

Renew and Improved

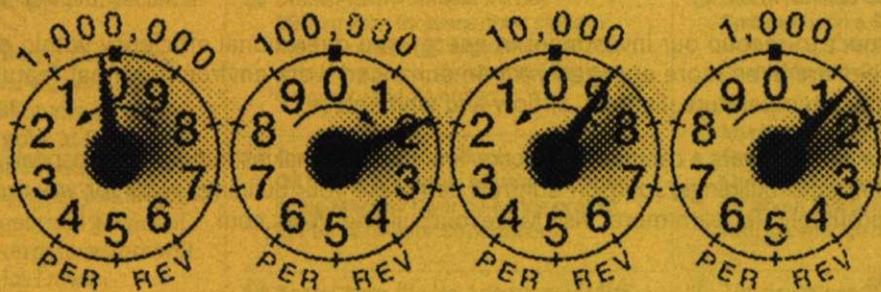
Sustainable energy is generally viewed as futuristic, but "someday" is a lot closer than most people realize

This year, General Electric Co. will spend \$600 million to develop the largest solar panel factory in the U.S. The plant will eventually produce enough panels on an annual basis to generate 400 megawatts of power, or enough to light up 80,000 homes. The size of more than 11 football fields, the panel factory, based in Aurora, Colo. will help the industrial conglomerate meet the increasing customer demand for affordable, renewable energy, and its construction says something: This whole idea of renewable energy entering the mainstream? It's a lot closer to reality than you probably realize.

Solar power is not a new technology, and as the field has matured it has become more efficient and accessible, prompting companies to view clean energy not only as a sustainability solution, but as an asset to the bottom line, as well. "Nobody expected [solar] to be so cheap or so big," says Jenny Chase, lead solar analyst for Bloomberg New Energy Finance (BNEF), a provider of information to investors in the renewable energy space. Chase adds that since margin compression has undercut existing companies, prices have dropped to only a quarter of what they were in 2008. "Many people were waiting for a technological breakthrough [to reduce costs], which turned

out not to be necessary," she says. Solar unit costs are expected to decrease by 60 percent in the next 20 years.

Other renewable energy sources such as wind and biofuels are becoming equally accessible, allowing venture-backed high-potential companies to implement clean energy on a large scale. If predictions pan out, clean energy will achieve grid parity for much of the world by 2020. However, despite plenty of innovation and \$243 billion in global investments (up from just \$52 billion in 2004), the perception of affordable renewables as a reality hasn't quite yet become commonplace. Many consumers and investors still see renewable energy as a buzzword and an expensive solution that's far off into the future, says Michael Liebreich, head of BNEF. In reality, "good wind locations today are already cheaper



than shale gas," Liebreich says. "And solar, which everybody thinks is really expensive, is going to be cheaper than [conventionally produced] electricity."

To be sure, there are plenty of existing challenges to be met in deploying renewables on a massive scale. Aside from the need to revamp aging installations and overcome food scarcity related to biofuel production, the energy sources also remain less consistent for now. "A big challenge for electricity generated from renewable sources is that wind and sun are intermittent and do not track peak power consumption," which can decrease profit margins, Chase says. Still, in 2010 renewable energy made up 12.6 percent of all global energy production, with 15.7 percent predicted in 2030, according to BNEF.

Tracking growth

With increased public awareness and concerns about climate change, there's greater incentive to track clean energy initiatives. Over the past year, newly created indices have helped trace renewable energy use and add transparency to an industry that's long been difficult to understand. The Corporate Global Renewable Energy Index, jointly launched last June by Danish wind turbine manufacturer Vestas and BNEF, is one example. The index helps measure the impact of renewable energy by surveying 1,000 of the world's largest companies about their renewable energy use and anticipated growth. Findings from the initial surveys, with more than 250 respondents, are promising: 12 percent of the respondents' electricity consumption is already from renewable sources, and 74 percent of companies increased their renewable energy use from 2009 to 2010.

Already, a significant portion of consumers and investors are interested in seeing data that analyzes a company's commitment to sustainability strategies, says Thomas Stith, program director at the Kenan Institute of Private Enterprise at the University of North Carolina's Kenan-Flagler Business School. "Investors realize that this consumer scrutiny will affect the company's financial performance," says Stith.

