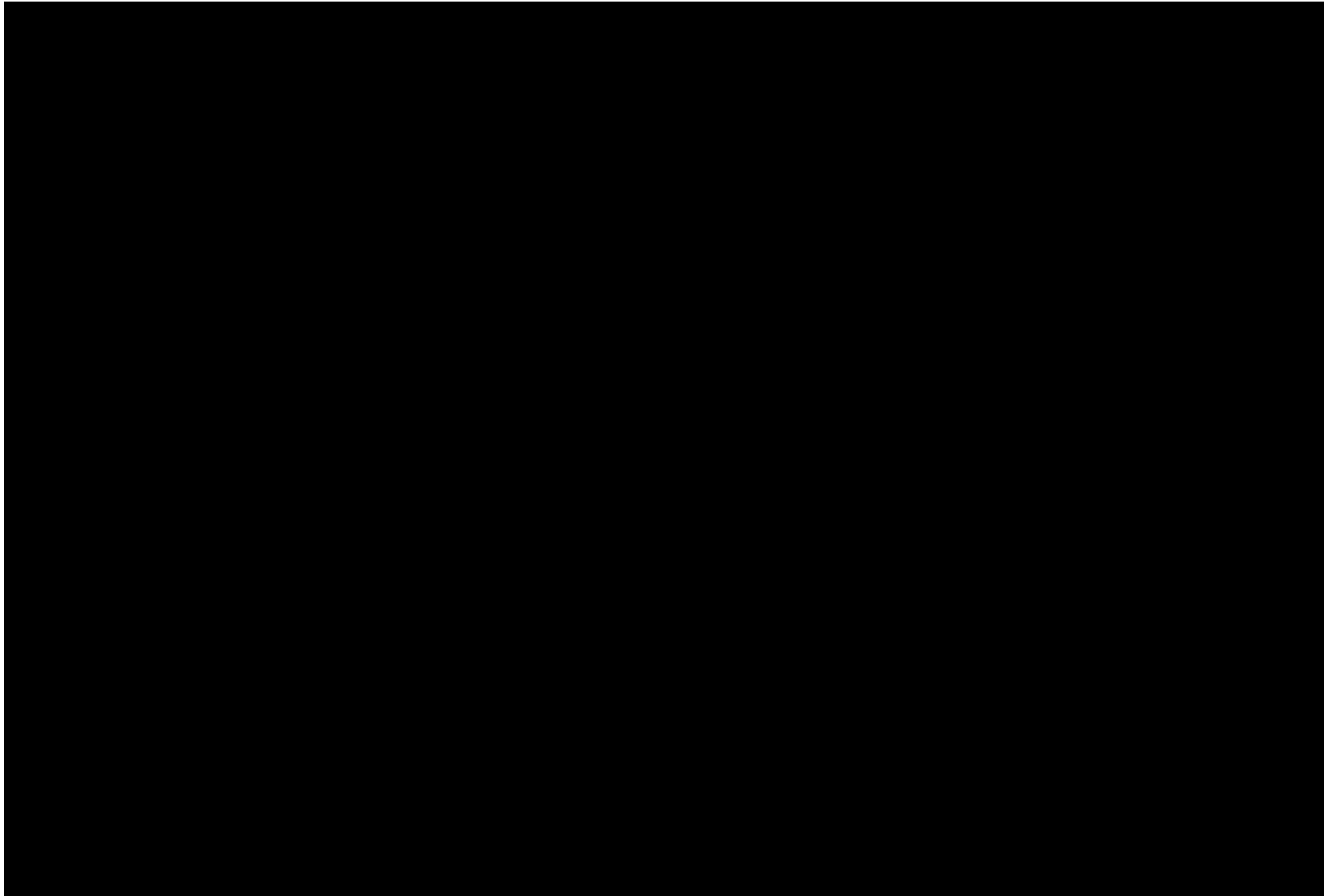
**UNFLOP 10x10 pyramids-10m side-620pcs float-180pcs no float=800pcs**

