

## San Diego seeks to ride 'cleantech' wave

By Karen Boman

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**SAN DIEGO, CALIF.:** Seeking to catch the wave of development in clean technology (cleantech) to allow utilization of renewable energy resources, the city of San Diego is seeking to position itself as an incubator for the development of clean technology and cleantech companies.

The San Diego region, which has been a hub of development for telecom and biotechnology, is now focusing on recreating the success seen with the development of these businesses in the region. These efforts include the formation of CleanTECH San Diego, a non-profit membership organization, "to accelerate San Diego's position as a world leader in the clean technology economy."

The group's mission is to stimulate innovation and advance the adoption of clean technologies and sustainable industry practices for the economic, environmental and social benefit of the greater San Diego region. The group said it "hopes to create a living laboratory in which clean tech companies can develop and mimic the success in developing clean tech as was seen for biotech and life science companies in the area."

Universities in the area, which include the University of California at San Diego (UCSD), the Scripps Research Institute, and the Salk Institute, are part of that living laboratory, providing a home to research that has resulted in the start of companies such as Qualcomm and clean tech companies.

Proponents of San Diego's future as a cleantech hub point to the city's atmosphere of collaboration between academia and industry as an asset, strategic location on the U.S.-Mexico border, and amenable outdoor climate are other benefits being touted on the city's quest to become a cleantech hub.

The clean tech industry also can draw from the region's talented pool of scientists and engineers available thanks to the presence of other technology clusters. A diverse workforce brings different skill sets and points of view, said Dan Squiller, CEO of PowerGenix.

"There are other companies we want to be around, especially the electric car business. We don't have to jump on an airplane to have a relationship with these folks," said Dan Squiller, CEO of PowerGenix, a San Diego-based company that manufactures batteries used in a number of products, including hybrid electric vehicles.

The region's history of being at the forefront of climate change monitoring also contributes to an atmosphere favoring cleantech. In 1958, Scripps geochemist Charles David Keeling initiated the

Keeling Curve, a measurement of rising carbon dioxide levels in the atmosphere. According to Scripps, the Keeling Curve has had profound impacts on subsequent climate research and on national and international environmental policy.

With over US\$1.2 billion in total investment in San Diego during 2006, there is potentially a large pool of risk capital to fuel the growth of cleantech startups, according to the San Diego Regional Economic Development Corporation.

Federal, state, and local policy is rapidly becoming more favorable to the cleantech industry, the EDC reports. Tax credits, incentive programs, and new laws that address environmental challenges are stimulating market demand for cleantech products and services.

According to CleanTech, over 200 companies involved in clean technology are located in the San Diego area. A large number of the cleantech companies in the San Diego area include companies involved in energy generation, such as wind and solar, and energy efficiency.

Other companies considered cleantech include water and waste water, transport technology, recycling and waste, manufacturing/industrial, energy infrastructure, energy storage, air and environment, agriculture and advanced materials.

CleanTECH San Diego is focusing on ensuring that research dollars from the "strong" local research community find their way to clean tech start-ups, and to move local activity beyond research and development to the creation of local companies.

CleanTECH President Lisa Bicker hope that CleanTECH's efforts will ensure San Diego a leadership position in upcoming clean tech trends, such as the development of algae for biofuels, considered a "Holy Grail" for this sector.

Scientists at Scripps, along with researchers at UCSD's Division of Biological Sciences, are part of an emerging algal biofuel consortium that includes academic collaborators, CleanTECH San Diego, regional industry representatives, and public and private partners.

Scripps scientists see algae as a "green bullet", science and society's best hopes for a clean bioenergy source that will help loosen dependence on fossil fuel, counteract climate warming, and power vehicles of the future, according to an article in Scripps' December 2008 /January 2009 issue of Explorations: The Magazine of Ocean and Earth Science.

While there benefits, challenges also exist. The current economic crisis and the state's budget deficit and unemployment rate paint an overall gloomy picture of California at the moment. However, investors and developers of clean technology remain bullish on the long-term future of their industry.

San Diego had a gross domestic product of US\$164.7 billion in 2007, and despite high housing prices that have create some issues with recruitment, the area has generally seen steady growth, said Julie Meier Wright, president and CEO of the DEC. Space is an issue, since two-thirds of the land in San Diego County is federal and state parks and off-limits to development, meaning that development is focused on coastal areas.