Individual companies are also keeping better track of their own initiatives than they did just five years ago. Tools like a sustainability index or corporate social responsibility audit help companies benchmark renewables targets and decide how to further

Some initiatives have taken on a grassroots feel, leaving green energy issues in the hands of local authorities and their supporters.



reduce costs. No longer just lip service, a sustainability strategy can really affect business decisions, Stith says. "Companies such as Wal-Mart are expanding upon this concept and are assessing their supply chain to determine how green their suppliers are, based upon a sustainability index," he says.

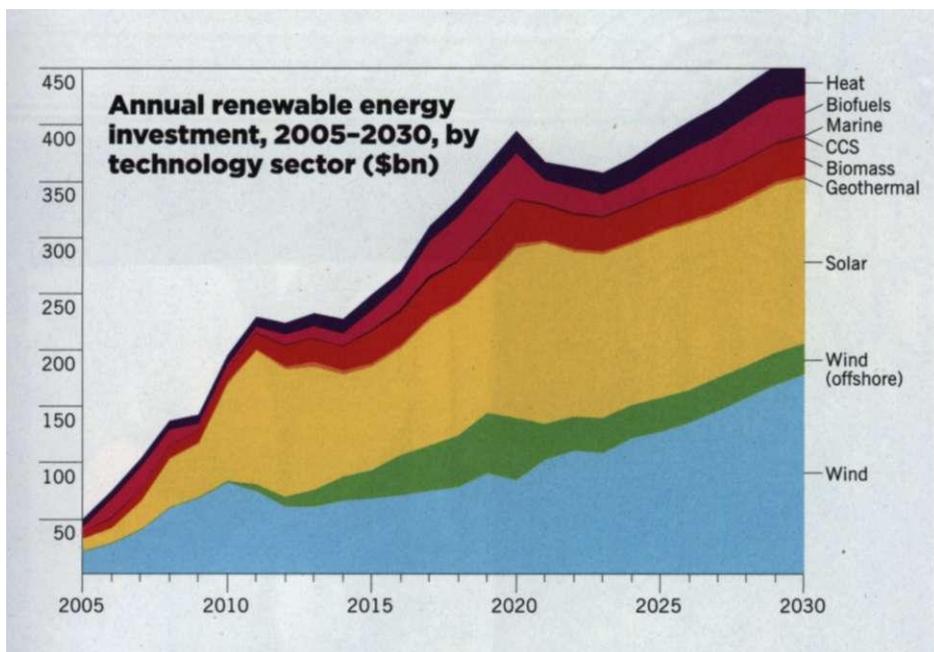
Industry growth coupled with more reliable data has spurred further scrutiny. Next year, NYSE Euronext and BNEF will launch three new indices to focus on clean energy use by geographic region. These indices help break down details of the different growth prospects in the renewable energy space, which differ greatly throughout Africa, North America, Asia and Europe. "The issue is not black and white—we've got these islands of [energy] competition that are growing," Liebreich says. The new indices will allow investors to track performance nearly anywhere, allowing easier comparisons.

Clean-tech hotspots

Michael Lenox, executive director of the Batten Institute at the University of Virginia's Darden School of Business, has been studying patents to understand clusters of innovation in renewable energy. Patenting activity helps forecast the type of energy-related innovations taking place in a specific area, says Lenox, adding that wind energy patents are strong in European countries such as Denmark; and Asian countries such as Japan and China are making significant improvements in solar energy use. "You can look at a map and see where patenting is occurring. Much of it clusters around other established locales like universities," Lenox says.

U.S. companies are betting on biofuels. In addition to increased patenting activity, "the Southeast [U.S.] in particular is positioned for a significant economic benefit because of the large woody biomass supply within the region," explains Stith. "The 'wood basket' region can not only leverage existing supplies to utilize in the biofuels industry, but it can also serve as a major exporter to global markets that are interested in utilizing biomass in their electric utility industry."

