



# ALGAE BIOMASS SUMMIT 2017

SALT LAKE CITY • OCTOBER 29 – NOVEMBER 1

## 2017 Algae Biomass Summit Detailed Agenda

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### **Sunday, Oct 29**

12:00 pm – 7:00 pm Registration Open

**6:00 pm – 7:00 pm Algae Biomass Organization Annual Meeting**

**7:00 pm – 8:15 pm Algae 101**

*Whether you are attending for the first time or the 11<sup>th</sup>, you will take something valuable away from this industry orientation. Perfect for investors, those new to the Summit, or anyone wanting an inside track to the week's activities and personalities.*

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### **Monday, Oct 30**

7:00 am – 5:30 pm Registration

**8:00 am – 8:30 am Welcome and Opening Remarks**

**8:30 am – 9:00 am Opening Plenary Session 1 Keynote**

**9:00 am – 10:15 am Plenary Session 1 Panel: Nutrition**

***The Growing Role of Algae in Health & Nutrition***

*Whether as a sustainable source of alternative proteins, nutraceuticals and oils, or as a production platform for innovative therapies and new drugs, algae are increasingly being looked to as a key source of health and nutrition solutions for the 21<sup>st</sup> century. This panel brings together algae innovators with brand owners – from global nutrition leaders to pioneers in plant-based products – to discuss opportunities and challenges in bringing algae health solutions to the global market.*

**Moderator: Rebecca White, Qualitas Health**

***Chris Butt, Principal Scientist, DSM***

***Xun Wang, CEO, Triton Algae Innovations***

***Miguel Calatayud, Qualitas Health***

**10:15 am – 10:30 am Ribbon Cutting and Grand Opening of the 2017 Algae Biomass Summit**

10:30 am – 11:00 am Exhibit Hall Opening / Energy Break / Young Innovators Lounge

**11:00 am – 11:30 am Algae Foundation and Technical Standards Update**

**11:30 am – 12:45 pm Plenary Session Panel 2: Finance**

**Getting to Scale: Where Will the Future of Algae Tech Investment Come From?**

*Algae innovation offers solutions in agriculture, health, environment, materials, manufacturing, and more. This diversity is both the industry's strength and its challenge. Investors from Wall Street to Main Street discuss the investment landscape from ag tech to domestic infrastructure.*

**Moderator: Martin Sabarsky, CEO, Cellana**

***Ab Basu, Executive Director, Rural Jobs Coalition***

***Ryan Dressler, Advantage Capital***

***Rep. Scott Sandall, State Representative Utah District 1***

***Chris Cassidy, Renewable Energy, U.S. Department of Agriculture***

12:45 pm – 1:45 pm Lunch in the Exhibit and Poster Hall

**1:45 pm – 3:15 pm Breakout Session 1 – Concurrent Track Panels**

*Biology*

**Searching for Solutions: Methods for Strain Screening and Characterization**

The vast functional diversity of algae has motivated us to screen existing strains to identify better traits for commercial development. At the same time, it is important to understand how strains behave in engineered cultivation systems. The presentations in this session will cover new methods for isolating strains with improved performance, as well as evaluating their growth and productivity. This session will present strain selection activities at multiple scales, the impact of leveraging genetics for strain selection, evolutionary approaches, and other analytical techniques.

**Moderator: Kenneth Reardon, Colorado State University**

***Taraka Dale, Los Alamos National Laboratory***

***Michael Huesemann, Pacific Northwest National Laboratory***

***Paul Roessler, Algenol Biotech***

***Christina Tyler, Los Alamos National Laboratory***

***Josh Stepanek, St. Cloud State University***

*Commercialization, Finance & Policy*

**Products, Products, Products: Producing and Recovering Nutraceuticals and Other High Valued Nutritional Products**

A variety of high valued products are being investigated in the commercial space. This session will present on challenges and advancements not only in production but recovery of Spirulina, Astaxanthin, Polyunsaturated Oils, and Omega-3 oils.

**Moderator: Ian Woertz, MicroBio Engineering, Inc.**

***Amha Belay, Earthrise Nutritionals***

***James Irwin, Algaecan Biotech, Ltd.***

***Yubin Zheng, Shandong Jinjing Biotechnology Co., Ltd.***

***Rebecca White, Qualitas Health, Inc.***  
***Thushan Withana-Gamage, POS Bio-Sciences***

*Engineering & Analysis*

**Beginning with the End in Mind: How Algae Applications Affect Growth Rates and the Cultivation System Design**

As interest in the diverse set of applications for industrial scale algae cultivation increases, more attention is being paid to how these applications influence growth environments. In this session, speakers will address how algae cultivation systems are affected by their focus on production of fertilizer, wastewater treatment and carbon sequestration.

