



ENERGY PROSPECTS

Executive Summary

Issue 34: February 27, 2004

News Channels

- > Distributed Generation
- > New Fuels
- > Waste-to-Energy
- > Generation Upgrades
- > Combined/Cooling Heat & Power
- > Efficiency Applications
- > Storage & Reliability
- > Transport Propulsion
- > Integrated Energy Webs
- > Green Power

Technologies Index

- Appliances >
- Batteries >
- Biofuels >
- Biomass >
- Capacitors >
- Compressed Air >
- Control Systems >
- Electric Motors >
- Electromagnetics >
- Flywheels >
- Fuel Cells >
- Fuel Innovations >
- Geothermal >
- HVAC >
- Hybrid Auto Propulsion >
- Hydrogen >
- Lighting >
- LNG >
- Low-head Hydro >
- Reciprocating Engines >
- Resource Recovery >
- Solar >
- Tidal >
- Turbines >
- Wind >

BC Hydro CFT Tilted Toward Gas?

Utility ruminates after BCUC review, bidders split over effect @ 1].

Inquiring Shareholders Want to Know

AEP and Cinergy agree to disclose potential emissions impacts @ 2].

LNG May Freeze Island's Peak Pinch

Vancouver Island storage proposal makes pipeline look obsolete @ 3].

LNG: Onshore Vs. Offshore

Siting debate continues at Calif. LNG conference @ 4].

More Pieces of the LNG Puzzle

Shipping and re-injection issues complicate the LNG scene @ 5].

SW Fortifies Renewables Standards

Arizona boosts commitment, while New Mexico makes it law @ 6].

Renewables in PacifiCorp's Future

Renewables, DSM to help PacifiCorp meet projected load growth @ 7].

Financial Risk Spooks Biomass Plant

N.H. regulators put biomass proposal in risk-and-reward quandary @ 8].

Konarka Augments Solar Arsenal

Latest DARPA grant will fuel advances in hybrid photovoltaics @ 9].

Fuel Cells Go Loco on Ammonia

World's largest fuel cell vehicle passes critical design milestones @ 10].

WEB FEATURES



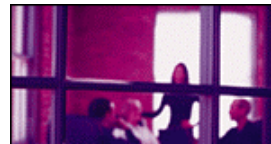
Domains

Indexing Key Energy Technology Web Sites



The Shadow

Shadowing Tech News on the World Wide Web



Podium

Seminars, Conferences, Tradeshows, Exhibits

NEWSTRACK

- Will the Real Price of NG Please Stand Up @ 13]
- Xcel Brings Electric City's Negawatts to Denver @ 14]
- Global Solar Flexible Thin-Film Module Hits 10.7 Percent @ 15]
- Cost, Performance Gains Ready FCs for Light Vehicles @ 16]
- West Creates Renewable Energy Tracking System @ 17]
- Underwater Transmission Link Plan for San Francisco @ 18]
- Green Power Ups and Downs In Florida and Georgia @ 19]
- Solar Power Goes On Duty At Ariz. National Guard @ 20]



OPEN SESAME

Reading a Dynamic Marketing Blurp

Stay clear or risk wasting your powers @ 11].



PROSPECTORS

The Physics of Sustainable Energy

UC-Berkeley's RAEL combines public policy with applied science @ 12].



1] BC Hydro CFT Tilted Toward Gas?

The scheduled retirement in 2007 of a high-voltage direct current transmission line from the British Columbia mainland to Vancouver Island leaves the island with the specter of a 200-MW capacity crunch and the potential of rolling blackouts.

But just how Vancouver Island will fill that void remains unclear in the wake of a decision last fall by the BC Utilities Commission to require Crown corporation British Columbia Hydro and Power Authority to issue a call for tenders (CFT) for alternatives to its proposed C\$370 million, 265-MW natural gas-fired Vancouver Island Generation Project (VIGP) near Nanaimo, with its accompanying fuel supply, the C\$340 million Georgia Strait Crossing Pipeline (GSX), a joint venture with Williams Gas Pipeline Company.

While the commission denied approval of the C\$710 million plan, some bidders in the call for tenders and other interested parties remain skeptical of the process, arguing that it appears designed to transfer the VIGP project to a private-sector developer.

BC Hydro has already sunk a combined \$110 million to \$120 million into VIGP/GSX, and private-sector interest is high. Twelve of the 23 registered bidders have proposed natural gas projects for Nanaimo, while PPM Energy and Sea Breeze Power Corp. are pitching wind projects and several others are proposing biomass, coal, small-scale hydro and cogeneration projects.

"We are concerned that BC Hydro is institutionally so committed to resurrecting VIGP under a private bidder that other projects will not be given a fair look," Dan Potts, executive director of the Joint Industry Electricity Steering Committee, a group representing the largest industrial energy consumers on Vancouver Island, told *Prospects*.

But a late January review of the call for tenders process by the BCUC—in which the commission encouraged BC Hydro to proceed, stating that it may revisit questions of its CFT design upon selection in late August—moved at least one early skeptic, NorskeCanada, to drop its opposition.

One of the largest paper manufacturers in North America, Norske is now going ahead with its bid to install cogenerating gas turbines capable of producing 364 MW of electricity at its three Vancouver Island pulp mills. "We got the fairness and clarification we sought [in the review]," said Lyn Brown, NorskeCanada's director of corporate affairs.

But some bidders who wished to remain anonymous told *Prospects* they still question the fairness of the call for tenders process on such issues as proceeds from VIGP and non-VIGP tenders, and other interested parties continue to express disappointment over its scope, saying that several cost-competitive

alternatives to on-island generation are not being explored.

Potts, for example, wonders why industrial demand-side management and load curtailment projects in mitigating peak load growth are not eligible. One grassroots organization, GSX Concerned Citizens Group, believes that building a new 230-kilovolt sub-sea cable to the mainland would be the best option, potentially delaying the need for on-island generation until around 2012. The group's president, Thomas Hackney, said he does not believe that on-island renewable resources could fill the capacity gap by 2007, but that mainland resources could.

In a report prepared last fall for BC Hydro by the Rocky Mountain Institute exploring Vancouver Island's potential energy solutions, RMI analysts noted several challenges to developing its renewable energy sources, in addition to intermittancy. For example, many renewable energy resources on Vancouver Island are in the north, where transmission improvements would likely be required to transmit power south. "On-island renewable power would be more viable," according to RMI, "if the transmission extension policy can be modified in such a way that [the incremental costs of transmission capacity] are shared among multiple sources and spread over time."

Overall, RMI's Amory Lovins and Kyle Datta found that there is untapped potential of distributed and renewable resources on the island "that could be forged into a viable resource portfolio that would deliver firm capacity and energy at moderate cost." Such a portfolio could complement the VIGP/GSX project, or provide part of a contingency plan in case it is not completed, they found. Distributed generation could be the least-cost option when the full avoided-cost, risk-management and reliability benefits are included, they added.

Because deliberations at BC Hydro continue over how to react to BCUC's review, the utility delayed its Feb. 18 deadline for the 23 bidders to submit their prequalification papers, said BC Hydro spokesman Ted Olynyk. The utility still plans to announce its preferred option in late summer for an electricity purchase agreement for 150 MW to 300 MW of firm, cost-effective new capacity on Vancouver Island. Independent reviewer PricewaterhouseCoopers will issue its final report at that time. [Garrett Hering]

More information:

[BC Hydro CFT information](http://www.bchydro.com/info/ipp/ipp8467.html)
(www.bchydro.com/info/ipp/ipp8467.html)

[GSX Concerned Citizens Coalition](http://www.sqwalk.com/home.htm)
(www.sqwalk.com/home.htm)

[RMI Report](http://www.sqwalk.com/RMI%20Final%20Report%20-%20October%202003.pdf)
(www.sqwalk.com/RMI%20Final%20Report%20-%20October%202003.pdf)

[Sea Breeze Power](http://www.seabreezepower.com) (www.seabreezepower.com)

RMI found that there is untapped potential of distributed and renewable resources on the island "that could be forged into a viable resource portfolio that would deliver firm capacity and energy at moderate cost."

