

By Greg Varhaug -

Financing

green energy



**CERAWeek 2010
Half full or half empty?**



access any media outlet – Internet, a newspaper, TV – and the most used word is “green.”

In Washington lately, “green” has acquired new cachet. Hang it in front of your bill, and it almost guarantees that people will rally behind it in support.

Have we seen the same run to fund before? You could argue that we did in 1999-2000, with the boom-to-bust of the Internet.

“Going green” was a prominent topic at CERAWeek, a prestigious international energy conference held annually in Houston. Among the companies represented were Saudi Aramco, ConocoPhillips, GE, and BP.

Increased Investment in Renewables

According to the UN, in 2008 global investment in renewable energy projects was greater than investment in fossil fuel projects. This marked the first time that renewable energy investments had outpaced investments in fossil fuels.

Khalid Al-Falih, the CEO of Saudi Aramco, is concerned that some of that investment money is being misplaced. At CERAWeek 2010, Al-Falih warned that “The focus on alternatives should not be to the detriment of conventional investment.”

This sentiment was echoed by other speakers at the conference. Energy producers worry that current investments in the conventional energy sector won’t be enough to ensure that they can react quickly to long-term changes in demand. A lack of new capital now, due to recession and lower oil prices, could result in an energy supply crunch within a few years.

Certainly, there’s no debate within the industry about the need

to invest in alternatives. One central theme at this year’s CERAWeek was the need to develop new energy technologies. Most of the companies represented at the meeting have already been pursuing development of renewables for years. Most have steadily increased their investments in renewables, and plan to spend even more in years to come. Nearly every major oil company is publicly committed to “going green,” or at least “going greener.” Al-Falih, for instance, balanced his remarks with a description of his company’s commitment to renewable energy, especially solar.

Yet despite overall agreement about the need to invest in alternative energy, getting individual projects financed is a case-by-case debate. Regarding new energy projects, whether conventional or alternative, one analyst has described the industry’s problem as a matter of synchronizing supply-and-demand for energy with supply-and-demand for capital.

Al-Falih pointed out that alternative technologies can’t yet completely eliminate the demand for oil. Oil will be a necessary energy source for the foreseeable future, especially for transportation.

On the other hand, Helge Lund, president and CEO of Statoil ASA, also speaking at CERAWeek 2010, says that his company’s goal is to eventually replace carbon-based energy.

His isn’t the only major oil company to say, directly or indirectly, that their days in the oil business are numbered. Oil companies concede that their future hangs on developing renewables. Alternative fuels, they argue, will steadily erode demand for oil over the coming years, with existing oil reserves gradually being used less and less. After all, oil does have other uses: pharmaceuticals, fertilizers, and plastics, to name a few.



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Green Bubbles

Al-Falih warns that the recent rapid increase in green-tech investments could result in “green bubbles.” Some analysts point to solar energy investments made during the Carter administration. President Carter called for 20 percent of electric power generation to be from solar by the year 2000. Obviously, we failed to meet that target.

While many financial pundits are skeptical of the feasibility of green technologies, they still see green-tech as an investment opportunity. Investors like Louis Basenese, a senior analyst at the Oxford Club, claim that alternative energy will remain commercially uncompetitive in the long term. He predicts a great run-up in the stock prices of alternative energy companies, followed by large losses.

Eric Janszen, founder and president of iTulip.com, and a commentator on economics, predicts that the next big bubble is “alternative energy and infrastructure.” In a January 2008 CNBC interview, Janszen said, “We’ve really gone through a series of two asset inflations. The first was equity-financed in the technology industry; and the second one was debt-financed in the real estate industry. And the point is that our system, the combination of how our political system works, and the markets work, and our economy works, tends to develop these asset inflations.”

But Janszen cautions that we have to be careful how we use the term “bubble.” He argues that the U.S. economy is dependent on “bubbles” and that the “bubble cycle has replaced the business cycle.” Janszen

has been quoted often, if selectively, in the financial press by analysts who are unconvinced by green-tech initiatives. But he believes that development of alternative energy technologies is necessary, and he acknowledges the need to invest in alternatives on a scale commensurate with the task of creating a new energy economy.

Venture capitalist Vinod Khosla, a co-founder of Sun Microsystems, now has his own company, Khosla Ventures. On PBS's NewsHour in 2008, discussing the challenge of building a new alternative energy infrastructure, Khosla stated, “It’s probably the largest economic opportunity we’ve seen in a long time, maybe ever. But there are also likely to be bubbles.” He expects that we will witness a bubble in alternative stock prices, “But it won’t change the rate of the development of the basic technologies.”

