



Presentation for Maui DRIP Committee

Brittany Zimmerman and Team

Agenda

- Introduction
- What we do on Hawaii Island
- What we did to design the system
- How the system works
- How that can be applied to Maui
- Concrete under the Microscope
- Addressing Misinformation
- Work with local farmers, Pana'ewa, and Keaukaha
- Close

Desmon Haumea Kumu A'o

(Uncle Des)

'Ohana Wa'a – Voyaging Society
Halau Maui'ola Medical Campus



TOP CYBER NEWS MAGAZINE

PREMIÈRE EDITION

“ WE ANTHROPOMORPHIZE
INVENTIONS AS A SUBSTITUTE
RATHER THAN A SUPPLEMENT
FOR THE HUMAN ”

THE
CYBER REALM
**FUTURE
VIEW**

**Industrial Control
System Security**

Exclusive article by Edward LIEBIG

STEWART A. SKOMRA TECHNOLOGY EXECUTIVE
CHIEF EXECUTIVE OFFICER, OMNIQUEST™

HOW, FOR OVER 35 YEARS, STEWART A. SKOMRA DRIVES NEW PRODUCT AND NEW MARKET DEVELOPMENT COMPUTER-AIDED DESIGN & COMPUTER-AIDED MANUFACTURING, MACHINE-TO-MACHINE/ROBOT - INTERNET-OF-THINGS, SUPPLY-CHAIN MANAGEMENT, AUTO-ID, AND WIRELESS TECHNOLOGIES.

Stewart Skomra

CEO AIMAGO Limited Company

Over 40 years from Blue-Chips including IBM, Intel, Qualcomm, and Trimble Navigation through multiple startups

Pioneering leadership in Computer Integrated Manufacturing, Complex Systems Integration, Rugged Wireless Computing, Wi-Fi®, Secure Identity & Device Management, AI, Sensor and IoT.

Inventor of 13 patents, BS in Mechanical Engineering and MBA at The Ohio State University.

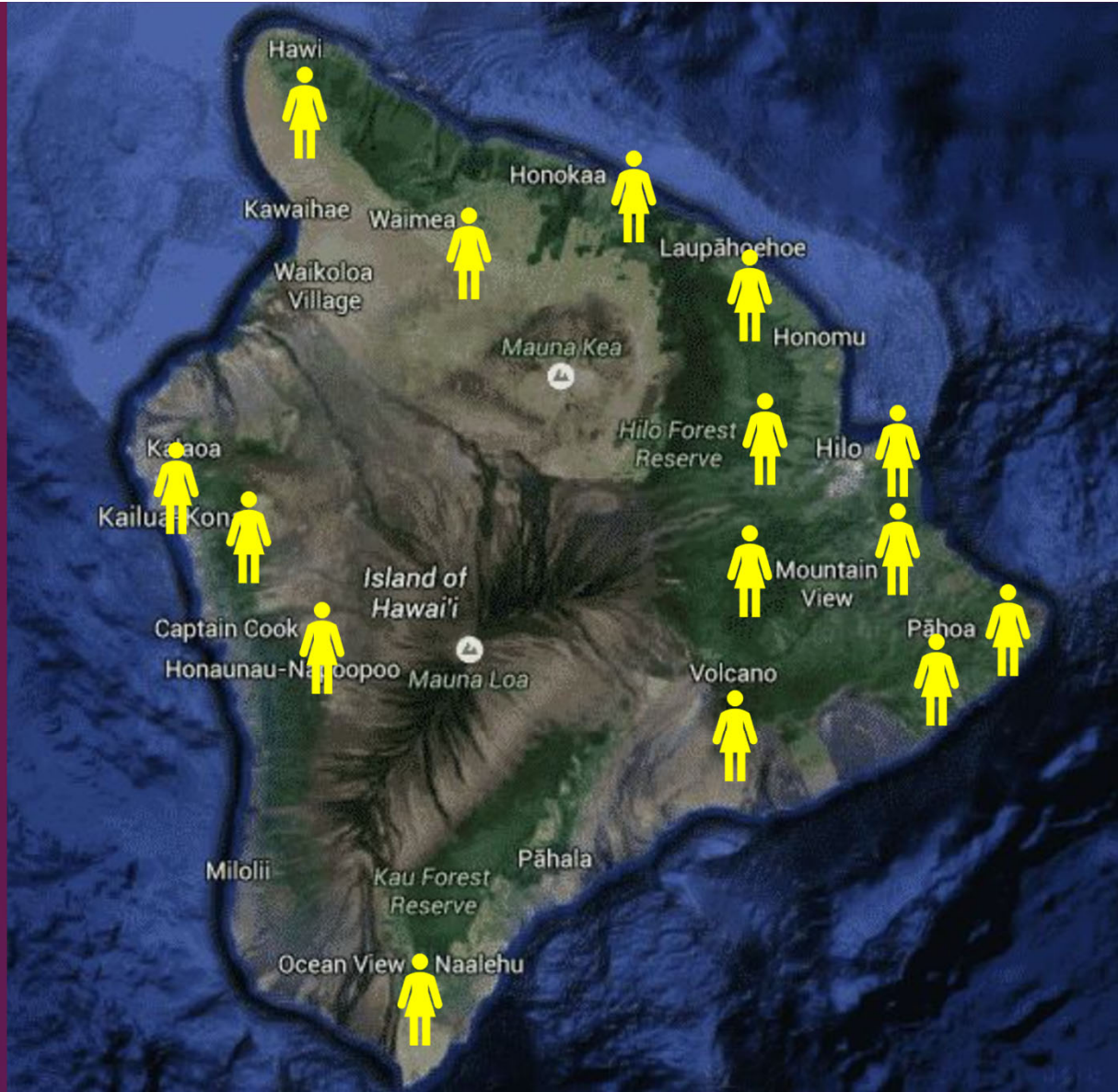


This is for the future.

Our children are our Kupuna in training.

This is our duty.

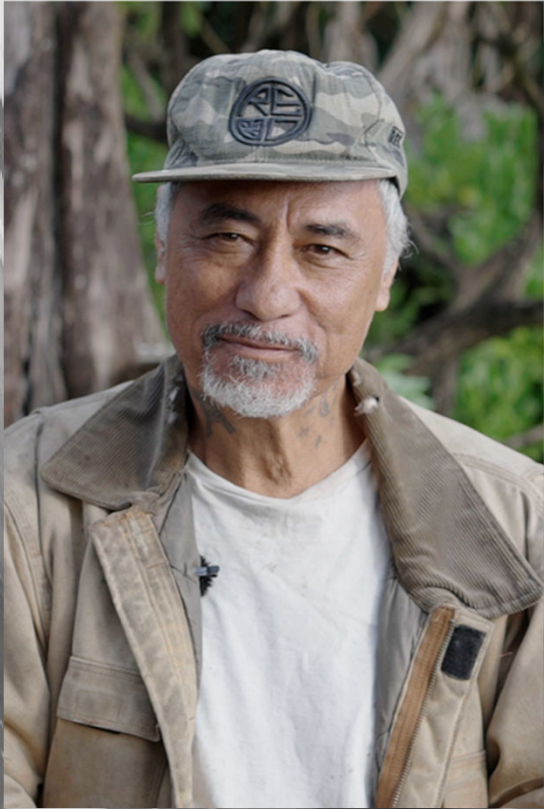




Why Hilo?

- The Keaukaha, Pana'ewa, and Malama ka Aina Hana ka Aina picked where we should build and why
- Puhi Bay
- Cost Differential
- It is the RIGHT THING TO DO!
- We listened.