At the same time, BNEF predicts renewable energy use will expand away from traditional renewable energy centers like Europe and the U.S. and into emerging markets where green tech has not been a focus. In emerging economies, affordable renewable energy can make a significant



impact, says BNEF's Chase. With more than 1.6 billion people worldwide living far from a public grid, widespread use of solar and wind is becoming reality, with a huge upside. "In three years, [solar] will be the only conceivable option for off-grid locations currently using diesel—an option spreading steadily across the sunny parts of the world," Chase says.

In fact, it's already happening. This year, many low-income families around the globe that live away from the electrical grid will become familiar with simple comforts like flicking on a light, storing leftovers in the fridge or watching television, thanks to Swiss-based energy company DT Solar. By installing pay-as-you-go solar panels, families can pay for power in small increments using their mobile phones. In turn, families get enough power to have essentials without a costly monthly bill, says Chase, who has worked with DT Power.

Since it's more difficult to export renewable energy than other exports, it's especially important to build renewable energy hubs throughout the world. "Unlike buying a large screen television, where you buy a box, most of the value in deploying solar, wind and geothermal is in the sharing and the deploying of it—not in the devices, which are fundamentally non-exportable," explains Travis Bradford, founder of the Prometheus Institute for Sustainable Development, a non-profit which works with the business sector to develop sustainable energy solutions.

From subsidies to incentives

Over the next 20 years, renewable energy growth will turn into an enormous industry requiring more than \$7 trillion of new capital, according to BNEF's Global Renewable Market Outlook. With such staggering investment needs, governments are thinking creatively when it comes to fostering growth and moving beyond traditional subsidy measures.

One new approach is on-bill financing, which allows customers to receive energy-efficient appliances like refrigerators or air-conditioning units right away without having to pay for them first. Customers then pay off the appliances through a no-interest charge on their bill. With new energy-efficient appliances the usage bill is lower, so an additional charge is within their budget. Already, some U.S. states and the U.K. have had success with on-bill financing incentives, explains Albert Cheung, BNEF's head of Energy Smart Technologies Insight. "In effect, the upgrades should pay for themselves from day one," Cheung says. "This will lower some of the biggest barriers to residential energy efficiency investment."

In Europe, another focus is incentivizing renewable heat resources because heat accounts for 40 percent of the continent's energy use, says BNEF's European policy analyst, Catherine Craig. "Member states are adopting market-based incentive mechanisms alongside more traditional direct

subsidy schemes," she says. For example, Germany's market incentive scheme, *Marktanreizprogramm*, provides highly efficient heat pumps for residents who are willing to make investments, and newly constructed buildings must meet strict green energy criteria.

But even as incentives become more efficient, subsidies are still necessary to mature the industry, says Lenox. While subsidies can add to the misconception that renewable energy is expensive, they are often an effective way of shortening the learning curve. "Sometimes, if we have a social desire to switch technology, it does take those subsidies to push it along," says Lenox. "In the past, we've had to spend millions of dollars and hundreds of years on refining oil." In the last three years, more than half of all new electricity assets coming online have been renewable.

Gaining acceptance

Some initiatives have taken on a grassroots feel, leaving green energy issues in the hands of local authorities and their supporters. The European Union-based Covenant of Mayors, a sustainability movement that started in 2009, now has over 3,000 signatures from leaders in local and regional governments, with backing from voters. The covenant focuses on climate protection and specific benchmarks to help reduce CO₂ production. Those who sign on must adopt a regional action plan within a year. "Energy efficiency efforts are not limited to state actors—we've seen substantial involvement among cities," says Cheung, adding that regional governments, especially in Europe, are eager to take action.

Despite doubts from consumers—especially when it comes to subsidies—renewable energy is coming into the mainstream, says Bradford, who teaches at Duke University's Fuqua School of Business. Bradford compares renewable energy to other world-changing technologies that users were once slow to embrace, such as the use of mobile phones during the early 1990s. With clean-tech companies pushing forward, consumers and investors will have little choice but to catch up. "People will look back and think it should have been obvious all along," Bradford says. Right now, "there is a big, vocal element of American policy that is against renewables just philosophically, so it will take time for the perception to catch up with the reality." — *Alina Dizik*