In response to those who compare this anticipated boom in alternative energy stocks to the Internet boom of the 1990s, Khosla pointed out, “Internet traffic didn’t follow stock prices ... we have too large a tendency to look at the symptom of stock prices, which is almost irrelevant to the basic businesses we are trying to build.” He observes that solar projects that failed financially in the 1980s nevertheless still continue to produce as much clean power as when they were first built.

Khosla is emblematic of a number of investors who reject seemingly authoritative oil market projections, arguing that future demand is inherently unpredictable – as we’ve repeatedly seen, new technologies can change everything.

China Is Doing It

Global investment in alternatives has grown, but the United States lags far behind other countries in its switch to renewables.

China leads the world in alternative energy investment and infrastructure development. China is a world leader in generating wind power, and is a leading producer of photovoltaic technologies. In 2008, China reached its goal of 10 gigawatts of wind generation two years ahead of its original target. Germany, too, has exceeded its goal of 12.5 percent of electricity from renewables by 2010.

To meet their alternative energy targets, many countries are adopting the use of “feed-in tariffs,” which requires utilities to buy energy generated by wind or solar projects. These models entail a high initial cost that will gradually decline as technologies and infrastructures develop over time. Subsidies also decrease over time, providing incentives for producers to increase efficiency and cut costs.

But Germany’s experience suggests that feed-in tariffs are not a magic bullet for developing green infrastructure affordably. A 2009 Ruhr Economic Paper outlines certain problems with this scheme. In Germany, feed-in tariffs for electricity from solar are over eight times the amount of the exchange price; those for wind power are four times the exchange price. The Ruhr report finds that feed-in tariffs are not responsible for increases in net employment, nor for decreases in carbon emissions.

The authors conclude that the German system creates incentives to implement large-scale projects using existing technologies, when R&D investments are probably more cost-effective in the long run. The report recommends that “policy makers should scrutinize the logic of supporting energy sources that cannot compete on the market in the absence of government assistance.”

In the U.S. at least, companies pioneering in alternative energy are aware of the dangers of committing to existing technologies this early in the game. This is one reason why the scale and number of projects has been limited so far.

Energy Return on Investment

Decades ago, M. King Hubbert observed that, when it comes to using oil as an energy source, the economics of extraction break down as the energy cost of extracting oil approaches the amount of energy that oil can yield. “Recoverable reserves” is a theoretical concept. Calculations of energy reserves are often expressed in terms of their gross potential energy, rather than in terms of net energy after extraction.

We need to systematically examine energy inputs versus outputs. Energy return on investment (EROI) is a comparison of relative energy inputs and outputs as measured at

the wellhead, in the case of oil, and expressed as a ratio.

The International Energy Agency maintains statistics on EROI, and the picture they paint is grim. EROI at the wellhead was estimated (after-the-fact) at around 100:1 in the early 1900s. That has since declined to 26:1 in 1992, falling to 18:1 in 2006.

Estimates are that once EROI at the wellhead sinks as low as 3:1, extraction of oil as an energy source will no longer be viable. Extraction of oil for other uses may continue after that point.

There were many problems with early EROI models. More recently, the International Standards Organization (ISO) has created a standard to systematically measure energy inputs and outputs (ISO 13602-1). This standard tracks energy inputs and outputs over the entire life of the project, factoring time into the overall equation.

ISO is also creating a new standard for managing energy systems in order to reduce cost and greenhouse gases emissions (ISO 50001), due to be released this year.

Conservation: A Key Step

Energy producers are publicly committed to the idea of clean energy, and to finding ways to “use energy in a cleaner way.” This is a code phrase for “efficiency.”

Efficiency and conservation are a tough sell for the American public. To them, it means giving something up, and it implies “shortage,” which to them means we need to “find more.” But as with everything from cars to refrigerators to computers, increased energy efficiency has coincided with improvements in the quality of consumer goods.

Dow Chemical CEO Andrew Liveris recently called for the federal government to set new efficiency standards for buildings, appliances, and cars. At the same time, IHS CERA released a report showing that increased efficiency is crucial to insuring future energy supplies and cutting emissions.

If we implement attainable efficiency standards now, it could substantially impact how we use energy in the U.S. over the long term, and could significantly affect future oil imports.

This is recognized and often discussed throughout the industry. Investors now seem a little more enlightened on this score. According to a report by UNEP SEFI/New Energy Finance and Deutsche Bank, energy efficiency is a “popular theme” among institutional investors.

Externalized and Unanticipated Costs

Energy production entails many costs which may not be obvious, but which are nevertheless very real.

For instance, the U.S. pays a hefty price for its military to protect oil shipments from the Middle East.

For another, closer to home: the explosion, fire, and eventual sinking of Transocean’s Deepwater Horizon drilling rig (under lease to BP) off the U.S. Gulf Coast illustrates how substantial unanticipated costs can arise from using new and very complex drilling technologies.

