Sol Survivors

Understanding clean tech's dirty little secrets

BY JOHN RUBINO

KEY POINTS

- Most "clean" technologies need government help because they are still not cost competitive with fossil fuels and other incumbent technologies.
- Understanding the incentive environment is half the analytical battle—the other half is assessing a given company's fitness for that environment.
- Virtually any country or state can ignite a clean-tech boom by implementing an easily replicated set of tax and regulatory policies.

Today's "clean" technologies have a dirty little secret: Most of them, including wind, solar, and electric vehicles, are still not cost competitive with fossil fuels and other incumbent technologies. To displace their dirtier rivals, they need government help.

But not to worry. Governments around the world have concluded that clean tech is the future and are showering the sector with subsidies and tax breaks. The best of these incentives work brilliantly, sending clean-tech installations through the roof. But they also complicate the investment equation, forcing analysts and money managers to become political prognosticators: Will the winner of the next election direct taxpayer funds to alternative energy? Will elected leaders favor solar or wind, energy efficiency or pollution control? Will they subsidize local firms and freeze out foreign producers? Will their choice of incentives produce sustainable growth or a boom followed by a bust?

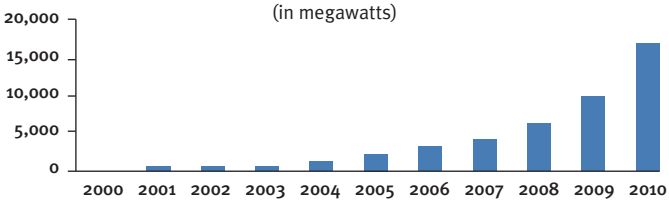
None of these political developments have a direct bearing on a given clean-tech company's technological or financial strength, yet they might be crucial to the firm's future earnings and share price. As a result, "Incentives play an immense role" in the analytical process, says Joshua Raffaelli, a principal with California venture capital firm Draper Fisher Jurvetson.

Right Place, Right Time

Germany is not an especially sunny or windy place. But in 2000 it began requiring electric utilities to buy power—at extremely attractive rates—from citizens who install solar panels or wind turbines. With the economic risk removed, Germans were able to focus on seeing their meters run backward, and they installed solar panels at a rate that made Germany by far the biggest solar market. In 2010, the country installed about 7 gigawatts of solar power, or about 40 percent of the total for the entire world.

German Solar Power Capacity

(in megawatts)

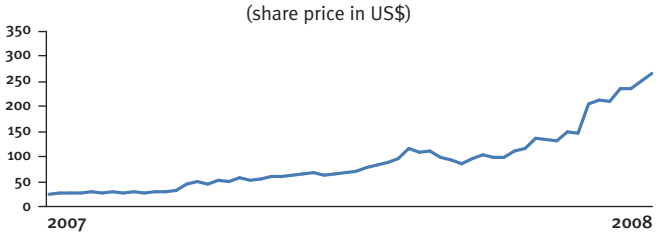


Source: German Federal Ministry for the Environment

As for why a money manager should care where the world's solar panels are being installed, consider the performance of First Solar, a U.S.-based maker of thin-film solar panels that began operating in Germany in 2007 and soon became a favored supplier to German utilities.

First Solar

(share price in US$)



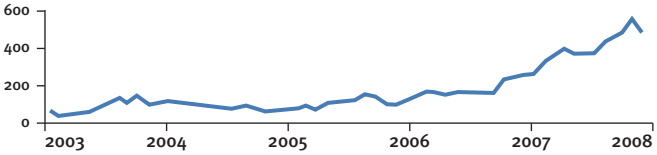
Source: Yahoo! Finance

Most of First Solar's early orders came from Germany, and as recently as 2010, German utilities accounted for more than half of the company's sales.

And then there's Denmark, which in 1979 decided to exploit a comparative advantage (a blustery coastline) by shifting its energy infrastructure toward wind. The policy mix included tax subsidies for wind farms, feed-in tariffs, and mandates that utilities pay for transmission networks connecting wind farms to the grid. This approach also worked. Wind's share of Danish electricity output rose to 20 percent, and Vestas Wind Systems, the largest domestic turbine producer, became a global leader.

Vestas Wind Systems

(share price in Danish krone)



Source: Yahoo! Finance

An analyst looking solely at income statements and balance sheets might have underestimated the early potential of First Solar and Vestas. But an analyst who focused on changing national incentive structures might have seen them coming.