Keli'i Ioane

King's Landing Village
MAHA Board Member

Malama ka Aina Hana ka Aina (MAHA)
King's Landing Community Association





Ainaaloha Ioane

King's Landing Village
MAHA Board Member

Malama ka Aina Hana ka Aina (MAHA)
King's Landing Community Association



Elected Trustee for Hawaii Island



Mililani Trask

Why Are We In Maui?

- I was asked to join a hui for disaster recovery
- Came visit
- I was asked to come speak at a council community meeting
- Did analysis with my amazing team to see if what we do in other locations could be a solution for the debris and ash concern. = YES
- Tamara reached out and asked if I would be willing to present our capabilities.

Brittany Zimmerman

Founder | CEO | Chief of Innovation

- Inventor of Patents and Technologies for NASA and DoD
- PI for 3 NASA Programs as the Youngest Principal Investigator
- >95% Proposal Selection - Exceeding \$85 Million in Awards
- 20 under 35: Space and Satellite Professionals International
- Promise Award Recipient
- Future Space Leader Awardee
- Integrated Technologies on the International Space Station
- Analog Astronaut: Crew 3 in Inflatable Lunar/Martian Habitat
- Analog Astronaut: Mars Desert Research Station Mission 171





NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) JOHNSON SPACE CENTER

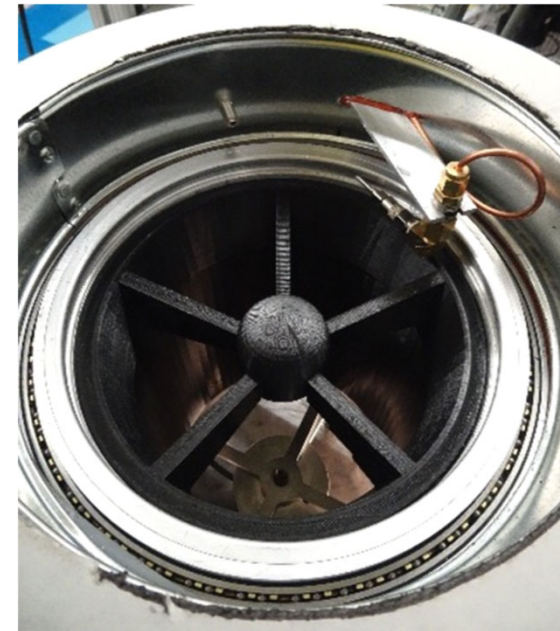
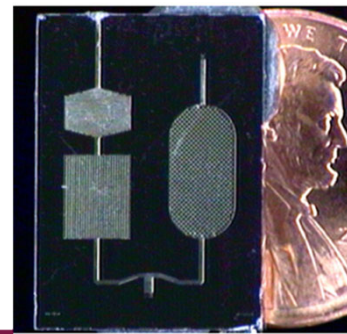
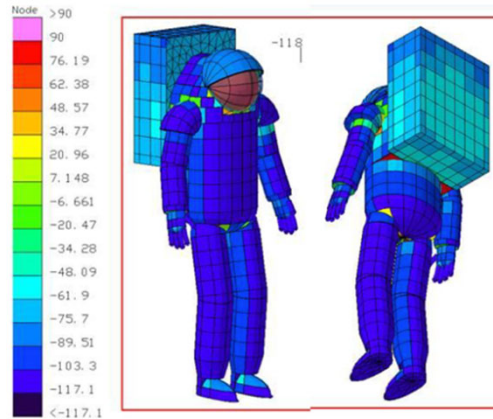
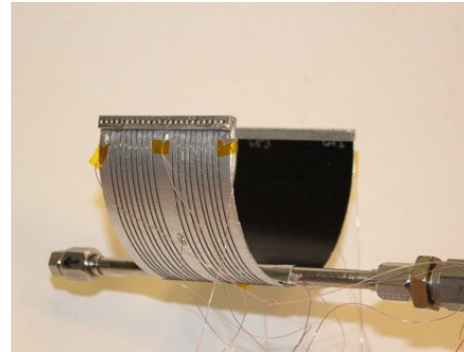


Thomas Cognata

Aerospace Engineer specializing in Thermal Systems and Fuel Cells Technologies

Thomas J. Cognata

- >\$4.7M toward early-stage technology development
- 19 publications, 4 patents
- Technology Areas:
Aerospace. Fuel Cells. Water management. In-situ Resource Utilization (ISRU). Shape memory alloys. Rotating machinery. Thermodynamics & Custom modeling.



About Brittany Zimmerman:

In my capacity as former supervisor and colleague:

I observed in Brittany far more than an exceptional engineer – she is a high performing innovator with a strength unique in the technical world: the ability to motivate a strong team of people in pursuit of lofty but realizable goals.

Her strengths came across immediately in her interview and manifested in her pursuits. Asks probing questions, understands the principles at play, communicates well, puts in the time to achieve success. She quickly filled roles well beyond her experience level, from project management to proposal writing and principal investigator.

About Brittany Zimmerman:

Example of her efforts toward NASA & DoD funded projects:

- GIPS (Gravity Independent Phase Separation) – Project Engineer
- IRA (Integrated water Recover Assy) – Deputy project manager: PI
- COSMIC (COndensate Separator for MIcrogravity Conditions) – proposal development, deputy project manager: project manager & PI
- SMARTS (Shape Memory Alloys for Regulating Thermal control systems in Space) (with Boeing and TAMU) – Deputy project manager: project manager & PI
- STOOLE (Separation Technology of On-Orbit Liquid and Excrement) (with MadeIn Space)– Proposal development, Principal investigator and project manager

About Brittany Zimmerman:

How is her prior work in aerospace relevant to Yummet technology?

Power and Life support systems for long duration space exploration endeavor to “close” the resource cycle. In other words, in space exploration there is a need to use and reuse materials that are at hand, whether raw or a waste product from elsewhere in a larger system, so that the expense of launching resources to replenish the system can be minimized.

Yummet technology appears to “close” a complex system in similar fashion – using waste and available resources to achieve a larger objective.





NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) JOHNSON SPACE CENTER



Scott Hansen

Gateway Thermal Control System, Lead System Manager



American Institute of Chemical Engineers



Dr. Chris Cogswell

Ph.D. Chemical Engineering, Northeastern University

Dr. Chris Cogswell

- PhD Chemical Engineering, Northeastern University
- 6 peer reviewed publications to date with 105 Citations
- 46 Academic Conference Presentations to Date, 4 Conference Chair Positions
- **Expert in sustainability, the capture of pollutants from air streams, and debunking pseudoscience.** Textbook chapters, magazine articles, interview appearances, and public group presentations on these topics
- Experienced in the inherently safe design of chemical plants, as well as environmental modeling for pollutant waste exposures in air, in compliance with OSHA, ASME, ASM, etc standards

- American Institute of Chemical Engineers 35 Under 35 Awardee 2023
- American Institute of Chemists Outstanding Graduate Student Award, Northeast Section 2016
- Bachelors Degree Chemical Engineering and Philosophy, University of New Hampshire



Yummet Philosophy

The Yummet team began as a think tank of volunteers, full of engineers, scientists, business developers, financial analysts, accountants, and community organizers to help solve a single problem:

How to help solve the issue of pollution and toxins in the environment

Our Engineering Philosophy is Based Around Three Core Principles

- 1. Solve Community Problems First**
- 2. Remediate pollution and toxins without creating more!**
 - Perform Cradle to Grave Life Cycle Assessments**
- 3. Operate in a way that is economically beneficial for community**

