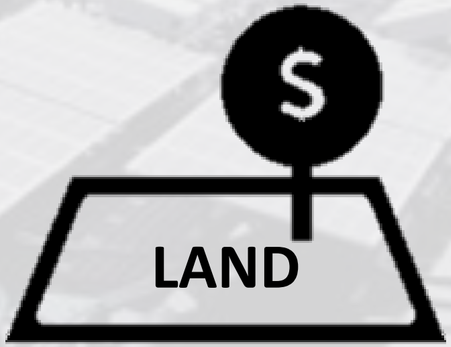
FLOATING PHOTOVOLTAIC SYSTEM

Sun Rise E&T

Why Floating

Generate
Additional Power



Limited Resource

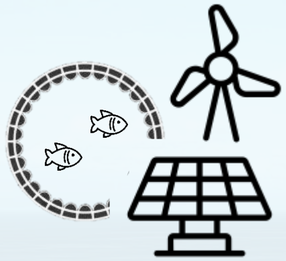
CURRENT APPLICATION

River

lake

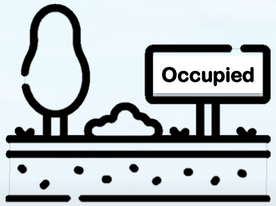
Reservoir

WHY OFFSHORE



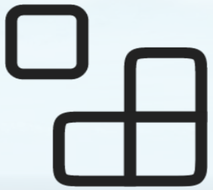
Hybrid WSA system

wind-solar-aquaculture co-construction to create a commercial-ecological win-win solution.



Limited Land Resources

Small maritime area can implement large-scale solar PV



Scalable-Modular Design

expand up to 100 MW per block

Low LCOE

Most cost-effective renewable energy on land, and soon for offshore!

Low CAPEX

Simple marine installation process, plus shared facilities with offshore wind system

Clear Sea View

6 km away from shore

Challenge of Going Offshore

Short O&M window

Mooring System

Connect to Grid

Material Longevity

Structural integrity

Lack of References

Earlier stage of Offshore Prototype

Year 2015
Thin-film Solar Panel for aquaculture
In Japan

Year 2016
Offshore 200m Radar Station
In Japan

Floater Material - HDPE PE100

Highly Flexible

± 60°C

Wide Range

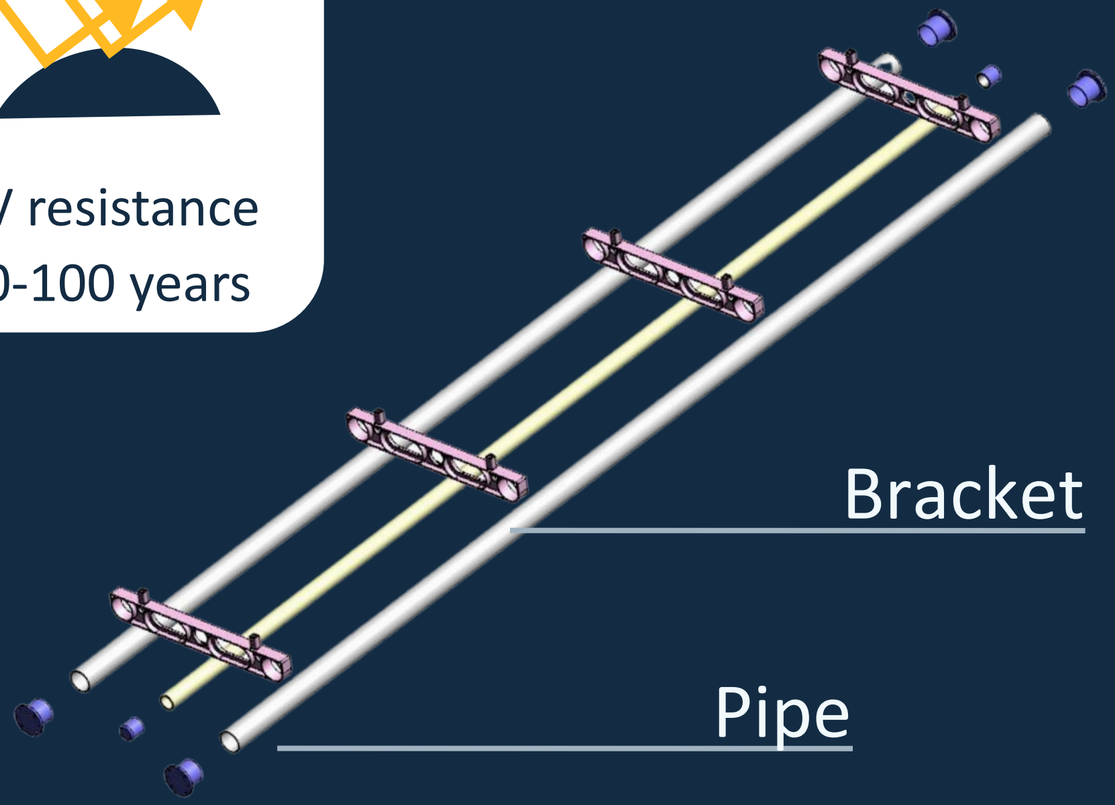
UV

UV resistance
50-100 years

SALT

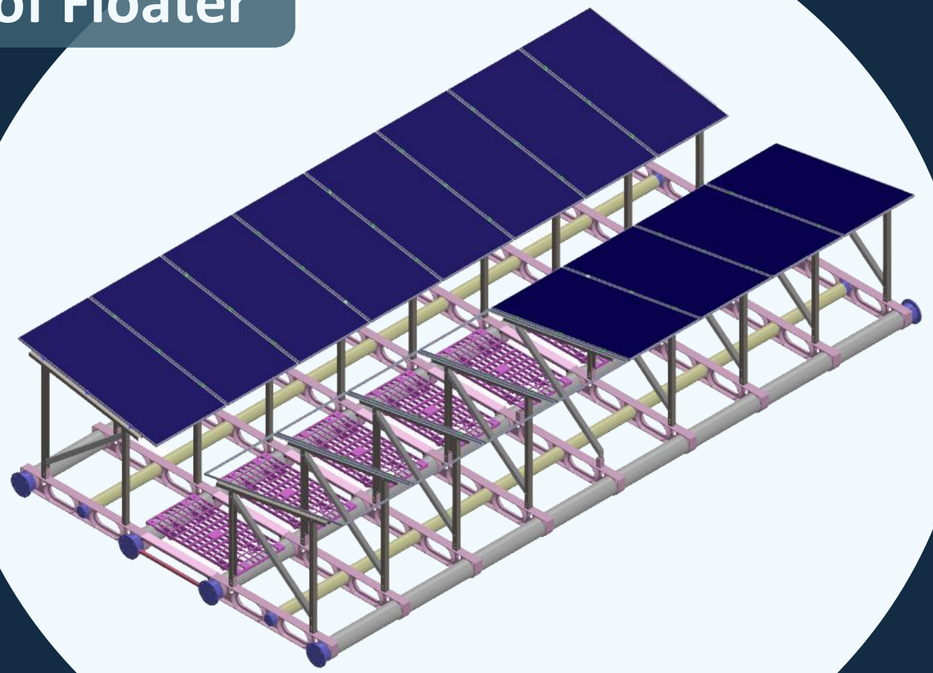
Robust

Enviro. friendly



Racking and Module Material

An Island of Floater



Ultra Durable Panels

- Wind-resistant, anti-corrosion PVDF coated frame
- Insulated super crystalline namomaterial Photovoltaic board