2] Inquiring Shareholders Want to Know

Under pressure from institutional investors and pension fund groups, two of the nation's largest coal burning utilities, Cinergy and American Electric Power, agreed this month to work with the groups to report the potential economic impacts of their greenhouse gas emissions profiles and reduction strategies. One of Cinergy's strategies was also revealed this month as CEO James Rogers announced the company's interest in building a state-of-the-art integrated gasification, combined cycle (IGCC) coal plant.

In January 2003, a coalition of institutional investors made up of state and church pension funds and led by the Connecticut Retirement Funds and Trust Plans filed shareholder resolutions with the five biggest carbon dioxide-emitting electric utilities—AEP, Southern Company, Xcel Energy, TXU Energy and Cinergy—asking them to report on the business risks of their greenhouse gas emissions and curtailment strategies. With back-to-back announcements this month, AEP and Cinergy agreed to work with independent directors and the shareholder groups to report this fall on their preparations for possible greenhouse gas policy scenarios and the impact on their bottom lines. Whether or not this reporting will recur on an annual basis will depend on regulatory development, according to a Cinergy spokesman.

AEP's pressure has come from a \$19 billion group of investors including the Connecticut pension fund, Christian Brothers Investment Services, Trillium Asset Management, and the pension boards of the Evangelical Lutheran Church in America, United Church of Christ and United Church Foundation. Cinergy, meanwhile, is working with the Mission Responsibility Through Investment Committee of the Presbyterian Church, with assets of more than \$8 billion.

Over the last year, both utilities have been active in developing greenhouse gas reduction strategies. AEP has been a heavy trader on the newly formed Chicago Climate Exchange, and announced in November that it would not build any more conventional coal plants. Both are members of the U.S. EPA's voluntary Climate Leaders Program and have set absolute (rather than per-kWh) emissions reduction targets [see **Movement on GHGs for AEP?**, November 14, 2003].

Cinergy has also begun examining IGCC possibilities, with preliminary engineering and site analysis to explore the feasibility of building an IGCC plant to replace an aging coal plant, CEO Rogers revealed at an IGCC conference at Harvard's Kennedy School of Government this month. While the higher cost of capital and financing for IGCC plants has been the

main barrier to their construction (currently in the \$1,100-\$1,600/kW range—with Cinergy shooting for \$1,450/kW for this project [see **IGCC Around the Bend**, December 19, 2003, and **Prospecting for Clean Coal**, January 30, 2004]), a financing plan by Harvard fellow William Rosenberg of the Kennedy School inspired Cinergy to begin tilting toward a project.

Rosenberg proposes that the U.S. Department of Energy provide a loan guarantee for 80 percent of a new IGCC program, with the participating utility making up the remaining 20 percent in equity, and state regulators providing assurances of dedicated revenues for the program through rates and construction-work-in-progress allowances. Though they haven't given any indication on their stance, members of the Ohio and Indiana regulatory commissions are aware of the proposal and have been involved with the issue, Cinergy spokesman Steve Brash told *Prospects*. Cinergy is the first utility to express interest in developing his proposal, and while funding and regulatory approval hurdles must still be passed, a plant could be online within six to eight years, Brash said.

The company is considering a plant in the 500-MW range to replace a 160-MW conventional coal plant at Edwardsport, Ind. Cinergy has owned the generation side of the Wabash River Generation Station IGCC plant, also in Indiana, since 1995, buying coal gas from Global Energy's gasification system and generating about 270 MW in combined cycle turbines. While Global still owns the system, ConocoPhillips bought the gasification know-how—which was originally developed by Dow Chemical and is one of three gasification processes in use in the United States—in July. But deciding on a particular technology or process will be premature until the public policy side of the project has been developed, Brash stressed.

Also this month, one investor-owned and four public utilities announced support for a CO₂ emissions cap as part of the World Wildlife Fund's PowerSwitch! Challenge, in which they also agreed to a 20-percent renewable portfolio by 2020, or to increase energy efficiency by 15 percent by 2020, or both. FPL Group and Waverly Light and Power of Iowa made the efficiency commitment, the Sacramento Municipal Utility District made the renewable commitment, and Austin Energy in Texas and Burlington Electric Department in Vermont committed to both. **[Ben Gilbert]**

More information:

[Cinergy Corp.](http://www.cinergy.com) (www.cinergy.com)

[AEP](http://www.aep.com) (www.aep.com)

[EPA Climate Leaders Program](http://www.epa.gov/climateleaders/)

(www.epa.gov/climateleaders/)

[Connecticut Retirement Funds and Trust Plans](http://www.state.ct.us/ott/)

(www.state.ct.us/ott/)

[Presbyterian Church's Mission Responsibility Through Investment Committee](http://www.pcusa.org/mrti/) (www.pcusa.org/mrti/)

[World Wildlife Fund initiative](http://www.panda.org/about_wwf/what_we_do/climate_change/)

(www.panda.org/about_wwf/what_we_do/climate_change/news/news.cfm?uNewsID=11222)

Cinergy has begun examining IGCC possibilities, with preliminary engineering and site analysis to explore the feasibility of building an IGCC plant to replace an aging coal plant.



3] LNG May Freeze Island's Peak Pinch

Terasen Gas, formerly Centra Gas, in February began a rezoning process for its newly proposed C\$100 million liquefied natural gas storage facility on Vancouver Island, near Nanaimo. The peak-shaving facility is yet another solution aimed at easing Vancouver Island's impending 200-MW power pinch with the scheduled retirement of a sub-sea high voltage transmission line in 2007 [see **BC Hydro CFT Biased Toward Gas? @ 1]**].

The regulated utility is promoting the facility as the most efficient way to meet growing residential and commercial demand on its Vancouver Island gas distribution system, as well as provide firm capacity that may be required by British Columbia Hydro and Power Authority at an existing cogeneration plant or as a peak-shaving fuel source for a potential new gas-fired generation facility at Duke Point, also near Nanaimo.

For now, however, it remains unclear whether the beleaguered gas plant initiated by BC Hydro, or the proposed Georgia Strait Crossing (GSX) Pipeline intended as its fuel supply, will be built. But Terasen's proposal will go forward even if the Duke Point plant and/or GSX do not, company spokesman Dean Pelkey told *Prospects*.

The proposed peak-shaving facility is an economically and environmentally sound alternative to building new pipelines such as GSX, Pelkey said, but even if the gas plant is shelved, Terasen believes the LNG storage plant will enable it to use its existing pipeline more efficiently and meet new demand incrementally at the lowest cost.

Talks between Terasen and representatives from the local and provincial governments, First Nations communities and the general public are ongoing. Terasen expects the rezoning process, including a public hearing, to last four to six months, and hopes to start construction in early 2005 after selecting a bidder. Pending approval of local and provincial authorities, the utility could begin filling the 60-meter-wide, 55-meter-high tank as early as September 2007, roughly coinciding with the closure of the sub-sea transmission line.

The utility envisions transporting natural gas to the LNG storage facility during times of excess capacity in the summer, then liquefying and storing it for use during periods of high demand in the winter. The proposed facility will hold enough gas to meet local residential and commercial demand for more than 30 cold winter days.

Terasen projects that the facility would deliver more than \$300,000 in new tax revenue to local government and would create hundreds of new jobs during its construction, as well as a handful of permanent jobs thereafter.

