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**NOTE: We have said it before, and we will say it again: Renewables hinge on rare earth minerals. If you don't know about rare earth minerals, you don't understand a core component of renewable energy. In this section you will see, over and over, articles on rare earths. Whether you're pro-renewable or agnostic, you need to understand that those minerals are the key and China controls 90 to 95% of them (estimates vary but are always in that range).**

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**"Taxpayers Take Hit as Solar Industry Implodes," National Legal and Policy Center, Paul Chesser, January 4, 2012**

"First Solar Inc. went from the U.S.'s solar sector poster boy to perhaps the worst performing S&P 500 Stock... The company's stock collapse is alarming considering the massive infusion of government support... This followed expenditures of \$2.2 million on lobbying since 2007, according to Bloomberg News... In addition the company spent heavily in that gravy train of states for renewable incentives, California. Bloomberg reported the company gave more than \$150,000 to Golden State political campaigns last year - more than triple what GP gave - and has received \$3.43 million in state sales tax credits... Similarly, First Solar extracted at least \$51.5 million in incentives from state and local government in Arizona to build a manufacturing facility in Mesa. [First Solar CEO Michael] Ahearn and his wife Gayle - also listed as co-owner - donated \$65,000 to the Democratic Party of Arizona since the 2008 electoral cycle, according to the Center for Responsive Politics... Michael Ahearn donated \$40,400 to the Democratic Senatorial Campaign Committee since 2008. Company executives and staffers also gave \$37,158 to President Obama and various other Democrat candidates for Congress during that time.

Now though, despite its past dependence on pursuit of political favor, First Solar says it will move away from subsidized markets and will 'bet its future on sales in countries in which solar companies that can provide low-priced equipment and engineering services will make money and stay in business,' according to a report on technology website Gigaom.com. Company officials said they will soon announce a three-year plan to stay in markets 'that aren't heavily dependent on government incentives and political whims that can dramatically shrink their appetite for solar electricity,' the website reported."

[Taxpayers Take Hit as Solar Industry Implodes](#)

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**"Dark Times Fall On Solar Sector," The Wall Street Journal, Yuliya Chernova, December 27, 2011**

"Over the past several months, at least seven solar-panel manufacturers have filed for bankruptcy or insolvency... Of the 10 largest publicly-traded companies by market capitalization whose focus is making solar components, six reported losses in the third quarter, and all but one of these 10 produced weaker profits from a year earlier.

Underscoring how debt is weighing down the industry, six of the 10 also had debt on their balance sheets that exceeded their market capitalizations...

Overall, public-market investors are punishing the solar sector, sending shares down 57% this year as of Dec. 19... compared with a decline of 3% for the S&P 500...

[Driven by a Chinese-led manufacturing glut solar panel prices have declined from \$1.60 a watt in 2010 to \$1.05 or less in 2011, further darkening the prospects for solar panel manufacturers.]

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### **"Solar Pink Slip," Public Utilities Fortnightly, Michael T. Burr, December 2011**

"[D]espite strong support among American voters, solar energy faces growing discontent in policy circles, with lawmakers demanding greater accountability from taxpayer-supported companies. Someday, maybe soon, solar might find a pink slip in its inbox; a new Congress might well decide to lay off some or even all of the solar industry from the tax support payroll. That will be the day solar energy is forced to grow up...

For Republicans, Solyndra is now the poster child of 'wasteful' government spending on things like renewable energy subsidies. No matter whom voters send to Washington in the November elections, green energy spending will suffer in the polls - and that translates into less federal funding, especially in the current incendiary budget climate...

Renewable energy supporters argue that green energy resources can't compete without subsidies because fossil fuels are artificially cheap; their environmental damage shifts external costs onto society at large. Plus, imported oil costs America billions of dollars, ballooning the trade deficit and driving military spending. Then the government spends billions more on the oil, gas, and coal industries, via tax supports for exploration, mining and production, refinement, and even sales of fossil fuels.

Such arguments have merit, but they tend to fall down in one key respect. Namely, fossil fuels would be competitive even without government support. Although subsidy totals for fossil fuels reach into the billions of dollar each year, they're modest compared to the value of the resource in our high-octane economy... By comparison, as a percentage of solar energy's share of the market it enjoys a veritable gravy train of government support - exceeding 20 percent of its overall value, by some calculations...

[W]hether it deserves it or not, solar can't count on continued government largesse, thanks to the Solyndra mess... [S]olar companies must face the unfortunate reality that cutbacks are coming. And in the end, Solyndra's demise might turn out to be exactly what the solar industry needs in order to wean itself off heavy subsidies and mature into a mainstream energy resource."

FOR MORE INFORMATION ON SUBSIDIES, HERE ARE TWO REPORTS LOOKING AT THE ISSUE:

[U.S. Inventory of Budget & Tax Support for Fossil Fuels](#)

[U.S. EIA Study of Energy Subsidies](#)

Here is a key slide from the second report, from the U.S. Energy Information Administration:

**Table ES5. Subsidies and Support to Electricity Production: Alternative Measures**

Fuel/End Use	FY 2007 Net Generation (billion kilowatthours)	Alternative Measures of Subsidy and Support	
		FY 2007 Subsidy and Support (million 2007 dollars)	Subsidy and Support per Unit of Production (dollars/megawatthour)
Coal	1,946	854	0.44
Refined Coal	72	2,156	29.81
Natural Gas and Petroleum Liquids	919	227	0.25
Nuclear	794	1,267	1.59
Biomass (and biofuels)	40	36	0.89
Geothermal	15	14	0.92
Hydroelectric	258	174	0.67
Solar	1	14	24.34
Wind	31	724	23.37
Landfill Gas	6	8	1.37
Municipal Solid Waste	9	1	0.13
Unallocated Renewables	NM	37	NM
Renewables (subtotal)	360	1,008	2.80
Transmission and Distribution	NM	1,235	NM
Total	4,091	6,747	1.65

**NOTES:** Unallocated renewables include projects funded under Clean Renewable Energy Bonds and the Renewable Energy Production Incentive.

NM=Not meaningful. Totals may not equal sum of components due to independent rounding.

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**"Rich Subsidies Powering Solar and Wind Projects," The New York Times, Eric Lipton & Clifford Krauss, November 12, 2011**

"From 2007 to 2010, federal subsidies [for solar and wind power] jumped to \$14.7 billion from \$5.1 billion... States like California sweetened the pot by offering their own tax breaks and by approving long-term power-purchase contracts that, while promoting clean energy, will also require ratepayers to pay billions of dollars more for electricity for as long as two decades.... [According to David Crane, CEO of NGR], "I have never seen anything that I have

had to do in my 20 years in the power industry that involved less risk than these projects. It is just filling the desert with panels."

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**"Energy Program Suffers New Blow," The Wall Street Journal, Katy Stech, November 1, 2011**

"A Massachusetts energy company that received a \$43 million U.S. loan guarantee has filed for bankruptcy protection, in a new black eye for the Obama administration's clean-energy program following the collapse of solar-panel maker Solyndra LLC two months ago. Beacon Power Corp. used the U.S. backing to build a plant outside Albany, N.Y., that is designed to store power and help electric companies manage minute-by-minute movements in supply and demand..

