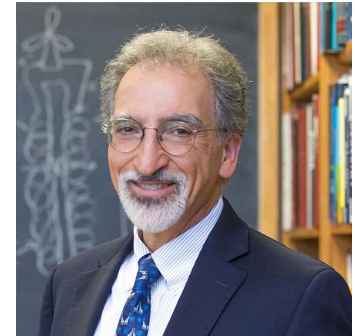
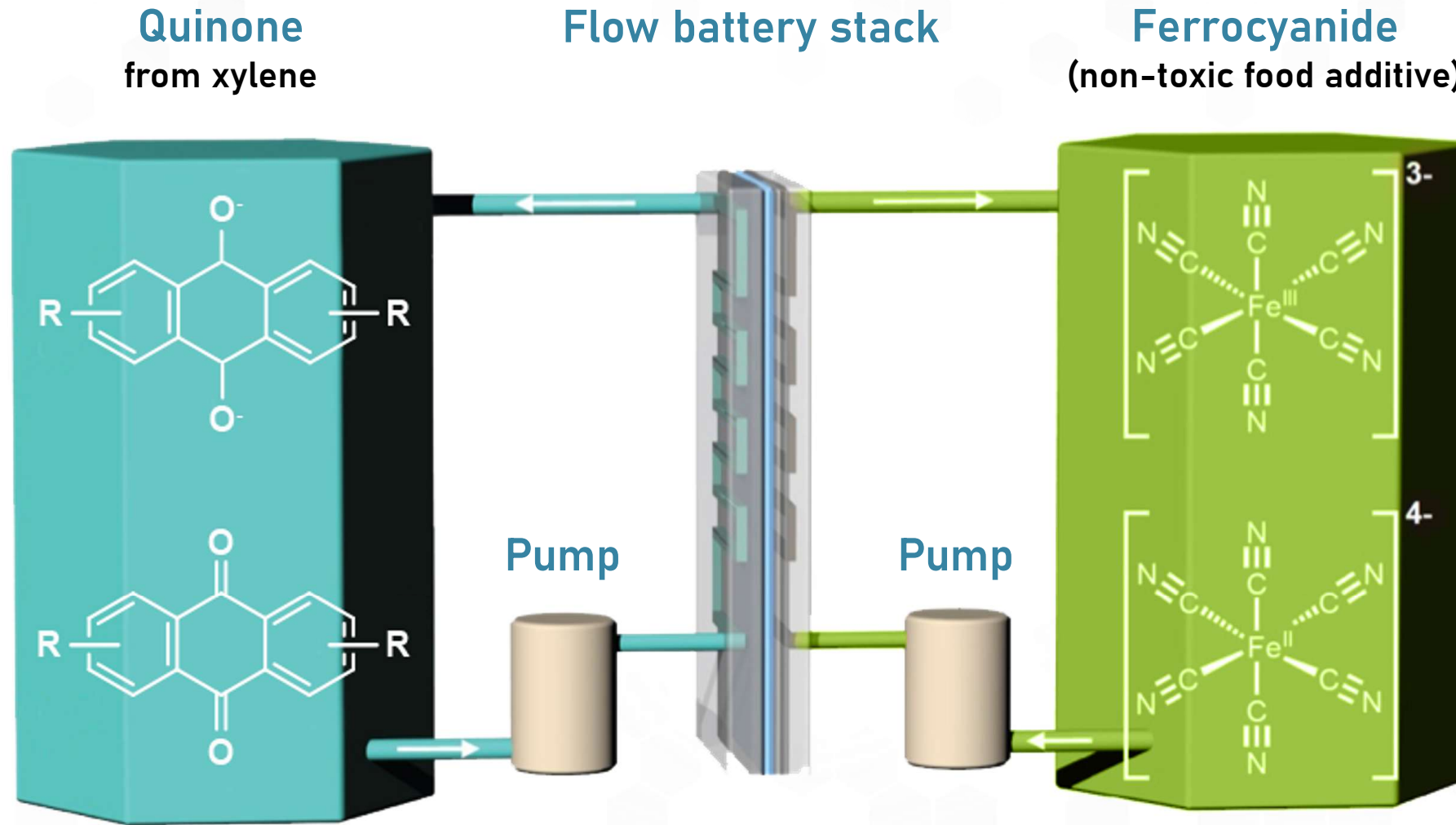