In terms of energy storage on Vancouver Island, BC Hydro has extensive experience with pumped storage hydro, but neither utility has much experience with other storage strategies. Terasen has deployed LNG storage on the lower mainland.

The proposed peak-shaving facility is an economically and environmentally sound alternative to building new pipelines, Terasen says.

The Nanaimo area is also noteworthy for a Nexen Chemical sodium chlorate plant that produces hydrogen as its byproduct, which some view as a promising cheap source of hydrogen for an initial pilot project to demonstrate hydrogen storage on Vancouver Island. The Canadian government last year pledged a large increase in funding for fuel cells and other hydrogen economy technologies as a part of its Climate Action Plan. As yet, neither BC Hydro nor Terasen has sought to initiate such a pilot project. **[G.H.]**

More information:

[Terasen Gas LNG storage project](http://gas1.terasen.com/terasen/lngstorage.html)

(<http://gas1.terasen.com/terasen/lngstorage.html>)

4] LNG: Onshore Vs. Offshore

The economics, safety, technology and growing need for liquefied natural gas imports in North America were all well documented during a two-day conference earlier this month in Long Beach, Calif., whose harbor is currently a prime potential site for an LNG receiving terminal. However, the debate over whether onshore or offshore locations are best suited for an influx of the global energy cargo is not likely to be resolved anytime soon. And when it is, government policymakers, not industry experts, are likely to make the decision.

The Pacific Coast LNG Development conference offered more than a dozen speakers from industry, government, financial and community sectors, along with an informed audience of LNG industry participants, but attendees were split on the question of plant siting.

ChevronTexaco recently examined both onshore and offshore sites for a proposed West Coast receiving terminal for supplies it has off the Northwest Shelf of Australia, concluding that an offshore site near South Coronado Island off the North Baja Pacific Coast is the best location for receiving LNG shipments. The proposal, however, is still awaiting action by federal Mexican energy authorities who have granted permits to three other developers with onshore sites.

Michael Christensen, multi-facilities project manager for ChevronTexaco, said he applied selection criteria of safety, environmental facts and pipeline proximity to onshore, offshore "gravity-based structures" (GBS), and offshore "floating structure and re-gas units" (FSRU). His conclusion was that the protected GBS site off South Coronado Island is the preferred place because of weather, logistical, safety and environmental advantages.

An executive with Mitsubishi Corp.'s Sound Energy Solutions (SES) subsidiary, which is proposing to build a terminal on 24 acres of a former U.S. Navy base in Long Beach Harbor, touted his proposed plant's safety, environmental potential for mitigating port air emission problems and its proximity to the local utility transmission pipeline system. This ran counter to claims by ChevronTexaco's Christensen, who said his firm had thoroughly examined West Coast LNG import sites and decided that offshore is the only viable option.

With reliability and safety being a part of almost every presentation at the two-day conference, SES COO Tom Giles admitted during the Q&A session that the recent Algerian tragedy has hurt the proposals for new LNG import terminals throughout the United States. He thinks that the increased concerns among policymakers, government officials and the general public can be overcome, but further seeds of doubt have been planted.

Offshore siting advocates such as Bill Perkins III, president of Houston-based Crystal Energy, argue it is better not to add to the negative perceptions that concern onshore sites. Crystal has a proposal for converting an idle offshore oil platform 11 miles off Ventura County in Southern California to bring in LNG from Alaska and other Pacific Rim sources. The Clearwater Port allows Crystal to use existing infrastructure and minimize environmental impacts, Perkins said.

In Mexico, the Altamira LNG receiving terminal is pretty much assured because it is tied to a network of new power plants being built by Mexico's federal government electricity provider, but in North Baja "the market will decide," along with local permitting and environmental issues, said Alejandro Buena de la Rosa, director general for natural gas at Mexico's Comision Reguladora de Energia.

De la Rosa said natural gas use for electric generation was going to continue on a rapid growth path in Mexico at more than 12 percent annually. Oil, the current dominant generating fuel, will continue a steep decline while gas moves from its current position of just under 30 percent of the power generation to providing nearly 60 percent of all Mexican electricity. **[Richard Nemec]**

More information:

[ChevronTexaco](http://www.chevrontexaco.com) (www.chevrontexaco.com)

[Sound Energy Solutions](http://www.soundenergysolutions.com)

(www.soundenergysolutions.com)

[Crystal Energy LLC](http://www.crystalenergyllc.com) (www.crystalenergyllc.com)

5] More Pieces of the LNG Puzzle

As the United States contemplates new liquefied natural gas receiving terminals along the Pacific and Gulf of Mexico coasts, a host of often-forgotten issues must be dealt with upstream and downstream of the process. In the so-called "LNG value chain," the receiving and regasification process at proposed coastal facilities is the relatively straightforward part, according to speakers at the recent two-day Pacific Coast LNG Development conference in Long Beach, Calif.

LNG shipping is a multi-billion-dollar industry that is undergoing its own technology and staffing challenges as the levels of global trade threaten to burst with the entry of the West Coast of North America into the shipping patterns.

Noting that he expects a rapid expansion of LNG ships owned by global oil and gas giant BP, Marc Hopkins, BP's gas shipping projects manager, said the industry needs to "look at the whole gamut of the shipping industry—both on the ships and in the terminals"—to apply advances in technology and crew

training. There are currently 160 LNG ships operating worldwide and another 53 firm orders for new ships through 2006, he said.

In addition to new technology for transferring LNG to and from the ships at marine terminals at both ends of the process, the traditionally steam-powered LNG ships are being transformed, Hopkins told the Long Beach

Certain mitigation measures must be considered, depending on where the LNG is going to be injected into the existing transmission/distribution pipeline system.

industry audience on Feb. 11. "In the future, I think ships will go to two propellers with diesel power—either steam-electric or direct diesel." Hopkins said this would reduce reliance on increasingly costly steam turbines. In developing bigger ships for long hauling

to the North American West Coast, draughts of ships can remain the same if they have "twin screws or two propellers," he said, noting that these ships can service existing or other shallow-draught terminals, such as those on the U.S. East Coast.

Another technological advance is the use of less steel, making lighter ships, Hopkins said. "The ships are structurally as strong as previously and meet the same transportation requirements," he said.

Once at its receiving terminal for regasification, LNG presents more challenges for the onshore natural gas system operators or direct end-use industrial customers. The heating value and the hydrocarbon composition and mix must be carefully dealt with, and the extent to which this can become an issue may depend on the degree to which the gas was processed and cleaned before the liquefaction process that turns it into a liquid for transport.

"There are a lot of ripple effects on processing and operations that you have to pay attention to in injecting LNG supplies into an existing natural gas system," said Larry Martin, a Houston-based consultant, who noted that injecting LNG supplies can be much easier in the Gulf than on the West Coast because of the Gulf's greater need for heavier hydrocarbons such as ethane and its existing capacity to mix the LNG with offshore supplies.

"LNG is produced from gas that has been extensively treated, dehydrated and processed in order to permit its liquefaction," Martin said. Therefore, he warns that certain mitigation measures must be considered, depending on where the LNG is going to be injected into the existing transmission/distribution pipeline system. Pure "slugs" of LNG into a distribution system could cause some problems for industrial customers, he said. In some cases, a dedicated pipeline for the LNG or additional receiving terminal processing and additional natural gas liquids storage may be necessary. **[R.N.]**

More information:

[BP](http://www.bp.com) (www.bp.com)

6] SW Fortifies Renewables Standards

The Arizona Corporation Commission voted 4-1 on Feb. 10 to keep moving forward with the renewables increases laid out in its Environmental Portfolio Standard and announced a series of workshops to be held around the state starting March 5 to consider EPS-related issues. "Solar energy is Arizona's Internet," said Commissioner Kristin Mayes. "It's a unique resource for us to take advantage of, and this isn't the time to step back from our commitment."

