



ausra

Corporate Overview

Solar Thermal Energy. Now.

Ausra designs, manufactures, installs, and operates solar thermal energy systems for customers around the world. Amid growing public demand for clean energy, our next-generation solar thermal energy systems provide reliable, scalable, and cost-competitive renewable energy solutions for both power and industrial steam customers. Our solar thermal energy systems can also serve as an integrated sustainability strategy for fuel and carbon market risk reduction.

Ausra's zero-pollution emitting solar thermal energy systems produce steam directly from the sun. It is simple, durable and scalable. The company's core technology, the Compact Linear Fresnel Reflector (CLFR) solar collector and steam generation system, uses modular flat mirrors to focus the sun's heat onto elevated centralized receivers, which consist of a system of tubes through which water flows. The concentrated sunlight boils the water in the tubes, generating high-pressure steam for use in power generation and industrial steam applications.

CLFR is the most land-efficient solar technology in operation, generating 1.5- to-3 times more power per acre of land than competing solar technologies. This high energy density translates into lower costs, a smaller environmental footprint and greater access to existing power plant and industrial sites. Unlike photovoltaic energy resources that immediately shut down during periods of transient cloud coverage, Ausra's solar thermal systems retain heat, allowing for a more seamless integration with the electric grid. For standalone power plants, Ausra can also include a natural gas boiler back-up design. These solar-natural gas hybrid plants can provide firm capacity to the grid.

Ausra's high-volume manufacturing capability, standard commodity materials, and land-efficient design allows it to quickly and cost-effectively scale-up and serve a broad range of power and industrial steam customers.

- **Industrial Steam Applications:** Ausra offers industrial customers direct solar steam or hot water for diverse process steam applications, ranging from enhanced oil recovery and petrochemical refining, to food processing and desalination.
- **Steam Augmentation:** Ausra's solar thermal systems provide steam augmentation for natural gas-fired and coal-fired power plants. This solar steam enables Ausra's power customers to increase electricity production at peak periods and reduce plant emissions.
- **Large-Scale and Hybrid Power Generation:** Ausra supplies solar steam boilers for large-scale, standalone power plants. Because Ausra's solar thermal energy system generates steam directly, the company offers a low-cost natural gas back-up boiler (solar-hybrid plant design) that can meet the same dispatchability levels as conventional power plants, but with far lower emissions.

Ausra At-a-Glance

Technology

- Cost-Effective, Emissions-Free Electricity and Steam
- Simple, Precise, Durable Design
- Direct Saturated and Superheated Steam Systems
- Most Land-Efficient Solar Technology
- Maximum energy per acre
- Non-Flammable, Non-Toxic Working Fluid (water/steam)
- Zero Emissions
- Reliable and Durable
- Engineered for Tough Environmental Conditions
- Modular and Scalable
- Rapid Deployment and Installation

Solar Energy Applications

Industrial Process Steam Applications

Power Augmentation for Fossil-Fired Plants

Standalone Solar Thermal and Solar-Hybrid Power Plants

Headquarters

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Founded: 2006

Ausra was acquired by AREVA Inc. in March of 2010

Innovation in Action

Electric utilities in the U.S. and worldwide are under growing pressure to expand their delivery of clean, renewable power and to reduce emissions at existing power and industrial sites. Ausra's experienced management team, leading engineers and scientists, superior technology, and volume production capacity are ready to meet your electricity and steam needs. The Ausra team brings to our customers expertise in every aspect of power generation and industrial steam applications, from R&D, engineering and manufacturing, through construction and operation.

Research and Development: Ausra's core group of chemists, physicists and engineers are working on thermal storage, optics, coatings, materials, and manufacturing processes to improve the performance and further reduce the cost of our solar thermal energy systems. Their ongoing refinements to our technology are extending Ausra's leadership in these fields.

Engineering: Ausra's engineering managers and engineers come from a variety of disciplines across the electric power and process steam industries. The team optimizes Ausra's existing technologies for production and brings new technologies from R&D into volume manufacturing. Ausra partners with leading consulting engineering firms to test and verify the energy production and lifecycle performance of its plants.