Mega-Scaling Aqueous Organic FBs: Manufacturing and Deployments

Eugene Beh, Co-Founder and CEO
eugene@quinoenergy.com

Quino Energy is a Harvard Spinoff Commercializing Organic Flow Batteries



Prof. Michael Aziz



Prof. Roy Gordon

Fundamental technology licensed from Harvard

Key Features of Organic Flow Batteries

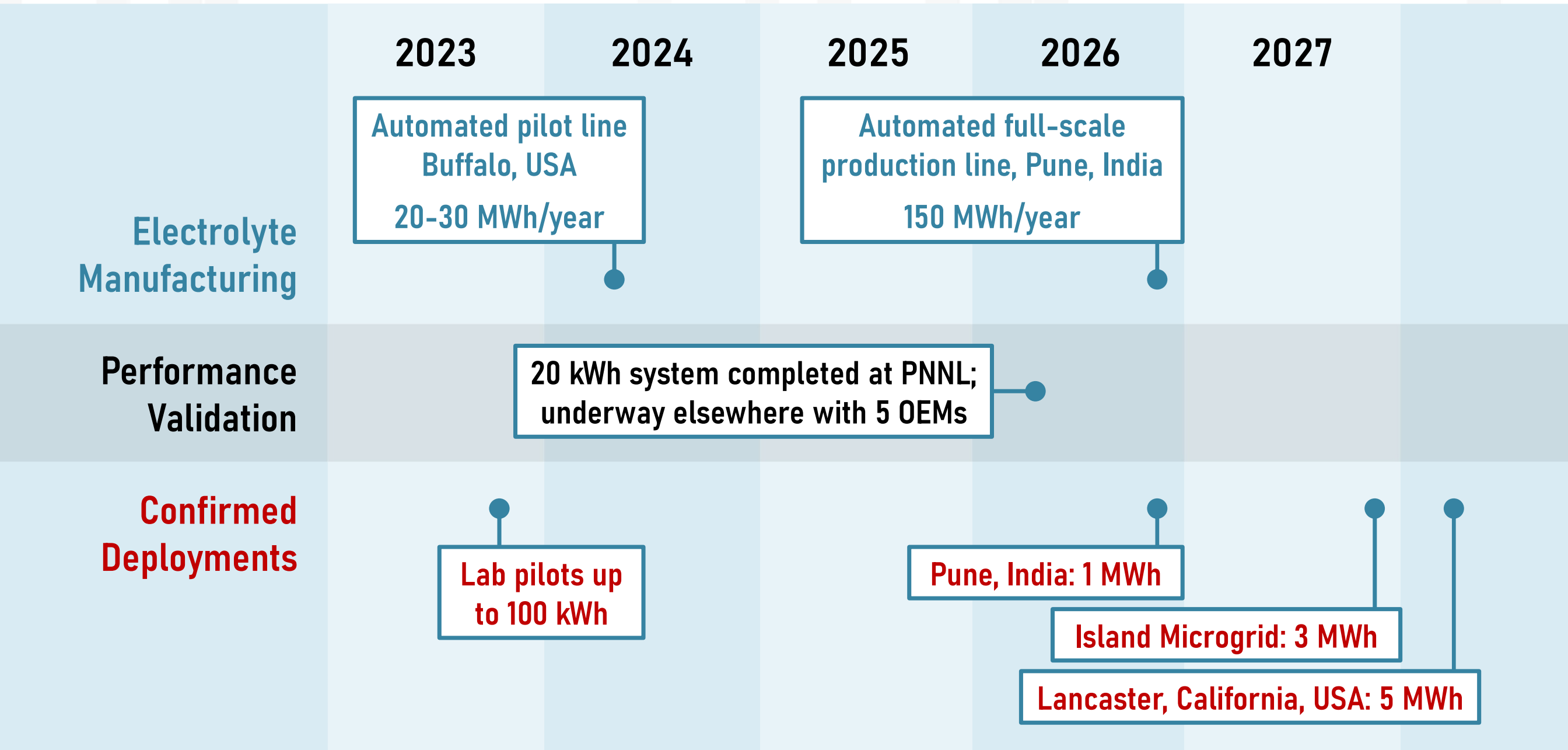
**Extremely Low-Cost
Electrolytes and Components**

