

CERAWEEK[®]
by S&P Global

Energy Innovation Pioneers 2023





“The great energy innovation enterprise is part of a very large experiment that is seeking to answer two enormous questions: Whether the world will have the energy it needs to support a \$130 trillion economy two decades from now and to what extent will it come from carbon fuels? This experiment is definitely not something just for the future. As the Energy Innovation Pioneers help demonstrate, it has already begun.”

Daniel Yergin

Vice Chairman, S&P Global



Welcome

Dear CERAWeek Participant,

Welcome to the 18th annual Energy Innovation Pioneers (EIP) program. Each year we feature many of the world's leading early-stage enterprises in energy and sustainability. Once again, CERAWeek is pleased to recognize an impressive group of entrepreneurs.

Pioneers are selected by a panel of S&P Global technology and market experts who identify companies—disruptive or enabling—that exemplify:

- Invention and creativity
- Scalability
- Feasibility and timeliness
- Superior management

Chosen from a field of over 500 candidates, this year's class of Pioneers is representative of the innovation occurring across the energy spectrum. Representing a variety of emerging technologies and business models—renewable baseload power, critical minerals extraction and processing, electrified industrial processes, low-carbon hydrogen generation, high-temperature superconducting electricity transmission lines—these companies are leading innovators shaping the new value chains of a decarbonized global energy system.

Please join us for two opportunities to hear their insights on innovation:

CERAWeek Agora Studios

Pioneers will explore their experiences and insights commercializing new technology in two Agora Studio Sessions.

- Wednesday, March 8: Adapting Proven Technologies to Accelerate Decarbonization
- Thursday, March 9: Reconfiguring the Global Economy for a Low-carbon Future

CERAWeek Agora Pods

On Tuesday, Wednesday or Thursday, each Pioneer will also give a 20-minute presentation diving deep into their technology and how their company is advancing the energy transition.

Concurrent with the CERAWeek Executive Conference, these presentations will be held in the CERAWeek Agora Pods, located just across the skybridge from the Hilton Americas in the George R. Brown Convention Center, level 3.

Our list of over 100 alumni companies is located at the back of this guide. We are proud of the remarkable successes of our past Pioneers, and we are equally confident that the 2023 Pioneers represented here at CERAWeek will play a critical role in enabling a low-carbon energy future.

Sincerely,



Carolyn Seto

Chair, Energy Innovation Pioneers
Executive Director, Energy Technology & Innovation, S&P Global

Strategy Sessions

Presented in Agora Studio 2 in the Innovation Agora@CERAWeek, located on level 3 of the George R. Brown Convention Center

Wednesday, March 8

9:30 - 10:10 a.m. | Agora Studio 2

Adapting Proven Technologies to Accelerate Decarbonization

While new solutions are needed to decarbonize the global energy system, adapting existing technologies developed and matured in other industries for use in future low-carbon energy systems is another pathway to achieving this goal. By building on the foundation of their established supply chains and capabilities, scaling of these types of solutions have the potential to occur at a faster rate than greenfield technologies. How are firms leveraging mature technologies to develop new opportunities in low-carbon energy systems? How transferable are they to supporting this goal? How are innovation models evolving to enable this approach to decarbonization?

- **Henk de Boer**, Chief Technology Officer, Strohm*
- **Joe Scherer**, CEO, GreenFire Energy
- **Grant Strem**, Co-Founder, Chair and CEO, Proton Technologies
- **Adam Wallen**, Chief Executive Officer, VEIR
- **Carolyn Seto**, Executive Director, Energy, S&P Global (chair)

Thursday, March 9

8:30 - 9:10 a.m. | Agora Studio 2

Reconfiguring the Global Economy for a Low-carbon Future

Achieving deep decarbonization of the global economy will require new zero-carbon and carbon-negative technologies and processes. Not only will these solutions transform how energy and materials are produced and consumed, but they will also impact future value chains. What commercial models will arise from these technologies? What role do new entrants play in building them? How are regulatory and financial systems evolving to support their development and accelerate scaling?

- **Saad Dara**, Co-Founder and CEO, Mangrove Lithium
- **Leah Ellis**, Co-Founder and CEO, Sublime Systems
- **Nick Myers**, Co-Founder and CEO, Phoenix Tailings
- **Geir Robstad**, Co-Founder and COO, Heaten
- **Carolyn Seto**, Executive Director, Energy, S&P Global (chair)

Note: Times and locations subject to change. Please download the CERAWeek app from the AppStore or Google Play to check times and locations.