Manufacturing: Ausra's approach to solar plant production emphasizes manufacturing facilities located near customer sites, the use of standard commodity materials (steel, glass and concrete), and the application of mass-produced components. Ausra operates its own solar collector production facilities to deliver the highest performance at the lowest possible system cost.

Construction and Operation: Ausra brings to its customers extensive experience in building and operating large-scale power plants and industrial steam projects. Ausra's team has an outstanding track record of safe, clean, reliable operations.

Energy Independence and Security

There is tremendous potential for solar thermal technology to help America, and the global community, achieve energy security and independence. Ausra's core solar thermal technology, CLFR, provides a secure, domestic source of electricity and industrial steam with stable prices. It is pollution-free and can quickly scale to meet the growing demand for clean, reliable energy. Our technology protects customers against fuel price volatility, and is secure against any future costs of carbon emissions.

Powering the Economy

Ausra's business will benefit local economies by bringing "green collar" manufacturing, construction and operating jobs to rural and urban communities in the United States and by spurring new investment that will make the U.S. and global economy increasingly sustainable and prosperous. By delivering clean, reliable energy at cost-competitive prices, Ausra is helping meet America's growing needs for climate-friendly power while maintaining consumer-friendly prices.



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Frequently Asked Questions

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What does Ausra do?

Ausra designs, manufactures, installs, and operates solar thermal systems for customers around the world. Our next generation solar thermal systems provide reliable, scalable, and cost-competitive renewable energy solutions for both power and industrial steam customers.

What is Ausra's technology?

Ausra's zero-emissions solar thermal systems produce steam directly from the sun. The company's core technology, the Compact Linear Fresnel Reflector (CLFR) solar collector and steam generation system, uses flat, modular mirrors to focus the sun's heat onto elevated receivers, which consist of a system of tubes through which water flows. The concentrated sunlight boils the water in the tubes, generating high-pressure steam for use in power generation and industrial steam applications.

Who are Ausra's customers?

Ausra's customers are industrial steam users, independent power producers, electric utilities and other purchasers of wholesale power located in the U.S. and around the world. The company's first customer was Macquarie Generation, the largest power producer in Australia. Ausra's solar thermal installation provides solar steam to help fuel Macquarie's coal-fired power station. This is the world's first solar/coal-fired power augmentation facility.

Where are Ausra's solar thermal energy installations located?

Ausra is currently pursuing solar thermal installations in the western United States, Australia, and the Middle East. The company has a solar-coal-fired power augmentation facility in operation in Australia, and operates a solar thermal research and demonstration power plant in Bakersfield, California. The company's manufacturing facilities are located in Las Vegas, Nevada and Singleton, Australia.

What is Ausra's solar system footprint?

Ausra's solar thermal energy technology is the most land efficient in operation—generating 1.5-to-3 times more power per acre than any other solar technology. This high energy density translates into lower costs, a smaller environmental footprint and greater access to existing power plant and industrial sites.

How does Ausra serve power and steam customers reliably?

Ausra supplies solar steam equipment for new and existing power plants and industrial steam users. Unlike photovoltaic energy resources that immediately shut down during periods of transient cloud coverage, Ausra's solar thermal systems retain heat, allowing for a more seamless integration with the electric grid. For standalone power plants, Ausra can also include a

natural gas boiler back-up design. These solar-natural gas hybrid plants can meet the same dispatchability levels as a conventional power plant. How long does it take to install an Ausra solar thermal energy system?

By using standard, commodity materials and high-volume, automated production, Ausra can quickly scale-up to meet our customers' needs. Depending upon the size of the project, Ausra can install a solar thermal field in 6-18 months.

What does "Ausra" mean?

Our company is part of the dawn of a new energy age that will employ our oldest energy source—the sun. Ausra was the Lithuanian goddess of the dawn, descended from the ancient Indo-European goddess of the sunrise "Hausos" or "Ausus." The word survives in modern Lithuanian meaning "dawn." The letters "AUS" suggest "from the east," but for us they reflect the Australian heritage of our technology. The word also contains "US," alluding to our headquarters in the United States. Finally, "RA" is the earlier version of the Egyptian sun god.