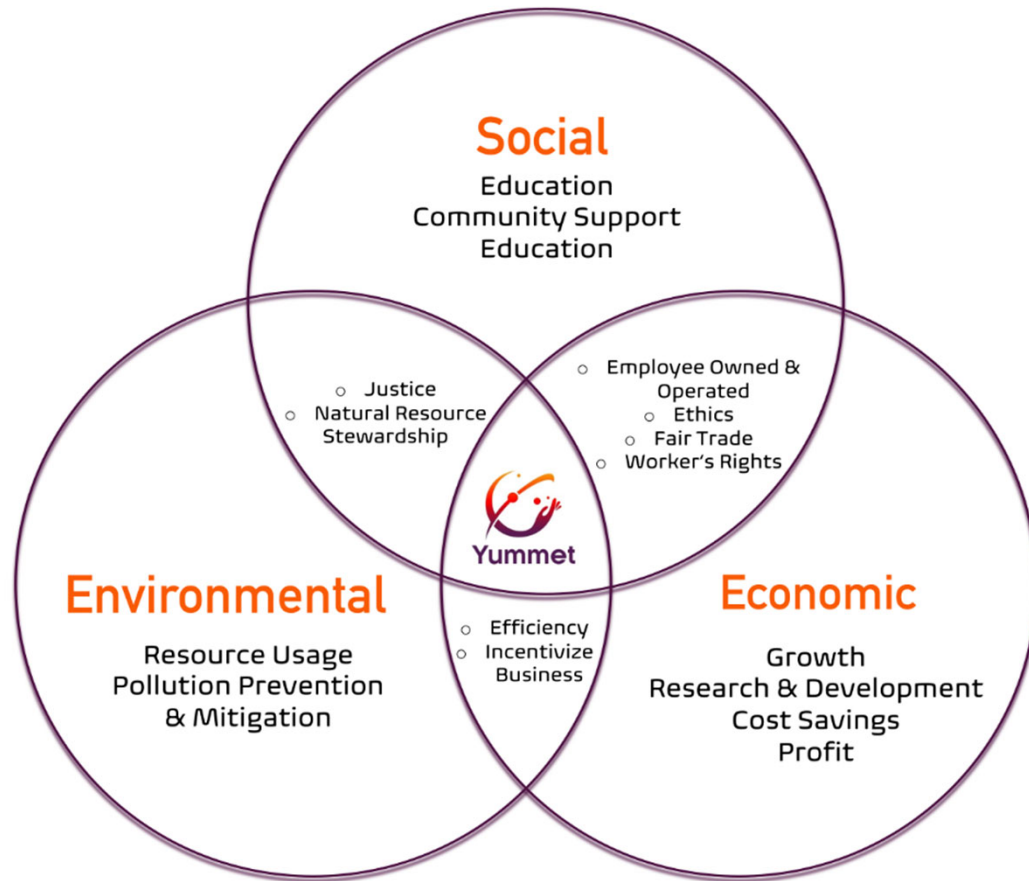


Let's apply these principles to Maui!

Solving Problems on Maui First

- Safely remediate toxic waste such as Ash and Debris
- Make land safe for future generations
- Clean the local environment

Sustainability can be used to Evaluate Tech



Triple Bottom Line

- Is it good for the community?
- Is it good for the environment?
- Can it exist on it's own long term?

Cradle to Grave Life Cycle Assessments tell if a technology is good for the Environment

- Life Cycle Assessment (LCA)
= a way to evaluate the impact a product, process, or technology has on the environment
- Like balancing your checkbook!
- Analyze what stuff goes into a process (and how those things were created), what comes out, and what we will do with them when they are no longer useable
- Not doing a full Life Cycle Assessment of Products is often used to hide their true environmental cost



Simple Example of an LCA: A White T-shirt



What are the Technologies We Use?

- Pyrolysis
- Water Treatment
- Cement Manufacture

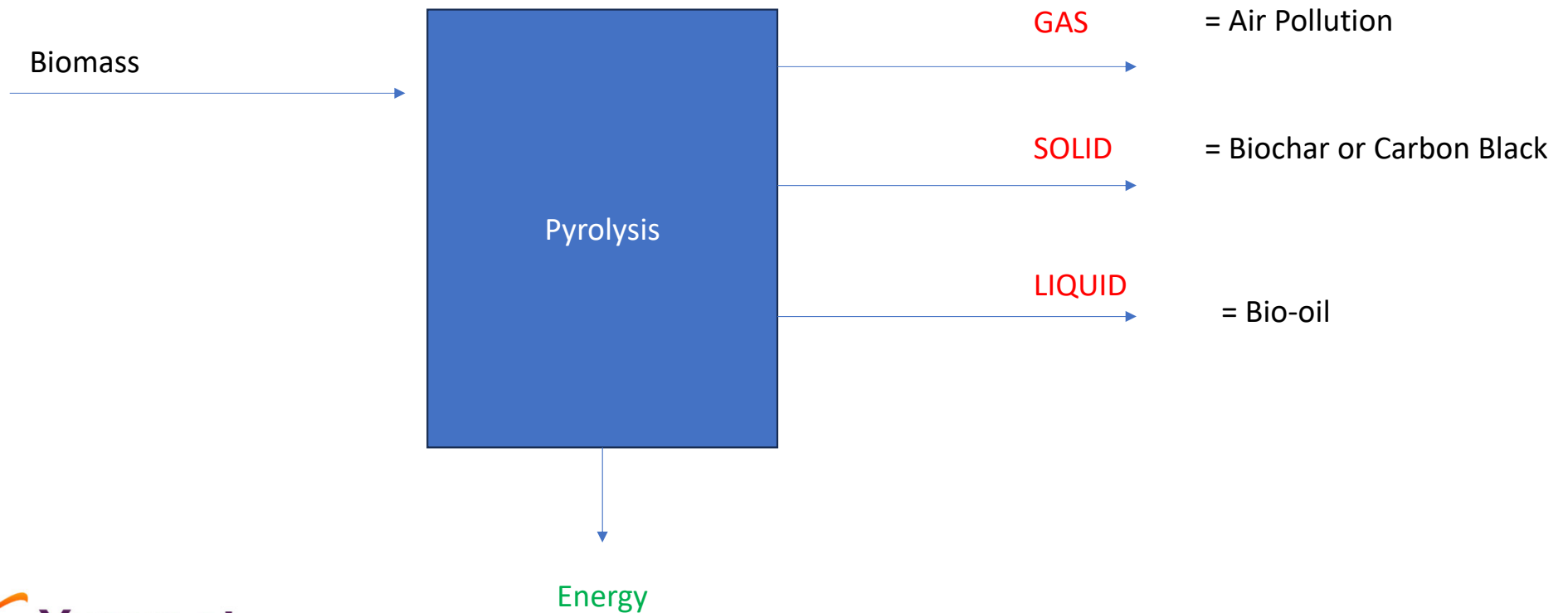
THESE TECHNOLOGIES ONLY WORK TOGETHER WITH NO WASTE
BECAUSE OF THE UNIQUE CEMENTITIOUS MATERIAL WE HAVE
INVENTED

THIS IS IMPOSSIBLE WITHOUT OUR NEWLY INVENTED CEMENT

What is Pyrolysis?