The White House last week said it ordered an independently review of the Energy Department program, which has offered final or provisional guarantees for nearly \$36 billion in clean energy, electric cars and other areas."

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**"Work on Rare Earth Suspended in China," The Wall Street Journal, Chuin-Wei Yap, October 19, 2011**

"China's largest rare-earth producer said Tuesday that it would suspend smelting and separation work for a month starting Wednesday, using its market power to rally falling rare-earth prices. Inner Mongolia Baotou Steel Rare-Earth (Group) Hi-Tech Co., which accounts for nearly half of the world's light rare-earth production, said in a filing with the Shanghai Stock Exchange that the move was aimed at 'balancing supply and demand.'

Rare earths - which comprise 17 metallic elements used in many key technological products including missile systems and hybrid cars - soared in price beginning in 2009, spurring worries about China's grip on the industry. China dominates the market with about 95% of the world's rare-earth output... But prices of some rare-earth oxides have fallen sharply in recent months amid global growth jitters."

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**"The Fat Stimulus Pipeline," EnergyBiz, Russ Choma, Sept-Oct 2011**

"The summer of stimulus was two years ago, and the program was officially wound down last year. But don't be fooled - money is still flowing from that tap. One of the biggest and most prolific stimulus programs has been the Section 1603 grant program, and of all the original programs, this one is arguably more alive than ever.

To date, more than \$7.8 billion has been handed out - almost \$5 billion more than originally intended - to more than 3,160 applicants. The program allows developers of renewable energy facilities to take a cash grant in lieu of the usual 30 percent investment tax credit. Originally intended to be over by the end of 2010, with a final price tag of \$3 billion, the Section 1603 program got new life with a one-year extension... More than \$6 billion from the program, 77 percent, has gone to just 133 large wind farms....

[But also] included on the list are hundreds of unexpected recipients. Pet-related businesses, for instance, are well-represented. Places like DogBoy's Dog Ranch, a dog-boarding facility in Austin, Texas, which got a \$23,948 grant for solar panels, or Pet Tender's Country Boarding Cattery, a cat-boarding place in rural Missouri, which received nearly \$5,000 for a solar-thermal setup.

A variety of other pet-boarding places, pet groomers, alpaca farms and sundry other animal businesses are on the list as well. There are pastry shops, doctor's offices and quilting shops. And there have even been an number of big retailers, including WalMart and Kohl's, that have collected millions in grants... none are businesses that stake their primary mission on renewables... The common thread among many of these recipients is that they [contract with] one or two relatively new companies that cater specifically to the financing and installation of small renewable systems.

It isn't hard to imagine that the final tally for this program might be north of \$10 billion. While Washington talks about getting thin, the stimulus stays fat."

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**"Pentagon Says China Hold On Key Elements Is Risky," The Wall Street Journal, Nathan Hodge, October 6, 2011**

"A new Pentagon report to Congress puts the spotlight on the U.S. military's critical dependence on materials known as rare-earth metals and recommends alternatives to Chinese sources of supply... At issue is a group of 17 elements with unique magnetic properties that are vital to 21st-Century consumer technology, found in everything from smart-phones to hybrid car batteries. The elements are also essential to modern warfare...

China produces more than 95% of the world's rare-earth oxides, and the country's near-monopoly in mining and processing them has raised alarms in Washington, particularly following Beijing's moves last year to impose export quotas on them."

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**"Oil, Gold... Rare Earths?" The Wall Street Journal, Liam Plevin, October 5, 2011**

"While oil costs a little more than twice what it did at the low point in 2009, for instance, the price of neodymium - one of a group of rare-earth elements used in high-tech products and advanced weaponry - was recently up 23-fold over a similar period... Despite their name, rare earth's are common in the Earth's crust. But about 90% of rare-earth supplies currently comes from China, which has started to limit exports, saying it needs the

materials at home."

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**"Rare Earths Demand Eases, Sapping Prices," The Wall Street Journal, James T. Areddy, September 22, 2011**

"Prices for the vital industrial minerals known as rare earths appear to have fallen in recent weeks following two years of relentless gains, as the supply outlook brightens and dominant producer China faces possible legal challenges to export restrictions.

Rare earths - shorthand for a collection of 17 minerals used to make products from hybrid-car batteries and oil-refining agents to military equipment - have been surging, with the prices of some rising more than tenfold since 2009.

China controls almost the entire global supply and its export limits, mine restructurings and other policies have sparked a scramble to secure the obscure metals... Rare-earth prices remain far above where they were just two years ago. Lanthanum hovers 18 times above its 2009 price, while prices for cerium are nearly 25 times higher... Companies are looking to cut back on their need for rare earths, taking some pressure off demand...

Trade lawyers, meanwhile, predict the legality of China's policy to allocate supplies to foreigners using government quotas will be undermined by an unrelated, but similar, case being considered by the World Trade Organization involving a separate class of minerals."

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**"Boston-Power Leaving for China," Dan Primack writing in the Fortune magazine blog, September 20, 2011**

"Boston-Power, an electric batter company, today announced that it has raised more than \$125 million via a combination of venture capital and giveaways by the Chinese government. To get the last part, Boston-Power plans to shift the locus of its operations from the Boston suburbs to China. Not only by building a massive new manufacturing facility, but also by putting its senior executive team in Beijing."

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**"Clouds Overtake Solar-Panel Firm," The Wall Street Journal, Yuliya Chernova, September 1, 2011**

"Despite receiving a \$535 million federal loan and about \$1 billion in venture capital, high-profile solar panel maker Solyndra Inc. plans to file for bankruptcy protection, undermined by a weak global economy and competition from China...

Solyndra adds to a list of crippled solar ventures. Evergreen Solar Inc. entered bankruptcy protection in August... SpectraWatt Inc, an Intel Corp. spinoff, also filed for bankruptcy in August... Not all U.S. backed solar companies are struggling. First Solar Inc., one of the world's largest [solar panel] manufacturers and developers, is getting more than \$5.3

billion in loan guarantees... The company has a solar panel factory in Ohio, but makes most of its products in Malaysia."

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**"China Storms Into Wind and Solar Power," The Wall Street Journal, Liam Denning, August 22, 2011**

"When an industry is this reliant on government subsidies, the last thing it needs is a dose of market forces. The industry is renewable energy. The market force is China. The paradox of wind and solar power is that they are too expensive to compete properly with conventional fuels like natural gas, yet lower equipment prices from competition can prove fatal to manufacturers.

Last week, U.S. solar panel maker Evergreen Solar went bankrupt... China figures large in renewable energy's future. It already is the world's largest maker for new wind turbines. In solar, China's share of global demand is set to rise to 13% in 2015 from 7% this year, says Barclays Capital...

Chinese suppliers make formidable competitors. Sanford C. Bernstein reckons Chinese [wind] turbines shipped to the U.S. and Europe are, on average, 20% cheaper than those built locally, and the gap could hit 30% next year.

If anything, Western solar equipment firms face an even bigger challenge, especially as they compete in a much more fragmented industry. This helped cut average solar module prices by more than half between 2006 and 2010.

