NORIA

RESTORATIVE RENEWABLES

www.noriaenergy.com

# AGENDA

- About Noria Energy
- Noria Research & Development
- About Floating Solar
  - Why Floating Solar
  - Standard Design
  - Equipment & Safety
  - Drinking Water Case Studies
- Sweetwater Authority Floating Solar

# ABOUT NORIA ENERGY

- Founded in 2018 with a vision to support customers in their efforts to reduce energy costs, improve resiliency and meet sustainability goals through the adoption of clean energy.
- Awarded +70MW of Behind-The-Meter energy contracts in the past 12 months, with +300MW portfolio under development both in the US and Latin America.
- Deployed some of the largest Floating PV system in the continent to date – 4.8MW system in Healdsburg, California and a 1.5MW pilot Floating PV plant on a hydroelectric reservoir in Colombia.
- R&D efforts funded by the DOE aimed at developing products and solutions that lower barriers to Floating PV adoption while improving the natural environment.
- Strategic partnerships with customers, engineering firms, equipment suppliers, R&D organizations and the finance community to deliver innovative Energy + Water Solutions.

DNV · isigenere · CIEL & TERRE THE FLOATING SOLAR COMPANY · Wild ENERGY UC DAVIS · RAEL Renewable & Appropriate Energy Laboratory Professor Daniel Kammen, UC Berkeley · BASF We create chemistry · EMERSON · Greenbacker CAPITAL

# PART OF THE GREENBACKER FAMILY

NORIA

**GREENBACKER FAMILY OVERVIEW**

Greenbacker is an asset management platform that marries renewable energy and other sustainable infrastructure assets and developers opportunities with investors

## SUSTAINABLE

Greenbacker invests in the renewable sector, both directly into the assets (the focus of Greenbacker Renewable Energy Company, LLC or "GREC"), as well as into the companies that develop these assets (the focus of GDEV). The firm focuses on solar, storage, wind and hydro projects and other income-producing assets

## 100+ YEARS

COMBINED PAST EXPERIENCE

+$50 billion in past infrastructure and related investments and advisory, hailing from leading players such as Macquarie, Guggenheim, BlackRock, GE Capital, Nomura and Evercore

## OVER $2.0 BILLION

ASSETS UNDER MANAGEMENT

Greenbacker Capital Management, the SEC-registered investment advisor owned by Greenbacker, is the external advisor to GREC and GDEV; it has been a steward of its investors' capital for almost 10 years

# TIMELINE

Corporate

Noria was formed under Dissigno International - **03/2018**

First project: Canal Alliance Completed

First Floating PV Feasibility Project Contracted

Pipeline of +50MW built with largest Floating PV project in North America contracted

Only US-based company member of a Global Joint Industry Project that published the 1st world recommended practice for the Floating PV

Noria Energy Holdings as it exists today is formed - **12 / 2021**

✓ DOE SBIR Phase I Grant Awarded

Series A Funding Secured

Greenbacker CAPITAL

Joined NHA

✓ DOE SIPS Grant Awarded

✓ DOE SBIR Phase II Grant Awarded

Registered as California Small Business

Member of the DOE /NREL /INL Project Advisory Committee evaluating FPV on Hydro PP

Growing the Noria Energy R&D focus

✓ DOE Solar Prize Finalist

U.S. DEPARTMENT OF ENERGY · AMERICA'S SEED FUND SBIR·STTR · SOLAR ENERGY TECHNOLOGIES OFFICE · NREL NATIONAL RENEWABLE ENERGY LABORATORY

dissigno International → NORIA

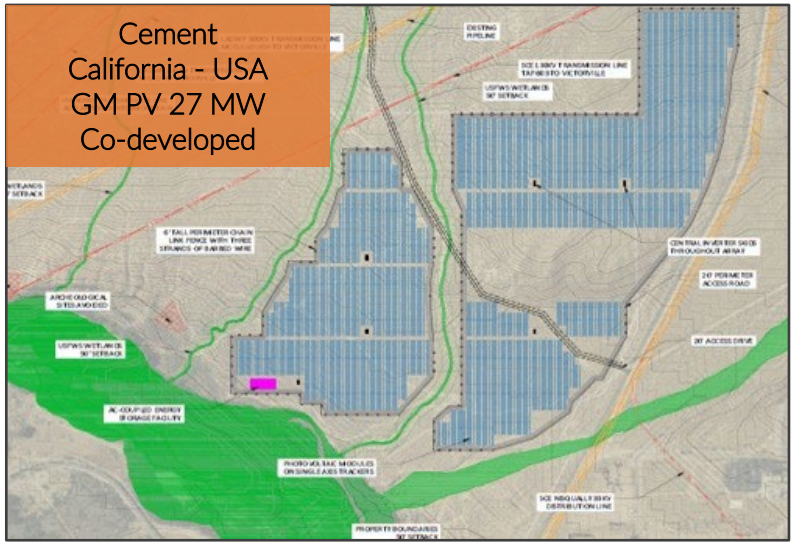
**2018 2019 2020 2021 2022 2023**

Milestones

CANAL ALLIANCE · URRÁ Generación Sostenible · CITY OF HEALDSBURG · Vulcan Materials Company · CEMEX · CHS · Chevron · GOLETA WATER DISTRICT · NEWTON NAPA VALLEY · NELSON FAMILY VINEYARDS · CERVANTES NAPA VALLEY · BASF We create chemistry · MOONLIGHT · TID WATER & POWER · KGHM POLSKA MIEDŹ · Flying M Ranch · SILVI MATERIALS · GRDA Grand River Dam Authority