(Deepwater Horizon represents a new class of drilling rigs. Traditional

Know the Facts

about energy resources



There's a popular misconception that the Middle East accounts for most of the U.S.'s imported oil. Actually, the number-one exporter of oil to the United States is Canada, followed by Mexico and Nigeria; then Saudi Arabia and Venezuela.

The record for Saudi Arabian oil production (excluding condensates) is just under 10m barrels per day. They are currently producing about 8m barrels per day. Worldwide, oil reserves are estimated to be about 1.3 trillion barrels.

More drilling in the U.S. won't mean lower gas prices at the pump. Gasoline prices are determined by the cost of crude oil on the world market. Gas at the pump now averages about 97 cents above the price of crude. About 40 cents of that is taxes. Proposed climate legislation that will determine a price on carbon will increase gasoline prices at the pump.

The price of oil peaked at \$147 per barrel in July 2008. The current price is about \$85 per barrel.

Worldwide, natural gas consumption is expected to double by 2030. ConocoPhillips CEO James Mulva and Secretary of Energy Steven Chu both cite the benefits of natural gas as a "bridge fuel" to a cleaner energy future. Much of this is expected to come from shales.

The \$787 billion federal stimulus package included \$79 billion for renewable energy. Of that, President Obama has awarded \$2.3 billion to renewable energy companies.

platforms, anchored securely to the sea floor, are an old and well-understood technology. Rigs like Deepwater Horizon – unsecured, controlled by a GPS-guided positioning system – rely on technologies that rival the space shuttle in terms of complexity.)

This catastrophe, in which 11 oil workers were killed, came on the heels of a West Virginia coal mine explosion in which 29 workers lost their lives. President Obama has banned new offshore drilling indefinitely, pending further investigation into the Deepwater Horizon incident.

Even at this early date, we can predict several things with some certainty. This spill will be a significant ecological catastrophe. It will change the scope of the political debate around drilling, and not just offshore. It will generate years of litigation that will outlive many of the litigants. Deep-water drilling is going to get even more expensive, with much higher insurance costs for floating drilling platforms.

The Emerging Picture

The world of energy finance is extremely complex. It's a mix of commodities markets, currency exchange rates, interest rates, geopolitics, government regulations, logistics – the list goes on. After the oil shocks of the 1970s, futures markets and other mechanisms were put in place to maintain market liquidity and to help producers to remain neutral to price, which they need in order to operate as businesses.

Industry leaders have learned a great deal from the few, mostly small-scale alternative energy projects they've implemented so far. These

initial projects may not have changed physical infrastructure very much, but they've afforded energy producers a better understanding and a foothold in a new arena. They've also gone a long way to help develop the financial infrastructure for funding alternative projects. In the financial world, "green" isn't weird anymore.

Many investments are currently being held up, waiting for the U.S. to set a definitive price on carbon. Everyone agrees that the money is out there. Insurance funds, pension funds, and mutual funds are poised to invest billions. Asset managers need a hard number on carbon – plus assurances that that number won't change in the near term – before they can commit to anything, especially on a large scale.

Senators Kerry, Graham, and Lieberman have proposed a bill to establish a United States Emissions Trading System (US ETS) that would spell out conditions for pricing carbon. (The consensus is that the price will likely be between \$18 and \$31 per ton.)

The creation of a US ETS will be a game changer in the investment world, and not just in the United States. This sends a signal not just to investors, but to the industry as a whole, that the U.S. is serious about alternative energy. CFOs will then be directly concerned with issues related to carbon.

Energy producers are on the lookout for new "disruptive" technologies. There probably has never been this kind of R&D gold rush before. No other single problem has ever spurred a search for solutions on the scale we're seeing now. Large companies are investing billions, while amateur scientists conduct experiments in their garages. Large investors are poised to get behind whatever looks like it might be "the next big thing."

The energy industry paints a picture of relative calm. That we have plenty of energy reserves to see us well into the future. That technology and markets will work together to provide a smooth transition from

reliance on carbon-based energy to a new, sustainable energy economy.

A more accurate likely picture is that we're in a technological race against scarcity and eventual depletion, and no one knows what the outcome will be.

We should get over the idea that government is pushing green initiatives down the throats of industry. True, oil companies weren't the first to get on board; but what started out as PR rhetoric 30 years ago is a part of the corporate culture today. A generation has passed since then, and we shouldn't underestimate the effects of generational change. **N**

Greg Varhaug has written software instruction manuals and procedural manuals for many Houston energy and manufacturing companies, and has designed websites for smaller companies. A professional musician for over 25 years, he has produced music for numerous commercials and independent films. Greg is an instructor at Houston's ABC School of Music, and he operates HoustonGuitar.com, a commercial music-instruction website.