



# ENERGY PROSPECTS

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1] DG Illuminates the Dereg Darkness

In a matter of minutes, 21 power plants generating about 61,800 MW of electricity suddenly lost power throughout much of the Northeastern United States and the Canadian province of Ontario—an area serving some 50 million people. But the lights were not out everywhere on Aug. 14, 2003.

Clean, energy-efficient distributed generators were the brightest spots in the darkness: a 200-kW UTC fuel cell fed uninterrupted energy to a New York City police station; a Frito-Lay facility in Queens and a Harbec Plastics plant in Rochester generated power with Capstone microturbines; Stuart Energy Systems used its Hydrogen Energy Station to support its critical systems in Toronto; and Fuel Cell Technologies used its 5-kW fuel cell to power its research facility in Kingston, Ontario.

Stocks in listed companies surged mightily in the days that followed, as did projections of business growth for all companies providing distributed power solutions with renewable energy and energy-efficient technologies.

But while the crisis turned into a business opportunity for companies developing DG, John Paul, CEO of RealEnergy, provider of 21 distributed power systems in California since the 2001 blackouts and with another 21 plants now under construction in California and the Northeast, says his company is not glad it happened.

"But we sure hope that next time around we can be part of the solution," Paul told *Prospects*. A lot of the discussion, he noted, has been about fixing and upgrading the whole transmission and distribution system. While this is important, he said, it's a very long-term and expensive fix. On the other hand, installing DG is something that can be done immediately with existing technology on a building-by-building basis.

"It is important that people understand—government, building owners and consumers—that there is a real option accessible in the short term to protect against this kind of fairly inevitable overloading of the grid happening in the future," he said.

Not economical, you say? New York City's economy shed \$1 billion during the blackout, estimate city officials. In spite of substantial environmental benefits in terms of toxic emissions reductions, RealEnergy, like all companies providing DG, presents its systems primarily as an economic opportunity. And the Woodland Hills, Calif.-based company offers more revenue opportunities for building owners than most.

Shouldering the initial capital cost and risk, the company will go into a building, install a combined-heat-and-power system, operate it for at least a 15-year period at no cost to the building owner, and as a tenant provide a monthly check to the building owner as a percentage of the revenue RealEnergy generates by selling power to the building owner's other tenants. How's that for service!

"We're reminding people that at no cost they get both a revenue and profit for their building, and a blackout-

tolerant system," said Paul, adding that the outage is a clear stimulator for customers to assess the benefits of distributed generation and appreciate the advantages of having locally controlled generating capability to handle a majority of power needs. The company's sales office in New York City is experiencing strong interest from commercial real estate, hospitals and hotels.

According to industrial DG developer and CHP pioneer Tom Casten, the United States could increase its share of distributed energy in the mix to about 40 percent by building only DG until the year 2020. In his paper *Optimizing Future Heat and Power Generation*, Casten and colleague Martin Collins note that Denmark, the Netherlands, and Finland already produce more than 40 percent of their current generation from decentralized plants, proving that industrial economies can operate with high percentages of DG.

But if distributed generation wants to succeed on a grand scale, the energy community needs to think of new ways to build infrastructure, say energy experts. Nationally, only about 8 percent of power is generated at decentralized plants, and there is a vast disparity between states. Only five states produce more than 20 percent of net power needs with distributed generation and as many as 12 states are under 1 percent.

Northern Power Systems' MicroGrid power network is one such solution. The Vermont-based company on Aug. 18 announced it is preparing to build the next-generation power

network in an area known as Mad River Park. The company will demonstrate "the capability and benefits of clustering tightly integrated, small-scale generation, storage, and distribution technologies including engines, microturbines, wind turbines and photovoltaic panels," according to a press release.

Infrastructure enablers such as the Pacific Northwest National Laboratory's "Gridwise" and Bonneville Power Administration's "Smart Grid" are also under development. And alliances such as the Consortium for Electric Infrastructure to Support a Digital Economy are bringing together a broad range of interests to modernize the grid for the 21st century.

But grid upgrades to promote continued reliance on less efficient systems look to play prominently into any solution hammered out on Capitol Hill, in spite of the fact that centralized power generation is inherently less efficient and less bulletproof to disruption than distributed cogeneration.

Ironically, government deregulation of the industry is implicated heavily as the indirect cause for the blackout, as well as the direct cause for today's power disconnect in which utility grid expenditures wallow at 40-year lows even as the age of the transmission system reaches the half-century mark and beyond [see **Eastern Blackout as Turning Point, @11**].

"Deregulation laws said Adam Smith was responsible," explained California Power Authority Chairman S. David Freeman during a National Public Radio interview

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on Aug. 15. "The market would rule, they said ... but the market incentives for transmission just have not been there. And now we have an interconnected grid power flowing over a huge area. It worked pretty well when the utilities owning transmission knew it was their job to beef up the system. Deregulation has muddied the waters of responsibilities. It's more fun to manipulate power supply and make huge profits in selling power than in making solid investments in transmission ..."

Freeman said that while "we are kind of stuck with this centralized system," there needs to be greater focus on decentralized energy. "It will take a combination of transmission upgrades and decentralized energy."

It is not a secret that many of today's utilities hope to keep distributed generation in check. "On-site generation by others penalizes monopoly electric companies," say Casten and Collins. "And typical state utility regulations offer no reward to the utilities to build more efficient plants. If DG were built, monopoly logic would evaporate, speeding the transition to open competition. This threatens many utility executives."

At Energy NewsData's energy technology showcase last year, Bonneville Environmental Foundation Executive Director Angus Duncan put it this way: "Distributed generation is the John Dillenger model of energy. Dillenger robbed banks because that's where the money is. You build generation closer to load because that is where the customer is." **[Ben Gilbert and Garrett Hering]**

**2] Sit on a Wall, Have a Great Fall**

While the debate on how to prevent another major power outage like the one of Aug. 14 rages on—massive transmission and distribution upgrades, more distributed generation or refined market practices—makers of advanced grid software are arguing that the existing grid could be used more efficiently, and upgrades more effectively targeted, if operators had better tools to see how it behaves. And while these tools have been proven and available, many utilities have until now perceived them to be superfluous.

Kentucky-based Genscape runs a real-time tracking system that measures power flows throughout the U.S. grid. Unlike utility-owned systems that monitor conditions on an individual utility's grid, Genscape has a map that displays data updated each minute from 1,300 monitors at power stations and major interconnections across the country. Subscribers to the service see what is happening across various grids and receive alerts when conditions at any of the monitoring points become critical. This bird's-eye view shows where problems started and where they continued to multiply. In the Aug. 14 outage, for example, rather than cascading in a defined path from one region to

**Makers of advanced grid software are arguing that the existing grid could be used more efficiently.**

another, failures "hopscothed" between different points throughout the region, seemingly at random.

According to CEO Sean O'Leary, someone with a sophisticated grid simulation package could take Genscape and utility data and "come up with something that would be a nice indicator of line loading and potential stress on the system. Before last Thursday there was an interest in that, but it wasn't viewed as a necessity. Now it may be."

Two California-based companies have such capabilities and are thirsty for a chance at cracking the outage quandary.

Optimal Technologies' nonlinear system-optimization software AEMPFAST takes grid-behavior data and displays exactly where the grid needs to be supported, where load needs to be reduced or generation increased. According to CEO Roland Schoettle, "Most of this collapse you will see will be very dependent on how the reactive flow was managed—that's very difficult to do with current tools."

In 2001, Optimal worked with the California Energy Commission, Lawrence Berkeley National Lab and the California Independent System Operator to analyze an unscheduled June 14, 2000 blackout in San Francisco. AEMPFAST found 412 re-controllable buses that could have been re-controlled that morning to prevent the outage and would have allowed an extra 130 MW of capacity on the system. Optimal is currently working on another CEC project to pinpoint prime locations for DG grid support in the Silicon Valley Power grid [see **Software Shows Optimal DG Sites**, November 15, 2002]. Early results are showing that adding distributed generation to strategic points on the distribution grid can in fact relieve stress on the transmission system.

AGORA, another grid-modeling software offered by San Francisco, Calif.-based EleQuant, was adopted by Pacific Gas & Electric after the energy crisis two years ago. The system uses advanced mathematics to solve load-flow equations even when the system is close to collapse. The same tool can also calculate the optimum path for restoring power after planned or unplanned outages. If the constraints on a system are extreme, it can determine the optimum way to shed load. It could also be used to help de-bug the planning model that helped lead to the outage, according to Eric Freeman, EleQuant vice president and general manager. "Utility restoration plans sit in white three-ring binders above operators' desks—this is not useful for dynamic situations. They must be generated according to the latest conditions of the network in real-time," he said.