# PROJECT EXPERIENCE (EXECUTED &/OR AWARDED)

Healdsburg CA Wastewater
Treatment Plant
FPV - 4.78 MW

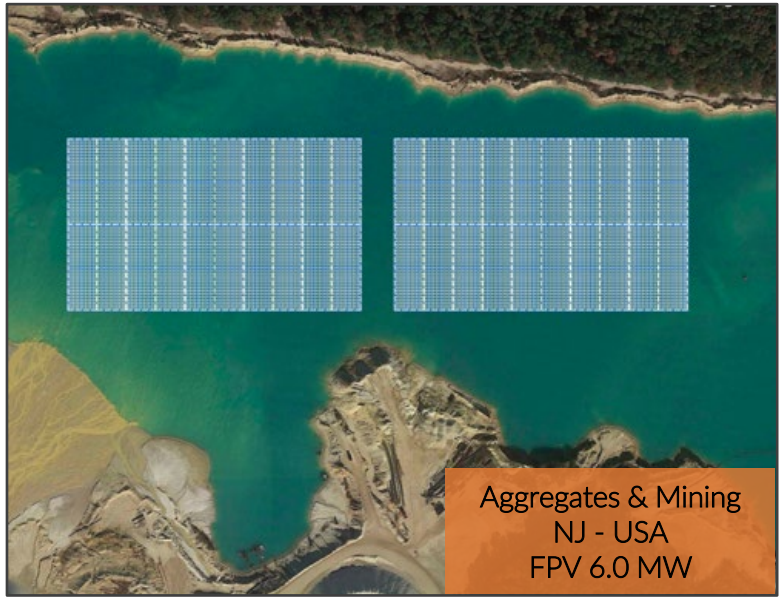


Cement
California - USA
GM PV 27 MW
Co-developed


Mining
Nevada - USA
GM PV 3.6 MW + BESS

Urra Hydropower Plant
Cordoba, Colombia
FPV - 1.5 MW

Oil & Gas
California, USA
FPV & GM PV - 26 MW



Aggregates & Mining
NJ - USA
FPV 6.0 MW

# NORIA RESEARCH AND DEVELOPMENT

# NORIA ENERGY R&D (N.E.R&D.)

## Improving Water Quality


- Developing a proprietary technology to integrate water management technologies (treatment, controls, etc.) into our floating solar systems.
- These solutions leverage the mechanical structure of the system and can be powered using clipped energy that would otherwise be discarded.
- This combination will not only produce low-cost renewable energy, but will also help repair stratified water bodies, prevent algae blooms, support desired flora and fauna ecosystems, and provide data to optimize decision-making.

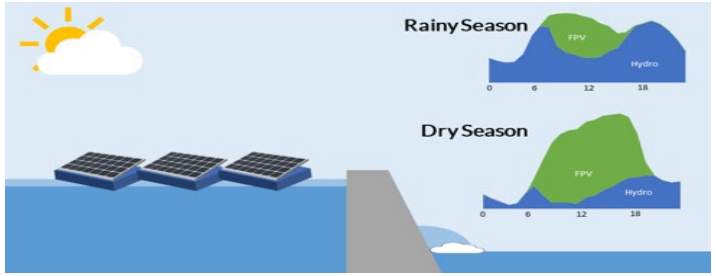
## Reducing Total Cost of Ownership

- Partnered with DNV GL and other industry experts in a Joint Industry Project to determine global standards and best practices for the Floating PV sector.


- Focus on domestic manufacturing of floating solar racking through Department of Energy grants.
- Reliability testing of key equipment at PVEL

## Integration with Hydro

- Leveraging existing infrastructure.
- PV & hydropower are complementary on a seasonal basis and can convert intermittent PV into higher value firm power.




- Member of the Project Advisory Committee w/ DOE's Solar Energy Technologies Office (SETO), Idaho National Lab (INL) and the National Renewable Energy Laboratory (NREL) developing the tools and benchmark data to assess opportunities for Floating PV (FPV) systems on hydroelectric reservoirs in the U.S.
- Member of the National Hydropower Association (NHA).

