THE FLOATING SOLAR EXPERTS

DOE WEBINAR – KELSEYVILLE WASTEWATER TREATMENT PLANT

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www.ciel-et-terre.net
OVERVIEW - MILESTONES

FROM 2006 TO 2011

16 MWp
Total installed ground and roof mounted system solar power capacity

55 FARMS
Grounding and Rooftop PV systems

Innovative solution

HYDRELIO®

FROM 2011 TO TODAY...

300+ MWp
Total installed solar power capacity using Hydrelio® technology

140 FARMS
Floating PV systems
OVERVIEW - CORPORATE TEAM

Executives/Founders

Bernard Prouvost
Chairman

Alexis Gaveau
CEO

Staff
100 Employees Worldwide

Management
Engineers
Finance & Adm.
Sales

100+
Collaborators throughout the world

SHAREHOLDERS

Japanese Investor

Employee shareholding

TECHNICAL PARTNERS

bpfrance excellence
ONERA
TECHSUB
ifp Energies nouvelles

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OVERVIEW - WORLDWIDE PRESENCE

25 Manufacturing lines

8 Local offices

15 Agents & Distributors

EMEA
Portugal
Israel
South Africa
Angola
Turkey
Iran

ASIA
Indonesia
Philippines
Thailand
Vietnam
Myanmar

OTHERS
Australia
Chile
Colombia

OFFICES
AGENTS & DISTRIBUTORS
LICENSES
MANUFACTURING LINES
OVERVIEW - CIEL & TERRE’S ACTIVITIES

- HYDRELIO® Manufacturing & Distribution
- PRODUCT ENGINEERING Expertise
- EPC Support
- FINANCING Solutions
- PROJECT Development
- OPERATION & Maintenance
OVERVIEW - KEY FIGURES & PROJECTS

500+ MWp
By the end of 2019

100+ MWp
Of on-going projects

70 MWp
The largest floating PV plant
WATER - FLOATING PV APPLICATIONS

- **KATO-SHI** Industrial reservoir
- **SAWA-IKE** Irrigation pond
- **SOBRADINHO** Hydroelectric dam
- **PIOLENC** Quarry lake
- **KUNDE** Water retention reservoir
- **YOTHATHIKAN** Aquaculture pond
- **QUEEN ELIZABETH II** Drinking water reservoir
- **KELSEYVILLE** Water-treatment plant

On-site consumption or export to utility
WATER - FLOATING PV BENEFITS

**ENVIRONMENTAL**
- Minimizes water evaporation (conserves water & ecosystems)
- Improves water quality and reduces algal blooms
- Limits erosion of reservoirs by moderating waves
- Neutral/Positive impact

**ECONOMIC**
- Converts unused spaces into profitable areas
- Reduces construction costs
- Smoothest & fastest installation processes
- Enhances electricity generation thanks to the cooling effect

**SOCIAL**
- Preserves valuable land for other uses
- Decentralized manufacturing. Installing with local workforces
- Reduces the effects of climate change
- Positive aesthetics – low profile – 15” off water surface
HYDRELIO® - SIMPLE & INNOVATIVE

1. MAIN FLOAT SUPPORTING THE PV MODULE
   HDPE material
   Inclination angle: 12°

2. SECONDARY FLOAT FOR MAINTENANCE / BUOYANCY
   HDPE material
   Non-slipping surface

3. CONNECTION PIN
   Fiberglass + PP material
   Certification NFT 58000

4. RAIL TO ATTACH THE PV MODULE TO THE FLOATS
   Aluminum or FG reinforced PP plastic
   Certificated ISO 3302-1/1996

5. STANDARD FRAMED 60 OR 72 CELLS PV MODULE
   60 CELLS
   Length: max 1670 mm
   Width: 991 ± 3 mm
   Cable length: 1000~1200 mm
   Connector: MC4 compatibility

   72 CELLS
   Length: max 1975 mm
   Width: 991 ± 2 mm
   Cable length: 1000~1200 mm
   Connector: MC4 compatibility

* Possibility to provide a PV panel fixing system for dual glass panels and to consider possible adjustments
HYDRELIB® - PRODUCTION & LOGISTICS

