Session 4: How to Maximise Dual use of Land and Water Surface Potential: Floating Solar and Agrivoltaics

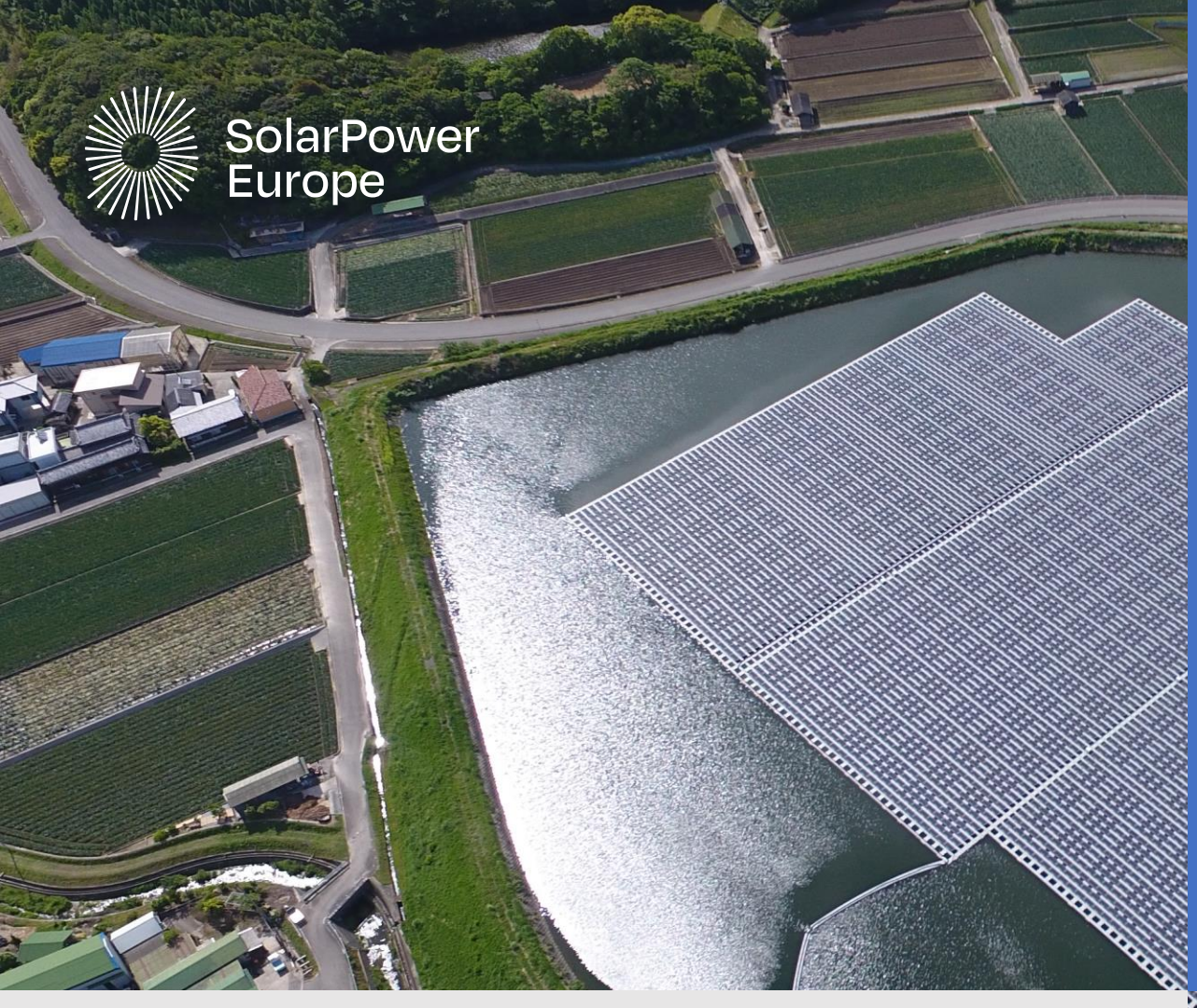
Thursday, December 7
15:30 – 16:30

SUSTAINABLE SOLAR EUROPE 2023

Lina Dubina

Policy Advisor for Sustainability,