Mega-Scalable

No Hydrogen

**Compatibility with Steel Tanks
(for quinone-based systems)**

Where We Were, How It's Going



Key Features of Organic Flow Batteries

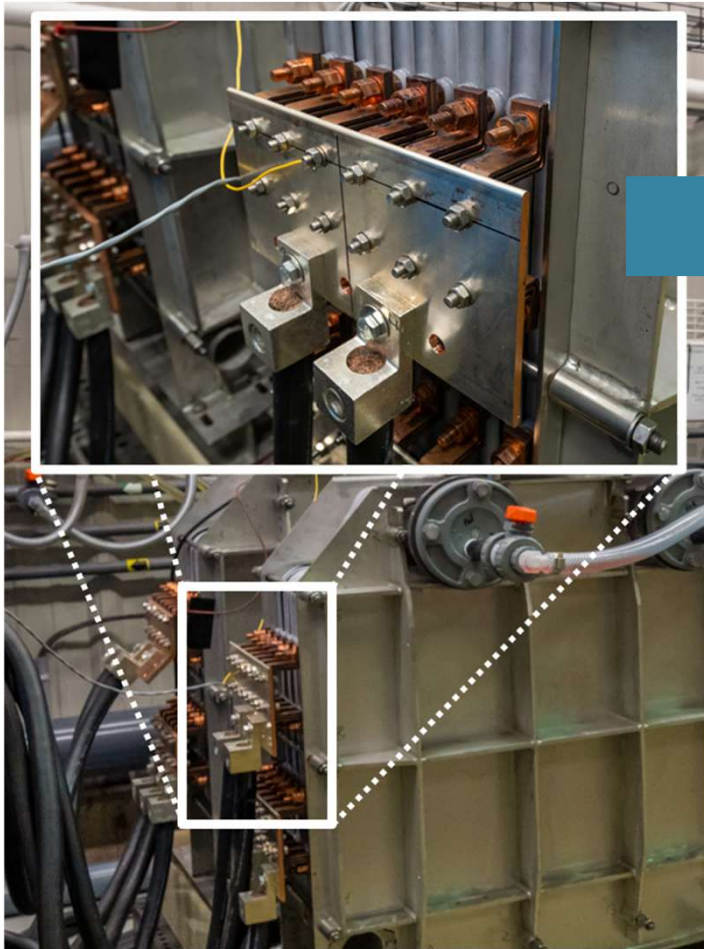
**Extremely Low-Cost
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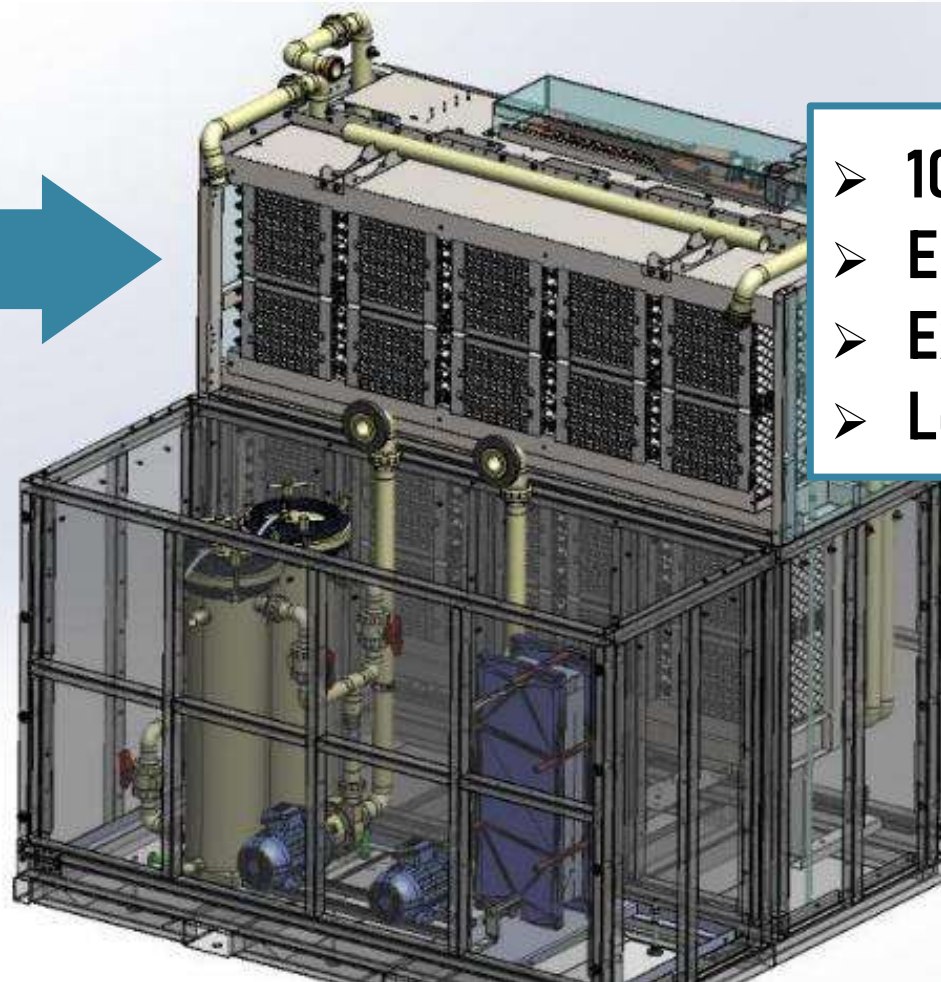
No Hydrogen