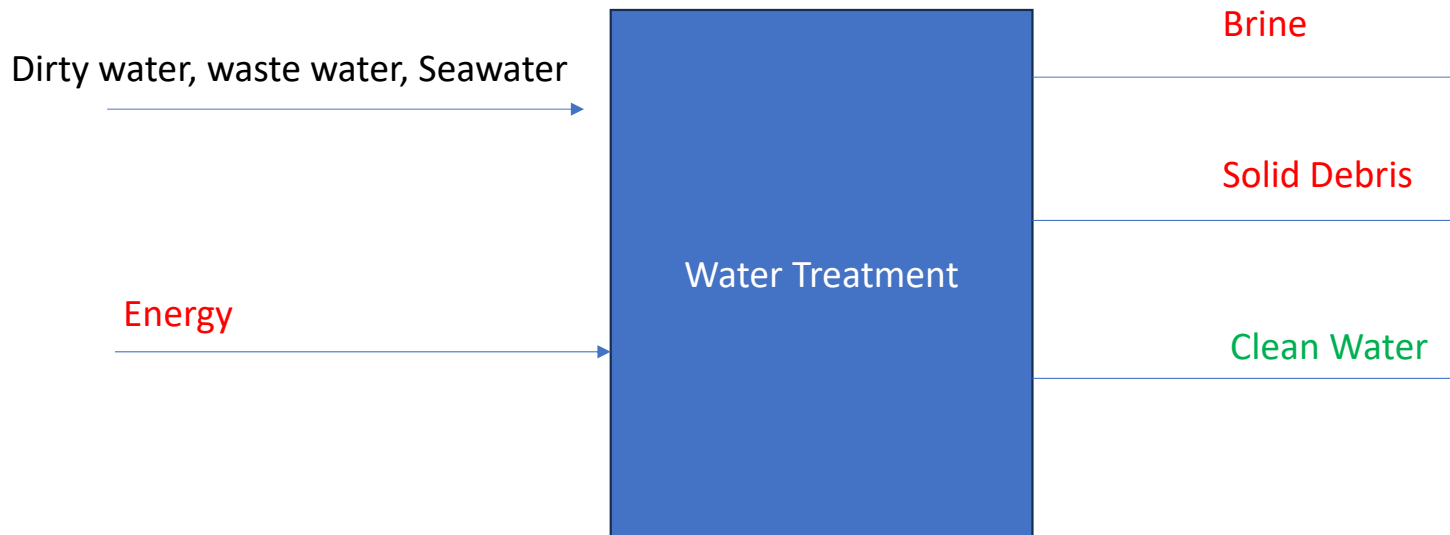
- Pyrolysis is a chemical change that breaks down large, complex molecules into smaller, more simple ones. Happens in the absence of oxygen ONLY
- It is not combustion, which requires oxygen to occur
- Example: CH₄ (methane)
 - Pyrolysis: $\text{CH}_4 \rightarrow \text{C (s)} + 2\text{H}_2 \text{ (g)}$
 - Combustion: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 \text{ (g)} + 2\text{H}_2\text{O (l)}$
- Pyrolysis is studied by environmental engineers because it is a way to break down compounds into usable end products

Traditional Pyrolysis (Not Yummet)



Traditional Water Treatment (Not Yummet)

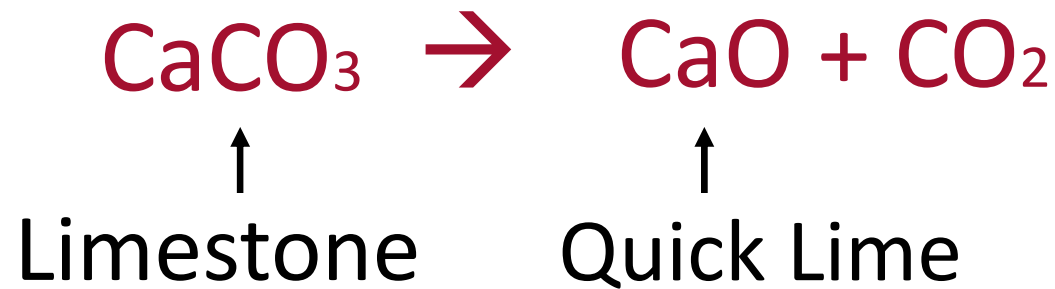
- Water treatment is a necessary component of modern living
- **Hawaii currently has been in a period of drought since 2008, meaning freshwater sources are becoming used up**



Traditional Concrete Manufacturing

Flour + Water + Egg = BREAD

Cement + Water + Aggregate = CONCRETE



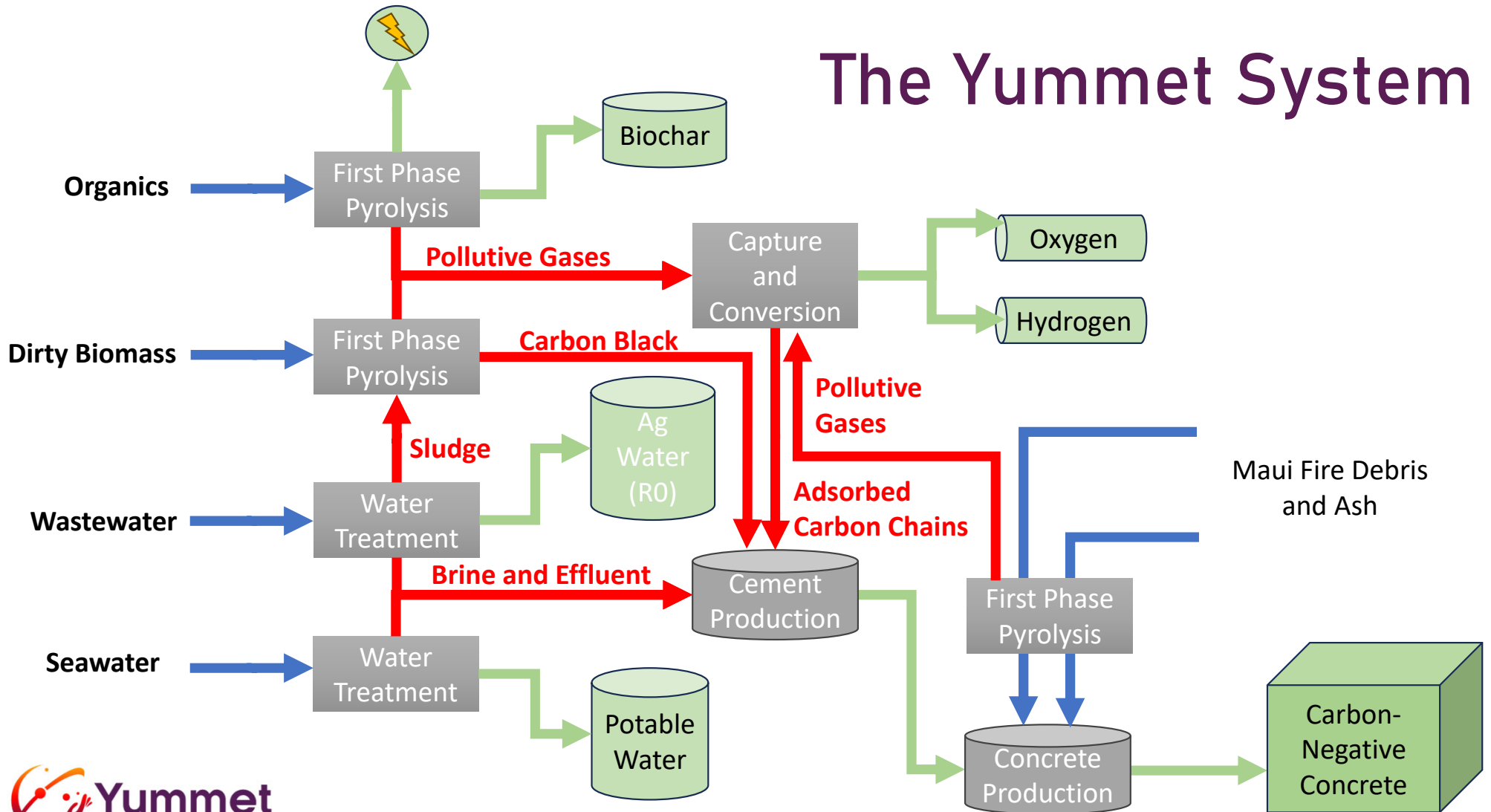
Traditional Concrete Manufacturing

Cement + Fine Aggregate + Coarse Aggregate + water
Sand Rocks
= Concrete

Yummet Design Philosophy

- Our goal when creating our system was to make a process where we produce the most amount of useful products, with removing the most amount of waste from the environment
- We wanted to recycle the wastes from other industries if we could
- This procedure takes the pollution from other systems and makes them inputs to other systems
- This helps to alleviate waste production from these processes, and makes otherwise pollutive technologies feasible and environmentally friendly

The Yummet System



A close-up photograph of a concrete surface with a diamond-shaped pattern. The concrete is light gray and shows signs of wear, including small pits and discoloration. The diamond shapes are separated by dark, recessed expansion joints. The text "Green Concrete" is overlaid in the center in a white, sans-serif font.

