

WALL STREET'S NEW LOVE AFFAIR

BY EMILY THORNTON
AND ADAM ASTON

Why some of the world's smartest investors are betting billions on clean energy

YOU SENSE IT FROM THE WAITING LISTS FOR Toyota Priuses. You see it on the faces of the solar-energy stalwarts who are suddenly being showered with attention. You read about it constantly in newspapers and magazines. And you hear it on TV and even at the movies. Warnings about global warming grow more dire by the day: Experts say Manhattan, Washington, and San Francisco will eventually be under water unless people start filling their tanks with corn squeezings and bolting solar panels to their roofs.

As troubling as the predictions are, even more urgent problems are weighing on the American psyche these days—namely the price of oil, which is surging past \$75 a barrel, and the deteriorating Middle East situation. In liberal and conservative circles alike, energy independence is becoming a national imperative, and renewable energy is attracting an unprecedented array of groups. "We're seeing an alignment of the environmental interests, automakers, the agricultural industry, the security and energy-independence proponents, even the evangelicals," says billionaire venture capitalist L. John Doerr. "When did all those [interests] come together before?"

You know a cultural movement is real when the money men get on board. In just the past year a broad swath of financiers—venture capitalists, hedge funds,

investment banks, public pension funds, and even stodgy insurers—have begun sinking billions of dollars into producers of ethanol, fuel cell superbatteries, microscopic bugs that turn glucose into plastic, environmentally friendly pesticides, anything that might tap into the green craze. Saving the planet, protecting America, doing God's work, cynically exploiting a feel-good trend—call it what you will. Wall Street sees money to be made. When John V. Veech, a managing director at Lehman Brothers Inc., snowed up at a renewable energy conference in June, he was amazed to see that it was standing room only. "If you went five years ago you'd see a lot of ponytails," he says. "Now these conferences are packed with suits."

Make no mistake: The U.S. is not about to resemble an ecotopia anytime soon. For all the happy talk about clean energy and green technology since the 1970s, people just haven't adopted the gadgets and concoctions written about in science magazines. The government has provided billions in subsidies over the decades for ethanol, wind, and solar technologies to help

make them more economically competitive—without much success. In 1975 renewable energy accounted for 6.6% of total energy consumption. By 2005 the figure had slipped to 6.1%. It would take decades more and tens of trillions of dollars to produce the countless windmills, solar panels, geothermal plants, and power-generating dams needed to mothball the nation's





coal- and gas-fired electric plants. And production of biofuels such as ethanol and biodiesel would need to soar from 325,000 barrels a day to nearly 16.5 million to replace conventional road fuels. Getting there quickly would be "physically impossible," says Steven C. Taub, director of emerging-generation technologies at Cambridge Energy Research Associates, a firm that advises big oil companies and utilities.

Bigger Piece of the Pie

WALL STREET ISN'T BANKING ON a radically different future, though. It's merely betting that wind, solar, biofuels, and the rest will make up some bigger portion of the nation's \$1.6 trillion energy market—enough to give clean-energy investing cred as part of a diversified portfolio. Their confidence is bolstered by the federal and state clean-energy quotas that have appeared virtually overnight.

Already, 22 states have ordered utilities to obtain as much as 33% of their electricity from renewable sources within the next 10 years. Others are likely to follow. And given the green-is-good mood these days, it would take a budgetary calamity to prompt politicians to yank clean-energy subsidies. They'll likely be around for a while.