**Compatibility with Steel Tanks
(for quinone-based systems)**

Using FB Stacks to Manufacture OFB Electrolytes (See IFBF 2024 for Process Details)



Bespoke Reactor



Module with modified FB stacks

- 10x lower cost
- Easy setup and maintenance
- Existing MFG supply chain
- Lower-current operation

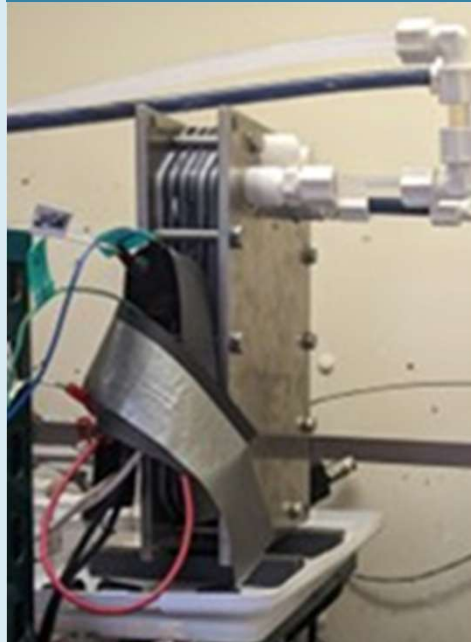
Module produced in
collaboration with

cellcube

The DCDHAQ Production Process Scales Extremely Well

2023

$<0.01 \text{ m}^2$



2024

0.8 m^2



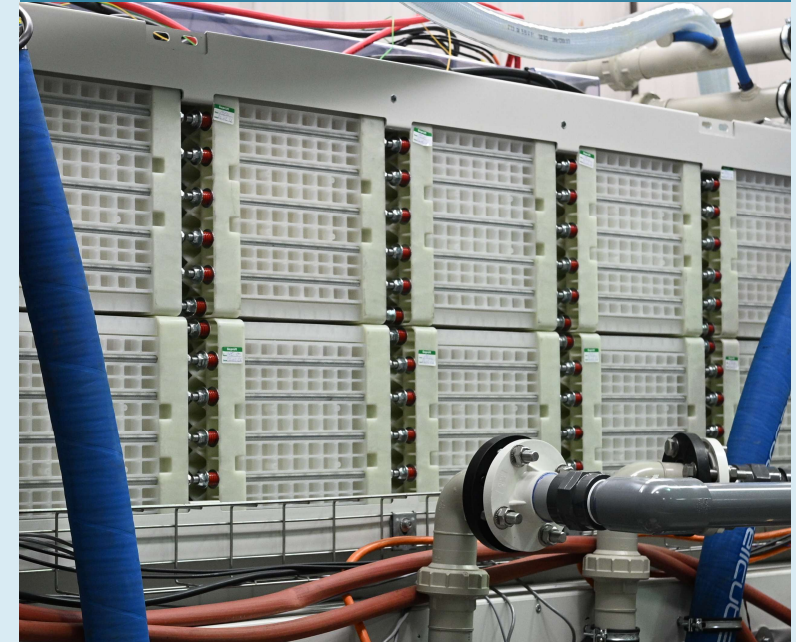
2025

4 m^2



2026

$32 \text{ m}^2 \times 2 \text{ systems}$



2027

4 orders of magnitude in 4 years!