SolarPower Europe

7 December, Brussels, Belgium

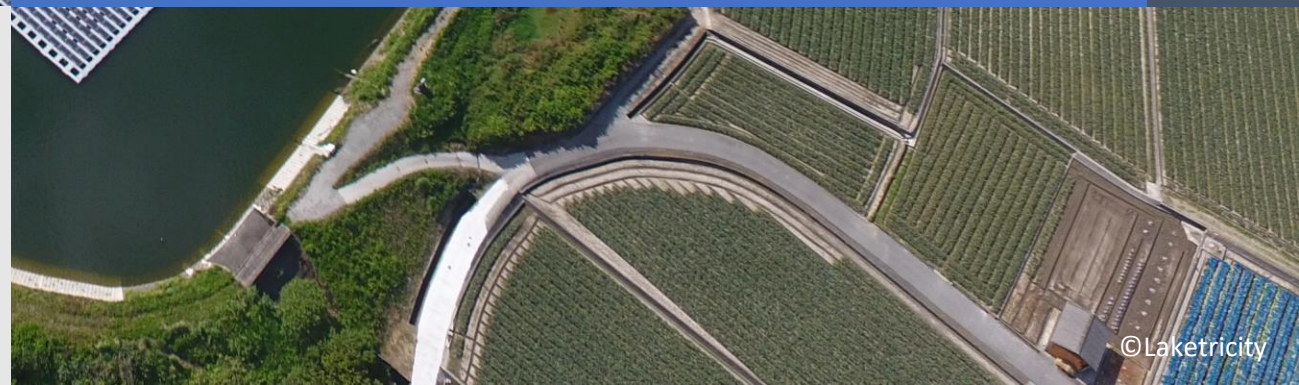


Sustainable Solar Europe 2023

SolarPower Europe

7th December 2023

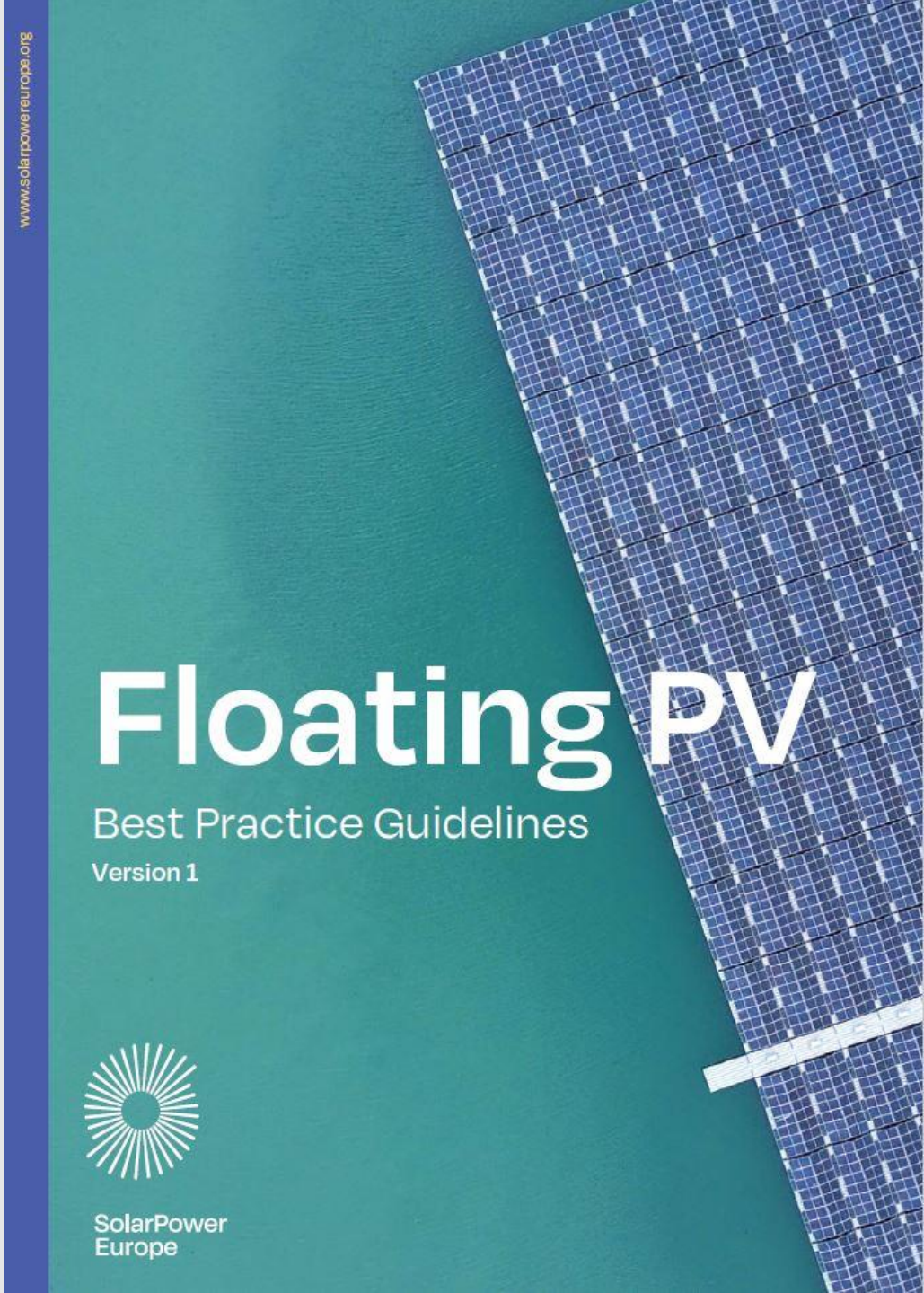
Lina Dubina, Policy Advisor for Sustainability



