

innovation
agora

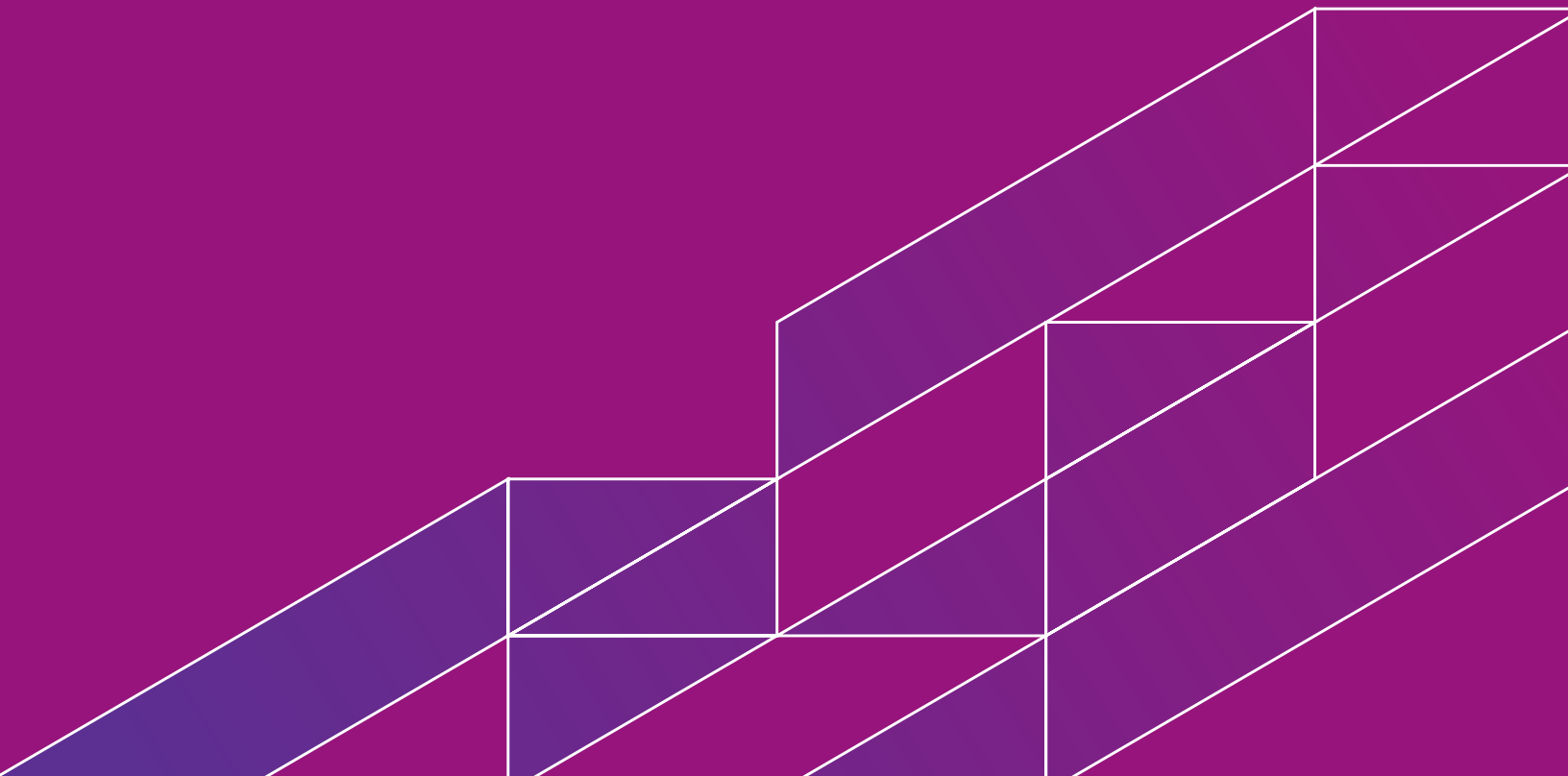


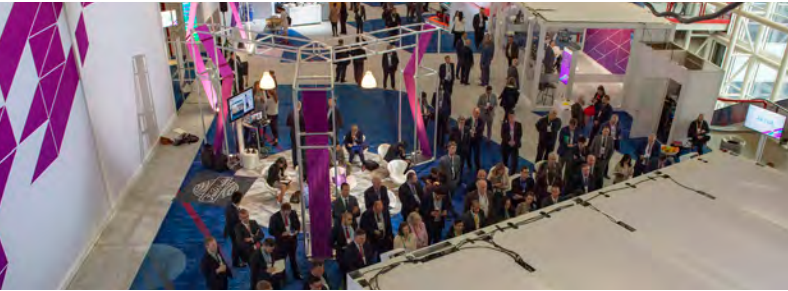
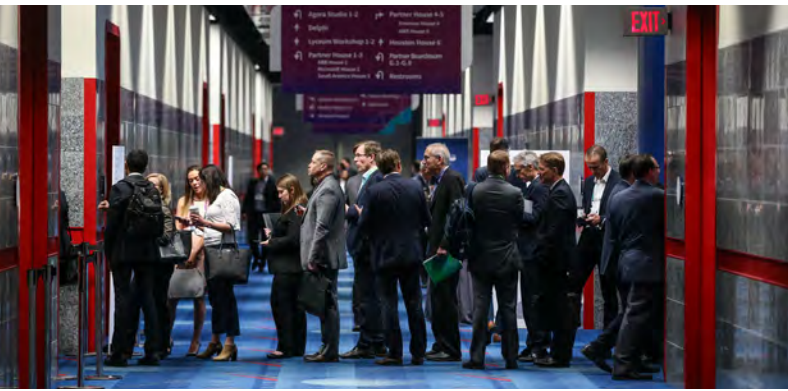
New World of Rivalries: Reshaping the energy future

11-15 March 2019 | Houston, Texas

CERAWeek.com

In Review 2019







CERAWeek INNOVATION AGORA 2019

The CERAWeek Innovation Agora is dedicated to the exchange of ideas on emerging technologies and solutions to the world's greatest energy challenges. It is a forum to learn and connect, featuring exciting programs and formats designed to facilitate meaningful dialogue, relationships, and new thinking.

In its third year, the CERAWeek Innovation Agora featured 400+ speakers covering a range of transformational technology platforms, from digitalization and AI to drones, agile design, additive manufacturing, mobility, storage, clean tech, and more.

Formats included:

- ▶ **Agora Studios** – interactive discussions on emerging and disruptive technologies.
- ▶ **Voices of Innovation** – intellectual journeys and insights by high-profile and provocative thought leaders.
- ▶ **Agora Pods** – deep-dive discussions in the form of case studies or presentations, in an intimate and relaxed setting.
- ▶ **Agora Café** – connect with colleagues over locally roasted coffee and other beverages.

New for 2019, we introduced:

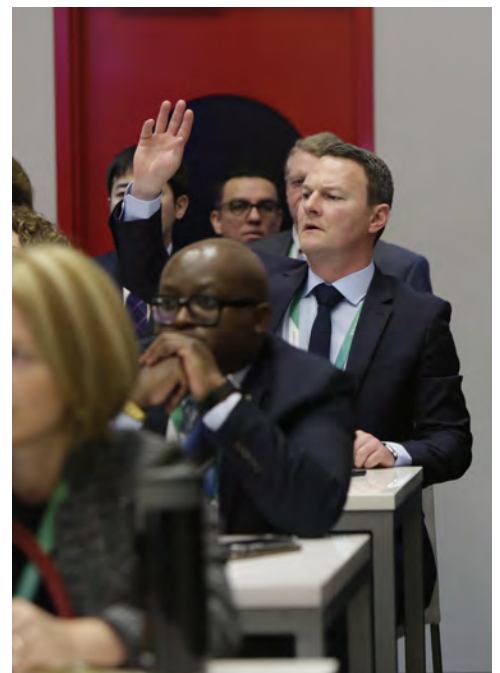
- ▶ **Agora Houses** – hosted by preeminent technology companies, offering experiences, learning journeys, and a glimpse of what's ahead.
- ▶ **The Learning Lyceum** – a hub for high-impact learning through engagement and collaboration.
 - ▶ *Lyceum Labs* offer seminars on critical emerging topics in energy, technology, and mobility.
 - ▶ *Lyceum Workshops* offer facilitated interactive sessions that allow groups to explore solutions to a specific challenge.