A branch of the Spanish company Grupo AIA, EleQuant began marketing AGORA in North America last fall [see **EleQuant's AGORA Software Improves Grid Reliability**, November 1, 2002]. When asked about response from utilities previous to the blackout, Freeman said, "Since PG&E has had it, they use it. Others are evaluating it currently, and other utilities don't believe they need this sort of technology yet."

The incentives to use better and more efficient tools, rather than more capital investments, are simply not built into rate structures for utility compensation, Peter Evans of New Power Technologies, the main contractor using Optimal's AEMPFAST in the Silicon Valley Power project,



to *Prospects*. Evans favors a system that would use something called all-source bidding—bidders could offer a variety of solutions to a given problem, from demand response to new software to new transmission, and utilities would be compensated for picking the best fit.

Could these software programs, if in place before the outage, have prevented it? The answers differ, but then so do the objectives of these advanced tools.

According to O'Leary of Genscape, the answer is no, but anyone with a subscription—including homeland security offices, regulators and neighboring utilities—would have been better poised to plan and react during and afterwards with a live map of the status of a region's resources.

Schoettle of Optimal Technologies said his system, if applied properly, "absolutely would have" prevented the outage. The outage will probably be falsely attributed to operator error, and "they don't know where the edge is," he said. "The operators are working with tools that don't give them that degree of visibility. If you're sitting in front of a tool that tells you you're a long way from the edge and you keep pushing it until it goes over the edge, whose fault is that?"

EleQuant's Freeman answered with a pragmatic "too early to tell"; until the causes are known it won't be clear whether operators could have had enough time to react to better information. But, he added, "We're confident we can identify areas of weakness within the transmission network ... more accurately than any other industry tool." [B.G.]

**More information:**

[EleQuant](http://www.elequant.com) (www.elequant.com)

[Optimal Technologies](http://www.otii.com) (www.otii.com)

[Genscape](http://www.genscape.com) (www.genscape.com)

**3] Hocus-Pocus on the H<sub>2</sub> Highway**

Hydrogen: the most mysterious of elements. And, indeed, some elements of the technical discourse regarding its use are beyond even scientific explanation. Take the hocus-pocus surrounding the paper *The Future of the Hydrogen Economy: Bright or Bleak?* by Swiss scientists Baldur Eliasson and Ulf Bossel, first presented at the European Fuel Cell Forum in July 2002 and updated this past April.

In response to a recent rebuttal from Ulrich Schmidtchen of the German Hydrogen Association—in which Schmidtchen blasts Bossel for spreading half-truths and trivialities about hydrogen in mounting his case against its use as a transportation fuel, and also points to systematic criticism of the paper's conclusions by physicist and entrepreneur Amory Lovins and German business strategy and technology consultancy L-B-Systemtechnik (LBST)—Bossel claims that the Rocky Mountain Institute co-founder and the three LBST scientists based their critiques "on something that does not actually exist."

Countering Lovins and LBST in the German-language hydrogen and fuel cell news source *Brennstoffzellen Newsletter* on Aug. 11, Bossel argues that Myth No. 4 in Lovins' *Twenty Hydrogen Myths* and LBST's *Comments on*

*the Paper by Baldur Eliasson and Ulf Bossel 'The Future of the Hydrogen Economy: Bright or Bleak?'* refer only "to the unpublished 17-page proposal of our work, which we gave to a few people as a confidential document in early January 2003." And because the "incomplete, preliminary and yet uncorrected version ... was never publicly accessible," neither Lovins nor LBST could cite any sources, says Bossel. "It would serve the reputations of the critics to remove both studies from the Internet as quickly as possible," he admonished.

But both do cite sources. Lovins and the three authors of the LBST commentary clearly cite the July 2002 conference-

**"LBST and I have both explained why Eliasson and Bossel's broad argument against direct hydrogen and in favor of methanol is incorrect and misleading."**

proceedings paper presented at the Fuel Cell World symposium in Lucerne as their subject of critique. And not only was the paper widely posted, says Lovins, "it bears no indication of being either a draft or confidential," adding, "Nor does Eliasson and Bossel's January 8,

2003 paper *Energy and the Hydrogen Economy*, which is not the paper I cited or criticized." But if it had been, Lovins' critique would not have changed.

"If Bossel is saying that the 2002 paper we have cited does not actually exist, that would be helpful to understand—was it not a paper presented at a public technical conference, as its citation implies?"

Mysterious rough draft aside, the final version, says Lovins, has only insubstantial differences with the 2002 version he criticized. "It did correct a major error spotted by LBST in a small term," he notes, but it was one of many details he had not bothered to criticize, preferring to focus explicitly on the major structural flaws in Eliasson and Bossel's argument.

"LBST and I have both explained why Eliasson and Bossel's broad argument against direct hydrogen and in favor of methanol is incorrect and misleading, and has caused much unnecessary public confusion," says Lovins, who agrees that the Swiss researchers' presentation of the energy intensity of certain hydrogen distribution options in a uniform manner was a useful contribution. "However," he continues, "I felt they had selected unrealistic options—those that, by industry consensus, are not likely ever to enjoy more than minor niche markets—and had omitted the most important and attractive options based on erroneous reasoning. This in turn led to completely invalid general conclusions."

Further in his response to Schmidtchen's rebuttal, Bossel commends LBST for supplementing its lengthy reply with a short appendix that does respond to his final version, where "at least a part of the critique is retracted."

But the LBST team offers no retraction of the original critique, partial or otherwise, says Lovins, adding that the revisions did not affect his critique at all, and calling Bossel's remarks inexplicable.



After a number of correspondences with Bossel in mid-July, Lovins does plan to slightly revise the sentence in Myth 4 that states, "This argument serves the business interests of its publisher, the Methanol Institute, which promotes methanol over hydrogen, but it does not present a balanced view of how the hydrogen industry is actually evolving." Bossel assured Lovins that he has never had business relations with the Methanol Institute.

Naturally, Lovins has no intention to remove *Twenty Hydrogen Myths* from the Rocky Mountain Institute website: "I published a valid critique of a published paper and gave three URLs for it, at least one of which Bossel acknowledged was posted with his authorization. So far neither he nor anyone else has made me aware of any error in my critique."

Still, Bossel defends his paper, calling it "a contribution to [the] open formation of opinion among experts." But perhaps because of the recent furor over his conclusions, Bossel says there is "no need for shepherd-like supervision from alliances, associations or organizations."

If this is a reference to either RMI or LBST, Lovins is not alone in calling it a spurious and distasteful way to describe normal and necessary contributions to technical discourse. But perhaps the comment was reserved solely for the German Hydrogen Association, which has sparred more polemically with Bossel.

"Eliasson and Bossel are free to publish whatever they wish," concludes Lovins. "Others are free to comment on it. 'Open formation of opinion among experts' requires the public exposure of error, and that is what we did," [see **Hydrogen Sparring in U.S., Europe**, August 8, 2003]. *[G.H.]*

**More information:**

- [Eliasson and Bossel's final version](http://www.efcf.com/reports/hydrogen_economy.pdf)  
(www.efcf.com/reports/hydrogen\_economy.pdf)
- [Lovins: Twenty Hydrogen Myths](http://www.rmi.org/sitepages/pid171.php#20H2Myths)  
(www.rmi.org/sitepages/pid171.php#20H2Myths)
- [LBST Commentary on Eliasson and Bossel paper](http://www.hyweb.de/News/LBST_Comments-on-Eliasson-Bossel-Papers_July2003_protected.pdf)  
(www.hyweb.de/News/LBST\_Comments-on-Eliasson-Bossel-Papers\_July2003\_protected.pdf)
- [English translation of Bossel's comments in Brennstoffzellen Newsletter](http://www.brennstoffzellen.de/News/English_translation_of_Bossel's_comments_in_Brennstoffzellen_Newsletter)  
(www.newsdata.com/ep/BosselTransEP22.html)

**4] Avenues Opening for LNG to Calif.**

Two more potential liquefied natural gas import terminal projects in Mexico's Baja California are now poised for development. Sempra Energy and Royal Dutch/Shell Group cleared major regulatory hurdles this week when they received storage and regasification permits from the Comision Reguladora de Energia (CRE), the Mexican counterpart to Federal Energy Regulatory Commission approval in the United States. Marathon Oil became the first terminal developer to win a CRE permit for its Baja project in April.

Becoming the first potential terminal developer in Baja to receive three major permits, Sempra received a land-use permit from the Municipality of Ensenada as

well, to add to an environmental permit it received in April. That leaves only a marine permit left before Sempra can begin construction of the \$600-million, 1-billion-cubic-foot-per-day facility, which it expects to do next year. Shell also received an environmental permit in April for its 1 Bcf/d terminal, which would be located about a mile from the Sempra facility.