Anti-corrosion Rack

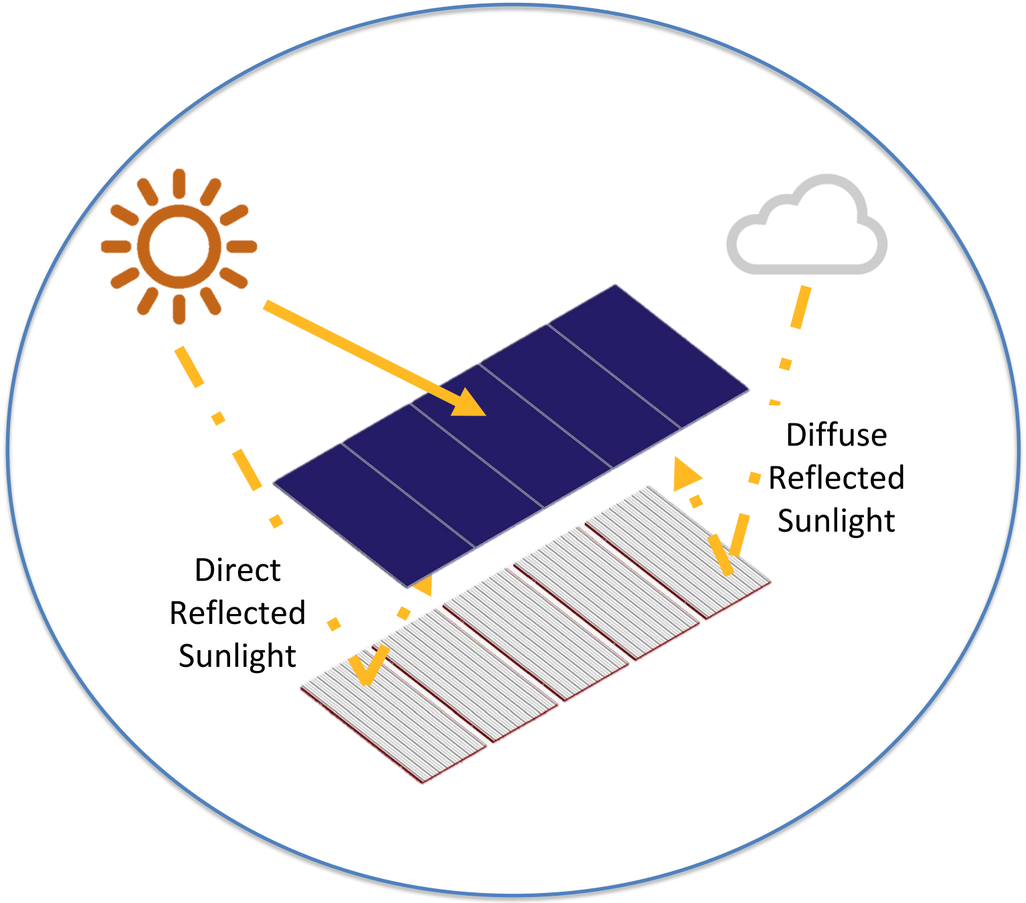
- Newly developed Stainless Steel 446
- Passing 10000 hrs - ISO9227 standard Salt Spray Test
- Expecting to complete 15000hrs SST.

Bi-facial Module

1st Floating System equipped with Reflector Board

7%*

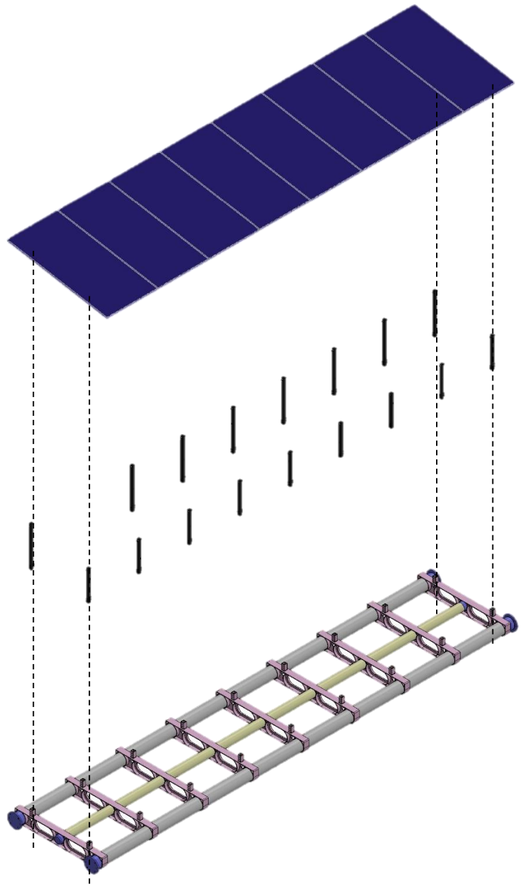
Additional power



*Data base on field testing result, number may vary depends on site condition

Micro-Crack Prevention

When establishing a connection between floaters and PV modules, utilizing SST 446 as an intermediary serves to mitigate the variances in Coefficient of Thermal Expansion (CTE) among materials. Consequently, diminish the risk of microcrack formation on solar panels.