Chinese expansion will accelerate this trend. Credit Suisse reckons China's GCL-Poly Energy, for example, could have production capacity equal to two-thirds of the global solar panel market in 2012. By then, it could be churning out panels at a lower all-in cost than current cost leader First Solar, an American firm... [D]on't be surprised if this most politicized of technologies becomes a flashpoint for protectionism."

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**"ICE to Shut Down Platform For U.S. Emissions Trading," The Wall Street Journal, Jacob Bunge, August 6-7, 2011**

"InterContinental Exchange Inc. told traders it would close down its U.S. emissions derivatives platform... The money losing Chicago Climate Futures Exchange venture will continue operating through the first quarter of 2012 before closing... ICE then will list over-the-counter emissions contracts mirroring products listed on the platform... The U.S. has not enacted carbon cap-and-trade legislation and changes to the EPA acid rain program have reduced trading activity, ICE said in the notice."

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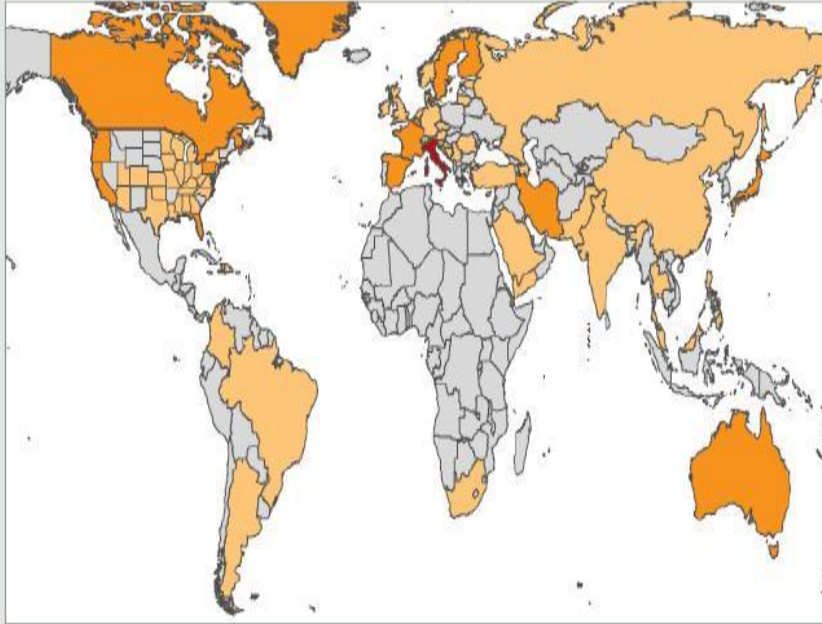
**"Green Transition," Public Utilities Fortnightly, May 2011**

**Fig. 1**

**SMART GRID'S GLOBAL FOOTPRINT**

Source: SmartGrid Consortium, 2010

- Zero penetration – no smart meter activity
- Low penetration – minimal smart meter trials and/or limited rollout
- Medium penetration – advanced trials and significant rollout
- High penetration – completed or near completion of smart meter rollout