Key Features of Organic Flow Batteries

**Extremely Low-Cost
Electrolytes and Components**

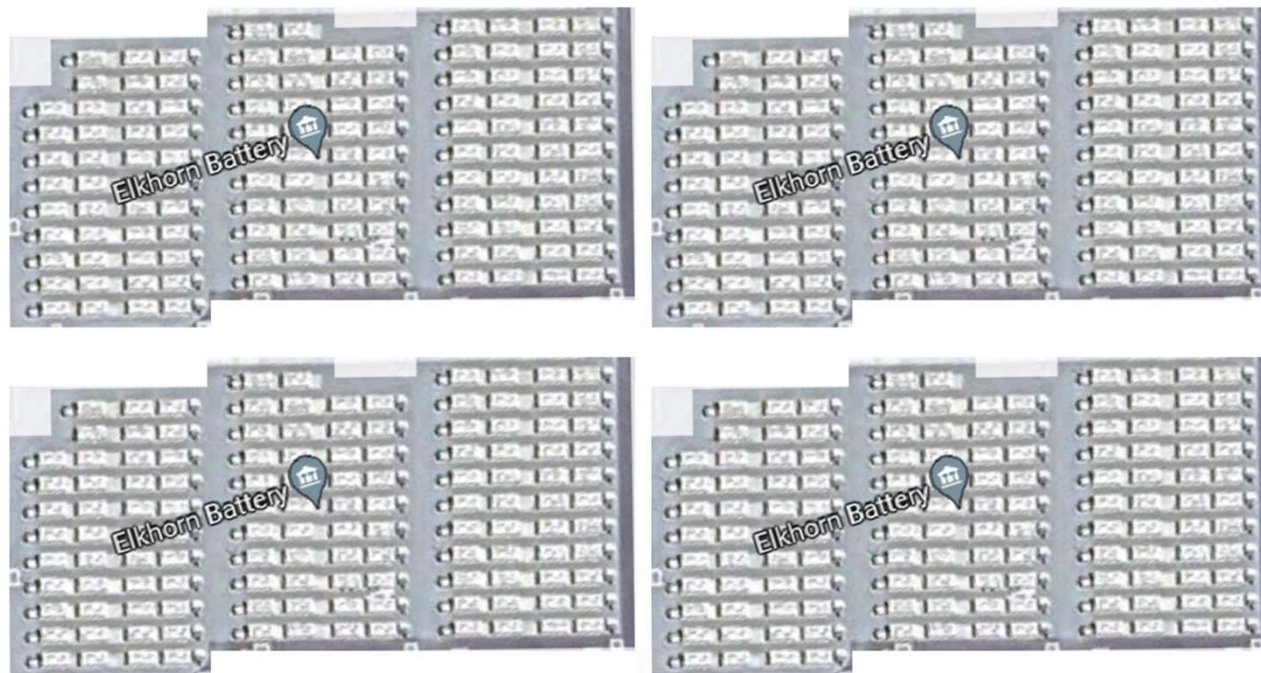
Mega-Scalable

No Hydrogen

**Compatibility with Steel Tanks
(for quinone-based systems)**

Compatibility with Steel Enables Tank Infrastructure to be Repurposed as FBs

- Huge Cost and Time Savings (~\$40/kWh on installation)
- 3x the land energy density of Li-ion