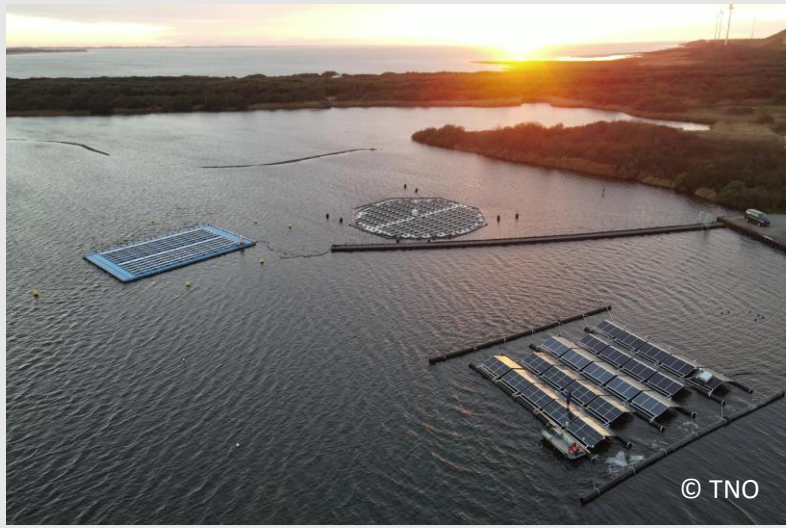
Floating PV
Best Practice Guidelines

- ✓ **Overview of sustainability** aspects of onshore floating PV
- ✓ **Application of Floating PV:**
  - Overview of development and implementation of projects
  - Social acceptance
  - O&M practices
- ✓ **Provision of best practice examples** in Europe
- ✓ **Floating PV** from a global perspective
- ✓ **Overview of Offshore Floating PV**

SolarPower Europe



Floating PV case examples



Ignacio Asenjo

Planning and Programming Officer, DG Energy, European Commission

7 December, Brussels, Belgium

Michele Tagliapietra

Head of Product Management Floating-PV,
BayWa r.e.

7 December, Brussels, Belgium

BayWa r.e.

Floating-PV for Dual Use of Water Operational Experience

Michele Tagliapietra,
Head of Product Management Floating-PV

7th December 2023 –
Sustainable Solar Europe

r.e.think energy

BayWa r.e. facts & figures

Turnover 2022	6.5 bn Euro
EBIT 2022	230.2 m Euro
Employees	4,500
Founded	2009
Globally active	30 countries

BayWa r.e. is a leading global renewable energy project developer, service provider, distributor and energy solutions provider.

265 MWp Floating-PV Track record of BayWa r.e.

Weperpolder, NL, 2,1 MWp
2018

Tynaarlo I, NL, 8,4 MWp
2019

Sekdoorn, NL, 14,5 MWp
2019

Bomhofsplas, NL, 27,4 MWp
2020

Tynaarlo II, NL, 6,6 MWp
2020

Nij Beets, NL, 13,5 MWp
2020

Kloosterhaar, NL, 15,7 MWp
2020

Beilen, NL, 15,9 MWp
2021

Oudehaske I, NL, 6,9 MWp
2021

Sellingen, NL, 41,1 MWp
2021

Uivermeertjes, NL, 29,8 MWp
2021

Lippe, NL, 13,7 MWp
2021

UBE, Thailand, 2,8 MWp
2022

Haltern, GER, 3 MWp
2022

Grafenwörth, AUT, 24,5 MWp
2023

Oudehaske II, NL, 21,1 MWp
2023

Hattemerbroek, NL, 16,5 MWp
2023

Many more to come!

EU, APAC, AMER

Central Europe’s largest Floating-PV project

Sand Pit

- Grafenwörth, Austria

Project Summary

- 24.5 MWp
- 45,000 modules installed
- Commissioning: February 2023
- Size: 14 ha

Floating Structure

- 2,700 solar boats
- 158 inverter boats
- 10 floating transformers

26,800 MWh/y	7,500	18,358 t/y
Energy yield	Consumption of average Austrian households	CO_2 emission reduction

Importance of Sustainability, Environmental Impact Studies and Research

Water utilities concerned about their assets

Regional/local authorities which need to opine on single Floating-PV projects, reviewing ESIA

National governments / International entities which need to define regulations for Floating-PV

Conscious project developers which want to make sure renewable projects have positive or neutral impact

Local stakeholders, NGOs, nature protection associations

- What is the impact of a Floating-PV projects on the water quality?
- How much water can we save thanks to evaporation reduction with Floating-PV?
- How can we ensure the water ecosystem and biodiversity is preserved/improved?
- How sustainable is Floating-PV?

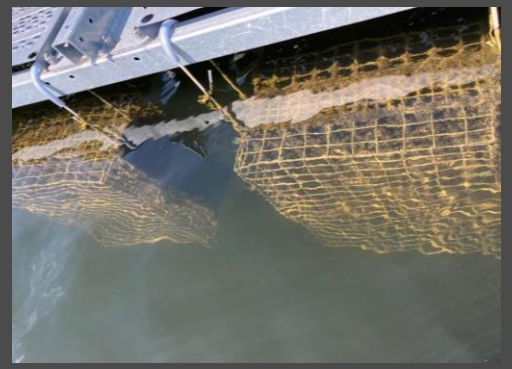
Biohut monitoring by Ecocean – Bomhofsplas

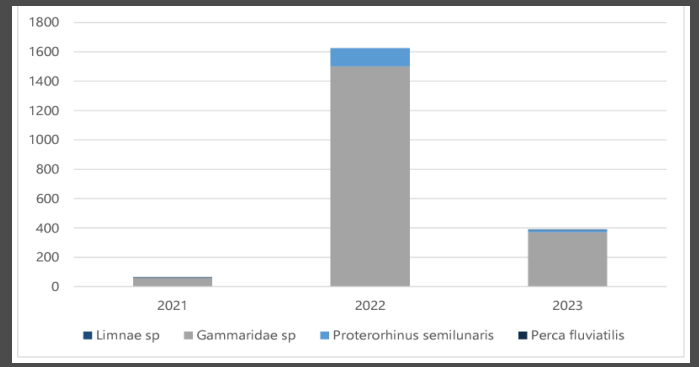
Scope and targets

- Biohuts are artificial habitats for aquatic ecosystems, skeleton containers with the center filled with shells
- Install Biohuts to promote ecosystem services and act as a:
  - Nursery protecting small fish from predators
  - Spawning ground for fish species
  - Habitat for micro-organisms and invertebrates
- 20 Biohuts were installed in June 2020 at Bomhofsplas site

