

9th International OTEC Symposium

Program

May 4-5, 2023
Houston, Texas

Hosted by:



Sponsored by:



Shell PTX / Engineering Technology
MARINE RENEWABLE PROGRAM

Supported by:



Ocean Thermal Energy Association

This program is subject to change.

Thursday, May 4, 2023

8:00 – 9:00

REGISTRATION

Coffee and Continental Breakfast

9:00 – 9:25

WELCOME

- | | |
|---|--------------------------------|
| 1-1) Welcome from OTEA | S. Thirugnana, Symposium Chair |
| 1-2) Welcome and Host Introduction | R. Robinson, Excipio Energy |
| 1-3) Greetings from Greentown Labs | J. Grazia, Greentown Houston |
| 1-4) Greetings from Shell Marine Renewable Energy Program | P. Leung, Shell |

9:30 – 10:00

KEYNOTE 1

- | | |
|--|------------------------|
| 1-5) The Year of OTEC (where we go from here):
The Results of 50 Years of Research in Japan | Yasuyuki Ikegami, IOES |
|--|------------------------|

10:00 – 10:10

BREAK

10:10 – 10:50

SESSION 1 – COLD WATER PIPES

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|--|-------------------------------------|
| 1-5) Analyses for deep sea HDPE pipeline for
an onshore OTEC plant | A. Vishwanath, NIOT |
| 1-6) A Re-Assessment of the Potential of Land-Based
OTEC With Larger Sea-Water Intake Pipes | M. Brown, Ocean Energy Systems Ltd. |

10:50 – 11:00

BREAK

11:00– 11:40

OPENING PANEL

Theme: Cold Water Pipes

Panelist	Affiliation/Title
Greg Navarre*	Energy Harvesting Systems, CTO
Harvey Svetlik	Harvey Svetlik Consulting, Owner
Aaron Paulsey	Global Composite Piping Solutions, Vice President Operations
Matthew Danysh	AGRU America, XXL Pipe Technical Manager
Roy Robinson	Excipio Energy
* Moderator	

11:40 – 12:40

LIGHT LUNCH

12:40 – 13:10

KEYNOTE 2

2-1) OTEC Starting Point in Mexico

Miguel Alatorre, UNAM

13:10 – 14:10

SESSION 2 – POLICY and PROJECTS 1

- 2-2) Proposed Incorporation of Ocean Thermal
Energy Nasional Berhad (OTENAS) of Malaysia A. Bakar Jaafar, UTM
- 2-3) KRISO's Official Development Assistance(ODA)
Projects and Plan for Pacific Island Countries J. Moon, KRISO
- 2-4) The Global Economic Potential of Floating OTEC J. Langer, TU Delft

14:10 – 14:20

BREAK

14:20 – 15:20

SESSION 3 – POLICY and PROJECTS 2

- 3-1) Challenges and Ideas for an Offshore OTEC in Brazilian Waters J. Sales, UFRJ
- 3-2) Feasibility of OTEC Development for U.S. Islands A. Copping, PNNL
- 3-3) Recent Activity towards MW OTEC and Large-scale
Ocean Water Industries on Kumejima B. Martin, Xenosys Inc.

15:20 – 15:30

BREAK

15:30 – 16:50

SESSION 4 – TECHNOLOGY

- 4-1) Analysis of Corrugated Plate Heat Exchanger
 Geometry for OTEC through Net Power Output
 to Heat Transfer Area Ratio Maximization K. Fontaine, IOES
- 4-2) Conceptual design of an Open Cycle OTEC plant
 in Ensenada, B.C. Mexico L. Meneses, Universidad del Caribe
- 4-3) Gardens on the sea, perpetual water, food
 and energy T. Kleperis, Tekmara
- 4-4) Experimental comparison of SWAC installations
 in real-operating conditions F. Lucas, University of French Polynesia

16:50 – 17:00

BREAK

17:00 – 17:40

PANEL 2

Theme: Policy and Projects

Panelist	Affiliation/Title
Benjamin Martin*	Ocean Thermal Energy Association, Secretary General
Sathiabama T Thirugnana	Universiti Teknologi Malaysia Ocean Thermal Energy Centre, Director, PhD
Joel Sena Sales Junior	Department of Naval and Ocean Engineering, Federal University of Rio de Janeiro, Adjunct Professor, PhD
Andrea Copping	Pacific Northwest National Laboratory, Senior Research Scientist, PhD
Manuel Laboy	Government of Puerto Rico, Central Office for Recovery, Reconstruction, and Resiliency, Executive Director and Governor’s Authorized Representative
* Moderator	