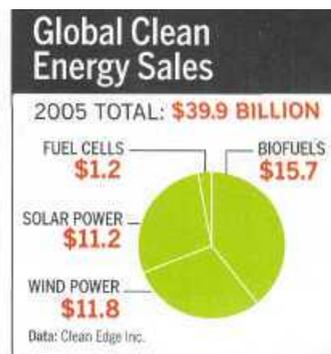
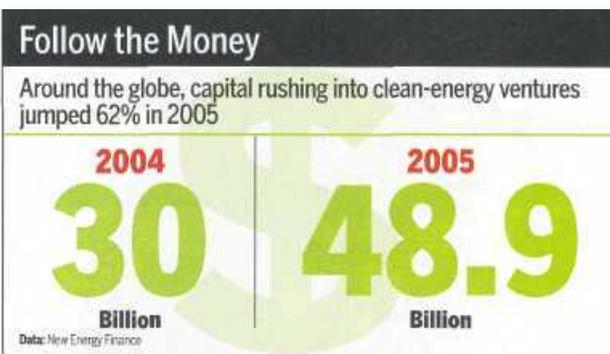
Even modest gains at the margins could add up to real money for investors. Let's look at some small slices of the energy market. Cambridge Energy, hardly a haven for green warriors, expects demand for ethanol and biodiesel for cars and trucks to more than double, to 6% of all road fuels, in the next four years—a \$28.4 billion opportunity. It expects demand for power from wind, sun, geothermal heat, biomass, and water to rise from 2.5% of the nation's electricity to 3.4%. That translates to as much as \$10 billion in new revenues for clean power producers by 2010. And these are baseline assumptions over the short run. If the technologies gestating today were to make, say, plant-derived jet fuel cost-competitive, the opportunities could increase by orders of magnitude.

Wall Street is champing at the bit to provide capital. Last year, \$17 billion poured into clean-energy projects in the U.S.—89% more than in 2004, estimates researcher New Energy Finance Ltd.

Worldwide, the \$49 billion collected in 2005 was up 62% from 2004. Interest in this stuff is "out of control," says Credit Suisse Group banker Paul T. Ho as he sifts through stacks of papers on his desk for potential initial public offerings of companies that produce fuel from corn, restaurant grease, prairie grasses, orange peels, and municipal waste. He says there aren't enough suitable opportunities out there for all the requests he's fielding from well-heeled investors.

There is a downside to the flood of newcomers rushing in: They're sending valuations higher, making good deals more difficult to find. And lavishing capital on technologies that have been stalled for three decades will surely trigger painful dislocations. For example, producers of today's leading solar panels, which use costly silicon wafers, might soon be threatened by companies like Phoenix-based First Solar Inc., which says it will make power from the sun as affordable as regular electricity within four years by using cheaper materials, such as

LUSH AND GROWING FAST



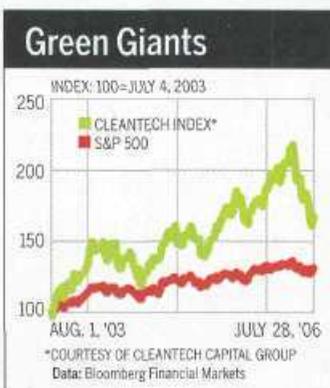
High Risk, High Return

Some clean-energy companies—but not all—have had dazzling initial public offerings

COMPANY	DESCRIPTION	DATE OF IPO	RETURN FROM IPO
SunPower	Maker of solar electric-power products	11/16/2005	74.6%
Suntech Power Holdings	Chinese maker of solar cells and panels	12/13/05	72.3
VeraSun Energy	U.S. ethanol producer	6/13/06	6.3
Aventine Renewable Energy	U.S. ethanol producer and distributor	6/28/06	-30.1

AVERAGE RETURN: 30.8%

Data: Thomson Financial



Picking Favorites

Imagine if the government had subsidized clean energy as it has subsidized traditional energy...

TRADITIONAL ENERGY* ANNUAL SUBSIDY (BILLIONS)	CLEAN ENERGY ANNUAL SUBSIDY (BILLIONS)
Oil and gas	Ethanol \$4.3
Coal	Other renewables 5.6
Fossil fuel, mixed	Conservation 1.6
TOTAL \$49.1	TOTAL \$11.5

*Excludes nuclear energy, which receives \$9.2 billion annually
Data: EarthTrack.net



created yet. Think of green investing in 2006 like technology investing circa 1976, when computer hardware was just starting to be introduced. Bet on the next Intel, and the sky's the limit.