**Moderator: Sandeep Kumar, Old Dominion University**  
***Ruth Spierling, MicroBio Engineering, Inc.***  
***Martin Gross, Gross-Wen Technologies, Inc.***  
***Daniel Mohler, University of Kentucky, CAER***  
***Derek Hess, Colorado State University***  
***Sandeep Kumar, Old Dominion University***

*Focus Topic*

**The Elephant in the Room: Macroalgae!**

Macroalgae represent a promising area for the production of biomass. The Department of Energy is currently investing with the goal of developing transformative technologies to reduce the cost of algal-based production. This session will overview current technologies, future research projects, and current economics for the production of macroalgae.

**Moderator: Ira Levine, University of Southern Maine**  
***Mark von Keitz, ARPA-E***  
***Tollef Olson, Ocean Approved***  
***Charles Yarish, University of Connecticut***  
***Ira Levine, University of Southern Maine***  
***Jason Quinn, Colorado State University***

3:15 pm – 4:00 pm Exhibit Hall / Energy Break / Young Innovators Lounge in Session

4:00 pm – 5:30 pm **Breakout Session 2 – Concurrent Track Panels**

*Biology*

**Approaches to Identifying and Developing Novel Strains**

Strains with improved performance can be isolated from natural environments or developed through cellular engineering. Presentations in this session will cover the isolation of strains from deserts and high salt environments, the use of synthetic biology to develop new strains, and the use of phylogenetics to evaluate novel strains.

**Moderator: Taraka Dale, Los Alamos National Laboratory**

*Dries Vandamme, KU Leuven Campus Kulak Belgium*  
*Michael Guarnieri, National Renewable Energy Laboratory*  
*Michael Sandmann, Institute for Food & Environmental Research e.V.*  
*Juergen Polle, Brooklyn College*  
*Richard Sayre, Los Alamos National Laboratory*

*Commercialization, Finance & Policy*

**Dollars and Cents: Economic and Policy Changes in Algae**

This session will cover a broad range of topics including funding outlook, research tax credits, changes in EPA regulations for genetic organisms, and IP valuation. The economic viability of algae systems are dependent on advancements in all of these areas.

**Moderator: Rebecca White, Qualitas Health, Inc.**  
**Martha Marrapese, Wiley Rein LLP**  
**Thomas Byrne, CarlsonSV**  
**James Drage, Algaculture Project**  
**Jeremiah Frueauf, Sterne Kessler Goldstein & Fox LLP**  
**Clare Thorp, Biotechnology Innovation Organization**

*Engineering & Analysis*

**Leveraging Advances in Computational Modeling to Bend the Algae Cost Curve**

The design and operation of algae production systems is benefiting from advances in modeling and less expensive computational power. In this session, speakers will address how computational modeling serves as an important tool in optimizing algae cultivation systems.

**Moderator: Carlos Quiroz-Arita, Colorado State University**  
**Jeremy Pruvost, AlgoSource Technologies-University of Nantes**  
**Samuel Compton, Colorado State University**  
**Neal Adler, MicroBio Engineering, Inc.**  
**Myra Blaylock, Sandia National Laboratory**  
**Carlos Quiroz-Arita, Colorado State University**

*Focus Topic*

**Turning One Green Thing into Another: Novel Algae Conversion Techniques at the Interface of Engineering and Commercialization**

A critical step in gaining economic value from algae cultivation is conversion to valuable products. There are a broad range of downstream processing techniques available, giving producers options about which products to bring to market, and what engineered processes can be used to get there. This session bridges the gap between engineering and commercialization in a discussion of algae conversion and processing techniques that are compatible with a market-driven product development approach.