Results after 3 years of monitoring

- 3 species of fish identified (common perch, cyprinids, tube nose goby)
- 2 species of invertebrates (Limnae sp, gammarids shrimps)
- Totally observed 2382 individuals, 1951 invertebrates, and 431 fish
- Biohut effectively fulfills its role as a nursery, both for fish and invertebrates
- Mobile fauna increased significantly in the second year of monitoring, and stabilized during the last monitoring, showing specimens at different maturity stage

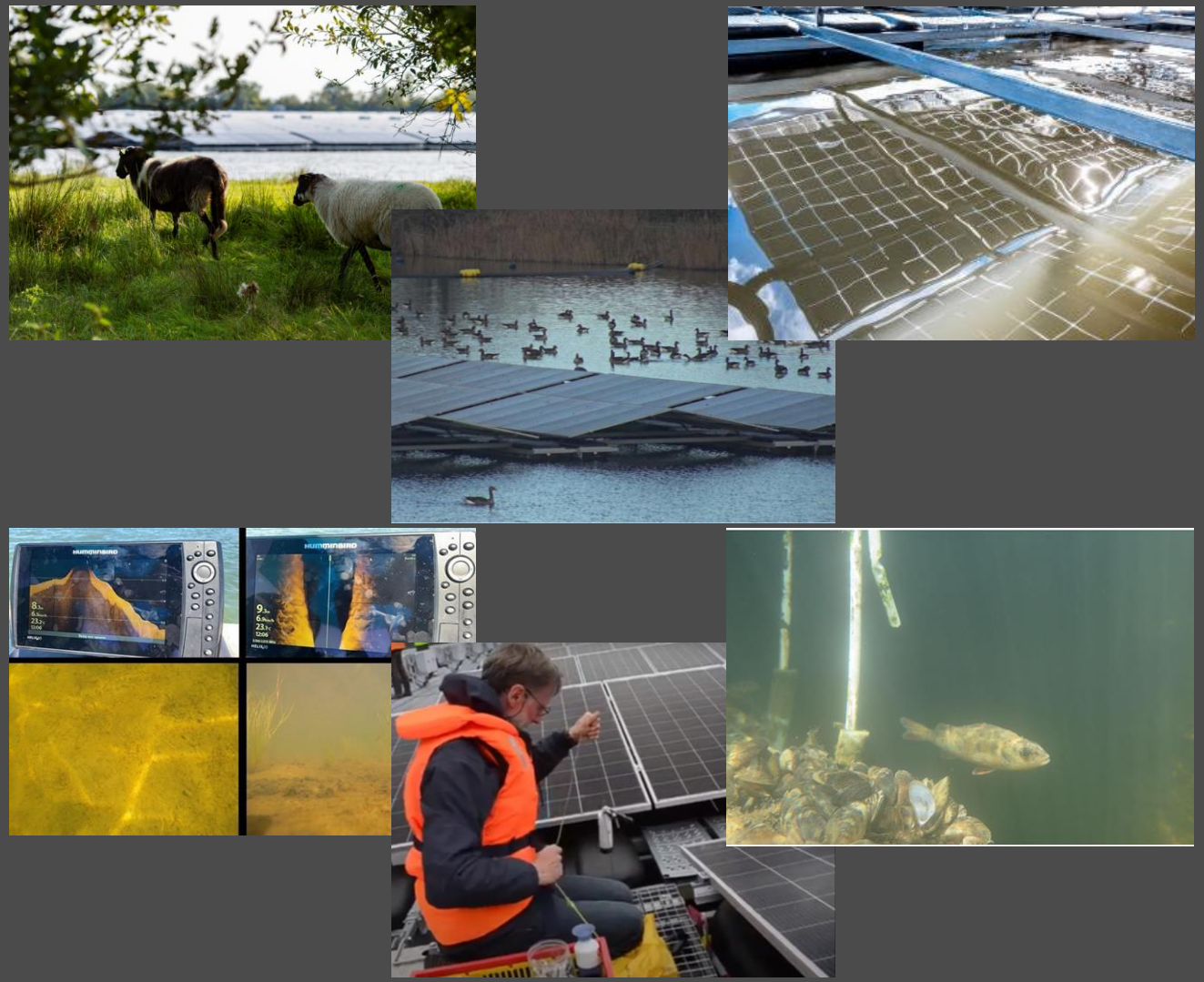




Comparison of the abundance of mobile fauna in the Biohuts between 2021 and 2023.