Of course, the green gains of the past few years are directly related to the price of oil, which has doubled since 2003. Oil remains the main lens through which all energy is viewed, and it takes high prices to stir demand for alternatives. Some economists are forecasting \$100 a barrel for the foreseeable future. Others say it would take only the briefest of global recessions to push the price of oil below \$40. Certainly the big payoffs for alternative energy would vanish in a second if oil prices were to plummet suddenly.

But the Street is focusing on the vast gray area that exists between these extreme scenarios, wherein oil prices remain high enough to keep renewable energy viable and profitable. With oil at \$75 a barrel, it costs half as much to produce a gallon of ethanol as a gallon of gasoline. Right now it runs about 6¢ to generate a kilowatt hour of electricity power from wind, vs. a national average of 8¢ for electricity from coal or natural gas. To bet on renewable energy is to bet that those spreads won't go away.

Newly Convinced

EVEN EXPERIENCED OIL PROS are putting up money. David M. Leuschen, 55, is a founder of private-equity firm Riverstone, which co-manages about \$7 billion with the Carlyle Group and invests in all types of energy, including coal-fired plants. It also has a \$685 million renewable-energy fund invested in solar power, geothermal, and ethanol

plants. Leuschen is a tall, fourth-generation Montanan who operates more than 100,000 acres of ranches, mostly near Yellowstone National Park. He's no radical greenie; in fact, he doesn't like to discuss global warming. That's "a debate for scientists," he says in his office overlooking New York's Central Park.

Like many others who are financing and investing in green technologies, Leuschen built his career largely on his expertise in the areas of energy that drive environmentalists nuts. In 1999, while a banker at Goldman Sachs, he helped advise Mobil on its \$81 billion merger with Exxon. He left Goldman in 2000 to co-found Riverstone. When some large public pension funds approached him about starting a renewable-energy fund two years ago, Leuschen hesitated, thinking alternative power couldn't deliver decent returns. "Our first obligation to our investors is to make money, and I wouldn't have initially considered renewable energy the best place to make money," he says.

Now he thinks otherwise. Leuschen isn't turning his back on coal, which generates more than half the U.S. electricity supply. But his company,

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together with Florida Power & Light Co., owns one of the world's largest solar-power plants, in California's Mojave Desert. Investors in Riverstone's renewable-energy fund have been told to expect annual returns of 15% or so and perhaps much more, based largely on the fact that most alternative-energy producers are able to enter into long-term contracts with utilities, some lasting 15 to 20 years.

Investment banks are making long-term bets, too. Instead of taking green companies public and collecting the easy underwriting fees, Goldman is choosing to own companies outright and keep the profits for itself. It's putting \$1 billion into everything from wind power to ventures that might one day produce ethanol profitably out of waste. JPMorgan Chase & Co. has invested in 17 wind farms and hopes to get into solar and geothermal plants soon. "The wind business has been growing at 25% a year," says John M. Eber, managing director for energy investments at JPMorgan Chase in Chicago. "We're responding to today's market needs."

What's striking about green investing is the sheer variety of players jumping in. Huge public pension funds CalPERS and CalSTRS together have committed more than \$1 billion to green investments. Multibillion-dollar hedge fund groups like S.A.C. Capital Advisors and D.E. Shaw & Co. have invested in and financed producers of geothermal energy, ethanol, and wind power. Even insurer American International Group plans to steer private-equity investments to projects that help cut greenhouse gas emissions. And venture capitalists earmarked some \$917 million for clean-energy startups last year, almost double the amount in 2003, according to research firm Clean Edge Inc. "Almost every venture firm now either has a clean-tech effort or a separate clean-tech fund or a few clean-tech partners and at least one clean-tech investment," says venture capitalist Bill Gross, who invested in a slew of dot-coms and is now focusing on solar power at a company called Energy Innovations Inc.

Once Burned, Not Shy

POTENTIALLY LUSH PROFITS are luring business luminaries, too, including Berkshire Hathaway's Warren Buffett, Microsoft's Bill Gates, Google's Larry Page and Sergey Brin, and Sun Microsystems co-founder Vinod Khosla. Such captains of industry as Virgin Group CEO Richard Branson and General Electric CEO Jeffrey Immelt are plowing hundreds of millions, and in some cases billions, into green ventures.