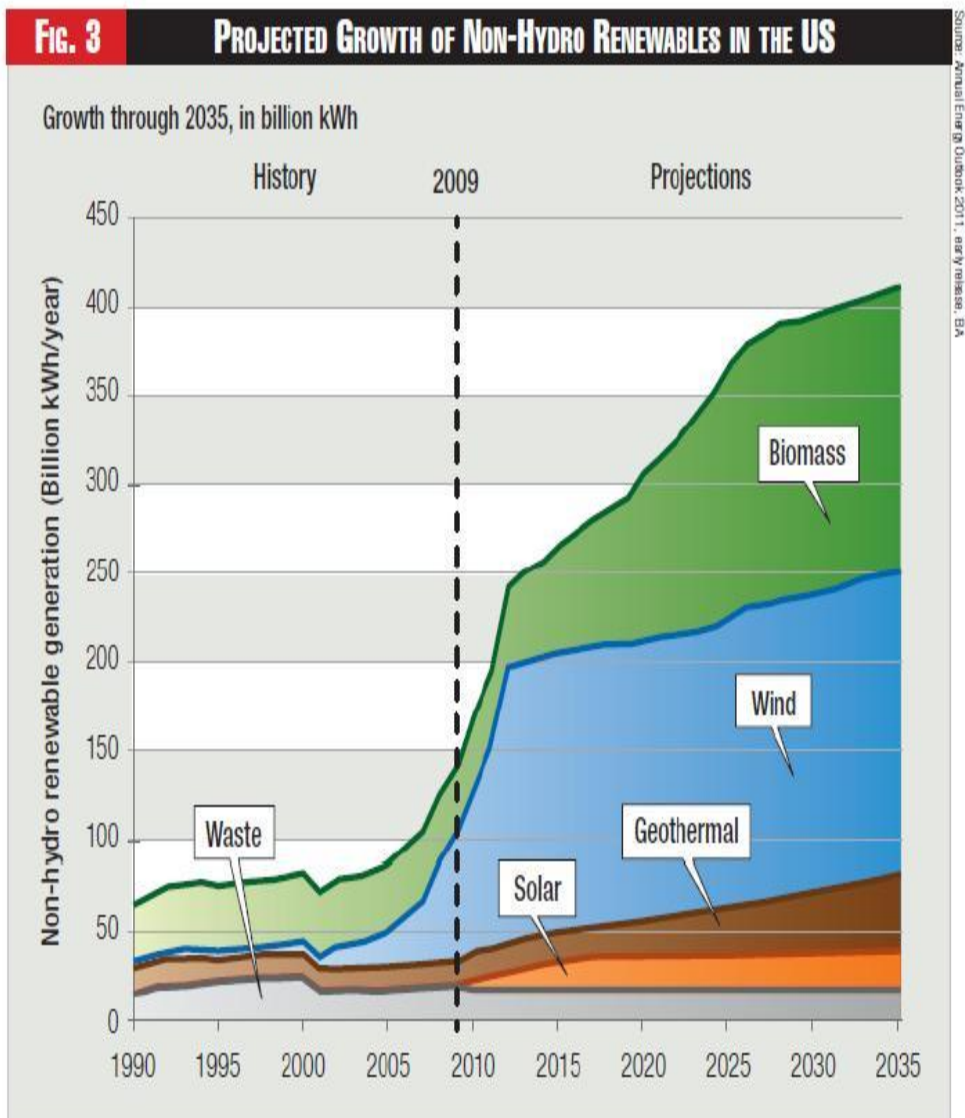


Smart meter installations – planned and actual\*



\*500 million+ meters to be installed by 2025

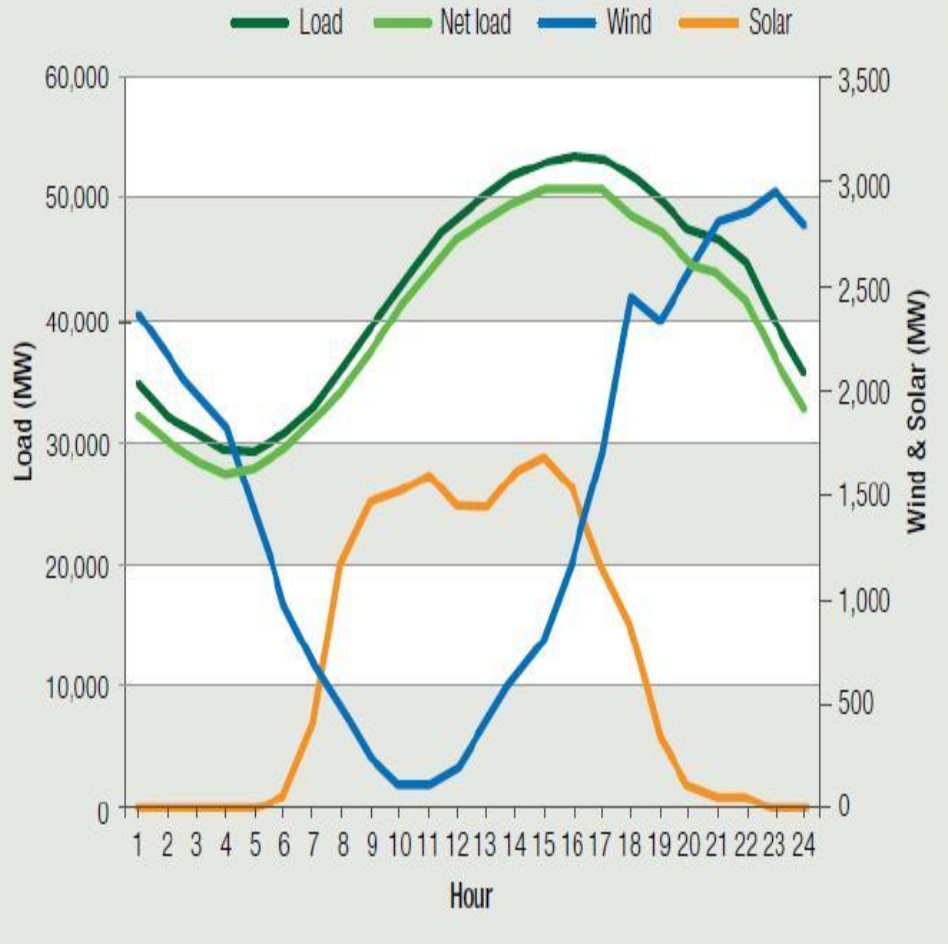
“Green Transition”, Public Utilities Fortnightly, May 2011



“Green Transition”, Public Utilities Fortnightly, May 2011

**FIG. 4** SIMULATED LOAD AND GENERATION ON A TYPICAL SUMMER DAY

Data is from July 25, 2010, in CA, in MW

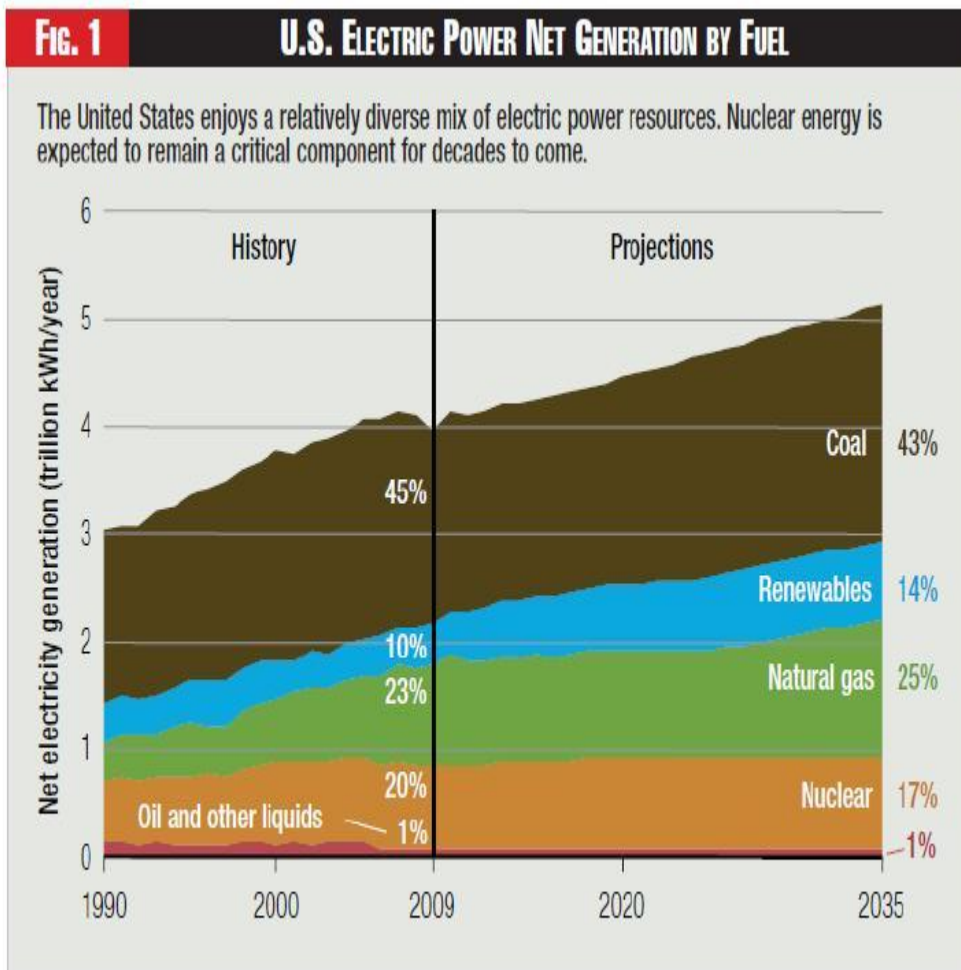


Source: Integration of renewable resources, CRESO, 31 Aug 2010

“Green Transition”, Public Utilities Fortnightly, May 2011

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“Green Transition,” Public Utilities Fortnightly, May 2011



"Seismic Omen", Public Utilities Fortnightly, May 2011

**"Rare-Earth Metals Add Heat", Wall Street Journal, March 23, 2011**

"Prices for rare-earth metals continue to soar... China's exports of rare earths in the first two months of 2011 came to 7,084 metric tons... That is up just 0.3% from the first two months of 2010 but about half of what Beijing said would be permitted for sale overseas in the first six months of 2011. And at an average price of \$44,361 a ton, the price was almost double last year's average of \$23,603 and many times the price paid in the first two months of 2010... The numbers from China underscore how Beijing's policy to tighten control of this strategic industry continues... China controls more than 95% of the global production".

[Ed: Rare earths are massively important in modern technology - they are essential to renewable energy, mobile phones, computer monitors, and pharmaceuticals, see article

below: **Marketwatch.com, September 4, 2009, "Rare earths are vital, and China owns them all"]**

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**"The Great European Carbon Heist", Katz, Carr, Bauerova, and Krukowska, Bloomberg BusinessWeek, March 14 - March 20, 2011**

"Europe's carbon market is under siege. Since November, criminals have hacked the computer systems of national registries or have stolen company passwords in Romania, Italy, Greece, Austria, and the Czech Republic and made off with more than \$80 million in emissions allowances... The crimes are a setback to Europe's aspiration to be an international model for cap-and-trade programs to limit greenhouse gases under the EU's Emissions Trading System (ETS), some 11,000 power plants and factories are issued emissions allowances, which they can buy or sell from one another. Each permit gives a company the right to emit a ton of carbon dioxide or its equivalent. In the six years the system has been in effect, the Continent's carbon trading market has grown from nothing to roughly \$110 billion a year."