Commissioner Mike Gleason, the lone "no" vote, questioned giving "subsidies to the solar industry" and why the commission would "set a goal when it doesn't know how to get there." But Commissioner William Mundell countered, "We need to send a message that we are not going back to the days when energy was solely generated by fossil fuels."

Arizona was the first state to adopt a renewable portfolio standard and was unique in its requirement that solar energy make up at least 60 percent of the portfolio. Last year, a state-appointed committee that studied the EPS since it went into effect in 2001 recommended that the commission either stick with the requirement that 1.1 percent of retail energy sales come from renewables by 2007, or freeze the level at 0.8 percent, pending further review of solar costs [see **Arizona Releases EPS Scorecard**, July 25, 2003].

The commission approved the increase to 1.1 percent and flagged several issues to be thrashed out at the workshops, most notably whether solar should continue to dominate portfolio requirements, or if utilities should have more latitude to make renewable megawatts from other sources like wind and biomass. The commission acknowledged that while solar is the state's best renewable resource, it is expensive, commanding a premium of 11 cents/kWh.

Ed Fox, vice president of communications, environment and safety for Arizona Public Service, said the state needs to provide more funding to help utilities meet EPS requirements. Commission chair Marc Spitzer agreed that "the current rules disadvantage technologies other than solar" and suggested raising funding levels for all technologies.

At the workshops, commissioners want to discuss the merits of "new and emerging technologies," including wind, biomass, hydrogen fuel cells and next-generation nuclear plants. Other topics will include further increases in portfolio requirements, EPS funding levels and deadlines, and restoring demand-side management funding.

Meanwhile in New Mexico, state legislators have voted to pass into law the Renewable Portfolio Standard adopted by the Public Regulation Commission last year. The RPS requires that at least 5 percent of a utility's retail sales be generated from renewables by Jan. 1, 2006, increasing 1 percent each year up to 10 percent in 2011.

While utilities had raised questions about the RPS and El Paso Electric had challenged the PRC's authority to impose the rule in state court, when the smoke cleared in Santa Fe this month, all three IOUs that serve in the state

supported the RPS bill. Gov. Bill Richardson championed the legislation and said he will sign it. New Mexico's Coalition for Clean Affordable Energy estimates the RPS will cause 500 to 600 MW of renewable energy (mostly wind) to be built in New Mexico. [*Susan Whittington*]

More information:

[Arizona Corporation Commission](http://www.cc.state.az.us) (www.cc.state.az.us)
[New Mexico Coalition for Clean Affordable Energy](http://www.cfcae.org) (www.cfcae.org)

7] Renewables in PacifiCorp's Future

Portland, Ore.-based PacifiCorp announced earlier this month its first step toward attaining an additional 1,400 MW of renewable energy as called for in its 2003 Integrated Resource Plan. The company said that its request for proposals, which seeks 1,100 MW of renewables over the next seven years, represents one of the largest RFPs of its kind ever issued by an investor-owned utility.

The RFP specifically targets 500 MW in Oregon, Washington state and Northern California by 2009, and 600 MW in Idaho, Utah and Wyoming by 2010. PacifiCorp said it expects its RFP to garner interest primarily from wind power developers, though it extended its request for renewables to geothermal, solar, biomass, digester and landfill gas, and hydro power located outside of protected areas. The company currently serves six Western states as Pacific Power and Utah Power.

Dave Eskelsen, a spokesman with PacifiCorp, told *Prospects* that as a heavily intensive coal-based utility, PacifiCorp now believes that "the most prudent course of action for our future resource portfolio is to try and achieve a sensibly balanced portfolio of resource types. We don't want to be too dependent on one type," he stressed.

A sizable increase in renewable energy and especially wind power, added Eskelsen, could also work to help PacifiCorp meet its bottom line. "When you consider the coming [financial] effects of more traditional fossil-fuel generation," he said, "we think that renewables score out pretty well in our portfolio."

Also this month, PacifiCorp announced its alliance with the California Climate Action Registry. The partnership is intended to help PacifiCorp voluntarily increase its energy efficiency and decrease its emissions of greenhouse gasses. According to CCAR, the registry enables utilities and organizations to establish baselines "against which any future GHG emission reduction requirement may be applied."

The move could take on increased significance in coming years, as PacifiCorp's 2003 IRP predicts a projected load growth of about 4,000 MW between 2004 and 2013. If fulfilled, PacifiCorp's call for an additional 1,400 MW of renewable generation would fulfill roughly only one-third of that amount. Eskelsen said that as of today, PacifiCorp plans on filling the remaining projected gap with traditional resources such as natural gas and coal, though he added that the company is also investigating how an increased focus on demand-side



management might help narrow the impending gap.

For example, he said that pilot DSM projects introduced last summer in residential Utah could provide PacifiCorp with essential data needed to help spawn additional load-curtailling programs. The project, which employs radio-controlled switches mounted on external air-conditioning units, controls when and how frequently air conditioners are allowed to cycle. Such programs, said Eskelsen, are expected to eventually help PacifiCorp allay its projected load growth by up to 450 MW. [Joel Puglisij]

More information:

[PacifiCorp](http://www.pacificorp.com) (www.pacificorp.com)
[CCAR](http://www.climateregistry.org) (www.climateregistry.org)

8] Financial Risk Spooks Biomass Plant

In its Feb. 6 order approving Public Service of New Hampshire's unique Northern Wood Power Project, the New Hampshire Public Utilities Commission also threw the utility a curve ball by setting forth a risk allocation plan that would force the utility to risk a quarter of its net annual earnings—giving the company pause on how to move forward with the project.

PSNH is finding itself in uncharted territory on the technological, green trading and regulatory fronts surrounding Northern Wood. The company's plan to replace an aging coal-fired boiler with a unique, \$70 million wood-fired circulating fluidized bed (CFB) boiler—financed by the sale of Renewable Energy Certificates to Connecticut and Massachusetts utilities—has created one of the first tests of New Hampshire's deregulation laws as regulators and interest groups alike traded different interpretations of how to allocate public, ratepayer and utility risks and rewards.

The project would be one of the first and largest applications using biomass fuel exclusively with a CFB unit—a modular, relatively affordable and low-emissions technology that recently won the project Class I REC status in the neighboring RPS states of Connecticut and Massachusetts—a rare designation for a biomass plant [see **CFB Biomass Plant Draws Attention**, January 30, 2004]. PSNH believes it can use the sale of those RECs to cover all or nearly all of the capital costs without increasing rates, but the uncertain market for those RECs leaves a big capital finance question for Northern Wood—Connecticut's market is just being launched and Massachusetts' has been in place for just one year. With low trading and an infant market, 2004 prices yielded \$35 to \$40 per MWh in Massachusetts; PSNH calculates it can make \$6.3 million per year on RECs at \$20 prices if the 50-MW plant runs at 80 percent capacity, and up to \$16.9 million with \$45 RECs and 95 percent plant capacity.

Critics of the project argue, however, that not only could the bottom drop out of the REC market as more renewables come online—particularly as large offshore wind projects in the Northeast persist in pressing forward—but with a political wind of change, either state could simply abolish its RPS, eliminating the REC market altogether. PSNH proposes to recoup some capital costs with the sale of SO₂ and NO_x emissions credits, reduced emissions

compliance costs and increased power sales with a higher capacity factor of the CFB technology (over 90 percent versus under 75 percent with the existing boiler). If the federal energy bill passes and includes the extension of a production tax credit to open loop biomass, that could also boost the project.