Each green banker, research analyst, and investor tells the story of an "aha" moment. For Brion Tanous, an analyst at investment bank Merriman Curhan Ford & Co., it came when he drank a glass of clean water directly from the tailpipe of a Honda fuel-cell car on display at an auto industry seminar. "Soon the question won't be whether you want a fuel-cell car," he says. "It'll be, what color do you want?"

John Doerr, a longtime partner at VC firm Kleiner Perkins

A FEW WHO THINK THE MARKET IS RIPE

Where some business titans are placing their bets

Warren Buffett, CEO of Berkshire Hathaway, which owns MidAmerican Energy, the nation's leading utility in wind energy. It has invested \$385 million to build wind-power plants.

At GE, CEO **Jeff Immelt** is betting that green technology will fuel the next century of growth. GE sold \$10 billion worth of clean-energy gear last year and plans to put \$3 billion into clean-energy ventures by 2008.



Caufield & Byers who supplied startup funds to such New Economy giants as Google, Intuit, and Sun Microsystems, got turned on to eco investing in 2000, when Dean Kamen, chairman and founder of scooter maker Segway Inc., shared his vision for how traffic and pollution would overwhelm cities by 2030. Doerr, now 55, told *Time* in 2001 that Segway would reach \$1 billion in revenues faster than any other company in history. When sales didn't live up to the hype, Segway became fodder for critics, as did Doerr's decision to fund the company. Today, Segway has just \$9.4 million in sales, estimates researcher Dun & Bradstreet Corp. Segway declined to comment on the estimate.

But Doerr still thinks green. From 2001 through this year, Kleiner Perkins has quietly committed more than \$100 million to nine ventures involved in everything from coal gasification to ethanol. One of them, Ion America Corp., is preparing a launch later this year of fuel cells that supply electricity to

Cascade Investments, the investment arm of Microsoft Chairman **Bill Gates**, has invested in Pacific Ethanol, a public company that is building an ethanol plant in California.

Virgin Group CEO **Richard Branson** plans to invest up to \$400 million in a biofuel plant. He is also investing in wind power and trains that run on biodiesel.

Microsoft co-founder **Paul Allen** has sunk \$250,000 into Seattle's Imperium Renewables, which plans to supply 40% of the growing U.S. market for diesel fuel made from vegetable oil by 2009.

Vinod Khosla, co-founder of Sun Microsystems, is a biofuels evangelist. In the latest of a string of ethanol deals, Khosla Ventures and other investors are plowing \$50 million into ethanol startup Altra.

Google co-founders **Larry Page** and **Sergey Brin** have invested in Palo Alto solar-energy startup NanoSolar.



buildings. And in February, Kleiner announced that it has earmarked at least \$100 million of its new \$600 million fund for green investments.

To Martin Tobias, a self-described "Republican tech-geek software venture capitalist," what's exciting is how the wave of investment is drawing good ideas and top minds from universities and corporate research labs. "This money is transforming ideas that have sat on shelves for years," says Tobias, whose attention shifted to clean diesel after he cashed out of posts at Microsoft and Loudeye.com. In 2005, when he walked into a former Seattle brewery that owner John Plaza bought with his life savings to make clean diesel, Tobias suddenly recognized the potential of renewable crops. Plaza was producing batches of diesel fuel cooked from soybeans—and selling every drop as quickly as he could make it. Together with Paul Allen's Vulcan Ventures and other top-tier VCs, Tobias plowed \$10 million into the plant and joined the company, now named

Deeper into the Green



See a wind farm and learn how to invest in green companies on our TV show, *BusinessWeek Weekend*. Check local listings or go to

businessweekweekend.com and type in your Zip Code to find when and where it airs in your area.

Meet Connecticut Treasurer Denise Nappier (right), who's confronting ExxonMobil on global warming.

Take a peek at the green ambitions of Virgin's globetrotting boss, Richard Branson.

In a Q&A, venture capitalist Bill Gross tells the story of how he became a solar entrepreneur.