Status of environmental research and next steps

- Various scientific papers being published, but only a few are based on measurements, monitoring or scientific results
- Increasing focus also on offshore Floating-PV applications
- Increasing interest in more holistic approaches for environmental impact assessment
- Necessity to understand and to quantify better the impact for different types of layouts and different types of water bodies
- Still some gaps to fill, especially in the field of evaporation reduction quantification
- Encouraging results shown by BayWa r.e. studies on operational plants, even at **coverage ratios above 50%**
- Key water characteristics (Oxygen, ph, temperature, conductivity) show limited variations due to presence of Floating-PV



Path forward for Floating-PV Sustainability

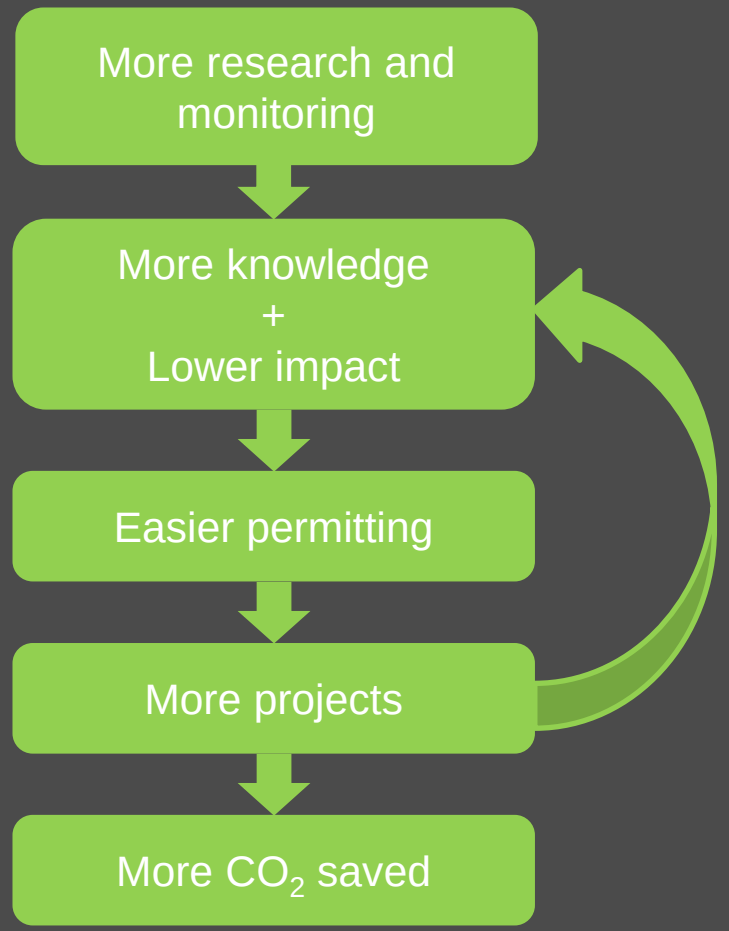
Floating-PV inherently has a positive environmental impact

- Reduced CO_2 emissions (saving 350-500t CO_2/year/MW)
- Reduced evaporation and water conservation
- Dual water use and avoidance of land pressure

BUT

It is important to ensure minimal or positive impact on the water ecosystem and water quality

- Further research
- Further dissemination
- Monitoring
- Design for minimal impact
- Implement compensation measures



Copyright

Francisco Vozza

Chief Commercial Officer & GM Norway, SolarDuck

7 December, Brussels, Belgium

ELECTRIFYING THE WORLD WITH OFFSHORE FLOATING SOLAR

SUSTAINABLE SOLAR EUROPE 2023

FRANCISCO G. VOZZA
CHIEF COMMERCIAL OFFICER & GM NORWAY

December 2023

OFFSHORE FLOATING SOLAR

Conquering the ultimate frontier for solar PV

- Safe Operation
- Reliable & Efficient Shape
- High Energy Output
- Low Ecological Impact
- Minimal Wear & Tear
- Optimal Transport
- Energy Storage

