



Greenstar

Strategic Energy and Communications Services

Greenstar offers professional development expertise in renewable energy systems and wireless data communications, with a special focus on developing countries and challenging "off-grid" settings.

Services include assessment of advanced technology, project planning, product marketing, investment and finance, technology procurement, deployment, field analysis and support. The company provides expertise in solar power systems engineering, portable satellite data systems, and in self-powered VSAT (very-small-aperture-terminal) satellite networks.

With a key focus on solar power, and extending to wind, biomass power and fuels, fuel cell, small hydro-electric and other green technologies such as electric vehicles, Greenstar delivers swift strategic action across international markets.

The Greenstar group is comprised of several world-class experts and experienced executives, who have worked together on a wide variety of projects over many years. This unique group has capabilities in engineering, software development, product design and configuration, with the ability to deliver optimized data services anywhere in the world, even to the most challenging remote environments.

The team is led by one of the leading experts in renewable energy, Dr. Charles F. Gay, who has spent more than a quarter century as a pioneer, engineer, manager and implementer of green technologies in more than 40 different countries. He served for several years as one of President Clinton's leading experts in the field, in the post of director of the Department of Energy's National Renewable Energy Laboratory.

The organization is rounded out by regional experts based in the US, Europe, the Middle East

and Asia, including executives from Astropower, the Arab Academy (Cairo), Photovoltaic Global Approval Program (Geneva), Tata Energy (India). One of the members of Greenstar's team serves as Chairman of the Inter Governmental Panel on Climate Change, chartered by the United Nations to provide research and strategic advice on global warming to the member states of the UN.



Most recently Greenstar has planned and deployed energy, data services and rural enterprise in the West Bank, Thailand, Ghana, Jamaica, Australia and central India, has provided advice on programs in Egypt, Vietnam, Cambodia and Papua New Guinea, and is currently engaged in projects in Brazil, Tibet, New Mexico and South Africa.



Nomad, Greenstar's new portable solar-powered satellite data system.

A unique product, called [Nomad](#), has been developed by the group and is now available. Nomad offers completely portable, solar-powered wireless Internet connections anywhere in the world, and has already shipped to key projects in Afghanistan and Pakistan.

The company has extensive relationships with leading technology and manufacturing groups at Shell Solar, RWE-ASE Americas, BP Solar, Siemens, Thai Photovoltaics, SunPower, Prime Solar and AstroPower, with a qualified, trained dealer network of 4000 companies in 168 countries who can be the local contractors for solar and certain high technology projects.

Greenstar also maintains close ties with energy development experts at the US Department of Energy, Sandia National Labs, Winrock International, the International Finance Corporation (IFC-World Bank), US Agency for International Development, UN Development Programme, and UN Environmental Programme. In the wireless communications realm, the company has strong relationships with Motorola, Thuraya, Blue Kite, SAIC, Shiron Communications, Iridium and Globalstar.

The Team

Dr. Charles F. Gay

based in Los Angeles



Charlie Gay is the team leader of Greenstar's Strategic Energy Development Services, and co-founder of Greenstar Corporation. His expertise includes solar cell manufacturing and international business.

He began his industrial career in 1975 designing solar power system components for communications satellites at Spectrolab, Inc. a subsidiary of Hughes Aircraft Co. He joined ARCO Solar in 1978 where he established the research and development program, and was project leader for the commercialization single crystal silicon wafer technology from laboratory to mass production. He served in various leadership positions ranging from Director of Research to President of the company.

In 1990 he became President and Chief Operating Officer of Siemens Solar Industries where he was responsible for increasing company sales into 110 countries and expanding the development of thin film solar technology to three continents.

From 1995 to 1997, Gay served as Director of the U.S. Department of Energy's National Renewable Energy Laboratory. NREL is the world's leading laboratory for energy efficiency and renewable energy research and technology. His responsibilities included management of an annual budget of more than \$235 million and 1,000 employees.

In 1998, Dr. Gay served as President and Chief Executive Officer of ASE Americas, the third largest solar cell manufacturer in the United States. He was responsible for commercializing silicon ribbon as a starting material in the manufacture of photovoltaic solar panels. The success of this has led to the establishing the world's largest factory for solar cell production at 60 megawatts in size.

