



**FREI**  
Florida Renewable Energy Initiative

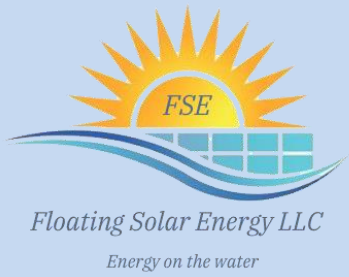


*Floating Solar Energy LLC*

# Floating Solar Energy LLC

Design, Manufacture, Supply, and Install





Presentation for FMEA  
Energy Connections Conference  
Orlando Fl. Nov 9th<sup>th</sup>, 2021



**Floating SolarPV Past & Future**

By. Thomas J. Lang CEO, FSE



FSE Project Tampa , Fl 2021



Floating Solar Energy LLC

Energy on the water

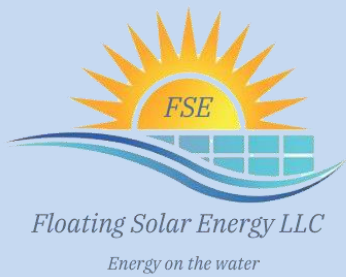


# Floating Solar Opportunity

- Met with several state universities and agencies in Florida, including FDAC Office of Energy, FDEP, FSEC, and FESC to identify their needs and objectives
- Established that Florida has a shortage of available land at reasonable cost that can't be utilized for other development, agriculture, or recreation activities, especially in urban areas
- Abundance of lakes, reservoirs, retention ponds, and over 260,000 acres of clay retention ponds from mining.
- FREI, in collaboration with AccuDock, a leader in floatation systems located in Florida, designed a technologically-advanced FSPV system

FSE Project Tampa , Fl 2021

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# FSPV Applications

## **WATER TREATMENT FACILITIES**

With consequent energy needs, countless of available and unused water parcels, water utilities can capitalize their assets by investing in floating solar to supply electricity directly to their facilities in self-consumption and reduce their costs.

## **RETENTION IRRIGATION PONDS**

Irrigation ponds and lakes are abundant around the world, and in Florida. By utilizing floating PV solutions to generate electricity for irrigation and other purposes on site.

Additionally, while preserving water for irrigation, and freeing up land for agriculture purposes creates a cost-effective option for those owners or end users

## **REPLACEMENT TO GROUND MOUNT SOLAR**

Cost effective alternative solution for distributed and large-scale utility applications.

## **PHOSPHATE MINING**

Often located in remote areas with significant tailing water bodies, the energy and water supply are costly and challenging on quarries. Floating solar offers here an economical solution to meet energy needs and can help reduce water evaporation, particularly precious in the mining operation process.

## **FRESH WATER RESERVOIRS**

Maintain a healthy function, while reducing evaporation up to 50%. Reduction in algae growth. Floating solar panels can even enable aquaculture, and fishing while easily coexisting with other recreational water activities. Floatation systems are eco-friendly, 100% recyclable, and compatible with drinking water, without harming the existing ecosystems living around.



# Floating Solar PV Background

**First Installation in 2007 Aichi Japan soon followed by France, Italy, Korea, Spain, and California**

**Since 2013 many large installations above 10 MWp installed with the largest of 150MWp installed in China in 2018**

**FPVS is growing exponentially and faster than the growth of land based solar PV**

**Currently over 1.2 GWp installed and operating efficiently**

*Reference World Bank Floating Solar Market Report 2018, NREL Study 2018*



## Floating Solar PV Benefits

- **Lower land cost by using existing lakes, reservoirs, retention ponds, and other bodies of water rather than high-cost land that can be utilized for other development or agriculture**
- **Reduced evaporation for water reservoirs by up to 50%**
- **Improved water quality through decreased algae growth**
- **Reduction or elimination of shading by surroundings**
- **Elimination of most site preparation as required by land-based installations**
- **Easy installation thereby reducing costs**
- **Reduced permitting in most cases**
- **Up to 15% more output efficiency due to increased cooling form water**

# Current Floating Solar PV Systems

## Single Panel Blow molded Float Design

### Ciel Terre France:

- A blow molded single panel float system designed for smaller lower output single monofacial panels. all blow molded hollow design are susceptible to puncture by alligators as found in Florida
- Systems are assembled on site and then individually connected to each other.
- This systems incurs assembly time and labor on site as well as transportation costs
- No bifacial panel ability
- Not applicable to new large format high watt panels FS and CS
- Panels in fixed elevation normally 12 degrees.
- Possible higher maintenance costs effects of high wind and wave motion.

### Chinese manufactures:

Several companies using similar blow mold designs and manufactured in China



# Floating Dock Design Floating Solar PV System

- High Density foam encapsulated with HDPV floats that can never sink. Full stable wrap-around walkways for maintenance and panel cleaning.
- Large float modules 24 ft by 8ft can accommodate all panels including new large format
- Easy connection of modules for module rows and columns to make large scale arrays
- Panels collapse flat into float module for shipment and raised once floated.
- Panels and can be collapsed flat in the event of a major hurricane
- Designed and certified by Naval architects to meet or exceed Florida inland wind and waves







# **FSE Floating Solar PV System Design**

**Patent Pending module connection system that allows quick and easy installation and ensures rigid attachment of modules both in length and depth of rows**

**Floatation Modules are solid and not able to be punctured by alligators.**

**System is delivered to site 20 modules at a time, fully assembled and ready to float. Ideal for**

**Smaller distributed sites or large 100 MW plus installations**

**Designed to utilize shore-based central inverters, string inverters, or micro inverters**

# **FSE Floating Solar PV System Design**

**Unique, preassembled six to eight panel floatation module designed to accept all types of panels**

**Unique designs allows optimization of bifacial panels with either water reflectivity or our unique float inserts that offer the highest albedo effect**

**24 ft long and 8 ft wide, offering 2560 watts per module when First Solar Series 6 panels used or 3120 if 8 CC 390 watt panels used**

**Unique designs allows optimization of bifacial panels with either water reflectivity or our unique float inserts that offer the highest albedo effect**



# ***NEW FSE Module 21 Single Axis Tracking*** **Floating Solar PV System Design**

- **Unique Single axis Elevation tracking.**
- **Full range of elevation from -10 degrees to + 30 degrees**
- **Automatic go to safe stow in wind events can meet hurricane requirements and significantly reduce anchoring costs**
- **Able to automatically change panel elevation to adapt to seasonal sun or load demand.**
- **Ability to accommodate new large format CS BiHiKu 7 655-watt bifacial panels offering 2560 watts per**





## Conclusion

### *Why FSPV?*

- Cost comparable to land-based SolarPV
- More efficient due to cooling
- Saves water from evaporation
- Reduction in algae growth



Floating Solar Energy LLC

Energy on the water



## Who We Are

[www.floatingsolarenergy.net](http://www.floatingsolarenergy.net)



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