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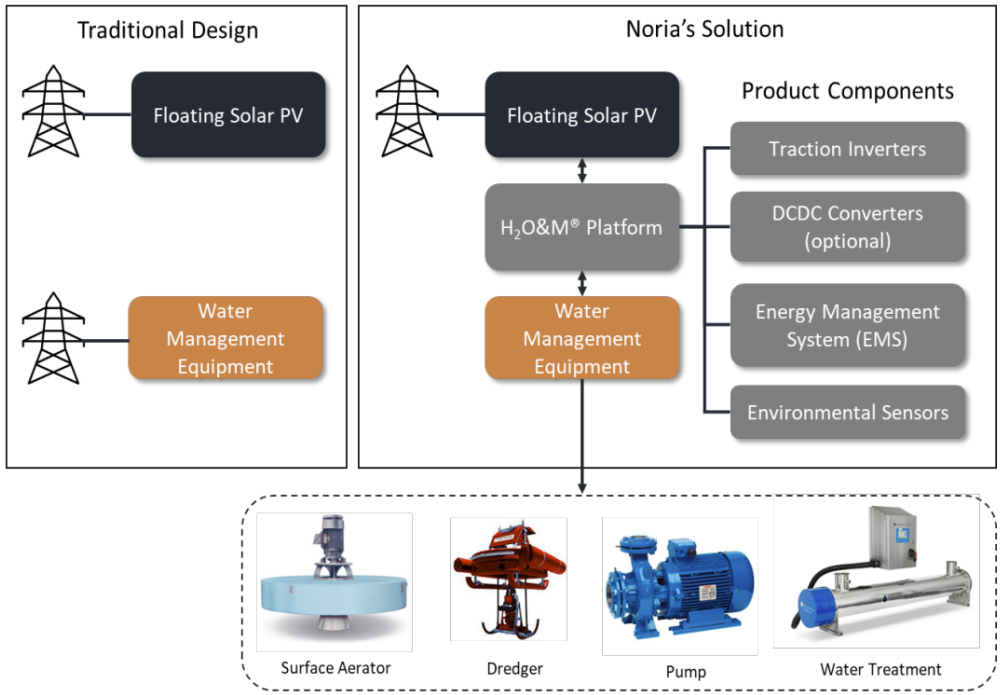
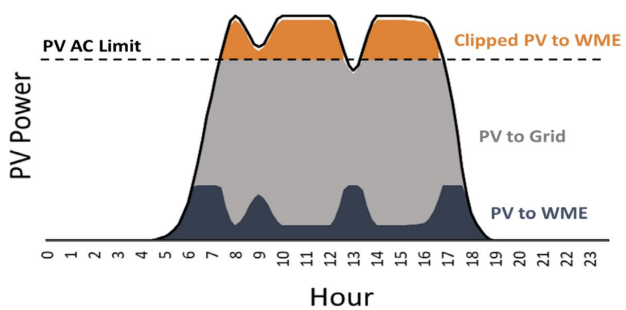
# $H_2O\&M^{®}$

Under the DOE Small Business Innovation Research (SBIR) Grant Program (Phase II – 2022), Noria is developing a platform, called H2O&M®, to integrate water management and treatment equipment into our floating PV systems.

The H2O&M® platform aims to simultaneously address the growing need for low-cost renewable energy, water stewardship and the rising cost of water management by facilitating the mechanical and electrical integration of new or existing water equipment into floating PV systems.




- Focus on improving water health and conservation, while also lowering O&M costs for water body operators by using excess energy from the solar array to power onsite equipment
- Project will include water quality monitoring and studies before and after installation of the Floating PV system to study net impact on water body
- Actively looking for organizations that would like to collaborate and benefit from this H2O&M® grant-funded work to deploy a commercial-scale Floating PV Solution

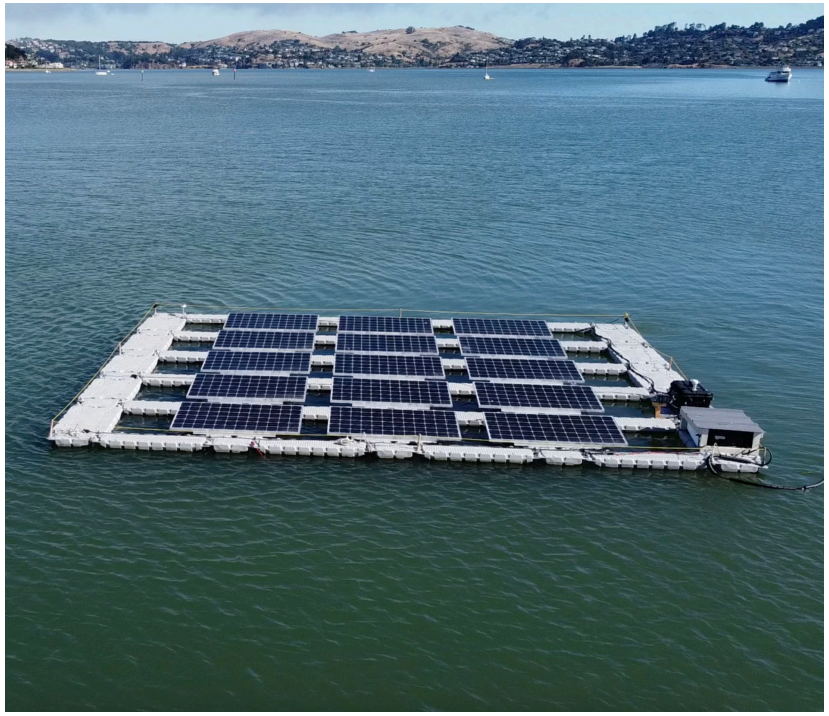



AMERICA'S SEED FUND SBIR·STTR

# NORIA ENERGY R&D PROJECTS


Off-grid Floating PV + Water Treatment

Grid Connected Floating PV + Water Treatment with proprietary Float Design



Floating Solar Remote Controlled / Autonomous Tracking System

# ABOUT FLOATING SOLAR

# WHY FLOATING SOLAR

## Solar for land-constrained customers


gtm: Solar Grid Edge Storage Wind Podcasts White Papers Webinars

SOLAR

**Floating Solar Excels Where Land Is Scarce, and That's a Lot of Places**

With more than 1 gigawatt already installed globally, the market potential of floating PV runs deep. But first developers and customers must feel comfortable taking the plunge.