Green Concrete

The American Concrete Institute (ACI)



American Concrete Institute



Dr. Rex Donahey

Director of Innovative Concrete



University of Wisconsin - Stout



Dr. Kevin MacDonald, PE, P.Eng, FACI

Named Top 5 Most Influential People in the Concrete Industry

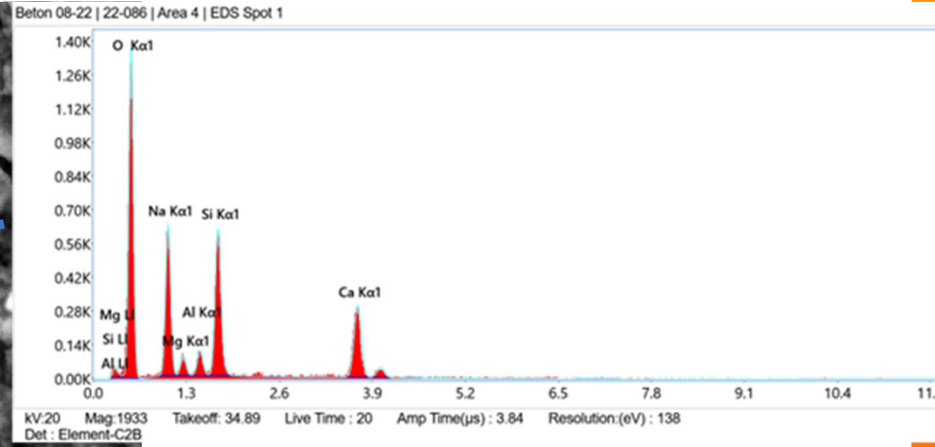
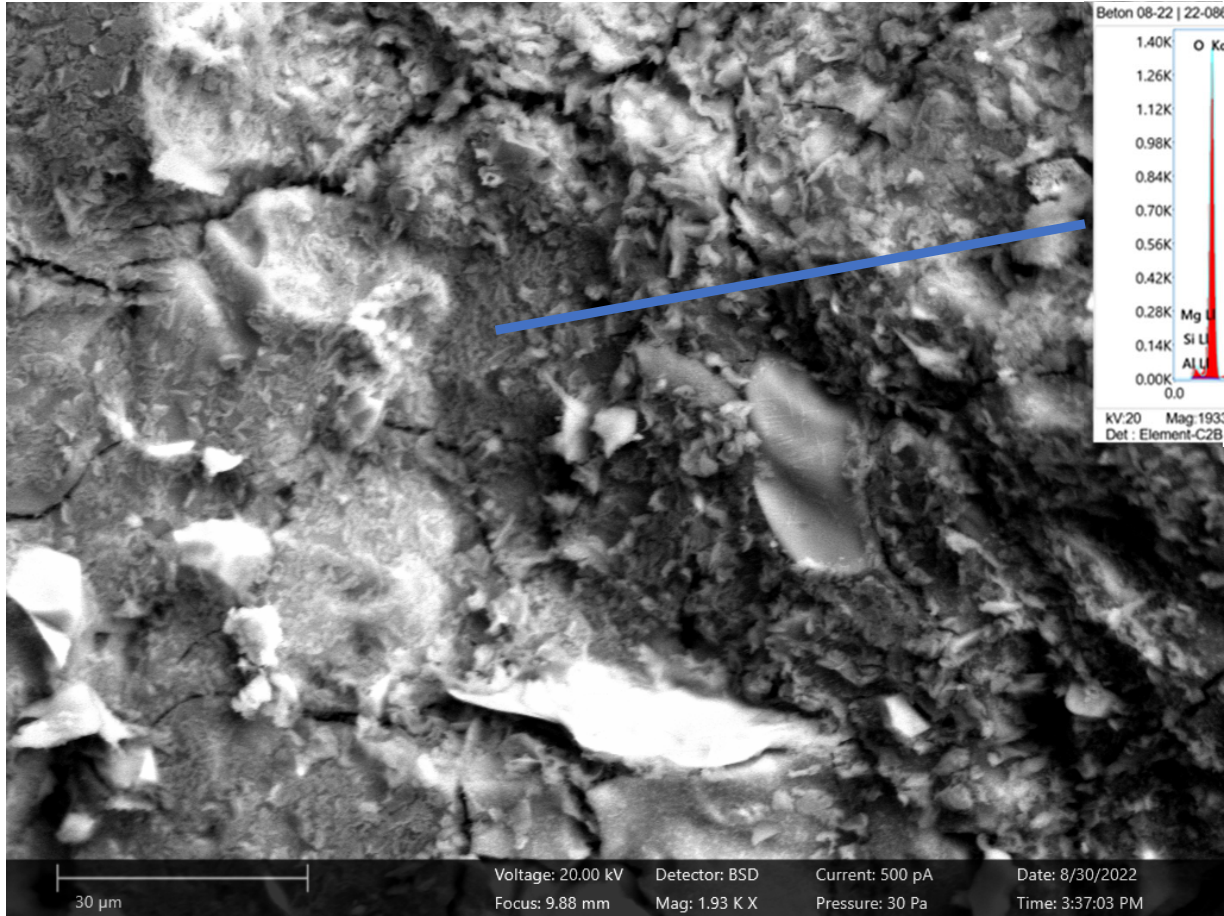
Kevin MacDonald

- Officer of many American Concrete Institute (ACI) Committees, including
 - Responsibility in Concrete Construction Committee
 - Sustainability Committee
 - Cold Weather Construction Committee
- Member of Technical Activities Committee at ACI
- Drafter? Contributor? ACI 318 (A) Building Code Requirements
- Drafter? Contributor? ITG 10 Alternative Cementing Materials

