SYNWATER®
desalination by renewables

Floating WINDdesal (FWD)

wind powered seawater desalination as floating unit

FWD is the fast deployable water treatment plant in utility scale suitable for both temporary or permanent use.

SYNLIFT Industrial Products GmbH & Co. KG

info@synlift.de www.synlift.de

Challenge

Water supply systems in coastal areas around the world increasingly rely on the sea as an unlimited source of raw water to meet the challenges of climate change and population growth.

Safe and sustainable water supply to these regions is possible through seawater desalination (SWD) with following requirements for future SWD systems:

- Minimal interference into maritime and terrestrial environment,
- Minimal carbon footprint while operating the energy-intensive process,
- Various applications for temporary or permanent water supply,
- Sufficient capacity to meet medium and large demand,
- Minimal water costs and financing requirements for all applications.

Applications

FWD systems offer significant benefits for all projects with **temporary** water demand and for **permanent** water supply in:

- Densely populated coastal regions,
- Environmentally sensitive nearshore areas,
- Emerging markets being not able to fulfill the financial preconditions for DBO models.

Solution

Wind powered seawater desalination units as floating systems enable a very compact and self-sufficient design, which can be towed to the place of use, anchored there, and operated as long as necessary. FWD systems offer the following advantages:

- Minimal environmental impact due to “floating” structure with integrated intake and outfall technologies in larger water depths,
- Sustainable water supply at low and long-term stable costs due to synergy effects of the specific wind turbine (WT) technology, the integrated energy management plus optimal wind conditions in nearshore and offshore areas,
- Can be mobilized and demobilized in the short term and thus also suitable for temporary supply tasks in the case of prolonged periods of drought or because of delays due to investment, licensing, or construction.
- The ability to relocate such systems to other sites relatively easily may reduce the need for long-term financial guarantees/securities provided by the customer, which could in many cases simplify project implementation.

Temporary water supply by FWD modules to irrigate an agroforestry project

Extra-Long-Blade Technology (ELBT)

Customized ELBT turbines are used for FWD, which are ideally suited for wind power self-consumption due to their very low specific power (W/m²).

Energy Management & Flexible Processing

The integrated energy generation, storage and consumption management in combination with a flexible desal processing enables a continuous adjustment of the production level to the current wind energy output and thus a maximum wind penetration.

Intake & Outfall

Intake and outfall are integrated into the floater structure. The outfall is offset horizontally and vertically to the intake during operation.

Mooring System

The variation in length, cross-section and steel grade of the mooring chains enables the anchoring to be optimally adapted to the individual site conditions.

Submarine Piping & Cabling

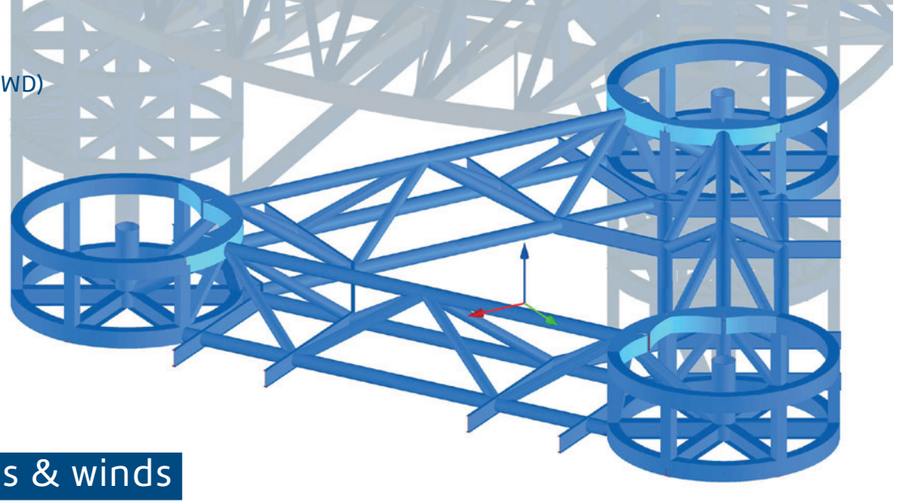
The permeate is delivered to the mainland by submarine piping. For ongrid configurations, the piping together with the power cable forms a submarine media line.

Modules

	Production Level [1] (m^3/d)		Supply Equivalent [2] (Number of inhabitants)	
	recommended	maximal	recommended	maximal
FWD 10,000/15,000	10,000	15,000	100,000	150,000
FWD 20,000/30,000	20,000	30,000	200,000	300,000
FWD 30,000/50,000	30,000	50,000	300,000	500,000

1) The value *recommended* indicates the operating capacity enabling a high wind penetration level of 90% +/- x%. The value *maximal* indicates the installed or maximum production capacity.