A World of Clean-Tech Incentives

The Japanese earthquake of 11 March and the subsequent crisis at the Fukushima nuclear reactor sent aftershocks through the global energy market, causing pretty much everyone to rethink their stance on nuclear power and clean tech. In Germany, for instance, "People were afraid that the government would weaken the renewable energy law, but now, because of the disaster of the nuclear power plant, the opposite has become likely," says Eicke Weber, director of German solar research institute Fraunhofer ISE. "This is very positive for the solar power market because all around the world people recognize that renewable power is much safer than nuclear."

So, going forward, incentives will loom even larger in the mind of clean-tech analysts. Which rules will be implemented by what countries? How will they affect individual companies or sectors? To answer these questions, start with a survey of the main policies.

Feed-In Tariff. Old-style power generation was a one-way street. Electric utilities produced it, consumers used it—end of story. But juice can flow both ways, and some governments have begun requiring utilities to pay for electricity generated by customers. Letting people become their own mini power companies has proven to be a very seductive idea. Results have consistently exceeded expectations, which is not always a good thing, as will be explained later.

Energy Taxes. Distributed alternative energy sources, such as rooftop solar and increased efficiency (known as "negawatts" because a watt saved is functionally identical to a watt produced), compete with the cost of electricity delivered by the local utility. Electric and hybrid vehicles compete with the cost of gasoline or diesel at the pump. The higher the tax on fossil fuel-derived power sources, the more competitive alternative energy will become. Germany, for example, taxes electricity at a rate of 23–25 euro cents per kilowatt hour, which effectively doubles the price. Under this tax regime, "the price of [rooftop solar] is already at grid parity," says Weber.

Local Preferences. The old-school mercantilist idea that the key to prosperity is to protect local companies from foreign competition is alive and well in clean tech. India plans to add 20 gigawatts of solar power by 2020 and has earmarked US$20 billion in subsidies for that end—but only for solar panels made locally. Foreign-made panels are effectively barred from entry.

The Canadian province of Ontario requires that at least 60 percent of the components in new solar installations be produced locally to qualify for subsidies, "which means you need some form of module manufacturing or other part of the value chain in Ontario in order to qualify," says Rory Macpherson, director of investor relations for Chinese solar panel maker Suntech Power. In the United States, the 2009 stimulus package contained a "buy American" clause requiring that the funds be spent on domestically produced clean technologies. (After Canada objected, Canadian companies were exempted from the provisions.)

Tax Credits and Rebates. Virtually every clean-tech incentive package includes some form of tax break. California provides up-front rebates to purchasers of distributed energy systems, such as solar panels or fuel cells. On the production side, "In the United States, the most important policy is the investment tax credit, which allows solar project developers to credit 30 percent of the capex against their tax bills," says Macpherson.

Utility Rules. Besides requiring utilities to buy electricity produced by customers with solar or wind, governments frequently mandate that utilities get a certain portion of their future power from renewable sources. These "renewable portfolio standards" create a predictable long-term market for alternative energy. California recently raised its target from 15 percent to a very aggressive 33 percent.

Subsidies. Clean-tech installations "frequently have higher up-front costs than the fossil fuels they're replacing," says Dan Kammen, chief technology specialist at the World Bank. Finding ways to defray those costs is necessary for further development, and governments around the world are offering cheap land and buildings, help with related infrastructure, and numerous other inducements. "California and New Mexico got into a friendly but heated battle over who was going to host the electric-vehicle company Tesla," recalls Kammen. In the end, the company took a California deal that included subsidies worth more than US$28 million. "The competition sent a message to other companies that this is something governments will look to support. That's an important signal to the industry."

Feebates. This is a theoretically self-financing program in which fees on undesirable behavior finance rebates for desirable behavior (fee and rebate = "feebate"). France, for example, imposes fees on drivers of less-efficient cars and pays rebates of up to €5,000 to buyers of more-efficient cars.

What Works and What Doesn't

Such a wide range of incentives will inevitably include good, less good, and dangerously bad combinations, with corresponding implications for the affected companies. For analysts, the key is to understand what distinguishes good policy from bad.

Clarity. The more easily understood the incentive, the more readily the target audience will respond. And the feed-in tariff has proven to be extremely clear. "It's easy to implement, transparent, and relatively free of bureaucracy," says Macpherson. Adds Weber, "As soon as you offer an attractive feed-in rate you immediately create a vibrant market."