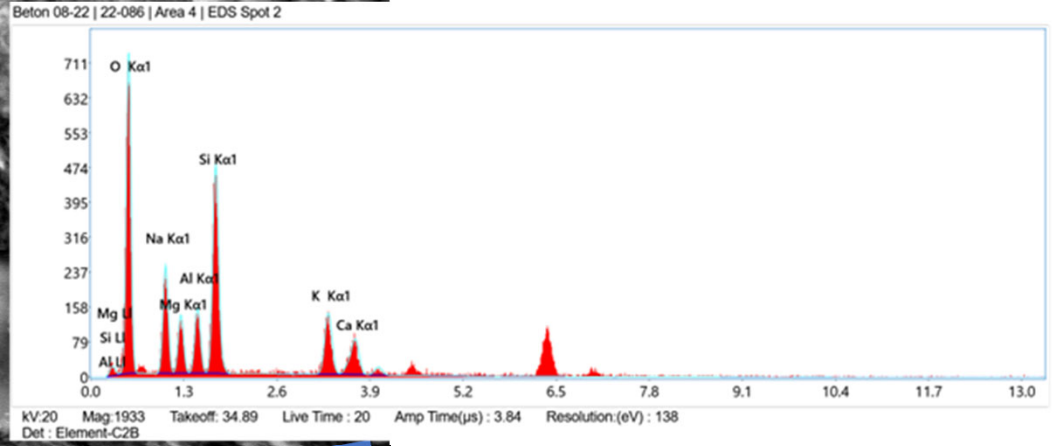
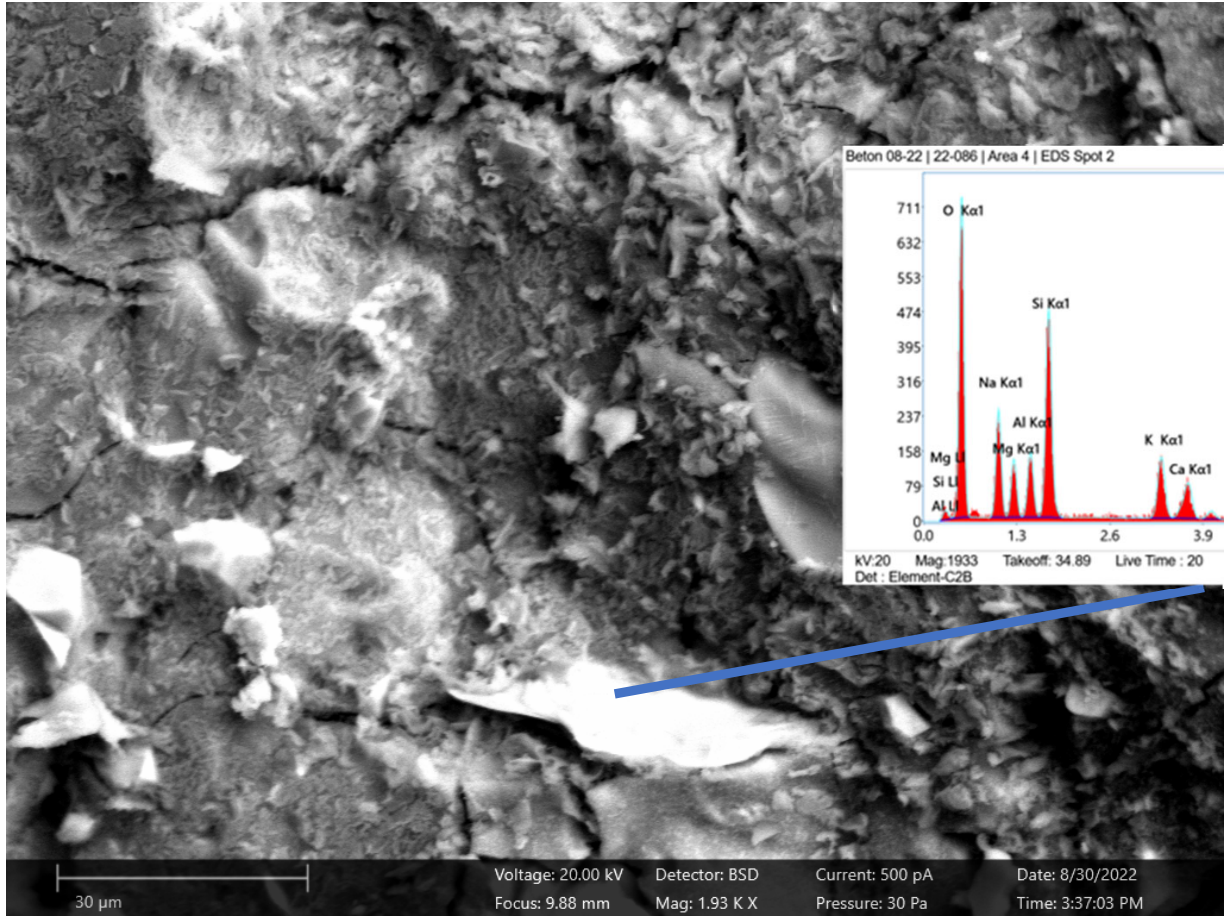
Award Winning Engineering Work

- Pankow Award for Innovation “Concrete with 98 percent Recycled Materials” 2012 ASCE
- Jean-Claude Roumain Innovation in Concrete Award 2013, ACI Foundation
- Rank of Fellow of ACI
- ACI Young Member Award For Professional Achievement 2001



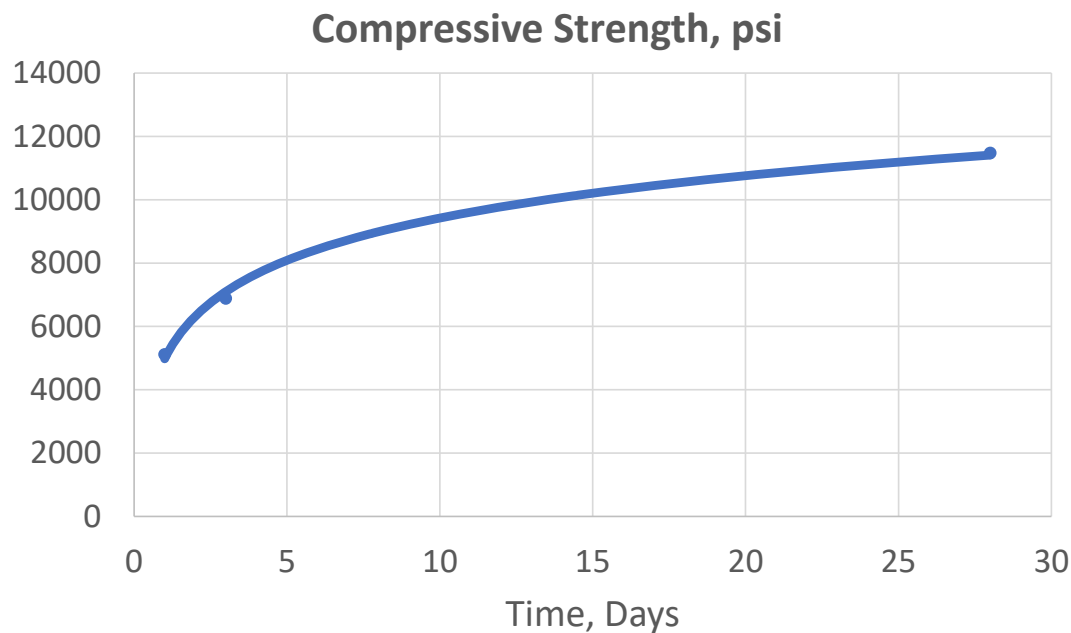


Voltage: 20.00 kV Detector: BSD Current: 500 pA Date: 8/30/2022
Focus: 9.88 mm Mag: 1.93 K X Pressure: 30 Pa Time: 3:37:03 PM



Voltage: 20.00 kV Detector: BSD Current: 500 pA Date: 8/30/2022
Focus: 9.88 mm Mag: 1.93 K X Pressure: 30 Pa Time: 3:37:03 PM

Concrete Mechanical Properties



Modulus of Elasticity 3 days 6.94×10^6 psi
Poisson's Ratio 0.36
 $83000 (f'c)^{1/2}$

Initial Setting 3:15
Final Setting 5:10

Slump 4 inches (readily available at any slump)