SSHE 3-4
Hurricane resistance

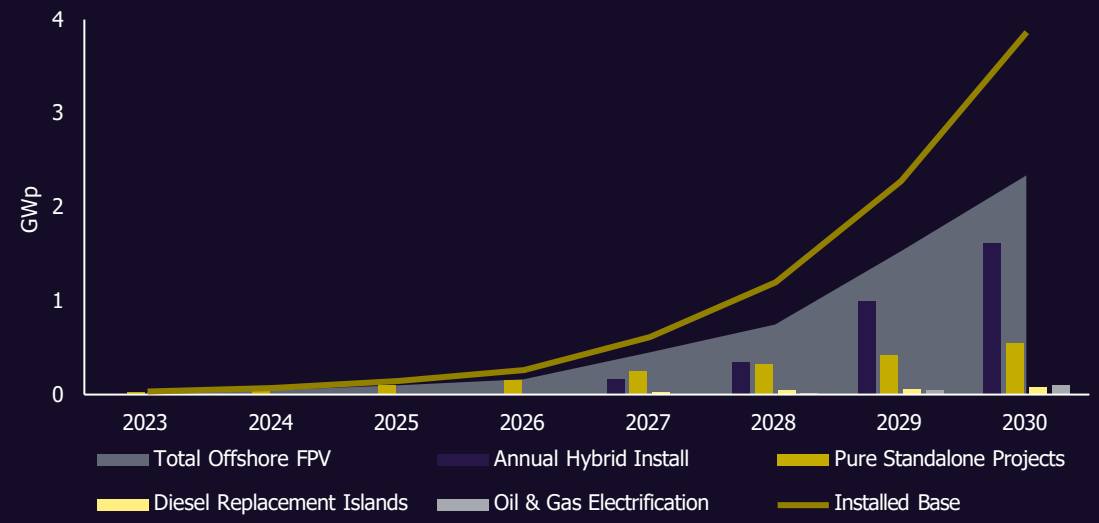
Hs =7+ meters
Wave resistance

30+ years
Platform lifespan

SEIZING AN INDUSTRIAL SCALE OPPORTUNITY

76% CAGR floating solar market 2023-2030

Market Outlook* Offshore solar PV annual capacity additions



Growing land scarcity

3X renewables by 2030

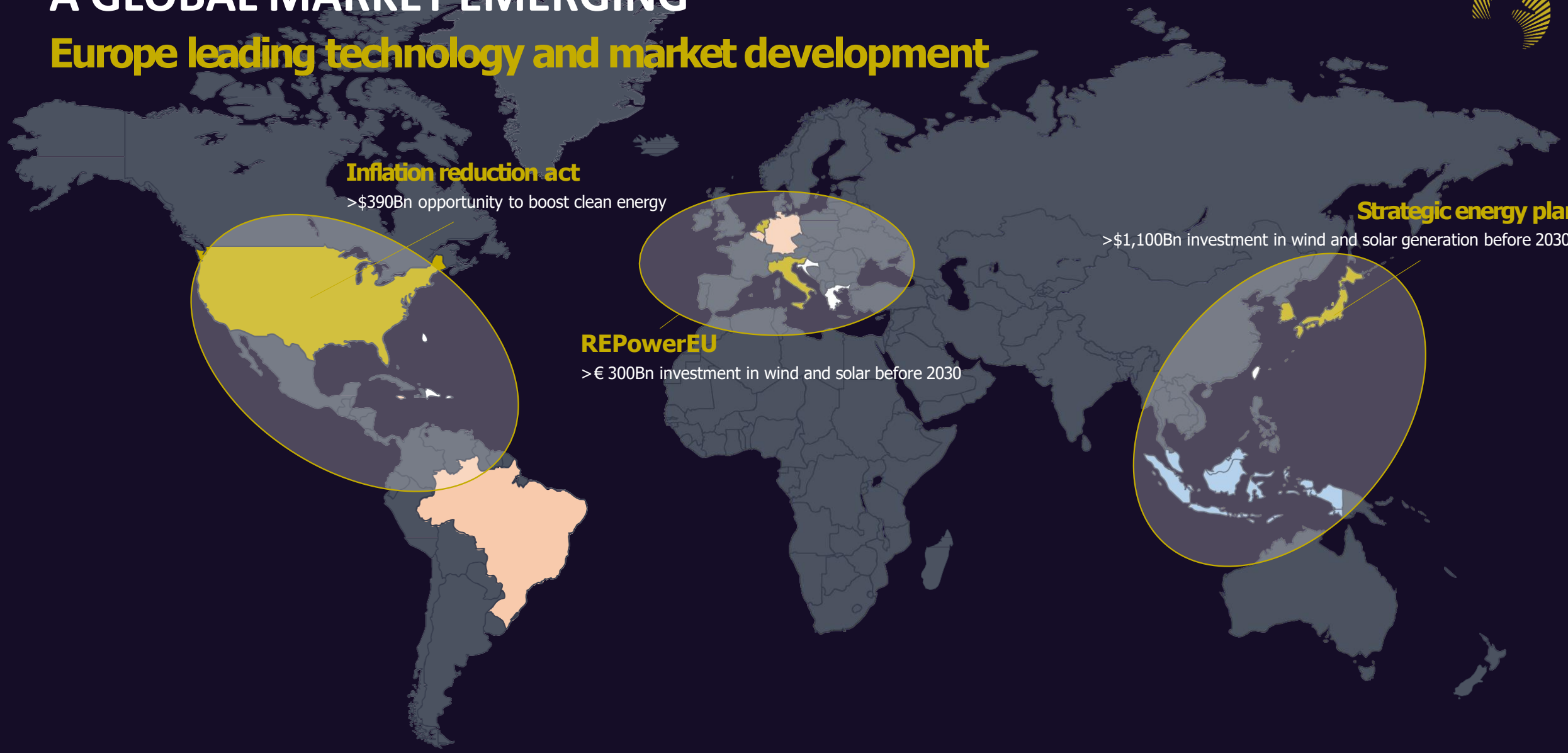
40% CO2 emissions reduction by 2030

Energy security

** SolarDuck market study 2023*

A GLOBAL MARKET EMERGING

Europe leading technology and market development

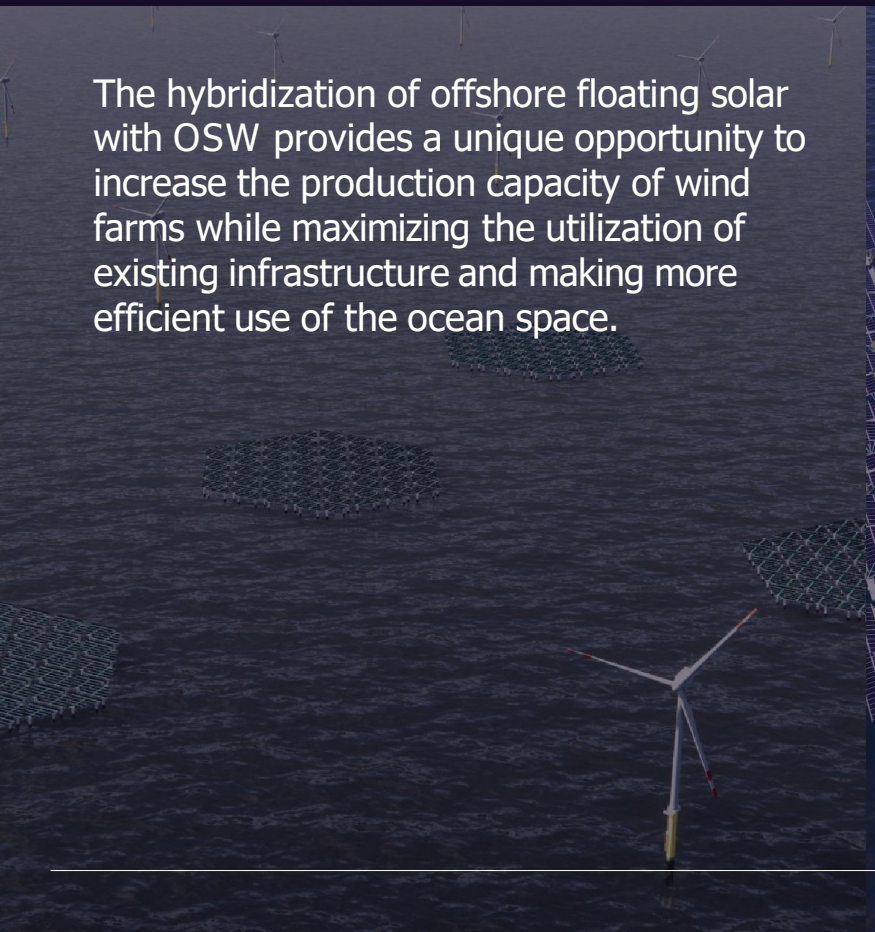