**CFD animation: Wave Height 4m-period 4 sec-wavelength ~35m**





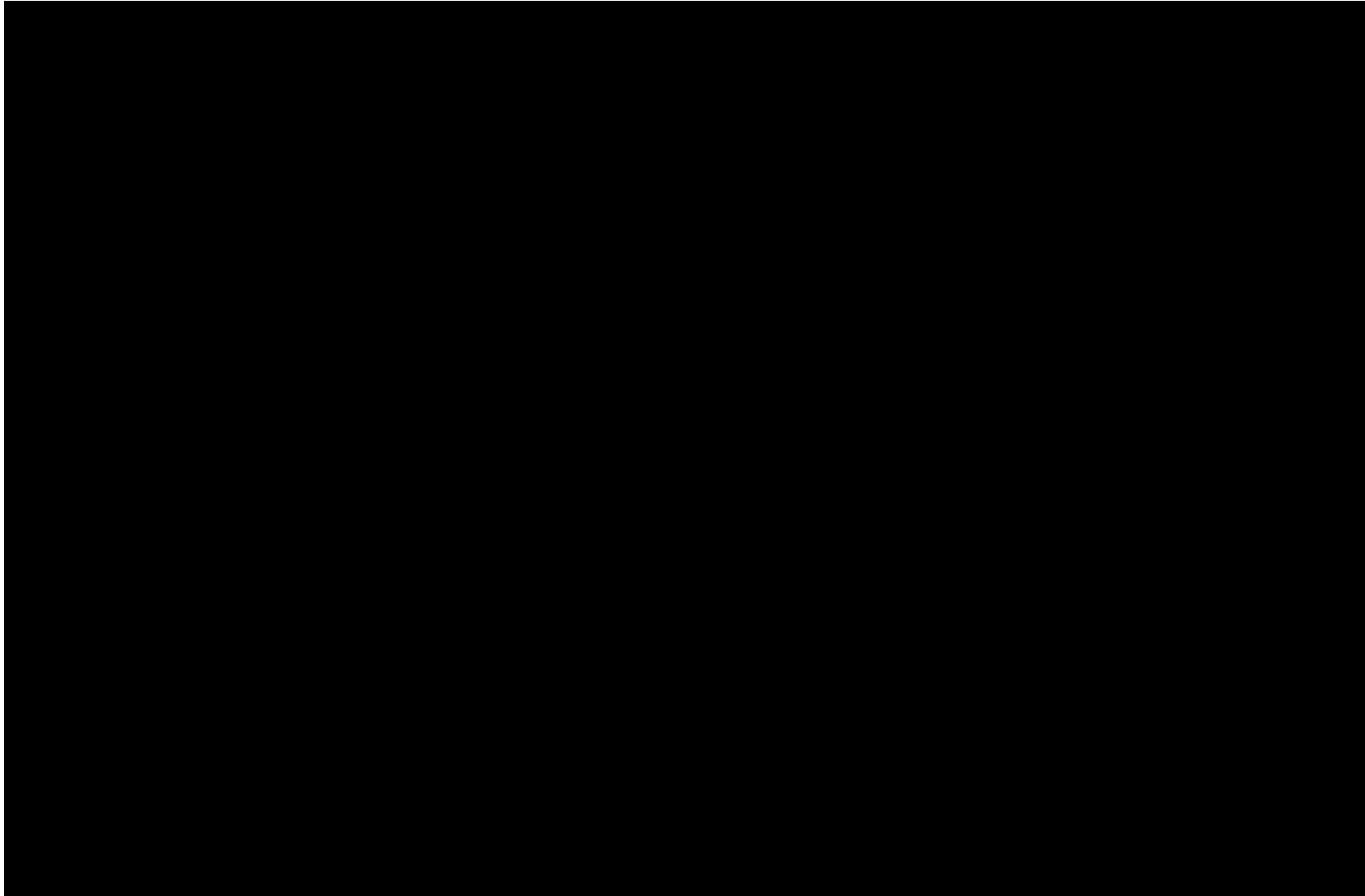
**UNFLOP 10x10 pyramids-10m side-620pcs float-180pcs no float=800pcs**  
**CFD animation: Wave Height 5m-period 5 sec-wavelength ~50m**



