SUSTAINABILITY RESEARCH visioning event

Sponsored by the UW- Madison Sustainability Research Hub

SUSTAINABILITY RESEARCH visioning event

RISE EARTH:

TECHNOLOGY

- BREAK OUT SESSION -

Sept 11th, 2024 | **UW-Madison**

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Thermal Hydraulics Lab, Mechanical Engineering

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HERD Lab, Mechanical Engineering
(Hydrogen and Electrochemical Research for Decarbonization)

Sustainable Technology areas

Technological advancements in renewable energy, smart grids, precision farming, and recycling are crucial for sustainability. They reduce environmental impact, enhance resource efficiency, and promote social and humanitarian well-being by providing clean energy, ensuring food security, and reducing waste. These innovations collectively support a healthier environment, stronger communities, and improved living conditions.

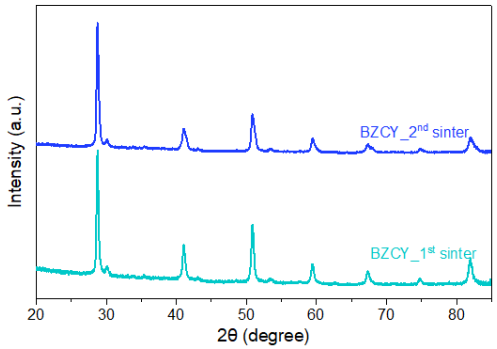
Focus comes from Engineering

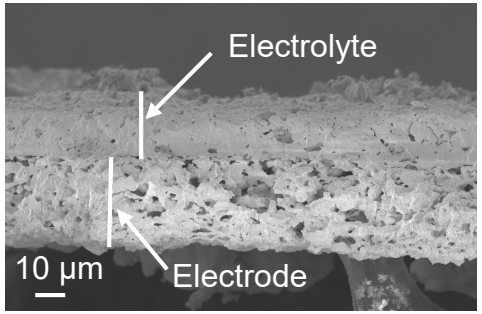
What we want to get out of the breakout session

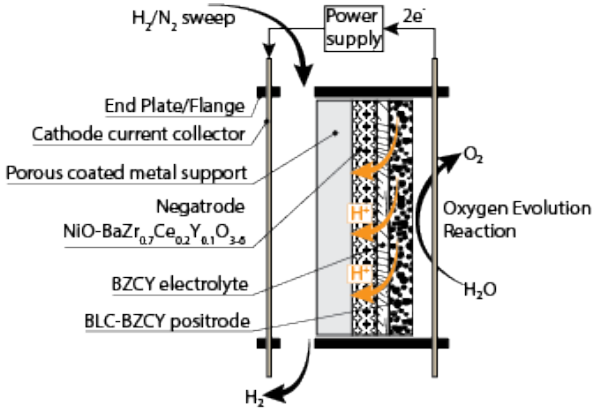
- What areas of sustainable technology are of interest and what does this mean to you?
- What resources do you see that exist to support UW-Madison in developing new technologies?
- What resources are needed or could add to the development of new technologies?
- How can the University support sustainability research, foster community, and build connections across campus?
- What do you see as areas of opportunity for sustainability research on campus?

Electrochemical systems for energy conversion and storage

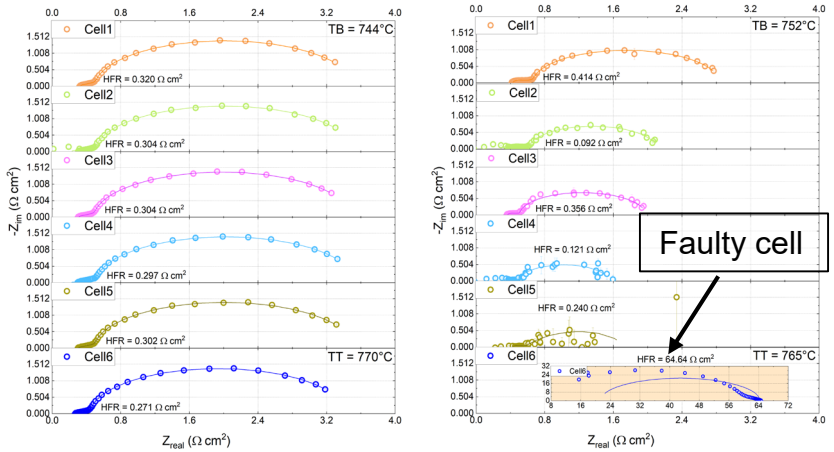
Electrolysis and fuel cells for hydrogen production/use and chemicals synthesis