**Moderation: Anthony Marchese, Colorado State University**

**Eric Monroe, Sandia National Laboratory**  
**Philip Pienkos, National Renewable Energy Laboratory**  
**Andre Coleman, Pacific Northwest National Laboratory**  
**Pascale Champagne, Queen's University**  
**Jessica Tryner, Colorado State University**

5:30 pm – 7:00 pm Grand Opening Reception / Poster Session #1  
 Exhibit & Poster Hall Open

**Tuesday, Oct 31**

7:00 am – 5:00 pm Registration  
 7:00 am – 6:15pm Exhibit & Poster Hall Open  
 7:15 am – 8:00 am Continental Breakfast in Exhibit & Poster Hall

**8:00 am – 8:30 am Plenary Session 3 Keynote**  
**Christy Sterner, Bioenergy Technology Office, U.S. Department of Energy**

**8:30 am – 9:45 am Plenary Session 3 Panel: Agriculture & Feed**

***Sustaining the Future of Fish and Animal Feed***

*Globally we are highly dependent on grains, soy and fishmeal for animal feed. As global population grows and demand for animal protein increases, producing this feed places more pressure on land and marine resources. Developing new sources of animal feed is critical to meet demand while reducing pressure on our planet's resources. The panel aims to highlight the current and potential adoption of algae ingredients for aquaculture, terrestrial and pet feed. Algae protein and algae-based marine omega-3s have emerged as scalable and sustainable ingredients for animal feed.*

**Moderator: Jill Kauffman-Johnson, TerraVia**

**Adam Ismail, GOED**

**George Chamberlain, Global Aquaculture Alliance (invited)**

**Peter Bergstrom, ADM (invited)**

**Barb Howe, Kemin Industries (invited)**

9:45 am – 10:30 am Exhibit & Poster Hall / Energy Break / Young Innovators Lounge in Session

**10:30 am – 12:00 pm Breakout Session 3 – Concurrent Track Panels**

*Biology*

**Leveraging –Omics Tools to Understand Metabolic Diversity in Algal Systems**

Microorganisms are complicated biological factories, but -omics tools offer new ways to understand the physiology, metabolism, and environmental responses of algae and cyanobacteria. Presentations in this session will provide information on new –omics tools and highlight their usefulness for probing algal metabolism.

**Moderator: Michael Guarnieri, National Renewable Energy Laboratory**  
**Robin Gerlach, Montana State University**  
**Niu Du, University of California-San Diego**  
**Aumaya Taleb, University of Nantes-GEPEA Laboratory**  
**Peter Karp, SRI International**  
**Kenneth Reardon, Colorado State University**

*Commercialization, Finance & Policy*

**Across the Pond: Advancements in Europe**

Focusing on advancements across the value chain being made in Europe, the session will cover economic challenges, high valued products, and market analysis.

**Moderator: Rene Wijffels, Wageningen University**  
**Maria Barbosa, Wageningen University**  
**Guido Reinhardt, IFEU-Institute for Energy and Environmental Research, Heidelberg**  
**Imogen Foubert, K.U. Leuven Kulak**  
**Orri Bjornsson, Algalif**  
**Dorinde Kleinegris, Uni Research AS**

*Engineering & Analysis*

**Making the Most Out of Algae: Advances in Extraction, Processing and Conversion**

Alongside the wide range of products that can be produced using algae is an equally varied set of techniques for mechanically and chemically altering algae into commercially viable products. In this session, speakers will address several key advances in the extraction, processing, and conversion of algae.

**Moderator: Lieve Laurens, National Renewable Energy Laboratory**  
**Katherine DeRose, Colorado State University**  
**Michael Kempkes, Diversified Technologies, Inc.**  
**Andrew Bessette, Old Dominion University**  
**Xiang Cheng, University of Toronto**  
**Lieve Laurens, National Renewable Energy Laboratory**

*Focus Topic*

**Beyond Fuels: Opportunities in Agriculture and Chemicals**

Algae have the potential to produce chemicals and materials, and to provide solutions to agricultural challenges. Presentations in this session provide examples of these new opportunities, ranging from high-value products to integrating algae cultivation with agricultural residues.

**Moderator: Jason Quinn, Colorado State University**  
**Laura Carney, Heliae**  
**Adriana Alvarez De la Hoz, University of Minnesota**

*Jianping Yu, National Renewable Energy Laboratory*  
*Gregory Rorrer, Oregon State University*  
*Peter Lammers, Arizona State University*

12:00 pm – 1:00 pm Lunch in the Exhibit and Poster Hall / Poster Session #2

**1:00 pm – 2:30 pm Breakout Session 4 – Concurrent Track Panels**

*Biology*

**Alternative Culturing Strategies**

Productivity is essential for successful algal cultivations. This session focuses on alternative approaches to achieving high productivity, including polycultures, feeding strategies, and the manipulation of system ecology.