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Executive Biographies

Leadership Team



Robert E. Fishman, President, CEO and Chairman

Fishman brings to Ausra more than 30 years of experience in large scale power projects. Prior to Ausra, he managed Calpine's 25,000-megawatt portfolio of clean, efficient and reliable natural gas-fired and geothermal power plants. He also managed Calpine's development and construction programs, engineering, and safety, health and environmental activities. Before joining Calpine in 2001, Fishman was president of PB Power, Inc. where he managed power project engineering services for more than 6,000 megawatts of gas-turbine and renewable energy projects. A former chief engineer in the U.S. Navy, Fishman holds a bachelor's degree in mechanical engineering from the U.S. Naval Academy, a master's and engineer's degree in mechanical engineering from Massachusetts Institute of Technology, and a doctorate in mechanical engineering from the University of Maryland. He currently serves on the Board of Directors of Century Aluminum Company.



Dr. Thomas Caulfield, President and Chief Operating Officer

With more than 15 years of executive leadership experience and a strong technical and OEM background, Dr. Caulfield is focused on accelerating the deployment of Ausra's concentrated solar thermal steam systems, lowering costs and supporting Ausra's global business development pipeline. Prior to joining Ausra, he was Executive Vice President of Sales for Novellus Systems, Inc., a Fortune 1000 company and a leading supplier of semiconductor equipment. At Novellus he was responsible for all aspects of worldwide field enterprise operations, successfully increasing the company's market share and customer satisfaction as measured by VLSI Research. He previously served in numerous executive management positions at IBM for more than 10 years. His accomplishments included significantly increasing profitability and strengthening operations of IBM's 300mm Semiconductor business. Dr. Caulfield also held a senior position at Phillips Laboratory and Post Doctorate position at Columbia University. He has a Doctorate of Engineering, a Master's of Science, and a Bachelor of Science degree in Science-Materials Science/Metallurgy from Columbia University, and has a Bachelor of Science degree in Physics from St. Lawrence University.



Dr. David Mills, Founder and Chief Scientific Officer

Mills is known worldwide for pioneering Compact Linear Fresnel Reflector (CLFR) technology and for his work in non-imaging optics, solar thermal energy, and PV systems over 32 years. His lab at the University of Sydney developed and licensed the evacuated-tube solar water heater technology, which comprises 60 percent of the world's solar collectors and is used widely throughout China for distribution of low cost domestic hot water. Mills originated and ran the research program that in 1991, with colleague Dr. Q-C. Zhang, developed the most advanced sputtered double cermet selective absorber coating, which is now used in evacuated tube receivers by China's largest solar company, Himin. He developed or co-developed other commercial systems including the Prism solar concentrator (Sol X) and the "S" evacuated tube reflecting system (Solahart). A solar sterilizer design he originated won a World Health Organization award in 2002, and he was a finalist in the 2002 World Technology Awards for Energy.

Mills is a former president of the International Solar Energy Society (ISES) and served as inaugural chair of the International Solar Cities Initiative (ISCI). While at ISES, he chaired the International Performance Measurement and Verification Protocol for Renewable Energy in partnership with the U.S. Department of Energy. Mills has published and refereed numerous academic reports and articles on solar energy in such publications as *The Journal of Solar Energy and Applied Optics*. At Ausra he continues to personally innovate while coordinating the highly talented Ausra R&D team and steering the direction of the company as chairman of the board.



Debra Olson, Executive Vice President, General Counsel and Corporate Secretary

Olson brings to Ausra her extensive legal expertise and renewable energy industry experience. Prior to joining Ausra, Olson was Vice President & General Counsel at Vestas American Wind Technology, Inc.—part of the world’s largest wind energy company—where she served as chief legal officer for the company and as a member of the company’s management team. Olson previously held the position of Senior Vice President & Assistant General Counsel at Calpine Corporation, a large, publicly-held leading U.S. independent power producer and one of the world’s largest generators of renewable geothermal energy. Olson holds a Bachelor of Science degree in business administration with a general science minor from Oregon State University and a Juris Doctorate degree from Northwestern School of Law at Lewis & Clark College. Olson serves as Ausra’s Executive Vice President, General Counsel and Corporate Secretary.