3 BEACHHEAD SEGMENTS

Key applications driving technology adoption today

Hybrid

The hybridization of offshore floating solar with OSW provides a unique opportunity to increase the production capacity of wind farms while maximizing the utilization of existing infrastructure and making more efficient use of the ocean space.

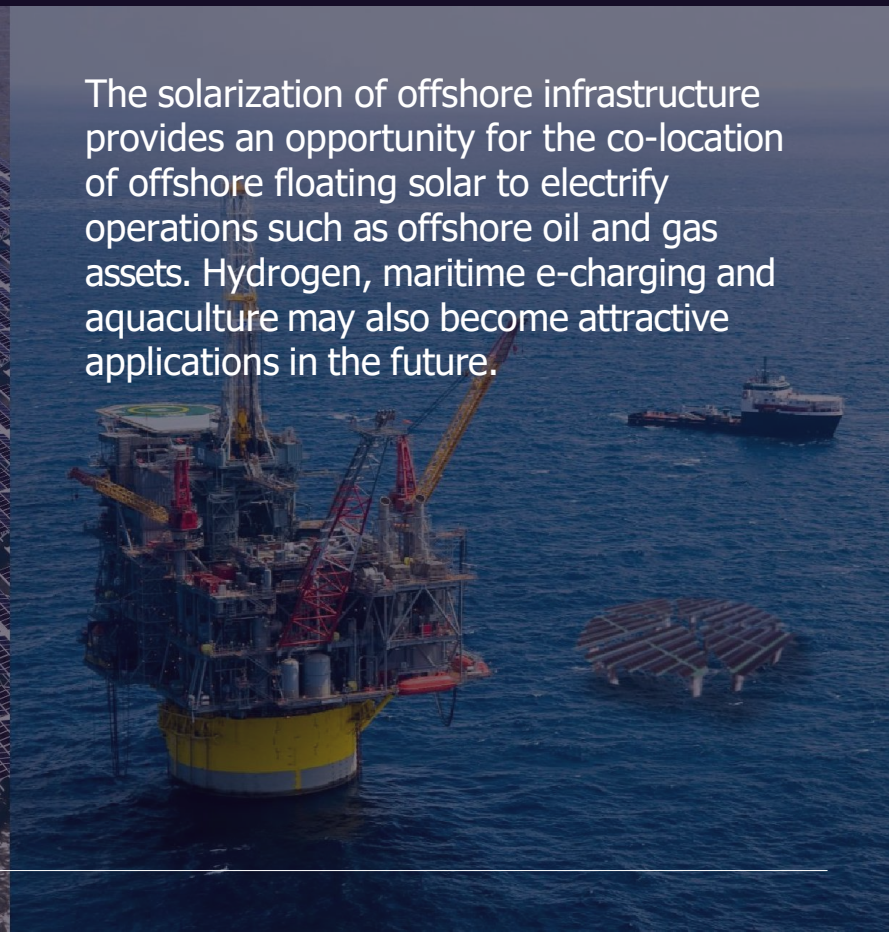


Standalone

Offshore floating solar plants provides the opportunity to utilize open sea space to generate clean energy in the sunbelt on a stand-alone basis to power population centers and land-based industry.