**Moderator: Michael Huesemann, Pacific Northwest National Laboratory**

*Anthony Siccardi, Texas A&M AgriLife Research*

*Ty Samo, Lawrence Livermore National Laboratory*

*Omar Chiriboga, Oregon State University*

*Matthew Jackson, Montana State University*

*Frederique Belanger-Lepine, University of Quebec at Trois-Rivieres*

*Commercialization, Finance & Policy*

**Thinking Outside the Pond: Advancements in Photobioreactors**

Photobioreactors represent promising growth systems addressing some of the core issues with open systems. This session will present on advancements in physical growth systems and impact of automation on operations.

**Moderator: Valerie Harmon, Harmon Consulting**

*Albert Vitale, Commercial Algae Professionals*

*Fritz Wintersteller, SCHOTT Tubing*

*Heikki Hyttinen, Subitec GmbH*

*Ed Legere, Algenol Biotech*

*Eugene Roebroek, LGem*

*Engineering & Analysis*

**Water, Water, Everywhere: Novel Approaches for Cost Effective Algae Harvesting and Dewatering**

Moving from dilute volumes of algae suspended in water to dried and concentrated algae produce is an energy intensive and economically costly component of microalgae cultivation and processing. In this session, speakers will discuss a range of novel approaches for cost effective harvesting and dewatering of algae.

**Moderator: Jordan Kern, University of North Carolina - Chapel Hill**

*Teodora Shuman, Seattle University*

*Alyssa Aligata, Colorado State University*

***Xuezhi Zhang, Institute of Hydrobiology, Chinese Academy of Sciences***  
***Ashok Damle, Techverse, Inc.***  
***Sridhar Viamajala, University of Toledo***

*Focus Topic*

**Navigating the Dual Role of Carbon as Pollutant and Critical Feedstock**

Algal biofuels have tremendous potential as a low-carbon source of transportation fuel. At the same time, the potential for widespread, cost-competitive algae cultivation may be intrinsically limited by a lack of access to concentrated carbon feedstocks. Speakers in this session will discuss the role of algae in mitigating carbon pollution via co-location with power plants and approaches for addressing potential carbon supply bottlenecks in cultivation.

**Moderator: Babetta Marrone, Los Alamos National Laboratory**  
***Jacques Beaudry-Losique, Algenol Biotech***  
***Agasteswar Vadlamani, The University of Toledo***  
***Everett Eustance, Biotdesign Swette Center for Environmental Biotechnology of Arizona State University***  
***Kyle Poole, MicroBio Engineering, Inc.***  
***John Benemann, MicroBio Engineering, Inc.***

2:30 pm – 3:15 pm Exhibit Hall Opened / Energy Break / Young Innovators Lounge  
3:15 pm – 4:45 pm **Breakout Session 5 – Concurrent Track Panels**

*Biology*

**Waste Not Want Not: Impacts of Nutrient Source on Algal Biology**

Nutrients are a critical aspect of algal systems for both biological and economic reasons. This session emphasizes research that evaluates the impact of a variety of nutrient sources on algal biology, including data from small- to large-scale cultivations.

**Moderator: Todd Lane, Sandia National Laboratory**  
***Todd Pedersen, Montana State University***  
***Rob Gardner, University of Minnesota***  
***Thinesh Selvaratnam, AzCATI, Arizona State University***  
***Ian Woertz, MicroBio Engineering, Inc.***  
***Jorijn Janssen, Wageningen University and Research***

*Engineering & Analysis*

**Designing Algae Systems that Meet the “Triple Bottom Line”**

Taking advantage of algae’s economic and environmental potential requires approaches for measuring and optimizing the design of algae systems as both: 1) a stand-alone industrial processes; and 2) interactive components within larger industrial ecology contexts. In this session, speakers will discuss the application of techno-economic analysis (TEA) and life-cycle assessment (LCA) to measure the sustainability of algae systems in different circumstances.



**Moderator: Jordan Kern, University of North Carolina – Chapel Hill**  
**Chih-Ting Kuo, UIUC**  
**Michael Walsh, Institute for Sustainable Energy, Boston University**  
**Jennifer Markham, National Renewable Energy Laboratory**  
**Deborah Sills, Bucknell University**  
**Jordan Kern, University of North Carolina-Chapel Hill**

*Focus Topic*

**Striving to Close the Cycle: Role of Algae in the Fossil Fuel and Mining Industry**

The Western U.S. has large reserves of fossil fuels, including coal, oil and gas, as well as large deposits of valuable minerals. Algae can play a role in both, improved economics and decreased footprint of operations by utilizing low value waste streams for the cultivation and processing of algae. The presentations in this session will summarize approaches and processes with the potential for value-enhanced operations through the use of algal-based technologies and products.