Charlie Gay co-founded Greenstar in late 1998. He serves as President of Greenstar Foundation and as a senior executive with Greenstar Corporation, which develops, distributes and licenses digital products produced by people in solar-powered villages. Greenstar communities include the West Bank, Jamaica, India and Ghana, with new sites planned for Tibet and Brazil. Dr. Gay has personally supervised much of the design and field work connected with this program, which has been recognized for its innovation by the World Bank, the Stockholm Challenge, the

Technology Empowerment Network and the Tech Innovation Awards.

Dr. Gay has a Ph.D. in physical chemistry from the University of California, Riverside. He is holder of numerous patents for solar cell and module construction and winner of the Gold Medal for Achievement from the World Renewable Energy Congress.

Key background websites:

NREL -- <http://www.nrel.gov>

Spectrolab -- <http://www.spectrolab.com>

Siemens Solar -- <http://www.siemenssolar.com>

ASE Americas -- <http://www.ase-international.com/english/about.html>

Peter J. McKenzie

based in Singapore



Peter McKenzie is the Asia Regional Director of Astropower, one of the world's largest and fastest-growing publicly-traded solar power component makers (NASDAQ: APWR). He is currently resident in Singapore, and is one of the co-founders of Greenstar, serving on the Board of Directors of the Foundation.

Through 1999, he managed the Solar Technology Consulting Co. (STC) based in Boston, and Hyderabad. STC's efforts centered around the development and implementation of sustainable financing tools for photovoltaic power systems. He established a multi-organizational marketing network to develop packaged solar products for remote and rural populations not being served by reliable electric services.

A native of Australia, Mr. McKenzie graduated from the Western Australia University of Technology. He has served in a progression of photovoltaic businesses dating back to the mid-1970's, when he was stationed in Papua New Guinea, and installed the first complete PV-powered microwave telecommunications system in the world. These communication units used solar power with a diesel backup generator. Such a hybrid combination remains the most common form of integrating renewables into village power today and forms the core concept of Greenstar.

In 1979 Peter began to assist Atlantic Richfield (ARCO) in initiating its solar program activities. He managed the regional field offices for ARCO Solar and Siemens Solar in Japan, Hong Kong and Singapore. His experience in these organizations includes leading successful efforts to secure financing for solar projects involving the International Finance Corporation (affiliated with the World Bank) in the U.S., GTZ in Germany and JICA in Japan for projects in

Bangladesh, Philippines, Maldives, Pakistan, Thailand, Indonesia, China, Nepal and India.

Corporate website: <http://www.astropower.com>

Edward C. Kern, Jr.

based in Boston



Dr. Kern has twenty-one years experience working with photovoltaic systems and their interconnection to electric power systems. He is president of Ascension Technology, Inc. Before founding Ascension Technology in 1987, he was a member of the Massachusetts Institute of Technology faculty and research staff. He joined the MIT Lincoln Laboratory Photovoltaic Field-Tests and Applications Project in 1977 and was promoted to Assistant Group Leader in 1980. In 1979 he planned and then implemented the U.S. Department of Energy's Residential Rooftop Photovoltaic Systems Project. From 1982 until 1987 he directed photovoltaic systems development activities at the MIT Energy Laboratory. He currently is a Research Affiliate at the MIT Energy Laboratory serving as an advisor to the MIT Analysis Group for Regional Electricity Alternatives. Currently he also serves as president of the New England Solar Energy Industries Association.

A Senior Member of the IEEE, Dr. Kern is a member of the Energy Development Subcommittee of the Power Generation Committee. He served the Power Generation Committee representative to the IEEE Standards Coordinating Committee on Dispersed Storage and Generation, and helped develop the IEEE Guide for Interfacing Dispersed Storage and Generation with Utility Systems. He has been a consultant to the Washington office of the Electric Power Research Institute on photovoltaic applications and served on the Science and Technology Review Committee for the National Renewable Energy Laboratory's Solar Radiation Resource Assessment Project.

In addition to his work with photovoltaic systems, he has directed the development of a non-intrusive method for acquiring electric end-use load data using pattern recognition and signature analysis techniques. He holds two U.S. patents and is the author of numerous papers and reports on end-use electric power consumption, distributed photovoltaic generation and early, cost-effective PV applications for electric utilities.