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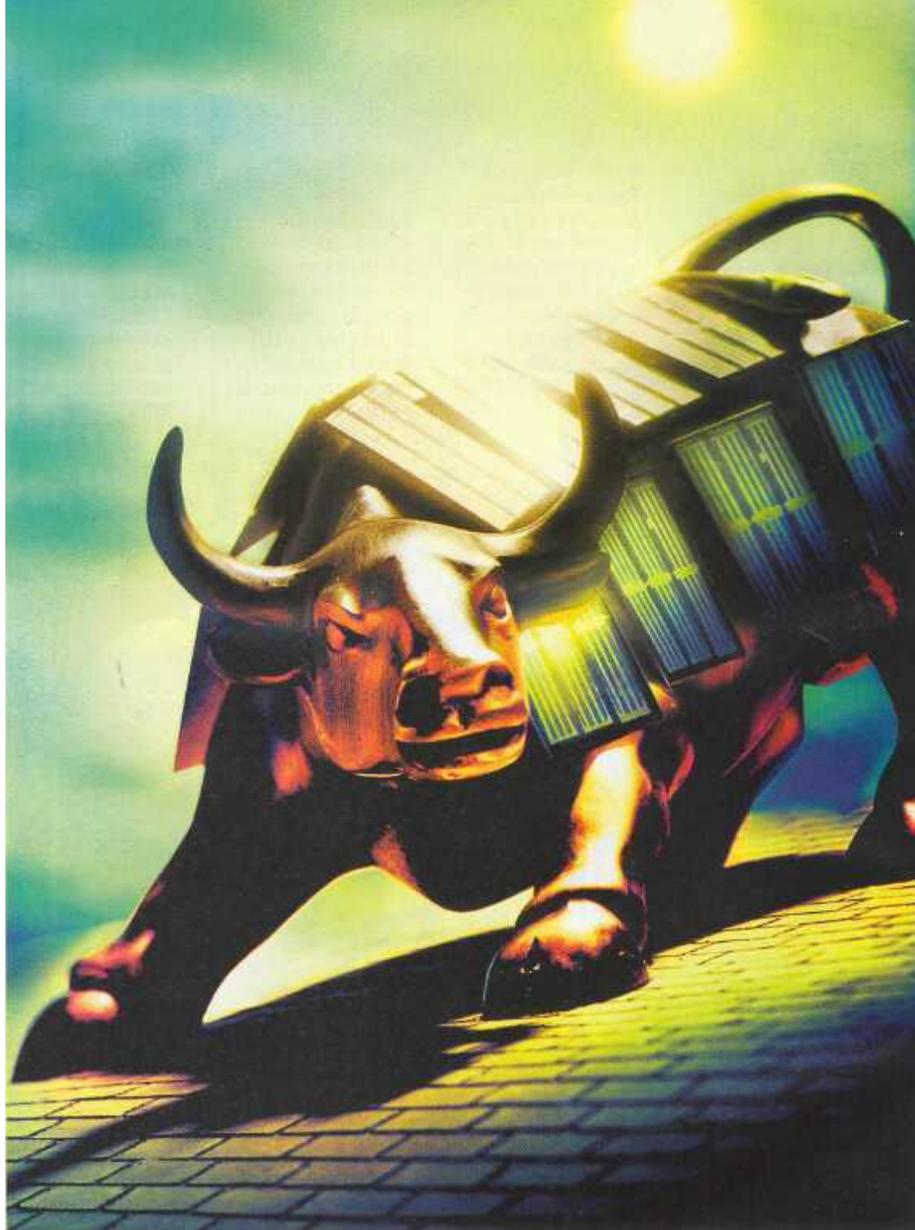
BRIAN MARANAN PINEDA

Imperium Renewables Inc., as chairman and CEO. Tobias is raising fresh funds to boost the company's production eightyfold.