THEMES

- ▶ **Digitalization of energy:** Machine learning, artificial intelligence, predictive analytics
- ▶ **Advanced manufacturing:** Robotics, agile design, additive & borderless manufacturing
- ▶ **Mobility & future transport:** Battery technology, EVs & AVs, electric charging infrastructure
- ▶ **Cities & the built environment:** Renewables, resiliency, energy efficiency, density & congestion solutions
- ▶ **Blockchain in energy:** Peer-to-peer networks, energy trading, mitigation & control of decentralized generation
- ▶ **Future technology pathways:** Decarbonization, electrification, cybersecurity, communication, future of work



Agora Studio | The Quest for Better Batteries: Khalil Amine, Sr. Materials, GL/Argonne Distinguished Fellow, Argonne National Laboratory; Mateo Jaramillo (back to camera), CEO & Co-Founder, Form Energy; Sam Wilkinson (Chair), Associate Director, Solar & Energy Storage Research, IHS Markit; Elsa Olivetti, Atlantic Richfield Associate Professor of Energy Studies, MIT; and Henrik Fisker, Founder, Chairman & CEO, Fisker



VOICES OF INNOVATION



Blake Moret, Chairman & CEO, Rockwell Automation



Ashok Belani, EVP, Technology, Schlumberger Limited



Andrew Jassy, CEO, Amazon Web Services



Dr. Fatih Birol, Executive Director, International Energy Agency



Simon Mulcahy, Chief Innovation Officer, Salesforce



Jason Zander, EVP, Microsoft Azure



Ulrich Spiesshofer, President & CEO, ABB



Voices of Innovation with U.S. Department of Energy National Labs: New frontiers of research—Hon. Paul Dabbar (Chair), Under Secretary for Science, U.S. Department of Energy; **Thomas Zacharia**, Laboratory Director, Oak Ridge National Laboratory; **Doon Gibbs**, Laboratory Director, Brookhaven National Laboratory; and **Brian J. Anderson**, Director, National Energy Technology Laboratory

VOICES OF INNOVATION



Henrik Fisker, Founder, Chairman & CEO, Fisker



Iain Conn, Chief Executive, Centrica



Dr. Robert Armstrong, Director & Professor of Chemical Engineering, MIT Energy Initiative



Ganesh Bell, President, Uptake



Lord John Browne, Executive Chairman, L1 Energy



Eric Ernst, CTO, Formula E



David Keith, Gordon McKay Professor of Applied Physics, Paulson School of Engineering & Applied Sciences; Professor of Public Policy, John F. Kennedy School, Harvard University; and Executive Chairman, Carbon Engineering



Hunter Hunt, CEO, Hunt Consolidated, and **Ray Hunt**, Executive Chairman, Hunt Consolidated



Arun Majumdar, Professor & Co-Director, Precourt Institute for Energy, Stanford University



Michael Chasen, CEO, PrecisionHawk



H.E. Suhail Al Mazrouei, Minister of Energy & Industry, United Arab Emirates



Andy Karsner, Managing Partner, Emerson Collective



Her Royal Highness Crown Princess Mary Elizabeth of Denmark



Dr. Vijay Swarup, VP, Research & Development, ExxonMobil



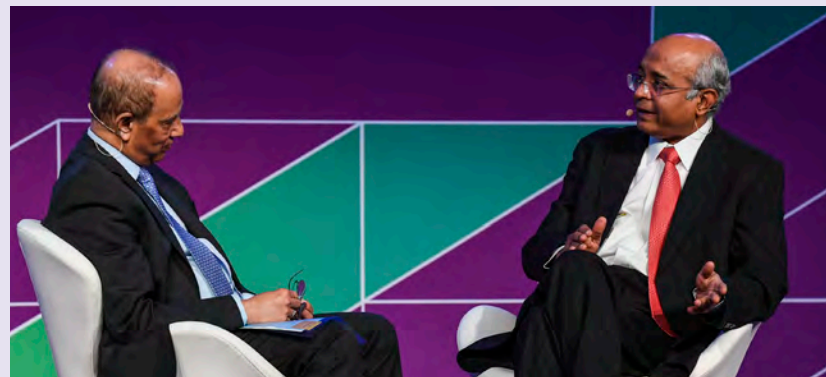
Lal Karsanbhai, Executive President, Automation Solutions, Emerson



Dr. Vaclav Smil, Distinguished Professor Emeritus, University of Manitoba, Canada



Ernest Moniz, President & CEO, Energy Futures Initiative



Atul Arya (Chair), SVP & Chief Energy Strategist, IHS Markit, and **Dr. Venkat Sumantran, Ph.D.**, Chairman, Celeris Technologies

CERAWeek AGORA STUDIOS

Interactive discussions on emerging & disruptive technologies

Digitalization of energy

- AI & the Energy System: Disruption or transformation?
- Digital Skills & the Workforce
- Energy Infrastructure: How vulnerable to cyber attack?
- Is Data the New Oil?
- Life on the Edge: The next computing revolution
- Oil & Gas: Realizing value from digital transformation
- Power: Realizing value from digital transformation
- Transforming the Upstream Business Through Digital Twins

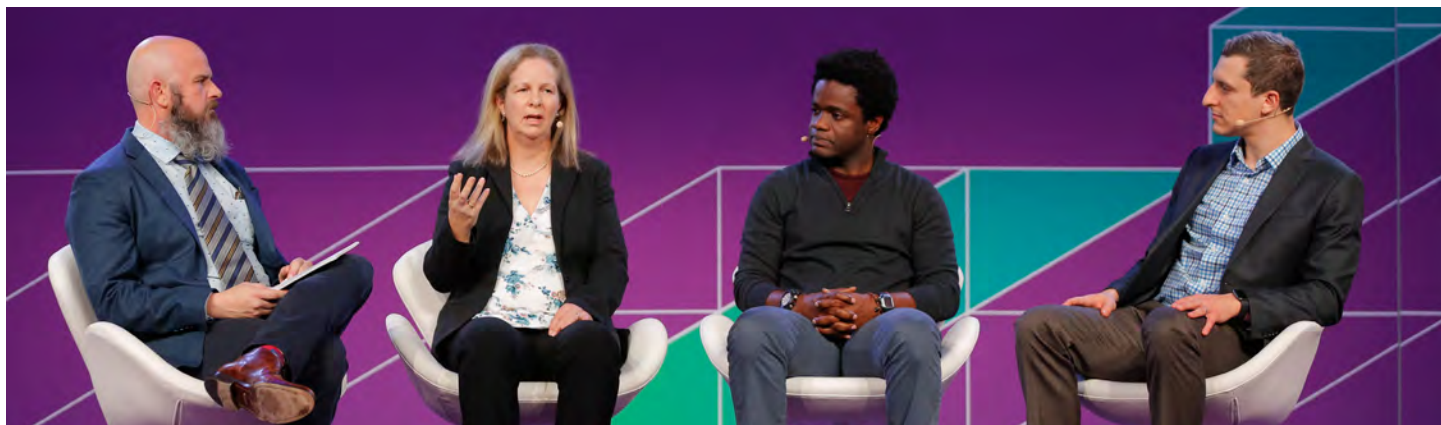
Advanced manufacturing

- Agile + Additive = Manufacturing Without Borders
- Collaborative Robots: Robots & humans in the future workplace
- Sea Change: Autonomy, automation, offshore & the ocean

Mobility & future transport

- Driverless Technology: The real disruptor
- EV Battery Supply Chain: Scale, geography & recycling

- EV Charging: Business models & players of the future
- Integrated Transport Systems for the Future City
- Planes, Trucks & Ships: Reinventing transportation
- The Future of Ride-Hailing & Mobility as a Service
- The Quest for Better Batteries
- The Quiet ICE Revolution: New tech driving new directions
- What Does the Hydrogen Transportation Economy Look Like?



AI & the Energy System: Disruption or transformation? **Matthew Short** (Chair), Research & Analysis Director, IT, IHS Markit; **Morag Watson**, VP, BP plc; **Dan Mbanga**, Principal Business Development Manager, Amazon AI, Amazon Web Services; and **Paul Orland**, Co-Founder & CEO, Tachyus



Oil & Gas: Realizing value from digital transformation: **Judson Jacobs** (Chair), Executive Director, Upstream Technology, Energy, IHS Markit; **Nick Farrant**, SVP, Industry - Oil & Gas, Uptake; **Arno van den Haak**, Head, Worldwide Business Development, Oil & Gas, AWS; **Justin Rounce**, EVP & CTO, TechnipFMC; **Tom Moroney**, Senior Director, Operations Technology, Chesapeake Energy Corporation; and **Michelle Pfluegger**, General Manager, Digital Innovation & Acceleration, Chevron



Digital Ledgers: Oil & Gas Supply Chain: **Andrew Bruce**, Founder & CEO, Data Gumbo; **Rebecca Hofmann**, Founder & Chairman, OOC Oil & Gas Blockchain Consortium and Leader, U.S. Blockchain Strategy & Innovation, Equinor; **John Kingston**, Editor at Large, Community Engagement, Blockchain in Transport Alliance, FreightWaves; **Manas Satapathy**, Managing Director – Accenture Strategy, Energy, Accenture; and **Tomicah Tillemann** (Chair), Chairman, Global Blockchain Business Council



What Does the Hydrogen Transportation Economy Look Like? **James Kast**, Fuel Cell Business Analyst, Toyota; **Andrew Fulbrook** (Chair), Executive Director, Powertrain & Compliance Forecasting, IHS Markit; **Bill Elrick**, Executive Director, CA Fuel Cell Partnership; **Bashir Dabbousi**, Director, Technology Strategy & Planning, Saudi Aramco; and **Barney Crockett**, Lord Provost, City of Aberdeen, U.K.