Sempra and Shell also made progress with regulators on their proposed Gulf of Mexico receiving terminals. Sempra's proposed Cameron LNG terminal near Hackberry, La., became the first new LNG terminal project in 20 years to receive a final environmental impact statement from FERC, the last puzzle piece needed before the commission can decide whether to approve the plant. Sempra expects to begin construction early next year with completion by 2007, Sempra spokesman Art Larson said. Shell also received a CRE permit for a 500 MMcfd LNG plant in Mexico near Altamira, but must win a tender from the Federal Electricity Commission in order to build it, Reuters reported.

"These approvals will allow us to move forward to conclude our LNG supply arrangements for both facilities," said Donald Felsing, group president of Sempra Energy Global Enterprises, in a press release. Larson declined to discuss any supplier negotiations or pricing details, however. But Harold Heinze, the executive director of the newly formed Alaska Natural Gas Development Authority, was scheduled to meet with Sempra this week. The authority was approved by Alaska voters last fall to market the state's gas resources, and the board was appointed by Gov. Frank Murkowski in June.

Natural gas reserves in Alaska have foundered for decades for want of a market as Asian customers have been content to buy from suppliers in the Far East, and oil and gas majors controlling the Alaska gas, such as ExxonMobil and ConocoPhillips, have preferred to re-inject the gas into oil wells to keep them productive. Meanwhile,

those companies have recently been discussing deals to produce and market LNG from the Middle Eastern country of Qatar and other foreign sources. Murkowski spokesman John Manly told *Prospects* that the majors have been willing to sell the Alaska gas if someone comes to them with buyers, which is what

the development authority seeks to do. An overland pipeline through Canada to the Midwest is still the preferred option, he said, but many stakeholders believe the projects are not mutually exclusive, while an LNG project would bring the gas to market sooner.

While Marathon and Shell already have supply sources for their terminals, Heinze was also scheduled to meet with Mitsubishi, which has applied to FERC to build a terminal in Long Beach, Calif. Deals with California and Baja terminal owners may not be enough to leverage a pipeline and liquefaction project in Alaska, however, and Heinze may

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still need Asian buyers. Indonesian representatives are also planning a trip to meet with Sempra in hopes of signing a memorandum of understanding for LNG supply, according to Reuters and Dow Jones news services in Jakarta.

Australia's BHP Billiton is also making a play to help meet growth in California gas demand. The company announced on Aug. 14 its intentions to file applications with the U.S. Coast Guard/Maritime Administration and the California State Lands Commission for an offshore LNG regasification terminal 20 miles from Oxnard off the Ventura County coast. Dubbed Cabrillo Port, the terminal would be a floating storage and regasification unit that would send the gas through a heat exchanger and into undersea pipelines connecting with the local utility. **[B.G.]**

**More information:**

[Sempra's announcement](http://public.sempra.com/newsreleases/viewPR.cfm?PR_ID=1573&Co_Short_Nm=SE)

([http://public.sempra.com/newsreleases/viewPR.cfm?PR\\_ID=1573&Co\\_Short\\_Nm=SE](http://public.sempra.com/newsreleases/viewPR.cfm?PR_ID=1573&Co_Short_Nm=SE))

[Shell](http://www.shell.com) (www.shell.com)

[Alaska Natural Gas Development Authority background](http://www.state.ak.us/local/03060902.htm) (www.state.ak.us/local/03060902.htm)

[Sen. Lisa Murkowski statement on LNG and overland pipeline projects](http://murkowski.senate.gov/Press%20Releases/6-10-2.html)

(<http://murkowski.senate.gov/Press%20Releases/6-10-2.html>)

[BHP Billiton](http://www.bhpbilliton.com) (www.bhpbilliton.com)

**5] Wisconsin Wind Plan Is Coal-Fired**

When We Energies of Wisconsin announced in late July that it had signed 20-year power-purchase agreements for the entire electricity output of three proposed wind farms, the move was viewed widely as a major advancement for wind power in the state. The wind farms, slated for development within the next two years, will more than quintuple Wisconsin's wind generation from 53 MW to 267 MW, and are expected to provide the state with the largest wind power generation capacity east of the Mississippi.

We Energies' decision to purchase the 214 MW of wind power, one that will also help the utility meet a state renewable portfolio standard of 2.2 percent and a self-imposed RPS of 5 percent, earned the company high praise from environmental organizations. RENEW Wisconsin on the day of the announcement said that with the decision, "We Energies is demonstrating that the future of electricity belongs to homegrown renewable energy sources."

But We Energies' decision to pursue the development of three new coal-fired facilities near its existing Oak Creek power plant may point to a different trend: that wind, while steadily becoming a more viable option for many utilities, will remain for some time a supplement to baseload generation, serving mostly to achieve what some critics contend are conservative renewable standards.

Following a Final Environmental Impact Statement released Aug. 1 by the Wisconsin Public Service Commission and the Department of Natural Resources, which laid out possible alternatives to major Oak Creek expansion, We Energies released its own statement. The

new coal facilities, part of its "Power the Future" plan, are a necessary means toward achieving "the state's growing electricity needs," We Energies stated.

And although one option suggested in the FEIS would be for We Energies to purchase power from Calpine's proposed natural gas-fired plant, build only one new coal facility and further expand its wind generation capacity, Jeff Anthony, manager of alternative energy programs for We Energies, told *Prospects* that "coal plants make sure we have the most cost-effective, around-the-clock source of energy."

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**Wind, while steadily becoming a more viable option for many utilities, will remain for some time a supplement to baseload generation.**

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The decision to pursue and stick with coal as a baseload generator could speak as much for the future

of wind in the state. At present, according to Anthony, We Energies has no definite plans to release another request for proposals to expand its wind generation. Several factors, he said, stand in the way.

"Right now when we look at the data," said Anthony, "wind is becoming cost competitive." Citing growth in new wind development coupled with the emergence of technology giants such as General Electric, the price of wind generation will only continue to decrease, he predicted. "But," he cautioned, "with wind [generation] currently only at 27 MW in Wisconsin, we have a long way to go" before reaching a needed level of 6,000 MW. "We're excited about wind," he volunteered, "and adding 214 MW [of new generation] is a significant step, but we need to first gain experience. We don't see wind replacing baseload generation anytime in the next decade."

Transmission constraints also represent major hurdles, and pending studies, according to Anthony, could still determine when the three new wind farms get built. Adding that We Energies was unable to seal deals in the past due to an inability to import wind power from nearby states, transmission, or lack thereof could exist as "the limiting factor" impeding further wind development not only in Wisconsin, but throughout the Midwest, said Anthony.

The dilemma, though, has prompted a number of suggested solutions. The "High Wind Scenario," as proposed by the American Wind Energy Association and Wind on the Wires, a McKnight/Energy Foundation program designed to bring Midwest wind energy to market, is one such proposal. Provided through the Midwest Independent System Operator's 2003 Transmission Expansion Plan [see **Transmission Plan Takes New Tack**, July 11, 2003], the scenario demonstrates how, with modifications and expansions to current transmission infrastructure, 10,000 MW of new wind power could be economically transmitted through the Midwest. The technically feasible scenario, according to Jim Caldwell, policy director for AWEA, has essentially shifted the terms of the wind transmission debate. "It's not a demonstration for 20-30 years down the road," he said. "It's something to be reckoned with today."

**[Joel Puglisi]**



**More information:**

- [We Energies](http://www.we-energies.com) (www.we-energies.com)
- [RENEW Wisconsin](http://www.renewwisconsin.org) (www.renewwisconsin.org)
- [Final Environmental Impact Statement](http://psc.wi.gov/electric/cases/ptfElmRd/ind-ptfElm.htm) (http://psc.wi.gov/electric/cases/ptfElmRd/ind-ptfElm.htm)
- [American Wind Energy Association](http://www.awea.org) (www.awea.org)
- [Wind on the Wires](http://www.windonthewires.org) (www.windonthewires.org)

**6] Wind Drills, Oil Cheers Ottawa Plan**

Canada's federal government on Aug. 12 announced its "Climate Change Plan for Canada," in which Ottawa will spend C\$1 billion (US\$710 million) on energy efficiency for homes and businesses, production of ethanol and development of new energy technologies to cut greenhouse gas emissions blamed for global warming. But while some oil and gas producers cheered the plan, the wind industry chastised it.

The initiative follows Canada's ratification of the Kyoto Protocol last December, and represents half of the amount the Canadian federal government has budgeted for 2003 to help the country reduce GHGs 6 percent below 1990s levels by 2010. More spending will be announced in the fall, said members of Premier Minister Jean Chretien's Labor Party cabinet at the School of Information Technology and Engineering at the University of Ottawa.