*We welcome Strohm, class of 2016 Energy Innovation Pioneer, to share their insights on energy innovation during this panel.

CERAWeek Agora Pod Schedule

Agora Pods held in the Innovation Agora, located on Level 3 of the George R. Brown Convention Center in the Agora Atrium.

Tuesday, March 7

5:00 p.m. **VEIR | Accelerating resilient renewable electricity generation**
Adam Wallen | Chief Executive Officer

Wednesday, March 8

3:00 p.m. **Proton Technologies | Repurposing oil and gas fields for clean hydrogen production**
Grant Strem | Co-Founder, Chair and CEO

4:30 p.m. **GreenFire Energy | Expanding geothermal resources through closed-loop technology**
Joe Scherer | CEO

5:00 p.m. **Mangrove Lithium | Diversifying lithium feedstocks and refining capacity**
Saad Dara | Co-Founder and CEO

Thursday, March 9

11:30 a.m. **Heaten | Boosting industrial efficiency through high-temperature heat pumps**
Geir Robstad | Co-Founder and COO

3:30 p.m. **Phoenix Tailings | Harvesting critical minerals from mine waste**
Nick Myers | Co-Founder and CEO

4:00 p.m. **Sublime Systems | Producing cement electrochemically**
Leah Ellis | Co-Founder and CEO

Note: Times and location subject to change. Please download the CERAWeek app from the AppStore or Google Play to check times and Pod locations.

Speaker Biographies



Joseph Scherer, CEO, GreenFire Energy Inc.

Joseph Scherer has been leading GreenFire Energy as the CEO for the last seven years. He is an experienced attorney of 33 years in project financing and was the head of the Credit Finance practice at Cooley LLP. His financing experience includes a wide range of emerging and established companies and their financing sources from venture capitalists to money center banks. He has substantial project finance experience both international and domestic, including projects in conventional cogeneration energy projects and renewable energy projects employing various geothermal, wind, solar and other technologies.

Mr. Scherer received a J.D. from the University of California, Los Angeles, School of Law and an MBA from UCLA's Anderson Graduate School of Management. He has a BA in economics from the University of California, Davis.



Grant Strem, Co-Founder, Chair and CEO, Proton Technologies

Grant Strem is the Co-Founder, Chair and CEO of Proton Technologies. Prior to co-founding the company, he worked for a variety of organizations involved in subsurface exploration and development, covering both technical and financial aspects of these activities. The organization include Paramount, Burlington Resources, ConocoPhillips, Total E&P, Husky, GLJ Petroleum and TD Securities. He also started his own oil company focused on light oil, helium and geothermal resources. Mr. Strem holds a BSc in geology and MSc in reservoir characterization from the University of Calgary.



Adam Wallen, Chief Executive Officer, VEIR

Adam Wallen is the Chief Executive Officer of VEIR. He brings over 20 years of entrepreneurial and executive experience, earned at organizations like British Petroleum and Breakthrough Energy Ventures. Mr. Wallen has led ventures in a wide range of domains, such as healthcare, cleantech and medical technology, where he developed and marketed a variety of technology, product and service businesses.

Mr. Wallen holds an MBA from The University at Buffalo and a BS in ceramic engineering from Alfred University.

Speaker Biographies



Saad Dara, Founder and CEO, Mangrove Lithium

Dr. Saad Dara is the Founder and CEO of Mangrove Lithium. He is an entrepreneur and innovator with experience taking research from the lab bench to a commercial scale. Dr. Dara's areas of expertise are in fuel cells, redox flow batteries, lithium-ion batteries, electrochemical water treatment and upstream lithium production. He holds a Ph.D. in chemical and biological engineering from the University of British Columbia, and in 2022, he was named to *Business Insider's* 2022 Rising Stars of the Electric Car Industry.



Leah Ellis, Co-Founder and CEO, Sublime Systems

Leah Ellis is the Co-Founder and CEO of Sublime Systems. She brings extensive experience in electrochemical processes to this position. Prior to forming Sublime Systems, Dr. Ellis was a National Science and Engineering Research Council of Canada Banting Postdoctoral Fellow. She spent her fellowship at the Massachusetts Institute of Technology, in the Department of Materials Science and Engineering, where she worked with Yet-Ming Chiang to develop the technology underpinning Sublime Systems's low-carbon process for cement production. Dr. Ellis holds a Ph.D. in chemistry from Dalhousie University, where she worked with Professor Jeff Dahn on lithium-ion battery optimization in partnership with 3M and Tesla. Dr. Ellis is an Activate Boston Entrepreneurial Fellow and has been recognized as one of *MIT Technology Review's* 35 Innovators under 35.