(CTE)
Coefficient of Thermal Expansion α value

Module Frame

Aluminum
24~26

Frame & Clamp

446 Stainless Steel
11

Floater Structure

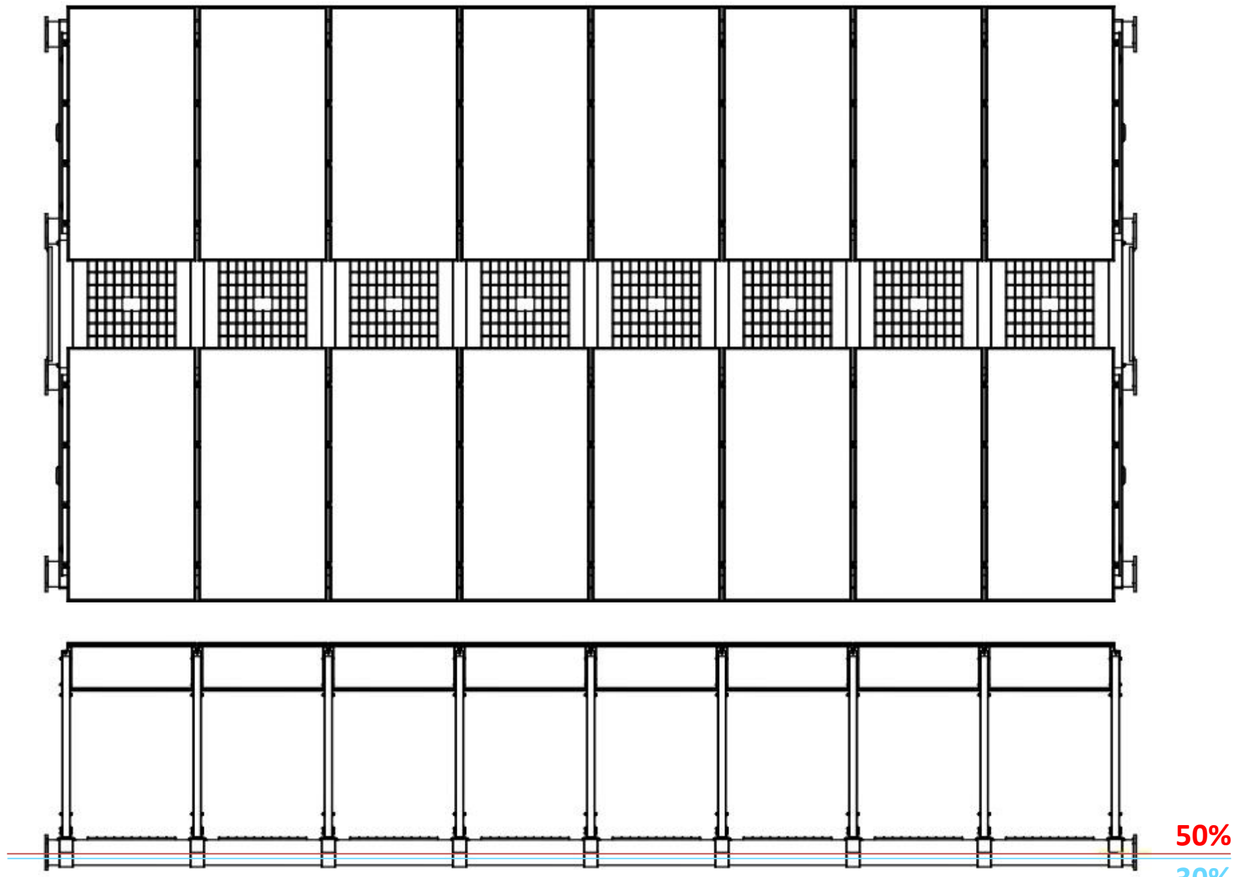
HDPE 126

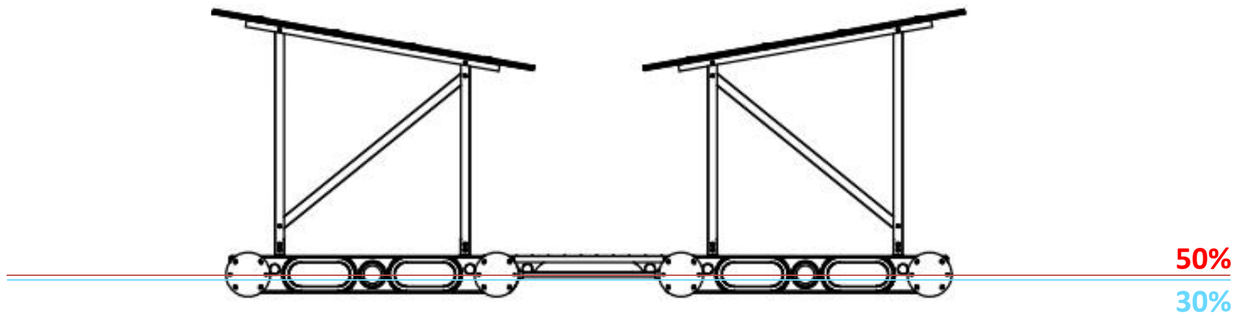
Buoyancy Control

In between 30-50%

Via controlling buoyancy and area of floater contacting sea water, the growth of barnacle on floater is being restrained.

