

By Logan Kugler

New

Horizon

In the rapidly changing renewable energy market, Membe



Zones

Firms use innovative strategies to lead the evolution

As the nation—and even the entire world—weans itself off carbon-based energy and fossil fuels, and as demand continues to grow for new systems and infrastructure powered by cleaner, more efficient technologies, the renewable energy market could become a lucrative practice for engineering firms.

That's the good news. What's a little tougher for firms to digest is just how to succeed in a market that, as of yet, has literally no established customer base. Truth is, no one knows which of the numerous renewable energy options—wind, solar, biodegradable animal waste, electric, or some as yet undiscovered method—will emerge as the de facto energy source of the future. >

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TIM CORRIGAN
R.W. BECK



Though it's unlikely that society will ever agree on a silver bullet, investing heavily in one area—solar, for instance—that fails to achieve critical mass could represent a devastating financial blow to any firm, especially in tough economic times.

Keeping a sure footing on this rapidly shifting terrain requires more than just engineering smarts. Investing time and resources cleverly, keeping up with the latest developments and building relationships both with and among partners and clients is essential if firms are to thrive in—and build—the emerging renewable energy landscape.

Building Tomorrow, Today

To succeed in the renewable energy market requires equal parts technological expertise and business acumen.

"You can't be too far ahead of the market," says Tim Corrigan, executive vice president for energy at Seattle-based R.W. Beck. "Even though we might know exactly where the markets are going to end up five years from now, we've got to get to tomorrow and next month and next year before five years get here."

For Corrigan, this means constant evaluation and further reevaluation of the latest technologies as well as the current business climate. Lean too far forward and you might overextend (say, by investing too heavily in sectors without staying power); hang back, and you risk being shut out of "the next big thing."

Creating a business process to balance up-and-coming technologies with current market realities is essential. For R.W. Beck, this means focusing on current strengths with new clients while nurturing relationships with existing clients whose needs can be met by new technologies. "We can go recruit or build new capability and take that to current clients who trust us because they already know us," says Corrigan. "The other side of that coin is that we can take our current technology that we're good at and have a deep resume with and go to new clients with what we already do well." By balancing existing strengths with new capabilities, the idea is that firms can stay grounded while still branching out into future technologies.

Psomas President Jacob Lipa is another leader who promotes the notion of integrating future technologies into projects for existing clients. "We are always looking for how new systems can combine with our existing services," says Lipa. "When we are designing a water system, for example, we are already looking at the possibility of adding, say, a photovoltaic system. Even if it possibly doesn't make sense to do it today, we are designing it with the flexibility to be able to attach to it in the future."

Blair Loftis, national director of alternative and renewable energy at San Diego-based Kleinfelder, subscribes to a similar school of thought, but takes a slightly different approach.

With increasing resources devoted to wind power and a growing percentage in solar, Kleinfelder already has significant expertise in two renewable energy sectors poised to make significant inroads in the coming years.

Loftis continues to press development of these emerging sectors, but also has created teams to explore fringe innovations.

"They're almost like focus groups," says Loftis, describing the teams his firm assembles to vet the technological, legal, environmental and business ramifications of new technologies. "We assess the technology and then we look at how the market is responding to that technology."

Firms rely on a wealth of knowledge

and understanding that often extends far beyond the realm of technical expertise. "Clustering toward a particular technology tends to be geographically based," says Guy Winebrenner, senior vice president at Georgia-based MACTEC Engineering and Consulting, Inc. R.W. Beck's Corrigan agrees. "We're not suggesting our clients go out and build wind turbines. We're suggesting our clients look at their resource options in their particular situation and assess whether wind turbines are the most efficient and economical next choice for them."

Understanding Needs

It is in the context of relationships among engineering firms, their clients and their partners that all new technologies must be assessed. "We look at two things," says Winebrenner. "First, where are our services best used? Second, what are the types of projects our clients are looking to invest in?" Of course, this is partially out of necessity—a firm without clients doesn't need to worry much about long-term energy plans—but it reveals an important truth about energy engineering: Ultimately, the development of future energy systems is tied to present-day relationships.

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BLAIR LOFTIS
KLEINFELDER



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GUY WINEBRENNER
MACTEC ENGINEERING AND CONSULTING



"Part of our strategy is a very deliberate and focused understanding of our partner's needs," says Loftis. "We want to work with them to take their existing technology to the next level." One Kleinfelder partner, for instance, recently developed a biomass plant that runs on dairy farm manure. A co-op of dairy farms, banded together, can generate more than 10 megawatts or more of power—often enough to run a farm's day-to-day operations.