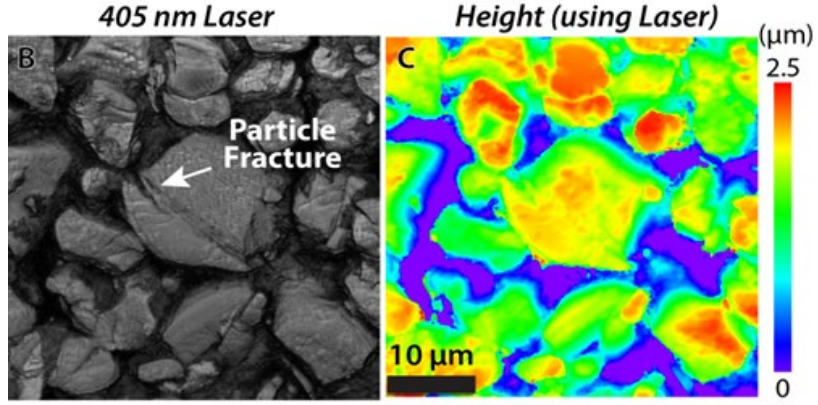




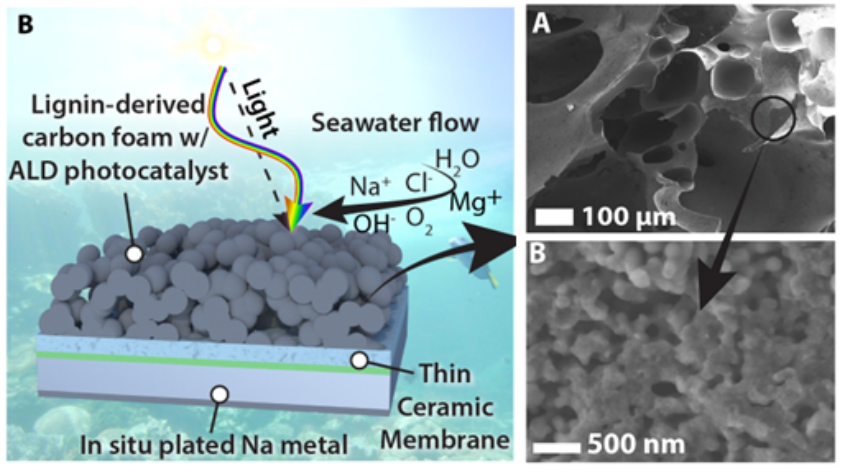


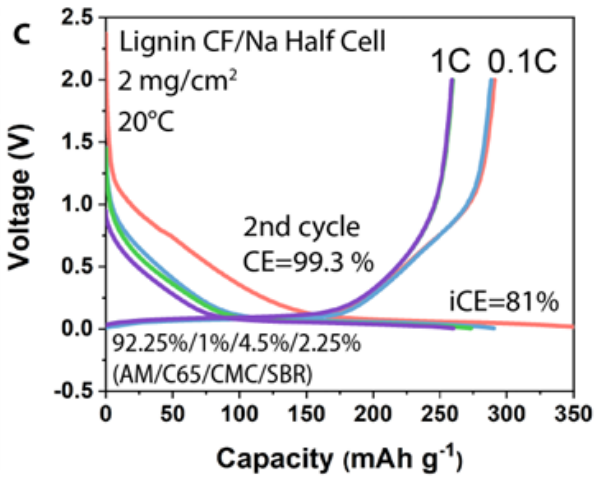
Understanding of degradation mechanisms for batteries and fuel cells via *operando* imaging and electrochemical characterization