Models of Innovation: Today & tomorrow: **Nicoletta Giadrossi**, Member of the Board, IHS Markit; **Nick Lowes** (Chair, back to camera), VP, Oil & Gas Consulting, Energy, IHS Markit; **Reed Sturtevant**, General Partner, The Engine; **Barbara Burger**, President, Chevron Technology Ventures; **Amit Mehta** (back to camera), Chief Executive, Mobilize; and **John Gibson**, Senior Advisor, Tudor, Pickering, Holt, & Co.

CERAWeek AGORA STUDIOS (continued)

Cities & the built environment

- Powering the Cities of the Future
- Urban Resilience in a Changing Climate
- Voices of Mayors: The energy city of the future

Blockchain in energy

- Blockchain & the Power Consumer: Myth or reality?
- Carbon Trading: Will blockchain change the game?
- Digital Ledgers: Oil & gas supply chain
- Trading & Risk Management: Blockchain & beyond

Future technology pathways

- 5G Providing a Backbone to the Smart Energy & Mobility Future

- Carbon Buildings: A scaleable market for hydrocarbons
- Decarbonization of Power: Which technologies will make a difference?
- Digital Skills & the Workforce
- Geo-engineering: How real & how immediate?
- Hydrogen: What role in heat & power?
- Industrial Energy Efficiencies: The path to decarbonization
- Innovative Pathways to Affordable Hydrogen Production
- Models of Innovation: Today & tomorrow
- Nature-based Solutions
- New Energy Technology Pathways for China
- Nuclear Fission: New pathways

- Renaissance of Biofuels: Opportunities for scale
- Sea Change: Autonomy, automation, offshore & the ocean
- Special Address – Collaboration for Energy Innovation: The case for Denmark's Green Transition
- Storm over Plastics: Innovative technology solutions
- Will Quantum Computing Disrupt Energy – & When?



Collaborative Robots: Robots & humans in the future workplace: Ian Weightman (Chair), SVP, Technology, IHS Markit; Michael Chasen, CEO, PrecisionHawk; Nicolas De Keijser, Manager, Sales & Marketing, ABB; and Roger Barga, General Manager, Robotics & Autonomous Services, Amazon Web Services



Urban Resilience in a Changing Climate: Susan Farrell (Chair), VP, Energy-Wide Perspectives, IHS Markit; Gil Quinones, President & CEO, New York Power Authority; Lara Cottingham, Chief Sustainability Officer, City of Houston, Texas; Naheed Nenshi, Mayor, City of Calgary, Canada; and John Berger, CEO, Sunnova Energy Corporation





Digital Skills & the Workforce: **Susan Kish** (Chair), Agora Curator, IHS Markit; **Tasnim Al Mzaini**, Head, Value Chain Optimization & Analytics, Abu Dhabi National Oil Company; **Leah McGowen-Hare**, Trailhead Evangelist & Senior Director, Salesforce; **Biswajit Roy**, Director (HR & BD) & CEO, Hydrocarbon Sector Skill Council, Oil India Ltd.; and **Mike Train**, President, Emerson & Chairman, Emerson Automation Solutions



Powering the Cities of the Future: **Naheed Nenshi**, Mayor, City of Calgary, Canada; **Roger Kranenburg** (Chair), VP, Energy Strategy & Policy, Eversource Energy; **Barbara Humpton**, CEO, Siemens USA; and **Steven Koonin**, Professor, New York University



Voices of Innovation with Dr. Vijay Swarup, VP, Research & Development, ExxonMobil, and **Dr. Robert Armstrong** (Chair), Director, MIT Energy Initiative

CERAWeek AGORA PODS

Deep-dive discussions in the form of case studies or presentations, in an intimate & relaxed setting.

Digitalization of energy

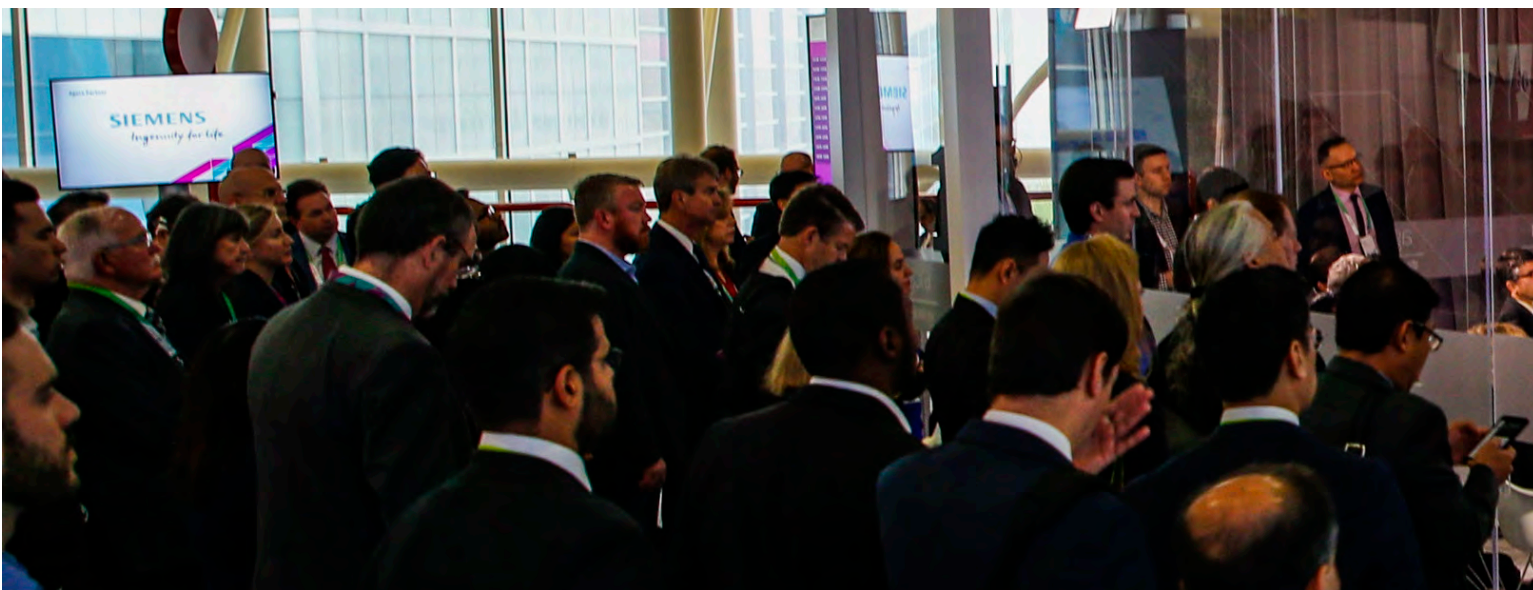
- A Journey into Industrial Machine Learning: A case study | [2predict](#)
- A Knowledge Integration Perspective on Major Capital Projects & Operations | [Maana](#)
- A New Reality: Augmented, virtual & mixed reality for energy applications | [Siemens](#)
- AI Comes of Age: An era of faster, smarter decisions with pragmatic processes | [AlphaX Decision Sciences](#)
- AI-aided Digital Technologies for Exploration & Production of Hydrocarbons | [Digital Petroleum](#)
- AI-driven Well Timelines for Well Optimization | [Maana](#)
- Artificial Intelligence for Smart Energy | [AutoGrid](#)
- Beyond Hype: Practical roadmap to digital transformation | [Emerson](#)
- Case Study: Technology innovation drives integrated asset analytics | [Aveva](#)
- Cloud: Virtually unlimited computer power for infinite possibilities | [Amazon Web Services \(AWS\)](#)
- Creating Connected Ecosystems in Oil & Gas | [Salesforce](#)
- Customer Rewards for Residential Energy Savings | [OhmConnect](#)
- Data Residency Perspectives | [AWS](#)
- Deep Dive on Machine Learning for Energy Outcomes | [Uptake](#)
- Demand Response: Energy efficiency in the power sector | [MIT](#)
- Digital Technology Empowers the Modern Energy Workforce: Case studies | [Aveva](#)
- Digital Twins | [ABB](#)
- Digitalization in Oil & Gas: Case studies | [MIPT Centre of Engineering & Technology](#)
- Diving Deep in Machine Learning for Your Industry | [AWS](#)
- Driving Intelligence to the Edge | [Agora, A Schlumberger Start-up](#)
- Driving Profitability with Advanced Analytics | [Seeq](#)
- Enabling Digital Transformation & Data Sovereignty Through the Intelligent Edge | [Microsoft Azure](#)
- Enabling Subsurface Intelligence in the Cloud | [Microsoft Azure](#)



Designing Cities as Dynamic Systems & Interfaces: Amy Korté, Principal, Arrowstreet, Inc.