Some C\$131 million is slated for incentives to homeowners in Canada to improve energy efficiency, representing a rebate of about C\$1,000 per home when improvements are documented by energy audits. Nearly C\$303 million is assigned to businesses for

**Some C\$131 million is slated for incentives to homeowners in Canada to improve energy efficiency.**

greater use of emissions-slashing technologies in building and transportation sectors, which includes about C\$130 million for hydrogen fuel technologies, C\$115 million for cleaner-burning fossil fuel technology and C\$100 million for ethanol production. Almost C\$321 million will go toward partnerships with provinces and territories for cost-effective emissions reductions.

Some Canadian environmental groups support the plan, while Stephen Harper of opposition party Canadian Alliance called it "the beginning of the biggest black hole boondoggle in Canadian history."

Canada's oil and gas industry, initially a fierce opponent of the country's inclusion in the Kyoto agreement, seems to have worked a compromise with the federal government allowing it to adjust its stance. The Canadian Association of Petroleum Producers called the initiative a promising step. "It's encouraging to see that energy consumption issues are beginning to get the attention they deserve," CAPP President Pierre Alvarez told the *Calgary Herald*.

In late November 2002, CAPP sent its policy paper on climate change to Canadian energy and environment ministers, and in late July received a letter from the

prime minister's office, outlining guiding principles for national policies on climate change after 2012. "These commitments from the Prime Minister will allow our industry to proceed with planning and development with much more confidence," according to CAPP.

Some critique of the plan was harsh. The editorial board of Montreal's *The Gazette* cited many faults: "the \$100 million squandered on ethanol, despite the fact that more energy is used in turning grain into ethanol than is generated by burning ethanol; the more than \$550 million for favored businesses ...; the mysterious absence of any encouragement of wind power, which is one environmentally friendly technology everyone agrees on, and so on. This isn't a strategy; it's a garage sale."

The Canadian Wind Energy Association also lamented the lack of support for wind power in the plan. "We remain committed to working with the federal government to meet and significantly exceed the Climate Change Plan for Canada's wind power production targets," says CanWEA Executive Director Robert Hornung. "But today's announcement represents a lost opportunity that we will need to address quickly if Canadians are to experience the potential economic and environmental benefits associated with an aggressive expansion of wind power production."

Although Canada currently produces only some 100 MW of its 110,000-MW capacity with wind power, the association maintains the industry is poised for a massive gust able to boost production to 10,000 MW by 2010.

Hornung lauded initial steps in several provinces in support of wind power. For example, Ontario in July became the first Canadian province to signal it will introduce legislation mandating a renewable energy standard this fall, the bulk of which is expected to come from wind and hydroelectric sources. However, Hornung added that the federal government's modest greenhouse gas emission reduction objectives for wind power production are in danger. **[G.H.]**

**More information:**

- [Canadian Association of Petroleum Producers](http://www.capp.ca/default.asp?V_DOC_ID=1) (www.capp.ca/default.asp?V\_DOC\_ID=1)
- [Canadian government climate change site](http://www.climatechange.gc.ca/english/index.shtml) (www.climatechange.gc.ca/english/index.shtml)
- [Canadian Wind Energy Association statement](http://www.canwea.ca/docs/Press_Release_12-08-03.doc) (www.canwea.ca/docs/Press\_Release\_12-08-03.doc)

**7] Filling in the E85 Puzzle**

Recent criticisms, cast particularly at the auto industry and articulated in an Aug. 2 *Washington Post* article entitled "Ethanol Cars Cause Fuming," are misleading, according to Tim Gerlach, director of the outdoor air program for the American Lung Association of Minnesota.

"I take issue with people criticizing flexible-fuel vehicles," said Gerlach, referring to arguments that little is being done to grow an E85 infrastructure and promote an awareness of (FFVs)—vehicles that can run on both E85 and conventional gasoline. Though mindful that the availability of E85 (a mixture of 85 percent ethanol and



15 percent gas) is relatively limited nationwide, "no one will build up the infrastructure," Gerlach protests, "if the vehicles are not on the road."

Although E85 has been praised because its combustion produces lower emissions of ozone-forming compounds than petroleum, critics have been quick to point out that with more than 3 million FFVs on the road today, only 300 fueling stations across the nation currently supply the fuel. And as critics contend, with auto manufacturers doing very little to promote awareness that many of their vehicles are in fact capable of running on E85, FFVs wind up using more oil than those vehicles that run solely on standard gasoline.

The reason, according to Phillip Lampert, executive director for the National Ethanol Vehicle Coalition (NEVC), stems from the Alternative Motor Fuels Act of 1988.

Under the act, auto manufacturers receive credits for building alternative fuel vehicles such as FFVs. These credits allow manufacturers to fall short of federal fuel standards by as much as

**The fact that nearly 1.5 million AFVs were built in 2002 clearly indicates that the credits have been successful.**

1.2 mpg and, according to the American Council for an Energy-Efficient Economy, could result in motorists using 20 million to 56 million more barrels of oil each year.

But the fact that nearly 1.5 million AFVs were built in 2002 clearly indicates that the credits have been successful, Lampert says. "The other side to that," he admits, however, "is that to some degree the 1988 program has been a failure in that the incentives did not provide the second part of the puzzle; that is, how to fuel these vehicles." And so, to make the E85 puzzle whole, "what [the NEVC] is now doing," says Lampert, "is addressing the second part of the equation, and that is to place the fueling stations around the nation."

Building on the cornerstones of outreach, communication and education, Lampert notes that while in 1998 there were only 10 stations that supplied E85, by the end of this year, 400 stations will carry the fuel. This number, says Lampert, will only continue to grow pending successful completion of this year's energy bill. In companion legislation introduced by Sen. Orrin Hatch, R-Utah, the CLEAR ACT offers tax credits not only toward the purchase of FFVs, but also provides hearty infrastructure incentives and a tax credit for the retail sale of alternative fuels. "The CLEAR ACT," Lampert told *Prospects*, "will overcome the previous failure of having E85 vehicles without an infrastructure."

In collaboration with the NEVC, Lampert notes that auto manufactures are also doing their part to increase awareness of FFVs and further E85 use. Ford Motor Company, for example, has funded more than \$2 million over the past several years toward the expansion of E85 infrastructure in four target cities, including Minneapolis and Chicago. And General Motors, maker of nearly one-third of all FFVs on the road today, in June launched its "I Fuel Good" campaign, a six-state initiative aimed at

promoting expanded awareness and use of E85. The campaign supplies owners of 2002 and 2003 model year GM FFVs with \$40 debit cards good toward the purchase of E85. Owners also receive E85 educational materials and a list of E85 stations in their area. GM dealers, for their part, are instructed on how to educate customers about the benefits of the fuel.

The campaign, according to Gary Herwick, GM's director of transportation fuels, has already been successful, and has helped call attention to local achievements of state governments and organizations. In Colorado, for example, a new law enables motorists with vehicles running on E85 to ride in HOV lanes throughout Denver. In Illinois, the state's governor recently signed into law legislation that removes sales tax from E85. And in Minnesota, due to a collaborative effort with the NEVC and sustained efforts by The American Lung Association of Minnesota, Herwick notes, many of the state's 80 stations that supply E85 do so at a cost of up to 20 cents below the price of regular unleaded gasoline.

With more E85-equipped stations than any other state in the nation, and with another 20 expected to be functional by the year's end, ALAM's Tim Gerlach says Minnesota is proof that political figures, fueling station owners and auto manufacturers can and have come together to increase awareness of FFVs and expand the E85 infrastructure. With Minnesota serving as a model, he said, the trend is now spreading outward and gaining serious momentum. **[J.P.]**

**More information:**

[American Lung Association of Minnesota](http://www.alamn.org/index.asp)

(www.alamn.org/index.asp)

[National Ethanol Vehicle Coalition](http://www.e85fuel.com) (www.e85fuel.com)

[CLEAR ACT](http://thomas.loc.gov/cgi-bin/query/D?c108:5:./temp/~c108KEgRP4:) (http://thomas.loc.gov/cgi-

bin/query/D?c108:5:./temp/~c108KEgRP4:)

[General Motors Corp.](http://www.gm.com) (www.gm.com)

**8] Bankers Train Scent on Green Power**

Swiss financial services giant UBS this summer began extensive training for some 400 top executives in New York and London, mostly equity research analysts and investment bankers, to help them apply environmental criteria in assessing investment risks and opportunities. The greater institutionalization of the practice points toward more investment into renewable energy, efficiency and related services on the horizon.