But the bulk of the financing is bound up in projected REC sales. In its order, the New Hampshire PUC

The bulk of the financing is bound up in projected REC sales.

acknowledged that the emissions reductions, state timber industry boost, increased reliability and fuel diversity would provide significant public benefit. But the PUC offered approval of the project only

under the condition that PSNH guarantee incremental revenue from the RECs, lower emissions compliance costs and the higher capacity factor to the tune of about \$8.9 million a year, or about 25 percent of PSNH's annual net earnings. That would amount to "a really big hit" if the REC markets do, in fact, collapse, PSNH spokesman Ian Wilson told *Prospects*. PSNH would not be able to recoup those funds through rate increases and would have to take a loss if the incremental revenues never materialize.

"Post-deregulation, with this project, we are kind of stepping into new territory, so the rules are a little unclear in terms of cost recovery. The Northern Wood Power Project is a bit of a test case on this," Wilson said. PSNH is willing to engage in some sort of risk-sharing arrangement, but the PUC's proposal "shifted too much risk onto the company." PSNH is now trying to get the PUC to revise its order and meet the company somewhere in the middle on risk sharing with customers. Wilson said the company still wants to have the plant online by the spring of 2006 and is continuing to develop other aspects of the project, but is "cautiously optimistic" about whether the PUC will budge. The project has key backers in the legislature and environmental community, but is being opposed by consumer groups and other wood-burning power plants in the state. [B.G.]

More information:

[Public Service of New Hampshire](http://www.psnh.com) (www.psnh.com)
[New Hampshire PUC order](http://www.puc.state.nh.us/Regulatory/Orders/2004orders/24276e.pdf) (www.puc.state.nh.us/Regulatory/Orders/2004orders/24276e.pdf)

9] Konarka Augments Solar Arsenal

Solar photovoltaics developer Konarka Technologies, Inc. of Lowell, Mass., last week announced its most recent, and by far largest, research grant awarded through the U.S. Department of Defense. Funded through the DoD's Defense Advanced Research Projects Agency, the \$6 million dollar award is intended to catalyze the development of new materials for high-performance photovoltaic cells.

To date, Konarka has received more than \$7.3 million in research contracts from DARPA. While the agency is focused on furthering the solar efficiency cause in order to develop remote and flexible power systems for soldiers and



unmanned vehicles [see **Solar Clothes and Portable Power**, September 5, 2003], Konarka says the grant will also help hasten the arrival of low-cost, long-lasting and highly efficient solar cells for civilian applications.

Konarka will direct its latest round of funding toward the advancement of hybrid photovoltaic cells, which the company says represent "the intersection" of dye-sensitized cells (DSSC) developed by Dr. Michael Graetzel and polymer cells developed by Nobel Laureate Professor Dr. Alan Heeger. Both scientists are part of Konarka's technical team.

The hybrid cell, according to Konarka, takes advantage of both the DSSC and polymer cells, while addressing the weaknesses of each. Similar to DSSC cells, hybrid cells employ dye-sensitized titania coated and sintered on a transparent semi-conducting oxide, though they substitute a conducting polymer for an electrolyte in order to shuttle electrons from the cell's counter electrode to the oxidized dye. Because "the one polymer replaces the multi-component electrolyte," Konarka states, "the cells are expected to be far simpler to make reproducibly and should afford the same or similar form factors as the polymer PV type cells."

Though not yet at the performance level of DSSC technology, hybrid cells are ultimately expected to yield much higher rates of efficiency, said Konarka Executive Vice President and Chief Marketing Officer Daniel Patrick McGahn. By 2008, he told *Prospects*, Konarka expects to demonstrate a 20-percent efficiency rate in the lab with its hybrid cells before scaling up to production of the technology.

Nevertheless, McGahn said that the hybrid cell chemistry is only one agent in Konarka's "arsenal" and represents just one of its potential paths toward producing versatile, high-efficiency solar cells. Stressing the need for "a portfolio of technologies that leverage each other at each step," McGahn said that Konarka intends to bring its DSSC cells to market by 2005. While these cells have already yielded up to 12-percent efficiency rates in the lab, McGahn said that from a production standpoint, the cells (which Konarka says will make it the first to manufacture and commercialize highly efficient, flexible photovoltaics), will achieve minimum efficiency rates of 7 percent. **[J.P.]**

More information:

[Konarka Technologies](http://www.konarkatech.com) (www.konarkatech.com)

[DARPA](http://www.darpa.mil) (www.darpa.mil)

10] Fuel Cells Go Loco on Ammonia

With an eye on commercial and military applications, the developers of what could be the world's largest fuel cell vehicle—a 109-metric-ton locomotive—have cleared a major design hurdle in selecting both the fuel cell type and fuel source for the 1.2-MW project. These were arguably the biggest design challenges in retrofitting an existing army diesel electric locomotive with fuel cell power while retaining the same performance characteristics.

Vehicle Projects LLC, the project developer, this month announced that the optimum design combines the

high power density and quick start capabilities of PEM fuel cells with the compact storage of an onboard metal hydride system, which will be supplied with hydrogen generated from ammonia stored off-board. The Defense Fuel Cell Locomotive project, funded by the U.S. Department of Defense's National Automotive Center at the U.S. Army Tank-automotive Armaments Command, will utilize eight of Nuvera's new FORZA PEM stacks aggregated to a 1.2-MW power plant, and hydrogen generators produced by another DoD contractor, MesoFuel, it was announced this month. The project received initial funding of \$1 million to initiate the design phase last May, and is expected to cost a total of \$12 million and be in operation by 2008.

Vehicle Projects considered five different fuel cell types, and chose PEM cells because of their long cycle life, power density that in some analyses beats diesel engines, commercial availability and a technological maturity that still has some development potential. But choosing a fuel source, and by extension a storage system, was by far the first and biggest issue, given cost and space constraints not

Choosing a fuel source, and by extension a storage system, was by far the first and biggest issue.

only in this project but also in the rail industry, Vehicle Projects President Arnold Miller told *Prospects*.

Potential future fuel cell customers in the rail industry have a lot at stake in terms of fuel costs; project partners Burlington

Northern Santa Fe Railway and Union Pacific both surpass the U.S. Navy's diesel expenses, with each railroad claiming to spend about \$1 billion per year.

A multitude of storage mechanisms, hydrocarbons and other hydrogen sources were considered for the Defense Fuel Cell Locomotive project, but ammonia has a number of cost, logistical and safety advantages, Miller said. Hydrogen from ammonia costs about \$1.70 per kg, versus \$4-\$5 per kg for hydrogen produced with electrolysis. The process is also a lot simpler and cleaner than hydrocarbon reformation, which uses reformers that typically outsize the fuel cells they supply. Vehicle Projects found that using compressed hydrogen would have taken up more than half of the engine compartment, and a reformer would have taken at least as much space—hence the onboard metal hydride storage and off-board hydrogen production configuration. The metal hydride system will take about 30 minutes to refuel. Future projects could see some combination of onboard ammonia storage and hydrogen production, depending on the application.

Ammonia as a commodity is also transported primarily by rail, so it's highly available. The safety characteristics are also attractive; ammonia has a high energy density, with pressure, temperature and storage characteristics very similar to propane, but it is considered to be nonflammable except in extreme circumstances. And while concentrated levels can be harmful if ingested, the smell of an ammonia leak is detectable at one-tenth the concentration level that federal regulations permit workers to be exposed to, according to Miller.

The fuel cell power plant and hydride storage system may actually end up being smaller than the diesel engine it replaces, and ballast may have to be added to preserve the weight. Vehicle Projects recently finished a project to retrofit and demonstrate a small battery-powered mining locomotive with a fuel cell and metal hydride system and had to replace nearly a third of the weight with ballast because of the improved power densities. The fuel cell in that project also provided healthier and quieter working conditions in the mine, with refueling times that far surpassed the battery recharging times.