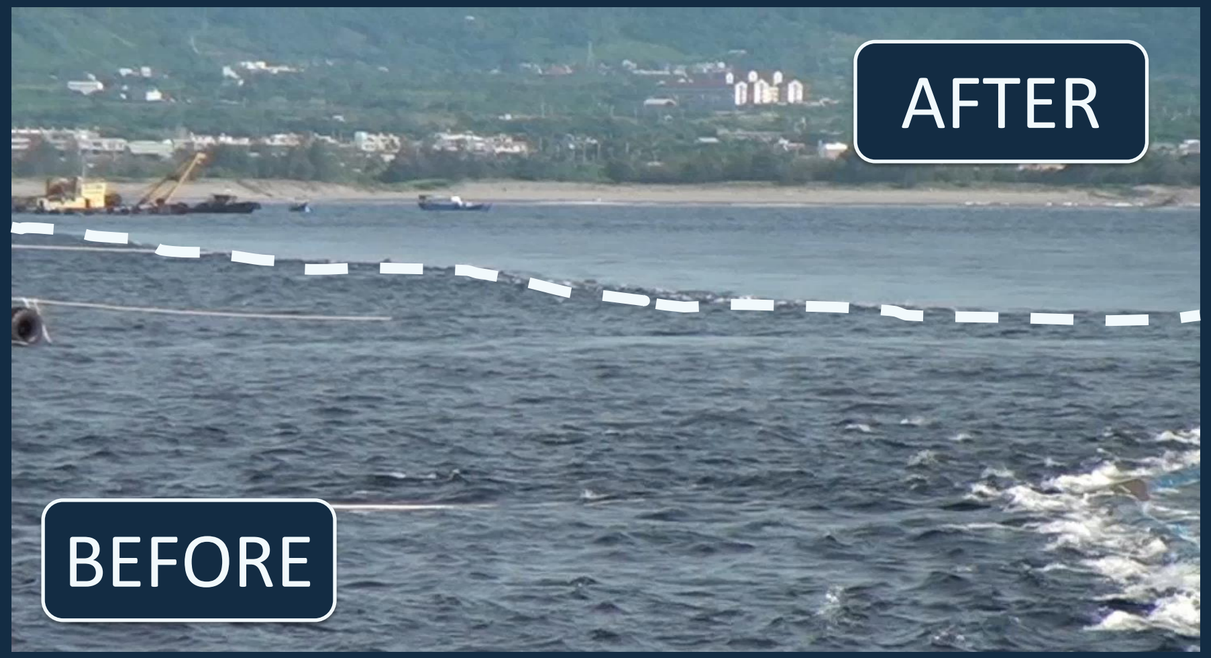
barnacle



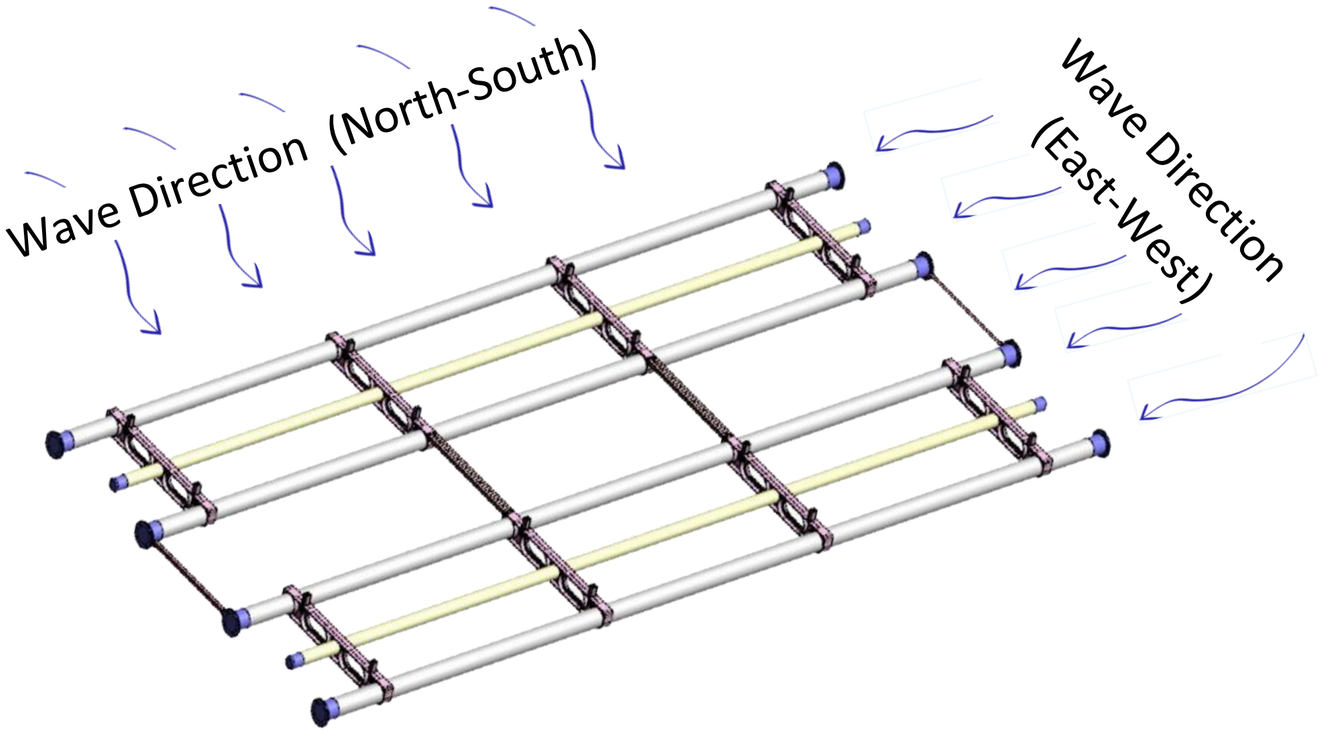


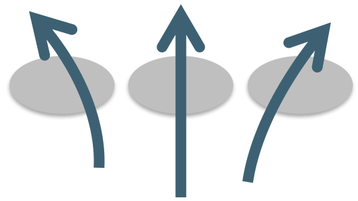
Wave Breaking

At Open Water



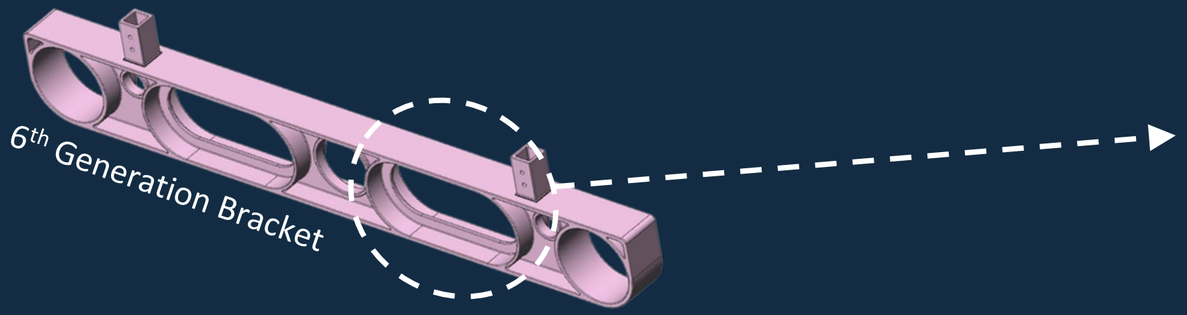
Wave Energy Degradation - stepwise reduction