At the opposite end of the clarity spectrum is the U.S. patchwork of federal and state incentives, regulations, and numerous public utility commissions (PUCs) that set rules governing how local utilities operate. Some U.S. power markets are monopolies in which the local utility is the sole provider of power; others are open to outside producers that compete for sales. As a result, "We've got kind ❯❯

of a dog's breakfast of regulatory frameworks and market structures," says Greg Dixon, senior vice president of marketing and sales with U.S.-based smart-grid firm EnerNOC.

Evenhandedness. "Generally speaking, the clean-tech industry would rather see non-discriminatory incentives," says Macpherson. "A lot of governments don't realize that the global value chain is actually very interconnected and interdependent. While we produce modules in China, we use silicon from the United States and have German and other European suppliers, and a lot of our equipment is produced in India."

And yet local-content rules do have the desired effect of attracting factories. "Our goal is to sell solar panels all over the world, so we need to be realistic," says Macpherson. "We're partnering with a silicon company which produces silicon in Ontario and that will allow us to comply with the tariff."

Not all clean-tech firms have the luxury of a global presence. "As a VC [venture capital firm] we're investing in earlier-stage companies that just aren't that big and so don't have the luxury of being able to just pick up and move," says Raffaelli.

Logical Consistency. "What we've seen in country after country is that the most effective or efficient way to launch a clean-tech sector is to have a coherent strategy," says Dan Kammen. That is, a set of policies that complement each other in both impact and timing.

Kammen points to the Japanese New Sunshine Program of the 1990s as "in many ways the quintessential example. They ramped up R&D on solar cells and then five years later ramped up funding for deployment. Time and time again it's that kind of coordination that's the hallmark of a successful policy."

China "recognized that with low labor costs and the flexibility of new plants, they could ramp up production of solar panels dramatically even though they didn't consume that much at home," says Kammen. "Their original goal was almost all export. They trained 10,000 technicians to become a sales force for solar internationally." As a result, Chinese solar panel makers are now among the world's largest, and the country is now able to shift toward domestic installations with plenty of home-grown production capacity.

The United States, though improving, again provides a negative object lesson, with a patchwork of federal, state, and local rules that are sometimes contradictory. For example, "In California there are generous subsidies to get people to install solar, and yet we don't easily permit people to become their own power plants and sell power back to the utility [i.e., there's no feed-in tariff]," says Kammen. "If you can't sell power back, it leads individuals and businesses to undersize their systems because all they can do is zero-out their utility bill instead of making more."

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>
> DAN KAMMEN

Predictability. "It almost doesn't matter what combination of options they use as long as it is implemented for the long term," says Macpherson. "That enables us to better structure our investments to develop a market." Germany's feed-in tariff rate, for example, is guaranteed for 20 years; subsequent downward adjustments in the rate don't affect existing installations. "Banks are able to give you credit because you have a guaranteed long-term income," says Weber.

Less certain is the U.S. production tax credit (PTC) for wind turbines, which was recently extended until the end of 2012—when it will again come up for renewal. "That's not long enough to really encourage a systematic industry policy," says Raffaelli. "People worry that the tax credits will expire and your projects become less economic." In the smart-grid market, meanwhile, "The stimulus funds that got spent accelerated a lot of smart-grid development, but since those funds dried up, I don't know of a single new smart-grid project," says Dixon.

Why is predictability so hard to achieve? "Industrial policy takes time. You make an investment today, and 10 or more years from now there might be a big payout," says Kammen. "That's a bad match for the political cycle of elections and appointments. Because renewables live closer to the edge in terms of financing and viability, they're going to be whipsawed by what happens at the policy level."

When Incentives Work Too Well

Another impediment to predictability is that clean-tech incentives tend to vastly exceed expectations, leading panicked governments to change the rules in the middle of the game. Some examples:

- The Czech Republic instituted a generous solar feed-in tariff that guaranteed a fixed rate for 20 years. Demand—and related costs—soared, and in 2011, the government reversed course and imposed a 26 percent retroactive tax on recently built solar plants.
- The U.K.'s recent boom in solar installations led its government to slash feed-in tariff rates by more than two-thirds, causing the delay or cancelation of several

major installations, including the government's own flagship project to put solar panels on public buildings.