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**"A European Showdown on China's Solar Industry", Bruce Einhorn, Bloomberg BusinessWeek, February 7 - February 13, 2011**

"As the Chinese ramp up [production of solar-power products], austerity-minded governments in Europe are scaling down their solar subsidies. Germany plans to reduce its feed-in tariffs, which guarantee above-market rates to solar power producers, as much as 15 percent by July. France, Spain, the Czech Republic, and other European countries are reducing their support as well... Europeans are cutting subsidies because of record-high budget deficits as well as political pushback against policies that some say primarily benefit foreign manufacturers... In France, which cut its feed-in tariffs twice last year, most new solar panels 'were made in China with a highly questionable carbon footprint', Environment Minister Nathalie Kosciusko-Morizet told Parliament in December."

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**"Hard Choices", Michael El-Hillow, Bloomberg BusinessWeek, January 31 - February 6, 2011**

[Mr. Hillow is the CEO of Evergreen Solar, which, after taking \$43 million in government assistance, closed its U.S. plant and moved to China - he authored the "Hard Choices" article summarized below]

"In 2008 we decided to build a plant in Massachusetts to be near our research and development facility... In December 2008 we were approached by a Chinese company, Jiawei, which was impressed with our wafer technology. The Chinese government agreed to support a loan that would cover two-thirds of our expansion in China. The subsidies we received here [in the United States] covered less than 5 percent of the cost of our U.S. plant. We received \$20 million and some future tax credits, but you can't pay taxes if you don't

make money.

One mistake was making the U.S. facility too large. We should have made it a quarter the size... late last year, prices went down 10 percent in one month for the modules we sell - on top of steadily falling prices for the last three years. That left us no choice but to stop making panels in the U.S. and shift our focus to making wafers in China."

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### **"A Better Offer from China", The New York Times, January 15, 2011**

"Aided by at least \$43 million in assistance from the government of Massachusetts and an innovative solar energy technology, Evergreen Solar emerged in the last three years as the third-largest maker of solar panels in the United States. But now the company is closing its main American factory, laying off the 800 workers by the end of March and shifting production to a joint venture with a Chinese company in central China... The Obama Administration has been investigating whether China has violated the free trade rules of the World Trade Organization with its extensive subsidies to the manufacturers of solar panels and other clean energy products..

Beyond the issues of trade and jobs, solar power experts see broader implications. They say that after many years of relying on unstable governments in the Middle East for oil, the United States now looks to rely on China to tap energy from the sun.

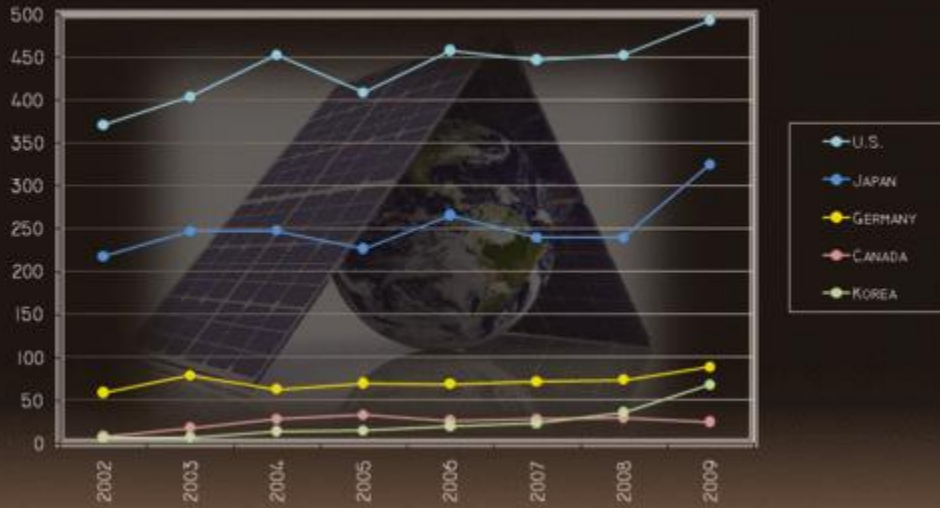
[Evergreen CEO Michael] El-Hillow said in a statement that his company had decided to close the Massachusetts factory in response to plunging prices for solar panels. World prices have fallen as much as two-thirds in the last three years - including a drop of 10 percent during last year's fourth quarter alone...

Other solar panel manufacturers are also struggling in the United States. Solyndra, a Silicon Valley business, received a visit from President Obama in May and a \$535 million federal loan guarantee, only to say in November that it was shutting off one of its two American plants and would delay expansion of the other.

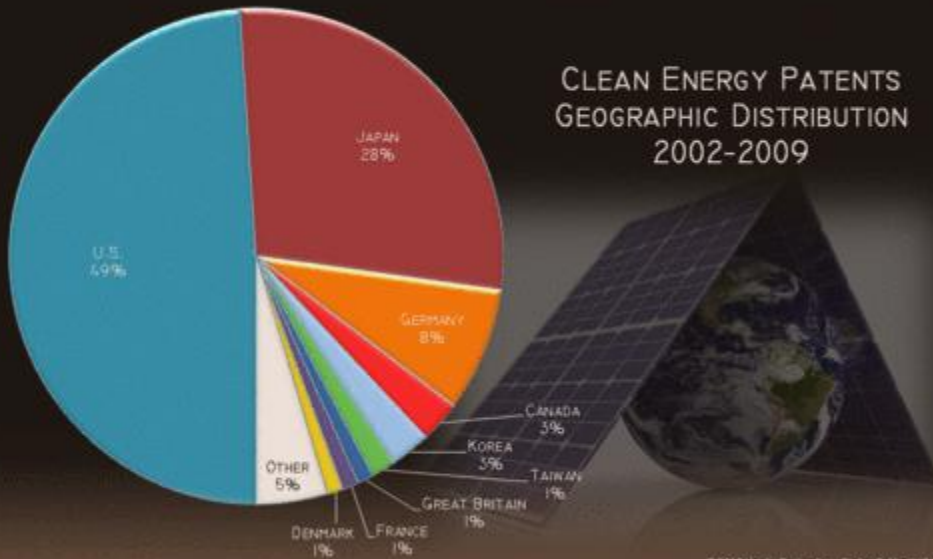
First Solar, an American company, is one of the world's largest solar power vendors. But most of its products are made overseas. Chinese solar panel manufacturers accounted for slightly over half the world's production last year. Their share of the American market has grown nearly six-fold in the last two years... and is still rising fast."