Nick Myers, Co-Founder and CEO, Phoenix Tailings

Nick Myers is the Co-Founder and CEO of Phoenix Tailings. Prior to Phoenix Tailings, Mr. Myers held C-level positions at several startups, including a genomics sequencing company and an electric vehicle charging startup. He has a background in finance including working with top venture capital fund Techstars. He has an MBA from Northeastern University.



Geir Robstad, Co-Founder and COO, Heaten

Geir Robstad is the Co-Founder and COO of Heaten, where he is responsible for strategic sales, marketing, production and operation. He brings extensive experience in developing and leading the advancement of very high temperature heat pump technology and heat recovery systems for the industrial sector. Prior to Heaten, Mr. Robstad was the CTO and Special Projects Director of Viking Heat Engines, a developer of industrial heat pumps, compressors and Organic Rankine Cycle heat engines.

Mr. Robstad has broad multidisciplinary experience, participating in international management teams establishing multiple businesses in Norway and abroad, as well as in driving large EU and government-funded multinational projects. Sectors range from renewable energy technology to design and construction of complex projects.

Company Descriptions



1990 N. California Blvd., 8th Floor
Walnut Creek, CA, USA 94596-3701
info@greenfireenergy.com
+1 888 899 7363

Founded in 2014, **GreenFire Energy** is advancing the generation of continuous and reliable geothermal energy. The firm takes a multifaceted approach to advancing this goal, leveraging their advanced geothermal system technology—GreenLoop, a closed-loop technology which extracts and transports heat from the earth; expertise built through both in-house experience and with industry-recognized partners; and collaboration with market leading geothermal operating companies. GreenFire Energy’s technology is applicable to a broad spectrum of geothermal resources, including well retrofits, field expansions and greenfield projects.

GreenFire Energy’s technology has been developed with grants from the US Department of Energy, the California Energy Commission, and is the result of years of research conducted with US National Laboratories, major universities and experts in multiple disciplines. GreenFire Energy’s strategic partners and investors include Baker Hughes, H&P and Vallourec.

Visit us at greenfireenergy.com.



140 - 8 Ave. SW, Suite #300
Calgary, AB T2P 1B3 Canada
+1 403 467 1220
Info@proton.energy

Proton Technologies is working to commercialize the production of clean commercial hydrogen from mature hydrocarbon resources. By adapting proven technologies from the in-situ gasification industry and combining them with hydrogen selectivity techniques from steam methane reforming, Proton’s patented process produces hydrogen from oil and gas fields by combining in-situ gasification with water to convert reservoir hydrocarbons to hydrogen. The produced hydrogen is separated from hydrocarbons in the subsurface, leaving the carbon in the ground. This technology enables clean hydrogen production from depleted or abandoned hydrocarbon bearing assets, thereby reducing the economic and environmental liabilities associated with oil and gas wells and other associated infrastructure.

Proton Technologies was founded in 2016 by Grant Strem and Dr. Ian Gates, Professor of Chemical and Petroleum Engineering and the Director of the Global Research Initiative in Sustainable Low Carbon Unconventional Resources at the University of Calgary.

Visit us at proton.energy.

Company Descriptions



3 Gill St
Woburn, Massachusetts 01801 USA
info@veir.com

VEIR, founded in 2019, is developing high-temperature superconducting (HTS) transmission lines to enable the rapid growth of renewable electricity generation and support grid resiliency. VEIR's HTS electric transmission lines operate with negligible resistive losses, enabling their lines to operate at electrical current levels higher than conventional lines. Very high current allows high power transmission for a given voltage level compared to conventional lines and transmission of the same amount of power as conventional lines, but at a lower voltage level. These characteristics allow VEIR's technology to increase the transfer capabilities in existing transmission corridors and reduce the space needed for new transmission corridors.

VEIR's technology uses a passive, distributed evaporative open loop cooling system to deliver significant cooling power per unit of coolant than conventional cooling systems. This technology is applicable to wide range of transmission market segments, from short- and long-distance overhead to underground and subsea.

VEIR's investors include Breakthrough Energy Ventures, Congruent Ventures and The Engine, and is collaborating with National Grid. to accelerate the development of scalable solution before 2030.

Visit us at veir.com.