JULIAN SPECTOR | MAY 21, 2019

Utilizing existing areas such as reservoirs, dams and other unused surface areas is an effective and innovative approach to maximize on renewable energy solutions

## Generation close to points of consumption

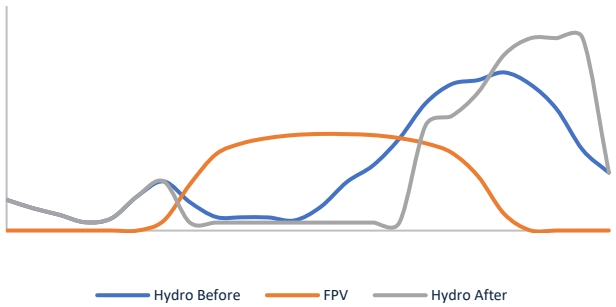
Energy used by water and wastewater utilities accounts for 35 percent of typical U.S. municipal energy budgets.

## Reduces evaporation & Increases PV Production

Benchmark studies of FPV covering 95% of the water area showed +70% water savings in the FPV-covered pond compared to the uncovered pond.

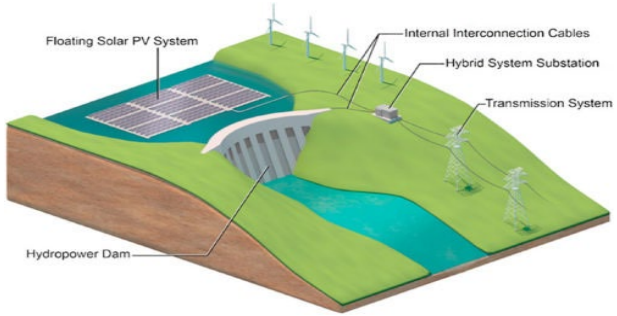
Floating PV systems produce more power due to a "cooling effect" from underlying water

## Complementarity: FPV + Hydro



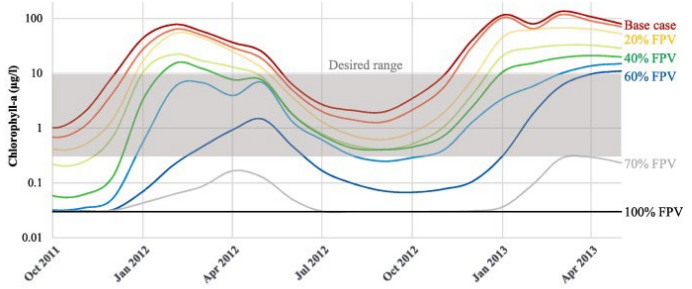

PV & hydropower are complementary on a seasonal basis and can convert intermittent PV into higher value firm power

## Leverage on Existing Infrastructure



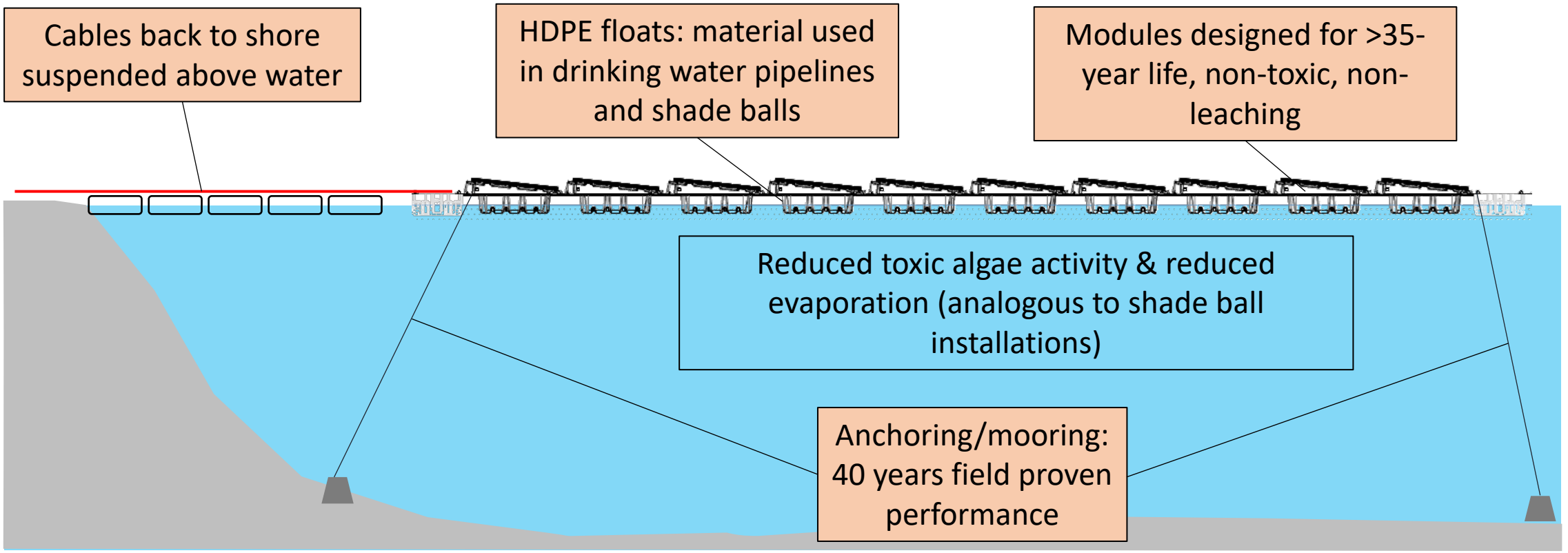

Hydro-solar hybrid systems can share interconnection & access infrastructure, and O&M

## Improved water quality & reduced algae growth




Initial studies found that algal bloom was avoided when FPV covered 40–60% of the surface of a body of water