Once completed, the Defense Fuel Cell Locomotive will be demonstrated as a "switcher" at a military base in Nevada, transporting supplies to and from commercial rail lines at the edge of the base. Switchers are notorious idlers since large diesel engines don't easily restart, so the stop and start capabilities of the fuel cells could prove advantageous in preventing constant emissions and fuel consumption. Vehicle Projects also has commercialization partners considering the applications for subway systems, utility rail, commuter rail, light rail, heavy freight and high speed rail. **[B.G.]**

More information:

[Fuel Cell Propulsion Institute](http://www.fuelcellpropulsion.org)

(www.fuelcellpropulsion.org)

[Vehicle Projects LLC](http://www.vehicleprojects.com) (www.vehicleprojects.com)

[Nuvera](http://www.nuvera.com) (www.nuvera.com)

[MesoFuel](http://www.mesofuel.com) (www.mesofuel.com)



OPEN SESAME

11] Reading a Dynamic Marketing Blurb

"I read the news today, oh boy," to quote a Beatles song that many of you will recognize. It would be more accurate to say that I read a blurb today from an *Energy Central* advertiser, but it was news of sorts:

"Harness the Power of Today's Dynamic Energy Markets with NewEnergy! Join the FERC, the Midwest ISO, the California ISO, and numerous other energy companies and jurisdictions that are enlisting the Siemens family of companies for support in developing markets. The economic impact of LMP requires serious consideration of how your revenue and profit will be effected. We specialize in the following LMP areas: cost/benefit analyses, industry-leading software solutions for LMP/FTR computation, & consulting expertise."

I am not an energy market systems maven, but I can tell you that LMP means locational marginal pricing and FTR means fixed transmission rights. How these complex variables interact (which of course they indeed do) is not for me to hold forth on. My major concern is the problematic situation of "developing markets" in terms of "revenue and profit."

Our editorial concerns (and by extension the concern of this column) take for granted that developing resources

are useful because they are intended to be reliable, efficient, clean and therefore good economic products. The generic problem of how the electric output of these resources comes to be matched with load is a complex matter. The technological path we often cover here tends toward development intended to shorten the span from resource to load, and when possible, integrate these two in real time.

The wholesale market does not usually figure in these higher-tech circumstances, although it can, but issues of revenue and profit certainly do. With respect to the market and resources, then, I hope that what might follow the quoted song line above (transformed to our energy topic) does not turn out to be "The FERClash army had just won the war."

By this I mean that FERC-promoted market development ought not to be a war winner unless there is corresponding development of resources that on account of

The market future FERC envisioned has not been associated with a good job of resource development of any sort.

what and where they are really need to be marketed. That doesn't seem to be happening, and as it turns out, the market future FERC envisioned has not been associated with a good job of resource development of any sort.

Parts of the industry are still limping from a disaster that bloated the energy enterprise with companies in business to buy (or in some cases even build if all else failed) resources that when taken to market would make them a bundle. The triggering event here was an attempt to reduce power rates in California by some magical mathematics that added dozens of companies and their payrolls to the power mix and expected lower prices.

That's almost the equivalent of increasing on-court basketball team membership to eight players as a way to reduce ticket prices.

I attended the great kickoff of this expected deregulation miracle in Los Angeles in the mid 1990s. I can tell you that the L.A. Convention Center main hall was full of business people who were on hand solely for the purposes of exploring how to get aboard and suck up some of the enormous amounts of "revenue and profit" that seemed to be in the offing. How this squared with lower power rates was not all that clear then, nor is it now.

The Pacific Northwest Regional Power and Conservation Act of 1980 says its overall goal for that region was to help assure an adequate, efficient, economic and reliable supply of electric power. Any energy business opportunity needs to see itself as being in accord with those assurances, and a market must also meet those objectives. If a developing market functions to support its players with higher costs to ratepayers, then it is by definition dysfunctional development.

Energy Prospects covers its range of technical and resource subjects on account of client interest in benefits associated with useful development and deployment. The controlling idea is to do better by doing more with less input and lower cost. Otherwise, why bother?



I am not suggesting that there is no merit in market operations. Most resources in the country are remote from load, although I continue to believe that remoteness has to diminish over time. But the impetus for FERC and market promotion in the first place turned out to be a reverse Catch 22. The market was supposed to make a bunch of money for marketers by saving money for distribution utility ratepayers.

The resulting mathematical double-shuffle helped drive the nation's largest utility, Pacific Gas & Electric, into bankruptcy. But I am not writing this column to belittle NewEnergy and Siemens. I am rather renewing in a different context my long-brewing suspicion of what FERC has been trying to do, even though there might well be some technical benefits to regional transmission organizations.

This would be particularly true if the RTOs also took on responsibility for investigating and helping develop alternatives to new transmission with so-called no-wires initiatives. And to be frank, I would have been happier with that introductory blurb had it offered a service to help marketers lower their costs and in hopeful consequence lower their power rates.

The promise of making a bundle making deals in the developing market air puts me in mind of Wordsworth's lines that say, "The world is too much with us; late and soon, Getting and spending, we lay waste our powers." Less poetically, unless you own something that simply has to be marketed, think that "the Power of Today's Dynamic Energy Markets" really sounds like Enron just before the wheels fell off. Or even a suspect invitation from the opening song: "I'd love to turn you on." [Cyrus Noë]

PROSPECTORS

12] The Physics of Sustainable Energy

With three degrees in physics, including a doctorate from Cal Tech, Daniel Kammen has advanced his career as academician and researcher in a hybrid mix—part laboratory research, part applied technology and part public policy advocacy. Unabashedly, he is out to advance what he considers an under-served part of the economy: energy and system analysis.

"My role is very much to do 'all of the above' and that is why our lab [Renewable and Appropriate Energy Laboratory or RAEL] has grown so large," says Professor Kammen, a faculty member in the Energy and Resources Group (ERG) at the University of California, Berkeley.

Kammen came to Berkeley from Princeton in 1998 with the proviso that he would be able to establish RAEL and foster his wide-ranging, interdisciplinary approach to attacking society's broad energy problems. Today, the lab, as one of its kind in the United States and the world, has affiliations with the ERG, the public policy school and the nuclear engineering department on the Berkeley campus.

"Energy is the single largest sector of the global economy when you add up the dollars, materials, transport across international borders," Kammen says. "It

is not clear that we do enough high-level thinking about what are the best ways to do that.

"Most of the analysis you see along those lines is very strongly driven by the ideology of the people doing the analysis. I would like to see more good solid tools developed, such as life-cycle effects, environmental economics and a whole variety of things that we can use to make those assessments. Everyone may not agree with them, but they would be more understandable. We do a lot of work [at RAEL] on developing and using those types of tools."

Researchers at RAEL are exploring the technical requirements and potential benefits of "hydrogen corridors," such as the 50-mile stretch of Interstate 80 between the San Francisco Bay Area and Sacramento, Calif. The idea calls for stations along the route that alternately can provide hydrogen fuel for vehicles or sell electricity to the grid. The stations can produce one or the other, taking advantage of demand

"It is striking how few people are working on energy issues in the country who aren't wedded to one technology."

for hydrogen for vehicles or the price of electricity during the day, Kammen says.

His lab has developed two software modeling tools to identify where to locate the power stations and the likely profits as a function of the price of natural gas and petroleum, along with other factors, such as the number of fuel cell-powered vehicles on the road. Hydrogen-powered fuel cell vehicles also can be used to generate electricity when they are parked if natural gas prices are low. Power produced from the vehicles is sold back to the grid when the vehicles are not in use.

"This idea can transform how we think about our cars—which are idle an average of 23 hours per day," says Kammen. He noted that RAEL's models are being made available to the California Energy Commission and to industry in general.