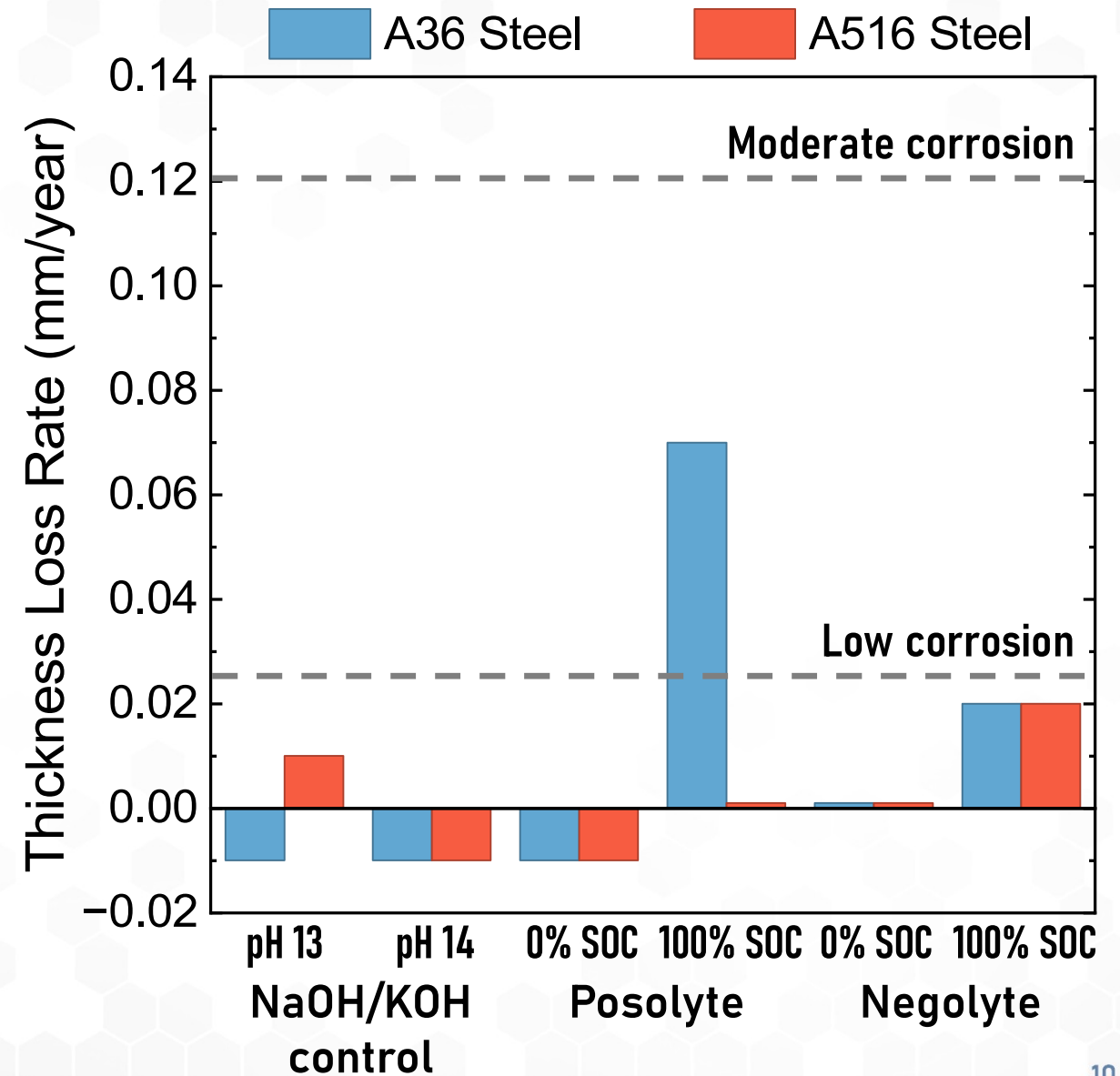