### CLEAN ENERGY PATENTS FOR TOP COUNTRIES 2002-2009

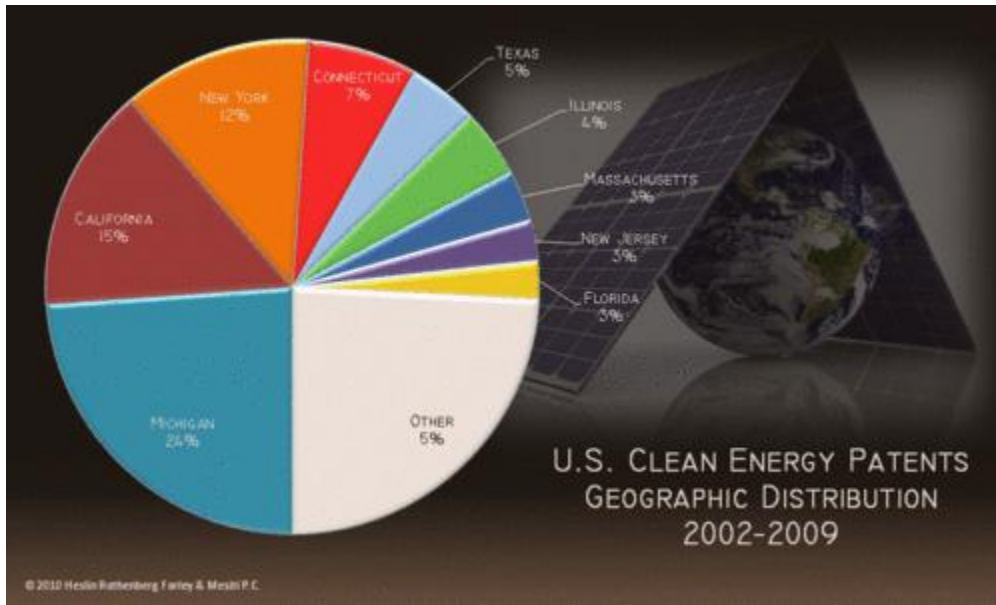
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### CLEAN ENERGY PATENTS GEOGRAPHIC DISTRIBUTION 2002-2009



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### **The Wall Street Journal, "U.S. Targets China's Wind Subsidies", December 23, 2010**

"The U.S. said Wednesday that it is requesting consultations with China at the World Trade Organization to end hundreds of millions of dollars of subsidies to boost wind-power production... The U.S. says wind energy is the fastest-growing sector in China's renewable energy market, which overall is expected to reach \$100 billion by 2010. Chinese wind-turbine makers now rank among the top 10 producers globally, and foreign companies' share of the Chinese market has been slashed to 13% from 79% in the past five years, according to Goldman Sachs."

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### **The Wall Street Journal, Op-Ed, "The Wind Subsidy Bubble", December 20, 2010**

"Despite more than \$30 billion in subsidies for 'clean energy' in the 2009 stimulus bill, Big Wind still can't make it in the marketplace... [W]hat have these subsidies bought taxpayers? According AWEA ["American Wind Energy Association"], in the first half of 2010 wind power installations 'dropped by 57% and 71% from 2008 and 2009 levels.' In the third quarter, the industry says it 'added just 395 megawatts (MW) of wind-powered electric generating capacity', making it the lowest quarter since 2007..."

According to an analysis by Chris Horner, an energy expert at the Competitive Enterprise Institute, the stimulus bill's subsidies for renewable energy cost taxpayers about \$475,000 for every job generated. That's at least four times what it costs a nonsubsidized private firm to create a job - a lousy return on investment even for government... The wind industry claims to employ 85,000 Americans. That's almost certainly an exaggeration, but if it is true it compares with roughly 140,000 miners and others directly employed by the coal

industry. Wind accounts for a little more than 1% of electricity generation and coal almost 50%. So it takes at least 25 times more workers to produce a kilowatt of electricity from wind as from coal. Given this level of inefficiency, it's no wonder that wind and solar energy require at least 20 times more in government subsidies per unit of electricity generate than the average for coal and natural gas, according to a 2007 study by the Energy Information Administration."

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### **RenewablesBiz.com, "\$172 Million a Week", January 2010**

"[W]ith the American Recovery and Reinvestment Act – the stimulus – [Greg Burkart of Duff & Phelps, financial advisory and investment banking firm] has 'followed the money enough to get a sense of what is clearly the winner for renewable energy projects... and there's one obvious answer: the so-called 1603 grants, the provision in which qualified renewable energy projects receive 30% of the project costs in direct payments from the Treasury Department instead of the usual production tax credit that is calculated over 10 years..."

Since the grants started to be released this fall, more than \$1.5 billion has gone out the door, with no end in sight. That averages \$172 million a week, for the about 150 projects... annualized, that's a total of \$8.8 billion... No one is sure if that level of activity can be sustained for that long, but consider that the Department of Energy estimated that the cash grant program would cost \$3 billion over two years.

The headlines have been written mostly about large wind projects, with about two dozen of them having received from \$20 million to \$120 million each. Interestingly enough, the big winner, in numerical terms is solar... The vast majority of those appear to be rooftop arrays on commercial buildings, most under \$100,000. Overall, with the large bump from the wind totals, projects are averaging slightly less than \$49 million.

The program is clearly doing what it was supposed to, with quick approvals of well-documented projects and the Treasury Department adhering to its promise to cut checks within 60 days... [Burkart] doesn't expect the activity to slow, especially if the economy improves, for one simple reason: construction on qualified projects has to start in about a year, completed by late 2011."

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### **The NY Times, November 2009, "China – U.S. Group Plans to Build Texas Wind Farm"**

"[Announcing] a 600-megawatt wind farm in West Texas, using turbines made in China. Construction of the \$1.5 billion wind farm will be financed largely by Chinese banks... The wind farm will be the first instance of a Chinese manufacturer exporting wind turbines to the United States... Construction is scheduled to begin March 2010... partners include the U.S. Renewable Energy Group, an investment firm, and a wind-farm developer, Cielo Wind

### **Energy Biz Insider, September 16, 2009, “Solar Systems Never Cheaper”**

"Altogether, solar system installation prices have dropped by 50% from a year ago and mostly because of unsold systems. Solar photovoltaic (PV) costs are not coming down because manufacturers are increasing their efficiencies and improving their economies of scale... “The combination of lower PV demand and higher PV supply has caused a rapid decline in PV price,” write Glenn Harris and David Devir for SunCentric, a solar consulting firm...

Increased silicon supply – the key ingredient in solar panels – along with PV manufacturing capacity has led to an abundance of PV modules and reduced profit margins. SunCentric estimates solar panels that would have generated as much as 500 megawatts are now in storage around the world...

The increased supply is largely a function of two dynamics: Spain is reducing its rewards for solar panel installations as a result of that country’s enduring economic problems. And, the Chinese government is heavily subsidizing domestically produced solar materials so that the nation can build global market share as well as grow its own internal solar base to 20,000 megawatts by 2020.

The cost of Chinese-produced silicon-based solar panels is about \$2 a watt compared to \$2.40 in other places, all of which is down from about \$4.50 a watt from a year ago... there’s no doubt that the Obama administration intends to jump start the industry here: it has not only made it more difficult for foreign solar material makers who do not participate in global fair trade practices to do business here but it is also giving out tax breaks and stimulus funds...