Transforming Air Travel: Susan Ying, SVP, Global Partnerships, Ampaire



Deep Dive on Machine Learning for Energy Outcomes: Adam McElhinney, Chief, Machine Learning & AI Strategy, Uptake

- Going Digital: Managing data in oil & gas | [Ovation Data](#)
- Harnessing Data Analytics to Reduce Risk for Oil & Gas Operators & Insurers | [Siemens PLM Software](#)
- How Being Customer-centric Is Disrupting Utilities | [Salesforce](#)
- How Can You Use Oilfield Water Intelligence to Achieve Your Goals? | [Sourcewater, Inc.](#)
- How Improved Computing Power Is Affecting the Future of AI: Applications for energy & mobility | [ArchiTek](#)
- How to Build a Holistic Cyber Security Approach for Your Enterprise | [ABB](#)
- Impact of Digitalization on Emissions | [Accenture](#)
- In-line Sensors for Pipeline Inspection | [Ingu Solutions](#)
- Intelligent Control for a Dynamic World | [Kelvin](#)
- Leveraging Machine Learning & Artificial Intelligence to Transform Tomorrow's Digital Utility | [Innowatts](#)
- Monitoring Cement Conditions in Real Time with Smart Cement | [Sensytec](#)
- Multi-party Collaboration for More Efficient Shipping | [Voyager](#)
- Network Connectivity | [GE Power](#)
- Open Data Universe in Oil & Gas | [Microsoft](#)

- Organizational Analytics | [Humanyze](#)
- Real-time, In-line Hydrocarbon Analysis for Process Control & Custody Transfer | [JP3](#)
- Science vs. Engineering in Oilfield Practice: A case study | [Phystech Geoservice](#)
- Seeq: Advanced Analytics for Oil & Gas | [Seeq](#)
- Silicon Valley Disruptive Approaches: Driving cost efficiencies | [Moblize](#)
- Storm Readiness | [GE Power](#)
- Understanding Unconventional Oil & Gas Productivity: Challenges & opportunities | [MIT](#)
- Unlocking the Economic Potential of Digital Twins | [Akselos](#)
- Using AI-based Software to Transform Data into Efficiency & Cost Savings | [MicroSilicon](#)
- Using Digital Knowledge to Create New Opportunities in Transport & Logistics | [Maana](#)
- Wind Power: Broaden your optionality with digital | [Uptake](#)

Advanced manufacturing

- A Robotic Wellbore Intervention Technology Development Project | [Aabakke Innovation AS](#)
- Clarke Valve, an OGCI Portfolio Company | [Clarke Valve](#)

- Cost-effective Multilateral Completions of Sidetracks & Wells | [ADL Completions](#)
- Domain Knowledge vs. AI: A journey into industrial machine learning | [2Predict](#)
- Drones, Analytics & the Future of Utilities | [PrecisionHawk](#)
- Improving Production Efficiency & Debottlenecking with Filtration Technologies | [Via Separations](#)
- New Security Systems to Enable Tomorrow's Innovations | [Xage Security](#)
- Next-Generation Separation, Purification & Catalyst Technologies | [NuMat Technologies](#)
- Recovering Cooling Water Using Electric Fields | [Infinite Cooling](#)
- Robotics-as-a-Service Technology Development | [Houston Mechatronics](#)
- Shortening the Learning Curve for Hydraulic Fracture Simulation | [ResFrac Corp.](#)
- Using Robots for Inspection When It Is Unsafe for Humans | [inRobotics](#)

Mobility & future transport

- Autonomous Shipping & the Future of Maritime Transportation | [ABB](#)
- Decarbonization: From all electric ferries to offshore rigs | [Siemens](#)
- Electric Vehicles in China: A road to where? | [MIT](#)



CERAWeek AGORA PODS (continued)

- Energy Storage Systems & Electrified Vehicles | [Stanford University](#)
- Long-range Electric Trucks: The cheapest & greenest solution is not enormous batteries & chargers | [Tevva Motors](#)
- Mobility as an Amenity | [Envoy](#)
- Transforming Air Travel | [Ampaire](#)

Cities & the built environment

- CarbonHouse: A new paradigm of global building production | [MIT](#)
- Designing Cities as Dynamic Systems & Interfaces | [Arrowstreet, Inc.](#)
- What Can a City Learn from the University of California's Path to Carbon Neutrality? | [University of California - Irvine](#)

Blockchain in energy

- Application of Blockchain to Industry | [Data Gumbo](#)
- Energy Web Foundation: An update | [Energy Web Foundation](#)
- What Is the OOC Blockchain Consortium? | [Equinor](#)

Future technology pathways

- A Bright New Future: The rise of hydrogen & photocatalysis | [Syzy Plasmonics](#)
- Accelerating the Growth of the PV Industry Through Wafer Production Efficiency | [NexWafe](#)

- Building a CO₂ Marketplace at Gigaton Scale | [Inventys Thermal Technologies](#)
- Capturing Fugitive Methane Gas from Landfills | [Loci Controls](#)
- Catalyzing the Sustainable Production of Fuels & Chemicals | [Stanford University](#)
- Decarbonization vs. Profit: Eliminating the rivalry through exergy | [Emerson](#)
- Distributed Energy Resources: Economics & distributional impacts | [MIT](#)
- Dramatically Increase Recovery with World's Most Autonomous Boosting System | [FSubsea AS](#)
- Early Detection of Methane & GHG Emissions | [Rebellion Photonics](#)
- Energy Storage in Stacked Concrete Blocks | [Energy Vault](#)
- Exploring the Role of CCUS in a Rapidly Changing Energy System | [MIT Energy Initiative](#)
- Investment in Colombia & the New Permanent Allocation of Areas Process (PPAA) | [ANH](#)
- Kairos Aerospace, an OGCI portfolio company | [Kairos Aerospace](#)
- Lessons Learned Developing Sub-Saharan Africa's First & Fastest Utility-scale Solar Project | [Izubu Energy](#)
- Maximizing Value from Gas & Coal Plants | [Uptake](#)
- Microgrids-as-a-service | [Enchanted Rock](#)
- Perovskite PV Solar Cell Development | [HEE Solar](#)

- Powering Disruption | [Evolution Well Services](#)
- Projecting Energy & Climate for the 21st Century | [MIT Energy Initiative](#)
- REDD + (Reducing Emissions from Deforestation & Degradation) 101 | [Everland](#)
- Renewables & New Energy Solutions | [Microsoft](#)
- Satellite-based Greenhouse & Air Quality Monitoring | [GHGSat](#)
- Solar Plus Storage Equals Powerful Solutions | [E.ON](#)
- Subsea Electrification: The gateway for industry 4.0 | [ABB](#)
- System Value of Energy Storage in Low Carbon Grids | [MIT Energy Initiative](#)
- Technology Offerings Toward Decarbonization | [Indian Oil](#)
- The Arrival of Commercial Fusion Energy | [Commonwealth Fusion Systems](#)
- The Science of Marine Microplastics: What do we know/need to know? | [WHOI](#)
- The Surprising AI Future of Renewables | [Ayata](#)
- Tidal Turbine Technology | [Orbital Marine](#)
- Unlocking Methane Reductions Through Virtual Reality | [Environmental Defense Fund](#)



Silicon Valley Disruptive Approaches: Driving cost efficiencies: Amit Mehta, Chief Executive, Mobilize



Shortening the Learning Curve for Hydraulic Fracture Simulation: Garrett Fowler, VP, Operations, ResFrac Corporation



What Is the OOC Blockchain Consortium? Kenneth Ebest, System Architect, ExxonMobil, and Rebecca Hofmann, Founder & Chairman, OOC Oil & Gas Blockchain Consortium and Leader, U.S. Blockchain Strategy & Innovation, Equinor



Decarbonization vs. Profit: Eliminating the rivalry through Exergy: Ana Gonzalez Hernandez, Resource Efficiency Consultant & Commercialization Manager, Emerson



Enabling Digital Transformation & Data Sovereignty Through the Intelligent Edge: Gaurang Chandrakant, Principal Programmer, Azure Stack, Microsoft



Application of Blockchain to Industry: Andrew Bruce, Founder & CEO, Data Gumbo



Energy Web Foundation: An update: Hervé Touati, Co-Founder & CEO, Energy Web Foundation



CarbonHouse: A new paradigm of global building production: Mark Goulthorpe, Associate Professor, Department of Architecture, MIT



Subsea Electrification: The gateway for industry 4.0 (case study with Equinor): Katrine Hilmen, Head, Engineering & Technology Studies, IA Energy, ABB

THE LEARNING LYCEUM

A hub for high-impact learning through engagement and collaboration.

Lyceum Labs offer seminars on critical emerging topics in energy, technology, and mobility.

Digitalization of energy

- C-Suite: What should you be asking about data science?
- Data, Governance & Security: The foundations of rapid innovation in the cloud
- Digitalization Deployed: From advanced analytics to artificial intelligence
- How Cloud-delivered AI- & ML-based Services May Disrupt the Energy Sector
- Predicting the Unpredictable
- Satellite Imagery Exploitation
- What Does Digitalization Really Mean?

