

Floating bifacials

Reflections on power

Rob Kreiter



bifiPV workshop 2017 - Konstanz

Sunfloat®

Solar PV on Water

Solar Energy

1 hour of solar irradiation on earth can power the world for **1 year**

Water

71% of the earth's surface consists of **water**

Resources

All other resources are **limited** and should be used with care

Mission

We believe in production and use of renewables that harmonize with the local environment, with individuals, and with societal interests.

Our approach is multiple use of resources

- Space: Multifunctional use and technologies that enhance the environment
- Resources: Design for recycling
- Energy system: Matching demand patterns, grid capacity



About Sunfloat

- Founded in 2013 in the Netherlands
- Developer of 3 generations of floating PV systems
- Two standardized floating PV product lines:
 - south-facing bifacial for maximum production
 - east-west bifacial for optimal grid integration
- Network organisation with strong local partner base: 6 companies and 2 technology institutes
- Proven track record of product and project development, technology demonstration, and stakeholder management

Our ambition

Commercial

- Make Solar PV on water the lowest cost and best-accepted PV technology
- Provide wave-resistant commercially viable systems

Societal

- Contribute to the natural ecosystem
- Enhance the landscape
- Improve local employability

Technical

- Use safe and reliable electrical designs
- Provide low maintenance systems



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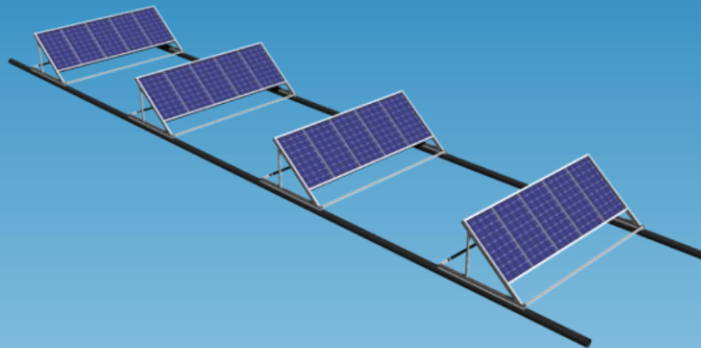
Product development



Concept 1:
Rotating system
2015



Concept 2:
Bifacial modules
Maasvlakte Rotterdam 2016



Current product:
Fixed South Bifacial
Pilot Maasvlakte Rotterdam
Summer 2017-2018

Full DC system layout

System advantages

- Remote power control (grid operator advantage)
- Remote shutdown possible (construction and maintenance)
- Automatic emergency shutdown when cable breaks (safety)
- Lower conversion losses possible: DC to end use application
- No inductive losses to water

Technical

- DC/DC power optimizers
- DC cable to land connection
- Active monitoring and AC conversion
- Wifi or hard-wired control system



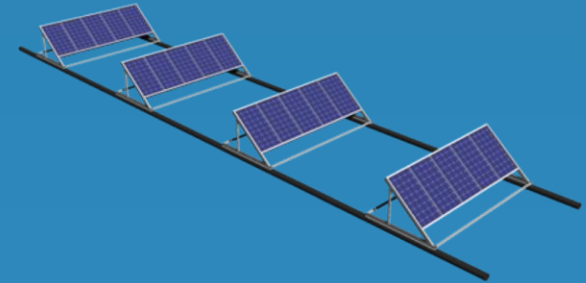
Fixed-south bifacial

Product specification:

- Scalable, 1,5 kWp – multi-MWp
- Proven construction & installation
- Open to the water: no permanent shading or coverage

Business case:

- **+30%** power compared to monofacial
- Ideal setup for maximum kWh production



Pilot project Rotterdam port area

- 250 ha of water area
- Waste disposal for harbor sludge
- Our pilot: **54 kWp** bifacial PV (Yingli Panda Bifacial 60CL)
- Main challenges
 - Wave resistance
 - Corrosive conditions



Product R&D: east-west bifacial

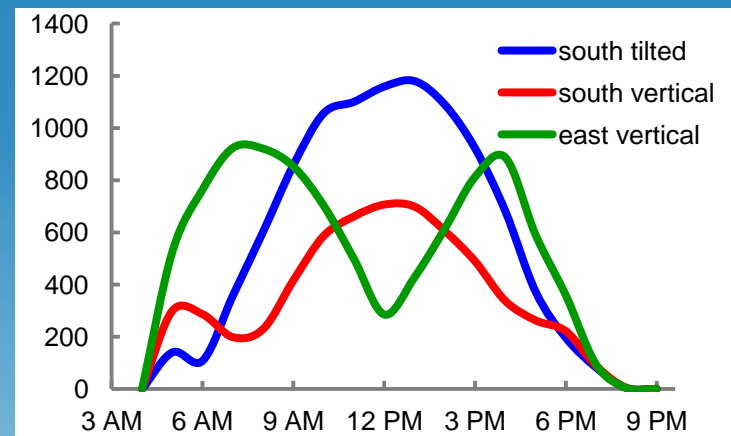
Specific E-W advantages

Societal benefits:

- Production matches demand
- Lower peak load in grid
- Enabler for energy transition

Business case:

- Higher average price for kWh
- Lower inverter power needed
- Lower cable diameters



Large scale vision: Solar Lagoon



- Energy landscape in the Dutch IJsselmeer
- Ecology and renewable energy in perfect harmony
- 2 GWp of floating PV

Team

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