The whole attitude toward green investing is shifting dramatically. Green "has become a mainstream business that's attracting mainstream investments," says Cambridge's Taub. When Mark Townsend Cox, 49, left his job as a portfolio manager at a family-owned investment firm in November, 2002, to start a hedge fund investing solely in clean-energy stocks, many prospective investors snickered or ignored him completely. "People would say, 'It's all science experiments' or 'No one makes any money from it' or 'There [aren't] enough publicly quoted companies to invest in,'" recalls Cox, who keeps a small solar cell in his bedroom that splits water into hydrogen and oxygen to remind him of how simple green technologies can be. With a scant \$100,000, Cox launched the New Energy Fund on Dec. 30, 2004. He quickly set about scouring the globe for publicly traded companies involved in sustainable energy or green technology. He found more than 400 of them. His fund is up over 50% in 2006 and has more than \$4 million in assets.

Filtering Down

LAST YEAR IT WAS ETHANOL that grabbed the attention of Paul Touradji, head of Touradji Capital Management, which manages about \$1.7 billion. Touradji has been roaming cornfields, sugar mills, and oil refineries for nearly a decade. After working in the refining division at Mobil while in college, he was recruited to join the commodity team at Tiger Management in 1996 and became a protege of former hedge fund titan Julian H. Robertson Jr. Touradji, who started his fund in January, 2005, perked up when he heard that some states were about to ban MTBE, a chemical added to gasoline to reduce emissions without hurting perform-

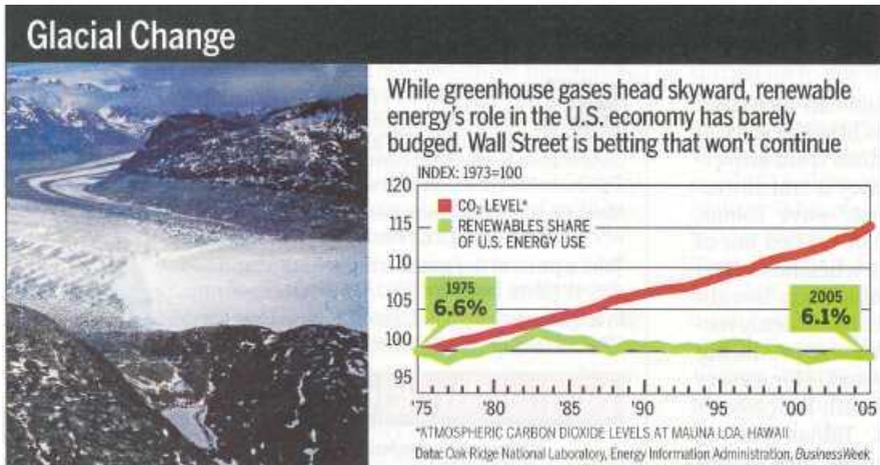


ance, because it had been found to contaminate groundwater. Touradji reckoned that refiners would rush to ethanol, a cleaner substitute that also fit the bill. By Touradji's calculations, there would be an ethanol shortage even if supply zoomed. He bet on ethanol producers' stocks and bonds and made private-

equity investments. By June, the wholesale price of ethanol had practically doubled, to nearly \$4 a gallon.

Wall Street's hunger for all things green is filtering into businesses that have been around for years, such as the power-trading markets that Enron used to dominate. Because so many states have ordered utilities to draw a big percentage of their electricity from wind, solar, and water sources in coming years, traders must bundle in green power as part of large transactions with utilities. "If you don't have the ability to play in renewable energies, large deals are nonstarters," says Beau Taylor, global head of energy trading at JPMorgan Chase.

Markets for hedging products are



percolating as new regulations on utilities stoke demand for emission rights and renewable-energy credits and hedge funds dive in to get a piece of the trading action. Already the global market for carbon emissions and related credits has ballooned from practically nil at the start of 2005 to more than \$11.7 billion by yearend, according to energy consultant Point Carbon in Oslo, Norway. The market is on track to double this year. "Carbon has the potential to be the biggest trading market in the history of the world," says Andrew Ertel, president and CEO of trading firm Evolution Markets.

At Evolution's headquarters in White Plains, N.Y., contractors are busy setting up new desks and terminals for the firm to double its staff of 50—including a handful of ex-Enron energy traders—over the next year. Profitable since its first

month in early 2000, Evolution has seen revenues compound by 50% a year. "We're saving the planet, one trade at a time," says Ertel.