3800 Westbrook Mall #216
Vancouver, BC
Canada V6S 2L9
1-833-664-7854 (1-833-MNGRV-Li)

Mangrove Lithium, founded in 2017, is developing and commercializing an electrochemical approach to lithium refining to allow for efficient conversion of extracted lithium intermediates into a battery-grade product from a variety of feedstocks. The company's electrochemical process streamlines lithium refining by eliminating the need for a carbonate plant, reducing operating cost and time needed to convert the feedstock into lithium carbonate.

By taking a modular and platform approach to their technology, Mangrove offers flexibility in sourcing, co-locating and scaling up lithium refining. Their solution can be co-located at a variety of locations along the battery supply chain—at the point of extraction to meet the production specifications for any operation, near battery recycling plants to enable cost-effective closed-loop battery-value chains, or with battery manufacturers to allow them to enter diverse lithium supply agreement and reduce material supply issues while controlling lithium hydroxide purity to meet product specifications. With the majority of lithium refining capacity concentrated in China, Mangrove's modular platform technology can allow a more diversified allocation of refining capacity world-wide, creating a more robust lithium supply chain.

Mangrove Lithium's investors and partners include BDC Capital, BMW i Ventures, Breakthrough Energy, Emissions Reduction Alberta, Third Derivative and Zeton. In 2023, they were named a Global Cleantech 100 company.

Visit us at mangrovelithium.com

Company Descriptions



444 Somerville Avenue
Somerville, MA, USA 02143
info@sublime-systems.com
+1 617 388 2929

Sublime Systems is developing and commercializing electrochemically produced cement. Their process replaces high-temperature, fossil-fueled kilns with an electrochemical process that makes cement at ambient temperature. Further reduction of greenhouse gas emissions can be achieved by using renewable electricity to power the process.

Sublime's technology produces an industry-accepted, calcium-based cement without the use of fossil fuels or limestone, and without the need for carbon capture and storage to mitigate greenhouse gas emissions associated with conventional cement production. The resulting Sublime Cement™ is an ASTM-compliant drop-in replacement for Portland cement.

Sublime currently operates a 100 tonne-per-year pilot plant in Somerville, Massachusetts, and recently closed a \$40M series A, led by Lowercarbon Capital.

Visit us at [sublime-systems.com](https://www.sublime-systems.com).



8B Henshaw Street
Woburn MA, USA 01801

Phoenix Tailings creates sustainable rare earth metals (critical minerals), which are harvested domestically from mining waste to eliminate supply risk in the production of key renewable energy technologies like wind turbines, power transformers and EV motors. Leveraging its proprietary technology, Phoenix Tailings secures these critical supply chains by enabling domestic production.

Backed by leading investors such as Olive Tree, Accomplice, Techstars and the U.S. Department of Energy, Phoenix Tailings has demonstrated production at its facility in Massachusetts, United States.

Visit us at [phoenixtailings.com](https://www.phoenixtailings.com).

Company Descriptions



Kjøita 404630
Kristiansand, Norway
info@heaten.com
+47 380 45 000

Founded in 2020, **Heaten** is working to decarbonize industrial processes through its HeatBooster very-high-temperature heat pump technology. By utilizing waste heat, HeatBooster increases energy efficiency and enables decarbonization in industrial sectors by replacing fossil-fuel supplied heat with electricity. Having successfully delivered steam or hot water at process temperatures of up to 200°C, Heaten's technology is applicable to food, plastic, pulp and paper, breweries and drying processes. It will also be relevant in the low carbon applications that will drive the future economy like carbon capture (both point source and direct air capture), hydrogen production, data centers and district heating solutions.

Working with AVL Schrick, the largest independent motor development company in the world, Heaten has developed and designed megawatt-scale heat pumps using a current and proven technology platform. The HeatBooster's piston-based compressor and family of 4-16 cylinder heat pumps leverages existing heavy-duty combustion engine infrastructure for scalable, low-cost production.

The company's 12-year R&D history in the fields of organic Rankine cycle heat-to-power and power-to-heat machines has resulted in a strong patent portfolio for its technologies. Heaten is located in Kristiansand, Norway with teams based in Germany and the Netherlands. Investors include Azolla Ventures, Nysnø Climate Investments, Shell Ventures and Valinor.

Visit us at **heaten.com**.

Past CERAWEEK Energy Innovation Pioneers

Representing the vanguard of innovation across the energy spectrum, startups featured in the Energy Innovation Pioneers program bring human ingenuity and technological and commercial disruption to the global energy industry. Since their participation in the Pioneers program, this select group of startups has seen more than 180 rounds of investment, collectively raising over \$5.5 billion in venture funding, and 42 exits, through acquisition or IPO.