UBS is the first major investment bank to enlist Innovest Strategic Value Advisors—an independent research firm with offices in North American and European financial centers—to provide the training. The specialist in non-traditional sources of risk and out-performance has already held two sessions for about 60 executives from UBS' credit and legal departments on each side of the Atlantic.

The greatest boost for the new energy technology marketplace, however, could come from the investment bankers who will train together with equity research staff in coming months. The course, which looks at how some 60 environmental factors could affect investment



decision-making, essentially is split up into three macro segments: risk and liability, management's ability to handle risk and liability, and strategic profit opportunities.

Over the next 12 to 18 months, Innovest sees a further increase in the "environmental risk/opportunity premium," noting the tightening environmental regulations, tougher corporate disclosure requirements and growing concerns from institutional investors and non-governmental organizations. The firm's axiom, that companies able to manage environmentally driven risks and opportunities better than industry peers tend also to out-perform them financially, seems to be catching on.

According to Peter Wilkes, managing director of business development at Innovest, the firm is talking with a handful of other large investment banks about training for their executives, too. And if "trains are leaving the station," as Wal van Lierop, president and CEO of Chrysalix, a Vancouver, B.C.-based early stage venture capital firm, says of early investment opportunities into fuel cells and hydrogen technologies, then a race for positioning could be on.

Since Innovest was founded in the mid-1990s, it has taken the relatively uncommon practice of analyzing how companies' environmental, social and corporate governance habits come to bear on their profitability, share-price performance and overall competitiveness, and has turned the practice into a science increasingly relied upon by institutional investors. Innovest's own pension-fund clients include BP Investments, Canada's OMERS and the Netherlands' ABP, Europe's largest pension fund, which is also a shareholder in Innovest. [G.H.]

**More information:**

[Innovest](http://www.innovestgroup.com) (www.innovestgroup.com)

**9] Dipping Toes in Hybrid Waters**

Citing a new flexibility they can live with, General Motors, Daimler Chrysler and Isuzu agreed last week to drop litigation against the California Air Resources Board when the board finalizes changes to its zero-emission vehicle rules approved in April that allow a greater variety of technologies to meet the mandates. And while GM and DaimlerChrysler plan to release hybrid cars in limited numbers next year, both say it's still unclear which compliance technology the market will support.

The new rules eliminate a battery electric vehicle requirement that automakers complained there was no market for, as well as all language pertaining to fuel efficiency, which can only be regulated by the federal government. The rules instead allow automakers to choose from among partial-zero-emission-vehicle technologies and require the companies to release their sales-weighted market share of 250 fuel cell vehicles by 2008, increasing to 50,000 between 2015 and 2017 [see **Two Roads Diverge in California**, May 2, 2003].

DaimlerChrysler spokeswoman Kathy Graham told *Prospects* that allowing a variety of technologies to meet emissions targets is better suited to what her company has to offer. While the company announced earlier its plan to sell hybrid Dodge Ram pickups next year, it can also bank

PZEV credits through sales of its zero-evaporative-emission Dodge Stratus and the neighborhood EVs sold through subsidiary Global Electric Motorcars (GEM).

Although the EV market may be limited as automakers argue, those who buy them drive them, according to a new study by the Green Car Institute of 260 GEM neighborhood electric vehicle (NEV) owners.

**The rules instead allow automakers to choose from among partial-zero-emission-vehicle technologies.**

More than three-fourths of NEV users own two or more internal combustion engine cars, but use the NEVs for 65 percent of daily short-distance trips, with 75 percent of those trips carrying extra passengers. The study

estimated more than 15,000 NEVs to be in service on California roads in 2003. DaimlerChrysler's GEM continues to market the NEVs and accumulate credits for the parent company's CARB requirements.

While there are a variety of options to meet the requirements, neither company is yet bullish on the hybrid market. But both say they are looking at it nationally, rather than through the lens of CARB compliance. "People look for performance, safety, utility, value at the price point—not fuel economy," said GM spokesman Dave Barthmuss. "If it does become a primary purchase decision, we want to make sure we're there."

GM plans to roll out hybrid versions of 12 different models by 2007, starting with the full-size Chevy Silverado pickup. GM wants to put the hybrids in the high-volume markets first to see if they will take hold in the market, Barthmuss said. Graham said DaimlerChrysler is launching hybrids in its full-size Ram pickup to capture the added value of using the hybrid system as an onboard generator.

Carmakers have been more optimistic in their public statements regarding fuel cell car potential as well. CARB spokesman Jerry Martin said the board "absolutely" plans to hold the automakers' feet to the fire on the fuel cell car requirements. But nothing prevents the companies from either lobbying the board for relief or suing again if they can't make the fuel cell car deadlines, he added. If developments in fuel cell technology do not progress according to CARB's market timeline, however, "the board is not inflexible."

GM still hopes to convince CARB to award credits for stationary fuel cell demonstrations that help lower component costs, build supplier base and expertise, and test durability. GM could use those credits to capitalize on units put out by its fuel cell manufacturing plant in Honeoye Falls, N.Y. CARB is currently examining that option, Barthmuss said.

"For the state and industry to settle their legal differences it really does set the stage for the emergence of fuel cell cars," Stephen Kukucha, Ballard Power's senior advisor for external affairs, told *Prospects*. The difference in carmaker rhetoric on electric vehicles, in which they saw constant roadblocks, and fuel cell cars, which many are now



touting, bodes well for common ground. Fuel cell cars in the U.S. should exceed CARB's minimums, he said. Product development from Japan's push for 50,000 fuel cell vehicles on the that nation's roads by 2010 will help fuel cell cars in the U.S. market achieve the performance that consumers and automakers demand, which should boost the market. Ballard Power has supplied fuel cells to 10 of the top 15 automakers, including DaimlerChrysler, Ford, Honda, Mitsubishi, Nissan and Volkswagen. [B.G.]

**More information:**

[Automakers' statement on agreement with CARB](#)

(www.gm.com/cgi-bin/pr\_display.pl?5125)

[CARB's ZEV program](#)

(www.arb.ca.gov/msprog/zevprog/zevprog.htm)

[Green Car Institute](#) (www.greencar.org)

**10] Calif. Self-Gen Plan Goes Green**

With the growing political popularity of renewable power sources and distributed generation—both helped along by the massive Eastern blackout—California's legislature earlier this month pushed ahead with proposals to narrow the state's rebates for self-generation systems to emphasize the ones using renewables.

With the advance of a compromise proposal (A.B. 1685) Aug. 20 in the state Senate, a growing split between less economically viable solar on-site generation systems and the better established combined-heat-and-power, microturbine and fuel cell systems could grow more intense. The advocates for simply extending the rebate program launched in the midst of the state's energy crisis two years ago won a partial victory by getting a proposal for more extensive change (S.B. 107) tabled for this legislative session.

The earlier proposal would have established a goal of making subsidized "ultra clean and low-emission" self-generation systems commercial by 2007, and it would have removed provisions for the self-generation rebates helping reduce peak-demand loads as called for in the original bill passed by state lawmakers in 2001 (A.B. 970).

At the end of the first quarter this year, the state's four major private-sector utilities had awarded almost \$15 million in rebates to new solar photovoltaic, fuel cell and wind turbine projects, compared to a little more than \$4 million to traditional microturbines and various internal combustion engine systems. Nevertheless, the amount of peak-shaving and cost-per-kilowatt-hour differences were dramatically in favor of the lower-valued internal combustion systems and microturbines, according to an analysis by an independent researcher/cogeneration expert.

The ICEs and microturbines produced 115 million kWh of peak-demand output, compared to 3.3 million kWh for the renewable-sourced systems. Similarly, the cost for the traditional self-generation systems was 4 cents per kWh, compared with \$4.48 per kWh for the PV, fuel cell and wind systems.

"It is inappropriate and ineffective to use incentives as a market mechanism for technologies that are not commercially viable," said Tracy Saville, government affairs

vice president for RealEnergy Inc., a firm that has proposed, installed and operated more than 35 MW of CHP in various commercial facilities in the West and New York. Saville wrote California Senate energy committee head Sen. Debra Bowen to argue for changes in the now-tabled S.B. 107.

"Incentives to install do not serve to incentivize performance of research and development in anticipation of R&D investment being recouped through an installation program like SGIP (self-generation incentive program)," Saville said. "Doing so will eliminate not only clean technology providing the greatest benefits of current peak demand reduction, but will fail to deliver the ability of manufacturers to achieve 2007 limits by 2007. Engineers and manufacturers of commercially available technology (those having sufficient operating hours and known maintenance cost) have invested and rely upon the path toward the 2005 CARB (state air resource board) review and 2007 benchmark (as set in the current state SGIP)." [Richard Nemec]

**More information:**

[California Senate](#) (www.sen.ca.gov)

[RealEnergy](#) (www.realenergy.com)



**11] Eastern Blackout as Turning Point**

Last week's humongous East-Midwest-Canada blackout resulted in power plants and transmission lines doing exactly what, under the circumstances, they were supposed to do, which is to shut down. What followed the triggering events, however, was not supposed to happen: load shedding was not supposed to spread over six states and into Canada before the system was stabilized [see **DG Illuminates the Dereg Darkness @ 1**].