Consulting firm SunCentric says that when the collective subsidies are tallied up homeowners can then pay the full cost of installation off in 16 years. That’s down from 22 years... And the downward price spiral is not over yet. Barclays Capital is reported to say that solar panel cost could fall to \$1.40 a watt in 2010 and to \$1 a watt in 2011... But most businesses and homeowners remain dizzied by the long recession... At the same time, the tougher [cost competition has] the potential to restrict already tight financing. That phenomenon has not just produced excess solar panel supplies but has also led to project cancellations totaling \$450 million in New Jersey alone, says Pike Research...

Drastically cheap solar panel prices can cut both ways. In the short run, that will serve to cut into already thin margins. But the industry is banking on a long-lasting recovery that will enable it to burn off inventories and eventually grow market share.

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### **The New York Times, September 11, 2009, "German Geothermal Project Induces Second Thoughts After the Earth Rumbles"**

"LANDAU IN DER PFALZ, Germany - Government officials here are reviewing the safety of a geothermal energy project that scientists say set off an earthquake in mid-August... The geothermal plant, build by Geox, a German energy company, extracts heat by drilling deep into the earth. Advocates of the method say that it could greatly reduce the world's dependence on fossil fuels by providing a vast supply of renewable energy... The Landau plant, which cost \$30 million, went into operation in 2007 and produces electricity for 6,000 homes by drawing heat from beneath the bedrock, nearly two miles beneath the earth's surface. Geox said a coal-burning plant producing the same electricity would emit 30,000 tons of carbon dioxide annually.

But in recent months, two similar projects have stirred concerns about their safety and their propensity to cause earthquakes. In the United States, the [US] Energy Department is scrutinizing a project in Northern California run by AltaRock Energy to determine if it is safe. (The project was shut down by the company last month because of crippling technical problems.) Another project, in Basel, Switzerland, was shut down after it generated earthquakes in 2006 and 2007 and is awaiting the decision of a panel of experts about whether it can resume."

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**Marketwatch.com, September 4, 2009, "Rare earths are vital, and China owns them all"**

"We are addicted to rare earths as much as we are addicted to oil," said Byron King, editor of Energy & Scarcity Investors, published by Agora Financial LLC. Yet "none of these elements are famous like gold or silver. None gets shipped in giant ore freighters like iron aluminum, or copper." But, "without these elements, much of the modern economy will just plain shut down," he said.

"China is the Saudi Arabia of rare elements," said Mark Williams, a risk management expert and finance professor at Boston University. And, "like oil, rare elements will flow to the highest bidder." China accounts for 97% of global rare-earth production --- 139,000 metric tons of material in 2008 --- and it consumes about 60% of the world's rare earths, according to Sean Brodrick, a natural-resources analyst at UncommonWisdomDaily.com... Indeed, rare earths are also critical in the cutting-edge technologies promised to create a new green economy and save the planet from climate-change apocalypse."

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**The New York Times, September 2, 2009, "U.N. Says Poor Nations Need \$600 Billion for New Energy"**

"It will cost between \$500 billion and \$600 billion every year for the next 10 years to allow developing nations to grow using renewable energy instead of relying on dirty fuels that worsen global warming, according to a United Nations report released Tuesday.

Numbers bandied about previously were in the \$100 billion range... The figure starting at \$500 billion [per year] is the cost of building the infrastructure needed in the developing world... That sum represents roughly 1% of the annual global economic output... Only about \$21 billion has been [thus far] committed to combating climate change...

One way to generate the money might be through a 'global tax' on carbon emissions of about \$50 per ton, the report said, which would raise about \$500 billion."

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### **The New York Times, July 8, 2009, "Pickens Scales Back Ambitious Wind Farm"**

"In a sign of the difficulties facing the development of wind energy, the legendary Texas oilman T. Boone Pickens is suspending plans to build the world's largest wind farm. He said that he was unsure whether he would ever revive the giant wind project in the Texas Panhandle... Mr. Pickens cited several factors that caused him to alter his plans, including lack of transmission lines and a fall-off in the price of natural gas, with which wind competes as a power source. Mr. Pickens' struggles are symptomatic of a broader reversal of fortune for wind developers. This year, Emerging Energy Research, a consulting firm, expects a drop of nearly 25% in the amount of new wind power installed compared with last year."

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### **The Deal, Spring, 2009, "Alternative Equity"**

"First, the need for sustainable energy infrastructure is massive and global. In the emerging economies that are likely to grow dramatically over the next two decades, infrastructure is embryonic. In much of the developed world, infrastructure is decaying.

Second, solutions that have worked in the past are insufficient to address the massive energy infrastructure needs of the future. Credit dislocation, among other factors, is encumbering traditional capital structures... Further, governments are looking to privatize solutions to their energy problems..."

Third, private equity is emerging as one of the most efficient means for addressing the massive demand [for capital] and for providing more workable solutions... Because PE-backed enterprises are relatively free of the pressure of shifting politics or quarterly earnings, they can establish and operate within the rational time horizons that the scope and nature of these investments require.

Fourth, the return expectations for PE have come down, as has the perceived risk of infrastructure relative to other opportunities.

However, two caveats are in order, one regarding strategy and one regarding talent. Although the needs for renewable energy are geographically pervasive, their regulatory and environmental texture is highly local, making universal solutions hard to come by... PE firms, fundamentally, will have to get comfortable gauging regulatory risk...

Moreover, success will in part depend upon the ability of private equity firms to find managers and operating partners who possess the requisite skills and mindset demanded by this rapidly evolving and demanding sector... Above all, they will emphatically reject the notion that an inherent conflict exists between being green and being profitable."

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### **BusinessWeek, April 27, 2009, "The Biofuel Bubble"**

"[The] difficulties don't mean advanced biofuels aren't coming, or that they won't play a crucial role in fighting climate change. But everything will happen more slowly than venture capitalists say. And the probable winners will be those with deep pockets and patience, such as Royal Dutch Shell, BP, DuPont, agriculture giant Archer Daniels Midland, or the rare startup with revenues from another business, such as making drugs. For the rest, the demonstration biorefineries now being built are more like high-stakes auditions than a step in the process of becoming commercial biofuels producers.

The business model that makes sense for most of us is demonstrating the technology and getting it into the hands of those who have balance sheets," says Bill Roe, CEO of biofuel producer Coskata in Warrenville, Illinois.

As startups stumble, big companies should be able to snap up technologies on the cheap, when and where they need them. More important, the laws of supply and demand mean that replacing a significant amount of gasoline with biofuels would cause the price of gas to plunge, making biofuels less competitive. The 5% drop in gasoline use in the second half of 2008 (compared with the previous year) helped push down the average price at the pump from \$4.14 per gallon to \$1.74.

The world could be awash in cheap oil and gas. It has happened before. In the early 1980s, higher-mileage cars and an economic downturn sent petroleum prices swooning, killing off many renewable-energy efforts, including those supported by Big Oil.