Advanced manufacturing

- Advanced Manufacturing & Drilling Technology in Industry 4.0
- Robotics in the Cloud: The autonomous future of oil & gas

Mobility & future transport

- Defining Autonomous Operations
- EV Charging Primer
- Mobility: The 5 levels of automation
- Vehicle Electrification: Understanding the basics

Cities & the built environment

- What Is TCFD & Where Is It Going?



Advanced Manufacturing & Drilling Technology in Industry 4.0: Dr. C. Fred Higgs III, Vice Provost & Professor of Mechanical Engineering, Rice University



EV Charging Primer: Heather Flanagan, Marketing Manager, EV Infrastructure, ABB, and **Erin Galiger**, EV Infrastructure Product Manager, ABB



What Does Digitalization Really Mean? Babur Ozden, Founder & CEO, Maana



Predicting the Unpredictable: John Gibson, Senior Advisor, Tudor, Pickering, Holt & Co.

Future technology pathways

- 10 Trends Changing Our Lives
- An Ethical Crisis in Computing?
- Assessing LNG Potential in South & Southeast Asia
- Business Cases for Microgrids
- China's Future Gas Supply: Competition for a growing market
- Competition Between Short & Long Cycle Crude Oil Supply
- Cost & Innovation: Changing upstream dynamics
- Crude Oil Quality Trends: Too light & too sweet?

- Decarbonization of Liquid Fuel: Are the programs working?
- Deep Dive into Fusion Energy
- Fuel Economy & Compliance Forecasting: Current prognosis
- Future Transit of Russian Gas Through Ukraine: To the brink & beyond?
- Key Transformations Driving Development of Cybersecurity Technology
- Low Emission Pathways: Identifying & modeling plausible alternatives
- Natural Gas Liquids & the Global Chemical Market

- Shale Growth Drivers & Limits
- Shale Performance: A look under the hood
- The 5 Defining Characteristics of Shales
- The Future of Exploration & Whole Basin Strategies
- Transformation & Disruption in the Ocean Energy Sector
- U.S. Shale Play Review
- What Is the Future of Batteries in the Power Sector?
- What's Right & Wrong with CCUS: A political & economic perspective
- Will Retail Fuel Price Populism Freeze Downstream Investment in Mexico & Brazil?



Lyceum Lab | What Is TCFD & Where Is It Going?
Fiona Wild, VP, Sustainability & Climate Change, BHP



Lyceum Lab | Shale Growth Drivers & Limits



Lyceum Lab | 10 Trends Changing Our Lives

Lyceum Workshops offer facilitated interactive sessions that allow groups to explore solutions to a specific challenge.

Mobility & future transport

- New Mobility: Reshaping the city of the future — An interactive workshop

Blockchain in energy

- Blockchain for the Boardroom: An interactive workshop

Future technology pathways

- Decarbonization vs. Profit: A workshop in reality
- Developing Unconventional Assets: A simulation workshop
- Mapping the Energy Transition with Scenarios: An interactive workshop



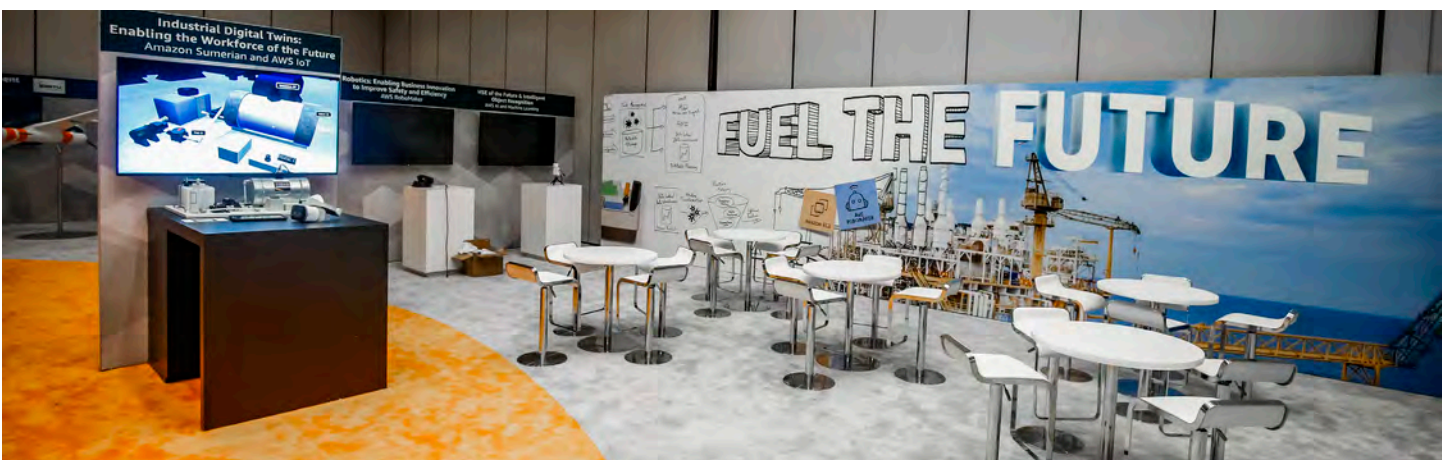
Lyceum Workshop | New Mobility: Reshaping the City of the Future — An interactive workshop led by Katherine Hardin, VP, IHS Markit, and Tom De Vleeschauwer, VP, Automotive, IHS Markit

CERAWeek AGORA HOUSES

The **ABB Partner House** immersed participants in the world of autonomous industries and electric cars. They tested their driving skills in the ABB Formula E Simulator and their intellect by collaborating with ABB's YuMi robot.



Visitors to the **Amazon Web Services (AWS) Partner House** learned how AWS is accelerating digital transformation and providing solutions for the modern energy company. They discovered how oil and gas companies are partnering with AWS to run business and technical workflows in upstream, midstream, and downstream.



This **Emerson Partner House** provided visitors with a Digital Transformation Experience. Employees of fictional Agora Energy shared how digital transformation has changed their jobs, operations, and business performance. Industry experts were on hand to discuss how industry leaders are using automation to drive best-in-class performance.

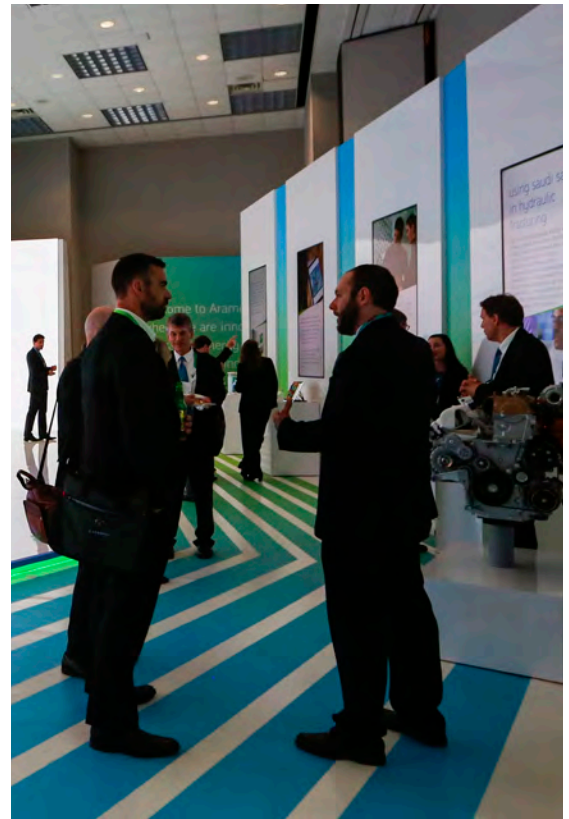


Microsoft Azure Partner House: Cloud computing is opening opportunities for the energy industry, creating new ways to harness data, increase productivity, and transform business.



CERAWeek AGORA HOUSES (continued)

At the **Saudi Aramco Partner House**, visitors engaged with world-class researchers and learned of innovation across the energy value chain. Experts from Saudi Aramco's research centers discussed how they are developing new applications in energy, reimagining manufacturing, and creating a more sustainable future.



Houston House: Houston, the world's energy capital, continues to develop disruptive energy technologies and innovative companies while capturing new opportunities in the renewables sector. Visitors to Houston House, sponsored by World Petroleum Council, learned more about exciting opportunities in the region.



Hon. Sylvester Turner, Mayor, City of Houston, Texas



Her Royal Highness Crown Princess Mary Elizabeth of Denmark and Bob Harvey, President & CEO, Greater Houston Partnership

2019 OGCI CLIMATE INVESTMENTS VENTURE DAY @ CERAWeek

This invitation-only event featured presentations by a shortlist of 10 companies seeking investment, as well as follow-up discussions and a networking reception. OGCI Climate Investments has allocated up to \$50M for promising technologies or business models that reduce CO₂ via increased efficiency in energy and industrial sectors. OGCI Climate Investments is a \$1B+ fund created by the Oil and Gas Climate Initiative to take practical action on climate change.



ARAB INNOVATION @ THE CERAWeek INNOVATION AGORA

Delegates looked at the Arab energy innovation ecosystem, mapping out the challenges and opportunities of energy entrepreneurship in one of the world's largest energy-producing regions through networking meetups, a reception, and two sessions in the CERAWeek Agora.