Phenomenal growth, for sure. But it's no coincidence that oil prices have soared throughout the period, from \$17 a barrel in 1999 to more than \$75 now. If that upward spiral starts to unwind, the whole green market could unwind with it, from emissions to ethanol, solar power to superbatteries. Riverstone's Leuschen acknowledges this reality. "It's the umbrella of high energy prices that's allowing us to do this," he says. "If oil went back to \$10, I don't think we'd be talking about renewable energy." But that's a risk Leuschen and others are suddenly willing to take. **II**

-With Justin Hibbard in San Mateo, Calif.

THE GREAT CORN RUSH OF 2006

Ethanol profits are drawing in investors, but can the heyday last?

BY HEATHER GREEN

Facilities that can turn kernels into clean fuel seem to be sprouting up faster than the corn itself. There are 101 ethanol plants in existence, more than 41 new facilities and expansions in the works, and another 100 in the planning stages. At an average construction cost of \$75 million, that's potentially \$10.5 billion headed into ethanol.

Why the rush? Investors are wowed by the combination of short supply, surging demand, and government subsidies that top \$2 billion annually. Already much of the nation's production capacity of 5 billion gallons is being soaked up by government mandates. Last spring, regulators ordered that ethanol replace MTBE, an environmentally suspect agent, as an emissions-cutting additive in the nation's gasoline. What's more, Washington is pushing for "renewable fuel standards," setting national sales targets for fuels such as E85, a mix of 85% ethanol and 15% gas.

The result: Wholesale ethanol prices now sit at just under \$3, compared with around \$2 a year ago. And since a gallon of ethanol costs just \$1 to \$1.30 to make and the government pays an additional 51¢ in subsidies for each gallon of ethanol, profits

are booming. "These [plants] are money-printing machines," jogen's Canadian paying for themselves

MONEYMAKER

The fermenter at jogen's Canadian ethanol plant

S. Grumet, executive director of the National Commission on Energy Policy, a bipartisan group of energy experts.

But don't break ground on your own backyard ethanol plant just yet. There are plenty of reasons for doubting that corn fuel is the answer to the nation's energy woes. Using today's production methods, it would take 85% of the U.S. corn acreage to produce enough to replace just 10% of gas demand, according to Alexander E. Farrell at the University of California, Berkeley. And since people and cows like to eat corn, too, rising demand could send prices soaring, making ethanol investments much less of a sure thing. Already, the Agriculture Dept. expects a bushel from this summer's harvest to fetch 24% more than last year.

What's more, since corn kernels must be cooked to make ethanol, producers are vulnerable to energy-price spikes. "Is money

being thrown around? Yes. Is some of it unwise money? Yes," says Brian Jennings, executive director of the American Coalition for Ethanol.

Some investors are making moves to cut the risks. In Mead, Neb., E3 BioFuels is building a plant smack next to a cattle feedlot. To fire its distillers, the plant draws in methane captured from manure, cutting operating costs by 35%. Even the waste is cheaper to dispose of: The remnants of the corn kernels are fed to the cattle next door, rather than dried and shipped out. Overall, the plant will be 15 times more efficient than a traditional plant.

Investors such as Royal Dutch Shell, Goldman Sachs, and venture capitalist Vinod Khosla are betting that bigger payoffs await in next-generation ethanol from so-called cellulosic sources. That's because cellulosic ethanol, made from corn stalks, saw grass, and even municipal waste, yields nearly seven times more fuel than corn kernels. The first cellulosic plants are expected to come online in 2009.

Still, it's costlier to break down cellulose into ethanol than it is to break down kernels of corn. Giants such as Archer Daniels Midland and Abengoa Bioenergy, and startups like Goldman-backed Iogen and Khosla's Celunol, are developing a variety of approaches to crack the problem. And many of today's kernel-fed facilities are built to be convertible to cellulosic production once the kinks are worked out.

With all of the troubles on the near and distant horizons, ethanol can't be considered a panacea. But more of it will soon find its way into cars—and investors are sure to go with the flow.