"The major thing holding us back is the lack of a price on carbon," says Jim McMillan, a biofuels expert at the National Renewable Energy Laboratory (NREL) in Golden, Colorado."

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### **The Deal, April 2009, "The Alternative Lifestyle"**

"It seems like almost every utility and power producer in America is jumping on the renewable energy bandwagon. NRG Energy Inc. said in February it was investing \$10 million in closely held eSolar Inc., which designs modular power plants using solar-tower technology. NRG has the rights to build three plants with eSolar technology in the southwestern U.S., including a 240-megawatt development for Edison International's Southern California Edison unit...

PacifiCorp, controlled by MidAmerican Energy Holdings Co., a unit of Warren Buffet's Berkshire Hathaway Inc., is also expanding into renewable energy. Last September it began

generating electricity from the 100-megawatt Leaning Juniper 1 wind project it bought from PPM Energy in 2006...

NV Energy Inc., parent of Nevada Power Co., recently signed a joint venture with Solar Millennium LLC to develop solar power plants in southern Nevada...

So is all this investing in renewable energy on the part of utilities and power producers the best of good intentions? Or is it just window dressing in an age of energy conservation? Maybe a little of both.

U.S. utilities and power producers are investing in renewable energy companies to create tax shelters to help offset profits as well as boost the renewable component of their portfolios to hopefully mask the dirtier parts, such as coal plants. Some of them are also being mandated to do so by the states they live in, most notably California, whose utilities are up against a tough deadline to obtain 20% of their power from renewable sources by 2010.

The Obama administration has made no bones about introducing environmental legislation on carbon dioxide, which will hit the U.S. electric utility sector with material risks and could lead to 15% to 30% higher power prices if Congress passes it, said a March report by Moody's Investors Service...

Last year, Congress loosened the eligibility requirements at which companies could qualify for a 30% investment tax credit. The \$780 billion stimulus package offers even more goodies, with \$94.1 billion worth of programs targeting renewable energy over 10 years. They include a 30% manufacturing tax credit for companies building renewable energy production facilities in the U.S., \$8 billion in loan guarantees for the renewable energy projects, \$4.5 billion in grants for smart-grid electric transmission systems and \$2 billion for carbon-capture and storage technology.

[To build the projects], contracts seem to be the way some of the larger utilities are going...Through power purchase agreements for three wind farms in Pennsylvania and one in West Virginia, Exelon has become the largest provider of wind power east of the Mississippi River... Entergy Corp., a New Orleans utility and big nuclear power producer... has acquired 50% stakes in two 80-megawatt wind farms in Texas and Iowa.

[Ed. Note. Arizona Public Service, which serves over 1.2 million customers in Phoenix and throughout Arizona, has signed two contracts for solar thermal generation, one, the Solana Project has cleared its siting hurdles but Abengoa Solar, the developer, is still working on financing and Rule 1603 loan guarantees. The other is the Starwood project, which was to be developed by Lockheed Martin. Lockheed Martin has since pulled out of the deal. Both plants are planned to be in the 290-megawatt range.]

There are plenty of critics of utilities and power producers incorporating renewable energy into their portfolios. Karl Miller, a former power plant executive and now a consultant in New York, is among them. He says the worst offenders are Sempra Energy, PG&E Corp. and

Southern California Edison, which he claims are window dressing... as an excuse to jam through major transmission pork projects...

"Utilities are signing checks they can't cash," [according to Miller], "which means that utilities are signing contracts with every Tom, Dick and Harry developer for wind, solar and biomass projects to meet their renewable standards mandates. The problem is almost all of the 'contracts' are for projects that are not constructed, have no firm transmission or have other major flaws and challenges...I truly believe it is going to be the next boom and bust industry in the U.S. economy."

[Miller adds that] "renewable technology and infrastructure support are simply not there yet and will take many years and hundreds of billions of dollars in venture capital to advance. Government handouts won't work - never have and never will, in any industry. There will be a period where it will enjoy a bubble, and then there will be a fallback. Then we'll see who is smart."

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### **EnergyBiz Insider, March 23, 2009**

"A federal mandate requiring utilities to acquire increasing amounts of renewable energy could be enacted as soon as this year... in recent years both houses of Congress have passed their own versions - but never at the same time or ever in any final energy bill.

Some type of [renewable energy] mandate is the law in at least 28 states, so there's widespread support... [Obama's] New Energy for America Plan [includes] a call for 10% of the country's electricity to be derived from renewable sources by 2012, and 25% by 2025. The Edison Electric Institute has long opposed a national standard... [stating that] a national standard won't take account of the different states and regions, where there may not be abundant renewable resources."

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### **EnergyBiz Insider, March 4, 2009**

"Reliability drives much of the discussion when utility planners and renewable energy advocates meet to devise a coherent strategy for integrating ever-larger amounts of wind, solar and other energy sources into the transmission grid... Many renewable energy projects, particularly wind and solar, require large amounts of land.

The challenges are moving power from a massive multi-megawatt farm in the nation's midsection to population centers maybe 1,000 miles away. Solutions are also needed to solve the challenge of integrating a few kilowatts... from a single homeowner's rooftop solar array to [a] distribution network measured in a few square blocks or miles.

The cost of adjusting power system operations to accommodate wind energy is typically low. Most studies have found that these costs are under \$5 per megawatt-hour, or about 10% of the typical wholesale price of wind energy, according to the American Wind Energy

Association.

Solar generation is largely confined to house rooftops with a few exceptions. As this source moves toward larger power plants, it will face many of the same obstacles as wind. One issue in the west is that large-scale megawatt projects require vast amounts of land that most likely [be] under the jurisdiction of the federal Bureau of Land Management and [will thus] have lengthy and difficult site hearings and siting requirements.”

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### **The New York Times, November 10, 2008, “Report says Sun and Wind Power could Threaten Grid”**

“The North American Electric Reliability Corporation says... that unless appropriate measures are taken to improve transmission of electricity, rules reducing carbon dioxide emissions by utilities could impair the reliability of the power grid... such carbon reduction rules are already in place in 27 states and four Canadian provinces and... they may force changes in the utility industry the group said, including the shutting down of coal plants that are located near load centers, and substituting power from wind turbines or solar plants in remote areas.

Renewable energy can form a larger portion of electricity supplies [the group said], but not without investments in transmission... [and] greater use of demand-side resources”.

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### **EnergyBiz Magazine, July/August 2008, “Renewables are Doable”**

“How much wind power can we harness? It is feasible that 20% of America’s electricity could come from wind by 2030. 20% in a little more than 20 years is an ambitious goal... Wind power today generates about 1% of our electricity today... The good news is that the industry is on a growth spree. Our wind power capacity has experienced a 30% annual growth rate over the past five years.

[I]n ‘20% Wind Energy by 2030’, a new US Department of Energy Report... the [20%] scenario would save 7.6 billion cumulative gigatons of CO2 and reduce CO2 emissions by 825 million metric tons annually thereafter. The scenario reduces water use and its associated costs by 8% compared with conventional power.... Despite a substantial up-front investment, the scenario would only cost 2% more than expanding the nation’s power supply without wind power. The average ratepayer would pay an additional 50 cents per month.”