As President of Ascension Technology, Dr. Kern has grown the company from two to twelve employees over eleven years and while serving photovoltaic system research, development, engineering and installation projects across the United States and in Mexico, Costa Rica, Brazil,

South Africa, and India, where Ascension Technology installed one of India's largest photovoltaic installations. Dr. Kern is a graduate of Dartmouth College and received his Ph.D. from the Massachusetts Institute of Technology.

website: Schott Applied Power (acquired Ascension Technology): <http://us.schott.com>

Dr. R K Pachauri

based in New Delhi



Dr R K Pachauri, an engineer turned economist and environmental scientist, is the Director of the Tata Energy Research Institute (TERI), New Delhi. He was recently elected to a six-year term as Chairman of the Inter Governmental Panel on Climate Change, the premier worldwide group charged with understanding the impact of global climate change, working under the United Nations.

Under Dr. Pachauri's guidance, TERI is playing a major role in influencing the government policy in fields of energy and environment.

Dr Pachauri was Assistant Professor, North Carolina State University, Raleigh, North Carolina, USA where he obtained a Ph.D. in Industrial Engineering and in Economics. Later, he was a Visiting Faculty Member in the Department of Economics and Business. He was a member of Senior Faculty of the Administrative Staff College of India, Hyderabad and Director, Consulting and Applied Research Division.

He is a Visiting Research Fellow, The World Bank. He is a part time Adviser to the Administrator for Energy and Sustainable Management of Natural Resources, UNDP (United Nations Development Programme).

Dr. Pachauri is associated with many committees of the Government of India which include Panel of Eminent Persons on Power, Ministry of Power; Core Planning Group (Delhi Vision - Core Planning Group); Advisory Board on Energy (ABE); National Environmental Council; Oil Industry Restructuring "R" Group. Dr R K Pachauri is Vice Chairman of the Intergovernmental Panel on Climate Change (IPCC) He has been active in several international forums dealing with the subject of climate change and its policy dimensions.

Dr. Fuad Abulfotuh

based in Cairo

Dr. Fuad Abulfotuh is one of the leading experts on solar power in the Arab world. He is former Senior Scientist at the National Renewable Energy Lab, US Department of Energy. Fuad holds a Ph.D. in Physics from Reading University, UK and Cairo University. He is Director of the Middle-East Center for Energy & Environment Technologies, sponsored by the Arab Academy for Science & Technology, Alexandria, Egypt.



He has served on the Faculty of Engineering, Cairo University, and on the Faculty of Science, King Saud University, Riyadh, Saudi Arabia. Special professional fields of expertise, in which he has lectured and written professional papers and academic books, include solid-state electronics, solar cooling, thin film phenomena, electro-optical properties of solids, and analytical equipment.

Dr. Abulfotuh was supervising engineer for the initial Greenstar installations at Al-Kaabneh, and heads Greenstar's technical and investment activities in the Middle East.

He says, "Greenstar is a vehicle that can bring together isolated communities in some of the most remote parts of the world, providing them with the means to experience the latest advances in telecommunication, telemedicine and ecommerce. I look forward to the opportunity of bringing together the technology and people from around the world with the goal improving the quality of life."

Arab Academy for Science and Technology, Alexandria: Egypt <http://www.aast.edu>

Also see the Suntainer which Dr. Abulfotuh helped to design and install in Alexandria, at <http://www.greenstar.org/suntainer/>.

Peter Varadi

based in Geneva



Peter Varadi holds a Ph.D. in physico chemistry from the University of Szeged, Hungary. In 1968 he became the head of the Communication Satellite Corporation's chemistry laboratory in Clarksburg, Maryland. In this function he also worked on basic research into photovoltaic (PV) solar cells, which was used to power satellites.

In 1973 he co-founded Solarex Corporation, to develop the utilization of solar cells for terrestrial applications. Solarex was a pioneer in this field, and by 1983 it was the largest photovoltaic manufacturing company in the world, employing over 600 people, with operations and factories in four continents. The company was sold to Amoco (now BP Solarex), and Dr. Varadi was retained as a consultant to assure its future growth. Today, Solarex has global market share of 20% , with projected revenues over \$200 million for 2000.