Jim Barnhart, Senior Vice President, Global Manufacturing

Barnhart brings to Ausra 25 years of global operations experience. Prior to Ausra he led West Coast Pharmaceutical Operations for Johnson & Johnson where he successfully implemented a regional operating model across Facilities Maintenance and Engineering, Capital Project Management, Facilities Planning, Business Services, Site Security, and Environmental, Health & Safety for three of J&J’s operating companies. He previously held increasingly responsible positions with Applied Materials, Inc. in semiconductor capital equipment manufacturing, engineering, product management/marketing, global service business general management, business group operations, global real estate & facilities, corporate business continuity planning, and intellectual property management. A former officer in the United States Navy’s submarine force, Barnhart led several nuclear engineering divisions and served as Sonar Officer. Barnhart earned a bachelor’s degree in electrical engineering from Washington State University and a master’s degree in business administration from the University of California at Berkeley.



Thomas J. Bartolomei, Senior Vice President, Business Development

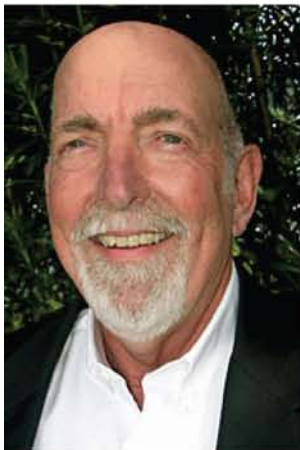
Tom Bartolomei brings to Ausra’s customers nearly 20 years of achievement in the power industry, with in-depth experience in every aspect of business development, project management and engineering for leading international energy firms. As Senior Vice President, Business Development, Bartolomei is responsible for driving Ausra’s global sales of solar thermal steam systems for standalone solar thermal and solar-natural gas hybrid power plants, power augmentation of new and existing fossil-fired power plants and industrial applications.

Prior to joining Ausra, Bartolomei was Vice President of Sales & Marketing of the Power and Industrial division for Burns and Roe Enterprises, Inc., a leading global EPCO firm. He also served as Vice President of International Sales for Alstom Power, Inc. (ABB Combustion Engineering Systems), where he developed and secured utility-scale domestic and international power projects, one of which was recognized by POWER Magazine as the Power Plant of the Year in 2004. Bartolomei received his Bachelor of Science degree in Mechanical Engineering from Worcester Polytechnic Institute in 1991, and held key engineering and business development positions for large-scale, coal-fired power stations in South Africa, China and Taiwan for a major U.S. boiler OEM.



Sam McIntosh, Senior Vice President, Power Engineering, Construction & Operations

McIntosh brings over 25 years of construction experience to Ausra including a thorough understanding of power plant design and construction execution practices. Sam has honed his “hands on” team leadership style through the design and construction effort of over 2500 MW of power plants. While at Calpine he helped to develop, organize, process, and refine one of the largest power plant build out efforts in the country while achieving new standards for safety, quality, cost and schedule control. With a background in nuclear and fossil fueled power plant operations, a bachelor’s degree in engineering from Cal Poly, San Luis Obispo and an M.B.A. from Pepperdine, Sam is well suited to develop and lead the Ausra construction team effort as they implement a utility scale solar thermal power plant construction program that is World Class.



Douglas J. Lehrmann, Interim Chief Financial Officer

Doug Lehrmann joins Ausra from FLG Partners, LLC. Doug brings to Ausra over 30 years of financial management in both public and private companies. He has served as CFO for five startups, raising more than \$80 million in venture capital and bank credit, and he has filed S-1’s for two initial public offerings.

His responsibilities have included finance, accounting, legal, banking, leasing, investor relations, facilities, human resources, MIS, and government contracting functions. Doug has worked for a broad spectrum of technology companies, including fabless semiconductor, semiconductor manufacturer, semiconductor equipment, R&D consortium, network storage equipment, and reverse logistics-service, among others.

Doug holds an MBA-Finance from the University of California-Berkeley Haas School of Business and a BA from St. Mary’s College of California. He is a former Certified Public Accountant in California.

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