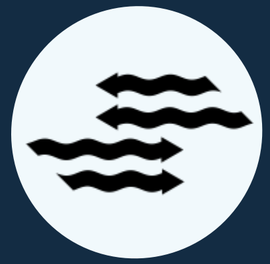




E-W Direction Wave

N-S Direction Wave





- Waterflow exchange
- Wave Braking

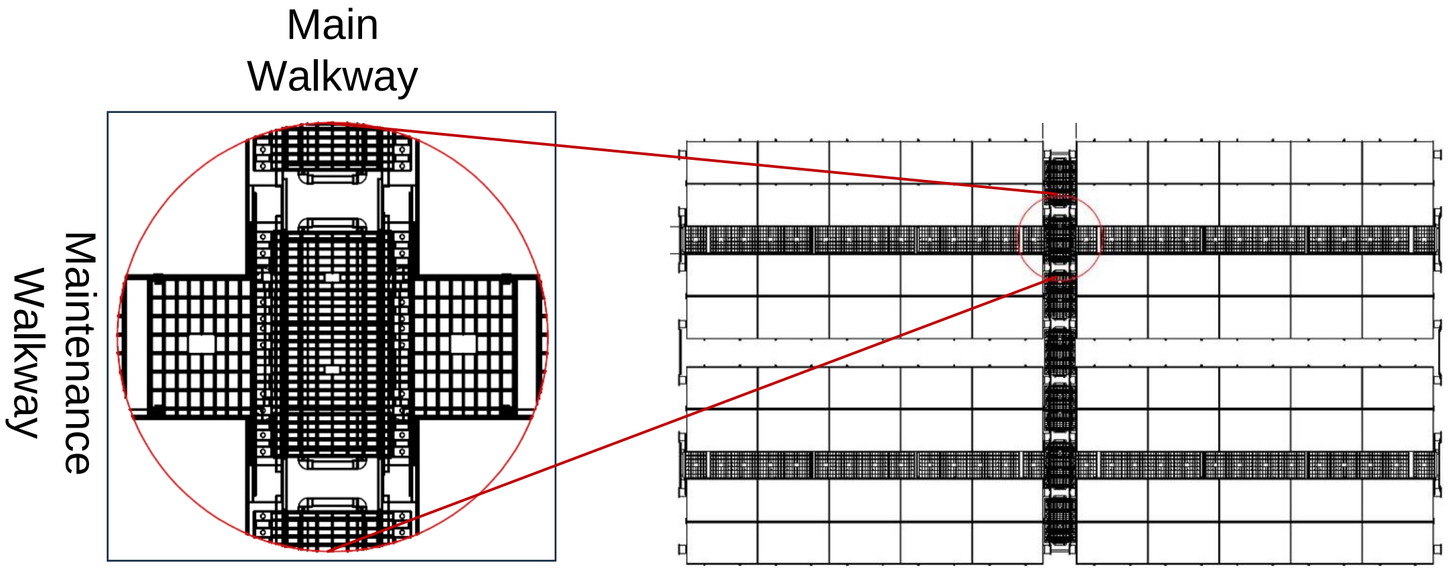
Floater under Typhoon

43m/s – 10 mins avg wind speed
53m/s – gust wind speed

Video Link: https://youtu.be/apnHXDxEef0

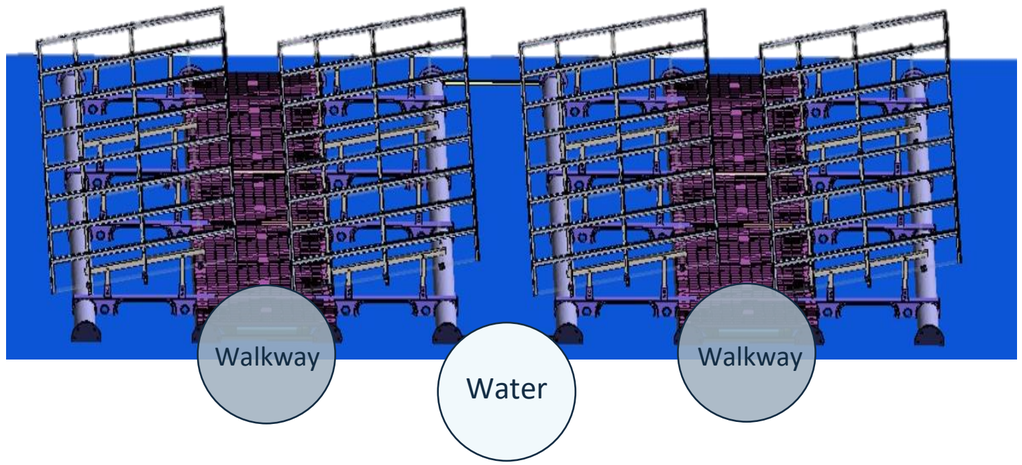
O&M Safety：
Anti-Slip Walkway

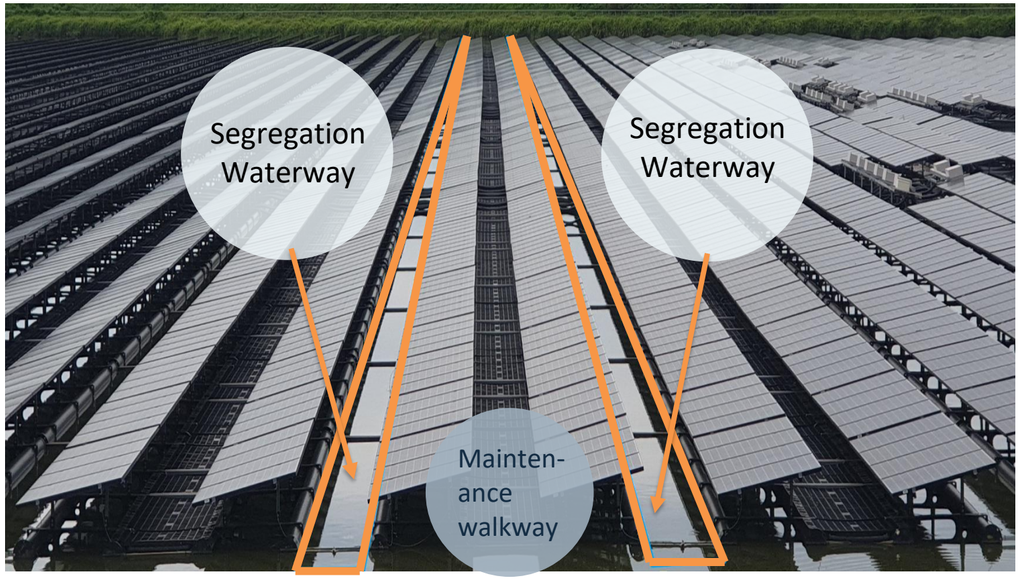
Easy access to all panels & equipment



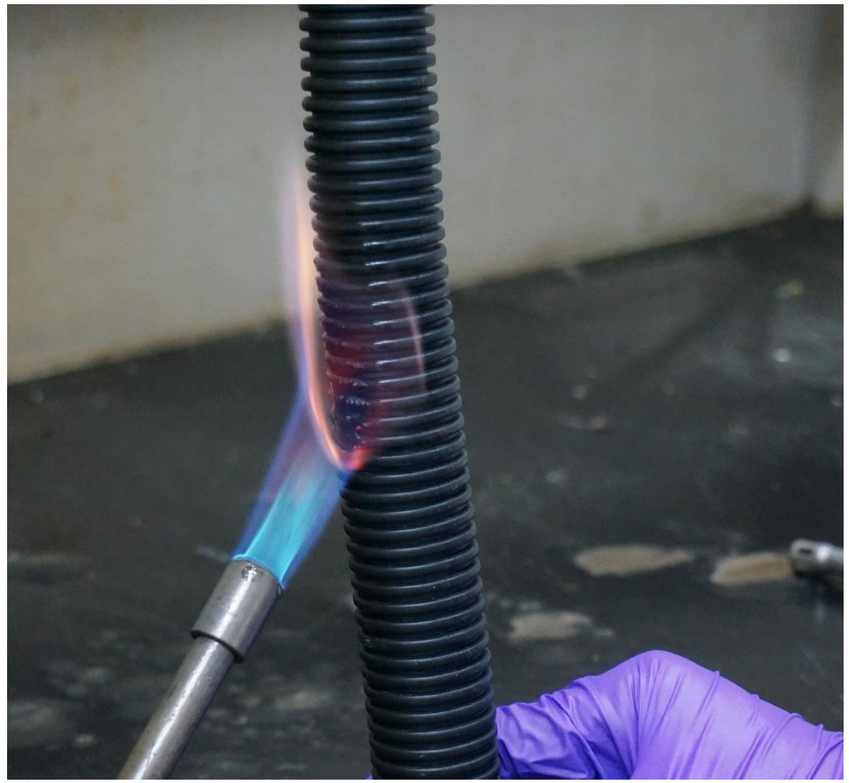
Fire Prevention
Segregation Waterway

DNVGL-RP-0584, Chapter 5.6 & 9.2.4
Floats **may need to be resistant to fire** in certain use cases. PV modules should be installed over a fire-retardant or fire-resistant mounting structure.





Fire Prevention
Fire-retardant PF Pipe



SGS
材料暨工程實驗室-高雄

試 驗 報 告

報告編號：KV-22-06044
頁　　數：1　　OF　　1
報告日期：111 年 09 月 06 日

工程名稱: PF 管測試
委託單位: 旭東環保科技股份有限公司
供料廠商: 旭東環保科技股份有限公司
樣品名稱: HDPE 8003H D34mm(標稱管徑 28mm)平均厚度 0.85mm±0.1mm

試 驗 結 果：

試驗項目	試驗方法:	試驗結果
可撓性	參考 CNS 12152(2008)	無龜裂或裂痕且量規可通過試樣
壓縮復原性		無龜裂或裂痕,外徑減少率：7.68 %
耐衝擊性		無龜裂或裂痕:12 支
耐彎曲變形性		量規可通過試樣
耐熱變形性		量規可通過試樣
耐燃性		耐燃且自動熄滅
耐電壓(2000V、15 分鐘)		可耐 2000V 電壓 15 分鐘
絕緣電阻((60±2)℃、MΩ)		>50000
抗拉試驗		無龜裂或裂痕

