

## SURGE IN ALTERNATIVE ENERGY DEVELOPMENT HOUSTON ENERGY CAPITAL STATUS GROWS AMID NEW OPPORTUNITIES



PHOTO COURTESY OF THOMAS C. LAVERGNE

**Amy Meyers Jaffe, Wallis S. Wilson fellow in energy studies at the James A. Baker III Institute for Public Policy and associate director of the Rice University Energy Program.**

By Amy Myers Jaffe and Ferras Vinh

In early July 2007, amid a Houston skyline that boasts the headquarters of some of the world's largest oil and national gas giants, Governor Rick Perry unveiled his plan to help the State of Texas to begin to develop new alternative energy technologies that will better position the state to thrive economically from the eventual transition to alternative energy.

The announcement of the Texas Bioenergy Strategy (TBS), which was made at the offices of the Greater Houston Partnership, and the ensuing benefits, will stand to again solidify Houston as not only an epicenter for traditional energy, but for future alternative energy innovation and expansion. While bioenergy could soon be hot in Houston, other kinds of energy companies are expanding their activities here as well,

potentially helping Houston keep a strong hold on its energy capital status.

As venture capital inflows to Houston surge, energy businesses are a big recipient. A total of 30 venture capital deals totaling \$212 million graced Houston last year, according to the annual survey conducted by PricewaterhouseCoopers LLP, Thomson Venture Economics and the National Venture Capital Association. Of those, one third were related to energy. While some of the capital is flowing to new oil and gas ventures, increasingly venture capital monies are chasing alternative energy, with venture capitalists investing six times as much on alternative energy in 2006 as the year before.

This recent surge in alternative energy development, motivated by increased environmental awareness and economic pressures alike, has not gone unnoticed by Wall Street, which in response, is making its own efforts to expand operations in renewable energy. To date, Goldman Sachs estimates that it thus far has invested \$1.5 billion in the renewable energy sector, with high-profile holdings in First Solar, SunTech, Sunedison and U.S. Geothermal, and a \$27 million minority stake in Iogen. Prominent among these investments was the acquisition of Horizon Wind Energy, headquartered in Houston and holder of 9 percent of the U.S. wind energy market. It was recently sold by the firm to Energias de Portugal for a princely sum of \$2.15 billion.

New investment firms are also emerging, such as Tudor Pickering & Co. LLC, which offers research, sales, trading, underwriting and investment banking services targeting energy markets. Oil price volatility is also stimulating a growth in financial investment activity. The number of energy hedge funds in the United States has risen from 180 at the end of 2004, to over 530 currently, several of which are based in Houston, according to *Business Week Magazine*. The energy boom is driving a growth in jobs in Houston: job growth is double the national average, with 97,400 jobs created in 2006, many in the financial sector with several major U.S. investment banks expanding the number of employees in Houston offices.

## Besides its oil and gas endowment, Texas is well-positioned to play a large role in promoting alternative energy.

The nuclear business is another area expected to see growth in Texas in the coming years. The Nuclear Energy Institute says Texas has a strong showing on its list of nearly 30 proposed nuclear plants in the United States, with six proposed for Texas, to be added to four currently operating plants. Some analysts are suggesting that Texas nuclear capacity could triple in the coming years as TXU, NRG Energy and Exelon vie for a piece of the Texas electricity market.

NRG is looking at building two reactors at the existing South Texas project near Houston, with operations beginning as early as 2015. TXU is also studying doubling the size of its Comanche Peak facilities. Comanche was the last nuclear facility built in the United States at a cost of \$11 billion, 12 times the original estimate. Exelon Energy and Amarillo Power are both looking at new greenfield facilities. Exelon has said it expects to submit an application for a Texas project in November 2008.

The rapid pace of development within the renewable energy sector has forced the major oil companies to adapt and seek joint ventures with firms not normally associated with the petroleum industry. One example is the proposed joint venture between Tyson Foods (which formed a renewable energy division last year) and ConocoPhillips to produce, market and sell biodiesel originating from the fat of poultry and pork fat.

Another is ExxonMobil Chemical, which has, in conjunction with its Japanese affiliate, Tonen Chemical Corporation, announced the commercial production of microporous films as a separator for the batteries utilized by hybrid and electric vehicles. According to the *MIT Technology Review*, this new separator, which acts to keep positive and negative electrodes in a cell apart, will ideally keep lithium-ion batteries from overheating by slowing the reactions—allowing the battery to cool off, instead of bursting into flames. As also indicated within the *MIT Technology Review*, by improving the safety of lithium-ion batteries, such technology would allow carmakers to replace the nickel hydride batteries presently used in hybrids with lighter lithium-ion batteries, thus improving fuel economy.