Engineers have since taken the basic idea behind the dairy farm technology and retrofitted it for use on North Carolina hog farms. Working on its clients' behalf, Kleinfelder reaches out to power utilities across the state, pairing utility providers with energy-producing hog farmers to create an as yet untapped market for the technology.

In the short term, Kleinfelder has no way of knowing whether it will profit from these early relationships. It is, after all, investing a lot of time and resources in a technology that has no established growth model. But, in the event the technology does take off, the firm will find itself at the leading edge of an emerging energy sector. If not, at the very least, Loftis says Kleinfelder will have established new relationships for future potential business.

The Future of Power

Though it is impossible to know what energy sources will dominate in the years to come, several technologies hold promise for the future. Here are a few:



• Enhanced Geothermal Systems:

Between the United States and China exists 8,000 miles of hot underground rock—more than hot enough to power steam generators. Drill a pair of connected holes 6 kilometers deep, dump water down one side where it heats instantly to 750 degrees Fahrenheit, creating steam to power a turbine in the second hole, and you have a steady and virtually inexhaustible supply of energy.



• **Hydrokinetics:** The crashing of the surf might soon be harnessed, converting at least some of that wild energy into electrical power. Unlike the wind farms and solar generators of the sunny Southwestern deserts and high plains, wave-powered generators can be built in close proximity to coastal cities, where the vast bulk of the nation's population lives, thus drastically reducing energy transmission costs.

Getting There From Here

For firms that want to prosper in renewable energy, the key is to build a portfolio of experience that touches on one or more emerging sectors.

"Looking toward the future, it really will take a portfolio of renewable energy resources to be able to provide an eco-

• **Wind:** Wind turbines today are popping up in the most unusual places. Offshore wind turbines are imminent, and flying wind turbines tethered 25,000 feet in the sky might well prove more practical than whimsical.

• **Biomass:** Coal and oil are not the only things that burn—nor are they the cleanest. Everything from wood chips to livestock waste can be converted into cleaner-burning, almost instantly renewable power, providing on-site energy generation for farms, sawmills, food processors, factories and other industries that produce organic wastes.



• **Nuclear:** "As unpopular as it might be, nuclear is the coal of tomorrow," says Kleinfelder's Blair Loftis. Current technologies produce less waste, dispose of waste more safely and minimize the risk of accidents.

• **Coal:** Don't count coal out—yet. "The engineering community has definitely risen to the occasion" of developing technologies to build plants that minimize pollution and carbon output while using coal more efficiently, says Guy Winebrenner of MACTEC. He adds: "Coal is going to remain an important part of our energy portfolio, at least in the near term."

nomical, environmentally sustainable and secure energy source over the next decade," says MACTEC's Winebrenner. This applies not just to emerging generator technologies, for example, but to methods of transmitting, storing and making more efficient use of power—whether it's power generated by burning

coal, splitting atoms, spinning turbines under a dam, converting sunbeams into steam, catching waves in the ocean, or whatever comes next.

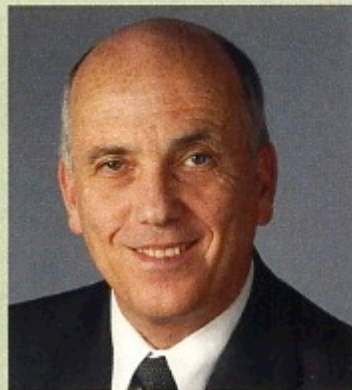
Building that portfolio requires a certain skill set and includes a combination of young and experienced engi-

neering talent, as well as several skilled non-engineers to help gather information and coordinate projects.

"What we are hiring now are project managers," says Loftis. "And that's most important, because we need to assure our clients that the project will run as

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JACOB LIPA
PSOMAS



seamlessly and as efficiently as possible."

Energy project teams at R.W. Beck consist of technologists, economists, financial analysts and others. Fielding such a diverse team enables the firm to provide a range of business services to its clients, and also stockpiles the firm with intellectual capital to evaluate new technologies. "We first have to know enough about a trend to know that it's sustainable," says Corrigan. "That includes the economic sustainability, the environmental concerns and the social community concerns of sustainable organization."

Staffing for the future requires taking into account far more than engineering capability. "You don't just provide technical services, you have to educate your clients," says Psomas' Lipa. "You need to hire not just engineers, but educators."

But just being knowledgeable isn't enough. "When you hire people to work on this kind of technology, they need to be explorers," adds Lipa.

It's a challenge that many firms today embrace. "We live in very exciting times," says Lipa. "It used to be that doing the right thing for the environment was just a nice thing to do, if you could. Now, it's evolved into a real business." ■

Logan Kugler is a business and technology writer based near Los Angeles.



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