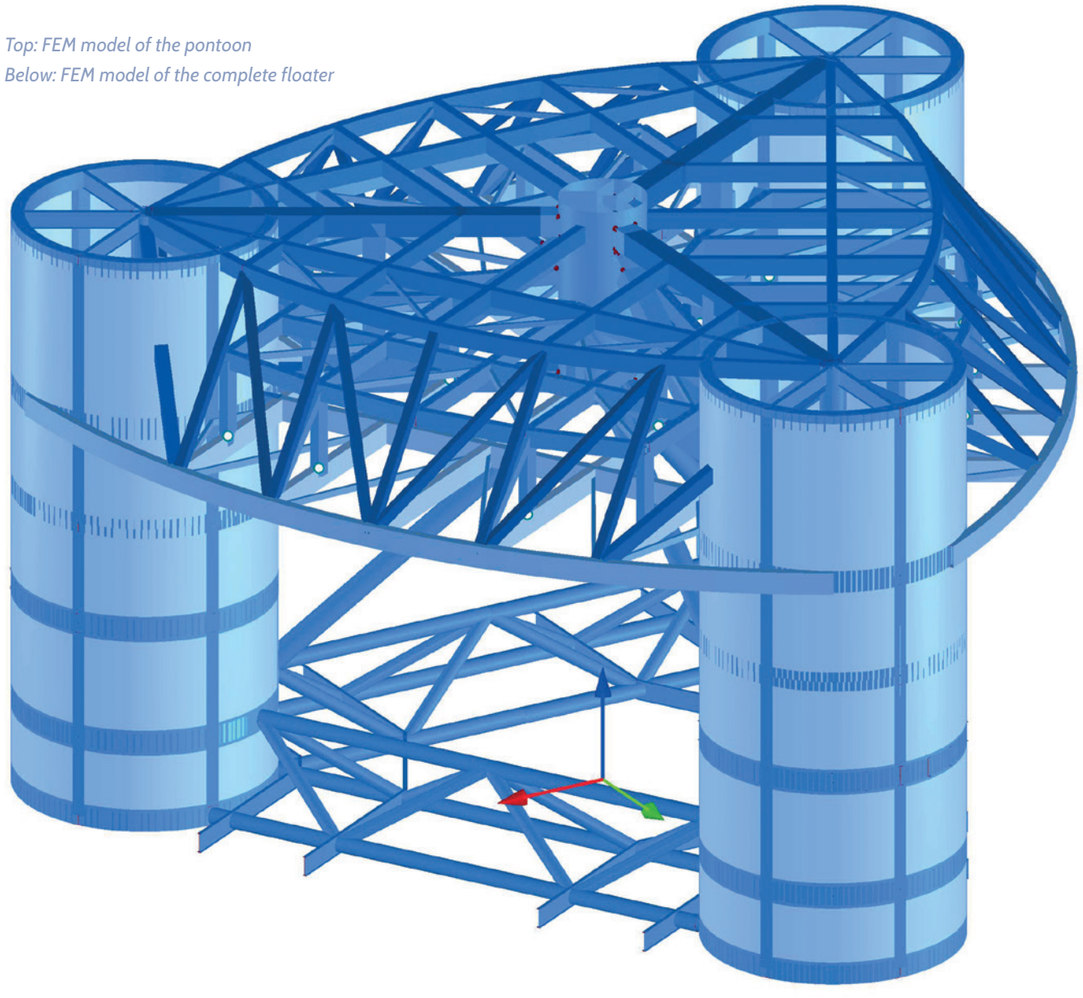
2) Based upon an assumed private water consumption of 100 liter per capita and per day the number of inhabitants is presented, which could be supplied per FWD unit operating on a recommended or maximal production level.



If local waves & winds are moderate or strong ...

The floater was designed for extreme external influences (survival wind speed, wave height, etc.) and can therefore be used very universally. A specific and optimal mooring design is developed and implemented for the respective location on the basis of local metocean and batimetry data.

Top: FEM model of the pontoon
Below: FEM model of the complete floater



If local infrastructure is insufficient or developed ...

Offgrid configuration

Without grid connection available or insufficient grid stability at project site, FWD will be equipped with an offgrid package that enables isolated grid operation.

Wind turbine installation without external cranes

During the floater transport to the project site, the main components of the wind turbine (tower segments, nacelle and hub) are fixed individually on the platform. After installing the mooring system on site, the wind turbine installation will be carried out by an assembly crane temporarily installed on the platform. The onboard crane erects and dismantles the assembly crane.

... FWD is operational for a wide range of sites worldwide.

History

After having started first FWD developments already in 2018, SIP initiated a European Industry Initiative (EII) to bring together manifold know-how in process, energy and marine engineering as well as financial support to carry out both technology and project developments. EII is currently consisting of the following system and tec partners:

System Partners:

Technology & Project Development:	SYNLIFT Industrial Products (Potsdam, Germany)
Plant Manufacturing / Process:	thyssenkrupp Industrial Solutions (Dortmund, Germany)
Plant Manufacturing / Energy (WT):	Asturfeito (Avilés, Spain)
Plant Manufacturing / Marine:	CRIST Shipyard (Gdynia, Poland)

Technology Partners (Components):

Submarine Cabling:	NSW / Prysmian Group (Nordenham, Germany)
Fine Filtration:	Boll & Kirch Filterbau (Kerpen, Germany)
On-board Crane:	Liebherr-MCCtec Rostock (Rostock, Germany)
Mooring System:	REMAZEL Engineering (Chiuduno, Italy)

Technology Partners: (Services):

Wind Turbine Design:	AEROVIDE (Rendsburg, Germany)
Floater Design:	StoGda Shipdesign & Engineering (Gdansk, Poland)
Marine Services:	EMS Offshore Services (Emden, Germany)
Site-Specific Investigations:	Fugro (Bremen, Germany, Netherlands)

Next steps

- Technology & project development of the reference project: 2022 – 2023,
- Manufacturing of the reference module: 2023 – 2025,
- Commissioning of the reference module and global market launch: from 2025 on.

In parallel to Floating WINDdesal (FWD), a second application as Floating WINDhydrogen (FWH) is currently under consideration.

SYNLIFT
industrial products

IMPRINT

SYNLIFT Industrial Products GmbH & Co. KG
Sellostr. 15B, 14471 Potsdam, Germany

info@synlift.de
www.synlift.de

Visualization: altspace, Berlin / Germany
Layout: Caroline Doyé, Potsdam / Germany
State: September 2022.
Picture credits: Cover, Page 2, 4, 5 and 7: altspace, Berlin / Germany
Page 6: SYNLIFT, Potsdam / Germany