In the continuing aftermath, responder jobs are being done pretty well. But all did not go well with a political blame-game prompted by clueless news reporters who wanted to

know which public figures were at fault when subways and elevators stopped and lights shut off that Thursday afternoon. Collecting simple sound bytes to assign political blame during the biggest blackout ever is the work of people I do not like to think of as colleagues.

From early rehearsals of what happened, it appears that negligence and communication failures were involved. Off camera, U.S.-Canadian team investigators will labor over enormous volumes of data before getting a useful sense of what happened—and that will come in the form of conclusions and conjectures on grid shortcomings, communications negligence and control system glitches.

But even before blackout facts are collected and mulled over, Congress will almost certainly address

**The Aug. 14 outage is a signal event that will mark a turning point in energy policy development.**



blackout-related issues in an energy bill, or tack a blackout rider on some other legislation. FERC, meanwhile, seems even more likely to put its Standard Market Design initiative on hold, as the Bush administration continues to distance itself from the concept.

The Aug. 14 outage is a signal event that will mark a turning point in energy policy development. Although it is too soon to tell how the blackout will affect the energy legislation now headed for congressional conference, the political stakes are at least an order of magnitude higher than they were before the lights went out.

The good news is that energy policy will change, and the bad news is that energy policy will change. I want to think that the balance will favor good news. But a bad-news danger is that the changed policy will have a different name, but will really be the big old central-station transmitted system writ larger and repackaged.

Reaction to signal events takes many forms, however, and the form of doing what comes naturally is the enemy of a useful turning point. The natural mode of the energy industry these difficult days is far too often to talk cutting edge and walk status quo.

What we must not do is waste this turning point opportunity by engineering a status quo patch job on the grid. Energy Secretary Spencer Abraham costs out his fix-the-grid version at \$50 billion, which sounds to me like a patch job being run up the flagpole in search of salutes. In addition to the Secretary of Energy, the chorus of bully pulpit energy voices swelled in volume even before the lights went back on.

My further take on these matters borrows the expertise of others—Tom Casten of Private Power Inc.; Amory Lovins of the Rocky Mountain Institute; and Ralph Cavanagh of the Natural Resources Defense Council; and the North American Electric Reliability Council, which was formed in the wake of the 1965 New York blackout.

Casten is the energy community leader in combined-heat-and-power generation, who, while at TriGen, built downscaled generators with efficiency rates as high as 95 percent. His approach would turn a more permanent reliability fix away from central to distributed resources, on an economic basis. In a September 2002 report, "Optimizing Future Heat and Power Generation," Casten said that "full reliance on distributed generation would supply power for 5.2 cents/kWh versus 8 cents/kWh from new central generation. Full reliance on DG reduces capital expenditures by \$247 billion by 2020, reduces 2020 incremental power costs by \$47 million and reduces NOx by 61 percent, SO<sub>2</sub> by 91 percent and PM10 by 6 percent. Finally, DG reduces carbon dioxide emissions by 389 million metric tons or 50 percent versus total reliance on new central generation."

Lovins is the energy efficiency polymath who a year ago this month published *Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size*, with its 207 ways to save energy money by downsizing. Lovins' book also focuses on economics. The

"most valuable distributed benefits typically flow from financial economics—the lower risk of smaller modules with shorter lead times, portability, and low or no fuel-price volatility," an executive summary says. Benefits increase "by as much as 10 times—even more when waste heat can be used. Nearly a dozen other technological, conceptual, and institutional forces are also driving a rapid shift toward the 'distributed utility,' where power generation migrates from remote plants to customers' back yards, basements, rooftops and driveways."

Both Casten and Lovins emphasize that distributed resources are inherently more reliable than central station generation, with its complicated transmission and distribution grid. Moreover, DG in transition deployment can be used to make the grid system more reliable.

Cavanagh is by word and deed the energy community's environmental conscience and good works facilitator. "Congress should stop holding grid reliability provisions hostage to pork barrel energy legislation," he advises in an NRDC issue brief on the outage. Cavanagh also points out that five years ago a bipartisan task force warned DOE that Congress needed to charter new institutions to set and enforce reliability rules for the interstate power grid: "[f]ailure to act will leave substantial parts of North America at unacceptable risk," the task force concluded.

"Consensus-based legislation executing this recommendation still is buried in energy bills loaded with unrelated provisions," Cavanagh said. "Congress should break the reliability provisions free and pass them immediately."

Cavanagh also sees a need for additional investments in technologies that can update and enhance the interstate transmission grid. "The Electric Power Research Institute points out that, as a fraction of utility revenues, transmission investment today is only about half of the low levels recorded during the Great Depression," he said. "Yet a host of technology upgrades are available, many of which do not require the construction of new lines."

Cavanagh further notes that the infrastructure crisis reflects uncertainty about whether and how such investments will be recovered, as state and federal regulators continue to debate the future of the electricity sector. "We need better cooperation among the regulators, and a full evaluation of all available ways to upgrade transmission systems, including demand reductions and improved controls and materials in addition to new lines," he said.

The complication is one of timing. The economic visions of Casten and Lovins are longer term than may be consistent with a blackout-driven change opportunity. And there is no arguing that the existing grid system is valuable enough for investment—particularly in the kind of technical investment Cavanagh references.

NERC, meanwhile, casts reliability in problem-and-solution terms: "Federal legislation is required to establish an independent, industry-led electric reliability organization to ensure the continued reliability of the interconnected,

**The natural mode of the energy industry these difficult days is far too often to talk cutting edge and walk status quo.**



high-voltage transmission grid in North America," reads a statement on its website. "The existing scheme of voluntary compliance with NERC reliability rules is no longer adequate for today's competitive electricity market.

"The grid is now being used in ways for which it was not designed, and there has been a quantum leap in the number and complexity of transactions," NERC also notes. "The users and operators of the transmission system, who used to cooperate voluntarily on reliability matters, are now competitors without the same incentives to cooperate with each other or to comply with voluntary reliability rules. As a result, there has been a marked increase in the number and seriousness of violations of these rules.

"Not a single bulk-power system reliability standard can be enforced effectively today by either NERC or FERC. FERC is being asked to make decisions on reliability issues for which it lacks both the technical expertise and clear statutory authority. Further, fully one-third of the nation's transmission facilities (cooperative, municipal and federal utilities, and power marketing administrations) are beyond FERC's jurisdiction. Finally, FERC has no jurisdiction over the portions of the interconnected bulk electric grid that extend into Canada and Mexico."

The NERC solution: "Reliability rules must be made mandatory and enforceable, and they must be applied fairly to all participants in the electricity marketplace throughout North America." NERC and "a broad coalition of industry, state and consumer organizations have agreed on a legislative proposal that would create an industry-led, self-regulatory electric reliability organization to develop and enforce compliance with mandatory reliability rules.

"The proposal authorizes the creation of a North America-wide electric reliability organization [ERO] with FERC oversight in the United States, and expressly protects the important roles of the states and regional entities." It also ensures "that Canadian and Mexican interests in the reliability of the interconnected North American electric grid are fully considered."

What is needed is a combination of short- and longer-term fixes, emphasizing new technology whenever possible. A first-order element is prompt congressional action establishing an ERO. It makes no sense that this proposal, which has essentially been ready for implementation for at least three years, should still be held hostage to some sort of broader energy legislation, which continues to be a moving target.

But what we clearly want to avoid is action that triggers investments in lots of the wrong kind of stuff. This is a high risk, indeed, as Cavanagh notes in referring to "pork-barrel energy legislation." I think the investigation will show that the blackout was not a supply problem, which means that a solution should sure as hell not include nuclear pork subsidies that Senate Energy Committee Chairman Pete Domenici, R-N.M., seems so fond of.

The message y'all out there should consider pushing along to your contacts on the Hill is that carving out the ERO establishment provision from the energy pig package and passing it posthaste is a rare opportunity to do good and

cover backsides at one and the same time. For the longer term, let's get serious about both talking and walking cutting edge by getting serious about distributed generation.