註：本試驗報告之試驗地點同實驗室地址。

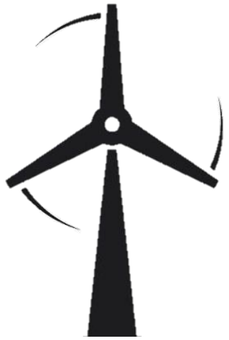
---- oOo ----

本報告若有提供規範值, 該規範值僅供參考, 合格之判定以委託單位實際要求為準

報 告 簽 署 人

Connecting to Grid

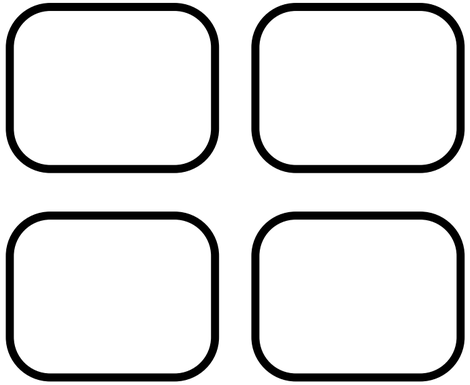
On-Grid



To Wind Turbine’s

Infrastructure

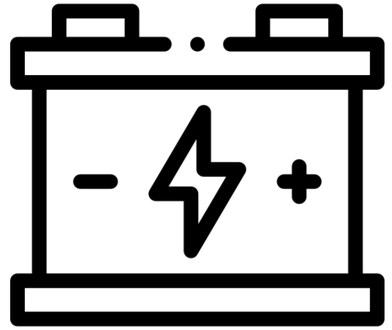
On-Grid



100 MW

independent cable

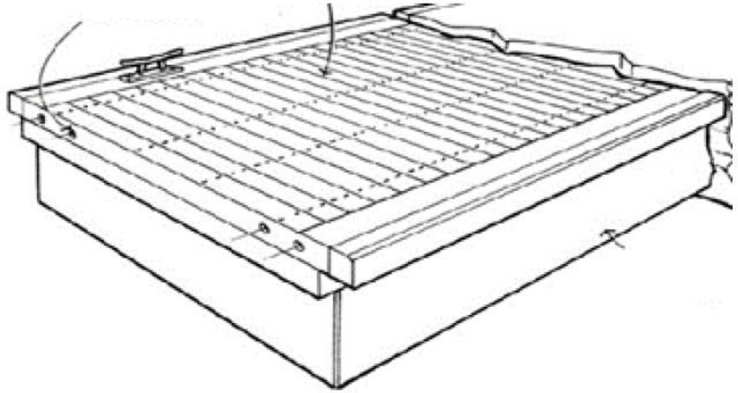
Off-Grid



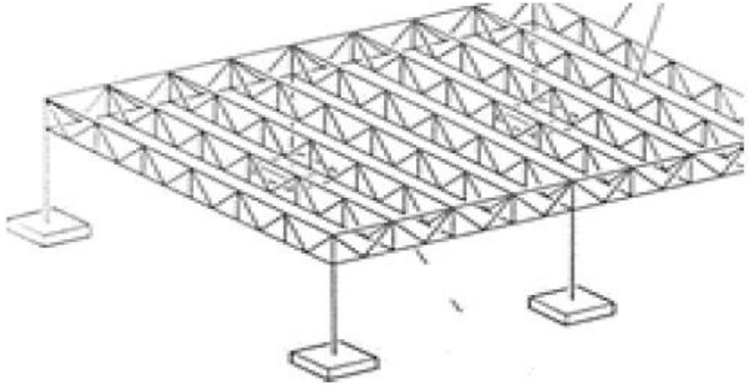
Off-grid

Energy Storage

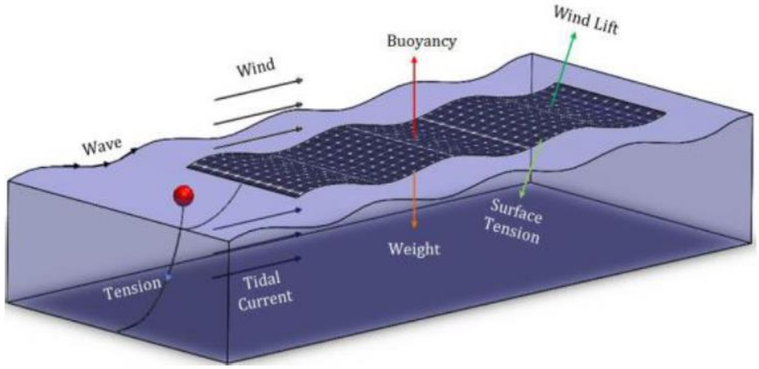
Different OFPV structure



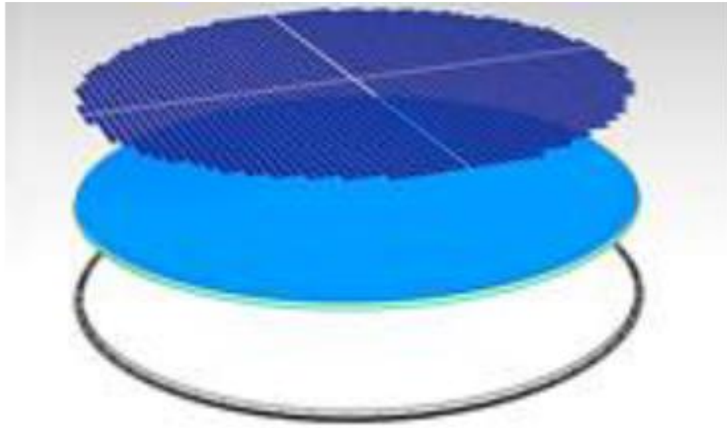
Pontoon concept



Truss concept

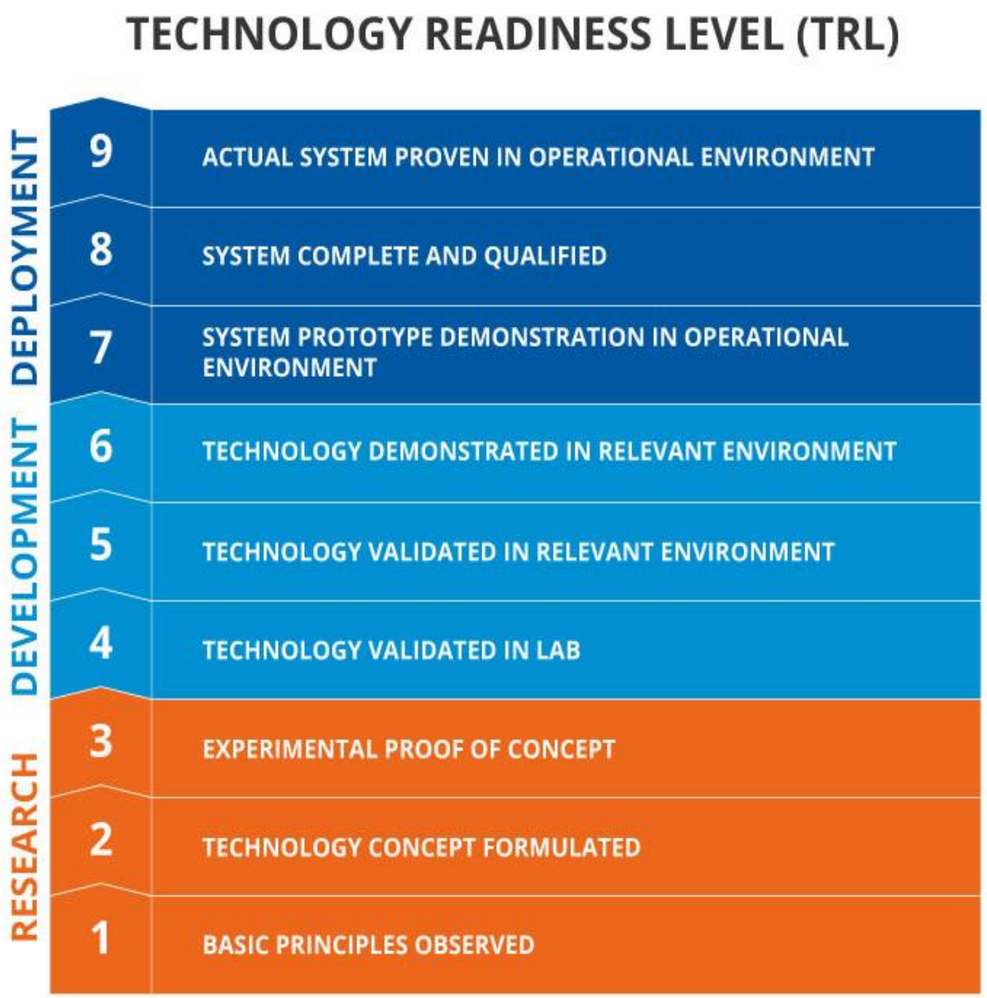


Soft & flex concept



Fish farm concept

Project Development- Chinese Taipei



Current Project Level:

System Prototype Demonstration in Operational Environment

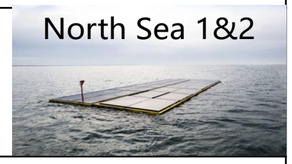
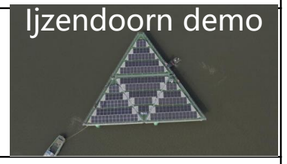
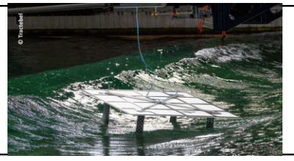
LV. 7