# STANDARD FLOATING PV PLANT DESIGNS

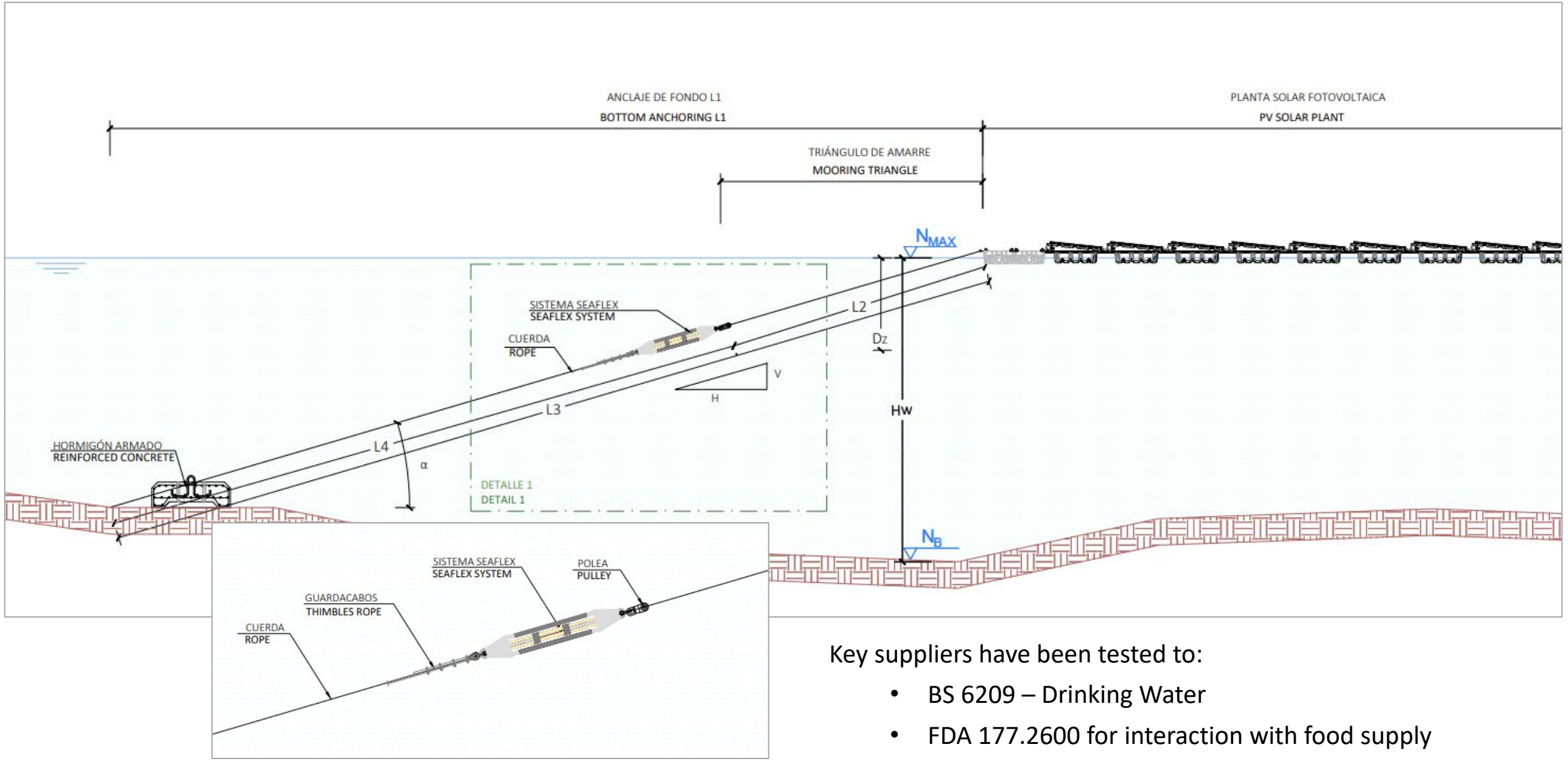



- System designed to only have HDPE in direct contact with the water surface.
- HDPE is one of the main materials used in piping for potable water.
- Main components are designed and tested for >25 years life and receive certifications and toxicity testing to ensure suitability for use for drinking water, food compliance, etc. – ie. BS 6920, NSF 61, FDA 177.2600, AS/NZS 4020

# FLOATING SOLAR –HDPE FLOATS SAMPLES


- HDPE is chemically inert and designed for >25 years of sun exposure
- Float providers have BS 6920 certificates
- HDPE providers are certified for NSF 61
- Same material used in pipes for drinking water and Shade Balls

# ANCHORING AND MOORING- SEAFLEX SAMPLE




Key suppliers have been tested to:

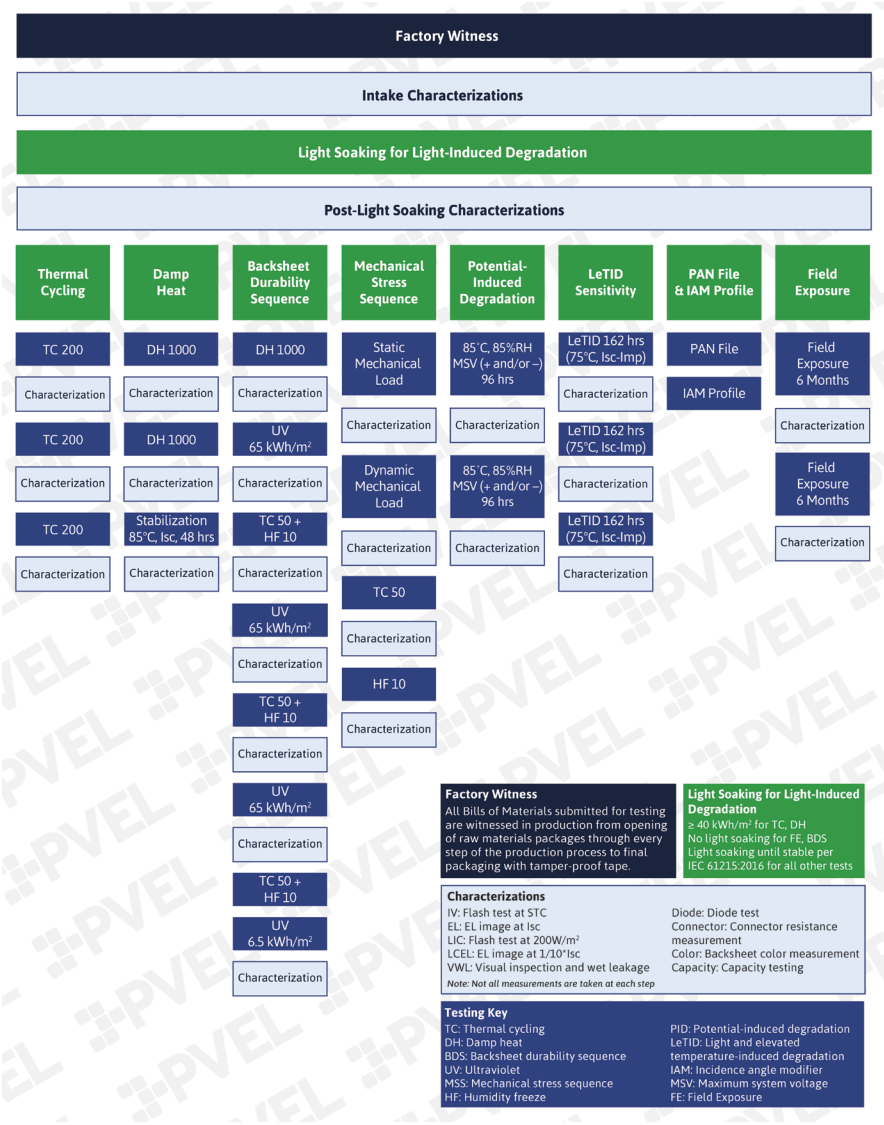
- BS 6209 – Drinking Water
- FDA 177.2600 for interaction with food supply

# PV MODULES

- Minimal contact with water surface
- Modules quality and durability are assured through testing. Testing explores safety (Hi-POT) and durability.
- Modules undergo toxicity characteristic leaching procedure (TCLP) and results have shown concentrations far below limits in solid and in a water column.
- Leaching caused by equipment failure is expected to be removed by the subsequent drinking water treatment and the concentrations are expected to remain well within standards.
- Equipment failure is easily detected and repairs/replacement happens almost immediately.

| Metal | Solid Waste Content (mg/L) | Content in a Water Body (μg/L) |
|---|---|---|
| Arsenic | 0.17 | 0.034 |
| Barium | 0.10 | 0.02 |
| Cadmium | <0.10 | <0.02 |
| Chromium | <0.10 | <0.02 |
| Lead | 3.64 | 0.728 |
| Mercury | <0.05 | <0.01 |
| Selenium | <0.10 | <0.02 |
| Silver | <0.50 | <0.1 |

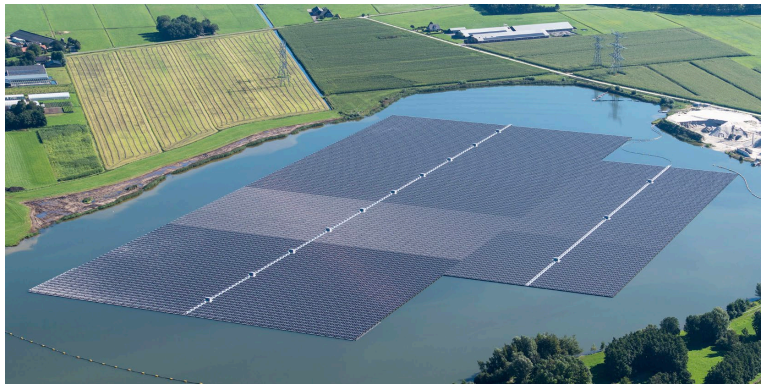
http://www.usvschools.org/Downloads/TCLP%20Results%20-%20LONGi%20Module%20-%20As%20delivered%20(1).pdf



# FLOATING SOLAR ON DRINKING WATER RESERVOIRS

*8.9 MW solar array covers 17 acres of the Canoe Brook reservoir in Short Hills, New Jersey - 2023*

*1 MW Pre-drinking water treatment holding reservoir, Altamonte Springs, Florida- 2022*