Among the majors, Chevron last year took a step to join Houston players in the biofuels business with its 22 percent stake in Galveston Bay Biodiesel LP. Chevron Technology Ventures is also exploring future commercial biodiesel and ethanol opportunities, including a \$12 million grant to the Strategic Energy Institute at Georgia Tech, \$25 million to the University of California at Davis, and a newly formed (May 2007) strategic partnership with Texas A&M to develop cellulosic biofuels.

The plant itself can generate 20 million gallons a year of biodiesel produced from soybean oil and stands as the largest such plant in the country, with plans to eventually expand on-site production capacity to 110 million gallons a year. According to the *Houston Business Journal*, BioSelect intends to pursue an aggressive nationwide expansion plan, with multiple large-scale plants and a target capacity of 470 million gallons per year.

The state of Texas is responding to the surge in industry interest in biofuels, albeit late to the party. Governor Perry hopes to facilitate further partnerships between the public and private sectors and academia to develop new products and create a more energy independent state, according to Deputy Press Secretary Krista Moody.

While the Texas Bioenergy Strategy has yet to take shape in the form of large authorized spending allocations or elaborated concrete details, the basic philosophy is to fund potential projects that can effectively utilize both the geography of the state and its inherent natural resources. Besides its oil and gas endowment, Texas is well-positioned to play a large role in promoting alternative energy. It is currently the largest wind power producing state in the United States while; it has the potential to surpass most states for solar power production.

Houston is also in a good position to lead the way in energy science and technology, but larger initiatives beyond the TBS are needed to attract corporate and federal dollars to Texas efforts. Midwestern and California universities are increasingly tapping into the growing interest in biofuels and solar energy research.

One important step is to recognize the potential for nanotechnology for the energy industry, including its role in enhanced hydrocarbon extraction, carbon sequestration, hydrogen technologies, renewable energy and innovative hardware and software for

QUESTIONS

**One important step is to recognize the potential for nanotechnology for the energy industry, including its role in enhanced hydrocarbon extraction, carbon sequestration, hydrogen technologies, renewable energy and innovative hardware and software for distributive generation. Texas Universities such as Rice University, University of Houston, University of Texas and Texas A&M have strong research capabilities in energy and nanotechnology that is not being fully tapped.**

distributive generation. Texas universities such as Rice University, University of Houston, University of Texas and Texas A&M have strong research capabilities in energy and nanotechnology that is not being fully tapped.

While the TBS is a great step forward, the public policy framework for Houston's future role as energy capital is a critical component. Increasingly, control of international oil and gas exploration activities is shifting to national oil companies (NOCs). Today, NOCs hold nearly 80 percent of global reserves of oil; they also dominate the world's oil production. Of the top 20 oil producers worldwide, 14 are NOCs or newly privatized NOCs.

NOCs will be responsible for the lion's share of increased output and investment in oil and gas over the coming 25 years, with as much as 90 percent of new oil production coming from outside the industrialized West. This is in contrast to the past 30 years when 40 percent of new production came from the United States, the North Sea, Australia and other areas inside the OECD.

To remain competitive in a world where foreign-based NOCs will increasingly dominate the international oil and gas scene, Houston needs tax incentives and other drivers to direct investment in future technologies. Maintaining its technology development role will be central to Houston's continued success as an energy industry hub. To that end, Houston should also expand the research and development infrastructure of the area and promote institutions that link businesses to technology. It should prominently host international energy technology and innovation meetings.

A proactive framework can ensure that Houston remains the energy capital of the world, now and in

the future. To meet the challenge of growing world energy needs and environmental protection, new areas of technology development are needed such as advanced drilling technology, carbon sequestration technology, alternative energy and market design. Houston is well-placed to play a substantial role in the future of energy and technology innovation as it has over the last decades. However, it must recognize that the forms of energy trade will be changing as well as the players and their strategies.

## NEW VENTURES

### MAJOR OIL FIRMS THAT ARE ADOPTING AND SEEKING JOINT VENTURES INCLUDE:

- ConocoPhillips with Tyson Foods to produce, market and sell biodiesel originating from the fat of poultry and pork fat.
- ExxonMobil Chemical and Tonen Chemical for the commercial production of microporous films.
- Chevron's 22 percent stake in Galveston Bay Biodiesel.

*Amy Myers Jaffe is the Wallace S. Wilson fellow in energy studies at the James A. Baker III Institute for Public Policy and associate director of the Rice University Energy Program, a multidisciplinary program that includes activities addressing energy science and technology policy and research. Jaffe leads the Baker Institute Energy Forum, a multifaceted program that promotes original, forward-looking discussion and research on the energy-related challenges of the 21st century. Ferris Vinh, a Rice University student majoring in political science, assisted with this article. ■*