17:40 – 17:45

DAY 1 CLOSING

17:45 – 19:45

RECEPTION

Friday , May 5, 2023

8:30 – 9:30

REGISTRATION

Coffee and Continental Breakfast

9:30 – 9:40

WELCOME

5-1) Day 2 Welcome from the Ocean Thermal Energy Association

B. Martin, OTEA

9:40 – 10:10

KEYNOTE 3

5-2) OTEC - The Indian perspective and Beyond

Purnima Jalihal, NIOT

10:10 – 10:30

BREAK

10:30 – 11:30

SESSION 5 – POWER CYCLE 1

5-1) Performance analysis of 10 MW Hybrid
Ocean Thermal Energy Conversion Plant
in Malaysia

S. Thirugnana, UTM

5-2) Prediction of Energy and Freshwater Generation using
a Machine Learning Algorithm in an Open OTEC

B. Pattanaik, NIOT

5-3) Changing the Game - Enhanced OTEC System Design

R. Robinson, Excipio Energy

11:30– 12:10

PANEL 3

Theme: Technology

Panelist	Affiliation/Title
Sathiabama T Thirugnana*	Universiti Teknologi Malaysia Ocean Thermal Energy Centre, Director, PhD
IKEGAMI Yasuyuki	Institute of Ocean Energy, Saga University, Director/Professor, PhD
Franck Lucas	University of French Polynesia, Researcher
Jongbeom Seo	Korea Research Institute of Ships & Ocean Engineering, Senior Engineer, PhD
Thomas Noll	Naware PLC, PhD
* Moderator	

12:10 – 13:10

LIGHT LUNCH

13:10 – 14:10

SESSION 6 – POWER CYCLE 2

6-1) Energy Harvesting Systems -Engineering of Large Floating OTEC Installations G. Navarre, EHS

6-2) Experiment characterization of a small-scale Organic Rankine cycle-based Ocean thermal energy conversion unit C. Zhang, Southeast University

6-3) Accounting for Desalinated Water Production in a Hybrid Ocean Thermal Energy Conversion A. Azmi, Saga U.

14:20 – 14:40

BREAK

14:40 – 16:00

SESSION 7 - ECONOMICS

7-1) Advances in Ocean Thermal Energy Conversion research and pilot project for commercialization J. Seo, KRISO

7-2) Enhanced Economy and Circularity of Ocean Thermal Energy Conversion T. Noll, Naware

7-3) Technical and Economic Feasibility of Ocean Thermal Energy Conversion in the Southern Red Sea C. Xu, KAUST

7-4) Potential Implementation of OTEC in Fernando de Noronha Island A. Shinohara, Federal University of Pernambuco

16:00 – 16:50

CLOSING DISCUSSION | OTEA General Meeting

16:50 – 17:00

CLOSING

KEYNOTES

Day 1



Dr. IKEGAMI Yasuyuki –Director/Professor, Institute of Ocean Energy, Saga University

Topic: The Year of OTEC (where we go from here):
The Results of 50 Years of Research in Japan

Professor IKEGAMI Yasuyuki is director of the Institute of Ocean Energy, Saga University. He has led a distinguished career having joined the University in 1991, leading the research and development of OTEC and other ocean energy technologies there. He is the delegate from Japan on Executive Committee of IEA-Ocean Energy Systems, Delegate from Japan of IEC/TC114 on OTEC, and chair of the Ocean Thermal Energy Association's Executive Committee.



Dr. Miguel Alatorre –Professor, National Autonomous University of Mexico (UNAM)

Topic: OTEC Starting Point in Mexico

Dr. Miguel Angel Alatorre Mendieta, Mexico. Bachelors of Science in Physics, Phd. in Marine Hydraulic Engineering from the National Autonomous University of Mexico (UNAM). His main fieldwork is in physical oceanography. Dr. Miguel has participated in oceanographic research in the Equatorial Pacific and East, in the Northern Atlantic and Equatorial Atlantic, the Gulf of Mexico, as well as the Caribbean Sea. Since the 1990s Dr. Alatorre has had an interest in ocean energy exploitation and has been a pioneer in this field in Mexico. He was part of a team that designed and built a cleanup system for coastal lagoons using energy produced by waves. This is a world-wide innovation and is currently being used in Cuba.