Still, the entrepreneurial spirit of the local universities, which has resulted in the development of companies and created seamless interaction between old and new economies, and research capacities of institutes of higher learning, creates a strong advantage for clean tech companies in San Diego, said Wright.

The proximity to Baja California, where low-cost manufacturing capacity with high-tech capabilities is available, is also touted as another asset.

According to the EDC, San Diego has fared better than other parts of California. The second most populous county in California, San Diego from 2000 to 2008 was the fourth fastest growing among California counties with 1 million people or more, now boasting a population of 3.1 million.

The San Diego region also continues to enjoy a diverse and vibrant economy, with biotech, communications, software, Internet and information technology companies, EDC said.

While companies have faced turmoil in getting projects financed in recent months, local academic institutions also are seeking more private funds and partnerships to finance research and projects as state funding declines.

Existing companies hope to fund future projects, which tend to be capital-intensive, with money earmarked for renewable energy development under the stimulus bill recently signed by President Barack Obama. However, navigating the process to apply for money is not yet clear at the moment; funds are not anticipated to be received for some time.

### **Sunrise PowerLink**

Besides seeking to cash in on a growing industry, San Diego's interest in cleantech meshes with California state mandates to increase energy used from renewable resources and to better meet energy needs in the region.

In 2006, the state passed legislation mandating that state greenhouse gas levels would be reduced to 1990 levels by the year 2020. To meet this goal, state laws require utilities to generate 20 percent of energy supplies using renewable resources by the year 2010. Part of this plan is the California Solar Initiative, the goal of which is to have solar panels installed on 1 million home rooftops.

As part of its push towards more renewable energy use, San Diego Gas and Electric (SDG&E) will offer US\$85 million in incentives and rebates for customers wanting to utilize green energy, such as the installation of solar panels, adding infrastructure to allow them to fill up their cars with natural gas and other green-friendly infrastructure to their homes.

Funds will allow customers of all incomes to use green energy. "Renewable energy should be classless and should be for everyone," said Hal Snyder, vice president of customer programs at SDG&E.

At the same time, SDG&E will offer its Smart Grid program is designed to utilize smart meters that show customers how much energy they're using in their daily lives. The idea is that if people see how much energy they're using, they'll modify their behavior, Snyder said. SDG&E's Smart Grid will have 1.4 million sensors that will allow it detect power outages faster and more

accurately. Electronic chips supplied by the ZigBee Alliance, will allow meters to talk to household appliances to monitor energy use.

These plans are part of SDG&E long-term efforts to satisfy San Diego's thirst for power, as well as become more energy efficient and keep energy costs for customers down. That plan includes a balance of environmentally-friendly conservation and energy efficiency programs, more renewable energy like rooftop solar, and the first new power plants built in decades.

Sunrise PowerLink is also part of this plan. In December, the California Public Utilities Commission approved the route for SDG&E's proposed PowerLink project, in which new transmission lines would be built to link renewable energy resources in eastern San Diego County and the deserts of the Imperial Valley east of San Diego county. Despite the challenges of costs and opposition, SDG&E is "very confident" that the project will move forward, Snyder said.

SDG&E is committed to helping California "go green" but needs new transmission lines like the Sunrise Powerlink to meet these aggressive clean power goals. Currently, there are few power lines in California that connect the green energy supplies found in the state's rural areas to population centers like San Diego.

According to SDG&E, vast supplies of solar, wind and geothermal energy are sitting untapped in eastern San Diego County and the sunny deserts of Imperial Valley. Together, these regions could become a leading producer of renewable power and help reduce polluting greenhouse gas emissions in California.

A solar farm of up to 900 MW will be constructed in the Imperial Valley using proven solar dish technology to track the sun and maximize electricity production. At full build out, the project's 36,000 solar dishes could cover nearly 10 square miles of land and become one of the largest solar farms in the world.

SDG&E has also contracted with MMR Power Solutions, LLC, to purchase power from two 50 MW solar farms using solar trough technology planned for the Imperial Valley. Geothermal has a long history in the Imperial Valley and could begin to play an even bigger role in California if new transmission lines are constructed.

The California Energy Commission estimates that there is approximately 2,000 MW of additional geothermal potential in the Imperial Valley near the Salton Sea.

SDG&E has signed contracts for 60 MW of geothermal electricity that would be imported from the Imperial Valley via the Sunrise Powerlink. SDG&E is talking with potential partners about jointly developing wind projects.