Kammen is very much the pragmatist and integrationist in his work, and he thinks these two qualities too often are lacking in the broad energy context running through today's globally focused world. His projects, which tend to center on combined-heat-and-power applications, stress energy self-reliance, lowering environmental impacts and increasing efficiencies.

"It is striking how few people are working on energy issues in the country who aren't wedded to one technology," says Kammen. "There are people very proficient at doing natural gas analysis; others very good at wind or nuclear, but clearly one of the crying needs is for how to think about the system of technical and policy and economic aspects of how these things get put together.

"I'm an environmentalist in the sense that the things we look at [in RAEL] affect the environment, but my basic mode isn't that if something isn't good for the environment, then I won't consider it. I am much more interested in what I would consider sustainable energy systems."



For CHP, there is no technological "magic silver bullet" that is just over the horizon, says Kammen. Rather, its emergence as a major force just depends on more painstaking, widespread integration work using the technology already available.

"In terms of power generation and management technologies, we're in pretty good shape [in the energy sector]," Kammen says. "We do need some new technologies in terms of managing the grid, but most of those are available. Ironically, if we managed the grid with the technology that goes into everyone's cell phone—real-time, two-way communications technology as opposed to 1950s relays and switches—we could make a lot of these CHP decisions. We're right at the cusp of that right now."

Kammen's point is that by using readily available control/monitoring technology that would make the grid smarter, our society's centralized plant grid system could intelligently deal with a whole array of distributed generation applications tied in, too, along with the major power plants. He thinks this solution would be good for the economy and the environment. Few can argue with either the physics or the public policy. [R.N.]

More information:

[Renewable and Appropriate Energy Laboratory](http://Socrates.Berkeley.edu/~rael/)
(http://Socrates.Berkeley.edu/~rael/)
[Energy and Resources Group](http://list-socrates.berkeley.edu/erg/)
(http://list-socrates.berkeley.edu/erg/)

13] Will the Real Price of NG Please Stand Up

In a letter to the Federal Energy Regulatory Commission in late January, the Industrial Energy Consumers of America called on FERC to require price reporting in the wake of recent Commodities Futures Trading Commission civil penalties totaling \$50 million handed down to energy trading firms Aquila Merchant Services, Xcel Energy subsidiary e prime, Entergy Koch Trading, Oneok and Calpine Energy Services for false reporting of natural gas prices.

Official gas market information that does not include liquefied natural gas storage tanks for peak-shaving may also be at fault for false prices.

CFTC has now handed down civil penalties, or reached settlement, with 16 companies for false reporting. "Voluntary reporting of prices has failed," wrote Paul Cicio, executive director of IECA, in his letter to FERC commissioners, adding that current natural gas price indices are in disarray after five years of gaming. "How long must consumers wait for action by the FERC and/or by Congress to correct the situation?"

Official gas market information that does not include liquefied natural gas storage tanks for peak-shaving may also be at fault for false prices. Official Energy Information Administration storage reports do not account for LNG peak-shaving facilities, notes energy consultant Ben Schlesinger.

This leads traders to the erroneous view that supply and demand are out of balance and unnecessarily drives prices higher, as happened in the Northeast this winter, Schlesinger told *Natural Gas Daily*.

The energy consultant said that gas market participants may not realize that a large percentage of supply on peak days comes from LNG storage tanks. [G.H.]

More information:

[Industrial Energy Consumers of America](http://www.ieca-us.com/index.html)
(www.ieca-us.com/index.html)

14] Xcel Brings Electric City's Negawatts to Denver

Electric City's combination of communication technology, aggregation and voltage control for energy reduction is catching on. As the company builds towards its goal of 50 MW of dispatchable negawatts in ComEd territory, Xcel Energy decided this week to adopt the company's remotely dispatchable efficiency technology for use in the Denver, Colo., area under the utility's Custom Efficiency Demand-Side Management Program—Electric City's second utility deployment [see **ComEd's Aggregated Negawatts**, April 18, 2003].

Electric City initially expects to achieve savings of 2.1 MW in Xcel territory with about 100 of its EnergySaver/GlobalCommander units. Units installed at commercial and industrial sites steady and lower the voltage entering lighting systems, reducing the energy draw of the lights without dimming them. Customers will realize constant energy savings, and Xcel can initiate further load reduction during peak periods using Electric City's remote control system, the Virtual "Negawatt" Power system.

Electric City has been bidding a number of utility RFPs since the middle of last year, and was cited as a model technology for demand-side management in the Canadian province of Ontario's 2004 Electricity Conservation and Supply Task Force Report as the province prepares to phase out the use of coal for generation [see **A New Era for Ontario**, January 30, 2004]. [B.G.]

More information:

[Electric City](http://www.elccorp.com) (www.elccorp.com)

15] Global Solar Flexible Thin-Film Module Hits 10.7 Percent

Tucson-based Global Solar Energy reported last week that it produced a solar module that converts sunlight to electricity at 10.7 percent, which the company says makes it the most efficient flexible, thin-film module ever built on a production line. The 60-cell module produces 42.5 watts from an aperture area of four square feet, weighs 2.3 pounds and "folds up like a map," according to Jeff Britt, Global Solar's vice-president of technology. It was manufactured for use in Global Solar's Military P3 portable power pack, which allows soldiers to field-charge batteries on the spot, saving time and money because fewer batteries are needed.



Global Solar says it was the first company to manufacture highly efficient flexible, thin-film photovoltaics for commercial and military applications, using high-rate, roll-to-roll production. "This module is the culmination of a two-year focus on raising conversion efficiencies," Britt said.

Global Solar also makes the PowerFlex module that charges 12-volt batteries for boats and other marine uses. ICP Solar Technologies of Montreal, which sells the latest and greatest in consumer solar products worldwide, markets PowerFlex products, as well as solar-enabled Coleman outdoor gear, which next year should feature the new record-setting modules. Unisource Energy Corp. is the majority owner of Global Solar. **[S.W.]**

More information:

[Global Solar](http://www.globalsolar.com) (www.globalsolar.com)

[ICP Solar Technologies](http://www.icpsolar.com) (www.icpsolar.com)

16] Cost, Performance Gains Ready FCs for Light Vehicles

Niche vehicle markets for fuel cells may soon come to fruition as Canadian fuel cell developer Hydrogenics launches its first commercialization initiative for off-road, light utility vehicles. Thanks to what Hydrogenics terms "substantial cost reductions" and "break-through increases in durability and performance," the company has accelerated its plans to enter this space commercially.

Over the last few years, operating life of the company's HyPM fuel cell power modules has moved from the hundreds of hours to the thousands—in range of large batteries and even engines that run between 5,000 and 10,000 hours, Hydrogenics Vice President of Sales, Marketing and Business Development Boyd Taylor told *Prospects*. Fuel cell materials suppliers such as membrane electrode developers are telling Hydrogenics that lifetimes of tens of thousands of hours, and up to 50,000 hours, are in sight, Taylor said. Although he could not release figures on cost projections, costs have been falling at roughly 50 percent per year, Taylor said. In examining materials cost reductions over potentially scaled-up orders of thousands of units, fuel cell pricing also begins to become competitive with large batteries and approach advanced combustion engines, he said.

Because of these improvements, the company this month launched an aggressive business initiative to partner with original equipment manufacturers in developing a range of off-road, light vehicles for utility markets such as airport ground support, materials handling, underground mining, grounds maintenance and military applications—niches with low onboard fuel needs that place value on emissions free, quiet mobility. With the fuel cell advances, the OEM partnerships are now needed to get the components of the cells integrated with vehicle systems to optimize the advantages for these markets. For instance, a joint development program was announced this week between Hydrogenics and ultracapacitor manufacturer Maxwell Technologies to improve regenerative braking and acceleration in mobility applications, as well as to explore other advantages over batteries.