Time counts, and the sooner the better. [Cyrus Noë]

## PROSPECTORS

### 12] Solar's Future in Silicon Valley

For an engineer originally trained to design automobiles, Bill Yerkes' lifetime work has had more to do with the speed of light than with rpms and mph. Early on, he abandoned those earth-bound constraints to join the race to the moon, and eventually moved on to help harness the power of the sun. Now he has retreated to Silicon Valley to try to make the development of cheaper, better and more accessible solar systems a reality in the first decade of the new century.

Yerkes is one of the solar industry's true pioneers. His early contributions to the solar systems helped make the U.S. moon landings a reality. He also started one of the first solar manufacturing businesses in a garage-like setting and nurtured it into a bonafide company that eventually was purchased by Arco. He then helped develop the beginnings of what today is Shell Solar, headquartered in Southern California in the same facilities that Yerkes founded under the Arco banner.

When it was Arco Solar, Yerkes' company was the first anywhere to manage the production of 1-megawatt's worth of solar cells in a single year. A little more than 20 years later, engineers in the United States, Europe and Japan are still trying to figure how to produce 1,000 MW of solar equipment in one year. Yerkes thinks he has the answer.

With big global oil companies coming back into the solar industry and the Japanese and European markets gobbling up all the systems they can find, Yerkes said

**The larger markets for solar are moving away from the remote locations on offshore oil rigs and in sparsely populated areas.**

the larger markets for solar are moving away from the remote locations on offshore oil rigs and in sparsely populated areas.

"The business has become something that is being put on roofs of homes and businesses and being connected to the grid," he says. "Where

photovoltaics are really useful is in the afternoon in the middle of summertime to shave peaks."

Acceptance by architects and engineers is coming about slowly, but Yerkes points to long-time colleague and UCLA architecture professor emeritus Richard Schoen as the role model for the future of fusing solar applications to total sustainable design. Schoen and a Southern California-based roofing company are developing a solar roof material for commercial buildings.

"The panels everyone makes now, the standard panels, have been designed for rugged outdoor use and



lowest cost," Yerkes says. "The aluminum extruded frame rails don't fit in with an architectural context. Schoen is designing new panels that architects will like."

Yerkes said he was strongly encouraged by the keynote address earlier this year at the World Solar Congress in Osaka, Japan, by Takashi Tomita, the head of Sharp Corporation's solar systems group, who emphasized that silicon-based technologies should be dominant in the coming decade. The Japanese solar business executive reinforces the premise behind Yerkes' newest venture, Solaicx, saying that making crystalline sheets directly from melted silicon is essential to boosting the efficiency of solar cells and reaching the 1,000-MW annual production level.

Said Tomita in his keynote address: "The efficiency of modules will be improved and thickness of wafers can be reduced. As a result, there are very large possibilities to reduce the cost to half at least. In this perspective, PV systems will become one of the strong candidates of renewable energy in the near future."

"In making fairly pure silicon—solar cells require high lifetime silicon—you need very pure material," Yerkes says. "We used to talk about 'solar-grade' silicon, which had a lot of impurities, but was still good enough for solar cells at the time. That idea has gone out the window. When you are making 15-percent to 20-percent efficient solar cells, you have to have very pure material to get high lifetime."

Solaicx is working on making pure silicon from the precursor chemicals. The privately financed start-up's machine makes very pure wafers with longer lifetimes at very high speed. "We think that the wafer part we are working on is half the cost of the solar cell," he says.

Yerkes says that the solar industry, once thought of as romantic in nature, "has become a billion-dollar commodity business," and the key question centers on who can provide the most efficient manufacturing process. He is convinced that it will be Solaicx.

"Solaicx will be designing components and the special machines that make the components for the industry to lower their costs," says Yerkes, who is most proud of his own role in making solar "a real business" instead of a government program. "We will pay close attention to the customer's [design] needs and will use the technology already accumulated in the PV business to make it happen on a budget and on schedule." **[R.N.]**

**More information:**

[Solaicx](http://www.solaicx.com) (www.solaicx.com)

[Japan Photovoltaic Energy Association](http://www.jpea.gr.jp) (www.jpea.gr.jp)

### **13] RECO Turns Sunlight Into Green Hydrogen**

The fuel cell industry has a problem: it can't make hydrogen without producing carbon dioxide as a byproduct, according to Dr. Reed Jensen, founder of Renewable Energy Corporation (RECO) of Los Alamos, N.M. But Jensen is working to change that through the commercialization of Solarec, a technology he invented after decades of work at the Los Alamos National Laboratory.

Solarec uses solar energy to produce CO<sub>2</sub>-free

hydrogen. RECO believes it has "the technological breakthrough the fuel cell industry requires to deliver on its promise of a zero-emissions hydrogen economy."

The Solarec (Solar Reduction of Carbon Dioxide) process involves two steps: first, using highly concentrated solar energy (around 5,000 suns) to convert CO<sub>2</sub> into carbon monoxide (CO) and oxygen, and second, using "common refining technology" to cause the CO to react with water to produce hydrogen and CO<sub>2</sub>. The CO<sub>2</sub> is recycled back into the system, and the hydrogen is ready for use, with only oxygen and electricity as byproducts. RECO's goal is to produce 20 kW of hydrogen and 25 kW of electricity from each 100 kW of solar energy.

Jensen and a colleague invented the solar dish used in RECO's process. The Solarec dish is 80 percent more efficient than other dish-based systems, he said, giving Solarec "a tremendous cost advantage over competing CO<sub>2</sub>-free methods of generating hydrogen such as wind power-based electrolysis."

RECO's demonstration prototype in Los Alamos has run more than 50 successful tests in the past two years. Now, a new scaled-up model, using a 10-square-meter mirror, is being built and is expected to go into operation in one month.

"There's no question the technology works—the only questions involve cost and reliability," Jensen told *Prospects*. If the clean energy promise of hydrogen is to be realized, he believes that the current preoccupation with "brown hydrogen," produced from fossil fuels, will need to change. "The billions of dollars being poured into fuel cell development will only lead to a marginal improvement in reducing greenhouse gas emissions unless a clean source of hydrogen is found," he said. Solarec is "a truly green process that can make honest people of the hydrogen folks," Jensen added. **[Susan Whittington]**

**More information:**

[Renewable Energy Corporation](http://www.re-co2.com) (www.re-co2.com)

### **14] City of San Diego Steps Up Renewable Energy Use**

While converting traditionally cynical consumer and environmental activists into supporters, the City of San Diego followed the lead from the state's major energy agencies that have aggressively moved up target goals for increased renewable use. The city quadrupled its commitment to produce electricity from renewable sources, principally solar and landfill gas, at its facilities. The added push could cost \$10 million, city officials indicated.

While the municipal government has no city-run utility and its local private sector utility, San Diego Gas and Electric Co., is being pressured to have 20 percent of its power come from renewables by 2010, San Diego's local government now plans to expand its renewable push from 13 MW to 63 MW. The city's mayor and two city councilmembers called a news conference earlier this month to announce the new city goal.

The state's major utility consumer watchdog group, The Utility Reform Network (TURN), and the



Sacramento-based Center for Energy Efficiency and Renewable Technologies (CEERT) praised the city's plan and the stepped-up effort among California's three major state energy agencies.

A few days prior to the Eastern blackout and the newfound push for distributed and renewable generation, Mayor Dick Murphy told local news media that California has a new sense of "momentum and urgency" stemming from the state's prolonged crisis two years ago. He noted that San Diego already uses solar systems on two of its largest facilities, and is involved in a landfill gas facility and some hydroelectric power projects.

In total, the San Diego's city officials expect to get their additional 50 MW from a combination of increasing photovoltaic systems and landfill gas facilities, and from encouraging private-sector developers to install renewable power systems. [R.N.]

**More information:**

[City of San Diego](http://www.sannet.gov) (www.sannet.gov)

**15] Hydrogenics Struts Stuff In New FC Demo**

At this year's Canadian National Exhibition currently happening at the National Trade Centre in Toronto, Hydrogenics is launching the first phase of the three-phase Toronto Fuel Cell Demonstration Project that starts with the unveiling of a new fuel cell module, and will lead into the vehicle-to-grid concept of using automobiles as mobile power plants.

In the first phase, Hydrogenics' new 50-kW HySTAT fuel cell module, developed with partial funding from Natural Resources Canada (NRCan) will provide peak shaving power to the National Trade Centre. The HySTAT system includes an integrated natural gas reformer that provides hydrogen for the fuel cell as well as an adjacent vehicle refueler, also partially funded by NRCan. The refueler will also supply hydrogen to a John Deere work vehicle running on a Hydrogenics fuel cell.

"We believe that that kind of multifunctionality [is] where you can make the value proposition work," Hydrogenics spokeswoman Jane Dalziel told *Prospects*. "It can be the start of a nucleus for fuel cell vehicles to be refueled."