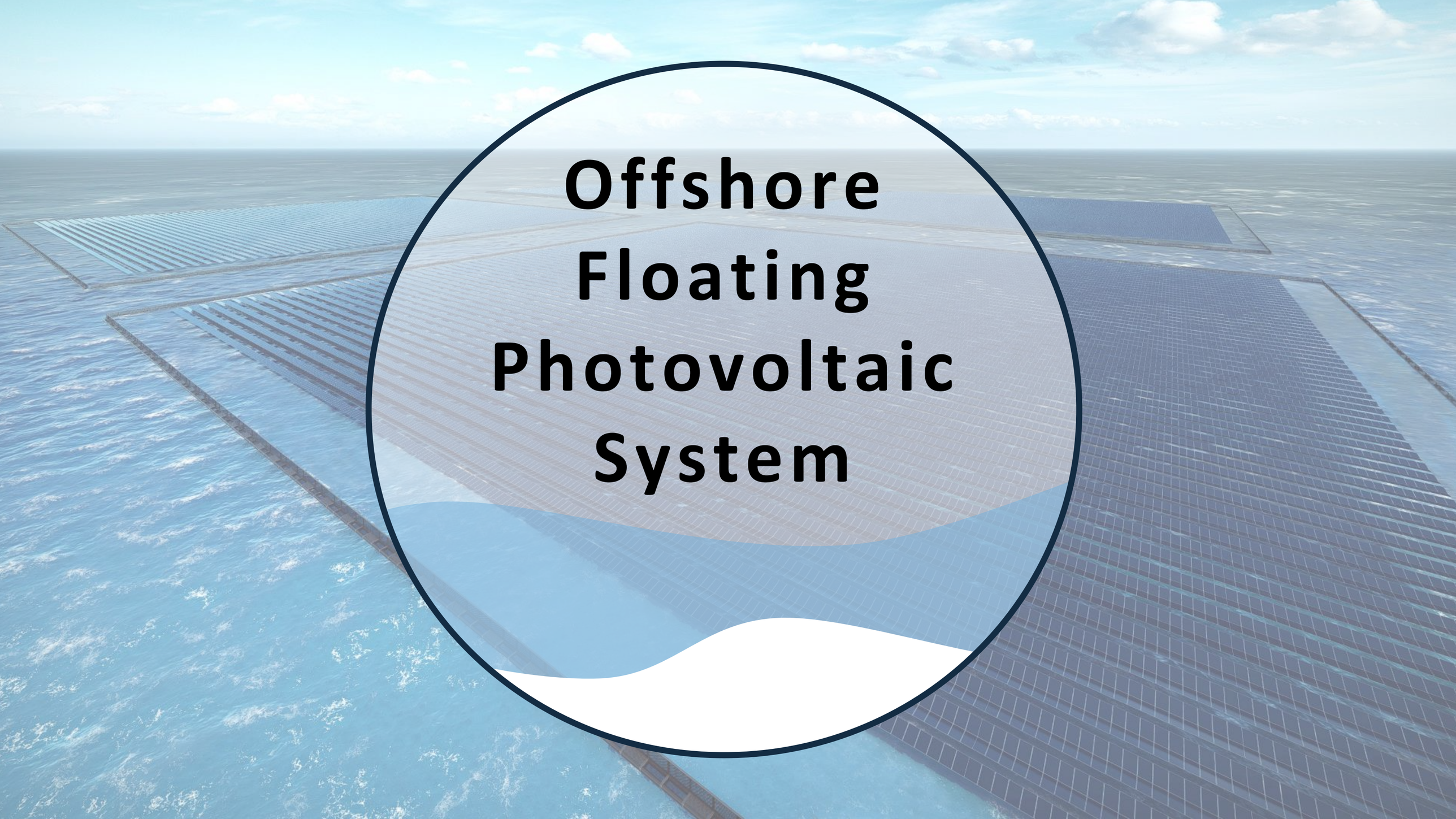
Table 4: Summary on TRL and LCOE - best estimates for northwest Europe

	Low exposure	Medium exposure	High exposure
Definition	Hmax = 2 m, HS = 1 m. mostly inland waters	Hmax = 6 m, HS = 3 m.	Hmax = 14 m, HS = 7 m.
Development status	Approx 2 GWp installations worldwide. Ongoing developments on reliability, cost and O&M. No full bankability yet. TRL 8.	Several pilot projects have been realized. TRL 4-6.	Initial developments. TRL 2-4. Pilots have been planned.

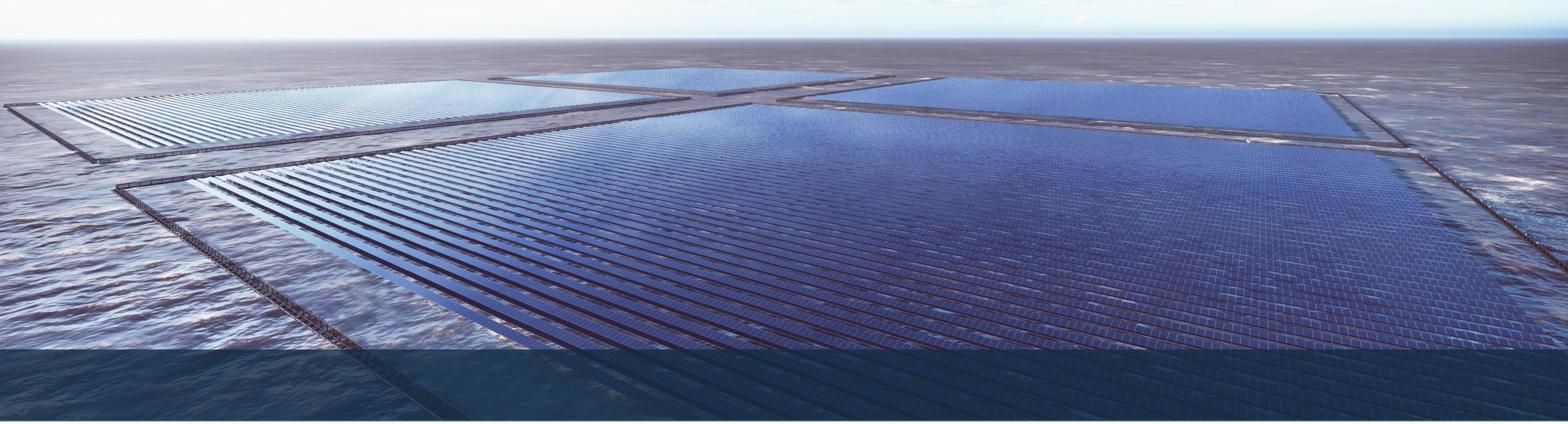
*Table Extract from TNO 2022 research- Challenges and potential for offshore solar

OFPV Project around the globe

Developer	Economy	Concept	Current/ Planned Scale	TRL	Image
Oceans of Energy	Netherlands	**Pontoon**	**1-3 MWp**	**5-8**	
Bluewater	Netherlands	**Soft&Flex**	**20 kWp**	**4**	
Solar Duck	Netherlands	**Truss**	**0.5-555 MWp**	**7-8**	
Tractebel-Engie	Belgium	**Truss**	**1-30 MWp**	**4**	
Swimsol	Austria	**Truss**	**96-678 kWp**	**8**	
Moss Maritime	Norway	**Pontoon**	**1:13 scale pool test simulates 80 square meters scale**	**4**	
OceanSun	Norway	**Fishfarm**	**2-500 MWp**	**5-8**	
Seavolt	Belgium	**Truss**	**250 kWp**	**3-5**	


Offshore
Floating
Photovoltaic
System

https://youtu.be/G7FPxAZUEng



Contact Us

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Tel: +886 (8) 753 0968