Agora Studio | Energy Innovation in the Arab World: Are we witnessing a resurgence? Dana Dabbousi (Chair), Research Assistant, IHS Markit; **Abdulmohsen Almajnoui**, CEO, Research Products Development Company; **Paddy Padmanathan**, President & CEO, ACWA Power International; **Dr. Enass Abo-Hamed**, Co-Founder & CEO, H2GO Power Ltd.; and **Khalil El Shafei**, CEO, Aramco Entrepreneurship Center: Wa'ed

DISRUPTORS DINNER: WHERE THE ENERGY DREAMERS CONVERGE

Foundational Partner **Tudor, Pickering, Holt & Co.'s** Disruptors Dinner featured creative chefs exploring the intersection of culinary art with innovation, inspiration, and disruption.



BOOK SIGNINGS

Delegates had the opportunity to meet authors and receive signed copies of their books: **Lord John Browne**, *The Glass Closet: Why Coming Out Is Good Business*; **Dr. Vaclav Smil**, *Oil: A Beginner's Guide* and *Energy: A Beginner's Guide*; **Dr. Angela Stent** (pictured below), *Putin's World: Russia Against the West and with the Rest*; and **Dr. Venkat Sumantran**, *Faster, Smarter, Greener: The Future of the Car and Urban Mobility*



Dr. Angela Stent: *Putin's World: Russia Against the West and with the Rest*

EXPERIENCES



ABB Formula-e car



Environmental Defense Fund Methane Emissions V/R



ABB Collaborative Robot YuMi® pours coffee



Saudi Aramco Ford F-150 with opposed piston engine & Gasoline Compression Ignition



GHGSat Satellite-based greenhouse & air quality gas emission monitor



AVEVA Engage, a touch-interfaced, 3D visualization of project & asset information

STARTUPS @ THE AGORA

The CERAWeek Innovation Agora proudly hosted startups and innovators from around the world who shared their ideas and technologies throughout the week. Audiences interacted and engaged with these entrepreneurs and disruptors.

- 2predict
- ADL Completions
- Akselos
- AlphaX Decision Sciences
- Ampaire
- ArchiTek
- AutoGrid
- Clarke Valve
- Commonwealth Fusion Systems
- Data Gumbo
- Digital Petroleum
- Eden GeoPower
- Enchanted Rock
- Energy Vault
- Energy Web Foundation
- Envoy
- Evolution Well Services
- FSubsea AS
- GHGSat
- HEE Solar
- Houston Mechatronics
- Humanyze
- Infinite Cooling
- Ingu Solutions
- Innowatts
- inRobotics
- Inventys Thermal Technologies
- JP3
- Kairos Aerospace
- Kelvin
- Loci Controls
- Maana
- MicroSilicon
- NexWafe
- NuMat Technologies
- OhmConnect
- Ondiflo
- Orbital Marine
- Ovation Data
- Parsable
- Phystech Geoservice
- PrecisionHawk
- Rebellion Photonics
- ResFrac Corporation
- Seeq
- Sensytec
- Sourcewater, Inc.
- Syzygy Plasmonics
- Tevva Motors
- Uptake
- Via Separations
- Voyager
- Xage Security



Agora Pod | Unlocking the Economic Potential of Digital Twins: Thomas Laurent, CEO, Akselos



Agora Pod | Energy Storage in Stacked Concrete Blocks: Merrick Kerr, CCO, Energy Vault



Agora Pod | Organizational Analytics: Ben Weber, President & CEO, Humanyze



Agora Pod | Improving Production Efficiency & Debottlenecking with Filtration Technologies: Shreya Dave, Co-Founder & CEO, Via Separations



Agora Pod | Creating the Largest Clean Technology Incubator in the U.S.: Dr. Emily Reichert, CEO, Greentown Labs



Agora Pod | Artificial Intelligence for Smart Energy: Amit Nariyan, Founder & CEO, AutoGrid



Agora Pod | Clarke Valve, an OGCI portfolio company: Kyle Daniels, Director, President & CEO, Clarke Valve



Agora Pod | How Can You Use Oilfield Water Intelligence to Achieve Your Goals? Josh Adler, Founding CEO, Sourcewater, Inc.



Agora Pod | A Bright New Future: The rise of hydrogen & photocatalysis: Trevor Best, CEO, Syzygy Plasmonics, A TPH Disruptor Company



Agora Pod | Capturing Fugitive Methane Gas from Landfills: Peter Quigley, CEO/Chairman, Loci Controls

SPEAKERS

- **Oscar Abbink**, Director, Upstream Research Group, IHS Markit
- **Ahmed Abdulla**, Post-doctoral Fellow, School of Global Policy & Strategy, UC San Diego
- **Audun Abelsnes**, Managing Director, Techstars Energy
- **Michael Ableson**, VP, Global Strategy, General Motors
- **Dr. Enass Abo-Hamed**, Co-Founder & CEO, H2GO Power Ltd.
- **Josh Adler**, Founding CEO, Sourcewater, Inc.
- **Laiq Ahmad**, CTO, GE Power Digital
- **Ahmad Al Khowaiter**, CTO, Saudi Aramco
- **H.E. Suhail Al Mazrouei**, Minister of Energy & Industry, United Arab Emirates
- **Tasnim Al Mzaini**, Head, Value Chain Optimization & Analytics, Abu Dhabi National Oil Company
- **Fatima Al Shamsi**, Assistant Undersecretary for Electricity & Future Energy, United Arab Emirates Ministry of Energy & Industry
- **Almir Alemic**, Head, Industry Ecosystem, Maana
- **Abdulmohsen Almajnoui**, CEO, Research Products Development Company
- **Khalil Amine**, Sr Materials, GL/Argonne Distinguished Fellow, Argonne National Laboratory
- **Brian Anderson**, Director, National Energy Technology Laboratory
- **Everett Anderson**, VP, Product Development, Nel Hydrogen
- **Doug Arent**, Deputy Associate Laboratory Director, Scientific Consulting & Energy Analysis, National Renewable Energy Laboratory
- **Robert Armstrong**, Director, MIT Energy Initiative & Professor of Chemical Engineering, MIT
- **Atul Arya**, SVP & Chief Energy Strategist, IHS Markit
- **Eric Åsberg**, CTO, eSmart Systems
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- **Roger Barga**, General Manager, Robotics & Autonomous Services, Amazon Web Services
- **Atanu Basu**, CEO & Founder, Ayata
- **Rana Basu**, COO, Ondiflo
- **Morgan Bazilian**, Director, Payne Institute & Professor of Public Policy, Colorado School of Mines
- **Benjamin Beberness**, VP & Global Head, Oil & Gas Business Industry Unit, SAP
- **Ashok Belani**, EVP, Technology, Schlumberger Limited
- **Ganesh Bell**, President, Uptake
- **James Bellingham**, Director, Center for Marine Robotics, Woods Hole Oceanographic Institution
- **Kathy Benini**, Managing Director, Pricing & Valuation & Reference Data, IHS Markit
- **Asher Bennett**, Founder & CEO, Tevva Motors
- **John Berger**, CEO, Sunnova Energy Corporation
- **Dan Berkovitz**, Commissioner, U.S. Commodity Futures Trading Commission
- **Dr. Paolo Bertuzzi**, CEO & Managing Director, Turboden – MHI Group
- **Trevor Best**, CEO, Syzygy Plasmonics, A TPH Disruptor Company
- **Roger Bhalla**, Manager, Supply Chain Systems & Technology, ConocoPhillips
- **Dr. Fatih Birol**, Executive Director, International Energy Agency
- **Ben Bishop**, Digital Innovation Specialist, Siemens
- **Aleksandr Bochkarev**, Project Manager, Phystech Geoservice
- **Ben Bodishbaugh**, CEO, Evolution Well Services
- **Jason Bordoff**, Professor of Professional Practice in International & Public Affairs, Columbia University
- **Diane Brady**, Founder, db Omnimedia
- **Wendell Brase**, Associate Chancellor - Sustainability, University of California - Irvine
- **Bob Braverman**, VP, Technology, IHS Markit
- **Thomas Broström**, President, Ørsted NA
- **Josh Broussard**, Technical Director, Ocean Infinity
- **Chris Brown**, President, North America, Vestas
- **Lord John Browne**, Executive Chairman, L1 Energy
- **Andrew Bruce**, Founder & CEO, Data Gumbo
- **Semen Budennyi**, Head, Department of Digital Technologies in Industry, MIPT Centre of Engineering and Technology
- **Michael Buhr**, President & CEO, Filld
- **Jacopo Buongiorno**, Professor, Nuclear Science & Engineering; Director, CANES, MIT
- **Barbara Burger**, President, Chevron Technology Ventures
- **Scott Burger**, Research Associate & MITEI Energy Fellow, MIT Energy Initiative
- **Charles Cameron**, Director of Technology, Engineering & Centrica Innovations, Centrica
- **Javier Canon**, Director, Maana
- **Marielle Canter Weikel**, Senior Director, Responsible Mining & Energy, Conservation International
- **Jeremy Carlson**, Principal Analyst & Manager, IHS Markit
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- **Kunal Chandra**, VP, New Energy Businesses, Siemens Power and Gas
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- **Nathaniel Connors**, CERAWeek Program Manager, IHS Markit
- **Matthew Costello**, CEO & Co-Founder, Voyager
- **Lara Cottingham**, Chief Sustainability Officer, City of Houston, Texas
- **Barney Crockett**, Lord Provost, City of Aberdeen, UK
- **Alistair Cross**, COO, Mercuria Energy Trading
- **HRH Crown Princess Mary Elizabeth**, Denmark
- **Don D'Souza**, Unit Head, Industrial Mitigation, British Columbia, Climate Action Secretariat
- **Hon. Paul Dabbar**, Under Secretary for Science, U.S. Department of Energy
- **Bashir Dabbousi**, Director, Technology Strategy & Planning, Saudi Aramco
- **Dana Dabbousi**, Research Assistant, IHS Markit
- **Jeff Dalglish**, Director, Oil Field Digital Transformation, Maana
- **Maher Damak**, Co-Founder & CEO, Infinite Cooling
- **Kyle Daniels**, Director, President & CEO, Clarke Valve
- **Premasish Das**, Senior Director, Energy, IHS Markit
- **Shreya Dave**, Co-Founder & CEO, Via Separations
- **Andrew Day**, Consulting Director, IHS Markit
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- **Jens Festervoll**, Corporate Liaison, Equinor
- **Marco Fiorentino**, Distinguished Technologist, HPE Labs
- **Henrik Fisker**, Founder, Chairman & CEO, Fisker
- **Heather Flanagan**, Marketing Manager, EV Infrastructure, ABB
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SPEAKERS (continued)