The goal of Phase Two, planned for next summer, is to expand the power output of the stationary HySTAT fuel cell to test its durability and reliability. One possible application is to use it for backup power, which would demand more of the fuel cell and require a new set of electronics and controls.

In Phase Three, scheduled to begin in 2005, the refueler could be used to supply hydrogen to a fuel cell hybrid urban bus [see **Hydrogenics to Link FC Bus to Grid**, December 20, 2002] that would demonstrate Hydrogenics' vehicle-to-grid technology. Hydrogenics also wants to use wind or solar power to run an electrolyzer to generate the hydrogen in this phase. [B.G.]

**More information:**

[Hydrogenics](http://www.hydrogenics.com) (www.hydrogenics.com)

**16] EPRI Releases Update On Biomass Cofiring**

The Electric Power Research Institute late last month released an update detailing the most recent findings of its ongoing biomass cofiring study. The cofiring report, EPRI's third in as many years, documents the activities of seven biomass cofiring projects spanning Oct. 2001 through March of this year. Since 1992, EPRI has collaborated with the Department of Energy and a host of industry experts toward the goal of broad-based commercialization of biomass cofiring.

Most recent findings, according to EPRI, "confirm the general pattern of the past decade of biomass cofiring testing and research in the United States." This pattern, marked by technical feasibility of cofiring, most importantly

demonstrates that for those utilities needing to reduce emissions from coal, cofiring biomass material in many cases can be a cost-effective means for reducing nitrogen oxides, sulfur dioxide, fossil-based carbon dioxide and trace metals such as mercury. Biomass cofiring can also prove essential for utilities looking to quickly meet a renewable

portfolio standard. "For electric power generation organizations that have coal-fired generation, cofiring biomass with coal will often be the lowest-cost form of renewable power," EPRI states.

Decreased costs relative to firing coal alone, however, are not guaranteed. Cofiring economics, according to DOE, depend on a number of factors, including plant location, power plant type and the availability of low-cost biomass materials. Among those patterns confirmed in EPRI's most recent report, economics and fuel supply are still found to be limiting factors impeding full commercial deployment. While certain cofiring technologies are ready to be deployed, EPRI says these issues warrant further studies before broad-based commercialization of biomass cofiring can be achieved.

The report (No. 1004319), along with its two predecessors, are meant to assist planners and engineers in their decisions regarding "whether and how to proceed with their own cofiring testing and operation." All three are available on EPRI's website. [J.P.]

**More information:**

[Electric Power Research Institute](http://www.epri.com) (www.epri.com)

**17] FuelCell Energy: New Projects and Acquisitions**

In support of its contract with the U.S. Department of Energy and participation in the Solid State Energy Conversion Alliance, molten carbonate fuel cell maker FuelCell Energy this month expanded its holdings in solid oxide fuel cell technology companies.



FuelCell Energy agreed to acquire Calgary, Alberta-based Global Thermoelectric, an SOFC developer, for \$80 million, and invested \$2 million in Versa Power Systems, a Des Plaines, Ill.-based company that develops reduced-temperature SOFC technology. FuelCell Energy in April was awarded a 10-year, \$139-million contract with the SECA program in an attempt to lower SOFC costs by an order of magnitude, to below \$400 per kW.

Also this month, PPL Corporation announced the successful installation of a 250-kW MCFC FuelCell Energy system at the Sheraton Edison Hotel-Rariton Center in Edison, N.J., providing about 25 percent of the hotel's electricity and hot water. The project was PPL's fourth installation as a FuelCell Energy distribution partner, and is part of an agreement between PPL and Sheraton's parent company, Starwood Hotels & Resorts, that could lead to more hotel fuel cell projects. A similar project at another Starwood hotel in New Jersey should be completed in September. [B.G.]

**More information:**

[FuelCell Energy](http://www.fuelcellenergy.com) (www.fuelcellenergy.com)

**18] PNM, EPRI Study Wastewater Use in SW Power Plants**

The Department of Energy will fund Public Service of New Mexico and the Electric Power Research Institute to the tune of about \$400,000 to study whether PNM's power plants can use wastewater produced by oil and gas drillers, instead of fresh water. The grant, announced Aug. 5, puts DOE dollars behind New Mexico's ZeroNet Water Energy Initiative, which aims to meet rising electricity demand with a zero net increase in power plant water withdrawals by 2010 [see **ZeroNet Tackles Water-Use Puzzle**, July 11, 2003].

PNM's 1,800-MW coal-fired San Juan Generating Station (SJGS) requires about 22,000 acre-feet of water a year, about three-quarters of a gallon to produce one kilowatt-hour. The study will look at the costs to treat and transport "produced water" (highly saline water from deep aquifers brought to the surface during oil and gas production) 40 miles from the gas fields to SJGS. About 2,000 to 3,000 acre-feet of produced water in the Four Corners region is considered potentially usable at the plant.

The amount of water used in power generation is a growing political issue in the parched Southwest. PNM hopes this study will help ensure that SJGS can continue to operate at full capacity during the summer months. Robert Goldstein of EPRI said, "If commercial-scale application of produced water in power plant cooling systems can be accomplished at SJGS, then many power plants throughout the nation could also benefit from a similar approach, saving millions of gallons of fresh water." [S.W.]

**The grant ... aims to meet rising electricity demand with a zero net increase in power plant water withdrawals by 2010.**

**More information:**

[Public Service of New Mexico](http://www.pnm.com) (www.pnm.com)  
[Electric Power Research Institute](http://www.epri.com) (www.epri.com)

**19] New FC Plates Show Resiliency in GTI Tests**

The Gas Technology Institute announced Aug. 14 that it has completed a year of successful testing on new low-cost metallic fuel cell bipolar separator plates that are corrosion-resistant and have strong potential for mass production in high-volume stamping operations.

"The automotive industry needs increased power density, high-volume manufacturability and significantly lower cost in bipolar plates before mass-produced fuel cell vehicles are viable. This first year of testing validates the potential of our technology to meet those goals," said Bill Liss, GTI's director of advanced energy systems.

The uncoated metal plates showed almost no degradation on either the cathode or anode side. Current resistance losses were found to be 10 percent lower than those in high-performance graphite plates often used in fuel cell development, which indicates improved power density and efficiency, according to GTI.

GTI will now test the formability of the metal alloy into different plate configurations, including large plates for multi-kilowatt stacks. [B.G.]

**More information:**

[Gas Technology Institute](http://www.gastechnology.org) (www.gastechnology.org)

**20] Jasper Energy's Solar-Thermal Plant Design Debuts in SW**

A merchant power plant designer and developer plans to erect the first solar-thermal power plant using its patented design near Yuma, Ariz. Jasper Energy LLC, headquartered in Harrison, N.Y., proposes to develop 50 MW of solar-generated power that will make an adjacent combined-cycle power plant about 12 percent more efficient. In approving the plant, the Arizona Corporation Commission said the Wellton Mohawk Generating Project should be operational by 2006 or 2007 in an area that has already been designated as electric transmission-constrained.

The project, to be built in two 260-MW to 310-MW phases, is being developed by Dome Valley Energy Partners LLC, a joint venture of Jasper and SCANA's power plant operating merchant unit affiliate, Primesouth, along with the Yuma County Water Users Association and the Wellton Mohawk Irrigation and Drainage District.

"At this point it looks like the solar component will be developed separate from the main power plant, rather than use a large architecture-engineering firm that would be familiar with building power plants, but may not be familiar with a solar facility," said Vito Elefante, Jasper's executive vice president. "We'll be pretty much working with experts in the solar field."

The 60-acre parabolic trough solar farm will feature reflectors made out of several different materials still being analyzed, said Elefante. He noted that a 3M



reflector looks interesting, and there is "talk of using a glass product; there are a number of new technologies that we're evaluating."

Elefante said this would be the first commercial-scale application of Jasper's patented technology called "SEECOT," or Solar Energy Enhanced Combustion Turbine technology. Its 25 MW in each phase of development—50 megawatts in total—will provide cooling to the main power plant's gas-fired turbines, allowing them to increase their efficiencies by producing the electricity in a cooler ambient environment.

The solar field is used to heat a medium that travels through the steam generator that then goes into a chiller, cooling the inlet air of the power plant's turbines. Cooler inlet air translates into greater efficiency and higher output for the plant. "Turbines run much better when they're at a lower ambient temperature," Elefante said. "This would be the first of its kind, combining solar and gas projects." **[R.N.]**

**More information:**

[Jasper Energy](http://www.jasperenergy.com) (www.jasperenergy.com)

[SCANA](http://www.scana.com) (www.scana.com)

[Arizona Corporation Commission](http://www.cc.state.az.us) (www.cc.state.az.us)

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