Part of the shift is for better energy efficiency, while part is to meet state mandates under the California Solar Initiative. The state of California has set a goal for 1 million solar rooftops to be in place on California homes by 2020.

PowerLink will allow SDG&E to utilize its smart grid plan in which it can shift power to different parts of the San Diego area based on need and utilize a variety of green energy resources to do so. The variety of weather across the city can vary; with four different weather

forecasts for the inland desert, coastal area and other regions, the ability to shift supply as demand changes is critical.

### **Solar efforts**

San Diego Mayor Jerry Sanders supports efforts to turn San Diego into a hub for clean energy technology, as it dovetails with efforts to bring jobs and economic activity to the city, as well as energy efficiency and use of renewable energy resources.

To help meet the solar initiatives set forth by the state, the mayor is developing a program in which city residents can finance the installation of solar panels on their homes over a 20-year period. Residents would repay the loan through their property taxes. Currently, the city is looking for a partner to bid on providing financing for the program.

Sanders said only two other U.S. cities, Palm Desert and Berkeley, have solar financing programs. Palm Desert's program is funded out of the city's general expenses, while Berkeley utilizes a private company for financing. San Diego is studying the Berkeley program.

Officials with cleantech companies also point out the mayor's support for clean tech as a major plus to doing business in San Diego. "There's no doubters about climate change now," Sanders said of the political risks of pushing a green agenda, noting that overall trend towards energy efficiency.

CleanTECH also is helping communities around San Diego become more energy efficient. CleanTECH has been working with the city of Santee to make the small bedroom community with a highly electricity load and fewer resources become more efficient.

The trend towards energy efficiency also can be seen in new housing developments in the area, such as Black Mountain Ranch. Located north of San Diego, the 4,677-acre community, which features a golf course and homes constructed in old California-style architecture, offers solar panel installations on new homes, a reclaimed water pipeline system and reservoir that makes up the community's irrigation system, access to public transit and community planning with input from the city, local communities and environmental groups such as Sierra Club.

### **UCSD**

UCSD also is spearheading its own efforts to make its campus more energy efficient. Under its Sustainability 2.0 program, the college will address 12 areas of campus development to achieve its energy efficiency goal.

The program's goal is to make the 11 million square foot campus independent of the local energy grid by late 2010 or early 2011, said Steven W. Relyea, vice chancellor of business affairs at UCSD. While the focus is on being more energy efficient, budget cuts also are forcing the university to use more efficient energy resources.

The program will focus on renewable energy projects such as the expansion of the campuses' natural gas cogeneration facility. Other plans include retrofitting current buildings to reduce energy usage and construction new buildings to be energy efficient; replacing the school's vehicle fleet with hybrids and buses that run on electricity and compressed natural gas; deploying solar power and fuel cells around the campus; utilizing a reclaimed water system and ocean water to help cool computer data centers and research facilities; advanced energy storage and a campus forest management plan.

To deploy solar power on roofs, the school is leasing the rooftops to companies, since money is not available. Relyea said school officials would like to see the California Public Utilities Commission remove the cap that restricts solar projects to 1 MW of power per site for rebates. Redefining the cap "would allow us to do the right thing" and deploy more solar power on building parking garage rooftops.

To fund construction of new eco-friendly buildings, the school will seek funding from private partners.

The university also is seeking ways to utilize wind resources by developing the capacity to take wind power at off-peak load times.

UCSD has no shortage of volunteers for its clean tech projects among students. The top three concerns of academically-driven students at the university, which has no football team, is climate change, climate change, and climate change, Relyea said.

The university also is seeking ways to make some or all parts of its strategy work for nearby communities. The presence of a green university also can attract more cleantech companies to the area, Relyea said. Relyea noted that German solar company is in talks with the university to design and construct a concentrating photovoltaic solar panel. This kind of technology works best in hot desert climate of Death Valley, but the company "wants to be a part of the technology base here and wants North America to know about its technology," so it hopes to pursue its work at UCSD.

The collaborative spirit among students, faculty and the administration on making the campus green has put UCSD far ahead in terms of progress going green compared with other U.S. college campuses, Relyea noted.

Many of the students who attend UCSD are attracted to the campus' place in history as the first to begin studying climate change and the first to warn that it was a problem created by humans. "Since the problem was first identified here, they feel it's up to them to find solutions."

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