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- **John Gibson**, Senior Advisor, Tudor, Pickering, Holt & Co.
- **Cody Girod**, Principal Solution Engineer, Salesforce
- **Ana Gonzalez Hernandez**, Resource Efficiency Consultant & Commercialization Manager, Emerson
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- **Brett Howard**, Director, Chemical Management, Regulatory & Technical Affairs, American Chemistry Council
- **Jenalea Howell**, Director, Transformative Technologies, IHS Markit
- **Tyler Hufstetler**, Global Project Manager, Parsable
- **Barbara Humpton**, CEO, Siemens USA
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- **Ray Hunt**, Executive Chairman, Hunt Consolidated
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- **Todd Kubiak**, Senior Technical Sales Consultant, Aveva
- **Sujit Kumar**, President, Agora, A Schlumberger Start-up
- **Steven Kwast**, Lieutenant General, U.S. Air Force
- **Sarah Ladislaw**, SVP & CTO, Energy & National Security Program, CSIS
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- **Mike Lepech**, Professor, Stanford University
- **Mikko Lepistö**, Digital Lead, Marine & Ports, ABB
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- **Thomas Leurent**, CEO, Akxelos
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- **Dr. John Lovell**, VP, Technology & Strategy, MicroSilicon
- **Nick Lowes**, VP, Oil & Gas Consulting, Energy, IHS Markit
- **Ruben Lubowski**, Chief Natural Resource Economist, Environmental Defense Fund
- **Sam Lucero**, Senior Principal Analyst, M2M & IoT, IHS Markit
- **Dr. Chris Luebke**, Director, Global Foresight, Research & Innovation, Arup
- **Kristopher Luey**, Client Success Manager, Vulog
- **David Mabee**, Innovation Manager, ConocoPhillips
- **Sergej Mahnovski**, Director, Growth & Innovation, Edison International
- **Arun Majumdar**, Professor & Co-Director, Precourt Institute for Energy, Stanford University
- **Dr. R.K. Malhotra**, Ph.D., Director General, Federation of Indian Petroleum Industry
- **Dharik Mallapragada**, Post-doctoral Associate, MIT Energy Initiative
- **Khartish Manthiram**, Warren K. Lewis Career Development Professor in Chemical Engineering, MIT
- **Rohan Mathews**, Principal Solutions Architect, Amazon Web Services
- **Dan Mbanga**, Business Development Manager, Amazon AI, Amazon Web Services
- **Thomas McAndrew**, President & CEO, Enchanted Rock
- **Adam McElhinney**, Chief of Machine Learning & AI Strategy, Uptake
- **Leah McGowen-Hare**, Trailhead Evangelist & Senior Director, Salesforce
- **Morgen McGuire**, Senior Research Analyst, IHS Markit
- **Kenneth Medlock**, Senior Director, Center for Energy Studies, Baker Institute
- **Veeral Mehta**, Senior Consultant, Midstream Oil & NGLs, IHS Markit
- **Amit Mehta**, Chief Executive, Moblize
- **Rachel Meidl**, Fellow, Energy & Environment, Rice University
- **Antonio Merlo**, Dean, School of Social Sciences, Rice University
- **Carl Mesters**, Chief Scientist Chemistry & Catalysis, Shell
- **Rich Meszaros**, Managing Director, Accenture Digital
- **Jeff Meyer**, Research & Analysis Associate Director, IHS Markit
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- **Jonas Moberg**, Head of Corporate Affairs, Trafigura
- **Isabel Mogstad**, Senior Manager, EDF+Business, Environmental Defense Fund
- **Kareemah Mohamed**, Principal Research Analyst, IHS Markit
- **Ernest Moniz**, President & CEO, Energy Futures Initiative
- **Justin Montgomery**, PhD Candidate, MIT
- **Luis Miguel Morelli**, Director, National Hydrocarbons Agency, Colombia
- **Blake Moret**, Chairman & CEO, Rockwell Automation
- **Tom Moroney**, Senior Director, Operations Technology, Chesapeake Energy
- **Chaim Motzen**, Founder, Izuba Energy
- **Simon Mulcahy**, Chief Innovation Officer, Salesforce
- **Bob Mumgaard**, CEO, Commonwealth Fusion Systems
- **Yaacov Mutnikas**, EVP, Chief Data Scientist, IHS Markit
- **Jonah Myerberg**, CTO, Desktop Metal
- **Abhilash Nair**, Senior Principal Technical Sales Consultant, Aveva
- **Datuk Mohamed Najib**, Executive Director, Project Management, City of Kuala Lumpur, Malaysia
- **Amit Narayan**, Founder & CEO, AutoGrid
- **Naheed Nenshi**, Mayor, City of Calgary, Canada
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- **Sean O'Connor**, Principal Research Analyst, IHS Markit
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- **Chef Hugo Ortega**, Executive Chef, H Town Restaurant Group
- **Babur Ozden**, Founder & CEO, Maana
- **Paddy Padmanathan**, President & CEO, ACWA Power International
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SPEAKERS (continued)