Flexural Strength 7 days 1000 psi

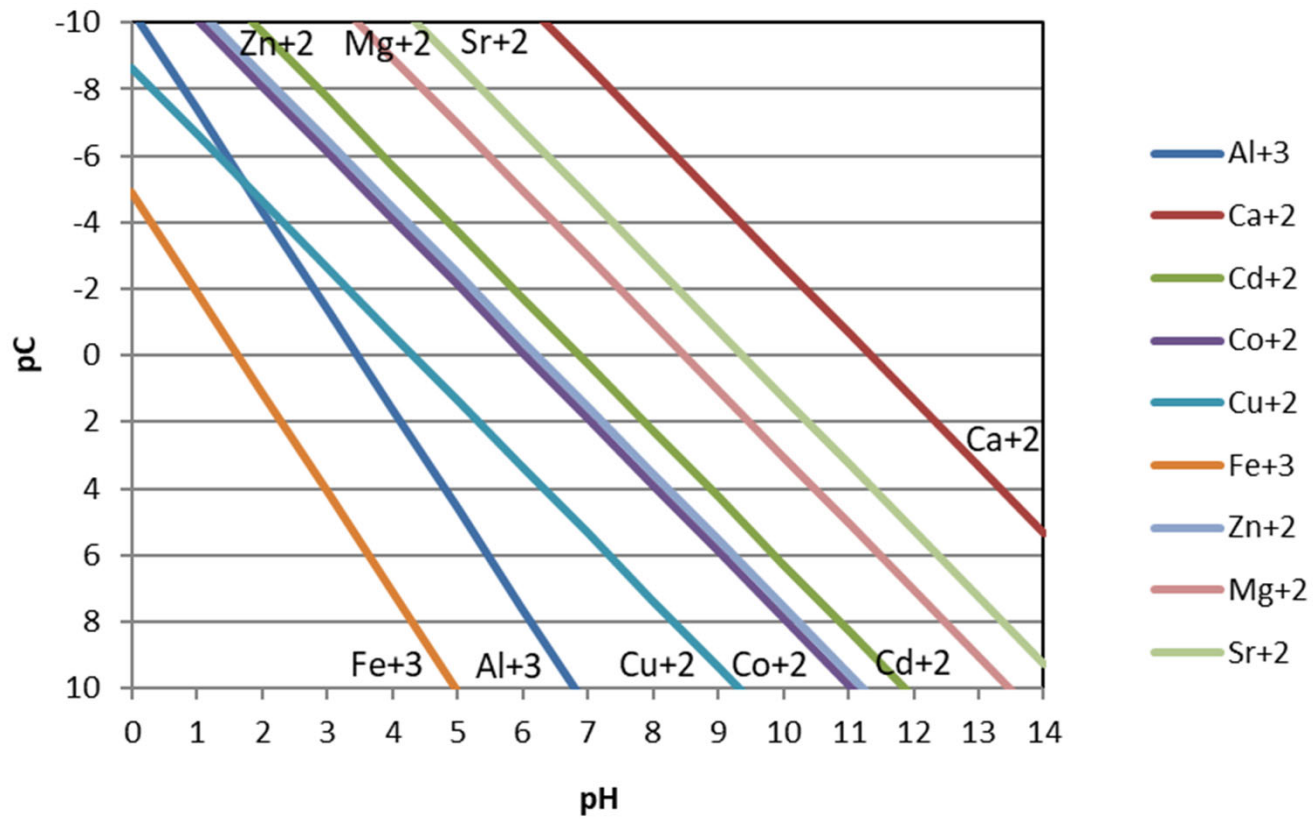
$MOR = 11(f'c)^{1/2}$

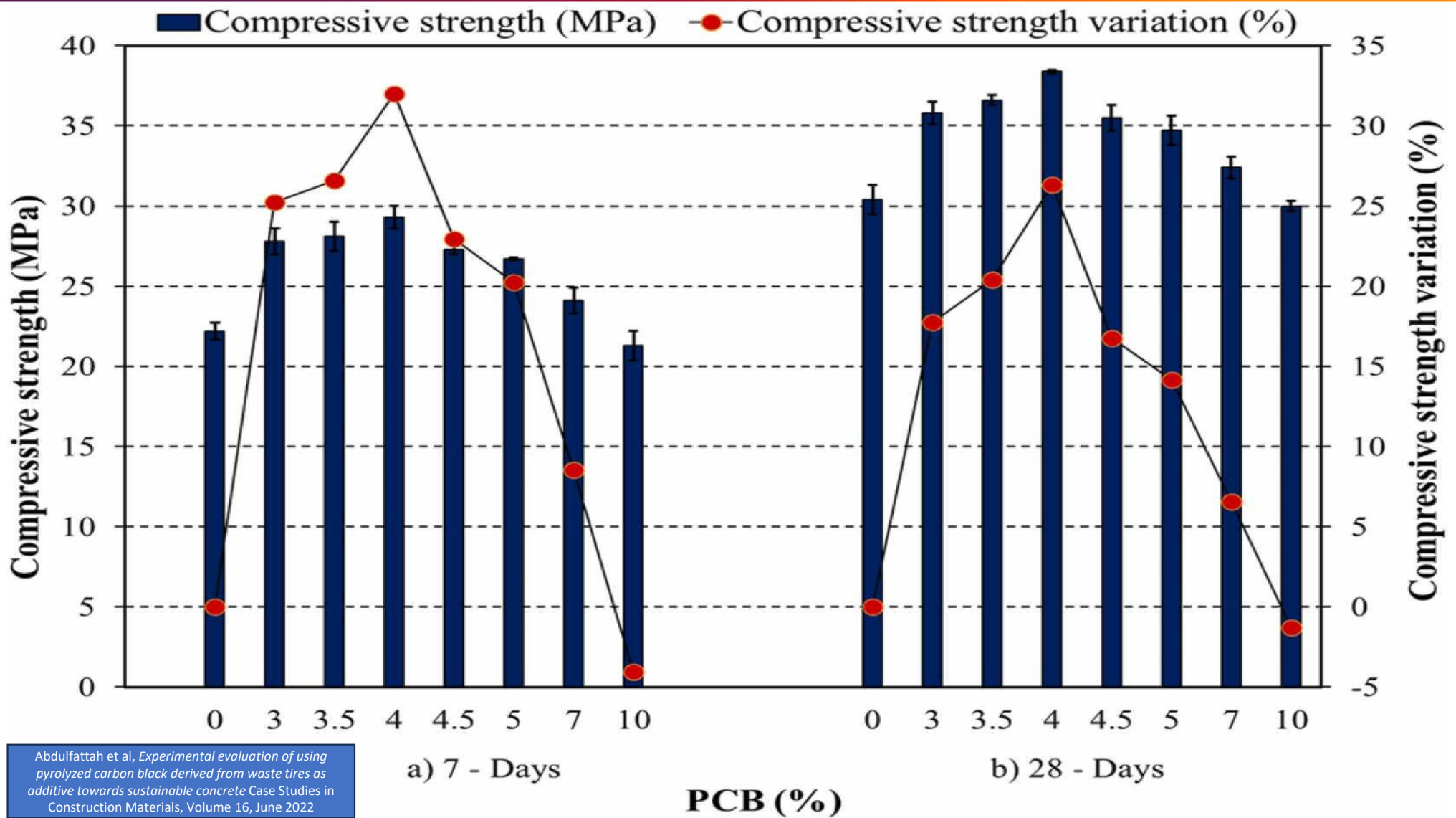
Production and Durability Design

- The pH of the concrete is similar to or less than that of portland cement concrete. Normal precautions need to be taken regarding contact of the materials with unprotected skin.
- Yummet Concrete can be made to be permeable for drainage.
- Yummet Concrete can be air-entrained using conventional methods and materials.
- Chloride Ion Resistance RCP equivalent of 200 C passed in ASTM C1202
- Shrinkage is similar to OPC Concrete without curing the Yummet materials
- Some efflorescence can be expected where the concrete is in contact with the soil.