Offshore microgrid

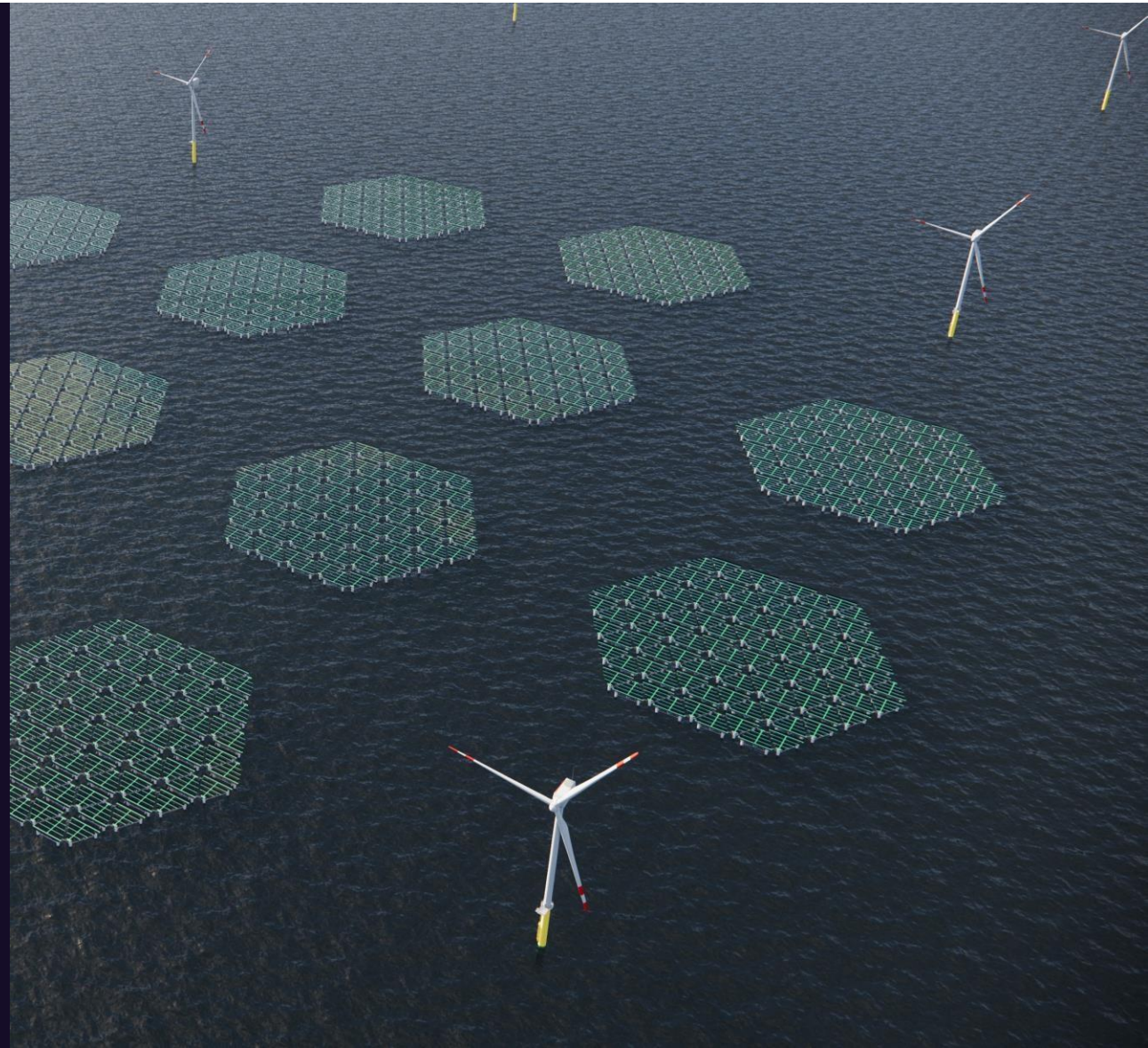
The solarization of offshore infrastructure provides an opportunity for the co-location of offshore floating solar to electrify operations such as offshore oil and gas assets. Hydrogen, maritime e-charging and aquaculture may also become attractive applications in the future.



ENVIRONMENTAL IMPACT

Learnings from analysis by Deltares

- The OFPV area blocking the sunlight should be minimized in order to mitigate the impact on the local ecosystem.
- The OFPV coverage ratio should be small enough to ensure that impacts can be diluted and/or compensated by surrounding waters.
- The contact area of OFPV with the water should be kept to a minimum to mitigate leaching, fouling and reduction of the air-water exchange.
- The ‘touchdown area’ of the mooring lines should be minimized in order to mitigate disturbance of the sea bottom and resuspension of (in)organic matter.
- The OFPV plant should be built from materials that are selected to minimize the risk of introducing toxic substances into the marine environment.



SOLARDUCK

CONTACT DETAILS

Francisco G. Vozza
CCO & GM Norway

T: +47 45431957
M: francisco.vozza@solarduck.tech

Session 4: How to Maximise Dual use of Land and Water Surface Potential: Floating Solar and Agrivoltaics

SUSTAINABLE SOLAR EUROPE 2023

Lina Dubina

Policy Advisor for Sustainability,
SolarPower Europe

Ignacio Asenjo

Planning and Programming Officer,
European Commission

Michele Tagliapietra

Head of Product Management
Floating-PV,
BayWa r.e.

Francisco Vozza

Chief Commercial Officer
& GM Norway,
SolarDuck