**UNFLOP 10x10 pyramid-10m side-620pcs float-180pcs no float=800pcs**

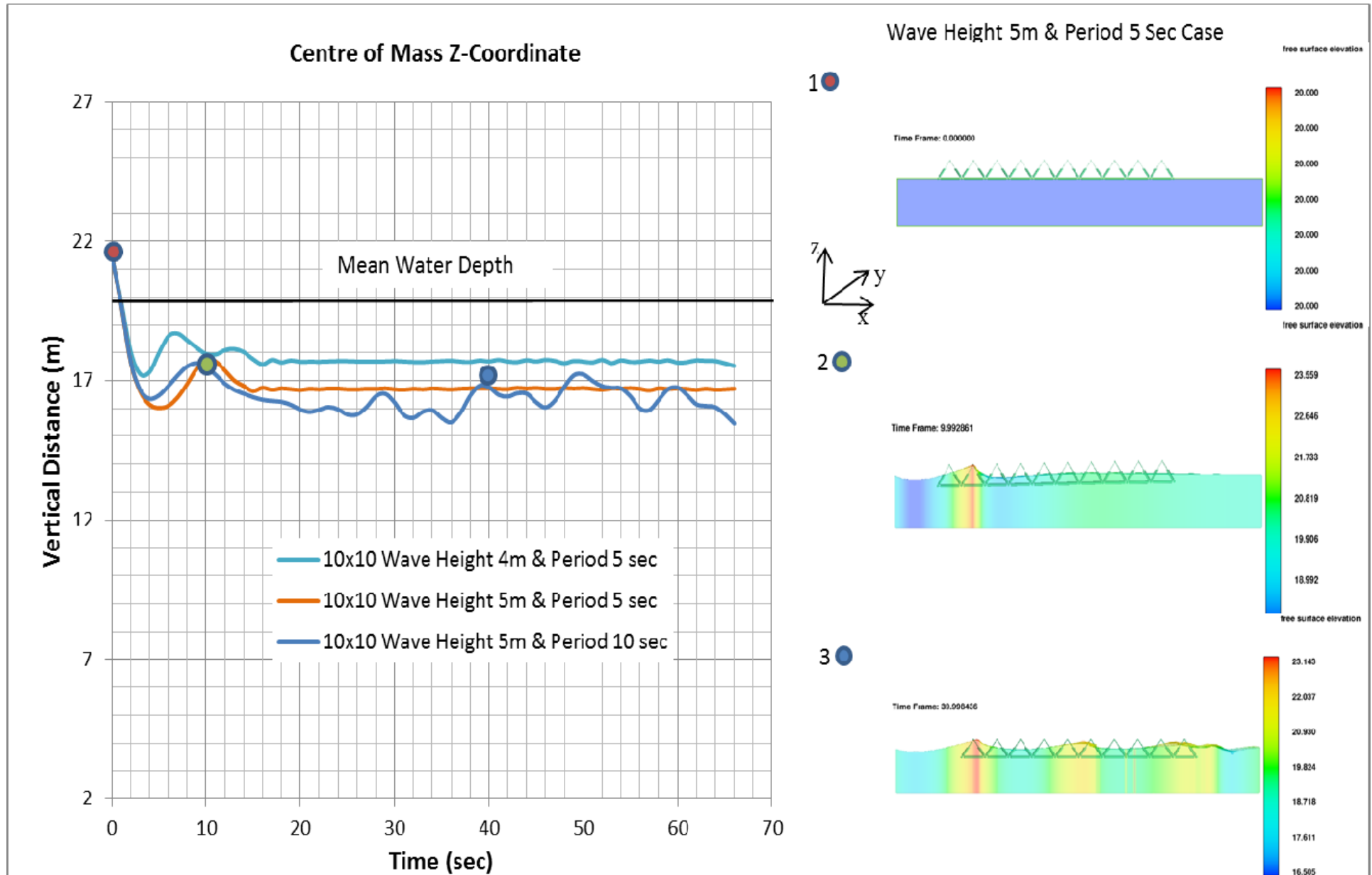
**CFD animation: Wave Height 5m-period 10 sec-wavelength ~100m.....**

**Extreme out of limits – wavelength similar to platform width**



# Large physical size pyramid **UNFLOP** - CFD results / graphs

10x10 pyramids 10m side, 620pcs float, 180pcs no float= 800pcs total





# CONCLUSSIONS

LUCK is only the encounter of EFFORT with OPPORTUNITY, as said by the Wise Greek Philosopher, and nothing happens by chance with **UNFLOP** !

Scientific research showed that the *STABLE UNDISTURBED FROM WAVES* is valid-proven !! (and NOT ONLY, in relation to ANY WAVES, that have finally found their “MASTER”!!)

The *UNSINKABLE* may remain under doubt by the “minors” as a fantasy of the crazy inventor (scientist, researcher). At the first DEMO Project though, I shall exert every EFFORT to secure “suitable” cooperation by the Greek Air Force or the Navy, in order that I can have the OPPORTUNITY to prove to “them” they ARE UNSINKABLE! Till then, I am “shouting” to them... INDEED THEY ARE!! By the way, ADAPTtoCLIMATE is NOT my STRATEGY, ADAPT CLIMATE to human needs by fighting bad choices and producing clean energy..... IS!!!

# **One more thing... Overpopulation**

- **We have become 7 billion smart anthropoids on land-Earth....**
- **Till 2050 we would become 10 billion smart anthropoids.....**
- **And if by 2080 we are 15 billion very smart anthropoids.....**
- **WHERE CAN WE ALL FIT ON [LAND] MOTHER EARTH???**

**The on-land real estate will be scarce, the  
ON-SEA real estate is the only solution.....**

**....The EARTH-QUAKE PROOF REAL  
ESTATE.... UNFLOP !!!!!**

**THANKS FOR YOUR ATTENTION**

**Themistoklis Andrikopoulos - [www.atioltd.com](http://www.atioltd.com)**