In 1994, Dr. Varadi was asked by the European Union to head a study group on the financing of renewable energy projects, with specific emphasis on photovoltaics. This study indicated that one of the difficulties in financing renewable energy projects is quality assurance.

To correct this problem, Dr. Varadi initiated the Photovoltaic Global Approval Program (PV GAP), a non-profit organization located in Geneva, Switzerland. The goal of PV GAP is to establish a global system to test, audit, inspect, approve and maintain high quality and reliability of PV products, systems and installations. He serves as Chairman of this vital international organization.

In 1996, Dr. Varadi was asked by the German state of Nordrhein Westphalia to participate in a study, with two German companies, to evaluate the possibility of establishing a large PV solar cell factory in Nordrhein Westphalia. The study resulted in the establishment of a 25 MWp (expandable to 100 MWp) solar cell manufacturing facility in Gelsenkirchen, Germany.

Dr. Varadi is highly respected in Europe and America as a passionate spokesman for renewable energy. He writes articles and lectures widely, to promote its finance and utilization.

Photovoltaic Global Approval Program: <http://www.pvgap.org>

Bill Yerkes

based in Santa Barbara



Bill Yerkes earned a B.S. in Mechanical Engineering from Stanford University. After serving in the United States Army, he went to work for Chrysler, at the Chrysler Institute graduate engineering program in Detroit.

At Boeing in the 1960's, Bill built the Boeing Kent Space Environment Laboratory in support of the Apollo lunar landings. Bill then became President and CEO of Spectrolab. There he was responsible for developing the solar array left behind on the moon by Apollo 11, along with space batteries, solar simulators and "Night Sun" searchlights for helicopters.

Next, Bill founded Solar Technology International, which developed low-cost terrestrial solar cells and modules. After several successful years, he sold STI to Atlantic Richfield, and served as President of ARCO Solar, building the company into the largest photovoltaic manufacturer in the world.

Again at Boeing, Bill worked on RF and photonic components in a new facility he designed. He then moved to Teledesic, which built a low-earth-orbit worldwide network of Ka-Band communications satellites.

Bill was one Teledesic's first employees, and served in the critical post of electric power systems manager for Teledesic's 800 satellites. He developed low-cost space power systems and thrusters for orbit raising. He also promoted the testing of lithium-ion batteries to replace nickel-based batteries for spacecraft.

Bill is involved today with neighborhood electric vehicles, battery technology, solar cell development, and transit-on-demand.



The Greenstar team is working in rural Tibetan villages, along with the U.S. Department of Energy, to build small, de-centralized solar power and wireless communications capabilities.



Scenes from a solar power installation designed, managed, financed and installed by Greenstar in Swift River, in the remote mountains of Jamaica.





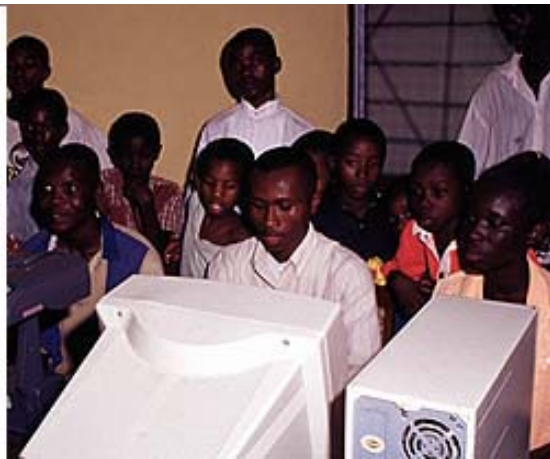
The Greenstar team was responsible for the installation of a large commercial solar array in a remote Palestinian village south of Hebron. The team worked closely with both Israeli and Palestinian specialists, to develop an array of health, education and cultural programs powered by the sun.



At a Greenstar installation in central India, solar power from the array on the rooftop (left) is used to power a computer learning lab in the school, which has drawn support from international businesses and regional government.



A Greenstar team member, Dr. Fuad Abulfotuh of Cairo, designed and built this demonstration solar-powered community center, with clinic, classroom and satellite communications, at the Arab Academy outside Alexandria.



In rural Ghana, Greenstar has helped to install a solar-powered computer lab, and to develop local businesses based on the availability of clean, economical power.





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