EFFICIENT AND FAST BLOW MOLDING MANUFACTURING PROCESS

- 2 weeks for a 1.5 MW system
- 11 production locations

DESIGNED TO MINIMIZE SHIPPING VOLUME AND COSTS

- Compact sets for easy shipment/storage
- Standard Semi Trailers or Shipping Containers
HYDRELIO® - CONSTRUCTION

Install time (approx.): **2.5 panels / hour / worker**
- QEII project, 6,338 kWp, 23,050 panels installed in 3 months
- Dixon, CA project, 607 kWp, 2,208 panels installed in 4 weeks

In every project we work alongside our clients to find the best solution and optimize the site preparation.

Ciel & Terre provides training for construction teams at the beginning of the installation.

Site preparation

Float assembly

Panel attachment

Launching
HYDRELIO® - ELECTRICAL SYSTEM

Interconnected wiring of the panels

The Junction Boxes are installed on the main floats

The Junction Boxes are connected to the inverters using waterproof wires

All wires and Junction Boxes are protected with suitable waterproof material

The electrical system depends on the standards of each country and on the options chosen by the EPC
HYDRELIO® - ANCHORING SYSTEM

ANCHORAGE ON BANKS
When the bottom needs to be protected (liner...)

ANCHORAGE ON BOTTOM
With plate anchor or with dead weight

SPREADER BAR
To connect the floating island with the anchoring system
Up to 4,000 daN
1.6 tons per spreader bar

WIND SPEED
Can be designed to withstand winds up to 210 km/h (131 m/h)

ANCHORAGE ON BOTTOM

- Spreader bar
- Solar island
- Water level variation
- Maximal depth
- Ground soil composition
- Bathymetry report
- Chain
- Shackle
- Mooring cable
- Ground anchor

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HYDRELIO® - A TESTED AND PROVEN SOLUTION

RESISTANT TO UV CORROSION
HDPE Blow-molding +20 YEARS Lifetime 5-20 YEARS Warranty

DRINKING WATER COMPLIANCE
British Standard 6920:2000 drinking water

EXTREME WIND RESISTANCE
UP TO 210 km/h (130 mph) TESTED BY ONERA® Aerospace laboratory

SAFE MOUNTING & MAINTENANCE
EASY & QUICK Installation | Dismantling | Recycling SAFE Access

ECO-FRIENDLY 100% RECYCLABLE

BANKABLE SOLUTION
Kelseyville Wastewater Treatment Pond
250 kWp – Lake County, CA
KELSEYVILLE – PROJECT REQUIREMENTS

- Maximize offset of utility electricity costs
- District will own system
- Reduce algae growth
- Minimize impact to ongoing plant operations
- Preserve valuable land for other uses
- Protect against utility rate increases
- Promote local economy – local contractor and crew keeps sales taxes in county
- Reduce greenhouse gas emissions for district by estimated 7,237 tons/year
KELSEYVILLE - INSTALLATION

- Completed in 6 weeks (Interrupted by Extreme Heat and Fires)
- 1 day onsite training by Ciel & Terre engineer
- Local crew of 6-10 workers, none had built floating solar before
- 40 hours max/week
- Tabletop assembly of panels to floats on embankment
- Industrial carpet remnants used for building assembly on shore
- Anchoring system installed in 1 day
- No interruption of daily operations
- No significant excavation or other land disturbance around reservoir required
KELSEYVILLE – RESULTS

• System provides nearly 100% of on site electricity needs
• Creates a dual purpose for the reservoir
• First Reservoir is a great test case for replication to other facilities
• Annual electricity cost savings projected to be $90,000/year
• Little to no maintenance and cleaning late summer through winter
• Excellent customer service from contractor and manufacturer
• Power Optimizers add efficiency and show individual panel performance
• Municipal Loan – Zero down payment, monthly payment less than previous utility costs
THANK YOU!