*27.4 MWp Bomhofsplas plant (Netherlands) - 2023*

*1.62 MW solar array at the Evides Waterbedrijf reservoir (Netherlands) - 2020*

*1.7 MW solar array at Canal Isabel II's Torrelaguna Plant (Spain) - 2023*

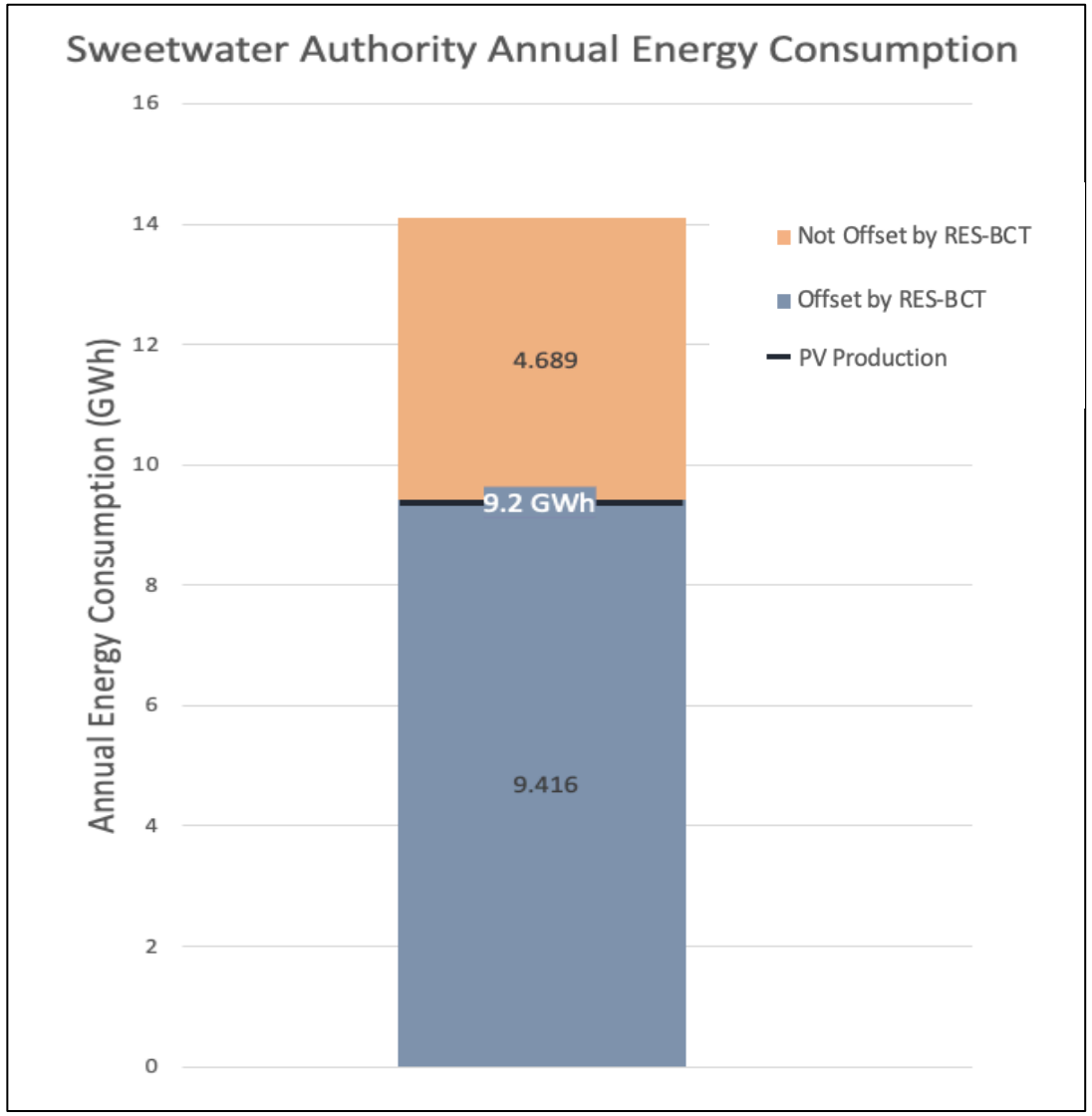
*1 MW solar array on Lancaster Reservoir (UK) - 2019*

# SWEETWATER AUTHORITY FLOATING SOLAR

# SWEETWATER FLOATING PV POTENTIAL (1)

- Reduce electricity cost with a Behind-the-Meter (BTM), clean energy project
  - Offset on-site load of Perdue WTP
  - Offset the Authority's aggregate energy consumption
- Preserve water
- Improve Water Quality
  - Reduce algae growth
  - Integrate water treatment technology
  - Reduce O&M Cost
- Local energy generation that could help the Authority meet its Climate Resilience and Drought Response plans

# SWEETWATER FLOATING PV POTENTIAL (2)

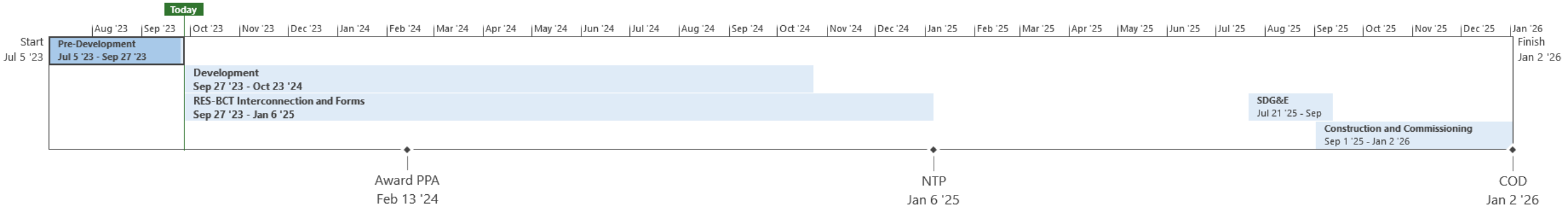



- SWA Annual Energy Consumption ~14GWh across 69 Meters.
  - Perdue WTP and Desal Facility main meters have SWA's largest energy load.
- SWA is eligible for Renewable Energy Self-Generation Bill Credit Transfer (RES-BCT)
  - The system size limit under RES-BCT is 5MWac
  - Offset up to 50 accounts annual energy consumption.
  - Program available capacity 7.78MW
- SWA's RES-BCT potential offset 9.2GWh from its top 50 accounts
- A **3.75 MWac** System is required to offset SWA's Annual Consumption
- SWA's potential annual energy savings **~$500K**