Dr. Alatorre has been interested in the installation of OTEC plants in Mexico for the past 15 years. He is a leader in his country in projects which study the feasibility of such plants in Mexico.

Day 2



Dr. Purnima Jaliha – Group Head, Energy and Fresh Water Group, India National Institute of Ocean Technology (NIOT)

Topic: OTEC - The Indian perspective and Beyond

Dr Purnima Jaliha is a senior scientist who heads the Energy and Fresh Water group in the National Institute of Ocean Technology, India. She has led device developments for harnessing ocean energy from waves, marine currents and ocean thermal gradient (OTEC) and has played a major role in developing ocean thermal desalination technology. She has a PhD in Civil Engineering from Duke University, USA. She was awarded the Vishwakarma Medal in 2006 by the Indian National Science. She is on many committees of Indian Government organizations, related to water and renewable energy and is the EU led Clean Energy Mission Innovation Champion for India, 2020. She is currently the Vice Chair of the Executive Committee of the Ocean Energy Systems (OES) Technology Collaboration Program (TCP) under the International Energy Agency (IEA).

SPEAKER LIST

Speaker	Affiliation/Title	Contact
Greetings		
Sathiabama T. Thirugnana	Ocean Thermal Energy Association, International OTEC Symposium Committee Chair	Sathiabama@utm.my
Roy Robinson	Excipio Energy, CEO	
Juliana Grazia	Greentown Labs, Chief Development and Investment Officer and Head of Houston Incubator	
Pak Leung	Shell International Exploration and Production Inc, Marine Renewable Program Manager, PhD	
Benjamin Martin	Ocean Thermal Energy Association, Secretary General	admin@ocean-thermal.org
Session 1 – Cold Water Pipes		
Ashwani Vishwanath	National Institute of Ocean Technology, Chennai, India	
Martin G. Brown	Ocean Energy Systems Ltd. Aberdeen, U.K., Managing Director/ Consultant Naval Architect	Martinbrown@oceanenergy systems.co.uk
Session 2~3 – Policy and Projects		
A. Bakar Jaafar	Razak Faculty of Technology and Informatics & UTM Ocean Thermal Energy Centre, PhD	
Jung-Hyun Moon	Seawater Energy Plant Research Center, Korea Research Institute of Ships and Ocean Engineering	
Jannis Langer	Delft University of Technology, Faculty of Technology, Policy and Management, Department of Engineering Systems and Services, Ph Candidate	j.k.a.langer@tudelft.nl
Andrea Copping	Pacific Northwest National Laboratory, Senior Research Scientist, PhD	
Joel Sena Sales Junior	Department of Naval and Ocean Engineering, Federal University of Rio de Janeiro, Adjunct Professor, PhD	
Benjamin Martin	Xenesys Inc., Kumejima Project Department, Assistant Manager	info@xenesys.com

Speaker	Affiliation/Title	Contact
Session 4 – Technology		
Kevin Fontaine	Institute of Ocean Energy, Saga University, Researcher	fontaine.kevin.d@gmail.com
Lucero Isabel Castro Meneses	Department of Basic Sciences and Engineering, Universidad del Caribe	180300410@ucaribe.edu.mx
Franck Lucas	GEPASUD Laboratory, University of French Polynesia	
Todd Kleperis	TEKMARA – Technology for Tomorrow	
Session 5~6 – Power Cycle		
Gregory Navarre	Energy Harvesting Systems, CTO	
Chengbin Zhang	School of Energy and Environment, Southeast University	
Ahmad Aiman Azmi	Department of Graduate School of Science and Engineering, Saga University	ahmadaiman.azmi94@gmail.com
Sathiabama T. Thirugnana	Razak Faculty of Technology and Informatics & UTM Ocean Thermal Energy Centre	Sathiabama@utm.my
Biren Pattanaik	National Institute of Ocean Technology	
Roy Robinson	Excipio Energy	
Session 7 – Economics		
Jongbeom Seo	Seawater Energy Plant Research Center, Korea Research Institute of Ships and Ocean Engineering	
Thomas Noll	Naware PLC (in foundation)	tnoll1954@gmail.com
Saumitra Saxena	Clean Combustion Research Center, King Abdullah University of Science and Technology (KAUST), Research Scientist, PhD	+966-54 470 1567
Armando H. Shinohara	Federal University of Pernambuco, Department of Mechanical Engineering, Professor	armando.shinohara@ufpe.br

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