**Moderator: Ron Sims, Utah State University**  
**Frederique Belanger-Lepine, University of Quebec at Trois-Rivieres**

4:45 pm – 6:00 pm Evening Reception

5:15 pm – 6:45 pm VIP Event

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**Wednesday, Nov 1**

7:15 am – 8:00 am Continental Breakfast in Exhibit & Poster Hall

7:30 am – 11:00 am Registration

7:30 am – 10:15 am Exhibit & Poster Hall Open

**8:00 am – 9:30 am Breakout Session 6 – Concurrent Track Panels**

*Biology*

**Algae as a Crop: Detection and Mitigation of Pathogens**

Culture stability is critical to the integrity of large-scale production of algal biomass. This session highlights current research on strategies for improving biomass stability, with a focus on identifying and treating non-desirable contaminants.

**Moderator: Rob Gardner, University of Minnesota**  
**Thomas Dempster, AzCATI-Arizona State University**  
**Carolyn Fisher, Sandia National Laboratory**  
**Ryan Simkovsky, University of California-San Diego**  
**Kunal Poorey, Sandia National Laboratory**  
**Todd Lane, Sandia National Laboratory**

*Commercialization, Finance & Policy*

**Industry Leaders: Reports from Commercialization's Front Lines**

**Moderator: Albert Vitale, Commercial Algae Professionals**

**David Hazlebeck, Global Algae Innovations**

**John Benemann, MicroBio Engineering**

**Dave Meyer, LanzaTech**

**Eric Moellering, Synthetic Genomics**

*Engineering & Analysis*

**Waste not, want not: Optimizing the Use of Algae as a Treatment Method for Wastewater**

A growing number of municipal and industrial wastewater facilities are taking advantage of the tremendous 'win-win' potential for integrating algae cultivation in wastewater treatment systems. Pilot-scale and commercial-scale demonstrations are proving that these systems can be reliable, effective, and economical. In this session, speakers will discuss ongoing projects that demonstrate the potential for algae cultivation to be paired with wastewater treatment.

**Moderator: Ruth Spierling, MicroBio Engineering, Inc.**

**Lei Lui, Queen's University**

**Juchao Yan, Eastern New Mexico University**

**Tryg Lundquist, California Polytechnic State University**

**Garrett, Pallo, Clearas Water Recovery**

**Daniel Johnson, University of Illinois**

9:30 am – 10:15 am Exhibit Hall Opened / Energy Break / Young Innovators Lounge in Session  
10:15 am – 10:45 am Awards Presentations / Announcement of the 2018 Summit  
10:15 am – 12:00 p.m. Exhibit Hall Move-Out / Poster Pick-up

**10:45 am – 12:15 pm Plenary Session 4: Nutrient Recycling**

**KEYNOTES:**

**Rob Teegarden, Vice President, Orlando Utilities Commission**

*Monetize carbon, nitrogen and other nutrients from waste streams*

**Mark Edwards, Co-Founder, Sustainable Phosphorus Alliance**

*The Looming phosphorus crisis and the opportunities it presents*

**Nutrient Recycling: Cashing in on Carbon, Nitrogen, and Other Nutrients and Turning Environmental Mitigation into Economic Opportunity**

*Recent years have seen a wave of endorsements for algae and other microbial approaches to mitigating industrial carbon emissions; this has taken on a more international flavor following ratification of the Paris Climate accord late in 2016. More recently domestic and international interests and projects have emerged that utilize algae to mitigate nutrient, typically phosphorus and nitrogen, releases from domestic wastewater, agriculture, and feedlot operations. Together with CO<sub>2</sub> these nutrients provide all of the ingredients to grow algae and produce a variety of marketable outcomes such as carbon capture and utilization (CCU), feeds, and foods. Representatives from utilities, manufacturing and agriculture discuss challenges and opportunities for applications of algae in nutrient recycling.*

**Moderator: Mark Allen, Accelergy**

**Rob Teegarden, Vice President, Orlando Utilities Commission**

**Mark Edwards, Co-Founder, Sustainable Phosphorus Alliance**

**Dal Wayment, General Manager, South Davis Sewer District, Utah**

**Matt Lucas, Associate Director, Center for Carbon Removal**

12:15 pm

2017 Summit Adjourns

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**1:15 pm - 6:15 p.m. Utah Algae Technology Tour**

An exciting tour of regional algae technology deployments and research. This is your chance to interact directly with the engineers and scientists making real-world algae applications possible, view technologies up close, and network with fellow Summit attendees. You can add this tour to your ticket when you register.