- **Emil Peña**, Consultant, Siemens Government Technologies
- **Felipe Perez**, Consulting Director, Oil Markets, Midstream & Downstream, Energy, IHS Markit
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- **Rich Powell**, Executive Director, ClearPath
- **Gregory Powers**, VP, Global Innovation, Halliburton
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- **Peter Quigley**, CEO/Chairman, Loci Controls
- **Gil Quiniones**, President & CEO, NY Power Authority
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- **Dr. SSV Ramakumar**, Director, Research & Development & Board Member, Indian Oil
- **Jordan Ramer**, CEO, EVConnect
- **Dr. Pratima Rangarajan**, CEO, OGCI Climate Investments
- **Dr. Emily Reichert**, CEO, Greentown Labs
- **Christoph Reinhart**, Professor, Director of Building Technology Program, MIT
- **Catherine Robinson**, Executive Director, IHS Markit
- **Darryl Rogers**, VP, Midstream Oil & NGL Research and Consulting, Energy, IHS Markit
- **Hossein Rokhsare**, Managing Partner, Darcy Partners
- **Jamey Rosenfield**, Co-Chairman, CERAWEEK & SVP, IHS Markit
- **Peter Rossky**, Dean, Wiess School of Natural Sciences, Rice University
- **Justin Rounce**, EVP & CTO, TechnipFMC
- **Gabriella Rowe**, CEO, Station Houston
- **Biswajit Roy**, Director, HR & BD & CEO, Hydrocarbon Sector Skill Council, Oil India Ltd.
- **Amish Sabharwal**, Global Head, Engineering Business, Aveda
- **Sid Sachdeva**, CEO, Innowatts
- **Christine Sagen Helgø**, Mayor, City of Stavanger, Norway
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- **Sam Salisbury**, Centrica Innovations Director, Labs, Centrica
- **Manas Satapathy**, Managing Director – Accenture Strategy, Energy, Accenture
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- **Laura Schafer**, VP, Sales, Precision Fluid Control, Emerson
- **Ian Schneider**, Research Assistant, MIT
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- **J. Clay Sell**, CEO, X-Energy
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- **Matthew Short**, Research & Analysis Director, IT, IHS Markit
- **Frank Siebke**, CFO, NexWafe
- **Vidur Singhal**, Senior Gas Analyst, South Asia PGCR, IHS Markit
- **Steve Sliwa**, CEO & Founder, Seeq
- **Dr. Vaclav Smil**, Distinguished Professor Emeritus, University of Manitoba, Canada
- **Lisa Smith**, Chief Corporate Development Officer, Data Gumbo
- **John Sneed**, Executive Director, Loan Programs Office, U.S. Department of Energy
- **Patrick Sobalvarro**, President & CEO, Veo Robotics
- **Chef Dominic Souci**, Executive Chef, Levy Restaurants
- **Ulrich Spiesshofer**, President & CEO, ABB
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- **Bob Stojanovic**, EV Charging Infrastructure North America, ABB
- **Robert Stoner**, Deputy Director, Science and Technology, MIT Energy Initiative
- **Reed Sturtevant**, General Partner, The Engine
- **Dr. Venkat Sumantran, Ph.D.**, Chairman, Celeris Technologies
- **Dr. Vijay Swarup**, VP, Research & Development, ExxonMobil
- **Matt Thomas**, CEO, JP3
- **Nick Thomson**, Director, Research & Analysis, Upstream, IHS Markit
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- **Nick Tillmann**, Co-Founder, President & CEO, inRobotics
- **Adie Tomer**, Fellow, Metropolitan Policy Program, Brookings Institution
- **Hassan Toorabally**, COO, ArchiTek
- **Hervé Touati**, Co-Founder & CEO, Energy Web Foundation
- **Mike Train**, President, Emerson & Chairman, Emerson Automation Solutions
- **Sylvester Turner**, Mayor, City of Houston, Texas
- **Lance Ugglá**, Chairman of the Board & CEO, IHS Markit
- **Kadri Umay**, Director, Industry Technology Strategy, Microsoft
- **Arno Van Den Haak**, Head, Worldwide Business Dev. Oil & Gas, Amazon Web Services
- **John van Pol**, Co-Founder & CEO, Ingu Solutions
- **Sylvain Vaquer**, Manager, Accenture Strategy, Energy, Accenture
- **Kripa Varanasi**, Associate Professor & Doherty Chair, MIT
- **Moshe Vardi**, Professor, Rice University
- **Bill Vass**, VP, Engineering, Amazon Web Services
- **David Victor**, Professor; Co-Director, Laboratory on International Law & Regulation, UC San Diego
- **Richard Vidal**, Director, Global Energy Scenarios, IHS Markit

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- **Wensu Wang**, Director, Applied Science, Ayata
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- **Ian Weightman**, SVP, Technology, IHS Markit
- **Henning Wicht**, Executive Director, Consulting, IHS Markit
- **Fiona Wild**, VP, Sustainability & Climate Change, BHP
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- **Peter Zornio**, CTO, Emerson

CERAWeek INNOVATION AGORA 2020

March 9–13, 2020

Hilton Americas & the George R. Brown Convention Center, Houston, Texas

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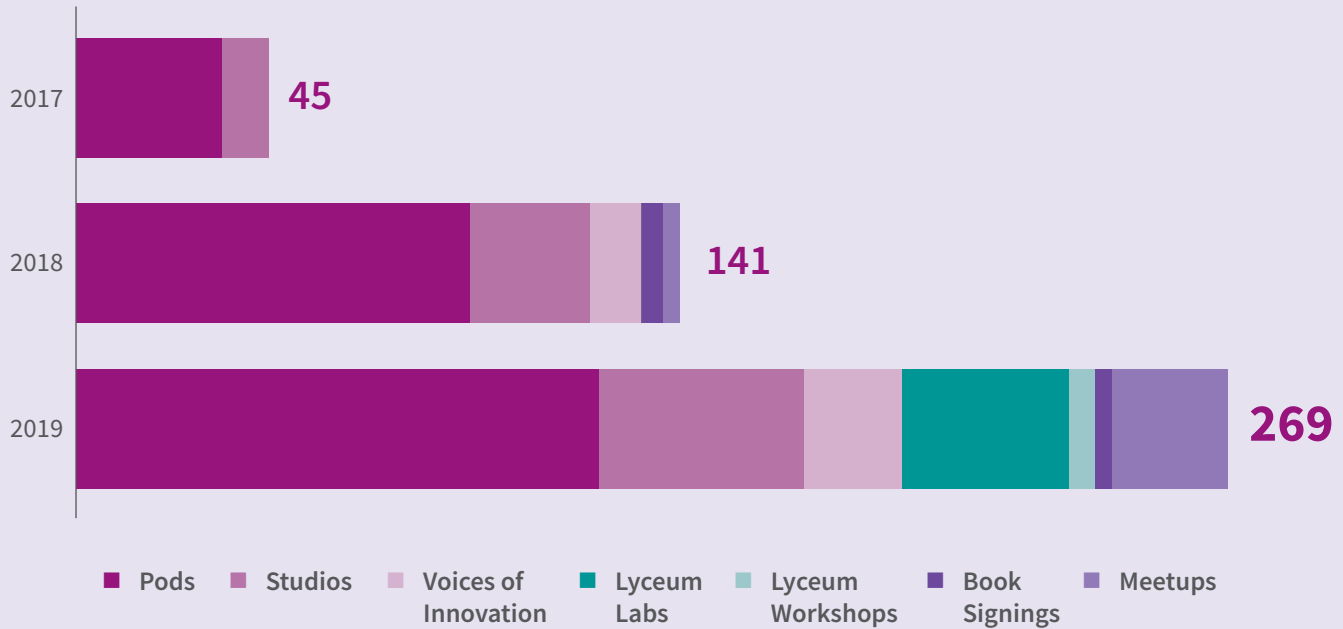


CERAWeek AGORA ASSOCIATES



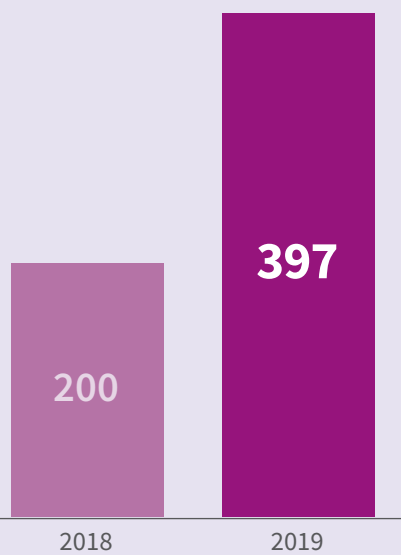
CERAWeek INNOVATION AGORA BY THE NUMBERS

Programs

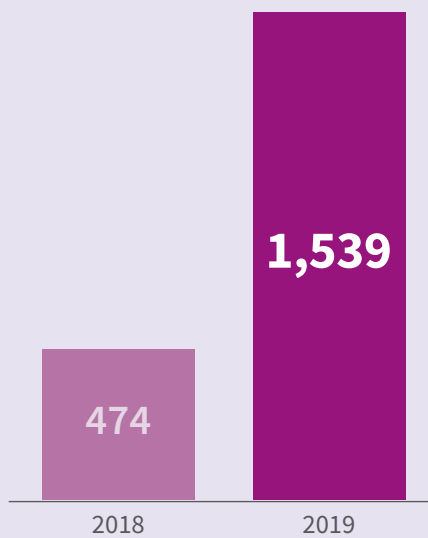


Participation

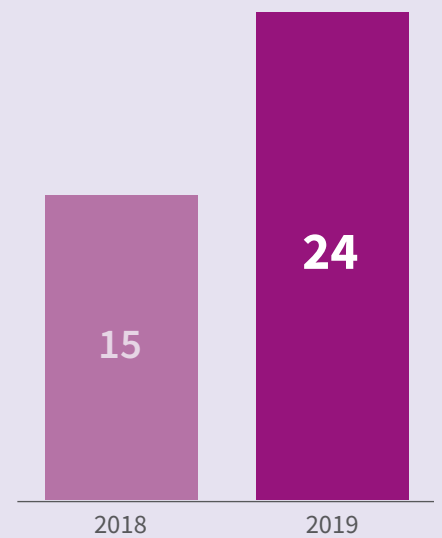
Agora Speakers



Agora Participants



Agora Partners



CERAWeek MEDIA IMPACT

75+ broadcast segments • **300+** accredited journalists • Media coverage across **122** countries

Media presence included:

Agence France Presse • Associated Press • *Bloomberg* • CBC • CNBC
Der Spiegel • *Die Zeit* • *Financial Times* • *New York Times* • Nikkei • NPR
Politico • Reuters • Ria Novosti • *The Economist* • *Time* magazine
Univision • *Wall Street Journal* • Xinhua • Yahoo! Finance

10,000+ news hits from 25 February to 31 March, with **7,500+** occurring during the conference

Total news media impressions: Nearly **13 billion**

CERAWeek Aggregate Social Media

28 thousand mentions
13 billion impressions

CERAWeek Agora Social Media

1,500 tweets using #CWAgora hashtag
15 million+ impressions



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