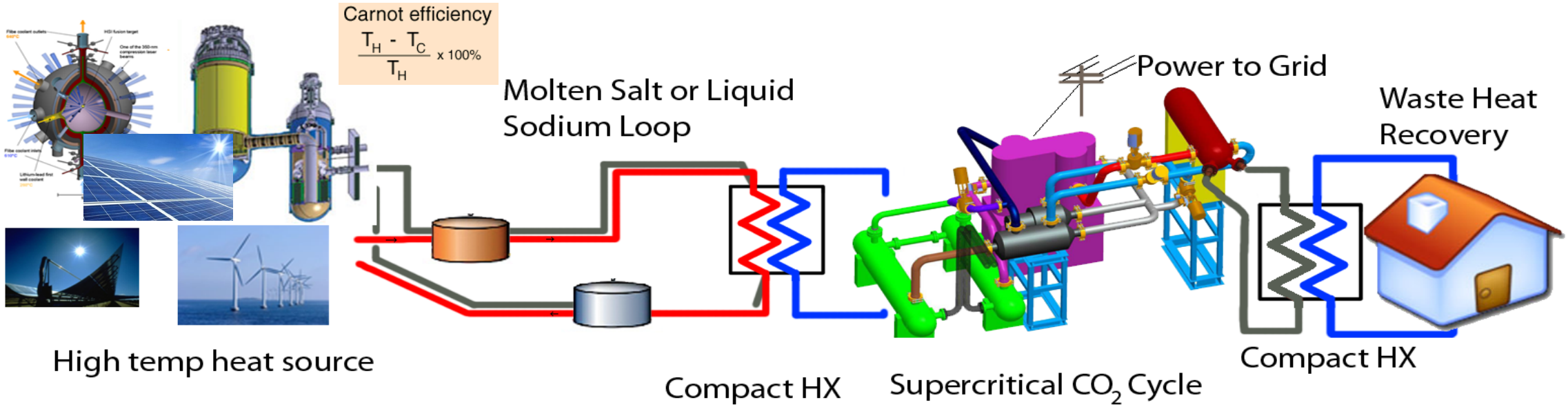


Enabling earth-abundant battery materials





Improve Energy Utilization and enhance industrial processes



Study advanced energy sources to increase efficiency and power output

- Advanced Nuclear Fission
- Fusion
- Concentrated solar
- PV
- Wind Energy
- Energy storage

Use advanced heat transfer fluids to store and move energy

- Electrical power generation
- Campus heating and cooling
- Grid power stabilization and utilization

Develop and test new power conversion cycles and components to improve efficiency

- Improved efficiency
- Lower cost
- Smaller components
- Higher temperatures
- lower water usage

Reduce/use waste heat for industrial campus Heat

- How can we use waste heat
- Use waste heat from power generation for industrial processes

Campus as a Living Research Laboratory

Engage with industry to advance campus sustainability goals and teach students about sustainable energy