- Italy's feed-in tariff produced a deluge of applications that overwhelmed its regulatory and record-keeping bureaucracy. At one point, estimates of the 2010 Italian solar market ranged from 1.8 gigawatts to 6 gigawatts (no one really knew for sure), with the potential cost of incentives approaching €45 billion. Meanwhile, the government requires Enel, the main Italian electric utility, to connect all of these projects to the grid, an open-ended obligation that has yet to be quantified.
- But the binge-and-purge award goes to Spain, which set up a highly generous solar subsidy program with a 25-year rate guarantee that made the country one of the world's leading solar markets in 2008. This policy overloaded the bureaucracy and the budget, leading the government to implement a retroactive 30 percent subsidy cut on existing plants. The local solar market all but evaporated in 2009.

Adapting to the Environment

Understanding the incentive environment is half the analytical battle. The other half is assessing a given company's fitness for that environment. Three areas to consider are influence, niche potential, and the risk of being blindsided by changing circumstances.

Ability to Influence the Incentive Package. The surest way to benefit from a set of incentives is to help shape them to your advantage. Companies with major roles in the industry bodies that negotiate with governments are more likely to get a favorable policy mix.

Dixon notes that while smart-grid technologies don't require subsidies to be economic, they do require a regulatory structure that treats efficiency as a source of electricity. Utilities need to understand how a smart grid works. In U.S. markets where utilities are monopolies, EnerNOC focuses on explaining the benefits of efficiency to utility executives. "Then we work with the utility to lobby the public utility commission," says Dixon.

Shaping the rules is obviously easier for multinationals with high-level connections and the wherewithal to hire lobbyists, but it's also a factor for smaller players. "When we're thinking about investing in a company we try to figure out how they fit into those [industry] bodies, whether they're helping to drive some policy and whether their people are thought leaders in that space," says Raffaelli.

Ability to Exploit Developing Niches. The United States intends to ban the sale of old-style incandescent lightbulbs in 2012. This opens the door for new forms of lighting, including LEDs—semiconductors that turn electricity into light far more efficiently than incandescent bulbs. LEDs are expensive but getting cheaper, and U.S. LED maker Cree might find a wide-open niche just as its products are becoming ready for prime time.

China plans to put a million electric buses on the road by 2020. Hunan Province recently awarded a contract for 1,000 buses to BYD, a leading Chinese maker of advanced batteries and electric vehicles. India is explicitly favoring local companies, thereby putting its two indigenous solar panel makers, Moser Baer India and Tata BP Solar India, first in line, similar to First Solar and Vestas during Europe's earlier clean-tech expansion.

Risk of Being Blindsided. Companies that commit to projects based on promised incentives can have the rug pulled out from under them. Solar plant operators in Spain are suffering indigestion caused by retroactive changes in the feed-in tariff. Iberdrola Renovables, ACCIONA, and Abengoa have all seen lower earnings and share prices, and local panel maker T-Solar was forced to delay its IPO.

Italy's solar debacle will affect module suppliers, such as Yingli Green Energy, Trina Solar, SunPower, Suntech, First Solar, and Power-One, that have invested in local projects. In France, the taxes levied to cover the required feed-in tariff payments from utility Électricité de France (EDF) turned out to be insufficient, forcing EDF to pay out nearly €1 billion annually—money that might otherwise go toward maintaining the country's aging nuclear plants.

Global Opportunities

Many lessons have been learned from the past decade's grand experiment with clean-tech subsidies. First, because they're generally more effective than expected, future adopters may want to err on the side of caution and investors should view big orders from newly implemented incentive regimes with skepticism. Second, clean-tech incentives work almost everywhere. Virtually any country or state can ignite a clean-tech boom by implementing an easily replicated set of tax and regulatory policies. No doubt many of them will, resulting in more gyrations in clean-tech company order books and share prices, more IPOs, and a general migration of the market toward the developing world.

"While the traditional view was that big companies or rich countries innovate and the others adapt and just take the tech, the world has changed," says Kammen. "Diversifying and broadening out the R&D base has put more companies in the pipeline in more places."

John Rubino, a former financial analyst, is the author of Clean Money: Picking Winners in the Green Tech Boom *and* The Collapse of the Dollar and How to Profit From It.

RECOMMENDED RESOURCES

Environmental, Social, and Governance Factors at Listed Companies: A Manual for Investors, CFA Institute (www.cfapubs.org)

"Everything a Young Charterholder Should Know about Energy" *CFA Magazine* (Sept/Oct 2010) (www.cfapubs.org)

"Hybrid Vehicles" *CFA Magazine* (Nov/Dec 2008) (www.cfapubs.org)

"Green Alpha" *CFA Magazine* (Sept/Oct 2008) (www.cfapubs.org)