# SYSTEM SUMMARY


| SYSTEM METRICS | |
|---|---|
| System Size | 3.75 MWac |
| Area Required | 9 acres |
| % Reservoir Coverage | 1.3% |
| Annual Energy Production | 9.21 GWh/yr |
| Lifetime $CO_2$ Saved | 52,324 MT |

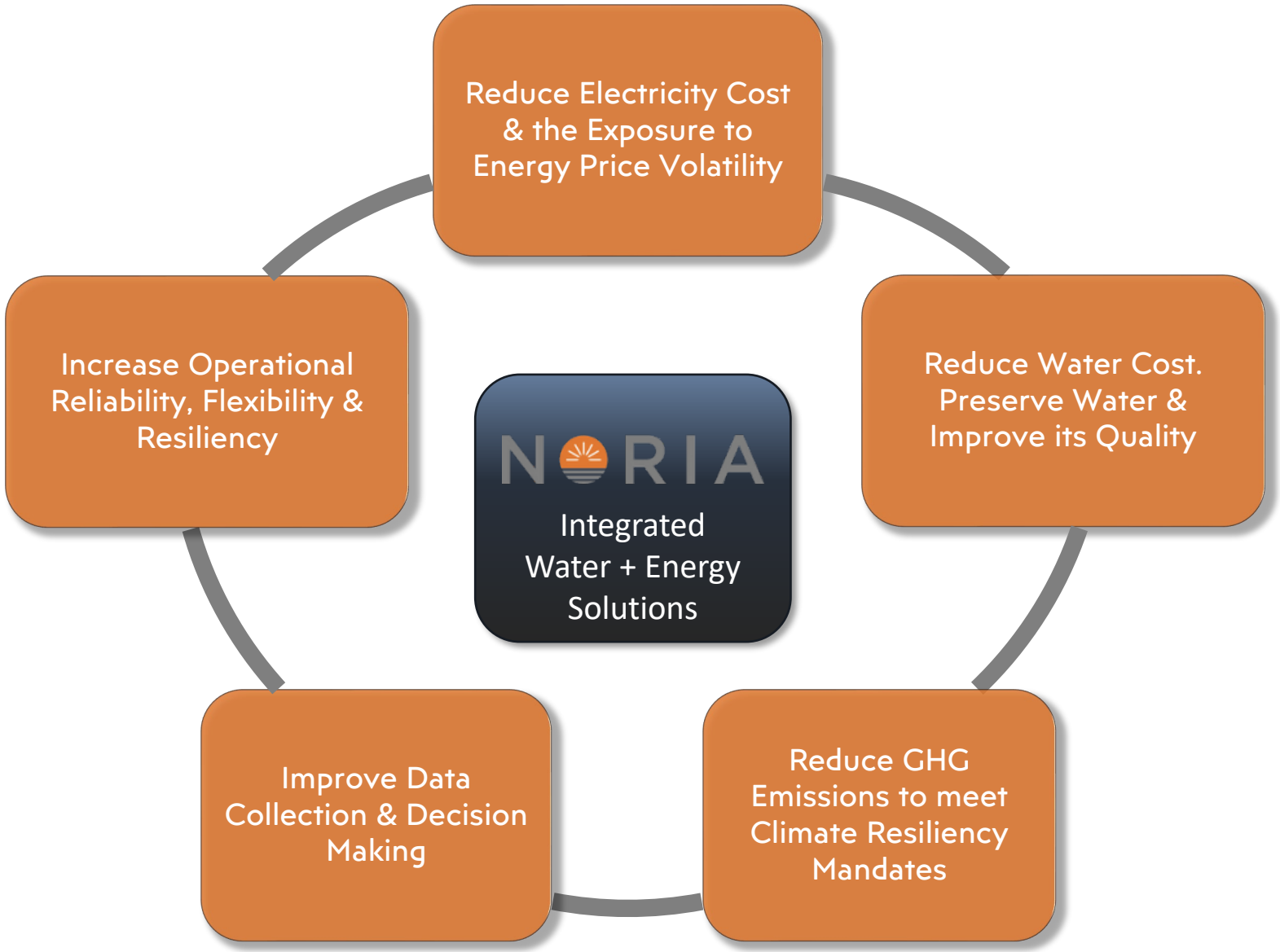
# NEXT STEPS




- Upon Board recommendation, interconnection will be submitted to SDG&E. SDG&E studies are anticipated to take 7-12 months. There will be application review and scoping meetings in the coming months.
- RES-BCT positions are not granted until SDG&E Permission to Operate is approved following construction.
- Finalizing contracting will allow for further engineering designs to support environmental studies, permitting efforts, 50+ week procurement, and deploying of R&D pilot system.

*Final timeline will be impacted based upon interconnection, permitting, and environmental study results and timelines.*

# WHY TO PARTNER WITH US



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