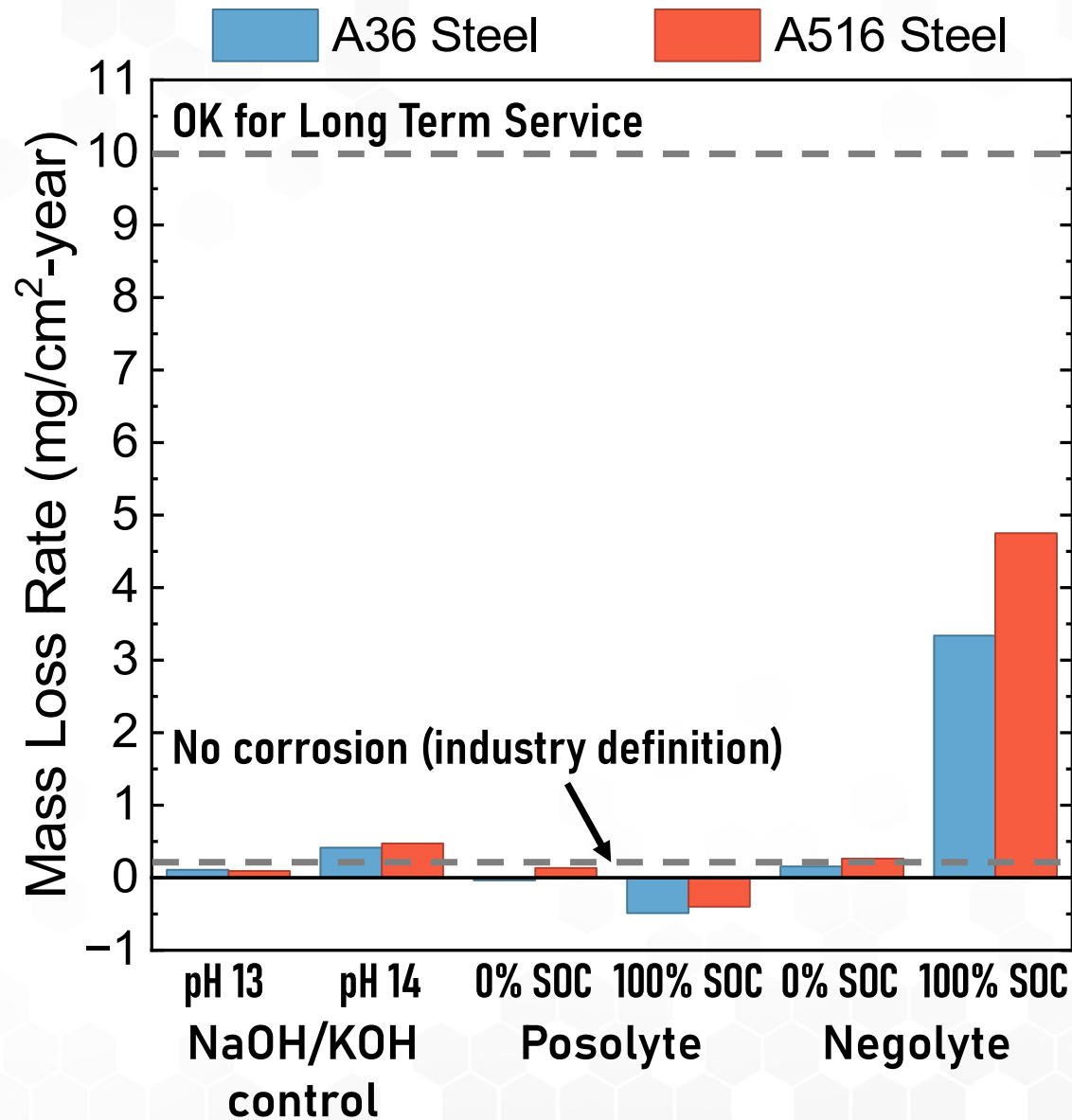
4 x 730 MWh LFP BESS