SIEMENS energy

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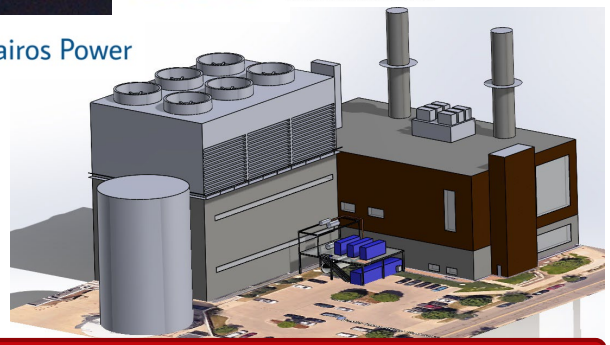
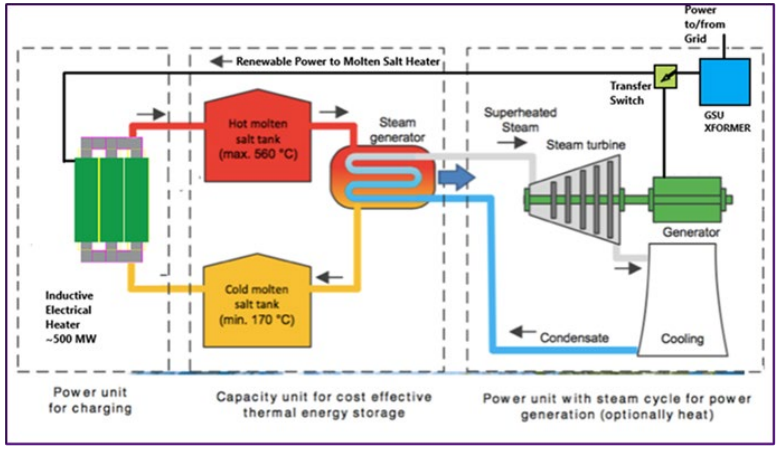
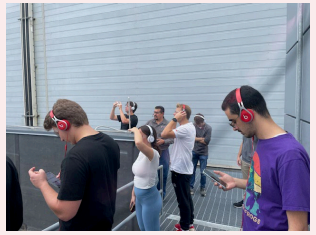
Kairos Power



Electrify heat production with added storage



UW-Madison Kegonsa Research Campus Agrisolar project



Student engagement with campus power heating and cooling

O'Brien 22mW solar field

Columbia County WI energy Storage Project

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Alliant Energy Powering Beyond

WEC Energy Group

mgoe Madison Gas and Electric

ENERGYDOME Our WORLD can't wait.

mgoe Madison Gas and Electric

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EDF renewables

RISE – Earth

"UW–Madison is well known for high-impact research led by our impressive faculty and RISE-EARTH will help bring new thinkers with bold ideas to campus that will help fuel greater interdisciplinary collaborations," says Provost Charles Isbell.

Examples of Rise –Earth areas in Mechanical Engineering

Rise Earth – Thought Leaders Discussion

Shawn Kaeppler – College of Ag and Life Science
Mark Anderson – College of Engineering
Justin Sydnor – School of Business, Risk and Insurance
Nancy Wong – School of Human Ecology
Steph Tai – Law School
Nancy Kendall – School of Education
Ankur Desai – Atmospheric and Ocean Sciences
Morgan Edwards – LaFollette School of Public Affairs
Andrea Hicks – Office of Sustainability

Internal Relationships and Systems (Existing)

- Sustainability infrastructure is relatively mature with respect to research, teaching, and service. How will this connect with existing systems, centers, expertise, and faculty?

- New overall systems are not needed; inventorying, coordination and investment among existing systems are needed. Will the Office of Sustainability be the coordinator? What is the right level of coordination?

Internal Relationships and Systems (Questions)

- Does the RISE-EARTH initiative encompass research into sustainability and environmental justice?
- How does this fit with campus Sustainability goals and connection with research and FP&M (campus as a living laboratory)?
- How do we seed new resources for greater collaboration among RISE and existing faculty?
- What synergies exist between RISE-AI and RISE-EARTH and other RISE hires?

RISE-Earth and the WI Idea (Existing)

- How do we elevate existing community collaborations at the university level, including Extension and tribal communities?
- What do we want to have set us apart in our RISE-EARTH Initiative? E.g. What do these faculty do once they are here that is different?
- Do we build on our existing strengths or launch into new areas?

RISE-Earth and the WI Idea (Questions)

- Can we leverage this initiative to reconstruct our relationship with the public, especially at the state and regional level, so that UW, the public, and industries are true partners in addressing imminent challenges?
- How state-specific versus global frontiers should the RISE-EARTH be focused?
- How do we use the WI Idea to transcend disciplinary boundaries and reward that collaboration in the tenure and promotion process?