Concrete - Synthetic Rock and Sink

- Binder and Inert Particulate materials
- Largest Chemical Reaction in the World
- Binders will sequester metals interstitially and substitutionally
- High pH suppresses pC of metal ions (C) due to low K_{sp}
- Binds Heavy metals that cannot be released without destruction of the binder fabric
- Carbon Black will act as a nucleation accelerator
- Concrete can be infinitely recycled as aggregate





Abdulfattah et al, *Experimental evaluation of using pyrolyzed carbon black derived from waste tires as additive towards sustainable concrete* Case Studies in Construction Materials, Volume 16, June 2022

Technology Transfer and Scaling

- Kevin MacDonald was Vice President Engineering for a large Concrete Producer
- Oversaw technical and operational aspects of production of 30+ million cubic yards of
- Consulting on Concrete Performance and Structural Design
- Inventor on Patents and Patent Pending for Alternate Cementing Materials and Supplementary Cementing Materials

Yummet Concrete Summary

- Concrete is made entirely from waste products
 - No mining
 - No importing
- Superior Mechanical Performance
- Passed MnDOT Federal Highways Batch Testing
- ASTM C1157 Certified

- Ash content has been analyzed. We would require sample materials be sent to our lab in St. Paul for a Production Test.



Minnesota Department of Transportation (MnDOT): Office of Materials & Road Research



Dr. Bernard Izevbekhai, PE

Concrete Research Professional Engineer -

MnROADS, Minnesota DOT, Department of Transportation



Izevbekhai, Bernard (DOT)

to me ▾

- Yummet Net-negative concrete was selected as the alternative material 2022
- Yummet Net-Negative Concrete went through Trial batching / testing successfully in 2022
- Yummet responded to the NRRRA Call for Innovation in 2023
- Yummet is in the finalist group for selection to Place Net-Negative Concrete in the 2024 MnROAD Mainline Test Cell Construction.

Dr. Bernard Igbafen Izevbekhai

Bernard I. Izevbekhai, P.E. (MN); Ph.D.

Research Operations Engineer

Minnesota Department of Transportation

Office of Materials & Road Research

1400 Gervais Avenue Maplewood MN 55109

E-mail: bernard.izevbekhai@state.mn.us

Phone: 651 3665454 Fax: 6513665461 Cell :6518025515

ORCID Researcher ID: <https://orcid.org/0000-0003-1024-2487>

Google Scholar Page: <https://scholar.google.com/citations?user=hKqhMU8AAAAJ&hl=en&oi=ao>

Web of Science Researcher ID: K-2846-2019



<https://dot.state.mn.us/mnroad/nrra/index.html>

Chief Financial Officer



Henry Hu

Former CFO at IBM SYSTEMS

On Call For Q&A



Biochar



United States Biochar Initiative (USBI)



John Webster

United State Biochar Initiative Communications



Green Hydrogen

Hawai'i State Energy Office



**HAWAI'I
STATE
ENERGY
OFFICE**

Hydrogen Production Partner



**HAWAII STATE ENERGY OFFICE
STATE OF HAWAII**

235 South Beretania Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii'i 96804

Telephone: (808) 587-3807
Web: energy.hawaii.gov

JOSH GREEN, M.D.
GOVERNOR

MARK B. GLICK
CHIEF ENERGY OFFICER

March 8, 2023

VIA ELECTRONIC MAIL

Brittany Zimmerman
Founder and Chief Executive Officer
Yummet Hawai'i LLC
1143 Kukuau Street
Hilo, Hawai'i 96720
brittany@yummet.com

Dear Brittany Zimmerman,

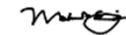
Re: Request for Interest for Regional Clean Hydrogen Hubs U.S. Department of Energy
Solicitation No. RFI-23-034-HSEO

This is to inform you that Yummet Hawai'i LLC has been selected to be an additional teaming partner in the Hawai'i Pacific Hydrogen Hub full federal grant application to the U.S. Department of Energy for the above-named grant funding opportunity. You have been selected for the following category:

Hydrogen Production Partner

Due to the short deadline, we expect numerous coordination calls, meetings, and information requests between now and until the submittal deadline on April 7, 2023. We look forward to speaking with you soon.

Sincerely,



Mark B. Glick
Chief Energy Officer



COLUMBIA | ENGINEERING

The Fu Foundation School of Engineering and Applied Science

Environmental Law, Policy, and Nonprofit



Dr. Michael Ginsberg

Doctor of Engineering Science, Earth and Environmental Engineering

Green Hydrogen Solutions



Ebrahim Takolia

Former Executive in Energy and Resource Management at Deloitte

Chief Marketing Officer



Bryce Groark

Emmy Nominated Cinematographer for Mission Blue



Environmental Law, Policy, Nonprofit, and Community Engagement



Melinda Hughes, MELP

Environmental Law and Policy Expert

30+ Years of Working in the Environmental Field

All levels – local, state, federal, international

- natural disaster recovery,
- brownfields,
- water quality and drinking water assessment,
- stream health assessment,
- invasive flora and fauna,
- wildlife protections and management,
- forest management,
- sustainable buildings,
- decarbonization and electrification,
- natural resource extraction policy and subsequent community clean-up, biosolids,
- climate mitigation adaptation and resilience,
- environmental justice, and
- environmental health



Career Highlights

- Coastal Louisiana Habitat Restoration project – 65,000 volunteer hours on hurricane-damaged lands from May 2007 – May 2008; turned an initial \$182,000 grant into a \$1.8 million grant by seeking matching and in-kind donations. Volunteers traveled from across the country. Winner of the US EPA's Guardian of the Gulf Award.
- Aided with the creation of materials for former Vice President Al Gore's Climate Crisis trainings.
- Led a national water quality monitoring program. This program received multiple awards, one being from the United Nations Environment Program.
- Summer 2023 consulted on a national campaign related to federal forest policy, securing more than 500,000 public comments to the federal government.
- Presenter at the European Citizen Science Association's gathering at the United Nations European Office in Geneva, Switzerland
- Presenter at the World Water Forum in Kyoto, Japan 2003



Yummet is excited to work with people who are interested in being part of the solution and who believe in science and culture. It is essential that scientific and cultural solutions are developed by those with scientific and cultural competency.



Ethical Journalism

The Society of Professional Journalists has a [code of ethics](#), which includes these four principles:

Seek Truth and Report It

- Ethical journalism should be accurate and fair. Journalists should be honest and courageous in gathering, reporting and interpreting information.

Be Accountable and Transparent

- Ethical journalism means taking responsibility for one's work and explaining one's decisions to the public.

Minimize Harm

- Ethical journalism treats sources, subjects, colleagues and members of the public as human beings deserving of respect.

Act Independently

- The highest and primary obligation of ethical journalism is to serve the public.

Richard Ha

Local Hawaiian Commercial Farmer
Keoki and Malia Organization

www.keokiandmalia.org



Pana'ewa Hawaiian Home Lands Community Association (PHHLCA)



Kauilani Almeida

President of Pana'ewa Hawaiian Home Lands Community Association



Mahalo

DRIP Committee

From: Brittany Zimmerman <brittany@yummet.com>
Sent: Wednesday, January 10, 2024 12:19 PM
To: DRIP Committee
Subject: Slide Deck for Jan 10 DRIP Committee
Attachments: January DRIP Committee Presentation_For Maui.pdf

You don't often get email from brittany@yummet.com. [Learn why this is important](#)

Aloha, Paige,

Please see the deck attached. We will be screen sharing to walk through some additional details.

We look forward to meeting with you shortly.

Mahalo!



Brittany Zimmerman
FOUNDER | CEO | CHIEF OF INNOVATION



Yummet | Celestial and Terrestrial Sustainability

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p: +1 (808)987-9917