As we enter our 18th year, the longevity of the Energy Innovation Pioneers program speaks to the role technology and innovation play in transforming and sustaining the global energy system. Despite the many shocks and resets of the industry, our Pioneers continue to thrive. We look forward to riding on the new paths they navigate for the energy industry.

1366 Technologies	ClimaCell	GHGSat
24M	Commonwealth Fusion Systems	Gradient Corporation
908 Devices	Compact Carbon Capture	GreatPoint Energy
AC Kinetics	CoolPlanetEnergySystems	Houston Mechatronics (Nauticus Robotics)
Accelergy	CURRENT	Hybrid Air Vehicles
Acumentrics	Digital Lumens	Hydra Energy
Agilyx	EarthRisk Technologies	Hyllion
Agrivida	Emefcy	Ingrain
Airborne Oil and Gas (Strohm)	Emvolon	Ingu Solutions
Aircuity Inc.	Enchanted Rock	Ioxus
Alert Enterprise	Energy Vault	itRobotics
Alion Energy	EnerNOC	JP3
Alta Devices	ENGO Engineering	Kurion
Altela	Enlighted	LanzaTech
Ambri	Eos	Liquid Robotics
Anax Power	ES Xplore	Liquiglide
APTwater	FastCAP Systems (Nanoramic Laboratories)	Local Motors
Azima DLI	Fervo Energy	Lunar Outpost
Bidgely	FirstFuel	Maana
C3 Energy	Fishbones AS	Magseis
Capstone Turbine Corporation	Fluidic Energy (Nant Energy)	MicroSeismic, Inc.
Carbon America	FogHorn Systems	Modumetal
Celanese Corporation	Foro Energy	MOTIVE Drilling Technologies
CeraMem	Fountain Quail	m-Trigen
Ceres	Gen4Energy	Net Power
Ciris Energy	GeoSynFuels	Neohydro
Claroty	GlassPoint	Novas
Clean Energy Collective	Glycos Biotechnologies	NuScale Power
CleanO2		

OhmConnect	RRT Global	Taxon Biosciences
OPOWER	SAFCell	Tendril
Opus One Solutions	Sakti3	TerraPower
OPX Biotechnologies	Sapphire Energy	Transaera
Orbital Marine	Seeq	Transphorm
Origin Clear Technologies	Sekal	Tri Alpha Energy
Ormat	Senscient	TS Conductor
OsComp Systems	Silixa	Veros Systems
Petroleum Technology	Siluria Technologies	Water Lens
Phononic	Silver Spring Networks	Wearable Intelligence
Picarro	SkyCool Systems	WegoWise
Powerit Solutions	SKYRE	Wireless Seismic
Primus Power	SmartBIM Technologies	WiTricity
Rebellion Photonics	Solazyme	Woods Hole Center for Marine Robotics Technology
Reidiant	Sourcewater	XL Hybrids
Renmatix	Sustainable Energy Solutions	Zahroof Valves
Retroficiency	Synapse	Zilift
Rive Technology	Synthetic Geonomics	

Internal Advisory Committee

CERAWEEK[®]
by S&P Global

We would like to recognize this year's internal advisory committee, aka the S&P Global Commodity Insights GEEKS—Gurus of Emerging Energy Knowledge and Science, for their help in selecting this year's class of Pioneers:

- **Oscar Abbink**, Director, Upstream Transformation
- **Tom De Vleesshauwer**, Global Transport and Mobility Practice Leader, Automotive
- **Sam Huntington**, Associate Director, Global Power and Renewables
- **Judson Jacobs**, Executive Director, Upstream Transformation
- **Alex Klaessig**, Director, Hydrogen and Renewable Gas Forum
- **Patrick Luckow**, Associate Director, Global Power and Renewables
- **Andrei Utkin**, Principal Research Analyst, Global Clean Energy Technology

S&P Global

S&P Global (NYSE: SPGI) provides Essential Intelligence. We enable governments, businesses and individuals with the right data, expertise and connected technology so that they can make decisions with conviction. From helping our customers assess new investments to guiding them through sustainability and energy transition across supply chains, we unlock new opportunities, solve challenges and Accelerate Progress for the world.

We are widely sought after by many of the world's leading organizations to provide credit ratings, benchmarks, analytics and workflow solutions in the global capital, commodity and automotive markets. With every one of our offerings, we help the world's leading organizations plan for tomorrow, today. For more information, visit www.spglobal.com.