Another partnership was announced this week between Hydrogenics, the government of Canada and Purolator Courier, Ltd., Canada's leading courier company, to develop and deploy a fuel cell hybrid delivery van and hydrogen refueling station in Toronto. **[B.G.]**

More information:

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

[Maxwell Technologies](http://www.maxwell.com) (www.maxwell.com)

17] West Creates Renewable Energy Tracking System

A vital renewable energy tracking tool is emerging for Western states with renewable portfolio mandates and goals. The Western Renewable Energy Generation Information System (WREGIS) is an initiative of the California Energy Commission and governors of Western Electric Coordinating Committee states aimed at substantiating retail product claims, verifying compliance with renewable energy mandates and voluntary measures, and tracking transactions of tradable renewable energy certificates.

Members of working groups are focused on creating the institutional and legal framework for the system spanning WECC states and provinces. Electronic accounting and verification systems are already operating in Texas, Wisconsin and New England, as well as in Europe and Australia.

Also known as green tags, green tickets or tradable renewable certificates, renewable energy certificates represent the tradable non-energy attributes—environmental, economic and social—associated with renewable energy generation, and attached to each unit of generation, usually on a MWh basis.

Members of the Western Governors' Association Renewable Energy Certificates Project will meet in April to develop a timeline for the project, create a list of stakeholders and prepare a request for proposal for a consultant to provide technical assistance. **[G.H.]**

More information:

[WREGIS](http://www.westgov.org/wieb/wregis/) (www.westgov.org/wieb/wregis/)

18] Underwater Transmission Link Plan for San Francisco

Think of it as the electric transmission sector's version of an angioplasty procedure to increase the flow of electrons to the San Francisco Bay Area's heart. That is what the industrialized East Bay city of Pittsburg, Calif., and global private merchant bank Babcock & Brown are proposing to do in the next three to four years with a proposed 50-mile, underwater, 350-MW DC transmission line from local power plants into the electrically constrained San Francisco peninsula.

Technology and economics are on the project's side. Now it is up to Pacific Gas and Electric Co. and California's transmission grid operator, CAISO, to complete needs assessments before the local muni and bank go after state environmental and federal



construction permits. The city would own and operate the line, the private bank would finance it, and PG&E's utility would interconnect with it at both ends.

While underwater transmission technology has advanced considerably in recent years, the biggest strides have come in the form of shorter and smaller capacity (under 1,000 miles and under 1,000 MW), along the parameters of the proposed Trans Bay Cable Project, according to David Parquet, Babcock & Brown's San Francisco-based project manager.

"There is quite a bit of experience from several vendors, and it is more reasonable to do the type of project we're talking about here, making economic the DC transport of smaller amounts of power over shorter distances," said Parquet.

"It is a very strong, very heavy cable and it is rolled off a large reel at the back of a ship and laid along the bottom following the environmentally prescribed route, and then depending on the needs in the area to bury it under the sediments, a remotely operated vehicle is used to direct the cable and 'retro-bury' it under the sediment," said Parquet, noting that the entire construction process for the line itself can be completed in a week or less. **[R.N.]**

More information:

[California Independent System Operator](http://www.caiso.com) (www.caiso.com)

[Babcock & Brown](http://www.babcockbrown.com) (www.babcockbrown.com)

[Pittsburg, Calif.](http://www.ci.pittsburg.ca.us) (www.ci.pittsburg.ca.us)

19] Green Power Ups and Downs In Florida and Georgia

Florida Power & Light, the utility subsidiary of the nation's largest merchant wind power owner, launched a green power program for its Florida electricity customers this month. But as the program takes off, none of the power will be drawn from FPL Energy's vast nationwide renewable installations. Said spokeswoman Patricia Davis, "we will look for resources from other places first."

Green Mountain Energy will provide the power for the utility's "Sunshine Energy" program. FPL is charging a \$9.75 monthly premium for 1,000 kWh of green power to be produced by generators serving Florida and other states. The premium will cover the additional costs of alternative energy sources, program administration, a profit margin for Green Mountain Energy and the costs of any photovoltaic solar plants FPL builds in conjunction with the program—for every 10,000 customers that join, the utility will build 150 kW of solar capacity within the state. The company is currently searching for a site at which to build one such facility.

One state north, a dispute over the meaning of "green" has developed between utility Georgia Power and environmentalists it was once aligned with, and is threatening a budding green power program there. The utility wants the state Public Service Commission to determine which energy sources are eligible to be marketed at the premium green price, whereas an earlier agreement with environmentalists required outside accreditation according to the California-based Center for Resource Solutions' "Green-E" seal, used in about half of green power programs nationwide. Georgia Power's program is one of the most expensive in the nation, charging a 5.5-cent-per-kWh premium on top of the retail price of 7 cents per kWh. **[B.G.]**

More information:

[Florida Power & Light](http://www.fpl.com) (www.fpl.com)

[Georgia Power](http://www.georgiapower.com) (www.georgiapower.com)

20] Solar Power Goes On Duty At Ariz. National Guard

SunAmp Power Company completed an installation of solar photovoltaic security lighting this month at the Arizona National Guard's Camp Navajo, in Bellemont, Ariz., just outside Flagstaff. "The military is interested in installing renewable energy systems, the facility needed street lights, and rather than dig up the street to connect with the local utility, they decided to put in solar," said Jon Walker, SunAmp CEO.

The 22 Cobrahead street lights are powered by BP Solar's 75-watt solar panel modules and controlled by SunAmp's proprietary lighting controllers. The systems use new fluorescent floodlights with a special precision-formed, highly polished aluminum reflector. They are more efficient than lighting derived from incandescent or mercury vapor and compare favorably in light output, according to SunAmp. Walker told *Prospects* the lights and solar panels are extremely reliable "premier products" that hardly ever break. "These lights have the capability of operating all night using the technology in deep-cycle batteries and Magnaray's Cobrahead street lights," he said.

SunAmp was acquired in January by Southern States Power Company, based in Riverside, Calif. Southern States invests in revenue-generating alternative energy businesses. **[S.W.]**

More information:

[SunAmp Power Company](http://www.sunamp.com) (www.sunamp.com)

[Southern States Power Company](http://www.sspowerco.net) (www.sspowerco.net)

Energy Prospects is a news service to clients of Energy NewsData, covering the essential North American resource core, with special heed to new technologies in small-scale supply and demand-side energy resources, efficiency, green power and distributed generation. ISSN 1545-2484. Report text section copyright 2004, NewsData Corporation. All rights reserved; no reprinting without permission. For subscription information, call [206] 285-4848. Telefax: [206] 281-8035. **INTERNET:** www.energyprospects.com or www.newsdata.com. **EDITORIAL OFFICES:** Mail: PO Box 900928, Seattle, WA 98109-9228; Express delivery: 117 W Mercer St Ste 206, Seattle, WA 98119. E-Mail: newsdata@newsdata.com. **MANAGEMENT AND STAFF:** President & Publisher--Cyrus Noë :: Vice President & General Manager--Brooke Dickinson :: Managing Editor--Katie Mulligan :: Reporters--Garrett Hering, Ben Gilbert :: Reporter/Production Assistant--Joel Puglisi :: Contributing Editor--Mark Ohrenschall :: Contributors--Lynn Francisco, Ben Tansey :: Southwest Correspondent--Susan Whittington :: California Correspondent--Richard Nemecek :: Director of New Business Development--Andrew Mock :: Director of Information Systems--Daniel Sackett. The Northwest Energy Efficiency Alliance has invested in *Energy Prospects* startup by matching charter support funding from 20 energy industry sources.