=



3 GWh LTFF FB

Quino's Electrolytes are Compatible with Carbon Steel



Closing Thoughts

1. **Organic flow batteries have come of age.** With manufacturability solved, organic electrolytes lower in cost than vanadium represent the next generation of flow batteries.

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2. **Repurposing tank infrastructure represents a paradigm shift for flow battery deployments.** These sites are an amazing opportunity to outcompete Li-ion on cost and energy density -- but only feasible with the right electrolyte.

Closing Thoughts

1. **Organic flow batteries have come of age.** With manufacturability solved, organic electrolytes lower in cost than vanadium represent the next generation of flow batteries.
2. **Repurposing tank infrastructure represents a paradigm shift for flow battery deployments.** These sites are an amazing opportunity to outcompete Li-ion on cost and energy density -- but only feasible with the right electrolyte.
3. **Collaboration, not competition.** The development of next-generation organic electrolytes was possible thanks to many mutually beneficial partnerships across the entire flow battery community.

Work With Us!



We aim to support your projects as an electrolyte supplier, and your hardware as an integrator for tank infrastructure projects.

Utilities and Developers: Utility-scale projects COD 2028+

EPCs: Investing in engineering design for large tank form factor systems.

RFB Manufacturers: Optimization and purchase of your FB systems for tank redevelopment projects. Supply of organic electrolyte for your projects.

Chemical Manufacturers: Manufacturing scaleup and delivery of electrolyte in regions with confirmed projects. Sourcing and supply chain management.



Thank You!

Eugene Beh, Founder and CEO
eugene@quinoenergy.com



U.S. DEPARTMENT OF
ENERGY

Made possible with support
from Award DE-EE0009795

Where We Were, How It's Going



2023

2024

2025

2026

2027

From University spinoff...

...to key ecosystem partner.



External validation of 20 kW completed at PNNL; underway



Global tech companies (confidential)

Key Features of Organic Flow Batteries

Extremely Low-Cost Electrolytes and Components

- Enables flow batteries to compete with LFP on cost
- No critical materials or PFAS

Mega-Scalable

- TWh/year of raw material supplies available
- Backward compatible with VFB hardware

No Hydrogen

- Fire safe
- Simple operation with no major reengineering

Compatibility with Steel Tanks

- Huge time and cost savings
- Less than 1/2 the land area of utility-scale Li-ion batteries

Quino's Breakthrough: A Zero-Waste Electrochemical Production Process

